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3,278,671

ELECTRIFIED ACCORDION

Filed Sept. 26, 1962

2 Sheets-Sheet 1

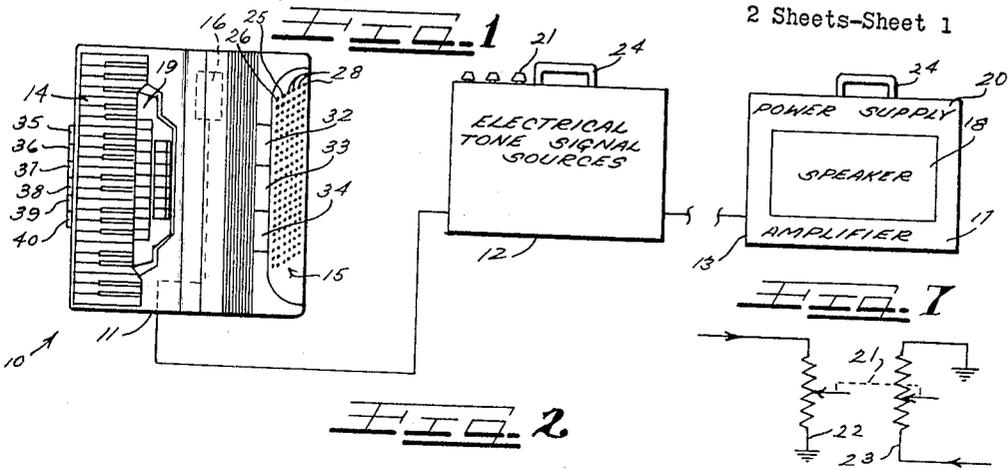


FIG. 2

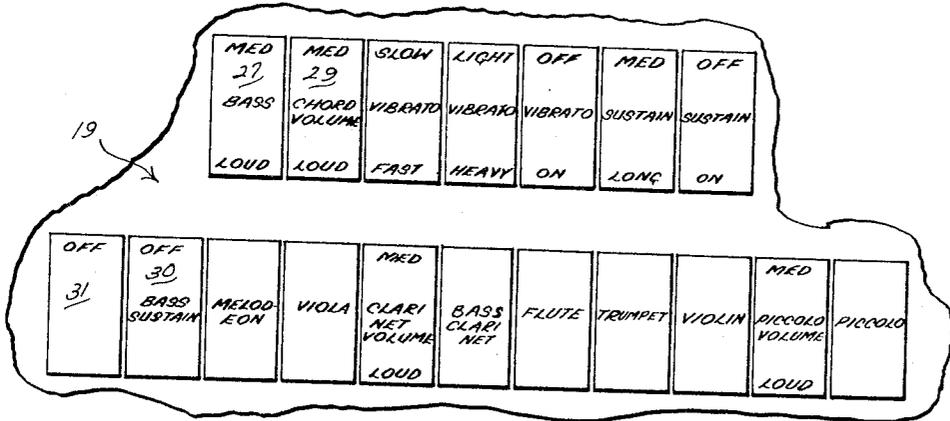


FIG. 3

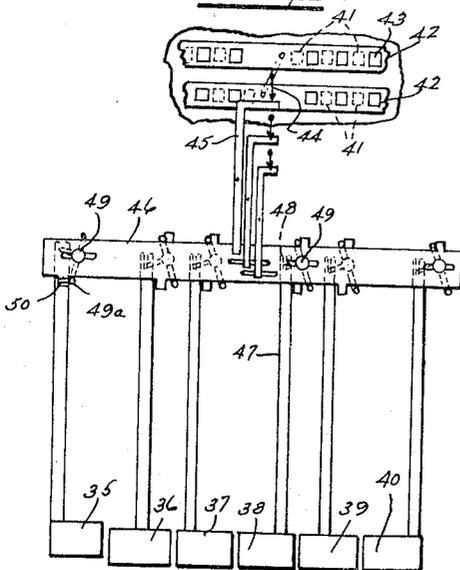
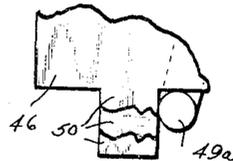


