

[54] ELECTRONIC ORGAN HAVING DELAYED FILL IN

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[52] U.S. Cl. 84/1.17, 84/1.24, 84/DIG. 22
 [51] Int. Cl. G10h 1/00, G10h 5/00
 [58] Field of Search 84/1.01, 1.03, 1.17, 1.24, 84/DIG. 12, DIG. 22

[57] ABSTRACT

An electronic organ in which the depressing of both an accompaniment key and a solo key will bring about the sounding of fill notes, preferably within an octave below the solo note pertaining to the depressed solo key with the fill notes sounding at the expiration of a predetermined time delay following the instant that the solo and accompaniment key are both in depressed position.

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26 Claims, 5 Drawing Figures

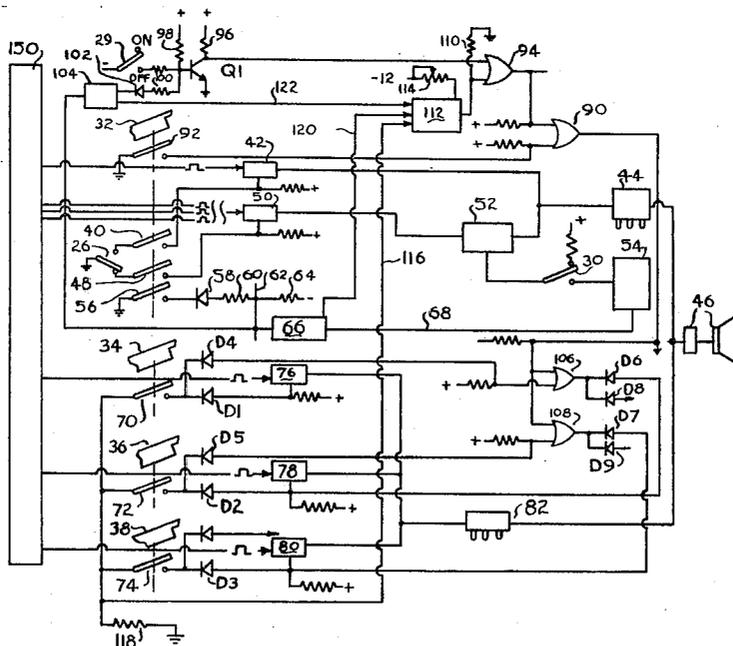


FIG. 1

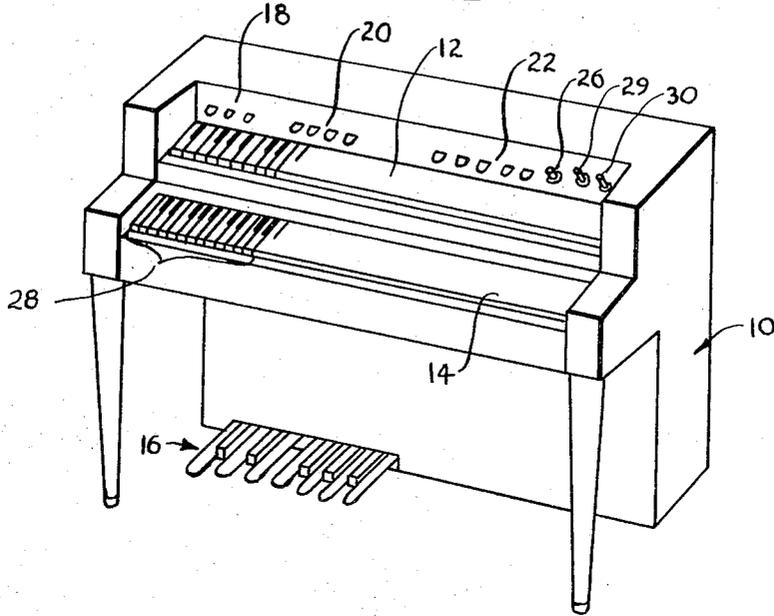


FIG. 2

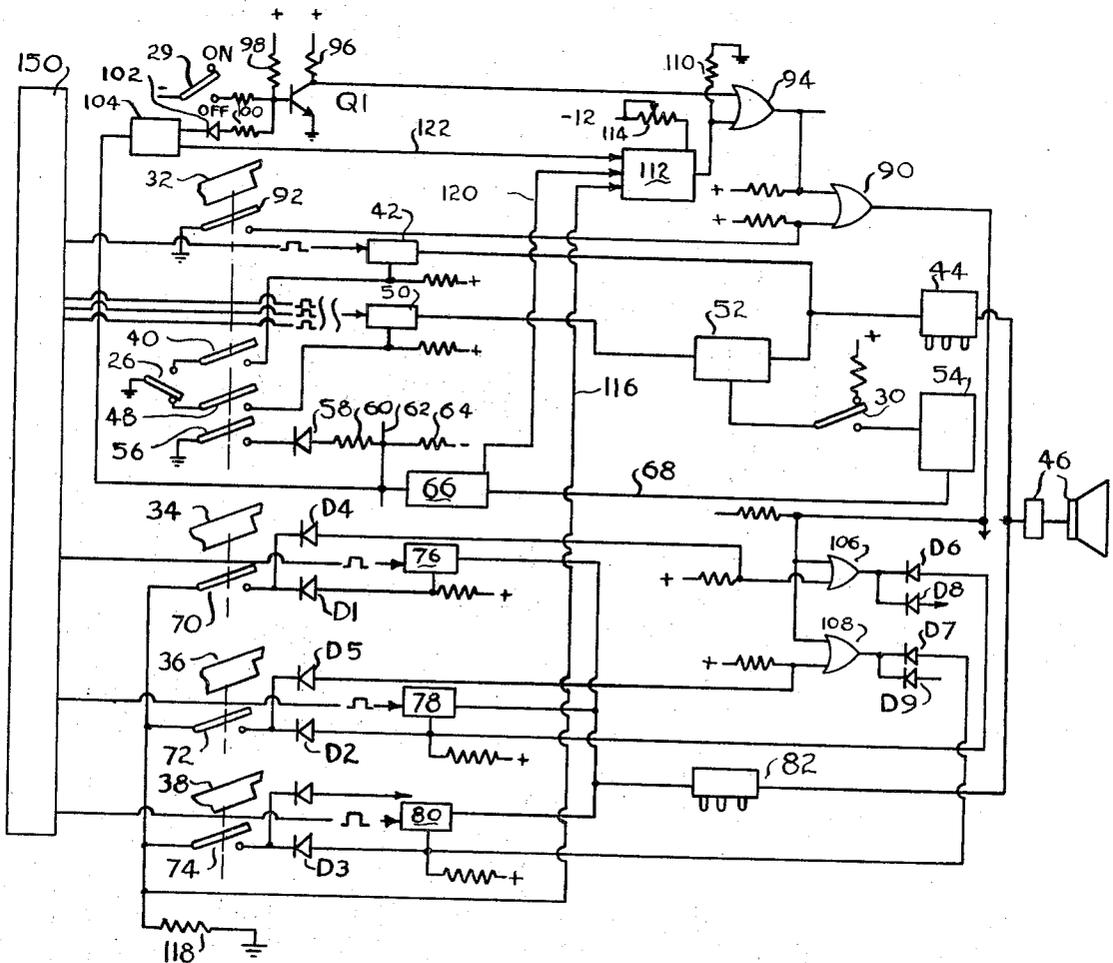


FIG. 3

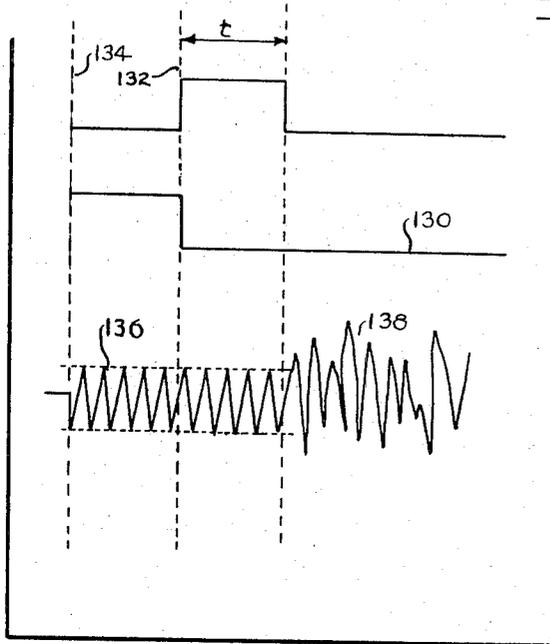


FIG. 5

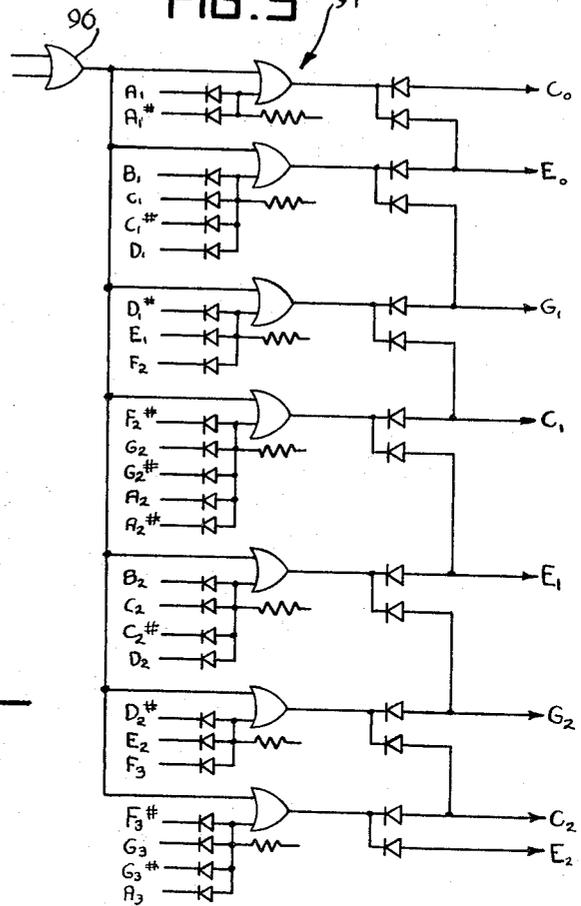
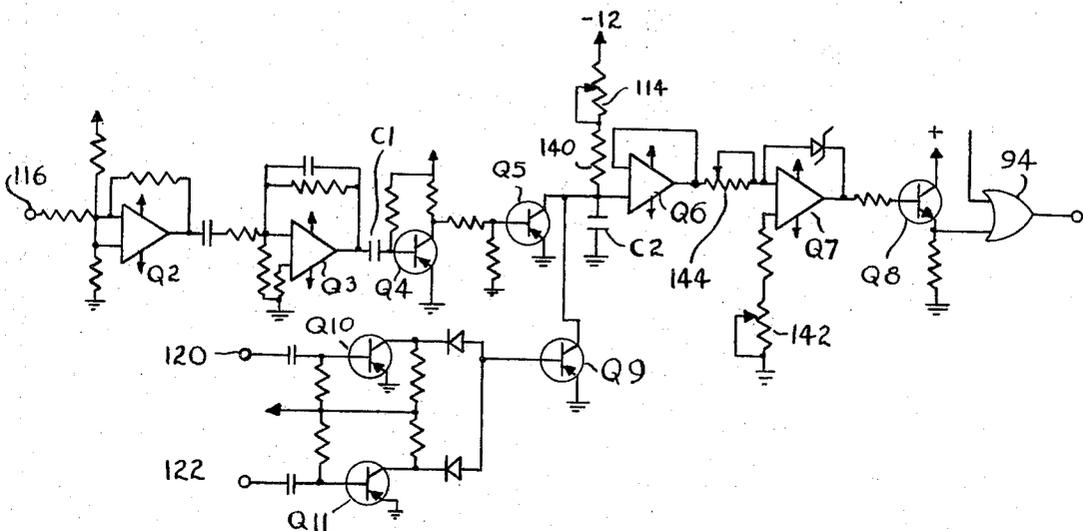


