United States Patent

[11] 3,610,804

[72] Inventor Toshiro Matsuura
Iwata-shi, Japan

[21] Appl. No. 864,496
[22] Filed Oct. 7, 1969
[45] Patented Oct. 5, 1971
[73] Assignee Nippon Gakki Seizo Kabushiki Kaisha
Nakazdwa-cho Hamamatsu-shi, Shizuoka-ken, Japan
[32] Priority Oct. 9, 1968
[33] Japan
[31] 43/73114

[54] **COMBINATION OF SELECTOR SWITCH AND EXPRESSION CONTROL OF ELECTRONIC MUSICAL INSTRUMENT**
3 Claims, 4 Drawing Figs.

[52] U.S. Cl. 84/1.17, 84/1.24
[51] Int. Cl. G01h 3/06
[50] Field of Search 84/1.17, 1.24, 1.26, 1.13, 1.27

[56] References Cited
UNITED STATES PATENTS

3,255,296	6/1966	Peterson	84/1.24
2,710,556	6/1955	Koehl	84/1.27
3,217,081	11/1965	Nakada	84/1.27
3,322,874	5/1967	Martin	84/1.26
3,499,094	3/1970	Hoshino	84/1.26
3,505,462	4/1970	Wayne	84/1.17

Primary Examiner—Milton O. Hirshfield
Assistant Examiner—R. Skudy
Attorney—Irving M. Weiner

ABSTRACT: An electronic musical instrument having several music playing sections including musical-scale tone playing sections and percussion sound playing sections. The instrument also includes several expression controls which are separately operated by the leg portion of a player, and several selector switches connected between the outputs of the respective music playing sections and the expression controls. Each music playing section has an associated output which is connected to an associated predetermined one of the selector switches. Each selector switch is capable of connecting its associated music playing section output to any one of the expression controls.