FIG. 4



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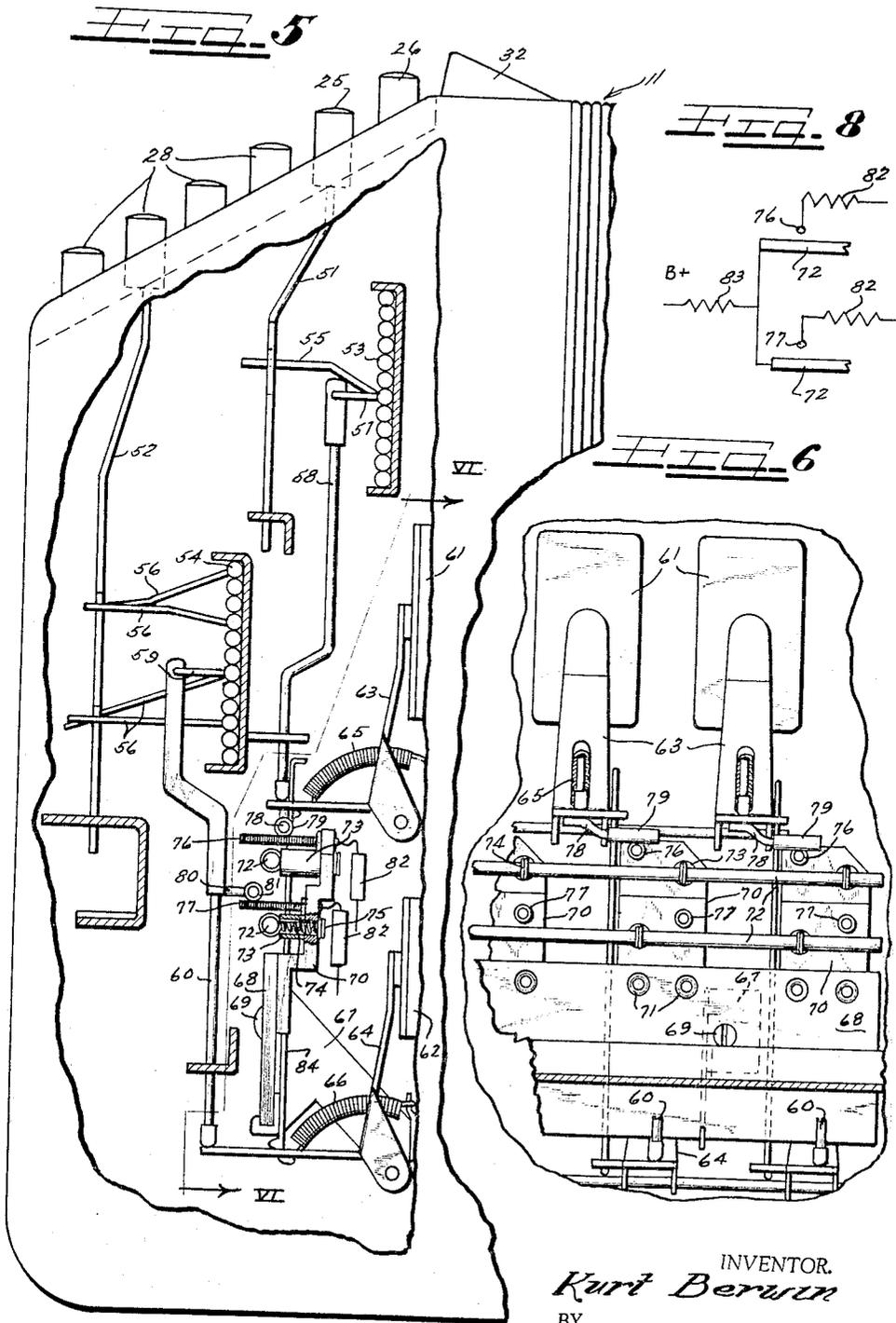
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ELECTRIFIED ACCORDION

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2 Sheets-Sheet 2



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3,278,671

ELECTRIFIED ACCORDION

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 6 Claims. (Cl. 84-1.04)

This invention relates generally to musical instruments, and more specifically to an improved electrified accordion.

