

1,385,944.

3 SHEETS—SHEET 1.

Figs. 1.

Adagio sostenuto ($\text{♩} = 56$).

[illegible]

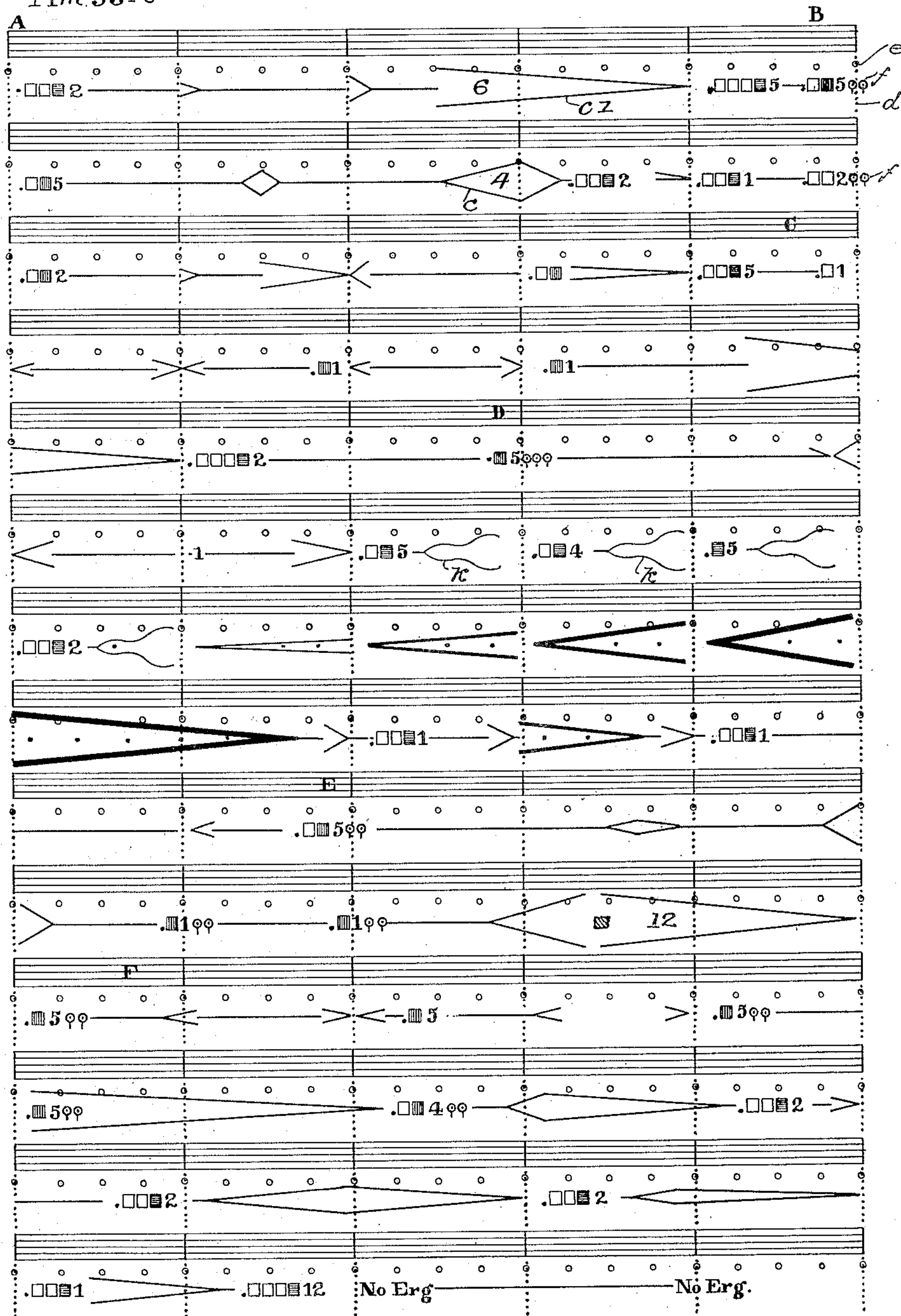
Inwitness,
Mary Hallock-Greenewalt,
by her Attorneys, Nowson & Nowson

1,385,944.

Patented July 26, 1921.

3 SHEETS—SHEET 2.

Fig. 2.

$$Mm. 56 = 0$$


Inventor,
Mary Hallock Greenewalt,
by her Attorneys, Howson & Howson

M. HALLOCK-GREENEWALT.
 NOTATION FOR INDICATING LIGHTING EFFECTS.
 APPLICATION FILED AUG. 18, 1919.

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3 SHEETS—SHEET 3.

