United States Patent

Hiyama

[15] **3,637,914**

[45] **Jan. 25, 1972**

[54] AUTOMATIC RHYTHM SOUND PRODUCING DEVICE WITH VOLUME CONTROL

[72] Inventor: **Ryu Hiyama,** Hamamatsu, Japan

[73] Assignee: **Nippon Gakki Seizo Kabushiki Kaisha,** Hamamatsu-shi, Shizuoka-ken, Japan

[22] Filed: **Mar. 15, 1971**

[21] Appl. No.: **124,257**

[30] **Foreign Application Priority Data**

Mar. 16, 1970 Japan.....45/24808

[52] **U.S. Cl.**.....**84/1.03,** 84/1.19, 84/1.24, 84/DIG. 12

[51] **Int. Cl.**.....**G10f 1/00**

[58] **Field of Search**.....84/1.01, 1.03, 1.24, 1.19, 84/DIG. 12

[56] **References Cited**

UNITED STATES PATENTS

3,207,835	9/1965	Holman et al.	84/1.03
3,247,307	4/1966	Campbell	84/1.03
3,255,292	6/1966	Park	84/1.03
3,358,068	12/1967	Campbell	84/1.24 X
3,482,027	12/1969	Okamoto et al.	84/1.03
3,549,774	12/1970	Bunger	84/1.03

Primary Examiner—Lewis H. Myers
Assistant Examiner—Ulysses Weldon
Attorney—Kemon, Palmer & Estabrook

[57] **ABSTRACT**

Device includes a rhythm pattern pulse generator to generate a set of rhythm pattern pulses selected from plural sets of rhythm patterns. Each rhythm pattern pulse of the selected set triggers each individual rhythm sound source so as to constitute, by the combination of the outputs of the triggered sources, a predetermined rhythm sound performance. The outputs of the rhythm sound sources are supplied to a sound volume presetting circuit the respective inputs of which are selectively connected to respective rhythm output lines through resistors having predetermined values in accordance with the kinds of the rhythms to be played, and the output lines are connected to an output terminal through respective rhythm selector switches to be closed upon selection of the kind of rhythm performances.