FIG. 4



ELECTRONIC ORGAN HAVING DELAYED FILL IN RELATED APPLICATION

Richard Hebeisen and Patrick Doane; Ser. No. 349,987; filed: Apr. 11, 1973; Title: CHORD PLAYING ORGAN INCLUDING A CIRCUIT ARRANGEMENT FOR ADDING FILL-IN NOTES TO THE SOLO PART assigned to the same assignee as the present application, and now U.S. Pat. No. 3,823,246.

The invention relates to electronic organs, and is particularly concerned with an arrangement for the automatic playing of fill notes when the organ is played.

The supplying of fill notes to a composition played on a keyboard type instrument is known and is accomplished by skilled players automatically during the playing of the instrument. Such fill notes are not usually scored and are selected in accordance with the harmonic requirements of the accompaniment and solo notes.

In an earlier application filed by the present assignee in the name of Hebeisen, et al., Ser. No. 349,987, filed Apr. 11, 1973, and now U.S. Pat. No. 3,823,246, an arrangement is illustrated for supplying fill notes in the solo of an electronic organ in conformity with a predetermined chord played in the accompaniment manual and also in conformity with the particular solo key which is depressed.

The fill notes are preferably supplied in the octave immediately below the depressed solo key and are, of necessity, harmonically related to the chord being played in the accompaniment manual and to the note being played in the solo manual. In the organ illustrated in the aforementioned application, as well as in the present application, a conventional organ is modified so that predetermined single ones of the keys of the accompaniment manual can be selectively switched over for playing chords.

When the organ is thus switched over, the keys of the accompaniment manual are disabled for playing single notes and, instead, the keys of the selected group of keys of the accompaniment manual each causes a respective chord to sound. It is when the organ is thus switched over that it is desired to supply fill notes in the solo manual although it will be understood that the supplying of fill notes could be carried out during conventional organ playing also if so desired.

A particular feature of the present invention is to be found in the provision of an arrangement for delaying the sounding of the fill notes after both a chord playing accompaniment key and a solo key are depressed. On advantage of effecting the delay is that an improved sound is obtained and another advantage is that when playing solo notes in succession rapidly as when playing glissando or playing a rapid arpeggio the fill notes will not be actuated and thereby a better and more clear rendition of the particular figure being executed is obtained. This would also be the case with ornaments that are ordinarily played quite rapidly as in the case of grace notes or turns or the like.

With the foregoing in mind, the primary objective of the present invention is the provision of an electronic organ having a circuit arrangement for automatically filling notes into the solo part being played while introducing a predetermined time delay before the fill notes sound.

Another object of the present invention is the provision of an electronic organ that can be switched from

regular playing to the playing of chords in the accompaniment manual when single notes thereof are depressed and wherein fill notes are provided for filling in the solo part and which sound at the end of a predetermined time delay after both of a chord playing accompaniment key and a key of the solo manual are depressed.

A further object is the provision of an arrangement for automatically filling in notes in the solo manual of an organ which do not in any way interfere with the execution of quickly played ornaments or in the execution of glissando parts or in the playing of rapid arpeggios.

A still further object of the present invention is the provision of an arrangement of the nature referred to for filling in notes in the solo manual a predetermined time after both a chord playing key in the accompaniment manual and a key in the solo manual are depressed and wherein the particular time delay before the fill notes sound is adjustable.

BRIEF SUMMARY OF THE INVENTION

According to the present invention, an electronic organ may have a single keyboard or it may be provided with at least one upper or solo manual or keyboard and a lower or accompaniment manual or keyboard. In the normal course of events, each key of each keyboard will key a single tone, sometimes together with an octave thereof.

In a modification of such an organ, special circuitry and switching is provided in respect of the accompaniment keyboard such that the function of each key playing an independent tone can be disabled and, instead, a certain group of the keys of the lower manual are so connected that each plays a respective chord by keying a related group of tones making up the chord.

In still another known modification of an electronic organ, and which is shown in detail in the copending application referred to above, the organ is provided with further circuitry for causing fill notes to sound in the solo part of a piece being played on the organ. The fill notes consist of one or two notes selected from the octave beneath the respective solo note played and are harmonically related to the solo note.