Although the principles of the present invention may be included in various accordions, a particularly useful application is made in a full accordion having a piano-forte treble keyboard and a 120-button bass keyboard. It has been proposed heretofore to provide means for combining such a unit with other musical instruments. Unlike such prior teaching, the instant invention does not comprise a structure wherein two instruments are connected together, but rather comprises an accordion having auxiliary electrical sound producing means, there being no keys or other playing instrumentalities for the electrical portion other than the keys provided on the accordion.

The present invention contemplates the provision of three distinct units which are coupled together by cables, namely an accordion, a first cabinet, and a second cabinet. In certain respects, the accordion is conventional, but unlike a truly conventional accordion, the accordion of this invention includes certain structure described below which coacts with that contained in the two separate cabinets. The first of such cabinets includes a number of series of electrical tone signal sources, and the second of such cabinets includes a translating system.

Accordingly, it is an object of the present invention to provide an improved electrified accordion.

Another object of the present invention is to provide an accordion having supplemental electrical sound augmentation which is so disposed and arranged that the entire device may be readily transported from place to place by hand.

A still further object of the present invention is to provide control means for the accordion by which sound originating from mechanical reeds, originating from electrical sources, or a combination thereof may be selectively produced while the accordion bellows are being actuated.

Yet another object of the present invention is to provide two types of electrical augmentation for the bass section of an accordion, such as for solo bass and as for bass accompaniment purposes.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

On the drawings:

FIGURE 1 is an elevational view of an electrified accordion constructed in accordance with the principles of the present invention;

FIGURE 2 is an enlarged fragmentary elevational view of a portion of FIGURE 1;

FIGURE 3 is a diagrammatic representation of a structure employed to control treble reeds of the accordion of FIGURE 1;

FIGURE 4 is an enlarged fragmentary view of a portion of FIGURE 3, the same being partially broken away;

FIGURE 5 is an enlarged top view of the bass section of the accordion of FIGURE 1, the case thereof being broken away for illustration of the internal structure;

FIGURE 6 is an elevational view taken along line

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VI-VI of FIGURE 5, the same being fragmentary in nature; and

FIGURE 7 is a schematic diagram of circuitry employed to balance signals, while FIGURE 8 is a circuit diagram representative of the connections made to the structure of FIGURES 5 and 6.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in an electrified accordion such as illustrated in FIGURE 1, generally indicated by the numeral 10. The electrified accordion includes a mechanical accordion unit 11, a first cabinet 12, containing electrical tone signal sources, and a second cabinet 13 containing a translating system.

The mechanical accordion 11 includes a conventional group of treble keys 14 connected to normally operate treble valves which control air flow through the several treble reed chambers (not shown) as is known in the art. The mechanical accordion 11 further includes a conventional group of bass keys generally indicated at 15 connected to a bass action described below for normally operating bass valves to the several bass reed chambers.

The treble keys 14 are individually provided with switch means for controlling individual electrical tone signal sources, such switch means being of a known type and not shown. Likewise, the bass keys 15 are provided with electrical switches described below which are connected to other electrical tone signal sources for controlling the same. The mechanical accordion 11 is further electrified by the inclusion therein of a microphone 16 which is connected to an amplifier 17 and speaker 18, forming a part of the translating system in the second cabinet 13.

Adjacent to the treble keys 14, there is provided a set of tab switches generally indicated at 19 and shown in detail in FIGURE 2 for regulating the electrical tone signal sources. Such sources include a number of chromatic series and may comprise any known form of signal source such as oscillators, rotating discs, oscillators coupled with dividing networks, and the like. Any one of these types of sources may include a filtering network or formant circuit on which various taps are provided for furnishing electrical wave forms which yield varying tonality, such taps also comprising tone signal sources within the meaning of the term as used herein. The tone signal sources are powered by a power supply 20 disposed in the cabinet 13, which power supply also powers the amplifier 17. The controls for the translating system contained in the cabinet 13 are disposed on the cabinet 12 and may include a volume control, tone control, and a balance control. The balance control knob is indicated at 21, also shown in FIGURE 7, the same being connected to a pair of potentiometers 22, 23, the output of the microphone 16 appearing across one of the potentiometers 22 and the output from the tone signal sources appearing across the other of the potentiometers 23. As connected, and dependent upon the position of the wiper of the potentiometers, the signal derived from each of these potentiometers is inversely proportional to the other, and is fed to the amplifier 17. Thus the relative volume of the reed section of the mechanical accordion 11 may be augmented and balanced against the volume derived from the electrical tone signal sources. Each of the cabinets 12 and 13 is provided with a handle 24 to facilitate carrying thereof.

