United States Patent [19]

Coles

[11] 3,865,004

[45] Feb. 11, 1975

[54] KEYBOARD TYPE MUSICAL INSTRUMENT

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[22] Filed: **July 10, 1974**

[21] Appl. No.: **486,973**

[52] **U.S. Cl.** **84/423,** 84/451

[51] **Int. Cl.** **G10c 3/12**

[58] **Field of Search** 84/423, 428, 442, 451

[56] **References Cited**

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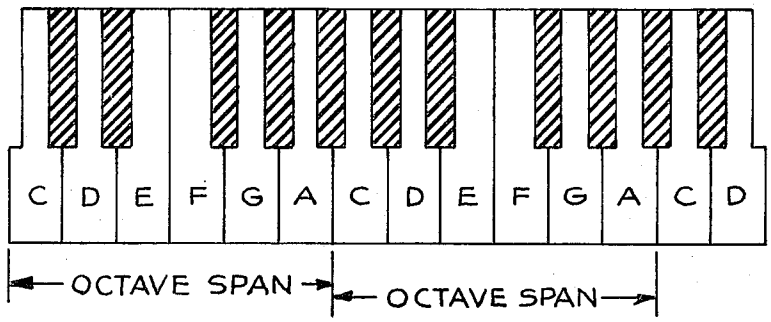
Primary Examiner—Lawrence R. Franklin

[57] **ABSTRACT**

The musical instrument has a keyboard with six lower digitals per octave span; there being not more than one upper digital between each pair of adjacent lower digitals.

The lower digitals of the keyboard play a six-tone scale obtained by omitting one tone from the seven tone diatonic scale. In the preferred embodiment, the lower digitals play the hexachord scale, obtained by omitting the leading tone from the diatonic scale, and upper digitals play the tones D♭, E♭, G♭, A♭, and B. It is shown that reduction of the number of notes from seven to six makes possible a compact and easily learned system of notation while retaining most merits of the diatonic scale.

