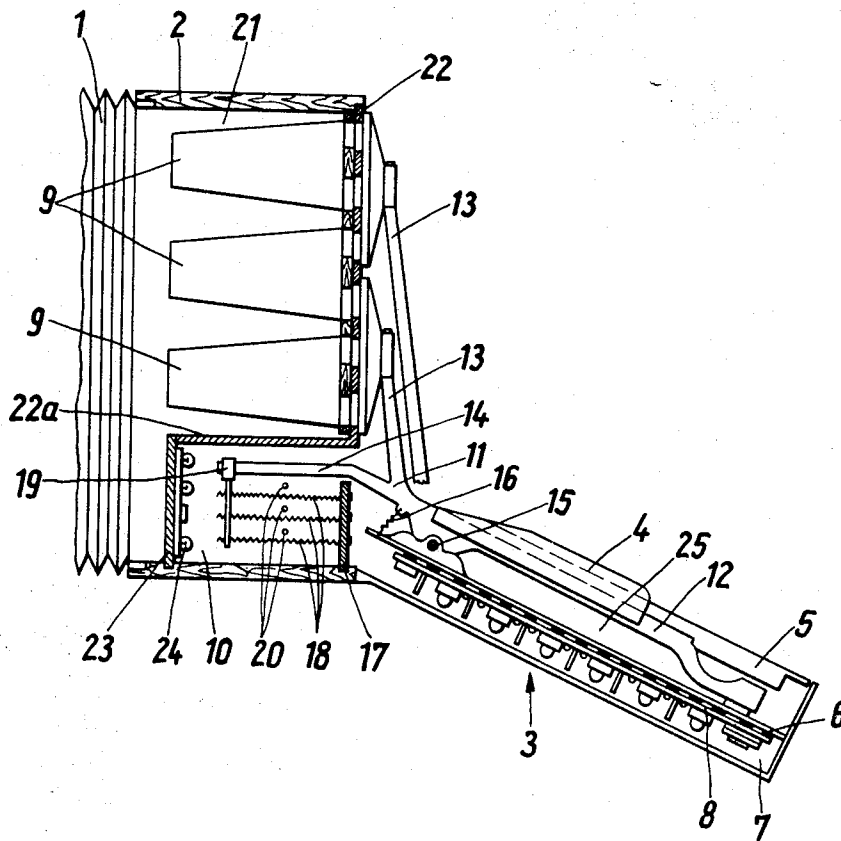


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ELECTRICAL MUSICAL INSTRUMENT WITH COMBINED CONVENTIONAL
REED AND ELECTRONIC TONE GENERATORS HOUSED WITHIN
A SINGLE COMMON STRUCTURE
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ELECTRICAL MUSICAL INSTRUMENT WITH COMBINED CONVENTIONAL REED AND ELECTRONIC TONE GENERATORS HOUSED WITHIN A SINGLE COMMON STRUCTURE

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5 Claims

ABSTRACT OF THE DISCLOSURE

Musical instrument apparatus is provided wherein the usual structure of an ordinary polyphonic accordion is modified so that the sound generator of a polyphonic electronic musical instrument, together with the necessary actuation and sound effect circuitry therefor, may be included in the standard frame thereof with no significant increase in weight or dimension. The musical instrument apparatus according to one embodiment of this invention may then be operated in the normal bellows driven reed mode, the electronic mode, or a combination electronic and normal bellows driven reed mode.

This invention relates to musical instrument apparatus and more particularly to an accordion-like structure having the normal reed-trunks and tone producing reeds normally found in present-day accordions and, in addition thereto, includes a polyphonic electronic sound generator and the necessary electronic circuitry for the production of electronic sound.

With the advent and ensuing popularity of the well-known "electronic sound," it has become necessary for successful musicians specializing in "in-person" entertainment of gatherings to have the capability to produce music with both the usual musical instruments and electronic instruments which synthesize normal tones in a manner to produce a truly distinctive sound. Further, such gatherings often prefer to listen to music produced by a combination of electronic instruments and ordinary instruments so that the overall music produced is a blend of both the normal and electronic tones and thereby comprises the attributes of each.

