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EP 0 053 393 B1

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Description

Background and summary of the invention

This invention relates to a sheet music printing system for printing sheet musics.

Heretofore, in printing a sheet music as shown in the parts (A) through (D) of Figure 1, a person familiar with music draws the staff, notes, etc. as required, and the resultant original is subjected to photochemical process to form a printing plate. Therefore, printing sheet musics need a lot of labor and time; that is, it is impossible to quickly and correctly print sheet musics.

Accordingly, an object of this invention is to eliminate the above-described difficulty accompanying a conventional sheet music printing method. More specifically, an object of the invention is to provide a sheet music printing system which can print sheet musics quickly and readily.

The foregoing object and other objects of the invention have been achieved by the provision of a sheet music printing system which, according to the invention, comprises: a music data inputting device for inputting data on a sheet music; a data processing device for processing data from the music data inputting device into predetermined processing codes; a first memory device for storing the processing codes outputted by said data processing device; an editing device for editing outputs of said first memory device according to a predetermined program which includes the functions defined in claim 1; a second memory device for storing music codes outputted by said editing device; a font memory for storing printing patterns corresponding to said music codes; and a photo-composing machine for forming a block copy for said sheet music according to the music codes from said second memory device and the printing patterns from said font memory.

The nature, principle and utility of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

Brief description of the drawings

In the accompanying drawings:

Figure 1 is a diagram showing one example of music;

Figure 2 is a block diagram showing one example of a sheet music printing system according to this invention;

Figure 3 is a block diagram showing a part of the system in detail;

The parts (A), (B) and (C) of Figure 4 are diagrams showing layout containers for different pages;

The parts (A) through (G) of Figure 5 are diagrams showing various bar lines;

Figure 6 is a diagram showing layout of rests;

Figure 7 through Figure 12 are diagrams for a description of the edition of serial notes;

Figure 13 is a diagram for a description of the function of combining bars;

Figures 14 and 15 are diagrams for a description of the layout of tremolo;

The parts (A) through (F) of Figure 16 are diagrams showing music patterns stored in a font memory;

Figure 17 is a perspective view showing the external appearance of a music data input device in the invention;

Figure 18 is a diagram showing the arrangement of keys on the music data input device in Figure 17;

Figure 19 is a block diagram showing various devices concerning the music data input device in the invention;

Figure 20 is a flow chart for a description of an initial setting operation;

Figure 21 is a diagram showing one example of a display on a display device in the initial setting operation;

Figure 22 is a diagram showing one example of music for a description of a music data inputting operation;

Figure 23 is a diagram showing one example of the arrangement of operating keys in the invention;

Figure 24 is a diagram showing one example of a display on the screen of the display device in the invention; and

Figure 25 is a diagram for a description of the operating range of a scale key in the invention.

Detailed description of the invention

A sheet music printing devide according to this invention, as shown in Figure 2, comprises: a music data inputting device 1; a data processing device 2 for processing data from the music data inputting device 1 and converting them into predetermined process codes PC; a floppy disk 3 for storing process codes PC provided by the data processing device 2; an editing device 4 for editing the output of the floppy disk 3 according to a predetermined program; a magnetic tape 5 for storing music codes MC outputted by the editing device 4; a font memory 6 for storing a printing pattern corresponding to music codes MC; and a photo-composing machine for forming a block copy (galley) 8 according to a printing pattern provided by the font memory 6.

The editing device 4, as shown in Figure 3 in detail, comprises: an analyzing/processing unit 43 for carrying out analyzation according to a work 40 and a constant file 41 with data from the floppy disk 3 as input data, to form a layout data file 42 as intermediate data; an editing/processing unit 46 for setting up notes and symbols according to the constant file 41 and the layout data file 42, to form a correction file 45; a

correcting/processing unit 48 for processing correction data 47 to adjust the positions of notes or the like in the correction file 45; and an outputting/processing unit 49 for setting up data from the correction file 45 according to the constant file 41 and outputting the data thus set up to the magnetic tape 5.

The input data 31 are to specify a layout container, and kinds and positions of notes to be set up. The constant file 41 includes common information such as film sizes and note points (sizes) which can be changed as desired. The layout data file 42 is an input file to the editing/processing unit 46, which includes edition instruction information and data groups. The correction file 45 includes edition result information which is edited by the editing/processing unit 46, carrying out the proof of note positions or the like. The music codes MC stored in the magnetic tape 5 are inputted to the photo-composing machine 7 where they are printed on a film or a photographic printing paper.

A fundamental layout function according to the invention will be described.

Four film sizes, A4, A5, B4 and B5 are employed in the invention and are selectively used. A reference point RP for setting positions on a page is set at an upper left position on a page which is so set that its longer sides are vertical as shown in Figure 4.

The music layout container can set at a given position (x_1, y_1; x_2, y_2; or x_3, y_3) from the reference point RP; that is, it can set a stage, large staff, score, record, bar, record length and record width as desired.

As shown in the part (A) of Figure 4, the term "stage" is intended to mean the combination of a plurality of staffs for a performance with a plurality of musical instruments; the term "large staff" is intended to mean the combination of a treble staff and a bass staff for a performance with the piano and the organ; the term "score" is intended to mean the combination of some staffs for a chorus music or concerted music performance; and then term "record" is intended to mean each staff in a stage. The space between records is referred to as "a record space".

Furthermore, the term "bar" is intended to mean the space between adjacent bar lines in a record. The length of a bar is referred to as "a bar length". The term "record length" is intended to mean a length in a direction in which notes in a record are described. The term "record width" is equal to the distance between the first and fifth lines of a staff. The bar can be divided into equal parts according to beats, and each part is referred to as "a column". The length of a column is referred to as "a column length".

The layout container is set according to the stage start point (x, y), the record width, the number of records, the record space, the record length, the number of stages, and the stage space. The layout is carried out by repeatedly setting the same layout container until the music is ended. Only the number of stages and the stage start point (x, y) for page 1 can be changed. The number of bars in each stage is determined in editing; however, the stage may be changed forcibly by specifying more than one bar.

The tops of records in a stage are connected with one continuous line DS (which may be called "a stage top line DS"), and the score and the large staff are connected with a bracket DG and a brace CG, respectively. In the case where the score and the large staff are overlapped, they are set up in the order of a bracket and a brace, and their layout positions are at fixed distances from the stage start point. The record is provided by drawing five parallel lines (the width of each line being fixed according to the record width) as long as the record length from the line DS. A clef is set at the top of the record. That is, a violin clef, bass clef, alto clef, tenor clef, soprano clef, mezzo soprano clef and baritone clef are selectively specified to be set at the top of the record. In the case where a temporary clef is present between notes in a record, the clef for the next record and so forth is changed to the temporary clef, and its layout position is fixed according to the record width.

Three different symbols, sharp (♯), flat (♭) and natural (♮) are employed as key-signatures. The editing/processing unit 46 determines the key-signature layout position according to the clef and the number of layout positions. Only the natural and sharp symbols or the natural and flat symbols may exist mixedly, and the layout is started with the natural symbol. The layout is effected in units of bars, and it is not carried out if a key-signature in a record is the same as that in the preceding record.

Numerals "1", "2", "4", "8", "16", "32", or "64" can be used as the denominator of a time signature, and any integer of from "1" to "50" can be used as the numerator. The layout of the time signature is effected for each bar, but if a time signature in a bar is the same as that in the preceding bar, the layout of the time is not carried out for that bar. Two time signatures can be laid out simultaneously. In the case where the key-signature is changed beginning from the top bar in the next stage, a new key-signature is set in the end of the record of that stage. In the case where the time signature is changed beginning from the top bar in the next stage, a new time signature is set at the end of the record of that stage. When both the key-signature and the time signature are changed, a new key-signature and a new time signature are set.

A bar line is drawn at the end of a bar. A vertical line as shown in the part (A) of Figure 5, a double vertical line as shown in the part (B), repeat marks as shown in the parts (C) through (F), a great double bar as shown in the part (G) and a dummy bar line not printed are selectively specified. A bar line in a large staff is one ruler line. In the case where a bar line at the end of a record is the repeat mark as shown in the part (D) of Figure 5, it is changed into a vertical line, and the repeat mark as shown in the part (D) of Figure 5 is set at the top of the next bar. In the case where a bar line at the end of a bar is the repeat mark as shown in the part (F) of Figure 5, it is changed into the repeat mark as shown in the part (C), and the repeat mark in the part (D) is set at the top of the next bar.

Simple notes, simple rests, dotted notes, dotted, rests, double-dotted notes, and double-dotted rests can be set. The simple notes of from a whole note to a 64th note can be set, and the simple rests of from a

whole rest to a 64th note can be set. The dotted notes of from a dotted whole note to a dotted 64th note can be set. The dotted rests of from a dotted whole rest to a dotted 64th rest, the double-dotted notes of from a double-dotted whole note to a double-dotted 64th note, and the double-dotted rests of from a double-dotted whole rest to a double-dotted 64th rest can be set.

It should be noted that all kinds of printing patterns are not provided for the notes. A note is formed by combining a note head, a note hook and a dot. The stem is formed by a ruler line. Printing patterns are provided for the rests except for the dots.

A basic column length in a bar can be calculated from the following expression (1):

$$\text{Basic column length} = (\text{basic note} \times \text{space}) / (\text{shortest note in bar}) \quad (1)$$

where the space is the distance between the heads of adjacent shortest notes, and the basic note is the note which is indicated by the denominator of a time signature.

The basic bar length can be obtained by multiplying the basic column length by the number of the beat, and further adding a key-signature, a time signature or some space within the bar, if necessary. In the case where a stage consists of a plurality of records, the basic bar lengths of the records are obtained, and the longest of the basic bar lengths is employed as the basic bar length of that bar. The layout position of the top note in a bar is on the column start point (in the direction x) of the first column and is therefore not affected by an accidental or a grace note. The layout positions of the notes in a bar are determined relative to the respective column start points.

The length of a note set (the position of a note to be set next) can be obtained from the following expression (2):

$$\text{Length} = (\text{basic column length}) \times (\text{basic note}) / (\text{set note}) \quad (2)$$

In the case where the sum of lengths exceeds the basic column length, a value obtained by subtracting the basic column length from the sum of lengths represents a layout relative position from the column start point of the next column. The layout position of a rest is as shown in Figure 6. The dots of dotted notes are put rightside of the note when the note head locates between lines, and are put between lines when the note head locates on a line.

A stem is extended upwardly or downwardly, and the direction of a stem can be determined according to the results of edition and can be changed for each bar. As a result of the edition, where a note head is above the third line, the stem is extended downwardly; where it is below the third line, the stem is extended upwardly; and where it is on the third line, the stem is extended downwardly. A plurality of notes different in pitch which can be produced simultaneously for instance with the piano can be handled as one note (cf. A1 in the part (A) of Figure 1). However, these notes are set beginning with the lowest note. If there is a second interval between adjacent notes, the notes are set on both sides of the stem. In the case where the direction of the stem is determined according to the edition, the layout of the notes is determined according to where the average of the pitches of the notes is located in the staff.