Fig. 5.

NOMENCLATURE

Brightling

Darkling

Twilight Arc $\frac{1}{4}$

Auroral Arc $\frac{2}{4}$

Diurnal Arc $\frac{3}{4}$

Dazzle Arc $\frac{4}{4}$

Bar Marks

Unit of white

Color Mark Green

Blue

Red

Proportioned

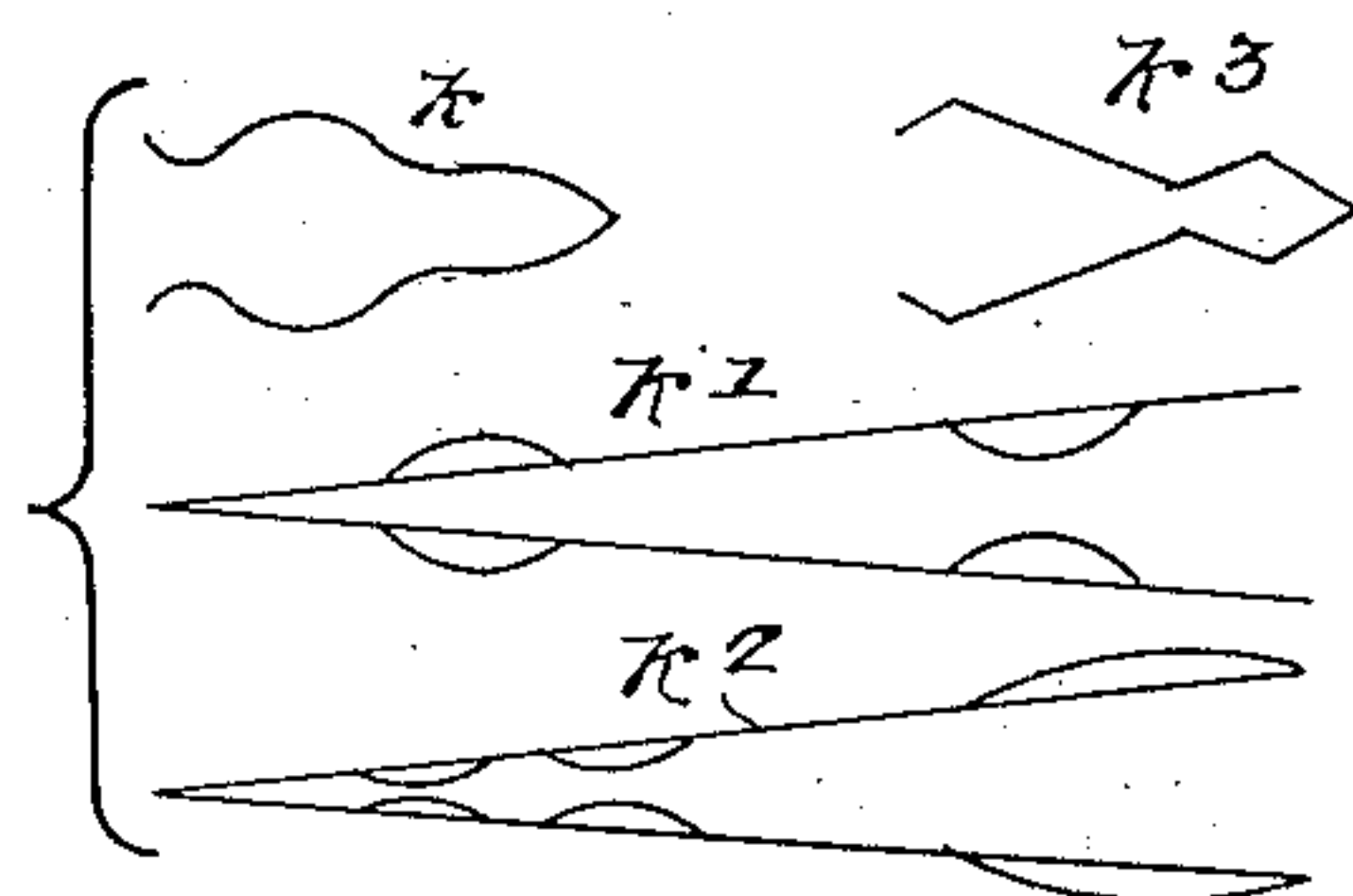