5 Claims, 7 Drawing Figures

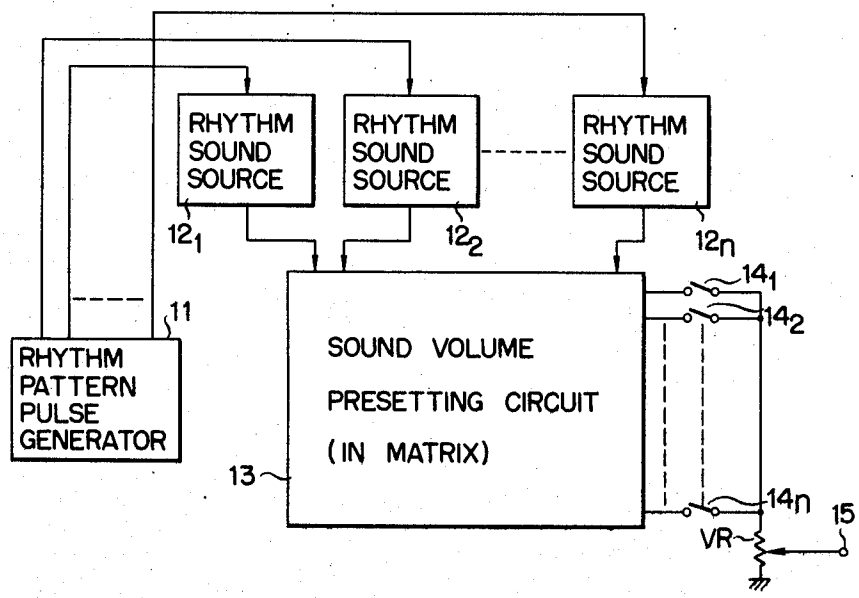


FIG. 1

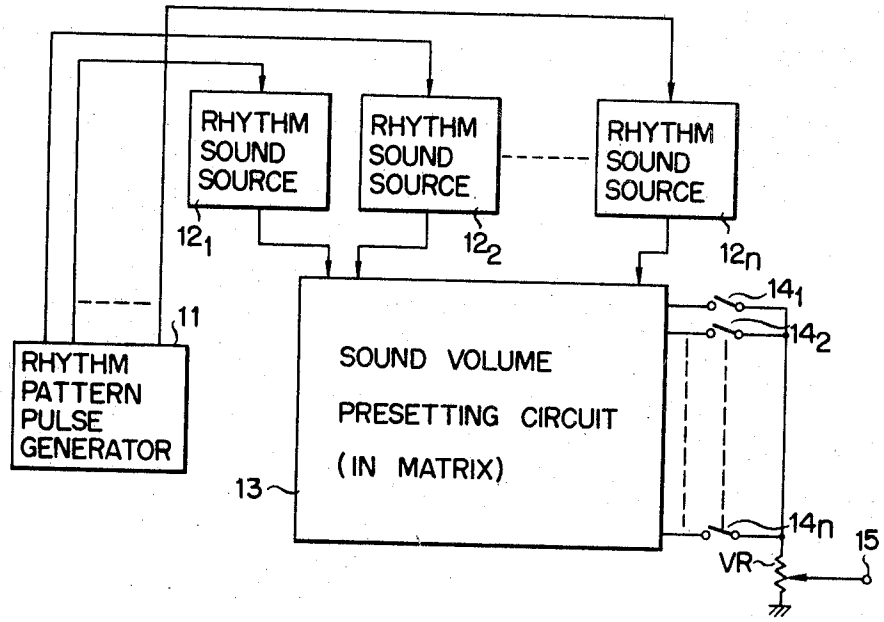
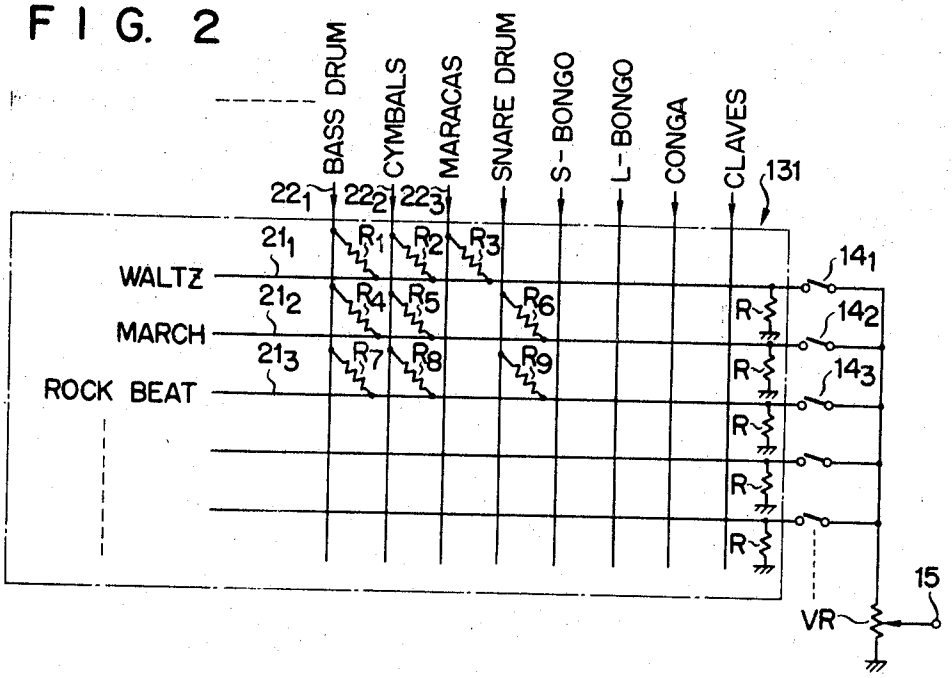


