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TRANSISTORIZED PERCUSSION CIRCUIT FOR ELECTRICAL MUSICAL INSTRUMENT

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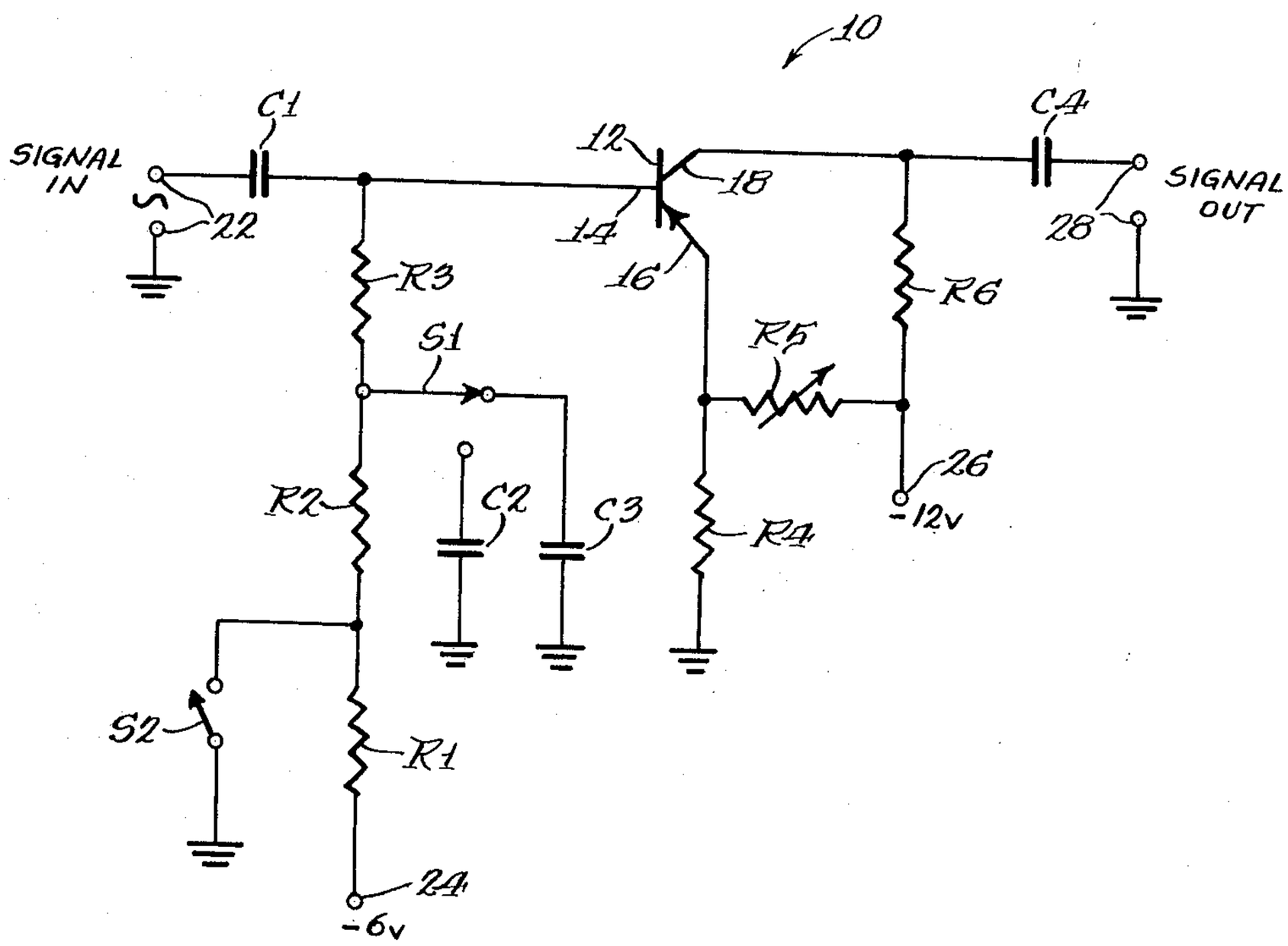

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TRANSISTORIZED PERCUSSION CIRCUIT FOR ELECTRICAL MUSICAL INSTRUMENT

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2 Claims. (Cl. 84—1.26)

This invention relates in general to percussion circuits for electrical musical instruments and more particularly to a transistor circuit for both keying and amplifying an electrically generated tone signal in a percussive manner.

In order to enhance the variety of tonal effects which can be secured from electrical musical instruments, such as an organ, it is desirable to provide such instruments with percussive effects. This gives the instrument a greater variety of expression and the instrument may then simulate tones produced by, for example, a piano. While there are numerous and many approaches to the problem of securing such percussive effects, in the main this is done by a circuit arrangement which first amplifies the tone signal and then causes it to decay automatically so that it is not thereafter heard.

The circuit components sometimes involved in the production of these effects have certain disadvantages, and in order to eliminate certain of these disadvantages, it is desirable to utilize solid state devices such as transistors. In order to do this it is necessary to key the transistor for permitting the tone signal to be initially amplified and to cut it off on decay. Heretofore, however, it has been a problem to drive the transistor into cutoff without the use of special switches and power supplies which are disadvantageous in an organ.

It is therefore a primary object of this invention to provide an improved percussion circuit for use in an electrical musical instrument.