The controls for the electrified tone signal sources comprise the tab switches indicated at 19 and shown in FIGURE 2. The electrical signal augmentation derived from the solo bass keys 25 and from the counterbass keys 26 is under the control of a tab switch 27 which, depending upon its position, effects two distinct levels of volume applicable solely to all the keys 25 and 26. The four

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rows of bass chord keys 28 are similarly under the control of a tab switch 29. Thus different tone signal sources may be employed for chord keys 28 than are employed for the other keys 25 and 26. All of the tone signal sources employed for the bass section 15 are under the further control of a tab switch 30 which provides sustain for the bass section. An on-off switch 31 controls all of the tone signal sources for both manuals. The electrical tone signal sources for the treble keys 14 are under the control of the other 14 tab switches appearing in FIGURE 2 and not numbered. The nature of their control of the electrical tone signal sources associated therewith is the same as that which is known in the electric organ art.

It is customary for mechanical accordions to be provided with stop buttons such as 32-34 for the bass reed chambers and 35-40 for the treble reed chambers. Each of these operates a combination of shutters whereby sets of reeds having different octave ranges are put into or taken out of service at the will of the musician. It has been customary to so construct the mechanism connected to the stops 32-40 that there would be not a setting of any one stop which would totally block off either all bass or all treble reeds. As a further feature of this invention, means have been provided by which one stop such as 32 and by which one stop such as 35 may be employed to block either all bass or all treble reeds or both. When all of the reeds of one section are blocked, the musician may continue to produce mechanical reed tones from the other section while producing only electrically derived tones from the section having the blocked reed chambers. One means for accomplishing this result is illustrated in FIGURES 3 and 4. Each reed chamber has an opening 41 which is covered and uncovered by a key-actuated valve (not shown). There are a number of parallel rows of reed chambers typically employed, only one pair of which is illustrated. A pair of slide valves 42 having apertures 43 are provided, the upper slide valve 42 being movable to the left and the lower one to the right in response to counterclockwise movement of a lever 44. The lever 44 in turn is under the control of a lever 45 which is pivoted at its center, clockwise movement thereof effecting counterclockwise movement of the lever 44. There are three levers 44, each of which controls a pair of slide valves 42. Thus there are three levers 45 each of which is connected at its other end to one of three slides 46 arranged in juxtaposition with respect to each other. Each of the slides 46 may be moved independently of the other causing the associated lever 45 to pivot. Each of the stop buttons 35-40 is connected to a rod 47 which has a forked end 48. When the button 38 is pushed in, the forked end 48 pivots a further rotary lever 49 in a clockwise direction, one end of the lever 49 sliding the uppermost member 46 to the right and the other end of the lever 49 sliding one or both of the lower members 46 to the left. To provide the novel result of being able to close all of the reed chamber openings 41 simultaneously, each of the slide members 46 is provided with an ear 50, seen in greater detail in FIGURE 4, so that the lower end 49a of the associated lever 49 will slide all of the members 46 to the left in response to pushing in of the button 35. In a conventional accordion, this would render the treble section totally inoperative. However in this invention, depressing the stop button 35 merely cuts out the mechanical reed tones produced by the keys 14, leaving the electrically generated tones. By a similar construction, the stop button 32 is also adapted to close all of the bass reed chambers.

Referring to FIGURES 5 and 6, the internal structure of the bass section of the mechanical accordion 11 is illustrated. Each of the bass keys 25, 26, and 28 is provided with a push rod, a relatively short rod 51 being employed for each of the solo bass keys 25, 26 compris-

