COW BELL INSTRUMENT

FIG. 1

FIG. 2

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ABSTRACT OF THE DISCLOSURE

An electronic musical circuit simulates a cow bell sound. The musical circuit employs a relatively high Q, high frequency circuit and a relatively low Q, low frequency circuit which are tuned so as not to be harmonically related and are connected in parallel between the audio amplifier and a triggering pulse source which causes damped oscillations in the tuned circuits and an exponentially decaying sound which simulates the cow bell.

The popularity of electric organs has led to the development of musical devices which automatically produce repetitive rhythms for accompaniment with the organ. An explanation of the circuitry employed in one such device known as a "side man" instrument is given in my prior Patent 3,105,106 and reference is made to such patent for the background of the present invention. In particular, the "side man" instrument has given rise to a need for a great variety of electrically produced sounds which sound sources are spoken of as "instruments." For example, modern automatic repetitive rhythm devices may include "instruments" producing sounds such as bass drum, tom toms, blocks and cymbals. An interesting not hitherto faithfully reproduced sound has been the sound of the cow bell.

The general object of the present invention is therefore to produce electrically a new kind of sound effect.

More specifically, the object of the invention is to provide a cow bell instrument for use in an automatic repetitive rhythm "side man" type device and in other electrical musical instruments.

The above and other objects will appear from the description following and the drawings, in which:

FIG. 1 is a block diagram of a circuit embodying the cow bell instrument of the invention.

FIG. 2 is a schematic circuit diagram of the cow bell instrument.

In general the invention comprises a parallel arrangement of two tuned circuits, one of relatively high Q and relatively high frequency and the other of relatively low Q and relatively low frequency. The circuits are tuned unharmoniously, i.e., not harmonically related, for example, 1400 c.p.s. and 680 c.p.s. The described high frequency, high Q, low frequency, low Q, parallel arrangement is connected between the audio amplifier and the trigger pulse source, the net effect being, with suitably chosen components, to faithfully reproduce in the speaker the sound of a cow bell.

Referring to the drawings, a suitable DC source 10 (plus 15 V. DC being used in the circuit illustrated) energizes high frequency, high Q, tuned circuit 11 which is connected in parallel with a low frequency, low Q, circuit 12 between a pulse triggering source 13 and an amplifier 14 connected to a speaker 15.

The high frequency tuned circuit 11 includes a coupling condenser 20 connected to a parallel network forming a high frequency tuned circuit which includes capacitors 21, 22, 23 and coil 24. Connected to one side of this high frequency network through base 29 of a transistor 30 is a Q multiplier arrangement which includes transistor 30, a resistor 31 which provides a feedback path back to the high frequency network and an emitter resistor 35.

The other side of this high frequency network is connected to a DC voltage source at 25.

Transistor 30 acts as an emitter follower, the collector 32 of which is connected to the DC source 10. The emitter 33 is connected to the previously mentioned feedback resistor 31 and also to ground through a resistor 35. Emitter 33 is also connected to the audio output through a coupling-mixing resistor 36, and a decoupling capacitor 37.

Within the high frequency tuned circuit 11 there is actually formed a Colpitts oscillator, defined in FIGURE 2 by the dashed line box 40 and which includes the previously mentioned Q multiplier circuit formed by transistor 30 and resistor 31. The defined Colpitts oscillator as employed in the invention is intentionally designed with values to prevent oscillation.

Continuing the description, the triggering pulse source 13 is fed through a current limiting resistor 50 to the previously mentioned high frequency, high Q, tuned circuit 11 and to the low frequency, low Q, tuned circuit 12. Considering the latter low frequency, low Q, circuit 12 in more detail, there is included an input resistor 55 connected in parallel with a coupling capacitor 56. A tuned low frequency tank circuit is formed by coil 60 and capacitor 61, one side of which, the low frequency tank circuit is connected to a grounded side of resistor 55 and the other side of which is connected to the audio output through a coupling-mixing resistor 57.

The high frequency tuned circuit 11 as previously stated must have a high Q and a relatively high frequency, for example, 1400 c.p.s. If the high frequency tuned circuit 11 is inherently of a high Q, the need for DC source 10 and the Q multiplier, comprising transistor 30 and resistor 31, is avoided. The low frequency tuned circuit 12 must be of relatively low Q and of relatively low frequency compared to that of circuit 11, as for example 680 c.p.s.