The layout is carried out for each bar. The first bars in the records of a stage are set up beginning with the top record, and similarly the second bars and the third bars and so forth are set up (as 1→2→3→4→5→6 in the part (A) of Figure 1). In the case where a note (or a note head) is set above or below the staff, an additional line AL is inserted as shown in the part (C) of Figure 1; however, where a note is set immediately above or below the staff, no additional line is inserted. Five kinds of accidentals: sharp, flat, natural, double-sharp and double-flat signs: are available. These accidentals are set at the left sides of respective notes (or note heads). In the case where accidentals are set for plural notes different in pitch, the accidentals should be set in a lateral direction beginning with the note which is highest in pitch. However, in the case where the difference in pitch is of the fifth, the accidentals are set vertically. If there is no space for setting an accidental for a note between that note and the preceding note, then the layout position of that note, the column length and the bar length should be changed. If an accidental should be set for a note which is on the column start point, the column start point after that column and the column length of the preceding column should be changed. If it is required to set an accidental for a note located in a column, then the layout positions of notes after that note in the column, the column length of the column and the column start points of the succeeding columns should be changed.

Three kinds of grace notes (S_1 in the part (B) of Figure 1 and S_2 in the part (C) of Figure 1): long appoggiatura, short appoggiatura and double appoggiatura: are available. The space between double appoggiatura notes is a half (1/2) of the space which is obtained by calculating the lengths of the notes as those of ordinary notes. An accidental accompanying a grace note is set similarly as in the case where it accompanies an ordinary note.

Now, the edition and layout of a serial note will be described. There are two types of serial notes one of which is shown as R_1 in Figure 1(b), and the other is shown as R_2 in Figure 1 (C). The former will be referred to as "a serial note 1", and the latter as "a serial note 2".

In the edition of a serial note 1, the stems of the two notes at both ends are connected with a line. First, the angle (α) of the line KL is obtained from the following expression (3):

$$\alpha=\sin^{-1}\frac{b}{\sqrt{a^2+b^2}} \tag{3}$$

where a is the distance between two notes, and b is the difference in level between the tops of the stems, as shown in Figure 7. The two notes are connected with the line KL at the obtained angle (α).

Then, the coordinates (x, y) of the two notes are determined with a bar start point as the original point O. It is assumed that the coordinates Pn of the n-th note in a serial note is (x_n, y_n). In the case of a pure tone, the note coordinate position is at the note head; and in the case of a chord, the coordinate position is at the average thereof. A left average coordinates P_L (x_L, y_L) and a right average coordinates P_R (x_R, y_R) will be defined as follows: If the number of notes is represented by N, then N=2m or N=2m−1 (where m is the natural number).

$$\left.\begin{aligned} x_L &= x_1 \\ y_L &= \frac{\sum_{n=1}^{N} y_n}{m} \end{aligned}\right\} \tag{4}$$

$$\left.\begin{aligned} x_R &= x_N \\ \text{When } N=2m,\ y_R &= \frac{\sum_{n=m+1}^{N} y_n}{m} \\ \text{When } N=2m-1,\ y_R &= \frac{\sum_{n=m}^{N} y_n}{m} \end{aligned}\right\} \tag{5}$$

The inclination (α) of the line is:

$$\alpha=\frac{y_R-y_L}{x_R-x_L} \tag{6}$$

Thirteen inclination −6/10, −5/10, ... and +6/10 of the line can be actually printed. Among these inclinations, one most closest to the expression (6) is employed. If, even when an inclination is calculated as 0/10, the value of the expression (6) is not zero (0), then a minimum inclination +1/10 or −1/10 is employed. Furthermore, when the value y_n is naturally increased or decreased as shown in the part (A) or (B) of Figure 9, the minimum inclination value is set to −1/10 or +1/10, in order that the line inclination is made smaller than the inclination of a line which connects the note heads as shown in the part (A) of Figure 10 or that the line is set horizontal irrespective the positions of the two notes at both ends.

In the case where a serial note consists of notes different in duration time, the range is obtained according to the length of longer notes, and is set to a note immediately before another note which is longer than the note to be lately set as shown in Figure 11(A), (B), and where a shorter note exists separately this note is set as a note of predetermined length without connecting stems as shown in Figure 12(A) through (D). The stems in the serial note 1 may be extended upwardly or downwardly. The layout position of the serial note 2 is set similarly as in the ordinary note; however, the notes in the range are handled as a beat number different from the ordinary one, and the column length of that column and the column start points of the succeeding columns are renewed. The centers of the top and last notes in the range are connected with "⌐¬", and a serial note number 1, 2, 3, ... or 9 is set in the blank at the center of "⌐¬".

When notes are set in a record, the record may have a blank region at the end portion. The blank region is equally distributed over the bars therein, so that the record ends are in alignment with one another. In the case of the ordinary record, the blank region at the end portion is equally distributed over the bars in the record, and a part of the blank region distributed to a bar is proportionally distributed between the notes with the shorted note as a reference. Adjustment of the last record is carried out according to a predetermined allowance PL and the length EL of a blank region at the end portion of the record. In the case

of PL≧EL, similarly as in the case of the above-described ordinary record, the blank region is allowed to be absorbed by the bars. In the case of PL<EL, adjustment of the blank region is not carried out; that is, the length of the last record is reduced.

In the case of a sheet music including at least two parts in one record similarly as in a chorus music, the parts are edited as different bars and combined together (cf. Figure 13). In combination of bars smaller than a beat number, the shortage is complemented with a dummy rest. The dummy rest is not outputted on a film or a printing paper; a blank region corresponding to the duration of the dummy rest is obtained, and the next note (rest) is set.

In addition to notes, other various symbols concerning tone stresses and durations must be used to form a sheet music. These will be described below:

For the entirety of a music, only a speed symbol is employed. The layout position is at the fixed position of the first bar in the first record as indicated by HE in the part (A) of Figure 1. A symbol such as "segno" or "fermata" (pause) accompanying a bar is set with the center of the symbol above the bar line as indicated by SN in the part (B) of Figure 1. In the case of a double bar, the layout is made with the rear edge of the character aligned with the bar line. A symbol such as "D.S." ("dal segno"), "D.C." ("da capo") or "Fine" ("fine") is set with the rear edge of the symbol below the bar line as indicated by A2 in the part (B) of Figure 1. A symbol "v" (breathing) is set on the fifth line and between the relevant note and the preceding note, as indicated by A3 in the part (B) of Figure 1.

An "arpeggio" symbol ($\S$, $\S$ or $\S$) is set at the left-handed side of a note as indicated by A4 in the part (C) of Figure 1. The length of the symbol should be equal to the distance between note heads, and in the case where an accidental such as a "sharp" symbol is used, the "arpeggio" symbol is set at the left-handed side of the accidental. Symbols ">" ("sforzando"), "·" ("staccato"), "v" ("staccatissimo") and "–" ("tenuto") are set at a predetermined distance from the heads or the stem tops of respective notes (cf. A5 in the part (C) of Figure 1).

Other symbols such as "f" ("forte"), "ff" ("fortissimo"), "p" ("piano"), "pp" ("panissimo"), "mf" ("mezzo forte") and "mp" ("mezzo forte") are set at a predetermined distance from the heads or the stem tops of respective notes, similarly as in the case of the above-described symbol ">"; however, if the position is in the record, then the position should be at a predetermined distance from the fifth or first line.

Symbols which should be set for a plurality of notes, such as "crescendo", "decrescendo" and "octave" are set at a predetermined distance from the heads or the stem tops of the notes in the range; however, if the position is in the record, then the position should be at a predetermined distance from the fifth or first line. The layout is made in such a manner that the character pattern is extended from the left edge of the top note in the range to the right edge of the last note. In the case where the layout is over a plurality of stages, it is divided into two parts in such a manner that the first part is extended from the top note in the range to the record end, and the second part is extended from a start point at a predetermined distance from the same record start point in the next stage to the last note in the range, as indicated by A5 in the parts (A) and (B) of Figure 1.

In the case of "tremolo", the note or notes are performed quickly and repeatedly. "Tremolo" includes one or two sounds. If "tremolo" is treated as normal notes, its resultant set becomes not matchable to time signature so that "tremolo" consisting of one sound is adjusted to the note to be actually outputted when inputted. The position of the note to be set next is determined according to the note used for calculating the length. "Tremolo" consisting of two sounds is set by obtaining the angle between two notes in a manner similar to that of serial notes aforementioned, and then connecting the tops of the stems to draw a lateral line, besides putting other lines shorter than the lateral line by a predetermined length at the center of the notes. Furthermore, where all notes are treated as "tremolo", three declined lines are set between the notes and the length of the lateral lines is determined by the value of the constant file. The text is set to the positions corresponding to respective notes and printed out.

An initial set data picture consists of a common information picture and a record information picture for specified records, and the contents are retyped as the data are inputted successively according to the cursor. Where an input item is omitted, the cursor is advanced to the next item by depressing a predetermined key. Initially set items are inputted when input requests are indicated on the picture. The music data input device 1 inputs data according to the following procedure:

Item	Input method
(1) Music start	Predetermined key
(2) Job name	Eight character
(3) Film size	
(4) Start point x	Point value of three digits or less

Item	Input method
(5) Stage length	Point value of three digits or less
(6) Music top indent	Point value of three digits or less
(7) Layout of page 1	
(a) Start point y	Point value of three digits or less
(b) Number of stages	Value of 30 or less
(c) Stage space	Point value of three digits or less
(8) Layout of ordinary pages	
(a) Start point Y	Point value of three digits or less
(b) Number of stages	Value of 30 or less
(c) Stage space	Point value of three digits or less
(9) Music end adjustment data	Point value of three digits or less
(10) Minimum bar length	Point value of three digits or less
(11) Shortened note space	Point value of three digits or less
(12) Speed symbol	Note duration, and value of three digits or less
(13) Number of records	Value of 30 or less
(14) Score	Start record number, and end record number
(15) Large staff	Start record number, and end record number
(16) Record width	1—5 code section
(17) Clef	Key operation
(18) Time signature	Key operation
(19) Key-signature	Key operation
(20) Record space	Point value of three digits or less
(21) Symbol point	1—3 code selection
(22) Data input mode	1 and 2 code selection

The data inputted according to the above-described procedure are processed by the data processing device 2. A process code PC outputted by the data processing device 2 is stored in the floppy disk 3, and is then stored in the magnetic tape 5 after being edited by the editing device 4. When the data in the magnetic tape 5 is inputted to the photo-composing machine 7, a printing pattern stored in the font memory 6 is read

out according to the data thus inputted, and a block copy 8 is formed using the printing pattern. Note patterns as the printing patterns are, for instance, as shown in the parts (A) through (F) of Figure 16. By using these patterns, notes are formed.

As shown in Figure 17, the sheet music printing system comprises: an operating panel 10 having a forwardly inclined surface; a music data input device 11 (1); a display device (CRT) 12; and a memory control circuit (13). The music data input device is a desk type one in which operating keys 100 are operated to apply various music symbols and printing instructions to the data processing device 2. The display device 12 performs a display operation according to a predetermined program for introducing initial set data inputs and music data inputs. The memory control circuit (13) stores music data from the music data input device 11 and causes the display device 12 to display the data in its message area. The memory control circuit (13) further operates to display the data at a predetermined position after confirming it, and to transfer the data to the floppy disk 3. Thus, the sheet music printing system follows instructions from the display device 12, and inputs printing music data successively while confirming the instruction, to for printing music codes.

