

[72] Inventor **Paul Edwin Kiepe**
 113 Village Lane, Boise, Idaho 83702
 [21] Appl. No. **800,094**
 [22] Filed **Feb. 18, 1969**
 [45] Patented **Feb. 9, 1971**

3,186,291 6/1965 Pedicano..... 84/470
 3,376,778 4/1968 Musser..... 84/483
 3,394,625 7/1968 Grow..... 84/471
 3,460,425 8/1969 Kiepe..... 84/470
 3,470,785 10/1969 Shallenberger et al..... 84/470

Primary Examiner—W. E. Ray

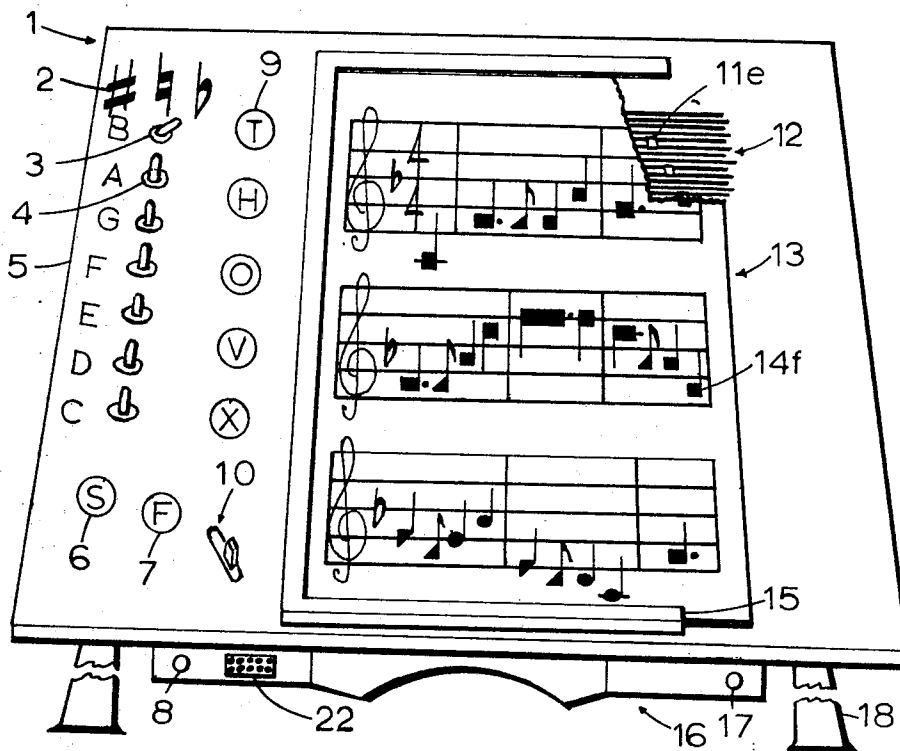
[54] **ELECTRONIC MUSICAL INSTRUMENT WITH FINGER-DEPRESSABLE NOTE HEADS ON MUSICAL SCORE**
 14 Claims, 7 Drawing Figs.