6 Claims, 5 Drawing Figures



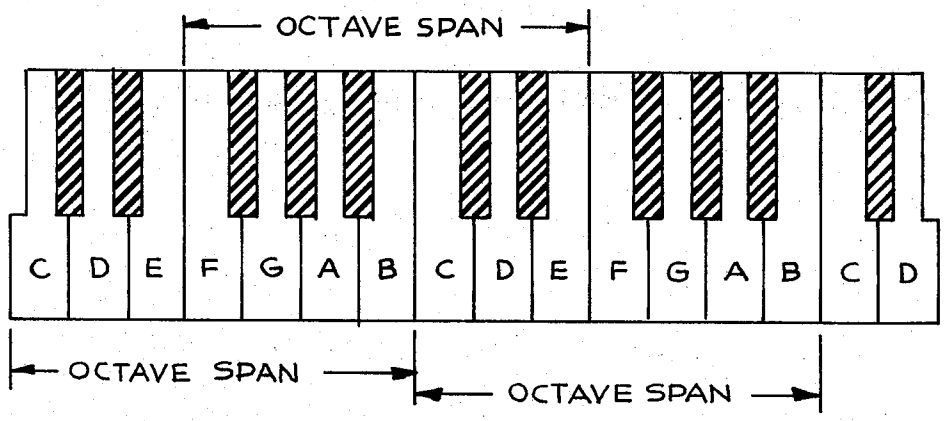


FIG-1

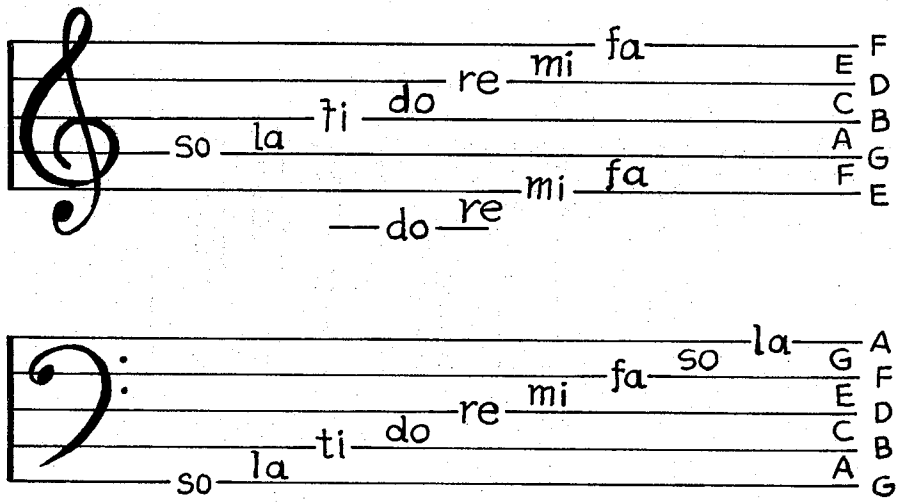


FIG-2

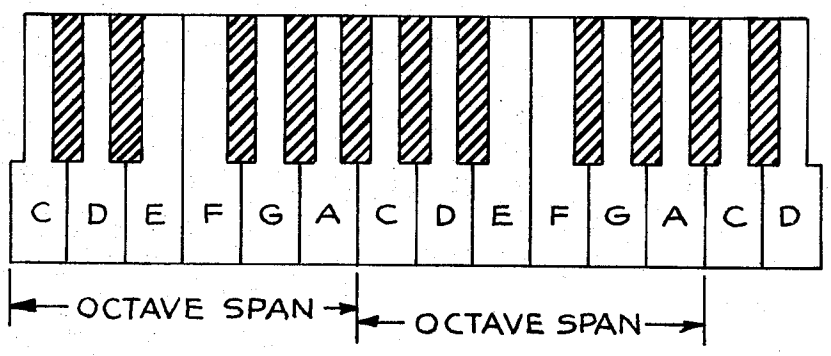


FIG-3

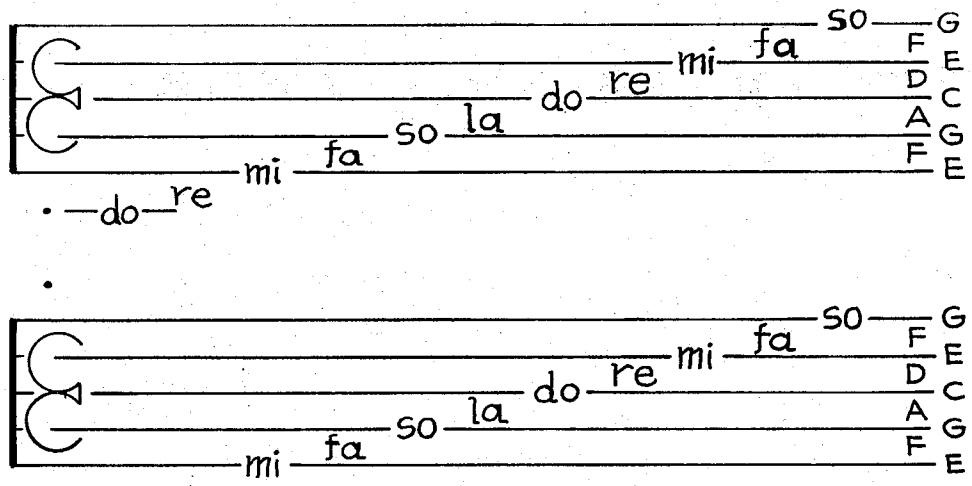
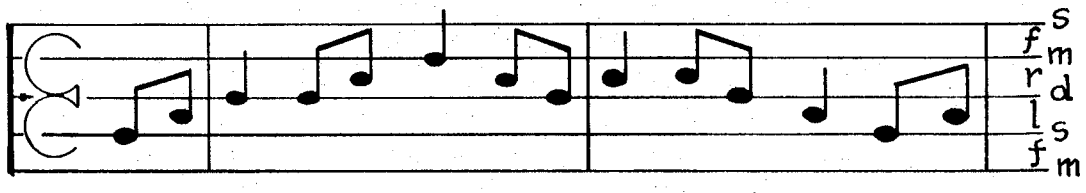


FIG-4



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FIG-5

KEYBOARD TYPE MUSICAL INSTRUMENT

BACKGROUND OF THE INVENTION

The standard musical keyboard used to key individual tones has had much the same configuration for the last 400 years. That keyboard has seven lower digitals and five upper digitals per octave span. Proposed changes have generally been in the direction of increasing its complexity. So far as I am aware, all configurations proposed by others have included at least twelve digitals per octave span or at least seven lower digitals per octave span.

My musical instrument has a keyboard with reduced octave span containing only six lower digitals. It has not more than one upper digital between each pair of adjacent lower digitals. In the preferred embodiment, the musical instrument includes a pitch selecting mechanism.