The kinds of operating keys 100 and the arrangement thereof are as shown in Figure 18. The arrangement of the system is as shown in Figure 19. The output of the music data 11 is applied to the data processing device 2. The data processing device 2 in cooperation with memory 13 and a memory control circuit 14 causes the display device 12 to perform necessary guide display and input display. According to the inputted data, data are outputted to the floppy disk 3 and a sheet tape 5A. The editing device 4 is illustrated in Figure 3 in detail.

Referring to data processing for note layout and for distributing a blank region at the end of a record over bars, music data inputting will be described.

The music data inputting operation is divided into an initial setting operation and a data inputting operation. The flow chart of the initial setting operation is as shown in Figure 20. The inputting operation is carried out by operating the operating keys 100 in the data inputting device 1. Therefore, first, the kinds and functions of the operating keys 100 will be described with reference to Figure 18.

A key K1 is a brake key to forcibly stop an operation which is out of control. A key K2 is an upper part instruction key which, in the case where a key has two functions, instructs the upper part. Keys K3 through K8 are music keys for inputting music symbols marked thereon, respectively. A key K9 is a lower part instruction key which, in the case where a key has two functions, instructs the lower part. Keys K10 to K13 are range symbol instruction keys adapted to instruct range symbols marked thereon, respectively. The lower part of the key K13 is a range symbol instruction key for instructing and inputting a range symbol in the form of a code. Keys K14 through K18 and K32 through K36 are music keys for instructing rests, etc. marked thereon. A key K19 is to instruct "record" (RCD) and "music" (MSC) for instruction the start and end of a music. A key K20 is a scale key for lowering a scale by two octaves. A key K22 is a scale key for lifting a scale by two octaves. A key K21 is a scale key for restoring a scale. Keys K23 through K25 are symbol keys for instructing symbols marked thereon. The lower part "MRK" of the key K23 is a key for inputting a symbol accompanying a note in the form of a code. Keys K26 and K27 are position specifying keys for instructing the direction of stems in a serial note and the position of a symbol. Keys K28 through K31 are correction keys for correcting input data or the like. The key K28 is a correction start key for instructing the start of correction. The key K29 is a correction end key for instructing the end of correction. The key K30 is an addition key for instructing the addition of data. The key K31 is an elimination key for instructing the elimination of input data. A key K37 is a bar "STU" key for instructing the inputting of bar data. A key K48 is a part "PRT" key for instructing the inputting of part data. Keys K38 through K40 are music keys for inputting music symbols marked thereon. A key K41 is one for specifying the direction of stems in the entire part. A key K42 is one for instructing the inputting of a key-signature. Keys K43 through K47 are music keys for inputting music symbols marked thereon. Keys K49 through K62 are scale keys for specifying and inputting a two-octave scale. A key 63 is a punctuation key for punctuating data inputs. Keys K64 through K73 are ones for inputting notes and numerals marked thereon. Alphabetical characters are used only for a job name. Only when the keys K37 through K62 are depressed after the key K19 (MSC) has been depressed, the alphabetical characters are inputted. The alphabetical characters A through Z are provided for the keys K37 through K62, respectively.

For inputting the music data, first the initial setting operation is carried as indicated in Figure 20 in detail. In this operation, display of the display device 12 is carried out as indicated in Figure 21, for instance. Data is displayed in message areas 122 and 123 on the screen, and the data is shifted to a predetermined position after being confirmed correct. The shifting of data is carried out according to the movement of a cursor displayed on the screen. Data is inputted in two modes. In one of the modes, data is inputted for every bar; and in the other mode, data is inputted for every record.

It is assumed that data on music as shown in Figure 22 are inputted by the music data inputting device 1. The actual operations in this case are as listed below:

I. Initial setting inputting procedures

Input order	Key depression order	Screen state, input content
1	K19	
(Job name input request)		
2	K51, K50, K52, K57, K56, K41, K53, K56	Inputting with English character keys (K37—K62)
(Film size input request)		
3	K66	Size B5
(Start point x input request)		
4	K65, K64, K64	100 points
(Stage length input request)		
5	K68, K64, K64	400 points
(Music top indent input request)		
6	K65, K64, K64	100 points
(Page 1 start point y input request)		
7-1	K72, K64	80 points
(Page 1 number-of-stages input request)		
7-2	K65	One stage
(Page 1 stage space input request)		
7-3	K63	
(Ordinary page, start point y, number-of-stage and stage space inputs request)		
8	K63	
(Music end adjustment data input request)		
9	K68, K64, K64	400 points
(Minimum bar length input request)		

Input order	Key depression order	Screen state, input content
10	K63	
(Minimum note space input request)		
11	K63	
(Speed symbol input request)		
12	K71, K66	Note duration
	K65, K66, K64	Numeral
(Number-of-records input request)		
13	K66	
(Score input request)		
14	K63	
(Large staff input request)		
15	K65	Start record No.=1
	K63, K66	End record No.=2
(Record width)		
16	K66	20 points
(Clef)		
17	K32	
(Time signature)		
18	K40	
(Pitch)		
19	K43, K66	
(Record space)		
20	K63	
(Symbol point)		
21	K66	12 points
(Record width)		
22	K67	24 points
(Clef)		
23	K34	Bass clef
(Time signature)		

Input order	Key depression order	Screen state, input content
24	K68 K63 K68	Denominator Numerator
(Key-signature)		
25	K44 K65	
(Record space)		
26	K69, K64	50 points
(symbol point)		
27	K67	14 points
(Data input mode selection)		
28	K66	Inputting for every record

II. Data inputting procedure

Input order	Key depression order	Screen state, input content
		Display of staff, tone, beat and key-signature
1	K71, K58	First note (displayed in message area 122)
	K63	First note (displayed on the staff)
2	K71, K40, K45	Second note (displayed in message area 122)
	K63	Second note (displayed on the staff)
3	K34, K65	Baritone clef (displayed in the message area 122)
	K63	Baritone clef (displayed on the staff)
4	K71, K58, K10, K27	third note (displayed in message area 122) Octave symbol start inputting
	K63	Third note and octave symbol start (displayed on the staff)
5	K71, K40	4th note (displayed in message area 122)
	K63	4th note (displayed on the staff)

Input order	Key depression order	Screen state, input content
6	K14	Bar line inputting (displayed in message area 122)
	K63	
7	K37, K63	Bar punctuation inputting (displayed in message area 122)
8	K42, K43, K66	Key-signature inputting (displayed in the message area 122)
	K63	Key-signature (displayed on the staff)
9	K42, K44, K66	Key-signature inputting (displayed in the message area 122)
	K63	Key-signature (displayed on the staff)
10	K41, K27	Direction of the stems in 1st part (displayed in message area 122).
	K63	
11	K71, K66, K61	1st note (displayed in message area 122)
	K63	1st note (displayed on the staff)
12	K72, K22, K49	2nd note (displayed in message area 122)
	K63	2nd note (displayed on the staff)
13	K70, K21, K62, K10	3rd note (displayed in message area 122)
	K63	3rd note (displayed on the staff)
14	K48	1st part punctuation 2nd part starts
15	K72, K52, K13, K26	1st note (displayed in message area 122)
	K63	1st note (displayed on the staff)

Input order	Key depression order	Screen state, input content
16	K72, K52	2nd note (displayed in message area 122)
	K63	2nd note (displayed on the staff)
17	K72, K58	3rd note (displayed in message area 122)
	K63	3rd note (displayed on the staff)
18	K72, K58, K13	4th note (displayed in message area 122)
	K63	4th note (displayed on the staff)
19	K18, K33	Dummy half-rest (displayed in message area 122)
	K63	Dummy half-rest (displayed on the staff)
20	K15	End bar line (displayed in message area 122)
21	K19	1st record punctuation 2nd record starts clef, time-signature and key-signature displays
22	K71, K67, K20, K54, K21, K63, K53, K43, K63, K56, K44, K6, K26, K41, K27, K36, K35	1st note (displayed in message area)
	K63	1st note (displayed on the staff)
23	K71, K60, K12, K67, K70, K26	2nd note (displayed in message area 122)
	K63	2nd note (displayed on the staff)

Input order	Key depression order	Screen state, input content
24	K71, K60	3rd note (displayed in message area 122)
	K63	3rd note (displayed on the staff)
25	K71, K56, K12	4th note (displayed in message area 122)
	K63	4th note (displayed on the staff)
26	K37	1st bar punctuation 2nd bar starts
27	K42, K45, K65	Key-signature (displayed in message area 122)
	K63	Key-signature (displayed on the staff)
28	K71, K58, K41	1st note (displayed in message area 122)
	K63	1st note (displayed on the staff)
29	K71, K60	2nd note (displayed in message area 122)
	K63	2nd note (displayed on the staff)
30	K42, K43, K66	Key-signature (displayed in message area 122)
	K63	Key-signature (displayed on the staff)
31	K34, K16	Rest (displayed in message area 122)
	K63	Rest (displayed on the staff)
32	K35	Rest (displayed in message area 122)
	K63	Rest (displayed on the staff
33	K7, K26	Symbol set after the bar (displayed in message area 122)
	K63	Symbol set after the bar (displayed on the staff)
34	K19	

In the above-described initial setting operation and data inputting operation, data inputted by operating the keys is displayed in the message area 122 on the screen, and is then moved to a predetermined display position on the screen by operating the key K63 after being confirmed that it is correct. That is, data inputted from the music data inputting device 1 is applied to the memory control circuit 14, so as to confirm whether it is correct or not. The correct data is inputted into the floppy disk 3 and is moved to a predetermined display position on the screen. The area 123 is used to display the messages of sequence errors or key input errors.

Figure 23 shows another example of the operating panel in Figure 17. The operating panel has scale keys K1 through K14 (generally indicated at 110) and octave selection keys K21 through K23 (generally indicated at 120). The octave selection keys K21, K22 and K23 are respectively for low scale, home position and high scale. Therefore, with one scale key (110) a wide scale can be obtained. The kind of a selected octave selection key (120) is displayed on the display device 12.

In Figure 23, the keys K3(A) through K9(G) provide one octave scale, the keys K1(F) and K2(G) provide a scale lower by one octave, and the keys K10(A) through K14(E) provide a scale higher by one octave.

In the above-described arrangement, music data are successively inputted by operation of the operating keys 100 of the music data inputting device, while note data are inputted by operation of the scale keys (110) and the octave selection keys (120) shown in Figure 23 and note keys (not shown). In inputting the note data, the staff 121 is displayed on the screen of the display device 12, and a key-signature separately specified by key operation is also displayed on the screen, as shown in Figure 24. An octave display region 123 is provided at the left end of a region adapted to display these note data, so as to display a selected one of the octave selection keys (120). When the key K22 for specifying an ordinary octave range (I in Figure 25) is selected a mark "H" is displayed in the octave display region 123. When the key K21 for specifying a lower octave range (II in Figure 25) is selected, a mark "↓" is displayed. When the key K23 for specifying a higher octave range (III in Figure 25) is selected, a mark "↑" is displayed. Thus, the kind of an octave selection key (120) selected can be detected immediately by referring to the mark "H", "↓" or "↑" displayed in the octave display region 123.