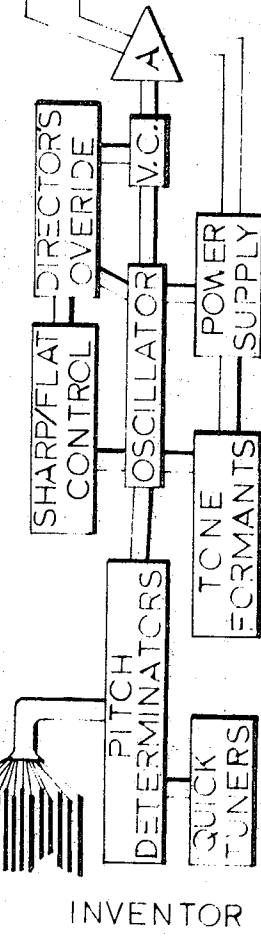
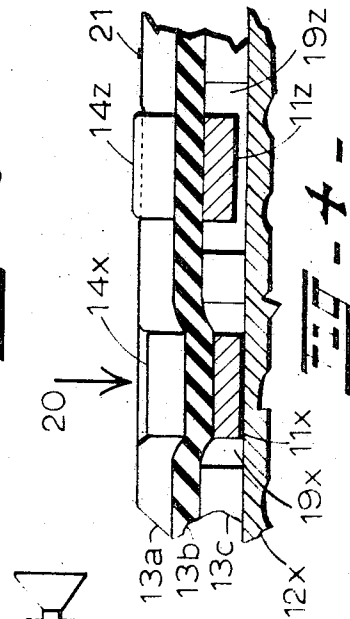
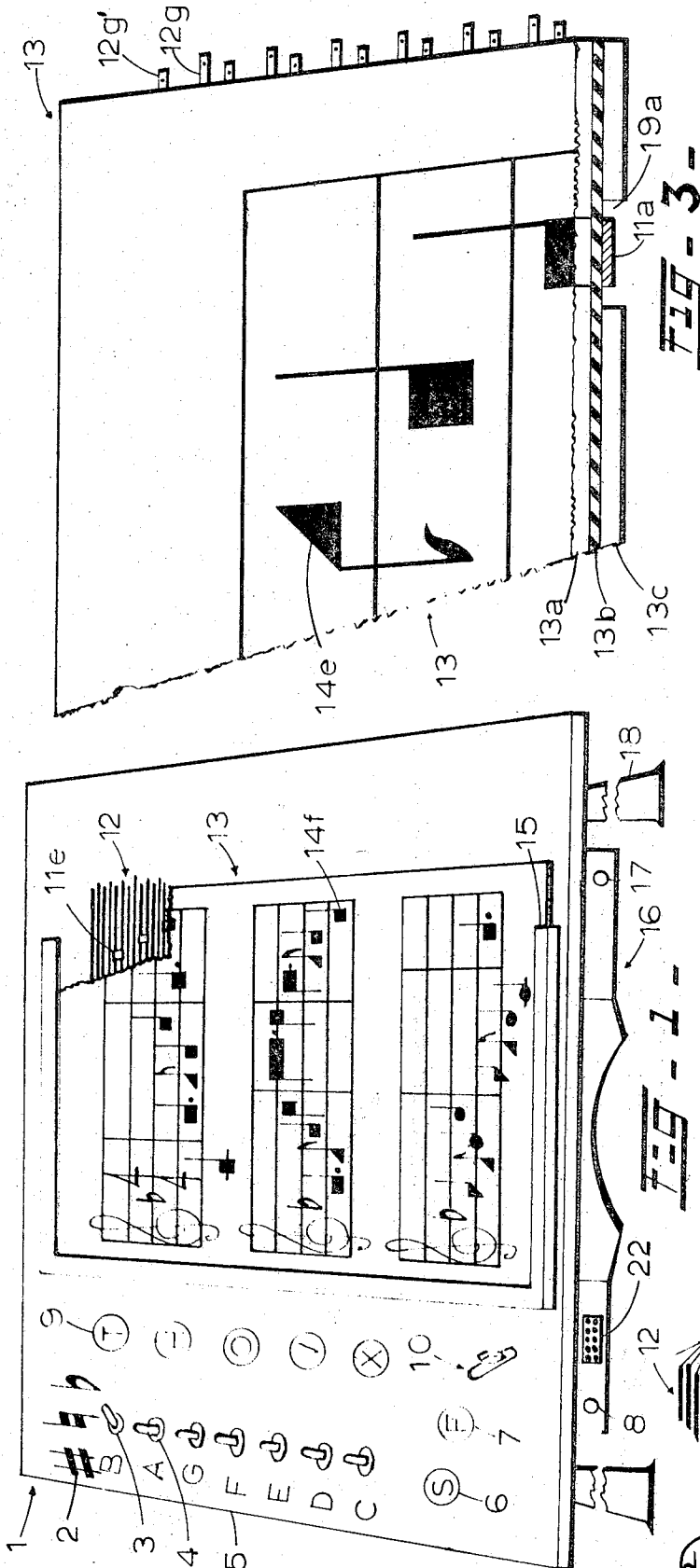
[52] U.S. Cl..... **84/1.01,**
 84/1.17, 84/1.28, 84/470
 [51] Int. Cl..... **G09b 15/04;**
 G10h 5/00, G10h 1/00
 [50] Field of Search..... **84/1.01,**
 1.14, 1.28, (D), 170, 171, 315, 316, 423, 470, 471,
 476—478, 483, 485

