

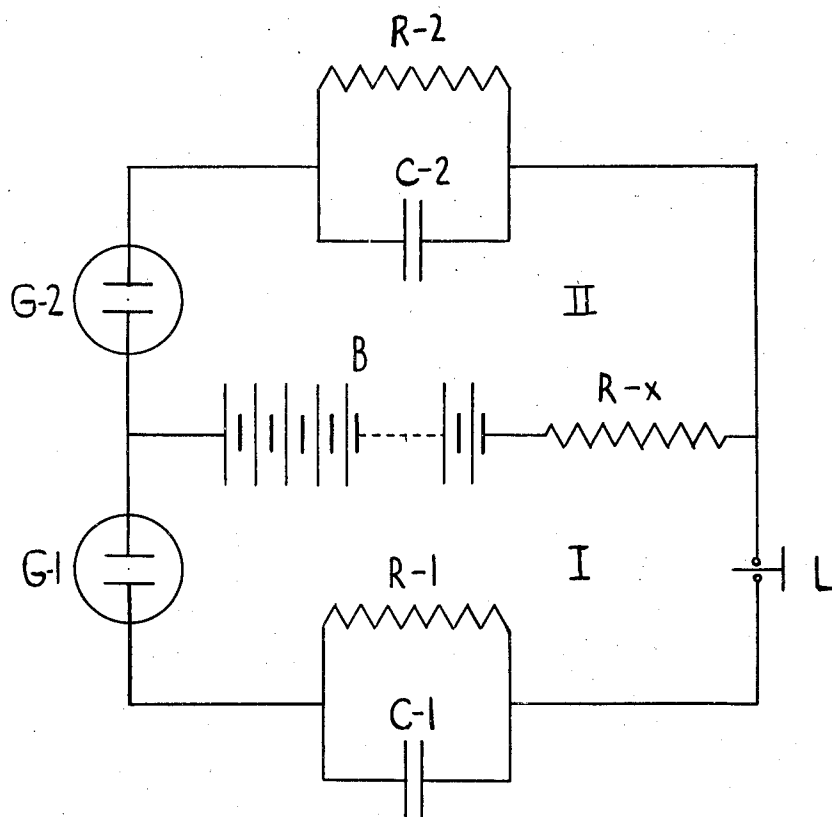
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AUTOMATIC TREMOLO FOR ELECTRICAL MUSICAL INSTRUMENTS

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AUTOMATIC TREMOLO FOR ELECTRICAL
MUSICAL INSTRUMENTS

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5 Claims. (Cl. 84—1)

The present invention relates to a circuit for producing slight variations in the pitch of sounds emitted by the sound producing means of electrical musical instruments and more particularly to a circuit which obtains this effect automatically and without the help of manually operative elements.

The present application is a division of my co-pending application Ser. No. 626,456 filed July 30, 1932, now Patent No. 1,993,890, granted March 12, 1935. The aforesaid patent broadly covers electrical musical instruments in which the electrical oscillations to be converted into musical sounds are produced by means of glow-discharge lamp oscillators and describes several methods and circuits for obtaining slight and regular variations of the pitch or as this is called in the art of music, the tremolo effect, by means of manually operative elements, closing and opening a contact or continuously varying a capacity between an upper and a lower limit. These manually operative elements had the inconvenience that their operation included rapid to and fro movement or vibration of a control arm or lever by the hand of the operator, and this movement was very tiresome and fatiguing if it had to be continued for any length of time. It has been also found that only experienced operators have been capable of operating these manual means with the regularity necessary for producing a pleasing and agreeable musical effect.

I have discovered that the problem can be resolved in a remarkably simple manner by purely electronic means and without recurring to mechanical or manually operative elements at all.

It is an object of the present invention to provide an electrical circuit which is capable of producing electrical oscillations the frequency of which is automatically varying at a regular and predetermined rate.

It is another object of the present invention to provide an automatic tremolo for electrical musical instruments which includes no mechanically moving parts and which is especially adapted to be used in electrical musical instruments comprising glow-discharge oscillators.

The invention also contemplates a circuit for automatically producing the tremolo effect which is extremely simple, inexpensive and completely noiseless in operation.

Other and further objects and advantages of the invention will appear from the present description taken in conjunction with the accompanying drawing showing a practical embodiment of my invention.

Generally speaking according to the principles of the present invention I provide an auxiliary glow discharge lamp oscillator adjusted to produce an oscillation of very low frequency, for example 4 to 8 a second. This auxiliary glow-discharge lamp oscillator is supplied with electrical energy from the same source of current as the main oscillator, a resistance being connected in the common branch of the circuit. Every time when the glow-discharge lamp of the auxiliary oscillator will light up there will be a little additional drain on the common source of current and an additional drop of voltage in the resistance. This will momentarily reduce the operative voltage of the main circuit oscillator and thereby also the frequency of the oscillations produced by said oscillator. Therefore, the frequency of the oscillations produced in the main circuit will be subject to small variations repeating with the frequency of the auxiliary oscillations. The preferred value of the auxiliary series resistance will be different for different values of resistances used in the glow-discharge lamp oscillators generally a resistance of 10,000 to 50,000 ohms will be satisfactory.