On the other hand, the scale keys (110) can provide a wide range of interval with the aid of selection of one of the octave selection keys (120). For instance, when the key K22 "HOME" is selected, the intervals "F" to "E" at the "HOME"position as indicated by I in Figure 25 can be inputted. When the key K21 "↓" is selected, the intervals "C", "D" and "E" lower by one octave than those corresponding to the keys K5, K6 and K7 at the "HOME" position can be inputted, as indicated by II in Figure 25. When the key K23 "↑" is selected, the intervals "F" through "B" higher by one octave than those corresponding to the keys K8 through K11 at the "HOME" position can be inputted. Thus, according to the invention, intervals corresponding to three octaves as indicated at RS in Figure 25 can be inputted by combining the scale keys (110) corresponding to two octaves and three different octave selection keys (120), which contributes to reduce the number of keys. Furthermore, since a selected one of the octave selection keys K21, K22 and K23 (120) is displayed on the display device 12, the music data can be correctly inputted at all times.

Claims

1. A sheet music printing system comprising:

a music data inputting device for inputting data on a sheet music into said system;

a data processing device for processing data from said music data inputting device into predetermined processing codes;

a first memory device for storing the processing codes outputted by said data processing device;

an editing device for editing outputs of said first memory device according to a predetermined program which includes the following three functions, namely,

connecting a plurality of notes into a serial note, where with a bar start point as an original point, coordinates of the n-th note in said serial note are designated by Pn (x_n, y_n) coordinates of notes in said serial note are those at the heads of said notes when said notes are of pure tone and are averages of coordinates at the heads of said notes when said notes are of chord, and

where N is the number of notes, a left average coordinates P_L (x_L, y_L) and a right average coordinates P_R (x_R, y_L) are defined as follows,

$$\begin{cases} x_L = x1 \\ y_L = \dfrac{\sum_{n=1}^{n} y_n}{m} \end{cases}$$

$$\begin{cases} x_R = x_N \\ \text{with } N=2m, \quad Y_R = \dfrac{\sum_{n=m+1}^{N} y_n}{m} \\ \text{with } N=2m-1, \quad y_R = \dfrac{\sum_{n=m}^{N} y_n}{m} \end{cases}$$

and an inclination α of a line connecting notes in said serial note is

$$\alpha = \frac{y_R - y_L}{x_R - x_L};$$

determining the direction of a note vertical line according to the judgement of the position of a note head whether or not the note head is above or on the third line;

determining a basic column length in a bar by calculating from the following expression,

Basic column length=(basic note×space)×(shortest note in bar)

where the space is the distance between the heads of adjacent shortest notes, and the basic note is the note which is indicated by the denominators of a beat symbol;

a second memory device for storing music codes outputted by said editing device;

a font memory for storing printing patterns corresponding to said music codes; and

a photo-composing machine for forming a block copy for said sheet music according to the music codes from said second memory device and the printing patterns from said font memory.

2. A system as claimed in claim 1 which comprises a display device,

said music data inputting device having a scale keys and octave selection keys, said octave selection keys consisting of three kinds of keys, namely, a key for lowering a scale, a key for restoring a scale and a key for lifting a scale, the kind of a selected one of said octave selection keys being displayed on said display device, thereby proceeding input operation in interactive manner.

Patentansprüche

1. Notendrucksystem enthaltend:

eine Musikdateneingabeanordnung zum Eingeben von Daten von einem Notenblatt in das Notendrucksystem,

eine Datenverarbeitungsanordnung zur Verarbeitung von Daten von der Musikdateneingabeanordnung in vorbestimmte Prozessbefehle,

eine erste Speicheranordnung zur Speicherung der Prozessbefehle, die vom Datenprozessor ausgegeben sind,

eine Editieranordnung, welche die Ausgangsdaten der ersten Speicheranordnung gemäß einem vorgegebenen Programm editiert, welches die folgenden drei Funktionen einschließt:

Verbinden einer Mehrzahl von Noten zu einer seriellen Note,

wobei mit einem Taktstrich-Anfangspunkt als Ursprung Koordinaten der nten Note in der seriellen Note bestimmt sind durch Pn (xn, yn); Koordinaten der Noten in der seriellen Note sind diejenigen der Notenköpfe, wenn es sich um reine Töne handelt und die Durchschnittswerte der Koordinaten der Notenköpfe, wenn es sich um Akkorde handelt, und

wobei N die Anzahl der Noten ist, linke Durchschnittskoordinaten PL (xL, yL) und rechte Durchschnittskoordinaten PR (xR, yR) sind wie folgt bestimmt:

$$\begin{cases} x_L = xi \\ y_L = \sum_{n=1}^{N} y_n : m \end{cases}$$

$$\begin{cases} x_R = x_N \\ \text{mit } N=2m, \quad y_R = \sum_{n=m+1}^{N} y_n : m \\ \text{mit } N=2m-1, \quad y_R = \sum_{n=m}^{N} y_n : m \end{cases}$$

und eine Steigung α einer Verbindungslinie zwischen Noten innerhalb der seriellen Noten beträgt

$$\alpha(\text{alpha}) = (y_R - y_L) : (x_R - x_L);$$

Bestimmen der Richtung eines Notenhalses entsprechend einer Entscheidung über die Lage des Notenkopfes oberhalb oder auf bzw. unterhalb der dritten Linie,

Bestimmen der grundsätzlichen Spaltenlänge innerhalb eines Taktes durch Errechnung nach dem folgenden Ausdruck:

grundsätzliche Spaltenlänge gleich (Noteneinheit mal Zwischenraum) mal (kürzeste Note in einem Takt), wobei der Zwischenraum die Entfernung zwischen den Notenköpfen zweier benachbarter kürzester Noten ist und die Noteneinheit diejenige Note ist, welche sich aus dem Nenner der Taktangabe ergibt;

eine zweite Speichereinrichtung zur Speicherung von Notenprogrammen, die durch die Editieranordnung ausgegeben sind;

ein Schriftzeichenspeicher zur Speicherung von Druckmustern, welche den Notenprogrammen entsprechen; und

eine Lichtsetzmaschine zur Formung einer Blockkopie für die Noten, welche den Notenprogrammen aus der zweiten Speicheranordnung und den Druckmustern aus dem Schriftzeichenspeicher entsprechen.

2. System nach Anspruch 1, gekennzeichnet durch die folgenden Merkmale:

— eine Anzeigevorrichtung (Bildschirm),
— die Musikdateneingabeanordnung hat Tonleitertasten und Oktavenauswahltasten,
— die Oktavenauswahltasten bestehend aus drei Tasten nämlich: einer Taste zur Erniedrigung der Tonleiter, eine Taste zur Einstellung der normalen Tonleiter und eine Taste zur Erhöhung der Tonleiter,
— die Art der ausgewählten Oktavenauswahltaste wird auf der Anzeigeanordnung angezeigt, dabei wird eine interaktive Dateineingabe vorgenommen.

Revendications

1. Système d'impression de partition musicale, comprenant:

un dispositif d'entrée de données musicales pour introduire des données sur une partition musicale dans ledit système;

un dispositif de traitement de données pour traiter des données provenant dudit dispositif d'entrée de données musicales dans des codes de traitement prédéterminés;

une première mémoire pour mémoriser des codes de traitement émis par ledit dispositif de traitement de données;

un dispositif de montage pour monter des sorties de la première mémoire selon un programme prédéterminé qui comprend les trois fonctions suivantes, à savoir,

relier plusieurs notes en une série de notes,

lorsqu'avec un point de début de mesure comme un point d'origine, des coordonnées de la n ième note dans ladite série de notes sont désignées par Pn (x_n, y_n) des coordonnées des notes dans ladite série de notes sont celles des têtes desdites notes lorsque lesdites notes sont d'une tonalité pure et sont des moyennes de coordonnées, des têtes desdites notes quand ces notes sont d'un accord, et

lorsque N est le nombre des notes, une coordonnée moyenne de gauche P_L (x_L, y_L) et une coordonnée de moyenne de droite P_R (x_R, y_L) sont définies de la manière suivante,

$$X_L = xl$$

$$y_L = \frac{\sum_{n=l}^{N} y_n}{m}$$

$$X_R = x_N$$

avec N=2m $$Y_R = \frac{\sum_{n=m+1}^{N} y_n}{m}$$

avec N=2m−1 $$Y_R = \frac{\sum_{n=m}^{N} y_n}{m}$$

et une inclinaison d'une ligne reliant les notes dans ladite série est:

$$= \frac{y_R - y_L}{x_R - x_L}$$

déterminer la direction d'une ligne verticale de notes selon les jugements de la position d'une tête de note, pour déterminer si la tête de note se trouve ou non audessus ou sur la troisième ligne;

détermine une longueur de colonne de base dans une mesure en calculant à partir de l'expression suivante,

longueur de colonne de base

=(note de base×espace)×(plus courte note dans la mesure)

où l'espace est la distance entre les têtes des notes les plus courtes voisines et la note de base est la note qui est indiquée par les dénominateurs d'un symbole de mesure;

une seconde mémoire pour mémoriser des codes musicaux émis par ledit dispositif de montage;

une mémoire de caractères pour mémoriser des motifs d'impression correspondant auxdits codes musicaux, et

une machine de photocomposition pour former une épreuve de ladite partition musicale en fonction des codes musicaux provenant de ladite seconde mémoire et des motifs d'impression provenant de ladite mémoire de caractères.

2. Système selon la revendication 1, comprenant un dispositif d'affichage,

ledit dispositif d'entrée de données musicales comprenant des touches de gamme et des touches de sélection d'octave, lesdites touches de sélection d'octave consistant en trois types de touches, à savoir une touche pour abaisser une gamme, une touche pour rétablir une gamme, une touche pour élever une gamme, le type de l'une sélectionnée desdites touches de sélection d'octave étant affiché sur ledit dispositif d'affichage, assurant ainsi l'opération d'entrée d'une manière intéractive.