[56] **References Cited**
UNITED STATES PATENTS

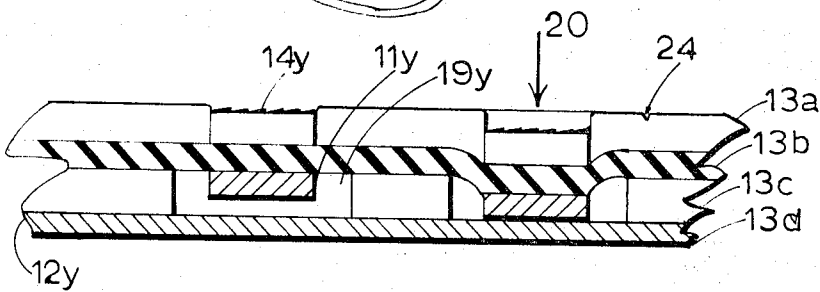
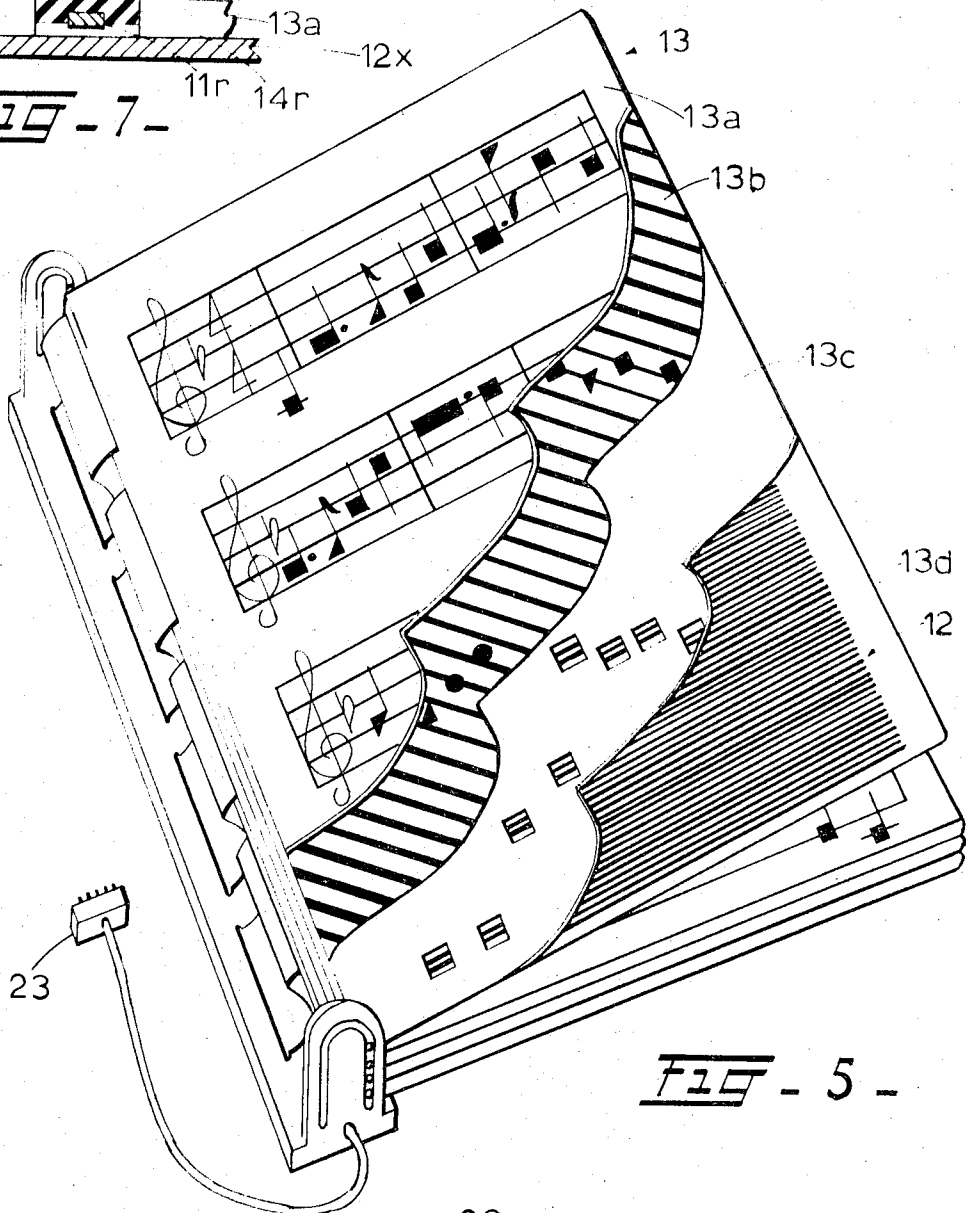
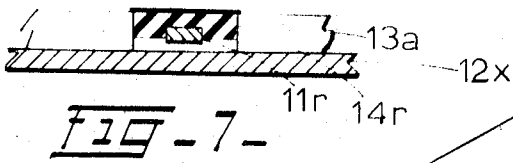
672,678	4/1901	Kitching.....	84/470
1,821,311	9/1931	Lamp.....	84/478
2,516,579	7/1950	Leonardson.....	84/405
2,879,685	3/1959	Page.....	84/470
2,888,849	6/1959	Humphrey et al.....	84/1.01

ABSTRACT: An electrically operated musical device with controls and tones resembling an electric organ, whose tunes are programmed by exchangeable scores that the performer plays by finger pressure seriatim upon their semiattached note heads. When in playing position, a score adapted for the device, that may be a page in a book of such scores, is—in effect—its keyboard, being in preferred size somewhat larger than conventional sheet music to make room for note heads big enough for the finger tips. Finger pressure upon each such note head transfers its effect to subjacent metallic connective pieces. Each such metallic piece, when it descends, connects electrically across an appropriate pair of subjacent conductor bars that interconnect with the pitch-determining electronic elements of an associated control console and oscillator-amplifier-loudspeaker system. The performer need not know the code of musical scoring to play a tune; the score in playing position determines for him what note sequence will issue forth as he touches the note heads one after the other.





INVENTOR
Paul G. M. M. M.



INVENTOR

Paul Edwin Kiefer

ELECTRONIC MUSICAL INSTRUMENT WITH FINGER-DEPRESSABLE NOTE HEADS ON MUSICAL SCORE

The principal purpose of musical devices in this class is to make easier of accomplishment musical rendition through programming in the exchangeable score the note sequence of compositions performed. Antecedents of the present invention are principally the U. S. Patents of Leonardson, Pedicano, and Musser as well as the pending application of the present inventor, Ser. No. 539,815, now U. S. Pat. No. 3,460,425, all of which have in common with the present device a musical score that the performer not only reads, but plays. By following this line, the present invention enjoys its benefit, namely the ease with which such devices may be caused to produce musical tunes and harmonies by persons of good motor skills but little musical gift.