The invention now will be more fully explained by taking reference to the drawing showing two circuits, I and II. Circuit I comprises a conventional glow-discharge lamp oscillator having glow-discharge lamp G—1, resistance R—1, sound producing means L, auxiliary series resistance R—x, and source of current B all in series, and a condenser C—1 connected across resistance R—1. A circuit of this type is capable of producing electrical oscillations which are converted into musical sound in the sound producing means L, the pitch of said sound depending on the value of R—1, R—x, C—1, and on the voltage of B as those skilled in the art will readily understand. An auxiliary glow-discharge lamp oscillator forming circuit II comprising glow-discharge lamp G—2, resistance R—2, and condenser C—2 and adjusted to a very low frequency is connected to the same source of current as indicated in the drawing.

The operation of the circuit will be readily understood by those skilled in the art. Every time the glow-discharge lamp oscillator G—2 will light up, there will be a small additional drop of voltage in the common resistance R—x. This will momentarily reduce the operating voltage of circuit I and slightly reduce the frequency of the sound emitted by the sound producing means L, in step with the slow oscillations produced in circuit II. In other words a sound of regularly

varying pitch or a tremolo will be produced in the sound producing means, the speed of the tremolo being adjustable at will by adjusting the frequency of the oscillations produced by circuit II.

5 Although I have described my present invention in connection with a practical embodiment thereof many variations and modifications may be resorted to as those skilled in the art will readily understand. In the circuit described only one
10 of the possible forms of glow-discharge lamp oscillators has been shown in which the glow-discharge lamp and the resistance are in series with the source of current and the condenser is arranged across the resistance. Obviously any
15 of the other conventional glow-discharge lamp circuits adapted to produce electrical oscillations may be used with similar results. I consider all these variations and modifications as within the true spirit and scope of my invention as described
20 in the present specification and defined by the appended claims.

1. An electrical musical instrument comprising a glow-discharge lamp adapted to produce electrical oscillations, a sound producing means
25 operatively associated with said glow-discharge lamp, a second glow-discharge lamp adapted to produce electrical oscillations of considerably lower frequency, and a source of current with a series resistance in common for both glow-dis-
30 charge lamps, said resistance being large enough to cause a substantial voltage drop whereby the varying voltage drop in said series resistance as caused by the current drawn periodically by the second, slower oscillator will vary working volt-
35 age and thereby the frequency of the oscillations produced by the first oscillator.

2. An electrical musical instrument comprising a glow-discharge lamp oscillator adapted to produce electrical oscillations of musical fre-
40 quency, a second glow-discharge lamp oscillator adapted to produce electrical oscillations of considerably lower frequency, a source of current with a series resistance in common for both of said glow-discharge lamp oscillators, said resist-
45 ance being large enough to cause a substantial voltage drop, and a sound producing means operatively associated with said first glow-dis-
charge lamp oscillator and being capable of emitting a musical sound having a pitch in ac-
50 cordance to the frequency of said oscillator, the pitch of said emitted sound being subject to small variations in accordance to the frequency of the oscillations produced by said second glow-dis-
charge lamp oscillator.

55 3. In an electrical musical instrument, the

combination comprising a glow-discharge oscil-
lator adapted to produce electrical oscillations of musical frequency, a second glow-discharge lamp oscillator adapted to produce an electrical oscil-
5 lation having a frequency lower than about 12 oscillations a second, a source of current in common for both of said glow-discharge lamp oscil-
lators, a resistance in series with said source of current and large enough to cause a substantial
10 voltage drop, and a sound producing means op-
eratively associated with said glow-discharge oscillators and adapted to produce sounds in ac-
cordance to said oscillations of musical frequency whereby the pitch of said sound is subjected to
15 small periodical variations corresponding to the frequency of the said second oscillator.

4. In an electrical musical instrument, the combination comprising a glow-discharge lamp oscillator adapted to produce electrical oscilla-
tions of musical frequency, a second glow-dis-
20 charge lamp oscillator having a frequency lower than about 12 oscillations a second, a source of current supplying electrical energy to both of said oscillators, a resistance electrically asso-
ciated with said source of current and causing a
25 substantial drop of the voltage thereof, and a sound producing means actuated by said oscilla-
tions and emitting sound of a periodically varying pitch, the average pitch of said sound being de-
termined by the frequency of said first oscilla-
30 tor, the speed of pitch variations being deter-
mined by the frequency of said second oscillator, and the amount of the said periodical variations being determined by the value of the said resist-
35 ance.

5. In an electrical musical instrument, the combination comprising a glow-discharge lamp oscillator adapted to produce electrical oscilla-
tions of musical frequency, a sound producing means for said oscillator emitting sound in ac-
40 cordance to said oscillations, a source of current supplying electrical energy to said oscillator, a resistance intermediate to said source of current and to said oscillator and adapted to cause a
45 substantial voltage drop of said electrical energy, and an auxiliary circuit including a second glow-
discharge lamp oscillator adjusted to a frequency of less than about 12 oscillations per second for
periodically increasing the voltage drop in said
50 resistance whereby the pitch of the sound emitted by said sound producing means will be periodically varied at a rate determined by the frequency of said second glow-discharge lamp oscil-
lator.

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