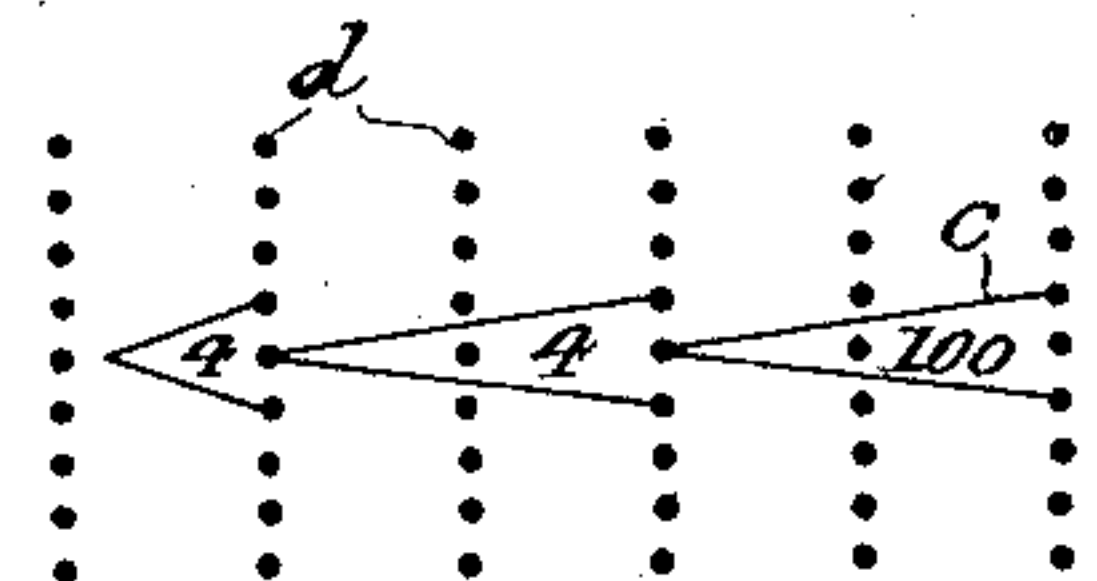
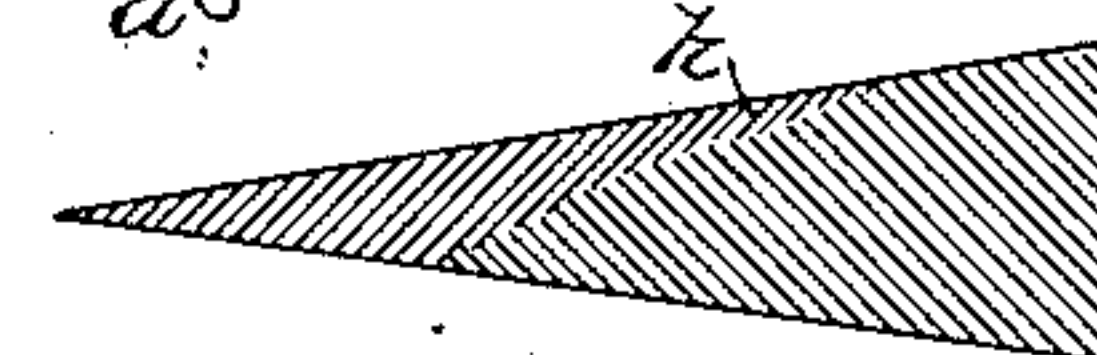
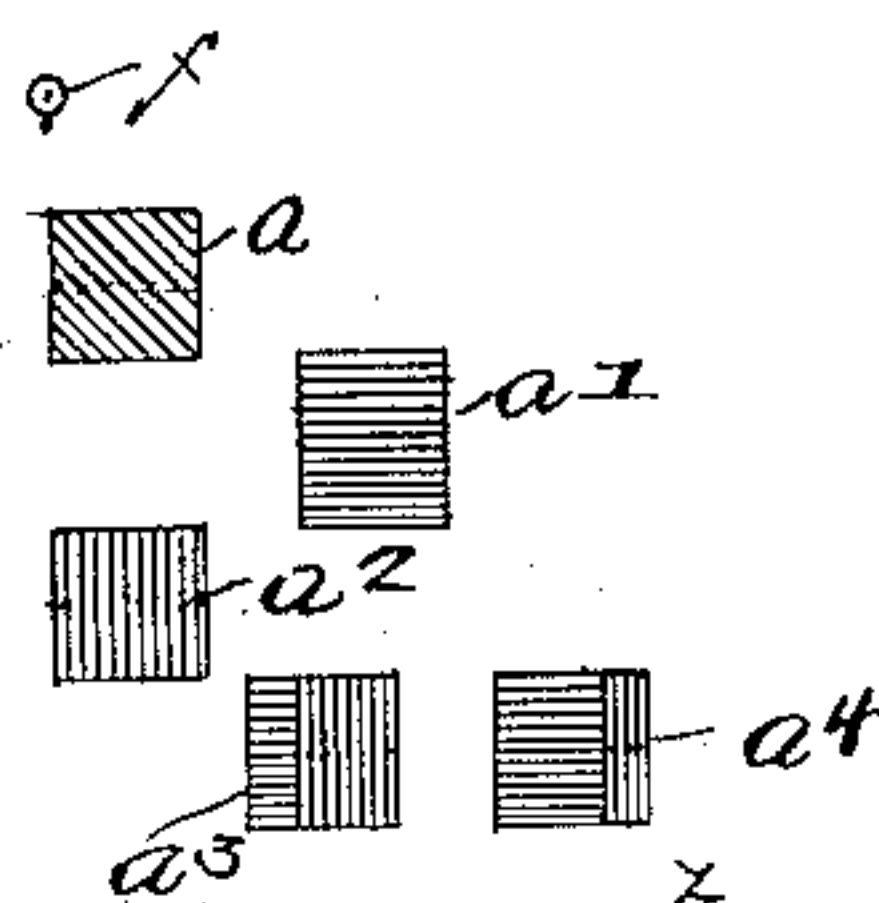
