United States Patent

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[54] **ELECTRONIC MUSICAL INSTRUMENTS**
2 Claims, 1 Drawing Fig.

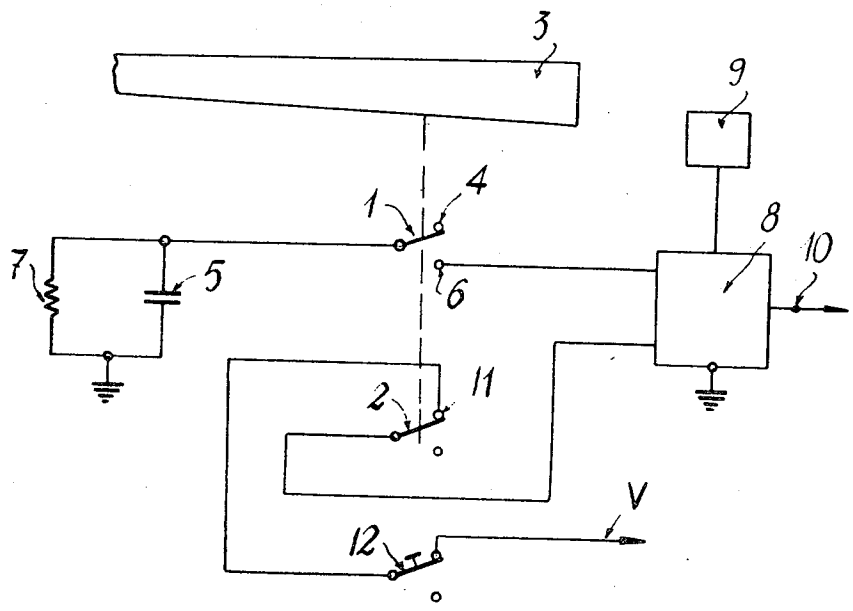
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[50] **Field of Search** ..... 84/1.01, 1.1, 1.27, E. O

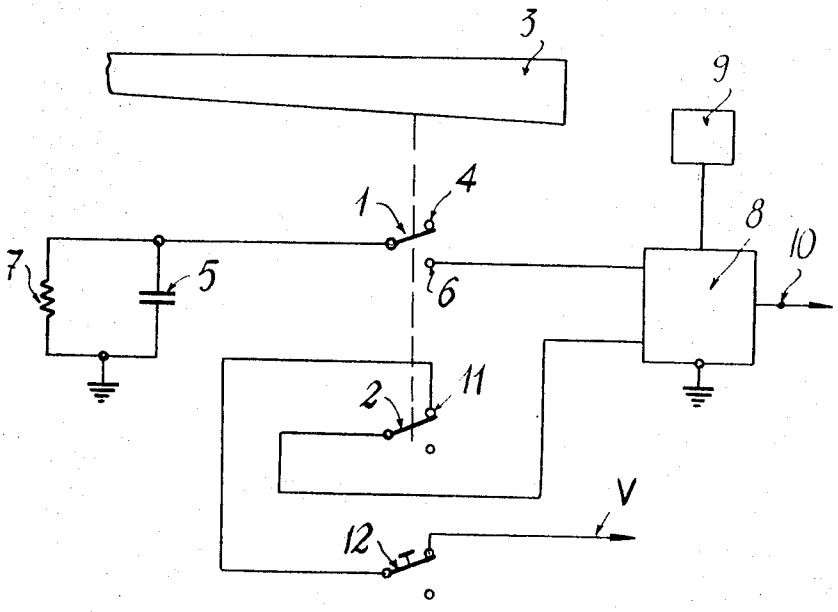
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ABSTRACT: An electronic instrument for simulating the sound effect produced by a piano. The instrument comprises an electronic generator an electric signal of constant amplitude and electrical switching arrangement connected to the generator and adapted, upon operation of a key associated therewith, to cause the signal from the generator to be applied to an output of the instrument.




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ELECTRONIC MUSICAL INSTRUMENTS

This invention relates to electronic instruments for simulating the sound effects produced by pianos.