FIG. 2



INVENTOR.
RYU HIYAMA

BY
Kemon, Palmer & Estabrook
Attorneys

FIG. 3

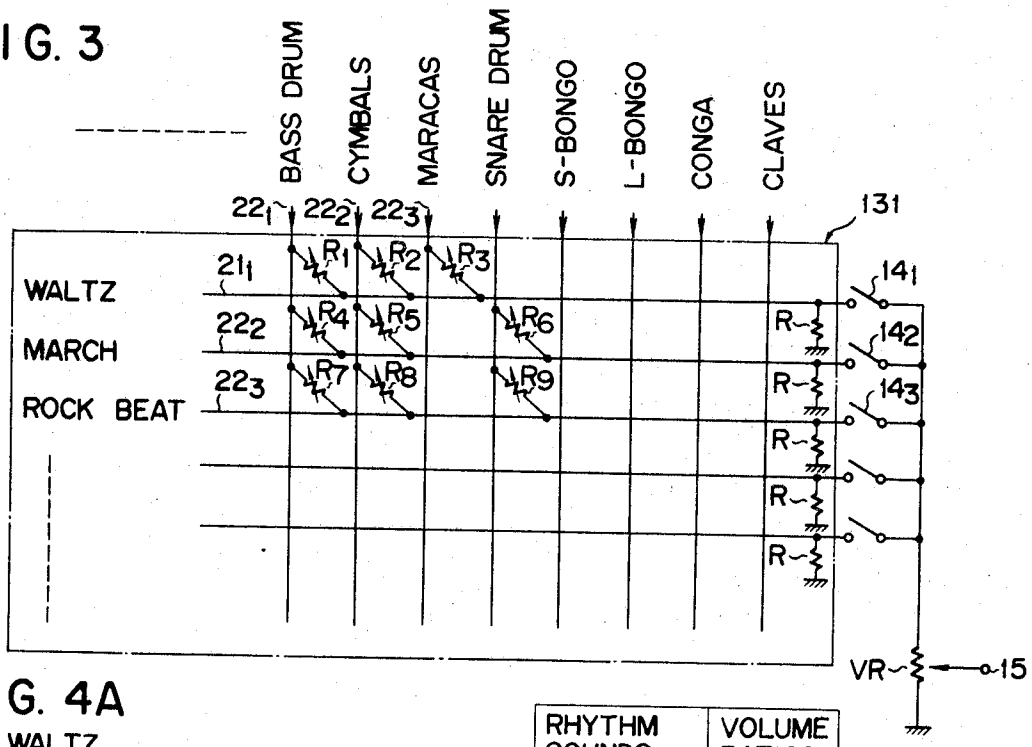
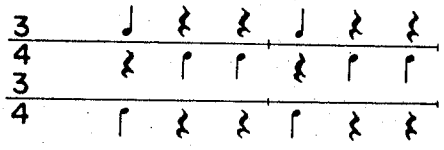


