

Dec. 9, 1969

G. JENNY

3,483,304

ELECTRONIC MUSICAL INSTRUMENT WITH AIR-FLOW VOLUME CONTROL

Filed Feb. 16, 1966

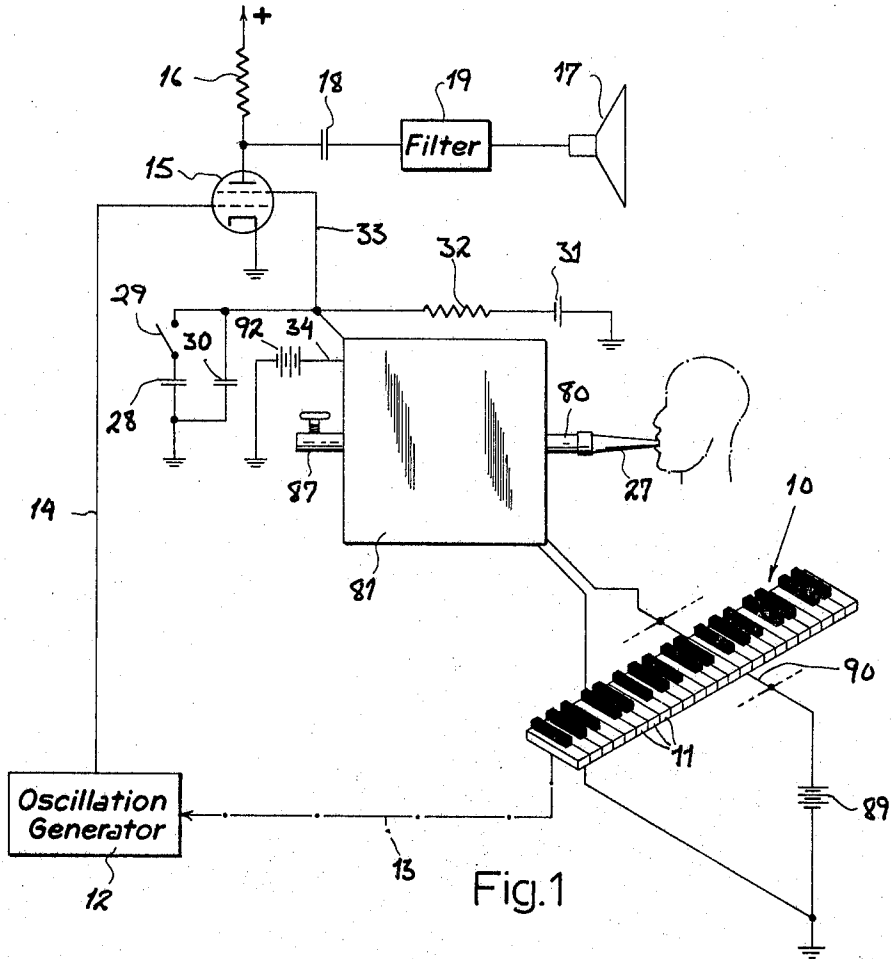


Fig. 1

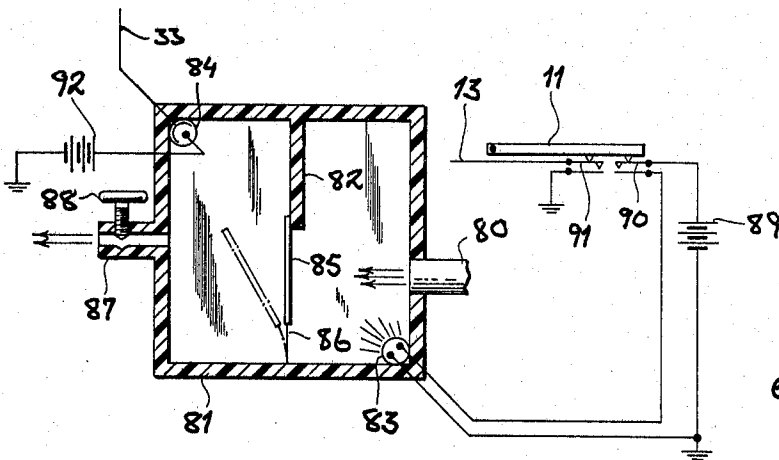


Fig. 2

Georges Jenny
INVENTOR.