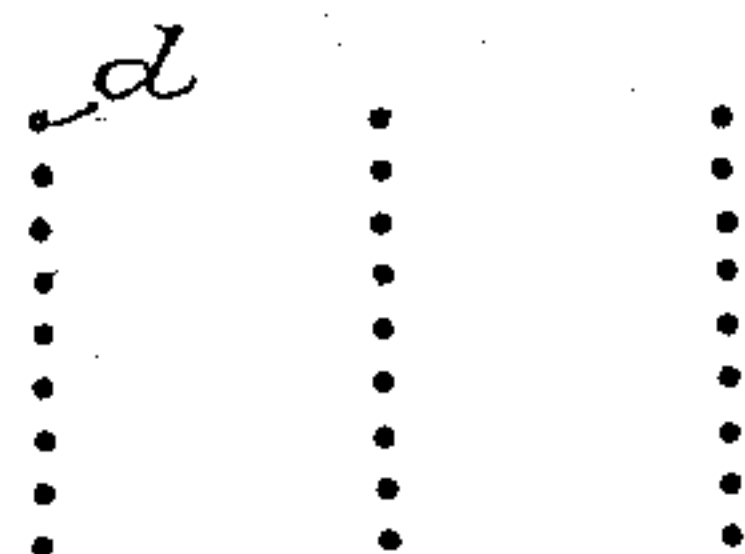
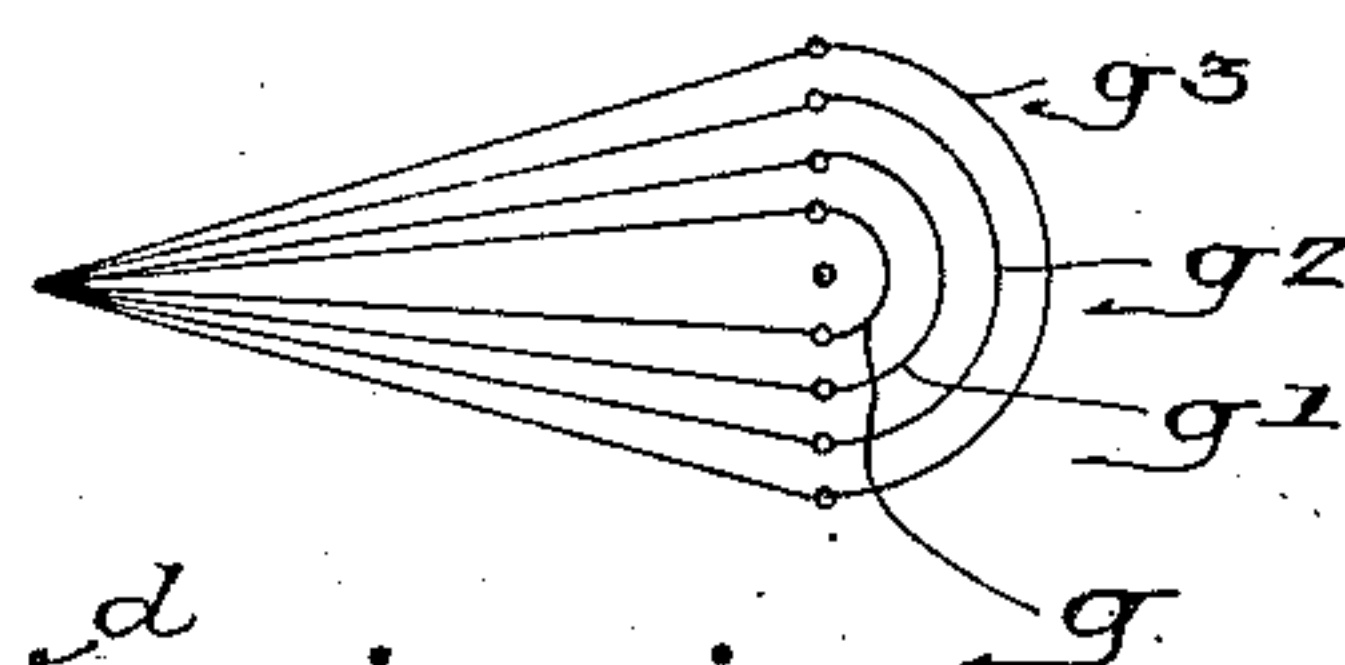
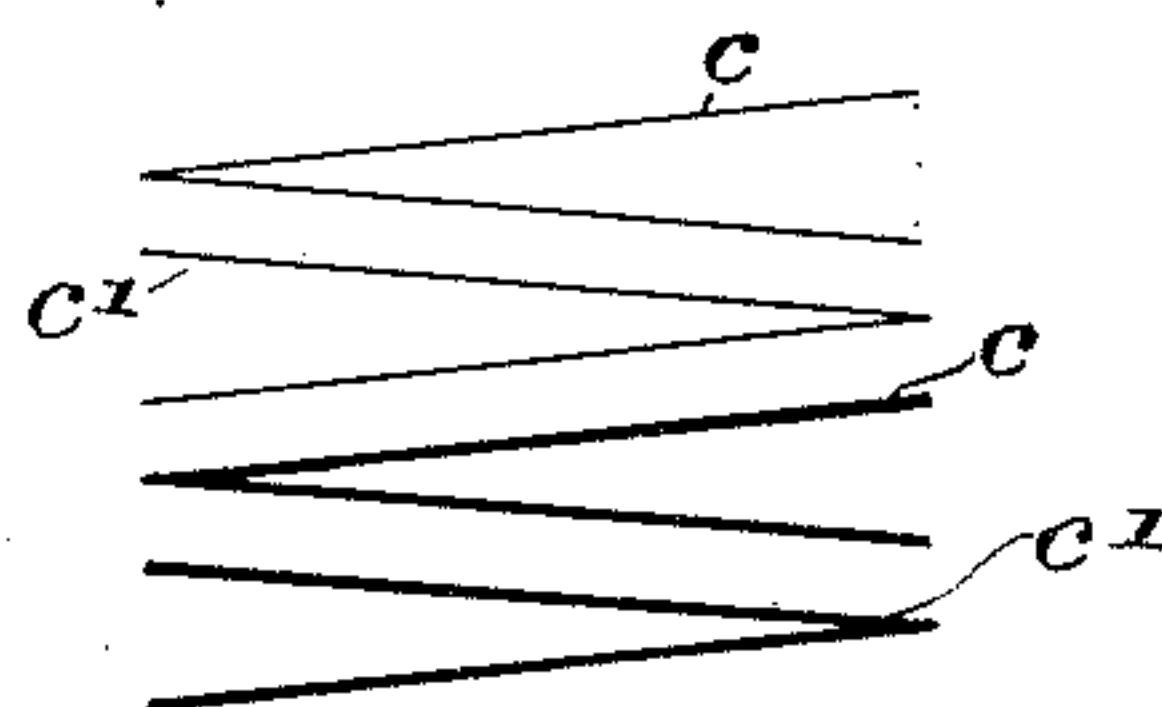
Merging Color