FIG. 1

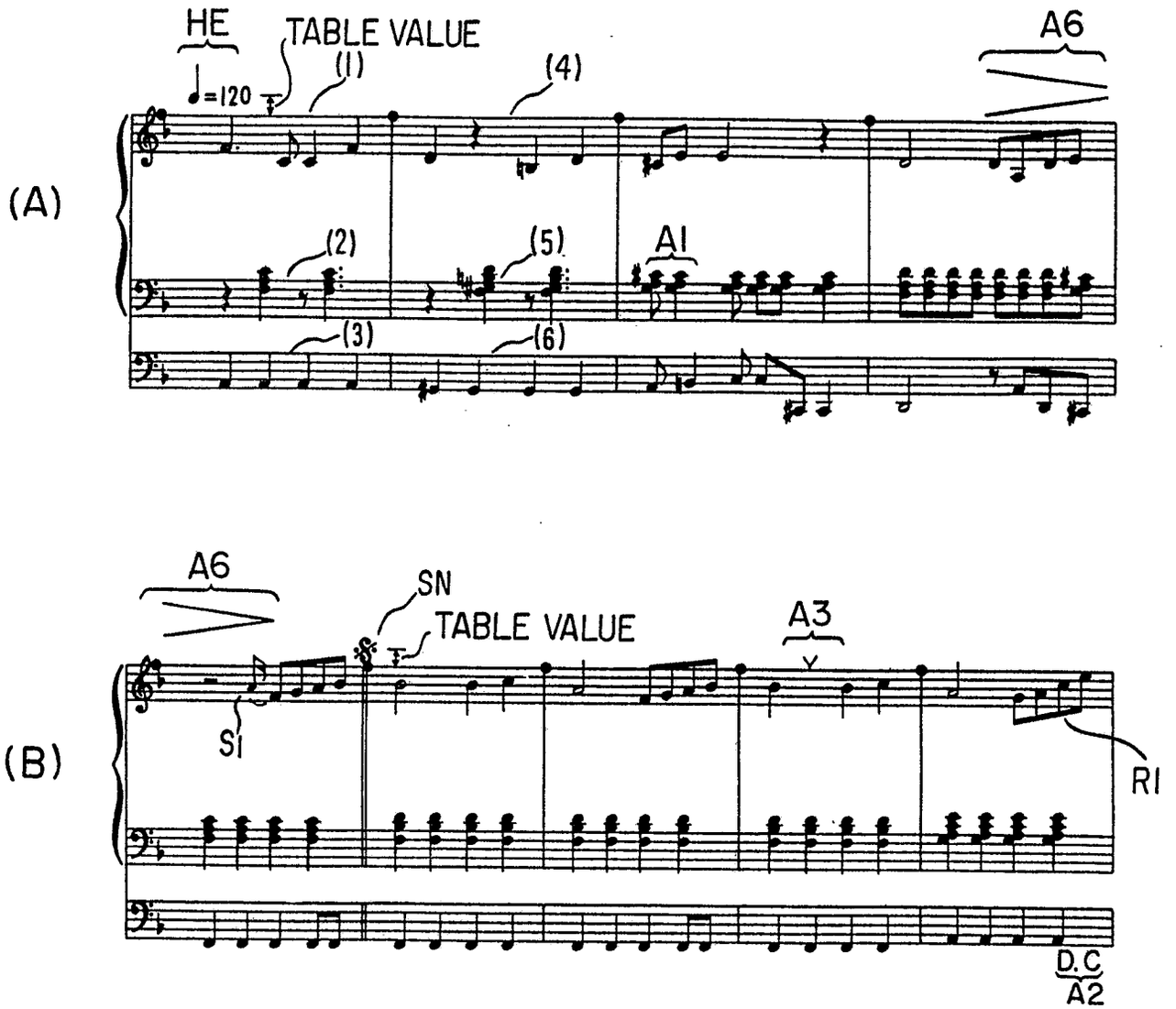

(A)
HE
TABLE VALUE
A6
♩=120
(1)
(4)
(2)
(5)
A1
(3)
(6)
(B)
A6
SN
TABLE VALUE
A3
S1
RI
D.C
A2

FIG. 1

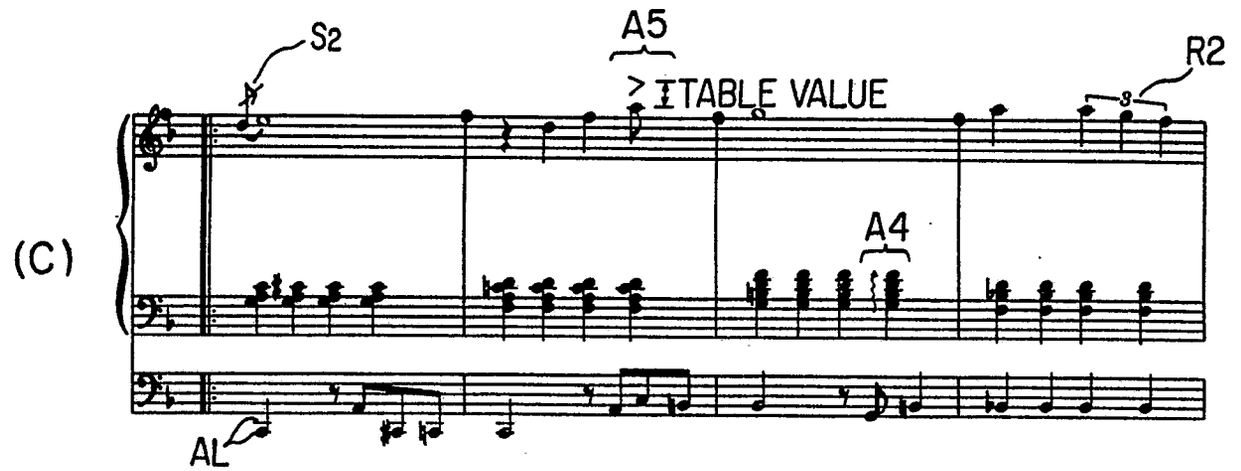


FIG. 2

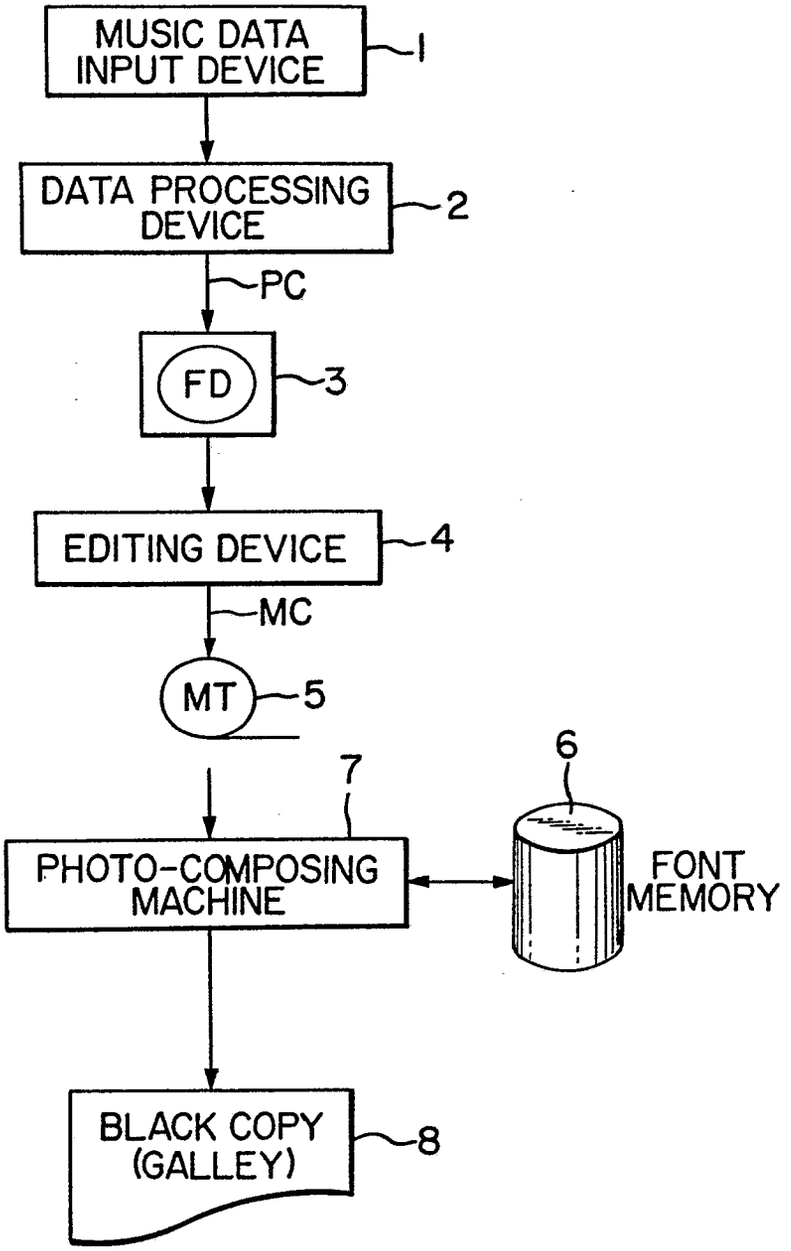

MUSIC DATA INPUT DEVICE
1
DATA PROCESSING DEVICE
2
PC
FD
3
EDITING DEVICE
4
MC
MT
5
6
7
PHOTO-COMPOSING MACHINE
FONT MEMORY
BLACK COPY (GALLEY)
8