When playing a piano each key actuates a mechanical device which causes a hammer to strike a wire of the instrument. Depending on the impulse applied to the key and the resulting moment of the motion of the mechanism, the intensity of sound will proportionally vary.

By keeping the key pressed, the wire is free to vibrate and the damping of wire vibrations occurs naturally, ensuring quite a long decay of the sound.

On releasing the key, a damper device causes the vibrations of the wire to stop.

By a suitable pedal the vibrations can be maintained also upon release of the key, since the action of the pedal is to prevent the damper device from operating.

The present invention consists in an electronic instrument for simulating the sound effect produced by a piano, comprising an electronic generator adapted to generate an electrical signal of constant or substantially constant amplitude, and electrical switching means connected to the generator and adapted, upon operation of a key associated therewith, to cause the signal from the generator to be applied to an output of the instrument, the amplitude of the signal at the output being representative of the time taken for the switching means to move from an inoperative to an operative condition.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, which is a block diagram of an instrument according to the invention.

The device shown in the drawing has two movable contacts 1 and 2 connected to a key 3, these contacts being shown in a rest or unoperated condition.

Each key in the keyboard of the instrument has a circuit identical to that as shown in the drawing.

In its rest or unoperated condition the contact 1 is supplied with a negative voltage from contact 4, which forms part of a common line for all the keys. Thus, capacitor 5 is charged to the voltage of contact 4.

On pressing the key 3, during the time taken by the movable contact 1 to move into engagement with a fixed contact 6, the capacitor 5 discharges via a resistance 7.

As a result, and depending on the velocity with which contact 1 moves from contact 4 to contact 6, the voltage remaining on 1 will change.

Since the velocity of the movement of the contact is the same as that of the key which is depressed and is directly related to the impulse as received, by forcibly pressing key 3, contact 1 is caused to move between contacts 4 and 6 at a higher speed and the voltage remaining on contact 1 on reaching the contact 6 is higher.

The circuit shown at 8 in the block diagram is a conventional electronic gate opening on operation of contacts 1 and 2.

This gate 8 allows the signal from an oscillator 9 to travel to an output terminal 10 with an intensity proportional to the voltage on contact 1 when this contact engages contact 6.

Gate 8 is provided with an automatic time constant which causes a slow closing thereof, thus ensuring the damping effect.

Until the key 3 is released, contact 2 is not in its rest or unoperated position and damping goes on undisturbed.

On release of key 3, as soon as contact 2 has returned to its rest position, the gate 8 closes and the sound ceases.

To this end, contact 2 is supplied at its rest position with a suitable voltage from contact 11, which is a line common to all the keys.

The supporting effect provided by the piano pedal is obtained by a contact 12, which at its rest position supplies the required voltage v. to the common line 11 for enabling contact 2 to close the gate. By pressing contact 12, return of contact 2 to its rest position, will not cause gate 8 to close and, therefore, the automatic decay remains.

I claim:

1. An electronic instrument for simulating the sound effect produced by a piano, comprising an electronic generator for generating an electrical signal of substantially constant amplitude, an electrical gate connected between an output of the generator and an output of the instrument, a first electrical switch which normally connects a first source of electrical potential to a storage capacitor, a key of the instrument coupled to a movable contact of the switch so that operation of the key disconnects the capacitor from the first source and connects the capacitor to a first control terminal of the gate, the capacitor having a discharge path which insures that the voltage remaining on the capacitor after disconnection from the source is representative of the speed of movement of the key from an unoperated to an operated condition, whereby the gate opens to pass to the output of the instrument a signal whose initial amplitude is representative of the speed of movement of the key to the said operated position, a second switch having a movable contact coupled to the key, a pedal-controlled switch, and means coupling a second control terminal of the gate to a second source of electrical potential via the second switch and the pedal-controlled switch, whereby when the key is moved to the unoperated condition the second switch is closed, the gate closes and the amplitude of the signal passed to the output of the instrument falls to zero if the pedal-controlled switch is closed but the gate remains open and the amplitude decays at a rate determined by the properties of the gate if the pedal-controlled switch is open.

2. An electronic instrument as claimed in claim 6, wherein the discharge path for the capacitor is a resistor connected in parallel with the said capacitor.