Brightling and Darkling with bars setting the pace

Time beats

Incidental increases

MARKINGS



Inventor,
 Mary Hallock-Greenewalt,
 by her Attorneys,
 Mason & Mason

UNITED STATES PATENT OFFICE.

MARY HALLOCK-GREENEWALT, OF PHILADELPHIA, PENNSYLVANIA.

NOTATION FOR INDICATING LIGHTING EFFECTS.

1,385,944.

Specification of Letters Patent.

Patented July 26, 1921.

Application filed August 18, 1919. Serial No. 318,393.

To all whom it may concern:

Be it known that I, MARY HALLOCK-GREENEWALT, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented an Improved Notation for Indicating Lighting Effects, of which the following is a specification.

My invention relates to notation whereby lighting effects progressively or otherwise intended either as an accompaniment for musical sounds or an independent display may be produced by an operator controlling such lighting effects in a more or less arbitrary relation to the musical sounds, or to the effect desired, in the case of an independent display; this light notation may be written in or disposed adjacent the staves of a musical score if used with music, or placed on an independent sheet if used for the independent display, or placed upon perforated sheets employed with mechanically operated musical instruments.

I have set forth in a prior application for patent, filed August 30, 1918, Serial No. 252,133, the idea of employing light, with and without color, as an accompaniment to music; musical compositions being susceptible of coördination and synchronization with a lighting system, with and without color. The object of my present invention is to provide a score comprising names, numerals, marks, symbols, hieroglyphs or the like, constituting a chart or record sheet for denoting or interpreting a lighting sequence or succession to accompany music to be used independently or to be used in conjunction with any other means of esthetic expression. By this the intensity of the lighting effect, its timed succession, the scheme, sequence, character or intended effect of the same may be understood by the performer, or by an assistant. Such light in any intensity, and with or without color, is to be distributed in the manner and throughout the space for which it is intended, which may be an auditorium or any other place adapted for esthetic pleasure.

In carrying out my invention and using the same as an accompaniment to music, the light and color notation is preferably placed between the musical staves when applied to the score, and, of course, bears a definite and more or less arbitrary relation to the musical notation thereon. If used without music, the notation may be arranged upon a sheet or other suitable surface, either alone or in

conjunction with any other forms of expression.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, shows a part of the score of Beethoven's "Moonlight Sonata," with lighting notation embodying my invention disposed between the staves of the musical notation.

Fig. 2, is a diagrammatic view illustrating lighting notation placed with reference to musical staves wherein the notes are omitted, and

Fig. 3, is a view illustrating certain arbitrary details of the lighting notation.

The light notation hereinafter described and forming the subject of my invention is intended not only to indicate the lighting and color effects desired, but also their intensity and the gradations of such intensity in increasing and diminishing effect, or any contrasted succession; all in relation to recurrent time.

For the purpose of indicating the quantity of light desired, I may employ rectangular figures or symbols a , each of which may represent a definite unit of intensity when used alone, and with which modifying characters or numerals may be employed to represent intensity.

For the purpose of indicating colored light, the figures or symbols a , as well as any modifying characters accompanying the same, may be arbitrarily marked to represent color in accordance with any recognized scheme; thus blue, will be indicated by filling the rectangular figures and the supplemental symbols with horizontal lines; red, by vertical lines; green, by diagonal lines, and so on; and these markings may be combined in any desired proportion, or intelligibly combined, shortened or condensed, as space or convenience may require. The uncolored light may be indicated by blank spaces, and by special symbols for adding white to the color in definite amounts.

When the lighting or color effect is designed to remain unchanged over a period indicated by one or more bars or parts of one or more bars of the music, the continuation of such color with its light intensity may be indicated by straight lines b following the color indication. Increase or decrease

crease in the intensity of the color effect may be indicated by the use of forked or diverging lines shown at *c*; their length across the lines of vertical dots shown at *d* indicating the time in which the ultimate increase and decrease is to occur; the inclosed numeral representing a certain light quantity together with the length giving the abruptness as well as leisureliness of the increase of the light and its decay; those lines diverging or opening to the right being designed to indicate intensification or brightening, and those converging toward the right a decrease or darkening in the intensity which may be sharply defined or diminish gradually; depending upon the length of the marks and the symbols indicating intensity changes for light quantity which they hold.