The keying of the extra fill notes is accomplished by the depressing of a chord playing accompaniment key and a solo key and the fill notes are harmonically related not only to the solo note played but also to the chord played by the respective chord playing key. In arranging the circuitry which causes the fill notes to sound, logic gates are employed so that signals from the depressed keys can be routed to keyers for the fill notes to be sounded.

It is known to cause the fill notes to sound at the instant that a solo manual key and an accompaniment manual key are both in depressed condition, but the present invention provides for a predetermined time delay from the aforementioned instant before the fill notes sound. The delaying of the sounding of the fill notes is of merit because the solo part will sound somewhat like a broken or rolled chord while, furthermore, the aforementioned time delay is of such duration that fill notes do not sound when solo notes are played in rapid succession, as is often the case.

The foregoing objects as well as still other objects and advantages of the present invention will become more clearly apparent upon reference to the following

detailed specification taken in connection with the accompanying drawing in which:

FIG. 1 is a somewhat schematic perspective view of a typical electronic organ.

FIG. 2 is a schematic view showing a portion of the organ circuitry pertaining to the present invention.

FIG. 3 is a graph showing, in particular, the time delay period which occurs prior to the fill notes sounding.

FIG. 4 is a schematic view showing one type of delay circuit contemplated for use with the arrangement of the present invention.

FIG. 5 is a schematic view showing more in detail the manner in which the fill notes are keyed according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings somewhat more in detail, in FIG. 1, 10 is a schematic perspective representation of an electronic organ having an upper or solo keyboard or manual 12 and a lower or accompaniment keyboard or manual 14. Such an organ also comprises a pedal clavier or keyboard 16 for operation by the foot.

The organ contains voice formant circuits and those pertaining to the pedal clavier are indicated at 18 and those pertaining to the accompaniment manual are indicated at 20 while those pertaining to the solo manual are indicated at 22. Such voice formant circuits are under the control of tab switches. Coupling switches and the like, which may also be under the control of tabs, are provided which are not illustrated in the schematic view of FIG. 1.

In the normal operation of the organ, each of the keys of the two manuals key single tones but upon actuation of a selector switch 26, the keys of the lower manual are disabled for playing single tones and, instead, a group thereof indicated by the bracket at 28 are enabled for playing chords, which is to say, each individual one of the keys within the range of the bracket 28, and which may consist of thirteen or more keys, is adapted for causing an accompaniment chord to sound when the respective key is depressed.

The organ is also arranged so that fill notes will be supplied in the upper manual within the octave below the depressed key when both an accompaniment key and a solo key are depressed, and this function is selected by actuation of switch 29.

Still further, the accompaniment part can be caused to sound rhythmically, and this can be selected by actuation of switch 30. The pedal tones can also be caused to sound rhythmically and according to any desired rhythm pattern when the switch 30 is actuated if so desired.

Turning now to FIG. 2, a portion only of the organ circuitry is illustrated in order to demonstrate the nature of the present invention. In FIG. 2, a single one of the groups of chord playing accompaniment keys in the range of bracket 28 is indicated at 32 while three of the keys from the solo manual are indicated at 34, 36 and 38. The last mentioned keys illustrated are not adjacent keys but keys 36 and 38 are disposed within the octave below key 34.

In conventional operation, when key 32 is depressed, it closes a switch 40 and, if switch 26 is at that time in its upper position, a keyer 42 is activated which will key a single tone frequency which will be supplied to voice

formant circuit means 44 pertaining to the accompaniment manual and then will be supplied to the amplifier and speaker means 46.

If, however, switch 26 is in its lower position, then the depressing of key 32 will close a switch 48 which will then be effective for actuating keyer 50 which keys a plurality of different frequencies making up a chord and which are supplied through a gate 52 to the voice formant means at 44 and then to the amplifier and speaker 46.

Gate 52 is held in conductive position when switch 30 is in an upper position, and when switch 30 is in a lower position, gate 52 is under the control of a source of patterned rhythm pulses 54.

Each accompaniment key 32, when depressed, closes a respective switch 56, one side of which goes to ground and another side of which is connected through a diode 58 and a resistor 60 to a wire 62 that is connected to a source of voltage via a resistor 64. The change in potential on wire 62 when a switch 56 is closed can be availed of via the circuit component 66 to supply a starting pulse via wire 68 to the source of pattern rhythm pulses 54. The source of pattern rhythm pulses can run continuously or it can be started at the beginning of each measure as by component 66.

Each of the solo manual keys 34, 36, 38 closes a respective switch 70, 72, 74 when closed and each switch is connected via a respective diode D1, D2, D3 with the control terminal of a respective keyer 76, 78, 80. Each keyer keys a single solo note and these notes are supplied through the voice formant means 82 to the aforementioned amplifier and speaker means.

The fill notes referred to are obtained by supplying actuating signals to the keyers of solo notes in the octave immediately below the actuated one of the solo notes together with the depressing of a chord playing accompaniment key.

The circuitry for accomplishing this consists of an OR gate 90 for each chord playing accompaniment key. The circuit of FIG. 2 will illustrate only a single accompaniment key has only a single OR gate 90 therein. One input of OR gate 90 is connected to one side of a switch 92 which is closed when key 32 is depressed.

