

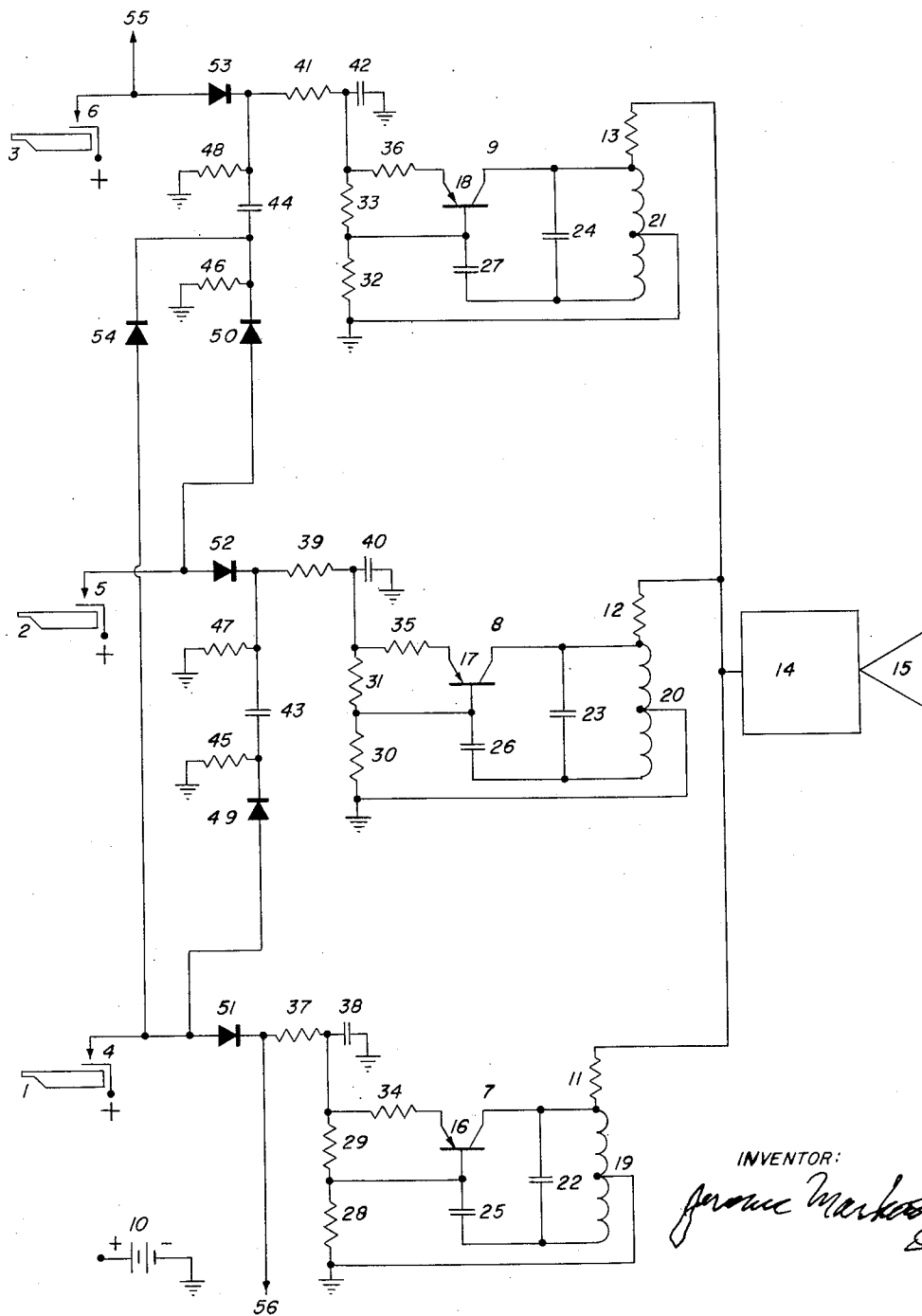
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ELECTRONIC ORGAN WITH TRANSIENT SPEECH EFFECTS

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**ELECTRONIC ORGAN WITH TRANSIENT
SPEECH EFFECTS**

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2 Claims. (Cl. 84-1.24)

In order to produce an electronic organ which is acceptable to the most discriminating organist, no factor in organ tone production can be overlooked. The present invention concerns an important element in the electronic production of realistic organ tone. This is the presence of speech transients in a given note or tone source.