These antecedent devices prove to have a shortcoming, however, in that the performer, to play them, must strike the note heads of the playable score with a hand-held stylus. Performance requires considerable skill, taxing continuously the eye-hand coordinative abilities of the performer. Indeed, the motor skills required exceed the abilities of many.

To eliminate from devices in this class the disadvantageous selector pin or stylus is the chief object of the present invention. Using the present device the performer need not keep his eyes fixed unswervingly upon the next note head to be struck, nor make exacting eye-hand coordinative movements of a hand-held object. It is necessary only that he contact, one after the other, the depressable note heads of the said score with his finger tips. These note heads are attached flexibly to the score. The performer's finger pressure transfers its thrust to underlying metallic pieces that are, in effect, the moveable members of electrical pushbutton switches, each pushbutton being in control of a musical tone appropriate in pitch to the note head's score position.

The novelty of playable note heads that require only fingertip pressure aims at being of especial value to persons, particularly children, who are physically or mentally handicapped. Generally speaking, it is this class of persons that lacks the abilities required to manipulate the playing stylus the present invention does away with.

In one of the variant modes of the present invention, where the note-head surfaces and the score markings occur in a tactility different from nearby surfaces, the playing of musical compositions can be learned and enjoyed from tactile cues alone, and thus the device becomes available for use by the blind.

A further object of the present invention is to provide the described score in a form readily exchangeable at the console of the device, so that a performer may play musical compositions or musical exercises easily one after the other.

A further object of the present invention is to offer, optionally, the playable score in a booklike form of such scores so as to facilitate, in a classroom or concert situation, the performance of extensive musical pieces requiring several score pages.

A further object of the present invention is to provide at the instrument's console three switching systems and a volume control for giving into the performer's hand unoccupied by the note heads the power of producing a range of organ like effects. With one switching system he may vary tonal timbre or bring on percussive sounds; with another he may quick-tune the instrument's gamut to any musical key; with a third he may raise or lower any score note his fingertip is touching a half tone, in order to supply sharps and flats. By means of a volume control he may give to each score note its appropriate musical expression.

A further object of the present invention is to provide, in the playable score depressable note heads of a particularity of shapes to transmit to performers in various classes immediate knowledge of musical time values. To the child performer the invention offers note heads in a code of graduated standard lengths corresponding to the length of time each note head is to be held down. To the blind performer the invention offers note heads in a code of shapes in a trice apparent to the touch,

from which correct musical time values may be learned then employed with facility thereafter.

A final object of the present invention is to provide in the device, optionally, an overcontrol of the performer's audible output. When the teacher (or director, in a concert situation) plugs in this overcontrol feature, called herein Director's Override, which is simply an interconnected duplicate of console controls, he may supply musical elements, such as half-tone adjustment, where the performer fails to do so. Thus means exist in the device, optionally, for a learner at first to manipulate only the depressable note heads while the teacher controls the rest of the device. In a concert situation, through his over-riding control of volume output, the director has means to switch down—or even off—the audible product of any performer in error so as to avoid an unpleasing concert result.

The advantages provided by the present invention include the following:

1. The device may be played rewardingly by persons of little musical gift.
2. It may be played by persons of considerable physical or mental impairment, even by children in these classes.
3. The device will accommodate a range of musical scores in any key, and musical key may be preset for any score through rapid manual switching.
4. The performer may produce musical accidentals at will, and he has at hand means of controlling musical expression.
5. From one of two simple note-head code systems the performer may gain command of musical tempo.
6. From note-head surfaces and score markings of a tactility different from adjacent surfaces the performer may learn to play the device though he be blind.
7. From employment of the Director's Override option, many classes of handicapped persons—even persons handicapped only by little musical talent—may learn to master the device one element at a time, whilst the teacher controls other elements.
8. Several of the devices in concert need not bear the ineptitude of single performers, since the director may control a performer's audible output electrically without marring a concert situation socially.
9. From concerts performed on these easily played devices by the handicapped on special occasions, such as holiday programs at schools and the like, the joy of musical celebration can come to players and to interested listeners alike.

The manner in which the foregoing and other objects and advantages of this invention are accomplished and the construction of the mechanical and electrical contrivances for accomplishing them will be apparent from the accompanying specifications and claims considered together with the drawings wherein:

FIG. 1 is a perspective view of the herein described electrically operated musical device in preferred embodiment, showing a fragment of the replaceable score as torn away to reveal the conductor-bar array beneath, and illustrating the device, particularly its console, at about one-fourth practical size in its physical aspect.

FIG. 2 is a schematic block diagram of the herein described electrically operated musical device in its electrical aspect.

FIG. 3 is an enlarged perspective view of the torn-away score fragment of FIG. 1, showing the score and the depressable note heads in a size practical for use by children. The near edge of the score appears in sectional view, and the conductor-bar array, in part, juts from beneath the score fragment at the right-hand edge.