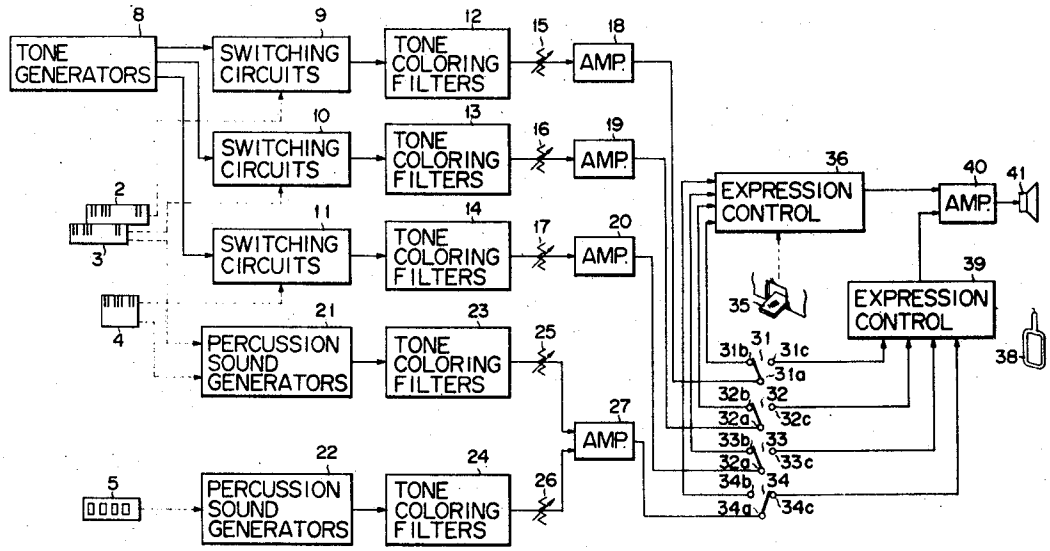


FIG. 1

PRIOR ART

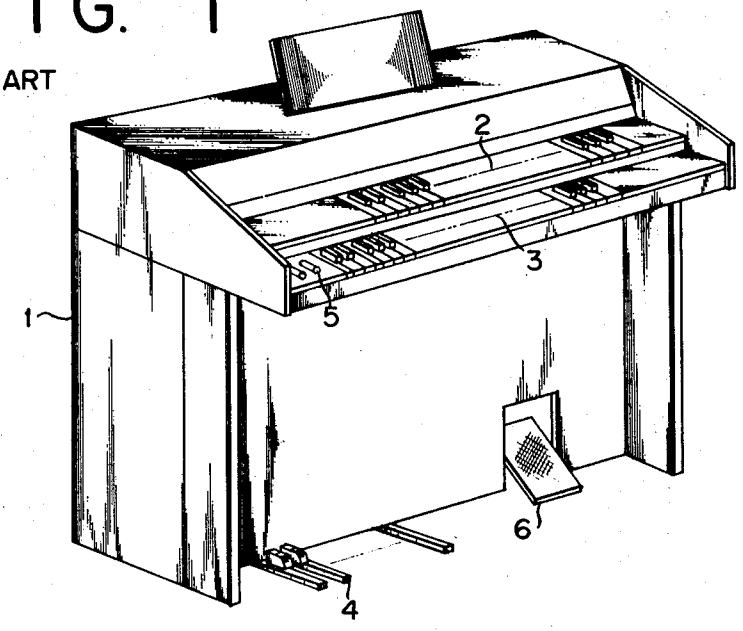
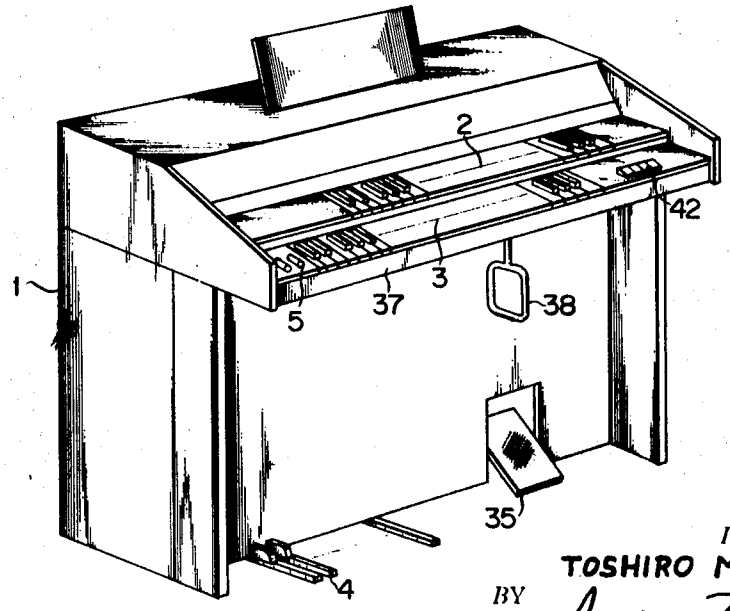