Karl J. Ross
Attorney

1

3,483,304

ELECTRONIC MUSICAL INSTRUMENT WITH AIR-FLOW VOLUME CONTROL

Georges Jenny, 190 Faubourg St. Denis, Paris, France
Continuation-in-part of application Ser. No. 390,694,
Aug. 19, 1964, which is a continuation-in-part of
application Ser. No. 123,818, July 13, 1961. This
application Feb. 16, 1966, Ser. No. 527,959
Int. Cl. G10h 3/06, 1/02

U.S. Cl. 84—1.18

3 Claims

ABSTRACT OF THE DISCLOSURE

Musical instrument with electronic tone generator whose oscillations are modulated by the output of a photocell illuminated from a light source inside an opaque box. The box is equipped with a mouthpiece and an outlet for air blown in by the user, this air serving to deflect a mobile baffle interposed between the light source and the photocell to vary the amplitude of the generated tone.

This application is a continuation-in-part of my application Ser. No. 390,694, filed Aug. 19, 1964, now patent No. 3,250,843 which, in turn, is a continuation-in-part of my application S.N. 123,818, filed July 13, 1961, now patent No. 3,247,311 for which, in turn, a claim for foreign priority was made based on French application P.V. 837,314 filed Aug. 31, 1960.

My present invention relates to a musical instrument of the type wherein notes of different audible frequencies are produced with the aid of an electronic oscillation generator under the control of individually operable tone selectors, such as a set of buttons or keys of a key board.

Although the operation and control of such electronic tone generators is well known per se, it has not yet been possible to operate them in such a way that their acoustic performance resembles that of conventional body-operated musical instruments, particularly wind instruments. Thus, notes produced by wind instruments (a term here intended to include not only instruments actuated by the mouth of the player, such as flutes, harmonicas and the like, but also instruments such as accordions in which the "wind" is generated by manual compression and expansion of a bellows) have a distinct intensity characteristic which is due to the fact that the medium which excites the individual sound generators, e.g. reeds, is an intermittent air stream which varies in intensity, and sometimes (as in a harmonica or accordion) in direction, at a subaudible rate so that there occurs a distinct amplitude modulation of each note. The general object of my invention is to provide, in an electronic musical instrument, means for simulating the performance of such instruments.

This object is realized, in accordance with my present invention, by the provision of a body-actuated source of air flow, such a mouthpiece or a bellows operable by hand or foot, in combination with flow-blocking means oscillatable at subaudible frequencies or otherwise displaceable at a relatively slow rate in response to variations or reversals of the air flow, the flow-blocking means electrically controlling an amplitude-modulating device including a photoelectric transducer, e.g. a photocell, in the output circuit of an associated electronic tone generator while acting as a light gate between the transducer and a source of illuminating radiation therefor.

The flow-blocking means, positioned to intercept the air current from the mouthpiece or bellows, may be a resiliently mounted baffle obstructing or impeding the flow. Resilient biasing, however, is not absolutely essential in the case of a reversible air flow, e.g. as produced by an accordion. The amplitude-modulating network associated with the transducer may also include other selectively ad-

2

justable impedances, e.g. capacitors, for varying its time constant and therefore the response characteristics of the modulator. Mechanical variation of this response characteristic is possible, alternatively or supplementally, with the aid of devices for selectively throttling the flow of air into or past the flow-blocking means.

The above and other features of my invention will become more readily apparent in the following detailed description of a certain embodiment, reference being made to the accompanying drawing in which:

FIG. 1 is a partly diagrammatical view of a mouth-operated modulating system according to the invention; and

FIG. 2 is a cross-sectional view of a control box forming part of the system of FIG. 1.