FIG. 4 is a sectional view of the replaceable score of FIG. 1 enlarged beyond normal size to show its several parts, to depict certain alternative embodiments claimed herein, and to illustrate preferred, smallscale means for securing depressability in the semiattached note heads.

FIG. 5 is a perspective view of an alternative mode of the herein described replaceable score in the form of a book of such scores that plugs into the console of FIG. 1 as a substitute

for the single exchangeable score shown in FIG. 1 in playing position.

FIG. 6 is a sectional view of a typical score in the alternative booklike mode of FIG. 5.

FIG. 7 is a sectional view of an embodiment of the exchangeable score that depicts alternative means for securing depressability in the semiattached note heads, suitable for manufacturing by the methods of mass production.

Generally stated, the electrically operated musical device of this invention provides mechanical and electrical means for unskilled persons to produce readily many of the musical sounds of an electric organ, and to play easily musical compositions thereon by fingertip pressure on the note heads of an exchangeable musical score, that may be a page in a book of such scores that fits the device in such manner as to be its keyboard. Principal parts of the device are (a) a console for accommodating both the said exchangeable score and an aggregation of pitch, tone, and volume controls; (b) a tone-making oscillator-amplifier-loudspeaker system that creates organlike sounds; and (c) the said exchangeable score in one of several useful modes.

Considering the foregoing in greater detail and with particular reference to the drawings:

THE CONSOLE—SINGLE SCORE

The physical character, in preferred embodiment, of the electrically operated musical device described herein that provides for single scores is apparent from FIG. 1. The console 5 is like a desk top, or may be a desk top, or may rest on top of a desk, table, or sturdy music stand. In FIG. 1 console 5 is shown as supported by legs 18, two in the drawing being concealed. Since the members of conductor-bar array 12 are strips of conductive metal in a precise pattern and electrically insulated from each other, console 5 is, in whole or in relevant part, composed of rigid, stable, dielectric material where the conductor-bar array lies inserted.

Console 5 has three general surface areas: In FIG. 1, shown at left is the controls area; shown at center is the conductor-bar area; shown at right is a necessary smooth surface area unoccupied. The controls area accommodates switches and their operational members within reach of the performer's left hand, said switches being the following: quick-tuner toggle switches marked C, D, E, F, G, A, and B for the corresponding musical notes, each switch having the three options, sharp/natural/flat; tone-formant pushbutton switches with hold feature on or off, marked X, V, O, H, and T for special tones such as of the xylophone, vibrato oboe, horn, and timpani, etc.; half-tone pushbutton switches for momentary contact with spring-actuated return 6 and 7, marked S for Sharp and F for Flat; and slide-operating volume control 10. The centrally located conductor-bar area determines the position behind which the performer sits or stands so that he may be within reach of every note on score 13 which a score holder 15, permanently attached to the console, locates and holds in its correct playing position after manual insertion. "Correct playing position" describes a physical relationship that score holder 15 maintains between conductor-bar array 12 and score 13 so that each metallic connective piece, such as connective piece 11e, FIG. 1, where it is shown detached form the score 13 for illustrative purposes, lies directly over a pair of conductor bars 12 controlling a corresponding pitch determinant in the interconnected oscillator system. By a router operation, or by other suitable means, such as metallic etching, the array of conductor bars 12 is let into the dielectric surface of console 5 so the upper surface of all lies flat and smooth. Thus score 13 the performer may exchange rapidly again and again without damage. Through the under side of console 5 run the connective wires from both the conductor-bar array and the switches of the controls area.

The conductor bars 12g, 12g', etc., shown in FIG. 3 in practical size for a children's instrument, are of a size, spacing, and orientation at the surface of the console 5, FIG. 1, to cor-

respond to the size and spacing of the staff lines and staff spaces of score 13, as set forth herein above: that is, each pair of conductor bars lies beneath a space or a line of each of the staves of the score 13 when the latter is in playing position. Preferably, the conductor bars are composed of an inexpensive conductive metal, such as copper, and bear gold plating for stable conductivity at their upper surface, that is, at the interface where they meet the gold-plated bottom surfaces of metallic connective pieces 11. A conductor-bar array of specific dimensions will accommodate exchangeable scores of corresponding dimensions, and no others, creating in widespread use of the device a need amongst manufacturers for standardization.

The right-hand area of the console 5 remains unoccupied so that the performer may slide the exchangeable scores in and out of playing position rapidly and without damage.

Shown in FIG. 1 attached to the underside of console 5 is oscillator-amplifier-loudspeaker system 16 that produces the musical tones of the device when initiated by the performer's manipulations of the console's controls hereinbefore described in appropriate synchronization with his playing of the note heads. It is only convenient to this presentation, not needful, that the loudspeaking system be located as shown; by appropriate wiring, some or all parts may be located away from the console at an appropriate distance. At the front of console 5, FIG. 1, is receptacle 8 for plugging in an optional foot-operated expression control (not shown) such as occurs in most electric organs. Along side of receptacle 8 is receptacle 17 for plugging in the Director's Override option that is described more fully hereinbelow.

CONSOLE—MULTIPLE SCORE

At the front of console 5, FIG. 1, is receptacle 22 for plugging in replaceable scores in the alternative booklike mode depicted in FIG. 5 and FIG. 6 and described more fully hereinbelow.