FIG. 3

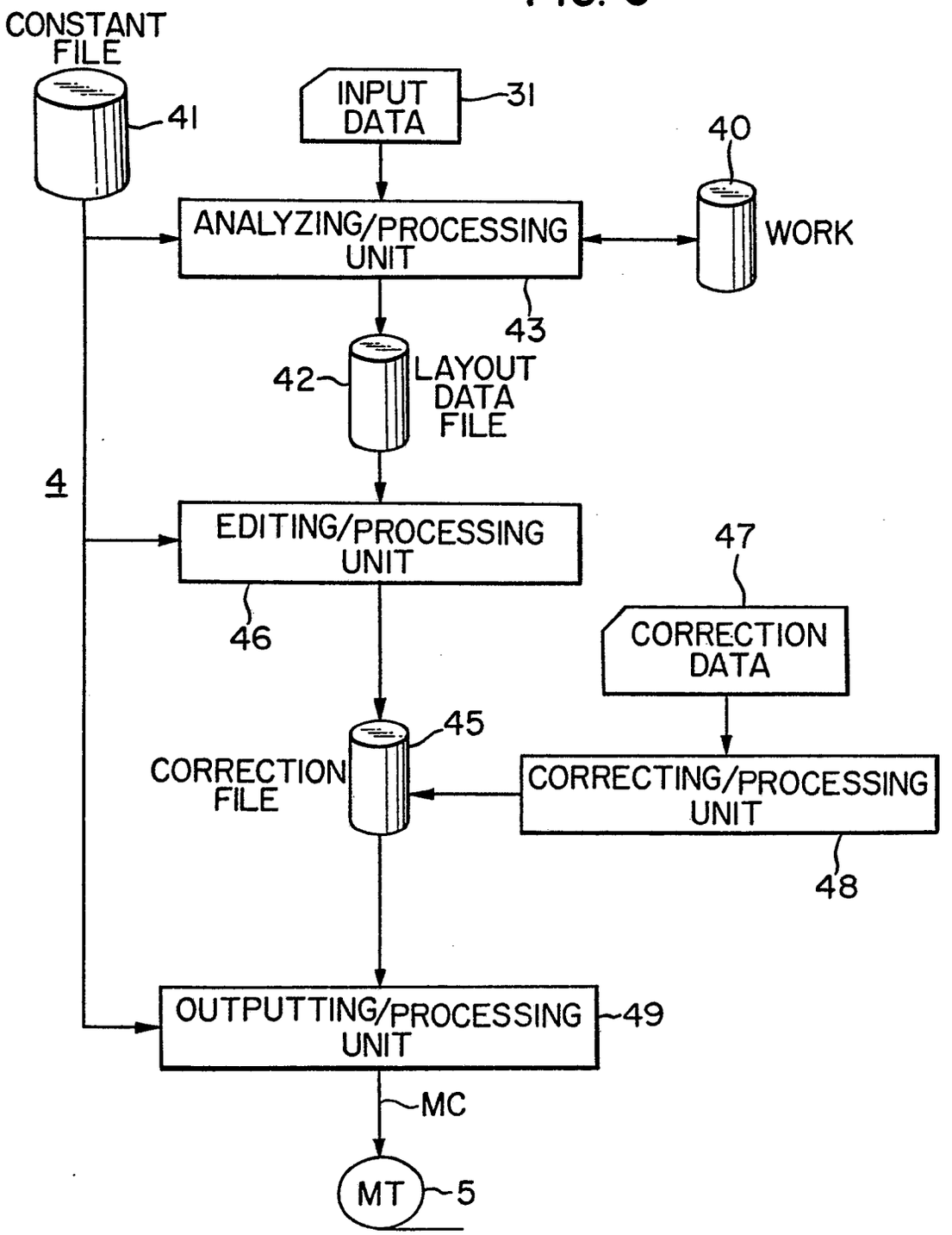

CONSTANT FILE
41
INPUT DATA
31
40
ANALYZING/PROCESSING UNIT
WORK
43
42
LAYOUT DATA FILE
4
EDITING/PROCESSING UNIT
47
46
CORRECTION DATA
45
CORRECTION FILE
CORRECTING/PROCESSING UNIT
48
OUTPUTTING/PROCESSING UNIT
49
MC
MT
5

FIG. 4

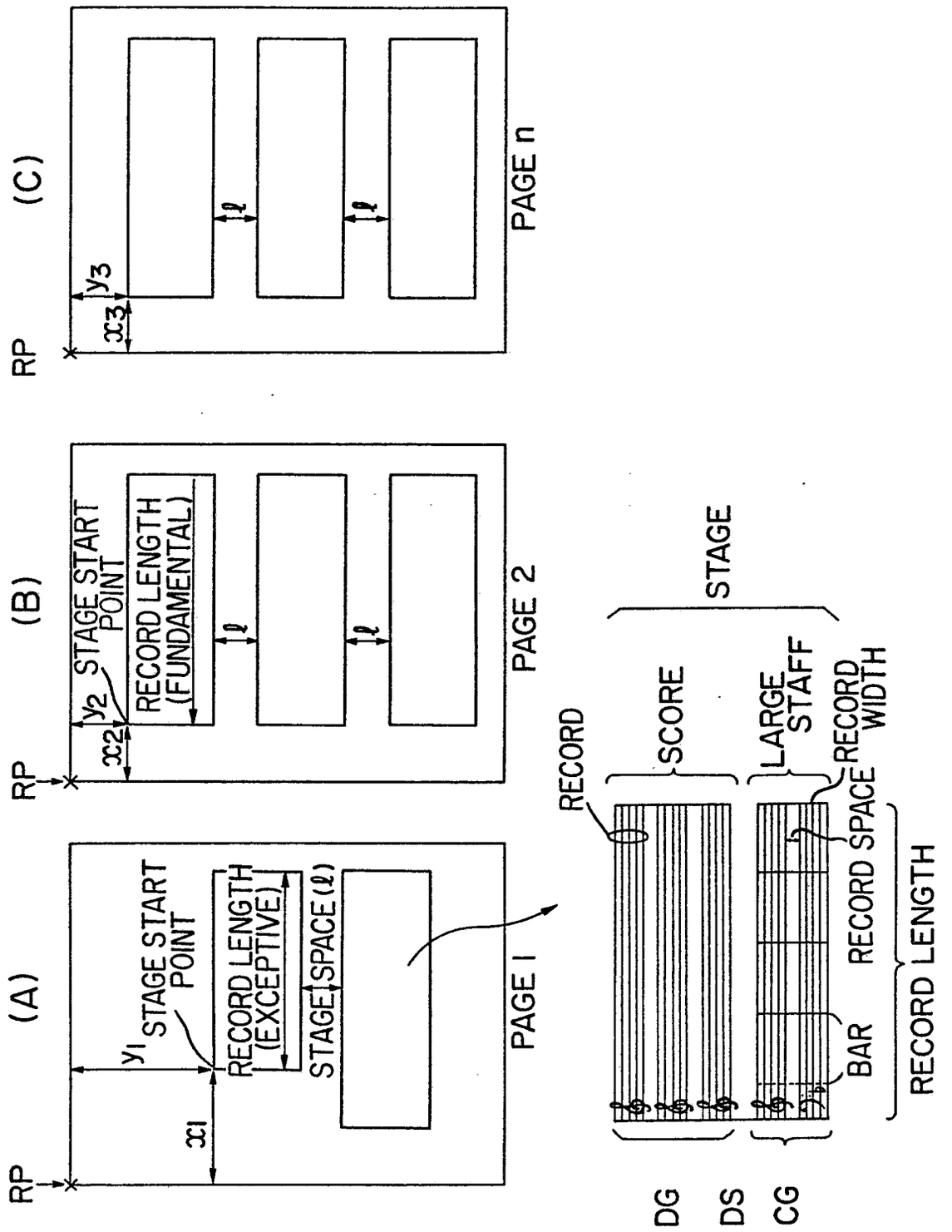
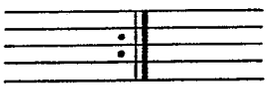

(A)
RP
STAGE START POINT
RECORD LENGTH (EXCEPTIVE)
STAGE SPACE (ℓ)
PAGE I
(B)
RP
STAGE START POINT
RECORD LENGTH (FUNDAMENTAL)
PAGE 2
(C)
RP
PAGE n
RECORD
SCORE
STAGE
LARGE STAFF
RECORD WIDTH
RECORD SPACE
BAR
RECORD LENGTH
DG
DS
CG

FIG. 5

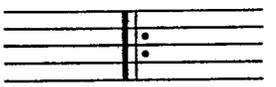
(A)

(B)

(C)

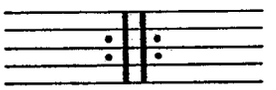


(D)



(E)

(F)



(G)