One object of my invention is to provide an electronic organ whose individual notes have a speech transient.

Another object of this invention is to provide an instrument of the type described, whose individual notes have a speech transient, with a recognizable pitch characteristic.

Another object of the invention is to provide an instrument of the type described, whose individual notes will produce a speech transient by means of circuits which do not require additional contacts so that normal organ contacts and wiring can be employed.

Another object of the invention is to provide in an electronic musical instrument a simple and novel means for causing a single or multiple type speech transient.

Another object of the invention is to provide a speech transient of any desired pitch, whether it be harmonically related or of a non-harmonic nature.

Another object of the invention is to provide means for providing a speech transient which can be added to any individual note of any electronic organ which employs a direct current key control system.

With these and other objects in view, which will become more readily apparent from the following detailed description of the various practical and illustrative electronic organ improvements shown in the accompanying drawings, my invention comprises the novel electronic organ, devices, elements, features of construction and arrangement of parts in cooperative relationship, as more particularly indicated and defined by the hereto appended claims.

In the accompanying drawing the FIGURE is a diagrammatic or schematic illustration which portrays certain electronic tone producing and other parts of an electronic organ arrangement having my invention incorporated or combined therewith.

For purposes of exemplification, or illustration, my invention is herein disclosed as embodied, in, or applied to, a standard, or conventional type electronic organ. However, it is to be noted that only those parts of such an organ have been shown in the drawings as are deemed necessary to facilitate a clear understanding of the construction and operation of my invention, the performance of its intended purpose and the manner in which it achieves certain unique and desirable results and advantages. From this disclosure it will be readily apparent to those skilled in this art how my invention can be utilized, in the same or in similar manner, with electronic organs or the like, in general.

It will facilitate an understanding of my invention to first briefly consider some of the more important aspects and phases of the comparative situation surrounding electronic organs and pipe organs, as well as some of the known factors relative to the production of musical sounds as involved in this situation.

In the pipe organ field, so called "purists" demand that a certain distinctive type of "speech" be available in the individual notes of their instrument. They demand that at least some stops of the instrument "chiff." This word has been applied in the past as a means of describing

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transients which occur during the initial speech period of a flue organ pipe. The presence of such an effect produces great articulation and this is easily discernible by most listeners.

Generally speaking, the main ingredient of such transients is the appearance, for a fraction of an instant, of a frequency or pitch which is different than that which the pipe normally "speaks" during its steady state period. In some pipes the instantaneous exaggeration of a certain harmonic is the transient. In diapason pipes for instance, it can be observed that a tone one octave higher appears before the pipe settles down to a steady state condition. In other types of pipes the chiff often is a still higher harmonic. For certain special effects it may be desirable to have a lower than normal pitch as the chiff.

It has long been the practice in pipe organs and electronic organs to provide what are known as couplers. Couplers, generally speaking, comprise a system of multiple electrical contacts associated with a given key, whereby the said key can play not only the normal pitch of a given note, but also other pitches which are harmonically related. Some may be higher in pitch and some may be lower in pitch. In a sense, this invention may appear to be a system of coupling, however, it should be noted that a basic difference exists. Instead of the harmonically related note being coupled to a contact on a given key so that it will speak continuously during the entire time that the key is depressed, a desired pitch will instead be "coupled" through a resistance-capacity combination whose time constant will cause it to "speak" only for a small period of time, usually a fraction of a second. This will occur only during the initial period of the speech of a given note.

In order to simplify an understanding of this invention couplers have been omitted from the description, however, it should not be construed that the use of this invention inhibits the use of couplers. On the contrary, the simple single contact per key for a unison pitch allows the use of any conventional coupler system.

The selection of which type of chiff generating system to employ depends upon the particular type of instrument that is desired as well as the electro-mechanical configuration which is available. One advantage of the chiff generation method herein described is that it may also be applied to a harmonic synthesis type of organ. I refer specifically to an instrument in which all the tonalities are produced by a combination of sine waves of various pitches. A division including an arrangement of this type may also be desirable as a portion of a more comprehensive organ.

As an example of how this invention operates, I am showing its use in conjunction with an electronic organ which employs transistor type oscillators, however, it can easily be applied to any electronic instrument which includes tone generators which require a direct current potential to be applied through a key and contact arrangement.