FIG. 3



INVENTOR.
TOSHIRO MATSUURA
BY Irving M. Weiner
ATTORNEY

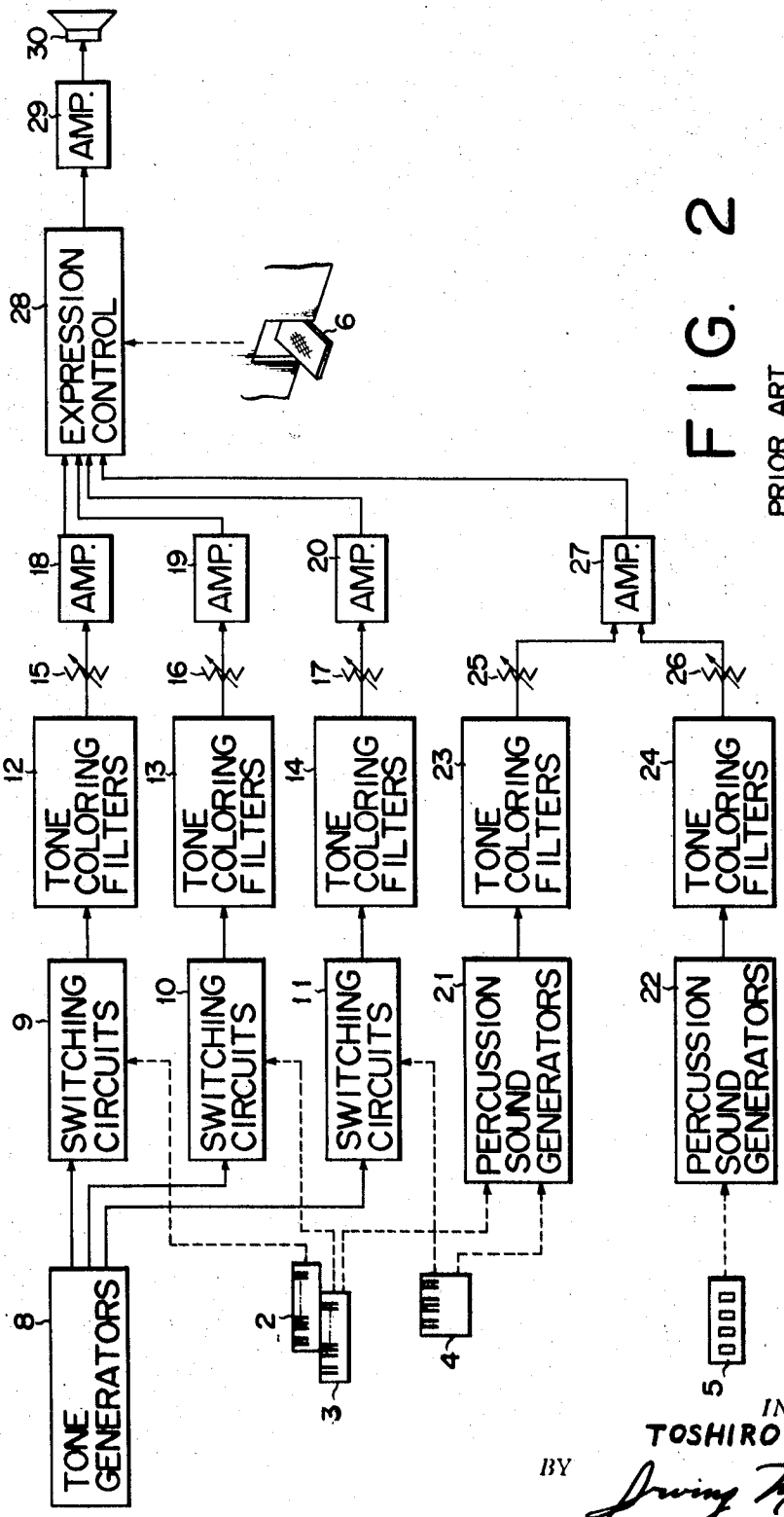
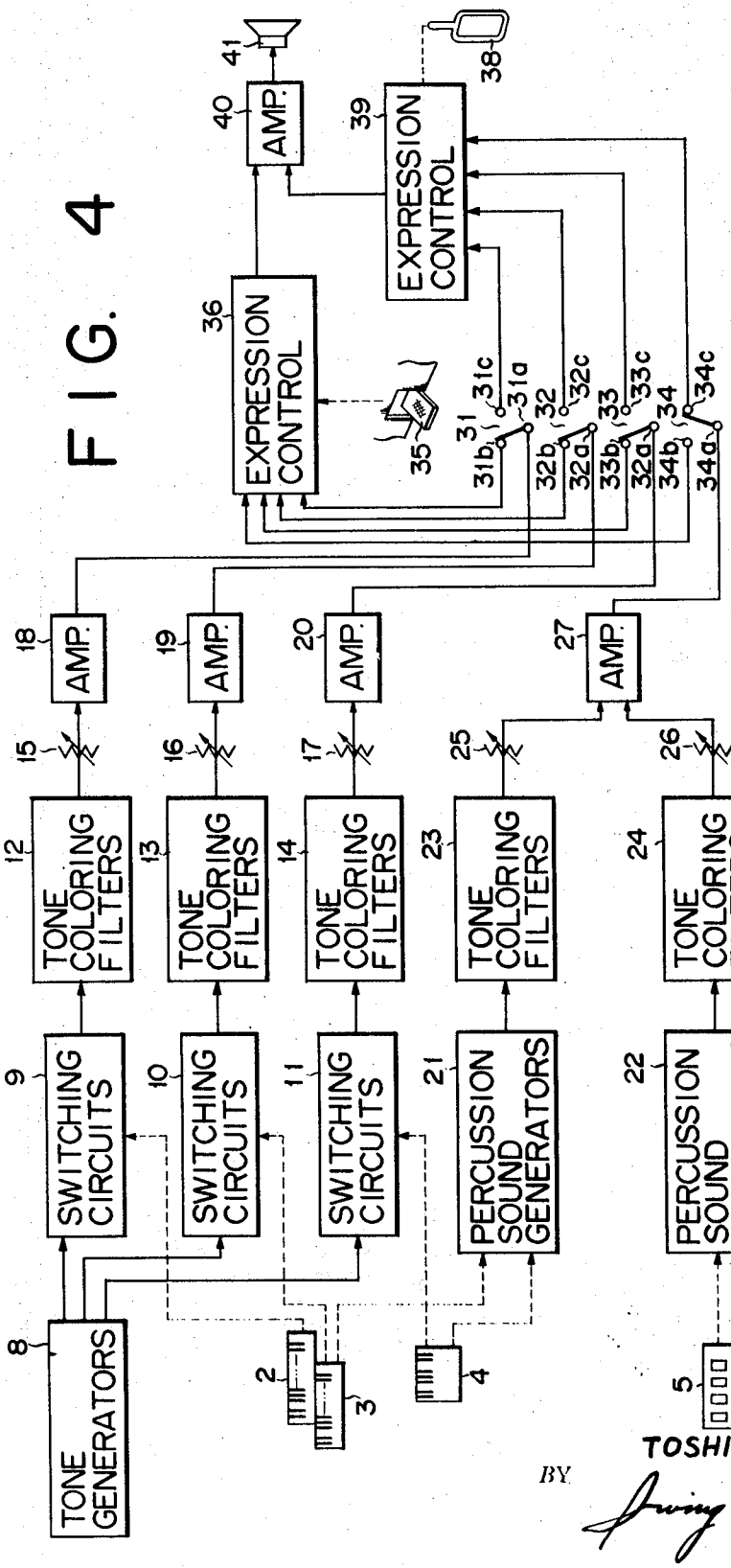