Of further importance to the cow bell effect is the relation between the frequency of the high frequency tuned circuit 11 and the frequency of the low frequency, low frequency, tuned circuit 12, which relation must be such that the frequencies involved are unharmonious as previously stated, meaning not harmonically related. For example, frequencies of 1400 c.p.s. and 680 c.p.s. are not harmonically related.

In operation, the pulse at terminal 13 splits and causes damped oscillations in the high Q, high frequency tuned circuit 11 and in the low Q, low frequency tuned circuit 12. The outputs are combined and fed to amplifier 14. The damped oscillations caused by the energy of the pulse at terminal 13 decay exponentially due to the losses in the tuned circuits 11, 12 thus simulating the decaying sound from a struck cow bell.

The terms "high Q" and "low Q" are used in the general sense well understood in the art. Such terms are defined in many source materials and the obtaining of a proper Q value is well understood in the art. For example, a high Q circuit can be given a lesser value simply by installing a resistor in series with the coil. See pages 144-145, for example, of the Radio Engineers Handbook, 1943 edition by Frederick E. Terman and published by McGraw-Hill Publishing Company of New York, N.Y. A high Q, for purposes of the invention, can be considered to have a value equal to or greater than 10 and a low Q can be considered to have a value less than 10 such values being those commonly attributed to those terms by the art. In this regard, however, it should be noted that given the basic concept of the invention the exact tone of cow bell obtained can be varied substantially with different values of Q's.

While it is not desired to be limited to specific values, the following values are given as representative for a circuit embodying the invention.
Resistor 50 -------------------------------- 10K
Resistor 31 -------------------------------- 22K
Resistor 35 -------------------------------- 68K
Resistor 36 -------------------------------- 220K
Resistor 55 -------------------------------- 100K
Resistor 57 -------------------------------- 68K
Capacitor 20 ...................................... mfd. .02
Capacitor 21 ...................................... mfd. .01
Capacitor 22 ...................................... mfd. .1
Capacitor 23 ...................................... mfd. .05
Capacitor 37 ...................................... mfd. .01
Capacitor 56 ...................................... mfd. .01
Capacitor 61 ...................................... mfd. .25
Coil 24 ........................................... mh 225
Coil 60 ........................................... mh 225

Transistor 30, GE type 2N2926.

Having described the invention, I claim:

1. In an electric music network including a loud speaker, an amplifier connected to and adapted to drive the speaker, and a triggering pulse source, the combination therewith of an instrument comprising a first tuned circuit of relatively high frequency and high Q, a second tuned circuit of relatively low frequency and low Q, said first and second frequencies not being harmonically related, circuit means connecting said first and second circuits in parallel between said source and amplifier, said circuits in response to pulses from said source being productive of said sound.

2. In an electric music network including a loud speaker, an amplifier connected to and adapted to drive the speaker and a triggering pulse source, the combination therewith of an instrument productive of sound comprising a first tuned circuit of relatively high frequency and high Q, a second tuned circuit of relatively low frequency and low Q, circuit means connecting said first and second circuits in parallel between said source and amplifier, said frequencies and Q values being selected such that said frequencies are not harmonically related and said sound simulates that of a cow bell.

3. In an electric music circuit as claimed in claim 2 wherein said high frequency is about 1400 cycles per second and said low frequency is about 860 cycles per second.

4. In an electric music circuit as claimed in claim 2 including a direct current voltage source connected to said first circuit and in which said first circuit includes a non-oscillatory Colpitts type oscillator circuit having Q multiplier means for achieving said high Q.

5. In an electric music network including a loud speaker, an amplifier connected to and adapted to drive the speaker, a triggering pulse source and a direct current voltage source, the combination therewith of an instrument simulating a cow bell sound and comprising a first tuned circuit of about 1400 cycles per second frequency and high Q and including a non-oscillating Colpitts type oscillator having Q multiplier means, a second tuned circuit of about 860 cycles per second frequency and low Q, circuit means connecting said first circuit to said direct current voltage source and said first and second circuits in parallel between said pulse source and said amplifier such that in response to pulses from said pulse source said cow bell sound is produced.

No references cited.

ARTHUR GAUSS, Primary Examiner.
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