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ing a portion of the keyboard 15, and a relatively long push rod 52 being employed for each of the bass chord keys 28 comprising a remaining portion of the bass keyboard 15. There is a first set of twelve rods 53 and a second set of twelve rods 54 provided for the push rods 51 and 52 respectively. Each of the push rods 51 has a shoulder which engages a radial arm 55 secured to an appropriate one of the rotatable rods 53, whereas the push rods 52 have three or four shoulders which engage a like number of arms 56 each secured to one of the rotatable rods 54. Each of the rotatable rods 53 also has a radial arm 57 connected to the upper end of an actuator 58, and similarly, each of the rods 54 has a radial arm 59 connected to the upper end of an actuator 60. The reed valve chambers are arranged in two rows so that there is provided a first or upper row of bass valves 61 and a lower or second row of bass valves 62, respectively supported by arms of bell cranks 63, 64. The lower end of the actuators 58 and 60 respectively engage the outer end of the other of the arms of the bell cranks 63 and 64. Each of the bell cranks 63 and 64 is held normally in the illustrated position by a spring 65, 66 respectively. Fixed rails shown in cross-section guide and support the various push rods 51, 52, rotatable rods 53, 54, and actuators 58, 60. The cross-sectioned rails are supported at their ends, such as by a plate which has been broken away, so that they collectively form a rigid frame by which the entire bass action including all the bass keys may be removed and installed as a unit.

A number of brackets 67 are secured to the accordion frame and at their left end as illustrated support an elongated insulative strip 68 which is secured thereto as by means of screws 69. At twelve points along the length of the insulative board 68, there are disposed and riveted twelve insulative support brackets 70 of stair-like configuration. Thus one step on each of the brackets 70 engages one side of the insulative member 68 and is riveted thereto as by rivets 71. A second step of the brackets 70 supports a bank of twelve switches, and the third step of the brackets 70 supports a second bank of switches. Each bank of switches has a fixed bar-like contact 72 disposed against twelve tubular spacers 73. A spring 74 having an enlarged end 75 engages the back of the insulative bracket 70 and extends through an opening therein and through the tubular spacer 73, one or two turns of the other end of the spring 74 being turned at an angle so that the contact bar 72 extends therethrough. The springs 74 are extension springs and thus draw the elongated contact bar 72 against the spacers 73 to rigidly and yet yieldably locate the same in a predetermined position. During assembly of the bass action with the rest of the mechanical accordion, it is likely that some components thereof will bump against one of the contact bars 72. If this happens, the springs 74 yield resiliently and also return the contact bar 72 to its original position, thereby preventing bending thereof as a result of any such accidental engagement.

To cooperate with the upper contact bar 72, there is provided twelve helical spring contacts 76 fixedly supported at one end by the insulative bracket 70. Similarly, there is provided a group of twelve helical spring contacts 77 to cooperate with the lower contact bar 72. The movable contacts 77 are likewise secured to the insulative member 70.

To actuate the movable elements 76, each of the bell cranks 63 is provided with an extension arm 78 having thereon a piece of insulative tubing 79. Whenever the actuators 58 rock the bell cranks 63 to an open position, the corresponding extension arm 78 with its insulative sleeve 79 engages the adjacent movable switch element 76 and deflects the same so that the outboard end portion of the movable element 76 engages the contact rod 72.

Each of the actuators 60 is provided with an extension or extension arm 80 shown in FIGURE 5 on which there is a similar insulative sleeve 81. Whenever the actuators

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60 are reciprocated, they also reciprocate the corresponding extension 80 and the corresponding insulative sleeve 81 to deflect the out-board end of the corresponding movable element 77, thereby engaging it with the contact rod 72, such engagement occurring at a midpoint along the length of the movable element 77.

To protect the switches of each bank against arcing, excessive current drain, and the like, and to prevent "popping," each movable element 76, 77 is provided with a current limiting resistor 82. As shown in FIGURE 8, the contact rods 72 are connected together and through a resistor 83 to a B+ supply. The resistor 83 serves to limit current. The resistors 82 and 83 may have a value of 22,000 ohms.

In the event that wear or electrical damage should occur to either of the contact rods 72, the same may be readily shifted by hand after the bass action has been removed. Each contact rod 72 may be shifted angularly by rotating the same slightly within the various retaining turns of the springs 74. The same may be shifted axially a small amount by sliding the same in an axial direction with respect to the springs 74. Such shifting disposes fresh contact surface for engagement by the movable element 76, 77.