FIG. 6

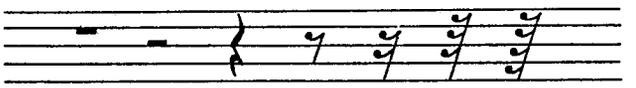


FIG. 7

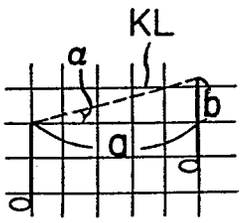


FIG. 8

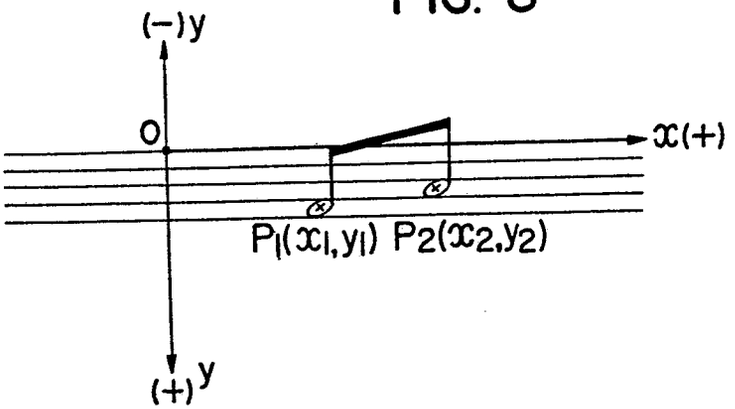


FIG. 9

FIG. 10

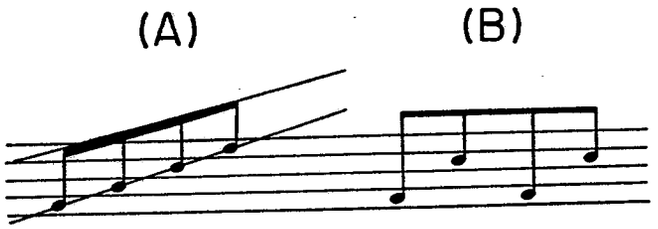


FIG. 11

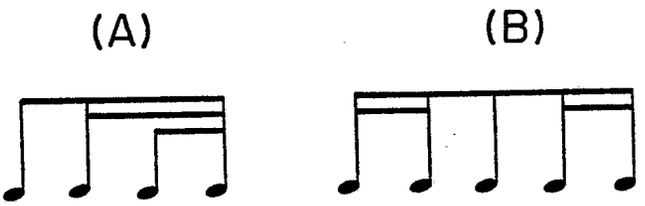


FIG. 12

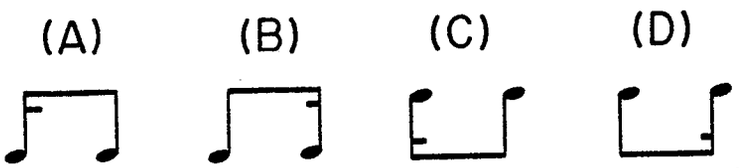


FIG. 13

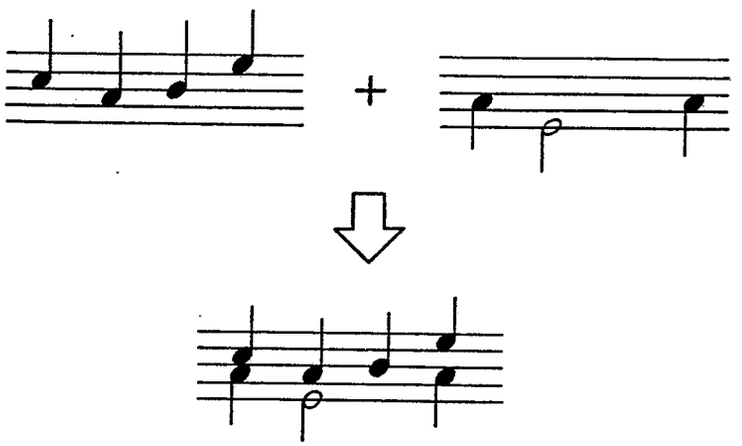


FIG. 14

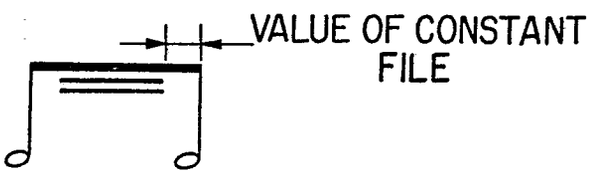


FIG. 15

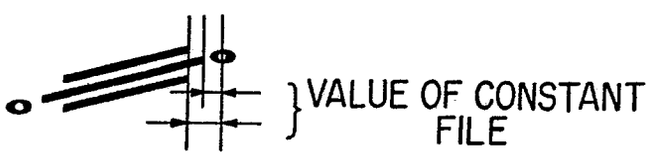


FIG. 16

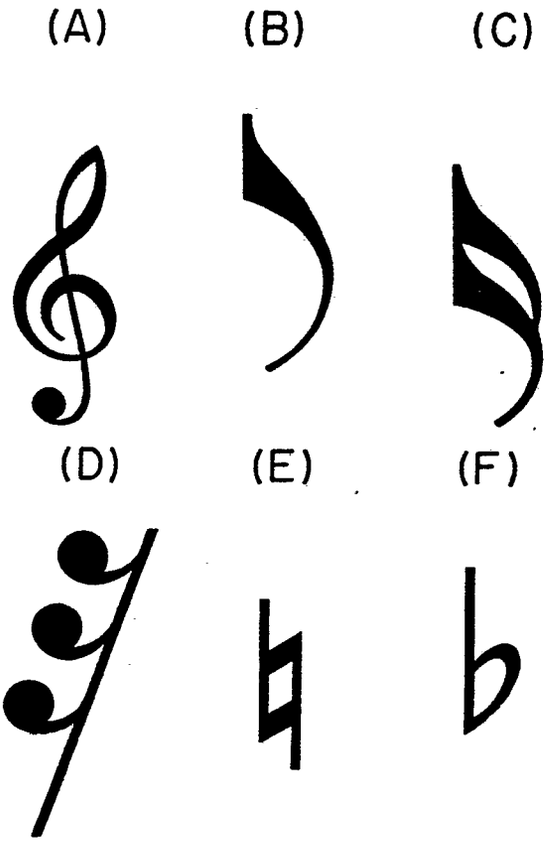


FIG. 17

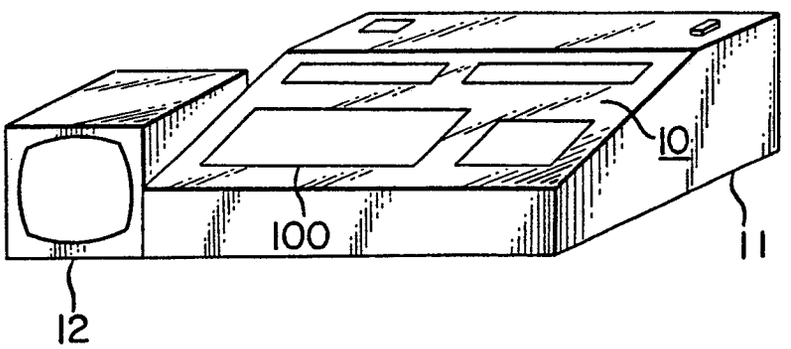
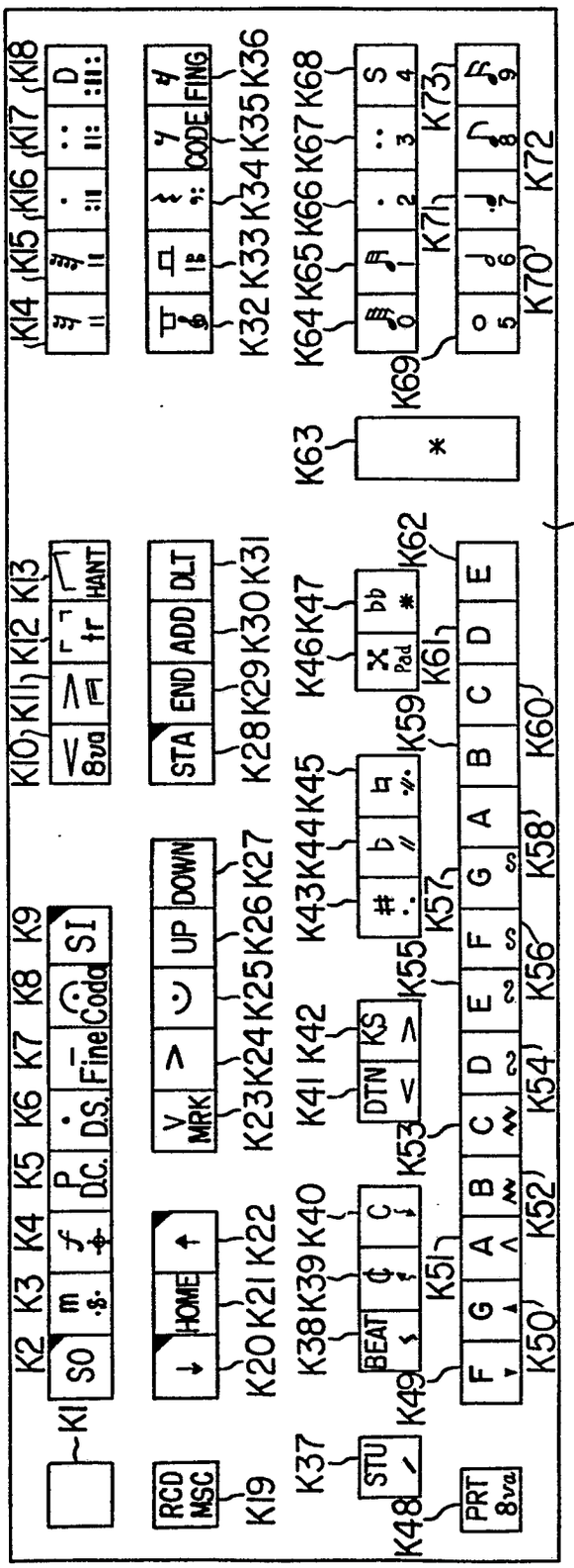


FIG. 18


K1
K2 K3 K4 K5 K6 K7 K8 K9
K10 K11 K12 K13
K14 K15 K16 K17 K18
K19 K20 K21 K22 K23 K24 K25 K26 K27
K28 K29 K30 K31 K32 K33 K34 K35 K36
K37 K38 K39 K40 K41 K42 K43 K44 K45 K46 K47
K48 K49 K50 K51 K52 K53 K54 K55 K56 K57 K58 K59 K60 K61 K62
K63 K64 K65 K66 K67 K68
K69 K70 K71 K72 K73
S0
HOME
DS.
Fine
Coda
SI
V MRK
UP
DOWN
8va
STA
END
ADD
DLT
HANT
fr
FING
CODE
RCD MSC
STU
PRT 8va
BEAT
DTN
KS
Pad
10

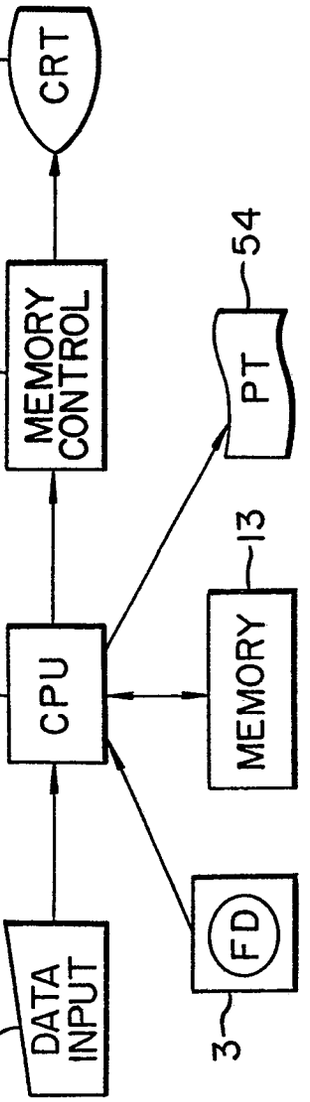

11
DATA INPUT
2
CPU
14
MEMORY CONTROL
12
CRT
3
FD
MEMORY
13
PT
54

FIG. 19

FIG. 20

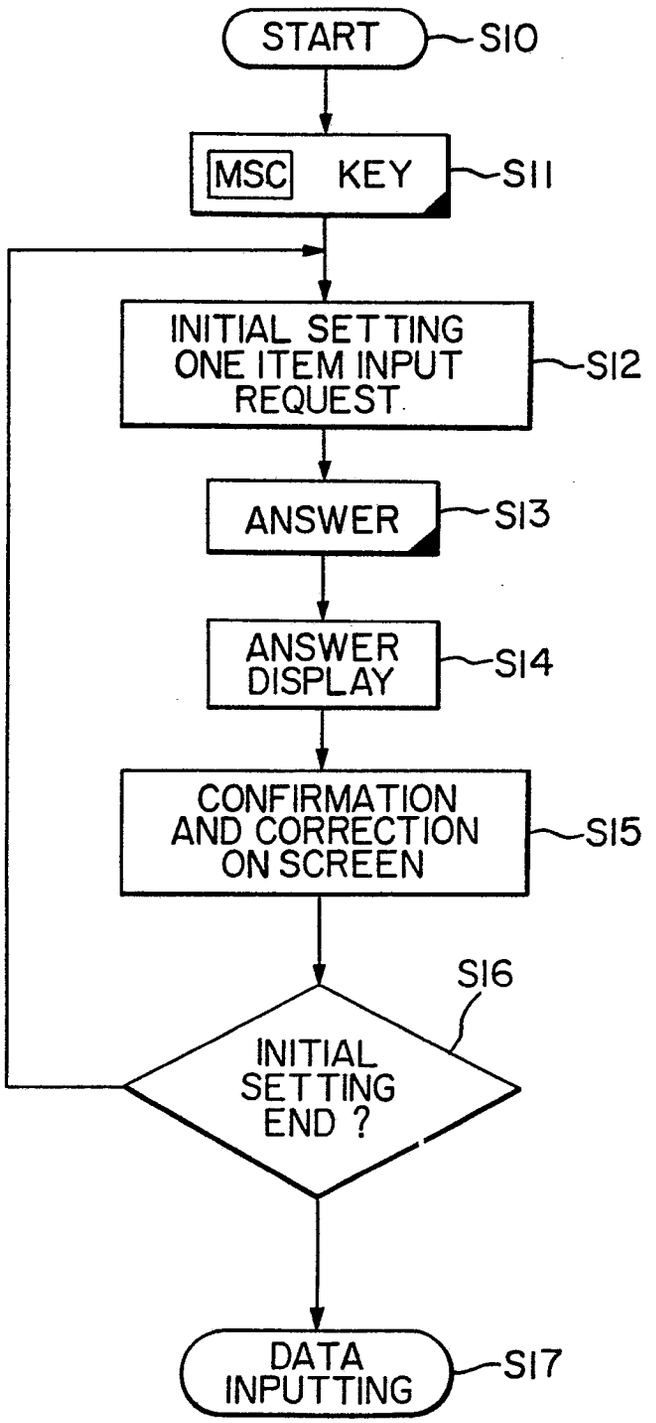

START
S10
MSC KEY
S11
INITIAL SETTING ONE ITEM INPUT REQUEST
S12
ANSWER
S13
ANSWER DISPLAY
S14
CONFIRMATION AND CORRECTION ON SCREEN
S15
S16
INITIAL SETTING END ?
DATA INPUTTING
S17