The other input of OR gate 90 is connected to the output of an OR gate 94 which is common to all of the chord playing accompaniment keys and which, in effect, forms and ON-OFF switch for controlling the supply of fill notes. One input of OR gate 94 is connected to the collector of transistor Q1, the emitter of which is grounded. A source of voltage is connected through a resistor 96 with the collector of the transistor so that when the transistor is conductive, an enabling signal is supplied to the pertaining terminal of gate 94.

Transistor Q1 is normally conductive because the base is connected via resistor 98 with a source of biasing voltage which is effective for holding the transistor at saturation while control switch 29 is in its upper or ON position. Switch 29 is connected to a source of voltage and when moved to its down or OFF position, will cause transistor Q1 to go non-conductive thereby disabling gate 94 which will, in turn, disable gate 90.

Transistor Q1 can also be driven to non-conduction via a resistor 100 and diode 102 which is connected to one side of a component 104 which has the other side connected to wire 62. Component 104 is provided for the purpose of detecting when more than one chord

playing key of the accompaniment manual is depressed and is operable for driving transistor Q1 to nonconduction when more than one of the accompaniment keys are depressed at one time. This avoids the sounding of dissonance in case of a player mistake.

Assuming that transistor Q1 is in conductive state then, if OR gate 94 is also supplied with a zero signal to the other input thereof, the output will go to zero thereby supplying an enabling signal to one input of OR gate 90. If now key 32 is depressed, switch 92 will close and an enabling signal will be supplied to the other input of OR gate 90 whereby the output of the gate will go to zero and supply an enabling signal to one input of each of the OR gates 106 and 108.

The other input of OR gate 106 is connected via a diode D4 with switch 70 of solo key 34 while the other input of OR gate 108 is connected via a diode D5 with switch 72 of solo key 36.

The output of OR gate 106 is connected via a diode D6 with the control terminal of keyer 78 while the output of OR gate 108 is connected via a diode D7 with the control terminal of keyer 80. A further diode D8 may be employed to connect the output of OR gate 106 with another solo keyer and another diode D9 of OR gate 108 performs a similar function,

At this point, it will be appreciated that the system operates on zero or negative signalling so that any time a plus signal, say, 5 volts, is supplied to either or both terminals of an OR gate, the output will go to logic 1 and with the output going to logic 0 only when there is a logic 0 supplied to both input terminals.

Similarly, each keyer is nonconductive in respect of tone signals supplied to one input terminal thereof when the other input terminal, which may be referred to as a 'control terminal' is supplied with a logic 1, and go to conduction when the control terminal is supplied with a logic 0, said conduction referring to the passage of tone signals.

Returning now to the OR gate 94, one terminal thereof is normally held at logic 0 by way of a resistor 110 but is caused to go to logic 1 for a predetermined timed period following the actuation of either a solo key or a chord playing accompaniment key. This circuit, which will be described more in detail hereinafter, introduces a predetermined time delay which is interposed between the instant that both a solo key and accompaniment key are depressed and the instant that the fill note, or notes, will sound.

The delay component, indicated at 112 (see FIG. 4 for specifics thereof) has an output terminal connected to one side of OR gate 94 and includes a resistor 114 which can be adjusted to adjust the particular amount of time delay. The input terminals to delay component 112, and which actuate the component to initiate the time delay period, comprise a first wire 116 connected to one end of a resistor 118 which is interposed between the solo key switches and ground.

Another input to component 112 is by way of wire 120 which leads to the component 66 which, as mentioned, is sensitive to the depressing of an accompaniment key for initiating operation of the source of patterned rhythm pulses. Component 66, upon depressing of an accompaniment key, supplies a pulse to wire 120.

A third wire 122 is provided leading from an input of component 112 to component 104 and is responsive to releasing of component 104 to initiate a time delay. The releasing of component 104 occurs when the con-

dition of more than one chord playing accompaniment key being depressed is corrected.

Considering the circuit of FIG. 2, as described up to the present time, when key 32 is depressed and key 34 is also depressed, gate 90 will be enabled at the end of a predetermined time delay following the depressing of the last depressed one of keys 32, 34. When gate 90 is enabled, gate 106 is also enabled so that an enabling signal will be supplied via diode D6 to keyer 78 so that the note pertaining to keyer 78 will sound at the end of a predetermined time delay after the note pertaining to keyer 76 sounds.

As mentioned, diode D8 will also actuate a further keyer. For example, if key 32 plays the chord of A minor and key 34 pertains to a C note, then keyer 78 will be an A and the keyer pertaining to diode D8 will be an E.

If now, instead of key 34, key 36 were depressed at the same time as accompaniment key 32, then gate 108 would be enabled and via diode D7 would actuate keyer 80 so that the note pertaining thereto would sound after the aforementioned time delay. A further note would also sound when gate 108 was enabled by a signal transmitted through diode D9.

FIG. 3 illustrates graphically the effect of the circuit arrangement according to the present invention. In FIG. 3, line 130 shows the voltage which is under the control of switch 92 operated by the accompaniment key. It will be seen that the accompaniment key is depressed at the vertical dashed line identified 132.

If it is assumed that a solo key is depressed at dashed line 134, then dashed line 132 represents the instant at which both an accompaniment key and a solo key are in depressed condition. The line 136 indicates the note which is keyed by the solo key, and it will be seen that this note is modified by the superposition thereon of the fill note, or notes, as indicated by the graph 138 at the time which is displaced from line 132 by a time interval t as marked on FIG. 3. Time interval t may be varied from a few milliseconds upwardly. In FIG. 3, t is about 20 milliseconds.