FIG. 2
PRIOR ART

INVENTOR.
TOSHIRO MATSUURA
BY Irving M. Weiner
ATTORNEY

FIG. 4



INVENTOR.
TOSHIRO MATSUURA
BY
Irving M. Weiner
ATTORNEY

COMBINATION OF SELECTOR SWITCH AND EXPRESSION CONTROL OF ELECTRONIC MUSICAL INSTRUMENT

BACKGROUND OF THE INVENTION

The present invention relates to an electronic musical instrument and more particularly to an expression control arrangement thereof.

An electronic musical instrument heretofore put to practical use has generally been constructed as shown in FIG. 1. On the front upper side of a cabinet 1 are arranged at different levels an upper keyboard 2 comprising a plurality of juxtaposed keys and a lower keyboard 3 consisting of a similar key array. The keys of the upper keyboard 2 are operated mainly by the right hand to give forth a melody tones while those of the lower keyboard 3 are operated mainly by the left hand to produce accompanying tones. At the front bottom of the cabinet 1 there is projectingly disposed a pedal keyboard 4, the keys of which are chiefly used in sounding contrabass-like tones. Further, as illustrated, there is provided on the left side of the lower keyboard 3 percussion buttons 5 whose operation gives forth some kinds of percussion sounds, such as of maracas, claves, symbals and drums. Also, if required, there is provided a percussion sound circuit interlockingly operated by the lower keys or pedal keys so as to produce further percussion sounds. The volume of musical tones, obtained by selective operation of a plurality of music playing sections consisting of the upper keyboard section, the lower keyboard section, the pedal keyboard section and the percussion sound playing sections, is varied by a single expression pedal 6 operable in common to said respective section.

Accordingly, the expression control arrangement of the prior art electronic musical instrument generally has such a circuit pattern as schematically illustrated in FIG. 2. The tone generators 8 provide tone signals for musical-scale tone playing sections i.e., the upper keyboard section, the lower keyboard section and the pedal keyboard section, while the upper keyboard section includes an upper keyboard 2, switching circuits 9, tone coloring filters 12 and tone volume controls 15, the lower keyboard section includes a lower keyboard 3, switching circuits 10, tone coloring filters 13 and tone volume controls 16, and the pedal keyboard section includes a pedal keyboard 4, switching circuits 11, tone coloring filters 14, and tone volume controls 17. The tone signals from the tone generator 8 are supplied to the switching circuits 9, 10 and 11 which are respectively associated with and operated by the upper keyboard 2, the lower keyboard 3 and the petal keyboard 4. Selective operation of a given key or keys arranged on said keyboards 2, 3 and 4 allows tone signals having predetermined pitches to be issued. Tone signals having predetermined pitches which are selectively derived from the switching circuits 9, 10 and 11 pass through the tone coloring filters 12, 13 and 14 and the tone volume controls 15, 16 and 17 consisting of, for example, indicated variable resistors, to be converted to tone signals having a desired tone color, and thereafter suitably amplified by amplifiers 18, 19 and 20 (provided if required). On the other hand, there are provided two percussion sound playing sections, one of which includes percussion sound generators 21, tone coloring filters 23 and tone volume controls 25 and being under dependent control by the keyboard operation, and the other includes percussion buttons 5, percussion sound generators 22, tone coloring filters 24 and tone volume controls 26 and being under independent control by the button operation. The signals from the percussion sound generators 21 which produce some kinds of percussion sounds by selective operation of the percussion triggering mechanism interlockingly provided with the lower keyboard 3 and the pedal keyboard 4, and from the percussion sound generators 22 which issue other kinds of percussion sounds by selective operation of the percussion buttons 5, similarly pass through the tone coloring filters 23 and 24 and tone volume controls 25 and 26 consisting of, for example, indicated variable resistors, so as to be converted to tone signals