The origin of the standard keyboard is obscure. The article on "Keyboard" in the 1954 edition of Grove's Dictionary of Music and Musicians states "The permanence of the width of the octave again has been determined by the average span of the hand, and a Ruckers harpsichord of 1614 measures but a small fraction of an inch less in the eight keys than a concert grand pianoforte of the 20th century. We are without definite information as to the origin of the keyboard . . . The first keyboard would be diatonic . . . When the row of sharps was introduced, and whether at once or by degrees, we do not know. We find them complete in a trustworthy pictorial representation of the 15th century. A painting by Memling in the Hospital of St. John at Burges, dated 1479, depicts the keyboard of a regal exactly as we have it in the arrangement of the upper keys in twos and threes." Pitch selecting mechanisms were developed in the 19th century.

I have found that children rapidly acquire appreciation of music if they are encouraged to experiment and improvise simple melodies and harmonies in a hexachord scale, derived from the diatonic scale, by the omission of its leading tone. Elimination of a semitonal interval from the diatonic scale decreases the likelihood of getting unwanted pitch combinations and increases the ability to pick out a tune. Early training of relatively young children is possible if they are allowed to sing rote songs and simultaneously play them on a keyboard instrument. An example of a rote song included in the hexachord scale is "This Old Man Comes Rolling Home." The keyboard serves as a direct graphical representation of tonal relationships for the singer; singing with expression and breathing develop the qualities of intensity and phrasing in the player. This approach, attempted on the traditional keyboard, is marred by the danger of hitting the wrong digital, with its distracting influences. This danger is reduced on my simplified keyboard.

When children are learning sight singing, they become confused by the traditional musical notation which sometimes represents a particular note on a line of a staff, and at other times in a space between the lines. More confusion is caused when a boy who has been trained to sing on the treble clef must later learn to sing on the bass clef, where the lines and spaces are differently labeled. In music written for my hexachord instrument, some of my notes are *always* assigned to lines, the other notes are *always* assigned to spaces.

Moreover, the labeling of the lines in the lower staff is the same as the labeling in the upper staff.

BRIEF SUMMARY OF THE INVENTION

My invention is a keyboard-type musical instrument such as a piano or organ which is specially adapted to play on the lower digitals a six tone scale, which is derived from the diatonic scale by omitting one of its seven tones. In the preferred embodiment, the lower digitals play the hexachord scale, which is composed of the first six tones of the diatonic scale. A compact and easily learned system of notation is described, made possible by reduction of the number of notes from seven to six. The keyboard contains six lower digitals per octave span, where the length of an octave span is defined as the center-to-center distance between two digitals which control tones an octave apart. (See FIG. 1) The keyboard contains at most a single upper digital located between any pair of adjacent lower digitals.

One object of my invention is to reduce the complexity of the musical scale available on the lower digitals, to encourage melodic and harmonic improvisation by children.

A second object of my invention is to provide a reduced musical scale which permits use of a simple and compact notation. In this notation, one group of notes is always represented by lines of a staff and other notes are always represented by spaces between the lines. Moreover, a particular note of the musical scale is always represented in the same position of the lower staff as it is in the upper staff.

FIG. 1 shows the traditional keyboard.

FIG. 2 shows the labeling of the lines and spaces in the traditional treble and bass clefs.

FIG. 3 shows my special keyboard for use with the hexachord scale.

FIG. 4 shows special notation for use with the hexachord scale and with my musical instrument.

FIG. 5 shows music rewritten for my hexachord instrument.

A detailed description of the invention follows. Referring to FIG. 1 the traditional keyboard has seven lower digitals per octave span. Although defined as a center-to-center distance, the octave span may of course be measured between any corresponding points of two digitals, controlling tones an octave apart, or between the cracks to the immediate left or right of these digitals.

Present keyboard instruments employ an equitempered scale with 12 different pitches per octave span separated by equal musical intervals of a semitone. The traditional keyboard with its seven lower digitals and five upper digitals can play each of these 12 pitches per octave span. In FIG. 1 the seven lower digitals to the left play the diatonic scale, which is characterized by the sequence of musical intervals of 2-2-1-2-2-2-1 semitones.

These intervals add up to twelve semitones, so that the pitch to the right of the last interval is just one octave higher than the first pitch of the sequence. The next seven lower digitals repeat the diatonic scale an octave higher, and so on.