LOUDSPEAKER SYSTEM

The oscillator-amplifier-loudspeaker system 16, hereinafter called "the loudspeaker system," as it appears in FIG. 2 in block diagram with its principal control input, the conductor-bar array 12, at upper left, and with its loudspeaker output at upper right, relates both to the single-score mode of FIGS. 1, 3, 4, and 7 and to the multiple-score mode of FIGS. 5 and 6. Other elements in the system are: an audiofrequency oscillator, marked OSCILLATOR; an audiofrequency amplifier, marked A, with suitable electric POWER SUPPLY, interconnected with the oscillator's PITCH DETERMINATORS and TONE FORMANTS, audio input to the amplifier being regulated by the volume control, marked V.C., and the pitch determinators of the system being modifiable both by the QUICK TUNERS and the SHARP/FLAT CONTROL. By note-head pressure and by switch manipulations the performer modifies the loudspeaker system's tonal output along the control lines suggested by the simplified connective s of the block diagram of FIG. 2. A director or teacher, optionally, can modify the tonal output also, along the control lines indicated as interconnecting with the DIRECTOR'S OVERRIDE which consists of an effectively overriding duplicate of the performer's controls of pitch and volume. The QUICK TUNERS of the device supplement conventional initial tuning of the gamut, ordinarily in the key of C. By way of illustrating the function of the QUICK TUNERS and their peculiar value to the device, particularly as a means of performance simplification, FIG. 1 shows in playing position a score 13 written in the key of F-major, which requires that all B notes be played as flats. Hence, before starting to play, the performer has switched quick-tuner 3—or in the case of a child performer, the teacher has done so—to the right, i.e., to the $\flat$ (flat) position. Now, as the performer plays the piece, he need not resort to half-tone button 7 to flat each B when it occurs in the score; by the presetting of switch 3, that is already done. The instrument's gamut now is

tuned to the key of F-major. As scores in the higher key signatures appear, the herein described system of quick tuning becomes more important. In fact, scores in such keys as A-flat-major and A-sharp-major cannot be played by ordinary persons even after considerable practice through employment of the half-tone buttons; the task of flattening or sharpening four tones out of seven requires too much musicianship. So these complex keys are preset in the QUICK TUNERS. Use of the half-tone buttons 6 and 7 thus is reserved for accidentals only, which means they are employed but rarely in the average composition. In FIG. 2 the half-tone button switches of FIG. 1 bear the block designation SHARP/FLAT CONTROL. This control ties into the main stem of the oscillator, adding a half-tone or subtracting a half-tone from any note sounded; it raises or lowers the tuning of the whole gamut.

EXCHANGEABLE SINGLE SCORE

The principal novel elements of this invention, the depressable note heads in an exchangeable score mechanism are illustrated in the case of single scores in FIGS. 1, 3, 4, and 7 principally, and are illustrated in the case of multiple scores in booklike form in FIGS. 5 and 6 principally. In essentials the difference between the forms is slight, and identical numbers in the several drawings indicate essentially similar parts, with the associated lower-case letters marking slight variations described hereinafter. In the case of the single-score mode, FIGS. 3 and 4 depict a score mechanism easily made by small-scale methods; whereas FIG. 7 depicts a score requiring considerable tool expense and hence mass production. Score 13 is shown in FIGS. 3 and 4 as comprising a topmost layer 13a, composed of white-face cardboard or the like; a nether layer 13c, composed of similar material with its under surface prepared so as to be highly dielectric; and an in-between score membrane 13b, composed of thin, flexible material such as sheet rubber. The score sheet 13a bears upon its upper surface the score markings, note stems, note flags, and other similar matter associated with conventional sheet music. In small-scale manufacture, the note heads 14e, etc., of FIG. 3, and the note heads 14x and 14z, of FIG. 4, are cut out of the score-sheet material, reduced slightly in size, and set aside. Score backing 13c is then suitably prepared by the cutting out of holes corresponding to the note-head cutouts of 13a, only larger in both lateral dimensions so as to produce the apertures 19a, 19x, etc. Score membrane 13b now is cemented to the top of 13c. Next, the top of score membrane 13b is prepared with cement, care being exercised to get no cement over the apertures 19a, etc. Then score sheet 13a is laid on, and the cement allowed to harden. Thereafter, small amounts of cement are applied to the bottoms of the cutout note heads, and these are inserted where they belong in the score sheet. When this cementing hardens, the three-layered score mechanism, now with its note heads attached depressably, is turned over, and the metallic connective pieces 11a, 11x, 11z, etc. are cemented to the score membrane in each place where the membrane appears through the score-backing apertures. Thus, in preferred embodiment, are made the depressable note heads of this invention, the connective pieces 11a, etc. acting as the moveable members of momentary-action pushbutton switches when score 13 is in playing position upon console 5, each such moveable member standing ready to connect across two appropriate stationary switch members in the conductor-bar array 12 to make its score position sound forth.