As an assistance to the eye, the scale of light may be arbitrarily divided into sections marked with such descriptive titles as "twilight arc", "daylight arc," &c. For the purpose of designating these more or less arbitrary divisions, the whole vertical space between the staves may be sub-divided into a plurality of unit spaces, the temporal or bar divisions being marked at intervals by lines of dots *d*, which may be alined with the lines dividing the musical bars. Thus in Fig. 2, the space between the staves is sub-divided into unit spaces of equal width, giving a range of intensity from that indicated by a single median width which may represent a crepuscular lighting or low range value of any color employed, to an intensity represented by all the spaces or full range; an increase in intensity which may reach a dazzling or superbright degree.

Mm. 56 = "o", in Fig. 2, refers to the metronome time underlying the orderly change of light. The "o", indicated at *e* represents the unit of beat underlying the play of that light score. A denoting of time, finer than the eye requires to establish a color, is incompatible with the synthetic nature of the light.

This particular light score to the Moonlight Sonata opens up at a light intensity equaling two ten-thousandths of a lambert. That light remains unchanged through four units of beat or four "oooo". At the opening unit of beat or first "o" of the second bar, the light may dip one step. Esthetically there would be choice as to whether the light shall begin to dip before the sound makes a step down or exactly with the lowering in pitch of the sound. This would be one of the many ways in which fine esthetic choice would enter into the use of time in conjunction with light.

In Fig. 1, the symbol ".□□■2" (two ten-thousandths of a lambert or two-tenths of a milli-lambert) indicates the quantity of light; also coloration.

At the second bar, Fig. 2, the light con-

tinues the same over the remaining three "ooo" (beats) of that bar. At the third bar, the light dips again with the first "o" or beat, and dips still a greater step at the third "o" or beat; gradually making its way down in intensity until it reaches a quantity of light denoted by .□□□■5, (or five hundred-thousandths of a lambert or five-hundredths of a milli-lambert). At the fourth "o" of the fifth bar, the light in conjunction with the entering of the melody (at B) changes into a higher quantity of light indicated by .□■5 (five-thousandths of a lambert shaded for red. Since that red is to be diluted into pink, denotation is made that two units of white light, indicated at *f*, are to be added to the red light being filtered through. This pink light continues through bar No. 6, and one-half of bar No. 7, where it increases in brightness; decreasing again at the beginning of the following bar, making at the third "o" or beat of bar No. 8, a still greater increase and decrease down to the final note of the melody. There the light dips and changes in tint till it reaches the opening quantity of light and its shade of color.

In Fig. 3, I have indicated diagrammatically various elements of the nomenclature comprising the marks to be applied to a sheet of music and the meaning thereof.

The forked lines *c* are intended to indicate a brightening or increase of the light; the forked lines *c'* are intended to indicate a darkening; the character indicated at *g* indicates a range of light equivalent to the "twilight arc;" the character indicated at *g'* represents a range of light equal to the "auroral arc;" the character indicated at *g²* indicates a range of light equal to the "diurnal arc," and the character represented at *g³* indicates a "dazzle arc." Other arcs may be added as "starlight arc," "moonlight arc," etc.

Bar marks are shown at *d*. The units of white light are indicated at *f*. These may be multiplied for the amount of light required. The colored squares *a*, *a'*, *a²*, are in accordance with the usual color markings of the heraldic scale. When the colors are proportioned, the blocks or other symbols will include the lines representing different colors, as at *a³* and *a⁴*. Merging color may be shown as indicated at *h*; being disposed within diverging lines.

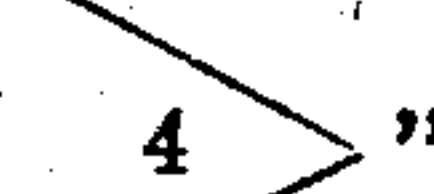
The time beats are indicated at *e*. Where it may be desired to effect momentary changes in the light or color in ultimately increasing or decreasing ranges of the same, I may employ characters such as shown at *k*, *k'*, *k²* and *k³*.

Since the spectral colors are not found in equal amounts in artificial light, the intensities of the lighting and colors will vary at the same point of scale value so that the

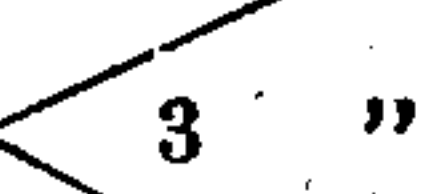
amount of coloration of one color at a given intensity of the light scale will differ from the intensity exhibited by another color at the same point of intensity measure for the one light source. The person making the light creation may provide for leveling of these natural discrepancies when this is wished. Color cannot be considered in steps as notes since its increment of quantity is insensible. Intensity of light, gradually increasing, gradually decreasing, carries the color and not color the intensity since color is only a form of intensity.