FIG. 21

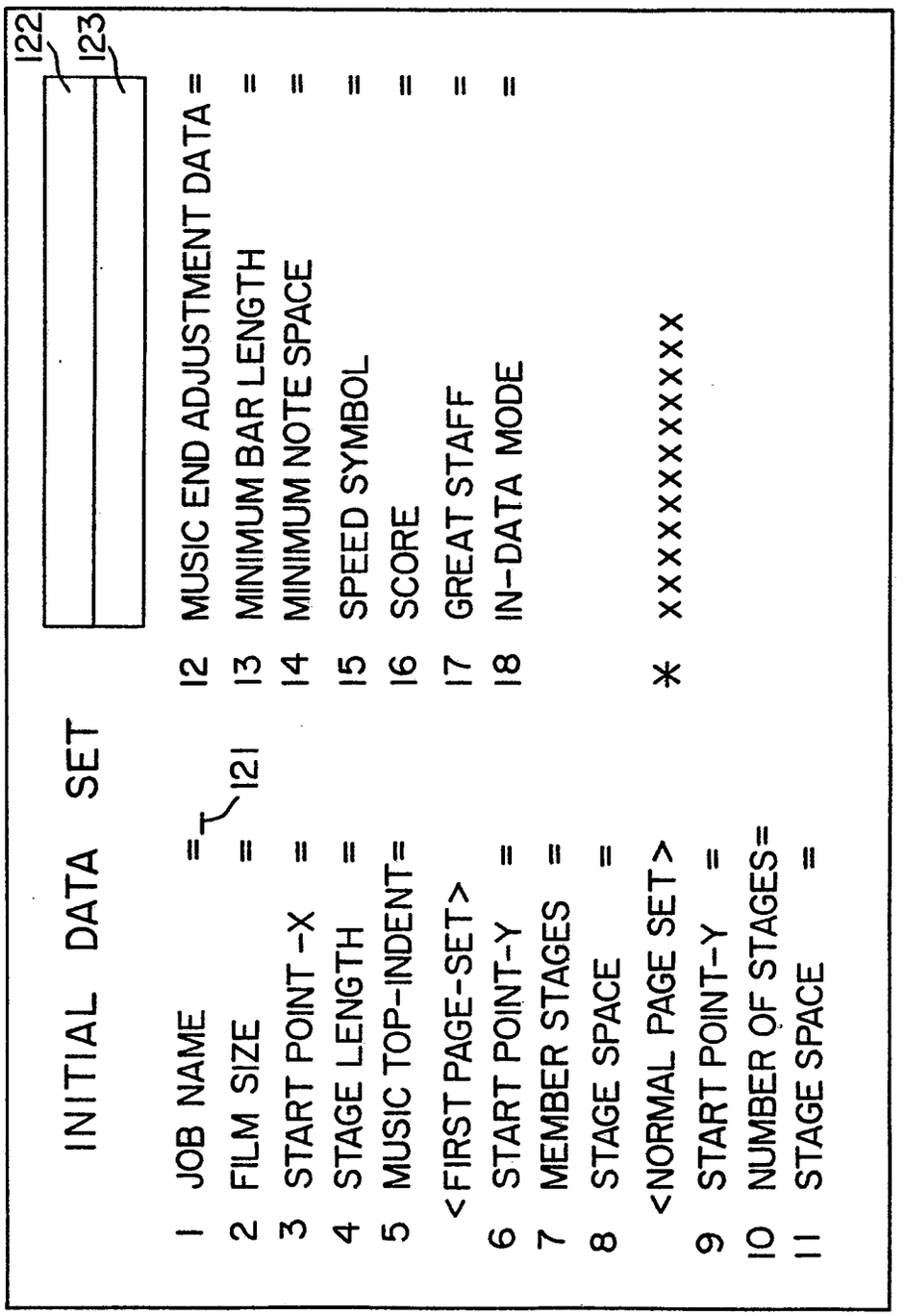
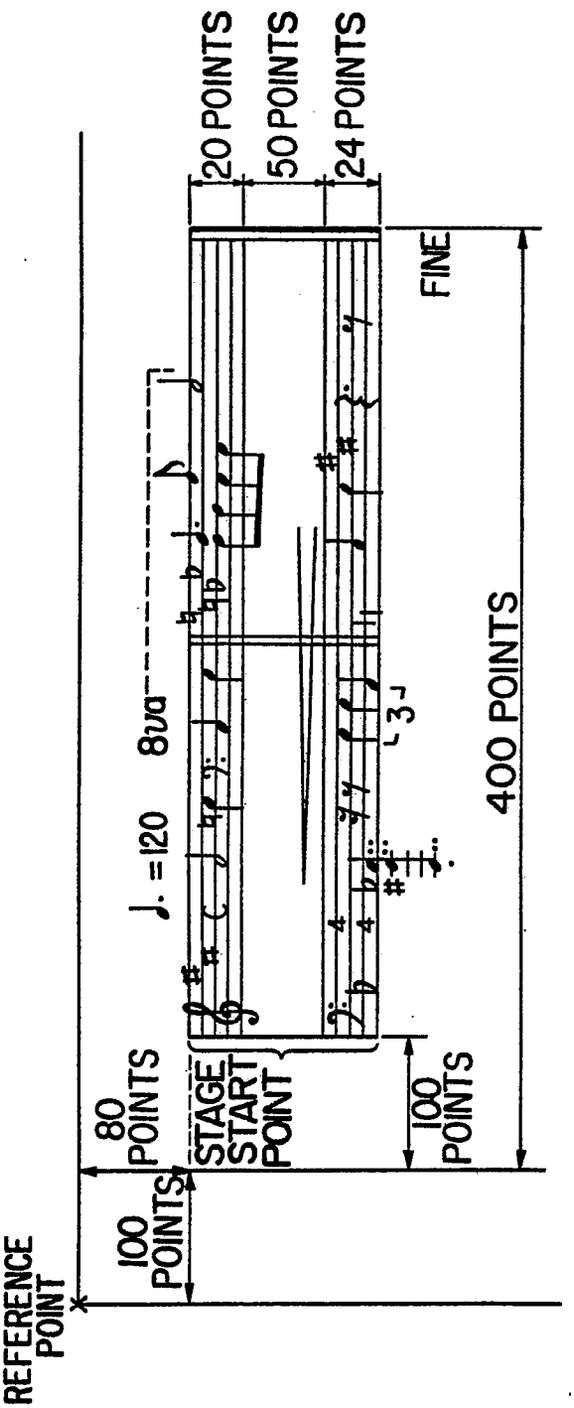

INITIAL DATA SET
121
122
123
1 JOB NAME =
2 FILM SIZE =
3 START POINT -X =
4 STAGE LENGTH =
5 MUSIC TOP-INDENT=
<FIRST PAGE-SET>
6 START POINT-Y =
7 MEMBER STAGES =
8 STAGE SPACE =
<NORMAL PAGE SET>
9 START POINT-Y =
10 NUMBER OF STAGES=
11 STAGE SPACE =
12 MUSIC END ADJUSTMENT DATA =
13 MINIMUM BAR LENGTH =
14 MINIMUM NOTE SPACE =
15 SPEED SYMBOL =
16 SCORE =
17 GREAT STAFF =
18 IN-DATA MODE =
* XXXXXXXXXXXX

FIG. 22


REFERENCE POINT
100 POINTS
80 POINTS
STAGE START POINT
100 POINTS
400 POINTS
20 POINTS
50 POINTS
24 POINTS
FINE
8va
♩. = 120
JOB NAME NOTE TEST
FILM SIZE B5

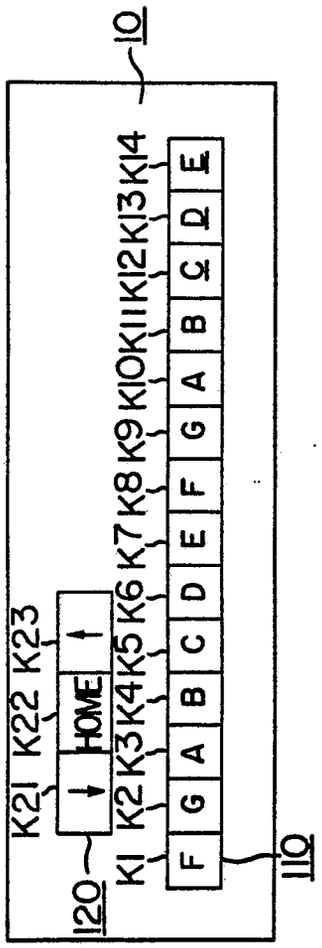


FIG. 23

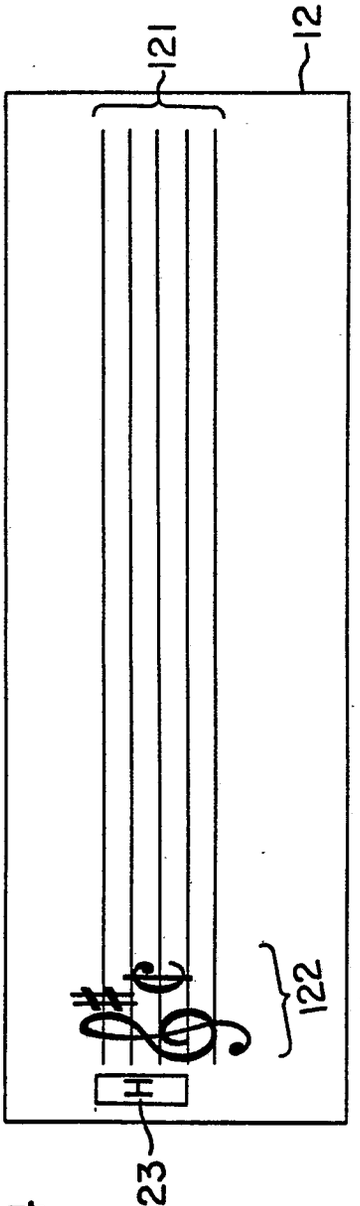


FIG. 24

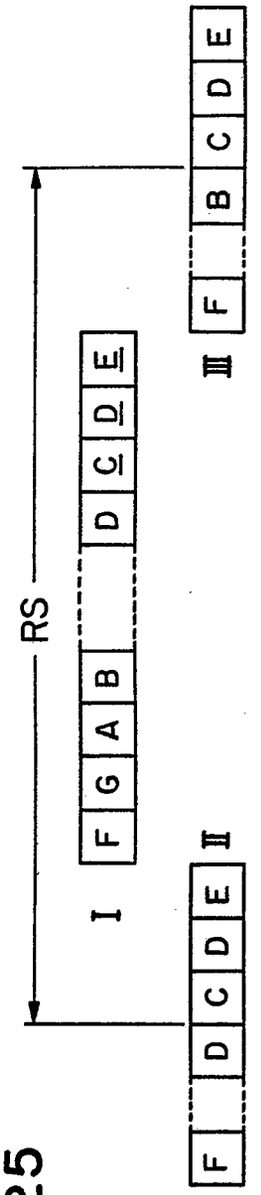


FIG. 25