In mass production, the score 13 can be made more easily, as illustrated in FIG. 7. Here, the score 13 and the score sheet 13a are identical; only one layer is required, the top layer. Cardboard is, as above, a suitable material, with its under side prepared so as to be highly dielectric. Out of 13a the note heads are cut, and the pieces discarded. Then, for each size and shape of note-head aperture is prepared a note head 14r, composed of flexible material such as molded rubber. To the bottom of each such note head is molded in, or later cemented, metallic connective piece 11r. Then the flexible note

heads are cemented into place in the score sheet, this version of the replaceable score now operating like the version made by small-scale methods described hereinabove. What makes the embodiment first described here seem preferable is the tool costs involved in the second version for making the flexible note heads of rubber in molds. Only large-scale production in tens of thousands could pay out such molds. By showing two methods of attaining depressability in the note heads, it is not intended that the herein claimed inventive idea should be limited to these embodiments; rather, it is intended that these embodiments should be examples of the conception of depressable note heads acting as momentary-action pushbutton switches in an exchangeable score mechanism. Moreover, the inventive idea herein expressed is intended to include note-head pushbuttons that, optionally, would sound musical chords from a staff position of the chord's leading tone or elsewhere on the score. Concerning the "feel" of the device to the performer: the distance of travel between the bottom of connective piece 11 and the top of conductor bar 12, which may be varied by making 11 either thicker or thinner, determines the touch of the device—whether "light" or "heavy". Similarly, the quantity, quality, and location of rubber associated with connective piece 11 determines touch as to "softness" or "hardness". A little sponge rubber, not illustrated, back of connective piece 11, not only softens touch, but minimizes clicking.

EXCHANGEABLE MULTIPLE SCORE

By the expedient of transferring the conductor-bar array 12 from the upper surface of console 5 to a conductor-bar sheet 13d of FIGS. 5 and 6, the exchangeable scores, alternatively, may occur in books of scores that comprise several compositions or the several pages of a single composition. To facilitate this mode of the present invention, which is not the preferred mode because of higher cost factors, it is not needful to employ a console different from FIG. 1, but only to ignore the conductor-bar array 12 embedded in the console surface and to use this space to accommodate the score book of FIG. 5, employing console receptacle 22 to accommodate book plug 23.

Parts of the exchangeable score 13 are the score sheet 13a, the score membrane 13b, the score backing 13c, all similar to the single score, and now is added conductor-bar sheet 13d that bears upon its upper surface in the technology of flexible printed circuitry, metallic conductor bars 12, with upper surfaces laid bare and preferably gold plated, beneath the several apertures of the score backing in such manner as to receive the corresponding conductive pieces 11 from above. Distal ends of the bars 12 connect through flexible wiring to the book plug 23 that the performer inserts into receptacle 22, FIG. 1, for connection to the loudspeaker system. Several book pages per book may be accommodated to the system as shown, and books may be exchanged through the plug-receptacle arrangement. The depressable note heads of the score, in the case of the multiple-score book, are formed and operate as in the case of the single score, the connective piece 11y, FIG. 6, under fingertip pressure 20, proceeding downward to connect electrically across a pair of conductor bars 12y through aperture 19y in score backing 13c.

ALTERNATIVE MODES

The score 13 occurs in an alternative mode, hereinafter claimed as of inventive merit, wherein the musical score markings upon the upper surface of score sheet 13a are not only printed, but are also, or alternatively, embossed or engraved upon that surface as suggested in FIG. 4 by marking 21 and in FIG. 6 by engraving 24, the purpose of this modality being to provide in musical notations a tactility sufficiently different from adjacent surfaces to be readable by touch as well as sight, or even by touch alone, to aid performers with little or no vision. Correspondingly, the depressable note heads 14, at their upper surface, occur in tactility to inform the blind, ex-

amples being given in the raised note head 14z of FIG. 4 and the roughened note head 14y of FIG. 6, also the raised, rubber note head of FIG. 7.

To produce a suitable musical effect, fingertip pressure seriatim by the performer upon the depressable note heads of this invention's replaceable score must, of course, occur in correct musical tempo. Each note must be held so long. To simplify this task of the performer, this invention offers the depressable note heads in two simple codes of shapes to denote musical time values. One code, particularly adapted for children, is illustrated in the first measures of score 13, FIGS. 1, 3, and 5, wherein the varying lengths of the note heads, in values of a quarter note and above, occur in a range of standard lengths corresponding to the length of time the child is to keep the note depressed. An eighth-note in this code is a triangular half of a quarter-note, as shown, thinner notes lengthwise being impractical. A second code, particularly adapted for the blind, is illustrated in the last three measures of score 13, FIG. 1, wherein each musical time value occurs in a special shape, not elongated, but apparent in a trice to sensitive finger tips when augmented by a surface tactility different from adjacent surfaces as described hereinabove. Any given score code of this sort, to be of value, must, of course, be learned. The particular shapes depicted in FIG. 1 are intended to be illustrative only of the inventive idea, hereinafter claimed, of having the said depressable note heads in coded shapes to express time values, no especial merit being claimed for the particular shapes illustrated, these having been chosen because easily drawn. Differences of tactility, that is, surface texture, in combination with fewer different shapes, may constitute a better embodiment, and the illustrations and claims are intended to cover these possibilities.