FIG. 4A

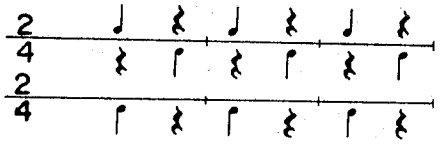
WALTZ



RHYTHM SOUNDS	VOLUME RATIOS
CYMBALS	0·5
MARACAS	0·8
BASS DRUM	1

FIG. 4B

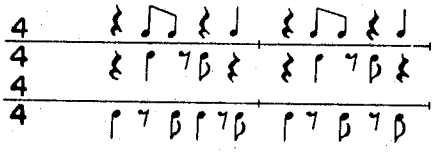
MARCH



RHYTHM SOUNDS	VOLUME RATIOS
CYMBALS	1
SNARE DRUM	0·8
BASS DRUM	1

FIG. 4C

ROCK BEAT

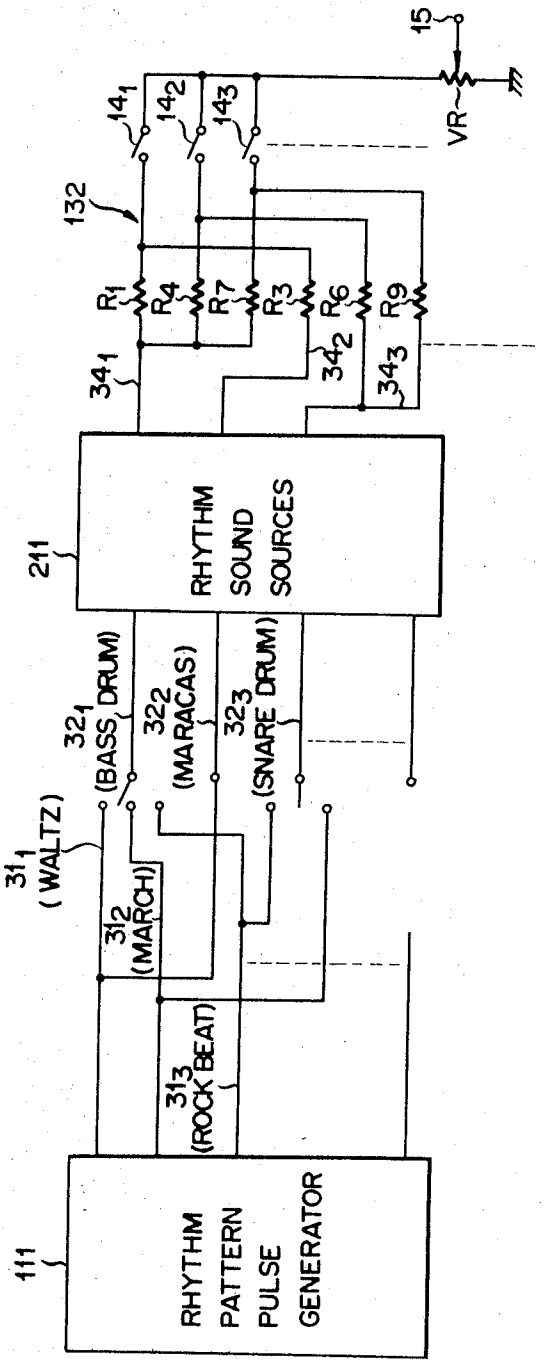


RHYTHM SOUNDS	VOLUME RATIOS
CYMBALS	0·5
SNARE DRUM	1·5
BASS DRUM	1

INVENTOR.
RYU HIYAMA

BY
Kemon, Palmer & Estabrook
Attorneys

FIG. 5



INVENTOR.
Ryu Hiyama
BY
Kemon, Palmer & Estabrook
Attorneys

AUTOMATIC RHYTHM SOUND PRODUCING DEVICE WITH VOLUME CONTROL

BACKGROUND OF THE INVENTION

This invention relates to an automatic rhythm sound producing device and more particularly to an automatic rhythm sound producing device so improved as to automatically determine the volume of each rhythm sound in accordance with the selected kind of rhythm.

The rhythm sounds played on natural rhythm instruments are different in volume according to the kind of rhythm to be played.

However, the prior art automatic rhythm sound producing device, such as electronic rhythm device, is so designed as to play all rhythm sounds with the same volume irrespective of the kinds of rhythms to be played, resulting in an undesirable unbalance among the individual rhythm sounds produced and in consequence an unnatural performance.

It is, therefore, an object of the present invention to provide an automatic rhythm sound producing device capable of playing rhythm sounds with properly different volumes according to the selected kind of the rhythm, thereby enabling rhythm performances closely resembling those on natural rhythm instruments.