In order to avoid ambiguities, I generally use the terms "tone" and "pitch" in a relative way to describe a musical sound relative to other tones in a musical scale. When I intend the term pitch in an absolute sense, I use the specific term "absolute pitch." I reserve

the term "note" for the label itself (such as C or D) which is used to specify a digital and the tone it activates. When a staff is used to record music on paper or blackboard, each musical note is indicated by a sign on the staff. In the traditional keyboard of FIG. 1, the seven lower digitals included in an octave span are labeled C,D,E,F,G,A,B. FIG. 2 shows the correspondence of lines and spaces of the treble and brass staves with the letter labels of the absolute pitches and, for the key of C, the syllable names of the tones of the diatonic scale.

The traditional notation has the serious disadvantage that a particular note may be positioned on either a line or a space, and it is positioned differently in the treble and bass staves. For example, the note E is placed on the bottom line of the treble staff, but also in the fourth space up on the treble staff and the third space up on the bass staff. Children find this notation confusing, especially when learning to sing at sight or to play by ear. The large number of notes in the diatonic scale and the large distance between digitals an octave apart add to their difficulties. It is easily understood then, that a large fraction of out children are unable to master the difficulties of sight singing and playing.

In an attempt to reduce these difficulties I have constructed a reed organ having a keyboard with a reduced octave span containing only six lower digitals. These digitals play the hexachord scale, which is a natural scale comparatively easy to sing. Depending on where one starts it, the hexachord scale may be considered to be made up of the six tones do, re, mi, fa, so, la of the diatonic scale, or six tones do, re, mi, so, la, ti of the diatonic scale. I prefer the first of these alternatives as a basis for my system of notation. The six syllables do, re, mi, fa, so, la and the labels C,D,E,F,G,A have a fixed correspondence with the six lower digitals in each octave span, as shown in FIGS. 3 and 4. This sequence of pitches corresponds to the sequence of musical intervals 2-2-1-2-2-3 semitones.

In the four cases above where the interval between adjacent pitches of the pentatonic scale is two semitones, there can be only a single pitch. I label these pitches D♭ , E♭ , G♭ , and A♭ ; they are controlled by four upper digitals located between the adjacent lower digital pairs C-D, D-E, F-G, and G-A respectively. In the single case where the interval between adjacent pitches of the pentatonic scale is three semitones, there is a choice between two pitches to be controlled by the single upper digital located between the adjacent lower digitals A and C. I preferably have this upper digital play the pitch B of the diatonic scale, which is missing from the hexachord scale. Since B is one semitone below C, this digital and this pitch are labeled C♭ in my system.

My notation employs the customary five-line staves as shown in FIG. 4. The note corresponding to the middle C digital lies on a ledger line between the two staves. The five lines of each staff represent the tones E,G,C,E,G, all members of the major triad based on C. The spaces between the lines in each staff represent the tones F,A,D,F. The first space above the top line of each staff represents the tone A, and the space immediately below the bottom line of each staff represents the tone D. FIG. 4 shows that the hexachord notation is somewhat more compact than the diatonic notation of FIG. 2; the hexachord notation requires only 3 spaces per octave span, as compared with the customary three and one half spaces. The fact that six is divisible by two ensures that a note falling on a line (or space) in one octave will also fall on a line (or space) in all octaves.

The similarity of the notation in the upper and lower staves is related to the fact that two octave spans occupy six spaces. (one more than the number of lines in either staff) The clef symbols at the start of each staff are therefore similar, but they are distinguishable from each other by the dots below the upper symbol and above the lower symbol. These dots indicate the position of middle C digital and note; when the pitch selector is in its central position they also locate the absolute pitch of middle C.

In the preferred embodiment, the upper digital between E and F is absent. This irregularity provides a landmark for the player. Of six-note scales, only the whole tone scale can have six alternating upper and lower digitals, all producing pitches in increasing order from left to right. But the whole tone scale lacks any musical intervals of fourth or fifth, and it contains no natural focal point to serve in the development of tonal patterns.

As an aid to remembering which notes are on the lines and which are in the spaces of the staff, I slightly change the traditional names of the notes to do-ra-mo-fa-so-la. This change makes the notes corresponding to lines end in *o*, and those corresponding to spaces end in *a*. (It also reduces the problem of pronouncing Italian names and frees the names re and mi for those who use syllables ending in *e* and *i* to name the series of flats and sharps) Table 1 indicates the fixed relationships between the lines and spaces of the staff, the note names, and major and minor triads.

TABLE 1

Lines of Staff	Spaces of Staff
primary notes C,E,G	secondary notes D,F,A
major triad do-mo-so	minor triad ra-fa-la

Many well known melodies can be played entirely on the lower digitals of my organ. FIG. 5 shows the beginning words and music of a Scotch tune that is included in the hexachord scale. In this case the dot by the clef sign indicates that this staff is centered about middle C note and digital.