To explain more in detail, the circuit arrangement pertaining to an organ, FIG. 5 shows the gates which are under the control of a single one of the OR gates 90 which might pertain, for example, to the accompaniment key that keys the C major chord or the C7 chord. When the gate 90 pertaining to the chord referred to is enabled, one input terminal of each of the OR gates, generally indicated at 91 in FIG. 5, receives an enabling signal.

The other input terminal of each of the aforementioned OR gates is connected to at least two solo key switches, with the connections identified by note designations in FIG. 5. There may be, for example, a two octave range of solo keys and the terminals pertaining thereto are identified by the letter designations pertaining to the half steps in the chromatic scale commencing with A1 and going up to A3 with the A3 note being two octaves above the A1 note.

The output side of each of the gates in FIG. 5 is also shown connected to wires leading through isolating diodes to certain keyers. For example, the topmost gate is connected to key notes CO and EO which are the C and E notes in the octave below the two notes connected to the lower terminal of the OR gate.

Similarly, progressing downwardly in FIG. 5, successive ones of the OR gates are each connected for key-

ing a pair of fill notes, and it will be noted that the fill notes in every case are in the octave immediately below the note pertaining to the lower input terminal of the respective gate. FIG. 5 will show that the system according to the present invention could be extended substantially without limit.

Turning now to the particular delay circuit which is shown in the box at 112 in FIG. 1, this will be seen in FIG. 4 with the aforementioned wires 116, 120 and 122 connected thereto. Wire 116 operates through serially connected operational amplifiers Q2 and Q3 to supply a pulse via a capacitor C1 to the base of a transistor Q4. Transistor Q4 is normally conductive and when supplied with pulse goes to nonconduction.

The collector of transistor Q4 is connected with the base of a transistor Q5 which is normally nonconductive but which goes to conduction when transistor Q4 goes to nonconduction. Transistor Q5, when conductive, establishes a connection to ground from one side of a ten microfarad capacitor identified at C2.

When transistor Q5 is nonconductive, capacitor C2 charges up from a minus 12 volt source via resistor 114 and another resistor 140 connected in series therewith. When the capacitor C2 discharges through transistor Q5, it operates through a non-loading operational amplifier Q6 and a comparator Q7 to supply an impulse to the base of the transistor Q8. The duration of the period for which the impulse is supplied to the base of Q8 is adjustable by adjustment of resistor 114 while a further resistor 142 is provided for changing the output bias of the comparator Q7.

An adjustable resistor 144 is provided between Q6 and Q7 and adjusts the switch point. The comparator Q7 is so constructed and arranged that it shifts over at a predetermined negative voltage on capacitor C2 and is characterized by extremely sharp leading side on the output so that the time at which transistor Q8 goes conductive can be determined quite accurately.

Transistor Q5 is connected in parallel with another transistor Q9 which is normally nonconductive but which will go to conduction when either of transistors Q10 and Q11 are driven to nonconduction by pulses supplied thereto from the respective wires 120, 122 which are connected through capacitors with the bases of said transistors.

The emitter of transistor Q8 is connected to the lower input terminal of gate 94 so that when transistor Q8 goes conductive, in response to an output signal from comparator Q7, the said terminal of gate 94 will be supplied with a disabling signal and will only be supplied with an enabling signal when transistor Q8 again goes nonconductive and which will occur at the end of the time delay period, as determined, in particular, by adjustment of resistor 114.

It will be understood that all of the notes keyed are derived from a tone generator means indicated at 150 in FIG. 2 with the tone generator means supplying as many frequencies as is necessary to span the range of notes covered by the solo and accompaniment manuals and by the pedal keyboard. The frequencies supplied by the tone generator means, and which differ from each other in accordance with the chromatic scale, are preferably square waves.

The keys, which are normally nonconductive, will, when an enabling signal is supplied to the control terminals thereof, pass the square waves through the voice formant means to the electroacoustic transducer means

wherein the waves which have been modified in the voice formant means are converted into sound.

The selector switches at 26 and 29 can be ganged together so fill notes will only sound when the organ is adjusted into chord playing mode.

Other time delay arrangements are, of course, possible. The important feature is that the time delay becomes effective upon the depressing of both a solo manual key and an accompaniment manual key, especially a chord playing accompaniment manual key.

It will be apparent from the foregoing that the delay circuit is triggered to effect discharging of timing capacitor C2 whenever a key of the solo manual is depressed or whenever a chord playing accompaniment key is depressed.

The delay circuit, however, becomes effective for its intended purpose only when both of the aforementioned keys are depressed because at that instant the circuitry pertaining to the fill notes becomes operatively associated with the remainder of the organ circuitry.

As to the duration of the delay time t , it has been mentioned that this is variable and it is, indeed, preferably variable in order to take into account different tempos and different players. A delay time of 20 milliseconds is, for example, readily apparent in the rendition of most compositions.

Modifications may be made within the scope of the appended claims.

What is claimed is:

1. That method of operating an electronic organ in which at least one fill note sounds in the treble portion of a composition when a key of each of the solo and accompaniment keyboards of the organ are jointly depressed, said fill note comprising a note within an octave range below the note which corresponds to the depressed solo key and harmonically related to the notes corresponding to the depressed solo and accompaniment keys, said method comprising delaying the sounding of the said fill note for a predetermined and audibly discernable time interval after the sounding of the notes corresponding to the depressed keys.