Each crank arm 63 is mechanically coupled to each crank arm 64 by means of a coupling bar 84 which has a driving connection at its lower end with one arm of the bell crank 64, and has a one way driving and one way sliding connection at its upper end with the one arm of the bell crank 63. Thus when the actuator 58 opens the valve 61, it also effects opening of the corresponding valve 62 therebelow. However, when the actuator 60 actuates the bell crank 64, the coupling member 84 merely slips with respect to the bell crank 63. The movable elements 76 are connected to tone signal sources which have a volume or voicing compatible with simultaneous opening of one valve 61 and one valve 62. The movable elements 77 are connected to other tone signal sources which have a volume and voicing which are compatible with the reed tones produced by opening a group of three or four valves 62. In this specific embodiment disclosed herein, the circuitry of FIGURE 8 contemplates that the individual movable switch elements 76 and 77 will upon being closed be provided B+ power which is directed to a particular signal source for effecting electronic coupling thereof with the translating system to which it is connected. Although this comprises a preferred embodiment, it is to be understood that actual signal frequency may be transmitted through the two switch banks to the common line, which would then be connected to the input of the amplifier.

From the foregoing it can be seen that this invention has the advantage of being constructed in three distinct units, coupled together by suitable cables having connectors for separate transportation thereof. The musician would stand at a preferred location during use of this invention with the cabinet 12 near him so that he could adjust the controls thereon at his pleasure. The cabinet 13 may be located somewhat remotely from the cabinet 12 depending upon the size and acoustics of the room. The electrified accordion may be played as a mechanical accordion alone, as an electrical accordion alone, as a mechanical accordion with electrical bass augmentation, as a mechanical accordion with only electrical bass augmentation, as a mechanical treble accordion with or without electrical augmentation for the treble keys but with only electrical bass, and as an accordion having only mechanical bass and electrical treble and bass. In addition to the foregoing, all of the wide range of effects are possible that are available on a conventional mechanical accordion by use of the regular stop buttons, and a wide variety of electrical sounds can be obtained depending upon the position of the various tab switches. Further, it has been shown that the microphone signals derived from the mechanical sounds may be balanced to an opti-

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mum relative volume with respect to the signals derived from the electrical tone signal sources. Still further the separate switch banks enable electrical bass playing or augmentation with a volume for the solo bass notes that is different from the volume of the bass chord notes. Also, various novel features of structure to achieve the foregoing have also been disclosed.

Although various minor modifications may be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A musical instrument comprising in combination:
 - (a) a mechanical accordion having a group of treble keys and a group of bass keys connected to normally operate valves to the several reed chambers for mechanically producing corresponding accordion tones, one portion of said groups of bass keys being solo-bass keys and the remaining portion being bass chord keys;
 - (b) three chromatic series of electric tone signal sources, one of which is under the operative control of said treble keys;
 - (c) an elongated strip removably secured to said accordion in a fixed position adjacent to the bass reed chambers, said strip supporting two series of switches, each switch comprising a pair of contacts, said series being connected to respectively control the other two series of tone signal sources, only one of said series of switches being under the operative control of said solo-bass keys, and the other of said series of switches being under the operative control of only said bass chord keys; and
 - (d) a translating system connected to receive signals from said tone signal sources in response to playing of said keys.
2. A musical instrument comprising in combination:
 - (a) a mechanical accordion having a group of treble keys connected to normally operate treble valves to the several treble reed chambers, and a group of bass keys connected to normally operate two parallel rows of bass valves to the several bass reed chambers, one portion of said group of bass keys being solo-bass keys and the remaining portion being bass chord keys;
 - (b) three chromatic series of electric tone signal sources, one of which is under the operative control of said treble keys;
 - (c) an elongated strip removably secured to said accordion in a fixed position generally between and spaced from said two rows of bass valves and adjacent to the bass reed chambers, said strip supporting two series of switches, each switch comprising a pair of contacts, said series being connected to respectively control the other two series of tone signal sources, only one of said series of switches being under the operative control of said solo-bass keys, and the other of said series of switches being under the operative control of only said bass chord keys; and
 - (d) a translating system connected to receive signals from said tone signal sources in response to playing of said keys.
3. A musical instrument comprising in combination:
 - (a) a mechanical accordion having two groups of keys connected to normally operate valves to the several reed chambers for mechanically producing the corresponding accordion tones;
 - (b) a chromatic series of electric tone signal sources under operative control of said keys;
 - (c) a bank of switches constructed as a unified assembly and including
 - (1) movable contacts connected to respectively control said series of tone signal source and said