In the past, such musicians were only able to satisfy their listening public by bringing several instruments of each kind, i.e., electronic or ordinary, to the point of entertainment and continuously switching therebetween. When the audience was desirous of listening to the aforementioned blend of both electronic tones and ordinary tones, the single virtuoso found it necessary to join with others in order to satisfy his public.

This situation has become intolerable from the viewpoint of the single virtuoso who normally entertains small gatherings because the number of musical instruments he must bring to each performance has outgrown his ability to conveniently transport them. Further, because he normally requires several instruments of each variety, the storage of the instruments not in use during the performance of an individual number has become a problem since a clutter of instruments stacked in easy reach of the performer cannot help but to distract his audience during the performance. In addition, the several instrument approach to the preferences of an audience has always had drawbacks because although certain numbers better admit of one form of sound generation than the other, instruments can not be switched during a single number without adding a comic air to the perform-

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ance. Finally, the single virtuoso, due to the very nature of his role and of his audience, can not readily combine with others into a band to provide a blend of the desired tones.

Because the accordion, due to its versatility, is generally one of the favored instruments of the single virtuoso, various attempts have been made to alleviate his difficulties with regard to his purchase and transport of a plurality of instruments. Such attempts, however, have been largely unsuccessful because they failed to supply a single instrument of ordinary proportions which was capable of operating in the normal reed mode, the electronic mode, and a combination mode. Thus, an entirely electronic instrument, as described in German Auslegeschrift No. 1,211,473, has been provided in the form of an accordion-shaped instrument wherein the timbre and/or volume of an electronic instrument is controlled by the movement of the bellows. In another form of commercially available instrument, capable of only electronic sound generation, the accordion shape has been utilized to provide a casing for the electronic sound generating equipment. Further, a normal accordion has been provided, as described by German Auslegeschrift No. 1,192,916, wherein electronic contacts and some circuitry has been provided on the musical instrument itself and the electronic sound generation equipment is mounted in a separate case which is connected via a heavy multi-conductor cable to the accordion; this apparatus is as cumbersome as two separate instruments and the cable connector serves to limit the flexibility of the musician. Other forms of combination instruments have also been made available in accordion type or shaped devices, however, such instruments are either so cumbersome as to not be practical or do not function in the normal reed mode as well as an electronic sound generating mode and a combination mode.

Therefore, it is an object of this invention to provide musical instrument apparatus that combines a normal polyphonic accordion and the sound generator of a polyphonic electric musical instrument into a single accordion-like structure having approximately the same dimensions and weight as an ordinary accordion. Various other objects and advantages of the invention will become clear from the following detailed description of the embodiment disclosed herein, and the novel features will be particularly pointed out in accordance with the appended claims.

In accordance with the invention, musical instrument apparatus is provided wherein the reed trunks which bear the bellows driven tone-producing reeds of a normal accordion and the polyphonic electronic sound generator as well as the related actuation circuitry therefor of an electronic musical instrument are combined into an accordion-like structure having approximately the same dimensions and weight as an ordinary accordion. This structure is capable of operating as a musical instrument in either the normal bellows driven reed mode, the electronic mode, or a combination mode. The invention will be more clearly understood by reference to the following detailed description thereof in conjunction with the accompanying drawing which is a top view, partially in section, of a preferred embodiment of the invention.

Referring now to the drawing, there is shown a preferred embodiment of the musical instrument apparatus according to the present invention. To simplify the description as presented hereinafter, only the treble side of the instrument according to the instant invention has been shown, however, it shall be apparent that the bass side of the instrument will have a similar mode of construction. The musical instrument apparatus depicted in the drawing has the external appearance of a normal accordion comprising a bellows 1, frame members 2, and

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a grip 3 having treble keys 4 and 5 mounted thereon. The interior portion of the musical instrument apparatus, however, has been uniquely modified from that usually present in known accordion apparatus to accommodate the additional electronic components and circuitry contemplated by this invention. Thus, the keyboard 6, in contradistinction to that of a normal accordion, has been shifted a small distance, i.e., from 1 to 5 cm., toward the front of the depicted musical instrument apparatus to thereby provide a space 7 having the dimensions of the keyboard for the accommodation of the sound generator 8.