SUMMARY OF THE INVENTION

According to an aspect of this invention, there is provided an automatic rhythm sound producing device which comprises a rhythm pattern pulse generator for generating a set of rhythm pattern pulses selected from plural sets of rhythm patterns, a plurality of rhythm sound sources each for being triggered by each rhythm pattern pulse of the selected set so as to constitute, by the combination of the outputs of the triggered sources, a predetermined rhythm sound performance, and a sound volume presetting circuit whose respective inputs receiving the corresponding outputs of the rhythm sound sources are connected to respective rhythm output lines through resistors having predetermined values in accordance with the kind of the rhythms to be played, the output lines being connected to an output terminal through respective rhythm selector switches to be closed upon selection of the kind of rhythm performances.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic circuit diagram of an automatic rhythm sound producing device according to an embodiment of this invention;

FIG. 2 represents the concrete arrangement of a sound volume presetting circuit used in FIG. 1;

FIG. 3 is a modification of the volume presetting circuit of FIG. 2;

FIGS. 4A to 4C illustrate the preferred volume ratios of several rhythm sounds obtained by passing them through the sound volume presetting circuit of the invention; and

FIG. 5 shows a schematic circuit diagram of an automatic rhythm sound producing device according to another embodiment of the invention, including another concrete arrangement of the sound volume presetting circuit.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, a rhythm pattern pulse generator 11 including a rhythm pattern pulse encoder and a rhythm selector (both being of conventional types and not shown) has a plurality of output terminals corresponding to plural rhythm instruments to be played in accordance with the rhythm kinds such as the waltz, march, rock beat, rumba, tango, samba and bossa nova and is so designed as to generate a set of rhythm pattern pulses selected by a player during performance, from the predetermined ones of the output terminals. In this case, each of the rhythm pattern pulses derived from the generator 11 consists of a train of the timing pulses encoded for each rhythm sound from a predetermined repetitive basic rhythm frequency pulse for the device.

There are also provided a plurality of rhythm sound sources 12_1, 12_2 . . . 12_n. The individual rhythm sound sources 12_1 to 12_n are so designed as to be triggered by the respective output rhythm pattern pulses derived from the generator 11 constituting the set selected by a player before performance and to enable from the triggered source rhythm sounds such as the desired percussion (e.g., cymbals, maracas, drum, etc.) sounds to be played in exact timing with the selected one from various tempos of rhythms, for example, the waltz, march, rock beat, rumba, tango, samba and bossa nova. The rhythm sound derived from the selected one of the rhythm sound sources 12_1 to 12_n is conducted through a sound volume presetting circuit 13 having the hereinunder described arrangement so as to be adjusted to a proper volume in response to the kind of rhythm sound thus obtained, and thereafter drawn out of a common output terminal 15 through the corresponding one of a plurality of selector switches 14_1, 14_2 . . . 14_n of normally open type which are selectively closed together with the aforementioned rhythm selector in the rhythm pattern pulse generator in advance by a player before performance.

FIG. 2 is the concrete circuit arrangement 131 apparently formed in matrix type of the volume presetting circuit of FIG. 1. Namely, plural column lines of the circuit 131 selected as, for example, output lines 21_1, 21_2, 21_3 . . . such as for the waltz, march, rock beat, etc., are connected to the common output terminal 15 through the corresponding selector switches 14_1, 14_2, 14_3 . . . and may be grounded through respective load resistors R provided if required. On the other hand, plural row lines of the volume presetting circuit 131 selected as rhythm sound input lines 22_1, 22_2, 22_3 . . . such as the bass drum, cymbals, maracas, etc., are connected to the corresponding output lines 21_1, 21_2, 21_3 . . . in predetermined combinations through the corresponding individual resistors R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9 . . . having predetermined values in accordance with the kinds of the rhythms to be played.

The character VR of FIG. 1 denotes an ordinary volume controller provided properly to adjust the volume of rhythm sounds drawn out of the common output terminal 15.

The concrete circuit arrangement including the rhythm pattern pulse generator 11 and rhythm sound sources 12_1 to 12_n are not shown in detail in FIG. 1, but those are conventional just as set forth in "Automatic Rhythm Device" invented by Richard H. Cambell, Jr., U.S. Pat. No. 3,358,068 (Ser. No. 378,365).

The automatic rhythm sound producing device is capable of playing rhythm sounds with properly different volumes according to the kind of the selected rhythm, resulting in enabling rhythm performances closely resembling those of natural rhythm instruments.