2. That method according to claim 1 in which said time interval is greater than the time interval between the depressing of keys of the solo keyboard when the keys are actuated in rapid succession whereby the fill notes will not sound when playing rapid arpeggios and glissando and like musical figures involving the actuation of keys in rapid succession.

3. That method of operating an organ having solo and accompaniment keyboards with each key of the solo keyboard when depressed causing substantially instantaneous sounding of a respective note while depression of a key of a predetermined group of the keys of the accompaniment keyboard causes substantially instantaneous sounding of the notes of a respective chord, said method enhancing the sound of the organ while simplifying the playing thereof, said method comprising; causing the sounding of at least one fill note within the range of an octave below the note corresponding to the key depressed in the solo keyboard when a key of each of said solo keyboard and one of said group of keys of said accompaniment manual are in depressed position at the same time, said fill note being harmonically related to the note corresponding to the depressed solo key and to the chord corresponding to the depressed accompaniment key, and delaying the sounding of said

fill note for an audibly discernable period of time following the last depressed one of said solo and accompaniment keys.

4. That method according to claim 3 which includes preventing said fill note from sounding when more than a single one of said group of keys of the accompaniment manual is in depressed position at the same time.

5. In an electronic organ having a tone generator with a plurality of terminals at respective tone signal frequencies, an electroacoustic transducer, and solo and accompaniment manuals each having keys; a plurality of normally nonconductive first keyers connecting respective terminals of said generator to said transducer and each going to conduction in response to the depressing of a respective key of said solo manual, gate means having outputs connected to at least some of said first keyers and causing the said first keyers to go to conduction when enabling signals are supplied to the inputs of the gate means, each gate means having one input which receives an enabling signal in response to the depression of a respective key of said accompaniment manual and a second input which receives an enabling signal in response to the depression of a respective key of said solo manual other than the key which normally causes the respective first keyer to go to conduction whereby each gate means is enabled in response to the joint depression of a key of each manual, and time delay means operatively connected to said gate means and operable to delay the response to said first keyers to the joint depression of a solo key and an accompaniment key for a predetermined and audibly discernable time period after the last depressed one of the keys which cause the supply of enabling signals to the inputs of the respective gate means.

6. An electronic organ according to claim 5 in which each said gate means comprises a group of gates each having one input connected to receive an enabling signal from a respective key of at least a predetermined group of keys of the accompaniment manual and another input connected to receive an enabling signal from a respective key of said solo manual.

7. An electronic organ according to claim 6 which includes a control gate for each group of gates, each control gate having an output connected to the said one input of each gate of the respective said group of gates and an input connected to receive an enabling signal in response to the depression of the respective said accompaniment manual key, and selector switch means having one position wherein an enabling signal is supplied to the other input of all of said control gates and a second position in which the enabling signal to the other input of said control gates is interrupted.

8. An electronic organ according to claim 5 which includes a plurality of second keyers connecting respective terminals of said generator to said transducer and each going to conduction in response to the depression of a respective key of said accompaniment manual, a plurality of third keyers each connecting a respective group of terminals of said generator to said transducer and each going to conduction in response to the depression of a respective key of a predetermined group of the keys of said accompaniment manual, the tone signals controlled by each of said third keyers being related as chords, said one input of said gate means receiving an enabling signal in response to the depression of a key of said predetermined group of keys of said accompaniment manual, and selector

switch means having one position in which said second keyers go conductive in response to the depressing of the respective keys of said accompaniment manual and a second position in which said third keyer means go to conduction in response to the depressing of respective keys of said predetermined group of keys.

9. An electronic organ according to claim 8 in which each said first keyer and each said second keyer and each said third keyer means has a control terminal, a first switch means operated by each key of the solo manual and each connected to the control terminal of a respective said first keyer, a second switch means operated by each key of the accompaniment manual and each connected to the control terminal of a respective said second keyer, each of said second switch means operated by the keys of said predetermined group of keys of the accompaniment manual also being connected to the control terminal of a respective said third keyer, selector switch means having a first position in which said second switch means are effective for controlling said second keyers and a second position in which the said second switch means operated by said group of keys are effective for controlling said third keyers, and means connected to said gate means and selectively operable for making said gate means responsive to the depression of keys of said accompaniment manual only when said second switch means is in said second position thereof.

10. An electronic organ according to claim 9 in which said gate means comprises a group of gates for each key of said predetermined group of keys, a control gate for each said group of gates having an output connected to the said one inputs of the gate of the respective group of gates and one input connected to the respective said second switch means, and selector switch means connected to the other input of all of said control gates and selectively operable for supplying an enabling signal to said other inputs of said control gates simultaneously.

11. An electronic organ according to claim 10 in which each said control gate has one input connected to the respective second switch means to receive an enabling signal therefrom when the respective key is depressed, said selector switch means comprising a single switch connected to second inputs of all of said control gates and having one position wherein disabling signals are supplied to all of said second inputs of said control gates and a second position in which enabling signals are supplied to all of said second inputs of said control gates.

12. An electronic organ according to claim 5 in which the first keyers to which the outputs of respective ones of said gate means are connected are in the octave next below the note corresponding to the said solo manual key which is jointly effective for enabling the respective gate means.

13. An electronic organ according to claim 5 which includes means operable in response to the depressing of more than one of said accompaniment manual keys for making said gate means ineffective for controlling said first keyers.

14. An electronic organ according to claim 5 which includes means for adjusting the duration of the delay of said time delay means.