The sound generator 8, which forms no part of this invention per se and hence has been indicated generally, may take any type of such circuitry and is preferably assembled in the form of a flat, slab-like member, whose length and width correspond to the dimensions of the grip 3. Due to the present state of the electronics art, it is possible, using printed circuit and/or integrated circuit techniques, to assemble the tone generators as well as the remainder of the necessary electronic circuits for the requisite sound effect, such as sustain, percussion, vibrato, tremolo, etc., in such a slab-like member having a thickness of not more than .5-4 cm. Thus, the total thickness of the grip 3 is only slightly in excess of that of a normal accordion and only a slight amount of excess weight is added thereby. Furthermore, the sound generator 8, mounted under the keyboard of the treble keys may comprise the tone-generators of both the treble and the bass section so that the bass section, which will have less available space for modification, need only include the requisite reed trunks, as hereinafter explained, and the sound contacts of the bass portion. If this latter assembly is utilized, the connection between the treble contacts and their respective tone generators may be accomplished by a cable passing through the instrument.

The musical instrument apparatus of this invention as depicted in the figure has the normal reed-trunks 9 of ordinary accordion type instruments mounted within the frame member 2 thereof to provide for normal accordion operation. The reed-trunks 9, however, are mounted closer together and also shifted forward in the frame compared to the usual mounting in ordinary accordion structures to thereby provide a mounting space 10 behind each row of reed-trunks 9 in the rear of the depicted musical instrument apparatus. The space 10 behind each row of reed-trunks 9 serves as a mounting area for the necessary contacts and further electronic components whose function determines the electronic sound timbres.

In the space 10 are mounted the contacts for the electronic portion of the musical instrument apparatus of the instant invention which are actuated by striking the keys 4 and 5. In the illustrated embodiment there is shown, for example, an arrangement of the type which would be necessitated for three-foot electronic sound generation. However, it should be apparent that any mode of poly-foot construction of the electronic portion may be utilized.

A vertical distribution and contact plate 17 is mounted in the space 10 at the bottom of the frame member 2. The vertical distribution and contact plate 17 has three contact springs 18 for each key firmly anchored therein. The contact springs 18 for each key extend to a separate contact spring spacer 19 which is secured at the free end of the arm 14 of lever 11 which extends into the space 10. Additionally, collector wires or rods 20 are mounted within the space 10, perpendicular, as indicated by the end view thereof, to their respective contact springs 18. The contact spring spacer 19 is located so that when lever 11 is in the deenergized position as shown, it is approximately parallel to the contact plate 17 and thus none of the three contact springs 18 are in engagement with their respective collecting wires or rods 20. However, when the lever 11 is energized by the depression of one of the keys, the contact spring spacer 19 is rotated in the clock-

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wise direction, as shall be explained below, so that the three contact springs 18 are brought into engagement with their respective collecting rods or wires 20. The space 10 in which the contacts 18 are mounted in separated from the remainder of the frame chamber, indicated as 21, which contains the reed-trunks 9. Thus, the air flow supplied by the bellows 1 to the frame chamber 21 is isolated from the space 10 by the cover plate 23 which forms an airtight seal with the deformed portion 22a of the resonance plate 22. The cover plate 23 is preferably made readily removable so that easy access to the contacts 18 is available. Further, the cover plate 23 may serve as a mounting platform for additional electronic parts 24 which are utilized for producing the selected timbre.

The electrical-mechanical connection of the keys 4 or 5 to the reed-trunks 9 and the contact springs 18 is preferably accomplished via a three-armed lever 11, wherein one lever 11 is supplied for each of the keys. The first arm 12 of each lever is located beneath the corresponding key therefor and upon the depression thereof is rotated about the pivot point 15 in the clockwise direction. The second arm 13 of each lever 11 leads to the reed-trunks 9 and opens the corresponding valves thereto when its respective key is depressed. The third arm 14 extends into the space 10 and serves to actuate the pertinent contacts of the electronic portion of the depicted musical instrument apparatus when its corresponding key is depressed. Each of the levers 11 is mounted about its axis of rotation 15 and is provided with a spring 16 to bias it in the counterclockwise direction to thereby return the lever to the depicted rest position when the key is released. As is obvious, a compression spring may be arranged under the key as an alternate to the bias spring 16. The space 25 is maintained between the key arms 12 and the sound generator 8 so that sufficient room is provided to insure that the key arm is free to pivot about the axis 15 in the clockwise direction.