The musical scores depicted in FIGS. 1, 3, and 5 are illustrative of scores suitable to production of musical sounds and musical renditions that involve variations in pitch. Nothing, however, need be altered in the inventive mechanisms herein described and claimed to produce drum music or other timpani sounds, in their variety, except employment of a suitable oscillator, FIG. 2, and its engagement by the performer through console management of the tone-formant switches. The tone-formant pushbutton T, FIG. 1, brings into a play a Timpani option so that the performer may render, then, a timpani score, mutatis mutandis, instead of a tonal one.

Having thus described my invention in its preferred embodiment and alternatives,

I claim:

1. An electrically operated musical device that provides a keyboard in the form of an exchangeable musical score with depressable note heads, said note heads being the effective heads of momentary-contact electrical pushbutton switches adapted to fingertip pressure that control the utterances of an interconnected oscillator-amplifier-loudspeaker system through circuitry wherewith a sound for each musical staff position gains expression when the performer touches a note head in that score position.

2. The electrically operated musical device of claim 1 in combination with a sharp/flat control that provides hand-operated switching for the performer that employs and disemploys pitch determinators within the said oscillator to raise by a half tone, and to lower by a half tone, the pitch of any musical sound brought to utterance by the performer's touch upon a note head.

3. The electrically operated musical device of claim 1 in combination with a quick-operating musical-key changer that provides an integrated array of halftone-controlling electronic elements interconnected with a corresponding array of hand-operated electrical switches whose options change in a trice that tuning of said oscillator's gamut from one musical key to another through circuitry wherewith each one of said switches provides the tones of said oscillator with a sharp option, a flat option, and a natural option through interconnected pitch determinators that said switches employ and disemploy.

4. The electrically operated musical device of claim 1 in the combination with a variable volume control for performer manipulation that so interconnects with the said amplifier-loudspeaker arrangement's volume determinators as to control the musical expression of any sound brought to utterance by the performer's touch upon a note head.

5. The electrically operated musical device of claim 1 in combination with a timbre control that provides hand-operated switching for the performer to employ and disemploy tone formants in the said oscillator that alter the wave form of oscillator output in options to produce utterances imitative of musical-instrument sounds, percussive sounds, and other sounds brought to utterance by the performer's touch upon a note head.

6. The electrically operated musical device of claim 1 structured in a combination of the said exchangeable score and a console that provides a desklike supporting surface with a score holder for said exchangeable score, an array of conductor bars subjacent to said score when within said score holder, and a switch space containing switch levers for controlling organlike tone, pitch, and volume options, said conductor bars being interconnected with said oscillator by pairs in a circuit arrangement where contact between pair members brings on a musical-tone utterance, said array of conductor bars lying subjacent to said exchangeable score within its holder so that each pair of conductor bars (by being suitably embedded in the upper surface of said console) controls a tonal utterance in pitch corresponding to the score position of each said depressable note head that lies immediately above.

7. The electrically operated musical device of claim 1 in combination with a director's override system that provides a disconnectably connectable sharp/flat control for the said oscillator-amplifier for operation remotely by one other than the performer to add and to subtract pitch to and from any musical sound brought to utterance by the performer's touch upon a note head.

8. The electrically operated musical device of claim 1 in combination with a director's override system that provides a disconnectably connectable volume control for the said oscillator-amplifier for operation remotely by one other than the performer to add and to subtract volume to and from any musical sound brought to utterance by the performer's touch upon a note head.

9. A musical score mechanism which provides a musical score of semirigid material whose face bears the staves and the notes of musical notation, with heads of the notes discrete from said score sheet but kept snugly, yet flexibly, attached to said score so as to be depressable, and with a metallic connective piece attached subjacent to each such note head.

10. The musical score of claim 9 with staves, musical symbols, and note-head surfaces made in a tactility enough different from nearby surfaces to inform the blind.

11. The musical score of claim 9 with said note heads formed in the shape of rectangles whose lateral dimension occurs in graduated standard lengths so as to constitute a readable code for telling the performer each note's musical time value according to a system where longer note heads mean longer time values.

12. The musical score of claim 9 with said note heads so formed in shapes apparent at once to sight as constitute an immediately readable code for telling the performer musical time values.

13. The musical score of claim 9 with said note heads so formed in shapes apparent in a trice to touch as to constitute an immediately readable code for telling the blind performer musical time values.

14. The musical score of claim 9 in a multiple arrangement that provides in a booklike form several such scores as pages, with a subjacent array of conductor bars beneath said metallic connective pieces, individual bars of said array being formed in pairs of conductor bars that lie directly beneath said metallic connective pieces so as to interconnect therewith as the related members of momentary-contact electrical switches, said

9

array being contained in a layer of dielectric material cemented to the nether side of said musical score, said array being intracircuited with corresponding members within the booklike pages then terminaied at its distal end so as to be

10

connectable disconnectably to a musical device suitably made for its accommodation in such manner as to make the said musical score in booklike form the keyboard of the said device, its means of being brought to utterance.

5

10

15

20

25

30

35

40

45

50

55

60

65

70

75