As may be further understood, any color may follow another and in passing from one to another there may be periods of time when the colors will blend and produce a third color or shade which is dispelled when the first color is cut off. These combinations or blending effects may be illustrated on any of the symbols by the use of arbitrary color indications according to the scheme employed, and proportioned for the end desired: half and half; much of one color; little of another; a third of this; a fourth of that, etc., so much time of this; so much time of that, and so on. It takes time to merge color and this merging cannot be denoted by notes of music, neither can colors follow each other with the "rapidity of change" of notes in music.

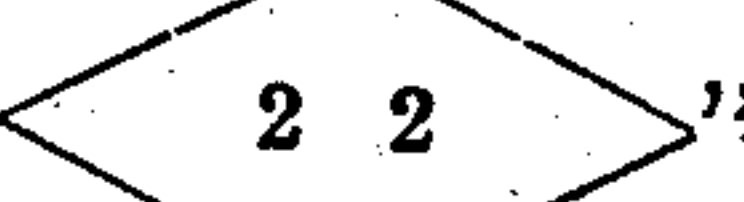
In addition to the markings above described, there may be occasion for a lighting effect in which the gradations of intensity may fluctuate or proceed in angular steps in their increasing or decreasing effect, and to indicate these fluctuating conditions, I may employ a symbol of the character indicated at k , k' , &c., where wavy lines are shown. The wavy lines may be changed to angular form where this may be wanted.

The forked lines displayed thus "  "

are intended to represent decrease in the intensity of the light or color effect, with a gradual diminution of the same, as the lines converge to the unit intensity of the light or color the point reaches, in use with any portion of the music with which it is coördinated.

The forked lines disposed "  "

are intended to represent a gradual increase in the intensity of the light or color employed, with a change to the unit intensity at the extreme point of divergence or, when

combined thus: "  " to a gradual

change beyond and back to any unit intensity. The intensity of the color indicated by the forked lines may be further indicated by the relative thickness of the same.

The forked lines used in this light notation, because of the wide range of light to be considered, require in all instances the quantity and numeral value denotation, since the numerals here would refer to the number of steps in a light scale as the note on the music staff refers to the note scale of an instrument.

The forked lines with thin incidental curves denote the time and manner of the growth only, which also is indispensable. It is plain that a plotting of the light fluctuations used in any light score may be made by one or two line graphs, continuous or cursive, for use in some required direction. Such plotting would stand in relation to light scoring as any diagram of relationship stands to the matter it portrays.

These light markings will connote esthetic qualities, attributes, expressions and uses of feeling, speed, matters of taste, climax and anti-climax, emotional and dynamic.

The unit value of intensity of the symbols employed may be based upon any table or scale of brightness. In the present case I have used the term "lambert" as the unit of measure of the light intensity, it being understood that "lambert" is the centimeter gram second unit of brightness, or the brightness of a perfectly diffusing surface radiating or reflecting one lumen per square centimeter.

I claim:

1. A system of notation for indicating lighting effects in timed succession comprising a series of arbitrary symbols, certain of said symbols indicating light, and other symbols indicating the intensity of such light.

2. A system of notation for indicating lighting effects in timed succession, comprising a series of arbitrary symbols representing units of light, and other symbols associated therewith and designed to represent increment and decrement in the intensity of such light.

3. A system of notation for indicating lighting effects, comprising a series of arbitrary symbols representing degrees of intensity.

4. A notation for indicating lighting effects comprising a series of arbitrary symbols representing the intensity and color of the light.

5. A notation for indicating colored lighting effects in timed succession, comprising a series of arbitrary symbols representing degrees of intensity, and other symbols in association with the first named symbols for indicating color.

6. A system of notation to indicate the timed succession of lighting effects in conjunction with rhythmic expression, comprising a series of arbitrary symbols, certain of said symbols indicating color, and other of

said symbols indicating the intensity of such color.

- 5 7. A system of notation to indicate the timed succession of lighting effects in conjunction with rhythmic expression, comprising a series of arbitrary symbols, certain of said symbols indicating color, and other of said symbols indicating the increase and decrease in the intensity of said color.

8. A system of notation to be used in 10 timed succession with a form of rhythmic expression comprising symbols indicating color, other symbols indicating the intensity of such color and means for indicating the timed sequence of the color and color in- 15 tensities.

MARY HALLOCK-GREENEWALT.