It will be apparent that said each of resistors R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, . . . may be formed by a variable type as shown in FIG. 3.

FIGS. 4A to 4C illustrate the typical volume ratios of the rhythm sounds played in timing with the desired rhythm patterns by an automatic rhythm sound producing device of FIGS. 1 and 2 or 3. Where there are to be played the rhythm sounds of the bass drum, cymbals and maracas in timing with the waltz tempo, the volume ratio of said sounds is preferred to be about 1:0.5:0.8 as shown in FIG. 4A. To this end, it is advisable to make the design values of the corresponding resistors R_1, R_2 and R_3 of FIG. 2 or 3 match the aforementioned volume ratios. Similarly where there are to be played the rhythm sounds of the bass drum, cymbals and snare drum in timing with the march tempo, it is preferred that the corresponding resistors R_4, R_5 and R_6 of FIG. 2 or 3 be so designed as to have such values as will give the volume ratio of about 1:1:0.8 as shown in FIG. 4B. And where there are to be given forth the rhythm sounds of the bass drum, cymbals and snare drum in timing with the rock beat tempo, it is desired that the corresponding resistors R_7, R_8 and R_9 of FIG. 2 or 3 be so designed to have such values as well match the volume ratio of about 1:0.5:1.5 as indicated in FIG. 4C.

FIG. 5 is a schematic circuit diagram of an automatic rhythm sound producing device according to another embodiment of this invention. In practice, the output terminals 31_1, 31_2, 31_3 . . . of rhythm pattern pulse generator 111 for selectively producing the aforementioned various rhythm pattern pulses are connected to the input terminals 32_1, 32_2, 32_3 . . . of rhythm sound sources 211 for generating the aforesaid various rhythm sounds through the corresponding normally open switches selectively closed before performance. The output terminals 34_1, 34_2, 34_3 . . . of the rhythm sound sources 211 are connected to the common output terminal 15 through a series circuit consisting of a sound volume presetting circuit 132 including the corresponding resistors R_1, R_4, R_7, R_3, R_6, R_9 . . . so designed as to have such values as will obtain the aforementioned volume ratios with respect to the individual rhythm sounds as well as the rhythm tempos and the selector switches 14_1, 14_2, 14_3 . . . . corresponding to said resistors.

Obviously, the embodiment of FIG. 5 can be operated in the same manner and with the same result as the preceding embodiments.

What I claim is:

1. An automatic rhythm sound producing device comprising a rhythm pattern pulse generator for generating a set of rhythm pattern pulses selected from plural sets of rhythm patterns corresponding to a train of the combination pulses in tempos of a repetitive basic rhythm frequency for the device; a plurality of rhythm sound sources each for being triggered by each rhythm pattern pulse of the selected set so as to constitute, by the combination of the outputs of the triggered sources, a predetermined rhythm sound performance; and a sound volume 91 circuit the respective inputs of which receiving the corresponding outputs of the rhythm sound sources are connected to respective rhythm output lines through resistors having predetermined values in accordance with the kind of the rhythms to be played, the output lines being connected to an output terminal through respective rhythm selector switches to be closed upon selection of the kind of rhythm performances.

2. The automatic rhythm sound producing device according to claim 1 wherein said volume presetting circuit is formed in matrix type either plural column or row lines of which represent various rhythms and the other plural lines of which are coupled with the individual outputs of said rhythm sound sources, said individual resistors being connected between the respective column and row lines.

3. The automatic rhythm sound producing device according to claim 1 wherein said volume presetting circuit is so designed as to directly connect the individual resistors to the corresponding output lines of said rhythm sound sources in predetermined combinations.

4. The automatic rhythm sound producing device according to claim 1 wherein said individual resistors included in the volume presetting circuit are a variable type.

5. The automatic rhythm sound producing device according to claim 1 wherein said each rhythm selector switch consists of a normally open type selectively closed upon rhythm selection performances.

* * * * *