In FIG. 1 I have illustrated a keyboard 10 whose keys 11 individually control, in a manner known per se, an oscillation generator 12 via a set of conductors symbolized by a connection 13. An output lead 14 of generator 12 terminates at the control grid of an amplifier tube 15, here shown as a tetrode, whose plate is connected to a high positive voltage via a resistor 16 and is further coupled to a loudspeaker 17 by way of blocking condenser 18 and a filter 19. The screen grid of tetrode 15 is connected via leads 33, 34 to positive voltage at a battery 92 by way of a variable impedance in the form of a control box 81 more fully described hereinafter with reference to FIG. 2, this box having an inlet 80 equipped with a mouthpiece 27 into which the user may blow to vary its resistance. A shunt circuit of manually adjustable impedance, including a biasing battery 31 in series with a large resistance 32, a first condenser 30 in parallel therewith, is connected across the variable-impedance unit 81 to permit selective altering of the time constant of the RC network 81, 28-32 connected to the screen grid of amplifier tube 15.

With this system, a skilled musician will be able to produce a variety of artistic expressions in modulating the output of tone generator 12, as selected with the aid of keyboard 10, under the control of his own breath as he blows more lightly or more strongly into the mouthpiece 27; in the absence of any air pressure applied to the mouthpiece, battery 92 is disconnected from lead 33 so that the screen grid of tube 15 receives negative bias from battery 31 through resistance 32 and the tube 15 is effectively cut off. Naturally, the biasing circuit 28-33 may also be so arranged that the tube 15 retains some conductivity in the no-pressure condition whereby a note of minimum intensity can be heard when one of the keys 11 is depressed without concurrent blowing.

In FIG. 2 I have shown the enclosure 81 provided with an internal partition 82. On one side of this partition there is disposed a light source 83 whose rays are directed toward a photoelectric transducer, shown by way of example as a photocell 84, on the opposite side of the partition, the path of the rays being normally cut off by a light gate represented by a swingable baffle 85 which is urged under pressure of a spring 86 against the partition 82. The oncoming air stream opens the light gate to a greater or lesser extent, depending on its intensity, by deflecting the baffle 85 against the force of its biasing spring 86 so that the air may escape through an outlet 87; this outlet carries a throttle valve 88 for regulating the flow resistance of the passage 80, 81, 87.

Light source 83 is a glow tube energizable by a battery 89 via a pair of normally open contacts 90 which are closed upon depression of any key 11 of the keyboard 10 (see FIG. 1), the contacts 90 of all the keys 11 being connected in parallel. FIG. 2 also illustrates another set of contacts 91, individual to the particular key 11, which connect ground potential to the associated conductor 13 leading to the oscillation generator. Photocell 84 is ener-

gized by battery 92 and has its output electrically connected to the control lead 33 of the amplitude modulator.

In operation, battery 92 applies a control voltage to lead 33 only upon illumination of photocell 84 when the light gate 85 is partly or fully opened, the magnitude of this voltage thus depending upon the intensity of the air stream flowing through tube 80 and exiting via outlet 87. This air stream is under direct body control of the operator, whether produced by blowing, manual compression of a bellows or stepping upon a pedal, so that the acoustic output of the tone generator will reflect the artistic performance of the operator.

I claim:

1. In a musical instrument having an electronic tone generator provided with a control circuit, electro-acoustic transducer means connected to the output of said generator, and a multiplicity of individually operable tone selectors connected to said generator for energizing the latter to produce electrical oscillations with a variety of audible frequencies translatable by said transducer means into sound waves, the combination therewith of a body-actuated source of air flow, mobile flow-blocking means displaceable in response to variations of said air flow, and amplitude-modulating means for said oscilla-

tions controlled by said flow-blocking means, said amplitude-modulating means comprising a light source on one side of said flow-blocking means and photoelectric transducer means on the opposite side of said flow-blocking means illuminable by said light source, said flow-blocking means forming an openable radiation gate between said light source and said cell.

2. The combination defined in claim 1 wherein said source of air flow comprises a mouthpiece.

3. The combination defined in claim 1 wherein said flow-blocking means comprises a resiliently mounted baffle.

References Cited

UNITED STATES PATENTS

3,166,622	1/1965	Neustadt	84—1.27 X
3,318,991	5/1967	Cookerly et al.	84—1.27 X

HERMAN KARL SAALBACH, Primary Examiner

F. P. BUTLER, Assistant Examiner

U.S. Cl. X.R.

84—1.27