- movable contacts being respectively under the operative control of said keys,
 - (2) an elongated fixed contact of circular cross-section, and having a conductive external surface, common to said movable contacts, and extending to be engaged by said movable contacts, and
 - (3) resiliently yieldable fixed means supporting said elongated fixed contact in such a manner as to enable shifting of said elongated fixed contact with respect to said movable contacts without disturbing the position of its axis, to present fresh contact surfaces to said movable contact; and
 - (d) a translating system connected to receive signals from said tone signal sources in response to playing of said one group of keys.
4. A musical instrument comprising in combination:
- (a) a mechanical accordion having a group of treble keys connected to normal operate treble valves to the several treble reed chambers, and a group of bass keys connected to a series of actuators each engageable with one arm of a bell crank, the bell cranks having other arms supporting bass valves to the several bass reed chambers;
 - (b) a chromatic series of electric tone signal sources under the operative control of said keys;
 - (c) a bank of switches constructed as a unified assembly and including
 - (1) movable elements respectively engaged by said actuators,
 - (2) movable contacts respectively carried on said movable elements and connected to respectively control said series of tone signal sources,
 - (3) an elongated fixed contact of circular cross-section, and having a conductive external surface, common to said movable contacts, and extending to be engaged by said movable contacts, and
 - (4) resiliently yieldable fixed means supporting said elongated fixed contact in such a manner as to enable shifting of said elongated fixed contact with respect to said movable contacts without disturbing the position of its axis to present fresh contact surfaces to said movable contacts;
 - (d) a translating system connected to receive signals from said tone signal sources in response to playing of said one group of keys.
5. A musical instrument comprising in combination:
- (a) a mechanical accordion having a group of treble keys connected to normally operate treble valves to the several treble reed chambers, and a group of bass keys connected to a series of actuators each engageable with one arm of a bell crank, the bell cranks having other arms supporting bass valves to the several bass reed chambers;
 - (b) a chromatic series of electric tone signal sources under the operative control of said keys;
 - (c) a bank of switches constructed as a unified assembly and said switches being connected to respectively control said series of tone signal sources, said assembly including movable contact elements respectively engaged by said actuators, an elongated fixed contact common to said movable contact elements, and resiliently yieldable fixed means so supporting said elongated fixed contact as to enable shifting

- thereof to present fresh contact surface without changing its position relative to said movable contact elements;
 - (d) a translating system connected to receive signals from said tone signal sources in response to playing of said one group of keys; and
 - (e) said group of bass keys and said actuators jointly comprising a unitary bass action, said series of actuators being assembleable into operative relation with said bell cranks and with said movable contact elements substantially simultaneously as a unit with said yieldable fixed means yieldably and returnably maintaining said elongated fixed contact in a pre-adjusted position.
6. A musical instrument comprising in combination:
- (a) a mechanical accordion having a group of treble keys connected to normally operate treble valves to the several treble reed chambers, and a group of bass keys connected to a series of actuators each engageable with one arm of a bell crank, the bell cranks having other arms supporting bass valves to the several bass reed chambers, said valves being arranged in two parallel rows, one portion of said group of bass keys being solo-bass keys and the remaining portion being bass-chord keys;
 - (b) three chromatic series of electric tone signal sources, one of which is under the operative control of said treble keys;
 - (c) two series of switches constructed as a single unit and disposed generally between and spaced from said two rows of bass valves and connected to respectively control the other two series of tone signal sources, one of said series of switches being under the operative control of said solo-bass keys, and the other of said series of switches being under the operative control of said bass chord keys, at least one of said series of switches having in common an elongated fixed contact supported by resiliently yieldable fixed means enabling shifting thereof to present fresh contact surface without changing its effective position, and at least one of said series of switches having movable elements respectively engaged by said actuators;
 - (d) said group of bass keys and said actuators jointly comprising a unitary bass action, said series of actuators being assembleable into operative relation with said bell cranks and with said movable switch elements substantially simultaneously as a unit with said yieldable fixed means yieldably and returnably maintaining said elongated fixed contact in a pre-adjusted position; and
 - (e) a translating system connected to receive signals from said tone signal sources in response to playing of said keys.

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