having a desired tone color and thereafter suitably amplified by an amplifier 27 (provided if required) operable in common to both of the percussion sound playing sections. The tone signals selectively issued from a plurality (five in this 20 of playing sections pass through the amplifiers 18, 19, 20 and 27 and are supplied to a single common expression control 28 for controlling the volume of tones interlockingly with the depression of the expression pedal 6. After proper adjustment of the volume, in said circuit 28, the aforementioned signals pass through an amplifier 29 to be reproduced from a loudspeaker 30.

With the prior art expression arrangement of an electronic musical instrument having an aforementioned construction, tone signals selectively issued from a plurality of playing sections are jointly supplied to the single common expression control 28, so that the depression of the expression pedal 6 causes the volume of all musical- scale tones and percussion sounds to be controlled in the same way.

In practical performance of music, however, the percussion sounds played by the percussion instrument present, generally, little volume variation from the musical standpoint. Accordingly, it is often desired that where tones are derived from various music playing sections, their volumes be different each other according to the kind of said performance sections. When musical performance mainly consists of percussion sounds, there are often played as a background in small volumes those tones of the melody section and those of the accompaniment section. In the case of playing the bass tones by a double-bass, the played tones can scarcely be furnished with an expression effect. And even if such effect is realized, it often does not coincide with that which is imported to the tones derived from the melody or accompaniment sections. Such noncoincidence appears particularly prominent where there is played a contrabass solo in a pizzicato manner.

Therefore, on an electronic musical instrument, tones produced from the melody and accompaniment sections by selective operation of the upper and lower keyboards are desired to be furnished with different expression effects.

Sometimes the melody section tones are desired to have an expression effect in the crescendo form, whereas those from the accompaniment section are desired to have such effect in the decrescendo form, or vice versa.

As described above, therefore, the prior art expression arrangement comprising only one expression control for tones from a plurality of playing sections had the drawback that it failed to display a desired musical performance effect over a broad range when an electronic musical instrument was actually played.

SUMMARY OF THE INVENTION

It is accordingly the object of the present invention to eliminate the aforesaid shortcomings encountered with the prior art expression arrangement, and to provide a novel wherein there are provided differently operated expression controls and selector switches between the playing sections and the expression controls, whereby tone signals from the playing sections can be selectively varied in volume.

BRIEF EXPLANATION OF THE DRAWINGS

FIG. 1 is a perspective view of the prior art electronic musical instrument schematically illustrating its arrangement;

FIG. 2 is a circuit diagram of said instrument;

FIG. 3 is a perspective view of an electronic musical instrument according to the present invention schematically illustrating its arrangement; and

FIG. 4 is a schematic circuit diagram of an electronic musical instrument according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

There will now be described by reference to FIGS. 3 and 4 an electronic musical instrument having a novel combination of selector switches and expression controls according to an embodiment of the present invention, in which the music playing sections including legend numerals 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25 and 26 and amplifiers 18, 19, 20 and 27 are of the same arrangement as shown in FIG. 2. As shown in FIG. 4, there are connected to the output terminals of the amplifiers 18, 19, 20 and 27 following the respective music playing sections, movable contacts 31*a*,32*a*,33*a* and 34*a* of the selector switches 31, 32, 33 and 34 respectively. There are connected the first stationary contacts 31*b*,32*b*,33*b* and 34*b* of the selector switches 31 to 34 to the input terminals of a first expression control 36 for controlling the tone volume interlockingly with the depression of an expression pedal 35 for foot operation.