Known switch means, which form no part of this invention and hence have not been shown, are provided on the instrument case to energize the reeds or the sound generator so that the depicted instrument may operate in only the ordinary reed driven mode, only in the electronic mode, or in a combination mode.

Additionally, the instrument may be provided with the usual register-like keys, buttons or similar adjusting elements for selecting the various timbres and the functions and effects of the electronic sound generator. Such keys, buttons or similar adjusting elements may be either separated from or combined with the registers of the accordion portion.

In operation, it is merely necessary for the performer to select the desired mode of operation, set the register keys or buttons therefor, connect the external amplifier and speaker system if an electrical mode is desired, and play the musical instrument apparatus of the instant invention as he would a normal instrument.

Thus, it is seen that musical instrument apparatus has been provided that combines a normal polyphonic accordion and the sound generator of a polyphonic electronic musical instrument into a single accordion-like structure having approximately the same dimensions and weight as an ordinary accordion and capable of operating in a normal bellows driven reed mode, an electronic mode, or a combination mode.

While the invention has been described in connection with two specific embodiments thereof, it will be understood that many modifications will be readily apparent to one of ordinary skill in the art; and that this application is intended to cover any adaptations or variations thereof. Therefore, it is manifestly intended that this invention be only limited by the claims and the equivalents thereof.

I claim:

1. In musical instrument apparatus having the outward appearance of an ordinary accordion instrument, said

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musical instrument apparatus including bellows means, reed-trunk means bearing tone-producing reeds capable of actuation by said bellows, grip means having a plurality of individual key means mounted thereon to form a keyboard and casing frame means having a resonance plate connected thereto, the improvement comprising:

electronic sound generator means having a slab-like appearance mounted in said grip means behind said keyboard, said plurality of individual key means being mounted in said grip means in a manner to accommodate said electronic sound generator means therebehind;

distribution and contact plate means having a first plurality of contact means mounted therein, said reed-trunk means being mounted forward on said resonance plate thereby forming a space therebehind, said distribution and contact plate means and said first plurality of contact means being mounted in said space;

a second plurality of contact means and electronic means for producing the selected timbre mounted in said space, said second plurality of contact means including one contact means for each of said plurality of first contact means, said second plurality of contact means being adapted for connection with said electronic sound generator means and said electronic means for producing the selected timbre; and

interconnecting means associated with each of said plurality of individual key means, said interconnecting means upon the depression of its respective individual key means engaging said first plurality of contact means respectively with said second plurality of contact means to thereby accomplish the selective connection to said electronic sound generator means and said electronic means for producing the selected timbre and further to actuate valve means present in each of said reed-trunk means to thereby enable said tone-producing reeds to be driven by said bellows.

2. The apparatus of claim 1 wherein the interconnecting means associated with each of said plurality of individual key means comprises lever means having a plurality of arms, said plurality of arms including at least a first arm situated under the respective individual key means of that lever and adapted for movement therewith, a second arm operatively connected with said valve means

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to open the same upon the depression of the individual key means of that lever, and a third arm extending into the space housing said first and second pluralities of contacts and causing the engagement thereof upon the depression of the individual key means of that lever.

3. The apparatus of claim 1 additionally comprising contact spacer means mounted on the free end of said third arm, said contact spacer means having one end of each of said first plurality of contact means mounted therein whereby each of said first plurality of contact means extends between said contact spacer means and said distribution and contact plate means, and means for mounting each of said second plurality of contact means intermediate said contact spacer means and said distribution and contact plate means in an operative relationship with respective ones of each of said first plurality of contact means so that engagement is caused therebetween upon the depression of the individual key means of that lever.

4. The apparatus of claim 1 additionally comprising sealing means interposed between the chamber in which said reed-trunks are mounted as formed by said bellows, said resonance plate and a portion of said casing frame means, and said space in which said contacts are mounted, said sealing means fluidically isolating said space from said chamber.

5. The apparatus of claim 1 wherein said electronic sound generator means having a slab-like appearance is assembled in the form of a flat plate of printed circuit components, said electronic sound generator comprising a master-generator, divider means, and all of the component and integrated circuit portions necessary for the production of the desired sound effects such as sustain, percussion, vibrato, and tremolo.

References Cited

UNITED STATES PATENTS

2,983,178 5/1961 Searles et al.

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U.S. Cl. X.R.

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