15. An electronic organ according to claim 5 in which said time delay means comprises a circuit which normally supplies an enabling signal to the gate means

input to which it is connected and becomes effective for an adjustable period of time following the actuation of a key of either of said solo and accompaniment manuals for supplying a disabling signal to the respective gate means input.

16. An electronic organ according to claim 7 in which said selector means includes a further gate connected in controlling relation to all of said control gates, said time delay means being connected to an input of said further gate.

17. An electronic organ according to claim 7 in which said selector means includes a further gate having an output connected to an input of each of said control gates, a selector switch connected to one input of said further gate for selectively supplying an enabling signal thereto, said time delay means being connected to the other input of said further gate.

18. An electronic organ according to claim 17 in which said other input of said further gate is normally supplied with an enabling signal, said time delay means when actuated by the depressing of said keys making said enabling signal ineffective for a predetermined period of time thereby disabling said further gate and said control gates for the said period of time.

19. An electronic organ according to claim 5 in which said predetermined period of time is longer than the interval between successive notes when the keys are depressed in rapid succession.

20. An electronic organ according to claim 5 in which each said gate means is a two input gate.

21. An electronic organ according to claim 7 in which each control gate is a two input gate.

22. An electronic organ according to claim 9 in which each said first switch is connected to an input of at least one of the said gates corresponding to each of said chord playing keys, the output of each such gate being connected to at least two of said first keyers in the octave which includes the first keyer connected to the said first switch whereby for every chord played at least two fill-in notes are played after said time delay period for each key of the solo keyboard which is depressed while a chord playing key is depressed.

23. An electronic organ according to claim 22 in which the note pertaining to said first switch is at the top of the octave and said fill-in notes are at lower pitches than the note pertaining to said first switch.

24. In an electronic organ having a tone generator with a plurality of output terminals for supplying an electroacoustic transducer, first normally conductive keyer means connecting said terminals to said transducer, said organ comprising playing keys in the form of solo, accompaniment and pedal keyboards, each key of said keyboards when depressed normally causing a respective first keyer means connected to a respective terminal of said tone generator to go conductive, second normally nonconductive keyer means connecting groups of said terminals to said electroacoustic transducer, selector switch means having a position in which the keys of said accompaniment keyboard are disabled for causing the pertaining first keyer means to go to conduction while enabling predetermined ones thereof

forming chord playing keys for causing respective said second keyer means to go to conduction, each said chord playing key when effective for causing a said second keyer means to go to conduction and each key of said solo keyboard jointly causing a first keyer means for at least one tone in the octave next below the respective key of said solo keyboard and musically related to the chord corresponding to the respective chord playing key to go to conduction when the said keys are depressed, and time delay means connected to said jointly controlled first keyer means and operable for delaying the response of said jointly controlled first keyer means to a condition of joint actuation of a key of said solo keyboard and a said chord playing key of said accompaniment keyboard, said time delay means having a control terminal connected to receive a signal from the last actuated one of said jointly actuated keys for initiating said time delay, said time delay being audibly discernable.

25. In an electronic organ having a tone generator with a plurality of terminals at respective tone signal frequencies, an electroacoustic transducer, first keyers connected between individual terminals of said tone generator and said electroacoustic transducer and actuable for keying solo notes, second keyers connected between individual terminals of said tone generator and said electroacoustic transducer and individually actuable for keying accompaniment notes, and third keyers connected between groups of terminals of said tone generator means and said electroacoustic means and actuable for keying accompaniment chords, solo playing keys each operable to actuate a respective first keyer, accompaniment playing keys each operable to actuate a respective second keyer, predetermined ones of said accompaniment playing keys forming chord playing keys and each operable to actuate a respective third keyer, a selector switch having a first position wherein said accompaniment manual keys are effective for actuating said second keyers and a second position wherein said chord playing keys are effective for actuating said third keyers, means operable in response to the joint actuation of a chord playing key and a solo playing key when said selector switch is in said second position for actuating at least two of said first keyers other than the one pertaining to the actuated solo playing key said two of said first keyers pertaining to tones musically related to the tone pertaining to the actuated solo playing key and to the chord pertaining to the actuated chord playing key, and time delay means connected to said first keyers and operable in response to the actuation of either of a solo key or a chord playing accompaniment key for delaying the response of said two of said first keyers to a condition of joint actuation of a said solo key and a said chord playing accompaniment key.

26. An electronic organ according to claim 25 in which the tones pertaining to said two of said first keyers are within an octave range of the tone pertaining to the actuated solo playing key.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,871,262

DATED : March 18th, 1975

INVENTOR(S) : John W. Robinson and Stephen L. Howell

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the specification:

Column 1, line 51, delete "On" and replace by --- One ---
Column 3, line 59, delete "groups" and replace by --- group ---
Column 4, line 41, delete "will" and replace by --- which ---
Column 7, line 14, delete "pulse" and replace by ---
a pulse ---
Column 7, line 29, delete "or" and replace by --- of ---
Column 7, line 30, delete "furthr" and replace by --- further--
Column 7, line 36, delete "extremely" and replace by
--- an extremely ---.

In the Claims:

Claim 5, column 9, line 29, delete "response to" and replace
by --- response of ---.
Claim 9, column 10, line 21, delete "piston" and replace by
--- position ---.
Claim 9, column 10, line 26, delete "depressison" and replace
by --- depression ---
Claim 24, column 11, line 49, delete "conductive" and replace
by --- nonconductive ---
Claim 25, column 12, line 47 after "key" insert
--- a comma (,) ---.

Signed and Sealed this

ninth Day of December 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

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