In the drawing, certain of the well known parts of an electronic organ are schematically indicated. These parts generally comprise organ keys 1, 2 and 3, and a series of cooperatively associated contacts 4, 5 and 6. These keys and contacts represent playing means for controlling the operations of transistor tone oscillator units 7, 8 and 9 which represent 3 notes of a multi-note electronic organ. These oscillators or tone generators receive an operating potential from a battery or power supply 10 through the aforementioned key contacts. Audio output currents from these tone generators feed through isolating resistors, 11, 12 and 13 to amplifier 14 and loudspeaker 15.

The tone generators 7, 8 and 9 include transistors 16, 17 and 18, inductors 19, 20 and 21 in combination with capacitors 22, 23 and 24, capacitors 25, 26 and 27 and

resistors 28, 29, 30, 31, 32, 33, 34, 35 and 36 to form in combination transistor versions of a Hartley oscillator whose operation is well known to those skilled in the art.

Resistors 37, 39 and 41, and capacitors 38, 40 and 42 are "delay" circuits of a common type whose function is to slow up the speech of the oscillators to approximate the speech of organ pipes. In practice lower notes have larger capacitors and higher resistances so that the speech of upper notes is quickened and the speech of lower notes is relatively slower.

If key 2 is depressed, contact 5 will close allowing current from battery 10 to flow through diode 52 and resistors 39 and 35 into transistor 17 and its associated components which comprise tone generator 8. An audio voltage whose frequency depends basically upon inductor 20 and capacitor 23 will flow through resistor 12 into amplifier 14 and loudspeaker 15. However, when key 2 is depressed operating potential will also flow through diode 50 and energy storage capacitor 44 into transistor 18 and its associated oscillatory components. Current will flow through capacitor 44 only until it is charged. Capacitor 44 should be of such size that only a momentary pulse will be available for transistor 18 and associated components. Under these conditions audio output from tone generator 9 will also sound through loudspeaker 15 but only during the period of initial speech of tone generator 8. Assuming that the frequency of tone generator 8 is 256 c.p.s. (middle "C") and the frequency of tone generator 9 is 512 c.p.s. it is apparent that the chiff or transient tone would be the octave of musical frequency middle "C." The presence of diode of diodes 49, 50, 51, 52, 53 and 54 is to prevent the keying of unwanted notes. For instance tone generator 7 will not sound if note 2 is depressed and tone generator 8 will not sound if note 3 is depressed. Resistors 45, 46, 47 and 48 will allow capacitors 43 and 44 to discharge when keys 1 and 2 are released so that the transient effect can be repeated. Lines 55 and 56 connect to higher and lower octaves if available.

A more complex transient effect is produced when key 1 is depressed. In this case both tone generators 8 and 9 will chiff. Tone generator 8 will chiff because of the momentary pulse of operating potential through diode 49 and capacitor 44 and tone generator 9 will chiff be-

cause of the pulse which it receives through diode 54 and capacitor 44. Assuming that the frequency of tone generator 7 is 128 c.p.s. its chiff will be both its octave and super octave. Additional tone generators can be inter-connected in the same fashion. It is interesting to note that, as in organ pipes, the chiff will appear slightly ahead of the pitch of the basic oscillator. This is accomplished automatically because of the quicker speech of the upper notes.

While this description shows the invention as applied to harmonically related notes, it can also be applied to non-harmonic notes. Any desired note or notes can be "borrowed" for the instantaneous transient speech effect. Any type of direct current supply potential controlled tone generator can be substituted for the transistor type shown. These tone generators might be of the electron tube type, the electrostatic reed pick-up type, or others.

Of course, it will be apparent to those skilled in this art that the novel electronic organ system developments specifically shown and described, can be changed and modified in various ways, without departing from the invention herein disclosed and more particularly defined by the hereto appended claims.

I claim:

1. An electronic musical instrument having a circuitry which includes individual tone oscillators that generate notes of a musical scale; a direct current supply potential for these oscillators, key contacts connected between these oscillators and the supply potential; an energy storage means connected between the key contact of a given oscillator and another selected oscillator, said energy storage means including isolating diodes.

2. A device in accordance with claim 1 wherein a plurality of energy storage means are connected between the key contact of a given oscillator and those of a plurality of other selected oscillators.

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