In the United States, the Sol-fa syllables are generally used in a movable do system, whereas in Continental Europe they are frequently used in a fixed do system, which associates the syllables with fixed notes, fixed digitals, and fixed absolute pitches.

Tonality relationships can be easily taught by bringing singing children into early and intimate relationship with the keyboard of a piano or organ. For this purpose, I propose to use the so-called fixed do system which associates the Sol-fa syllables with fixed digitals of the keyboard, but to dissociate the Sol-fa syllables from fixed absolute pitches. The advantages of the movable do system can be retained if the keyboard instrument is provided with a pitch selecting mechanism. In this way, music for voice and keyboard instrument can always be written in the "key" of C, without the troublesome key signature; by mechanical transposition the absolute pitch of the music can be adjusted to suit the voice by means of a pitch selector. Accord-

ingly, my reed organ is provided with a transposing mechanism which moves the tone generator assembly laterally with respect to the fixed keyboard.

Pitch selecting mechanisms of this kind are well known. One is described in my U.S. Pat. applic. No. 395,002.

With a keyboard containing several octaves of hexachord scale, it is possible to start on six different lower digitals and obtain sequences of musical intervals of 2,2,1,2,2,3 semitones, 2,1,2,2,3,2 semitones, 1,2,2,3,2,2 semitones, 2,3,2,2,1,2 semitones, 3,2,2,1,2,2 semitones, and 2,2,3,2,2,1 semitones. I include all six of these sequences as different modes of the same hexachord scale. The first of the above modes corresponds to the tones, do,re,mi,fa,so,la of the diatonic scale, and is used as a basis for the system of notation of FIG. **4.** The last of the above modes corresponds to the tones do,re,mi,so,la,ti of diatonic scale. Since this mode starts five semitones above the starting point of the first mode, melodies based on this mode would have as keynote the note F in the notation of FIG. **4.**

While my invention has been described with reference to a reed organ, it is not restricted to this embodiment. The invention is applicable to any other keyboard type musical instrument such as a piano or accordian. The instrument is not necessarily equipped with pitch selecting means. The term "keyboard" is used generically to include the pedalboard or clavier of an organ. The term "digital" includes the pedal. The tones controlled by the upper digitals may be different from those chosen for the preferred embodiment.

The instrument may be used to play different six-tone scales on its lowere digitals. Table 2 shows the hexachord scale and four other six-tone scales derived from the diatonic scale by elimination of one of its tones.

TABLE 2

Diatonic Tones Used	Interval Sequence
C-D-E-F-G-A-C	2-2-1-2-2-3
C-D-F-G-A-B-C	2-3-2-2-2-1
C-D-E♭-F-G-A-C	2-1-2-2-2-3
C-D-E-F-G-B-C	2-2-1-2-4-1
C-E-F-G-A-B-C	4-1-2-2-2-1

I claim:

1. A musical instrument having a plurality of tone generators which produce a sequence of pitches proceeding from low to high in an approximately equitempered scale, with 12 semitones per octave,

a keyboard having six lower digitals per octave span, not more than one upper digital disposed between two adjacent ones of said lower digitals,

said lower digitals being consecutively numbered from left to right, starting with lower digital number one to the left of said keyboard, said lower digital number one controlling a predetermined lowest pitch generated by one of said tone generators, each of said lower digitals with a number N greater than six controlling a pitch one octave higher than the pitch controlled by that lower digital which has a number equal to N-**6,** wherein the improvement comprises:

any six consecutive ones of said lower digitals play a six tone scale which is derived from the diatonic scale by the omission of one of its seven tones.

2. The musical instrument of claim **1** in which:

lower digitals number two,, three, four, five, and six control pitches respectively two, four, five, seven and nine semitones above said lowest pitch.

3. The musical instrument of claim **1** in which lower digitals number two, three, four, five and six control pitches respectively two, five, seven, nine and eleven semitones above said lowest pitch.

4. The musical instrument of claim **1** in which:

lower digitals number two, three, four, five, and six control pitches respectively two, three, five, seven, and nine semitones above said lowest pitch.

5. The musical instrument of claim **1** in which:

lower digitals number two, three, four, five, and six control pitches respectively two, four, five, seven, and eleven semitones above said lowest pitch.

6. The musical instrument of claim **1** in which:

lower digitals number two, three, four, five, and six control pitches respectively four, five, seven, nine, and eleven semitones above said lowest pitch.

* * * * *