On the other hand, there are connected the second stationary contacts 31*c*,32*c*,33*c* and 34*c* of the selector switches 31 to 34 to the input terminals of a second expression circuit 39 for controlling the tone volume interlockingly with the movement of an expression lever 38 for knee operation suspended from the underside of a keybed 37 approximately facing the part where there is disposed the expression pedal 35, in such a manner that said lever can be pushed sidewise to the right by the player's right knee. Such arrangement has the advantage of allowing the foot pedal 35 and the knee lever 38 to be operated independently by the same leg (right side) of the player. The same parts of FIGS. 3 and 4 as those of FIGS. 1 and 2 are denoted by the same numerals, and description thereof is omitted.

The selector switches 31 to 34 are operated by means of tablets 42, for example, as shown in FIG. 3 disposed on the right side of the lower keyboard.

Tone signals obtained through the first and second expression controls 36 and 39 from the plurality of music playing sections may be reproduced from a single common loudspeaker 41 through an amplifier 40 provided as shown. Alternatively, such loudspeaker may be separately provided for each of the expression controls 36 and 39 or for each music playing section.

The combination of the selector switches and the expression controls of the present invention wherein there is provided, as described above, selector switches for the output of each of the music playing sections and there are selectively connected to both ends of each selector switch separate expression controls, enables the volume of tone signals from the respective music playing sections to be controlled singly or in a suitable combination by selectively operating the selector switches because there are provided two independent expression control systems.

Let us take some concrete examples showing the operation of the present arrangement in actual performance. Where the selector switches 31 to 34 are in a condition ready for switching operation as shown in FIG. 4, only percussion sounds from the two generators 21 and 22 of such sounds are controlled in volume by the second expression control 39 using the expression lever 38, while other tone signals, musical-scale tones, given forth by the tone generators of the respective musical scale-tone playing sections through the amplifiers 18, 19 and 20 by selective operation of the upper, lower and pedal keyboards are collectively controlled in volume by the first expression control 36 actuated by the depression of the expression pedal 35. Therefore, tone signals

from the percussion section can be controlled in volume separately from melody section, accompaniment section and contrabass section.

Next, where only the selector switch 33 out of the group of 31 to 34 is connected to the second expression control 39 and the remaining switches 31, 32 and 34 are jointly connected to the first expression control 36, it is possible to control the volume of only tone signals issued from the contrabass section by selective operation of the pedal keyboard independently of the tone signals from the other musical performance sections. Since, in such case, musical performance can be made without imparting any expression effect to the tone signals generated from the contrabass section, it is possible fully to display a musical performance effect like a contrabass solo.

Further, where the selector switches 31 and 32 out of the group 31 to 34 are connected in opposite relationship to the first and second expression controls 36 and 39 respectively, it is possible to exhibit various musical performance effects, for example, of imparting an expression effect only to tone signals derived from either the melody section by selective operation of the upper keyboard or the accompaniment section by selective operation of the lower keyboard or furnishing different expression effects, i.e., a crescendo effect to the melody section tone signals and a decrescendo effect to the accompaniment section tone signals,

As is apparent from the foregoing, the tone signal control device of the present invention offers a great advantage in providing a novel electronic musical instrument having a power of expression, namely, capability of displaying various new musical performance effects resembling those derived from the playing of natural musical instruments which have been impossible with the prior art electronic musical instruments.

What is claimed is:

1 An electronic musical instrument which comprises a plurality of music playing sections including musical-scale tone playing sections and percussion sound playing sections; a plurality of expression controls which are separately operated by the leg portion of a player a plurality of selector switches connected between the outputs of the respective music playing sections and said expression controls; each music playing section having an associated output which is connected to an associated predetermined one of said selector switches; and each selector switch being capable of connecting its associated music playing section output to any one of said plurality of expression controls.

2. An electronic musical instrument according to claim 1, wherein said expression controls include a foot pedal device and a knee lever device, respectively, which are selectively operable by the same leg of said player

3. An electronic musical instrument characterized substantially in accordance with claim 1, wherein each of said plurality of selector switches includes a movable contact, a first stationary contact, and a second stationary contact; all of said first stationary contacts of said selector switches being electrically connected to a first of said plurality of expression controls; all of said second stationary contacts of said selector switches being electrically connected to a second of said plurality of expression controls; each selector switch has its associated music playing section output electrically connected to its movable contact; there is provided a plurality of tablets for controlling the movement of said movable contacts of said selector switches, there is provided a foot pedal device for controlling said first of said plurality of expression controls; and there is provided a knee lever device for controlling said plurality of expression controls.