It is another object of this invention to provide a novel transistorized percussion circuit for use in an organ and which is controlled to provide a percussion tone on the closure of normally open contacts.

It is still another object of the present invention to provide an improved arrangement for controlling a transistor to automatically cut off after an initial amplification period whereby it may be used for securing percussive effects in an electrical musical instrument.

Other objects of the invention will become apparent on examination of the following specification, claims and the drawing.

In the drawing, the transistor percussion circuit is indicated by the reference character **10**. The circuit comprises an NPN transistor **12** having a base circuit **14**, an emitter circuit **16** and a collector circuit **18**.

The base circuit **14** is connected through a capacitor C1 to a signal source indicated by the terminals **22** whereby a tone signal may be introduced into the base circuit. Also connected to the base circuit is a —6 volt battery **24** through a series connected chain of resistors **R1**, **R2**, and **R3**. Resistors **R1** and **R2** may for example be 4700 ohms and resistor **R3** may be 6000 ohms. A switch **S1** connects the junction of resistors **R2** and **R3** to either of two capacitors **C2** and **C3**. These capacitors are of different values and are selectively connected to the junction of resistors **R2** and **R3** for the purpose of providing either a soft or normal percussion decay pattern respectively. A percussion switch **S2** is adapted to connect ground to the junction of resistors **R1** and **R2** for the purpose of turning the percussion circuit on.

The emitter circuit **16** is connected to ground through a low value resistor **R4** of for example 22 ohms and is also connected to a —12 volt battery source **26** through a variable high ohmage resistor **R5** of for example 850 ohms. The collector circuit **18** is connected to the source **26** through a resistor **R6** having approximately one-half the resistance value of resistor **R5** and is also connected to an output circuit through a capacitor **C4** and terminals **28**.

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Normally, therefore, one of the capacitors **C2** or **C3** is connected to source **24**, depending on the position of switch **S1**. The connected capacitor is therefore charged to —6 volts through the resistors **R1** and **R2** so that the transistor is prepared to pass an input signal appearing at the terminals **22**. The emitter circuit **16** is also at a negative value between —12 volts and ground, but with the transistor conducting, the resistor **R5** is partially shunted and the base circuit **14** is more negative than the emitter circuit **16**. The transistor **12** therefore amplifies the incoming signal at terminals **22** in a normal manner for application to the output terminals **28**.

When it is desired to play percussively, the switch **S1** is operated to connect the junctions of resistors **R1** and **R2** to ground. The capacitor **C2** or **C3** depending on which is connected through switch **S1** begins to discharge to ground potential. The incoming signal is therefore amplified and decays at a rate to provide the effect of a percussive signal at the output terminals **28**.

As the base circuit **14** of the transistor swings more positive due to the discharge of the capacitor **C2** or **C3**, the current through the emitter collector circuit falls accordingly at a rate determined by the time consants of the discharge circuit for capacitor **C1** or **C2**. With the shunting effect of the transistor on resistor **R5** reduced, the emitter circuit **16** eventually reaches a more negative value than the base which is approaching ground. At that time the transistor is cut off and provides no output. The time period in which this occurs is determined by which of the capacitors **C2** or **C3** is connected to the base to thereby provide either a slow or fast percussive effect.

When the switch **S2** is released, the capacitor **C2** or **C3** again charges in a negative direction towards —6 volts and therefore the base circuit **14** becomes more negative than the emitter. The transistor now amplifies the incoming tone signal as before described.

Thus, having described my invention but appreciating that it is capable of a wide variety of modifications and embodiments, such as use with PNP transistors, there is appended hereto a series of claims which are believed to incorporate the inventive concept.

I claim:

1. A transistor circuit for use in an organ to provide a percussive effect to a tone signal the improvement comprising, a transistor having base, emitter and collector electrodes, a low ohmage resistor connecting said emitter electrode to ground, a comparatively high ohmage resistor connecting said emitter to a source of negative battery, a resistor of intermediate value connecting said collector circuit to said negative battery, an output circuit connected between said intermediate value resistor and said collector circuit, a signal input circuit connected to said base circuit, a plurality of resistors connected in series between said base circuit and a second source of negative battery intermediate ground and said first negative battery, a plurality of capacitors selectively interconnected with the junction of a pair of said serially connected resistors, and a percussion key having normally open contacts and operable for connecting the junction between another pair of said serially connected resistors to ground for the purpose of discharging the selected capacitors and biasing said transistor to cut off.

2. A transistor circuit for use in an organ to provide a percussive effect to a tone signal the improvement comprising, a transistor having base, emitter and collector electrodes, a low ohmage resistor connecting said emitter to ground, a comparatively high ohmage resistor connecting said emitter to a source of negative battery, a resistor of intermediate value connecting said collector to

said negative battery, an output circuit connected between said intermediate value resistor and said collector, a signal input circuit connected to said base, a plurality of resistors connected in series between said base and a second source of negative battery intermediate ground and said first negative battery, a capacitor interconnected with the junction of a pair of said serially connected resistors, and a percussion key having normally open contacts and operable for connecting the junction between another pair of said serially connected resistors to ground for the purpose of discharging said capacitor and biasing said transistor to cut off.

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ARTHUR GAUSS, *Primary Examiner.*