March 18, 1941. W. F. ALLEN, JR., ET AL 2,234,948

MUSICAL COMPOSITION WRITING APPARATUS

Filed March 24, 1938 4 Sheets-Sheet 1

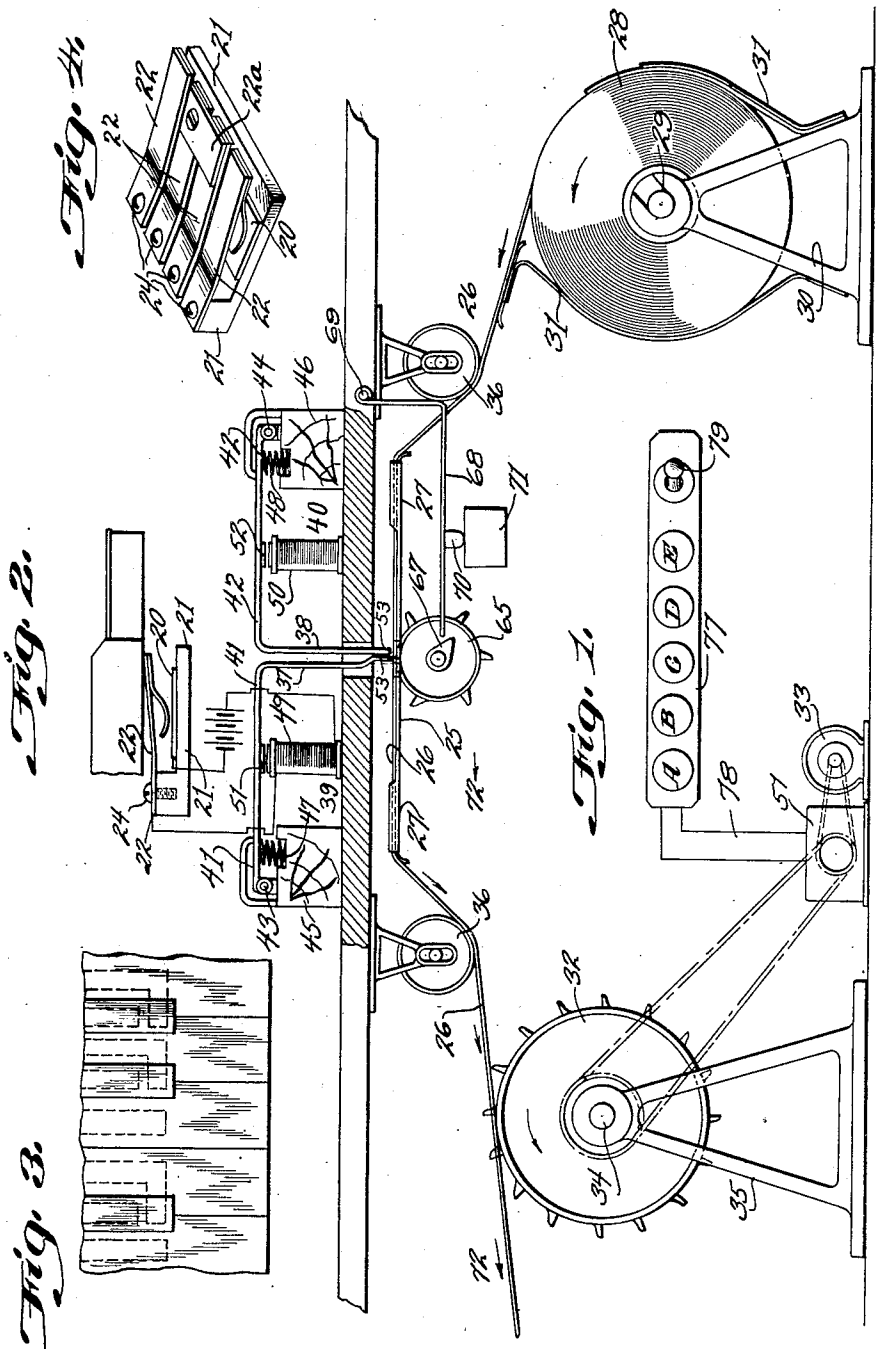


Fig. 4.

Fig. 2.

Fig. 3.

Fig. 1.

INVENTORS
William Franklyn Allen Jr.
BY and Edward J. Clark
Leonard L. Kalish
ATTORNEY.

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MUSICAL COMPOSITION WRITING APPARATUS

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Fig. 5.

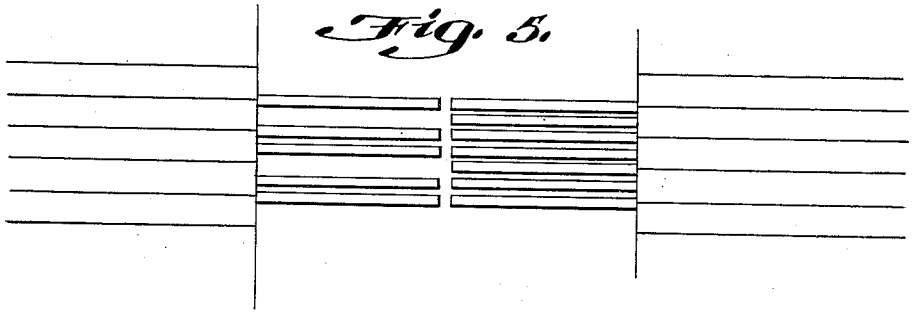


Fig. 6.

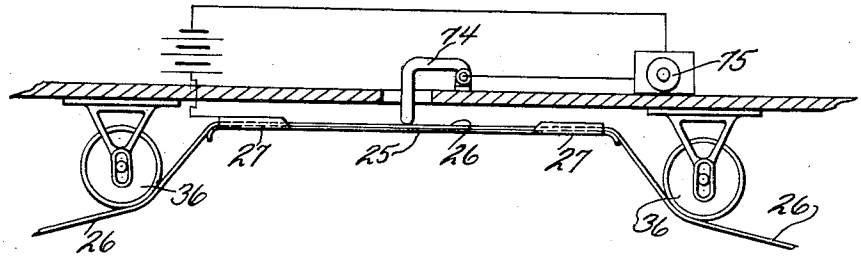
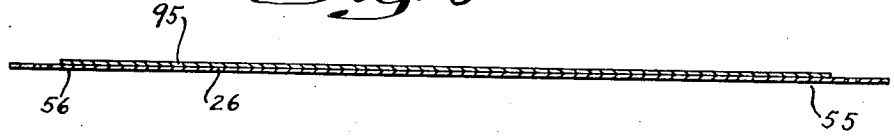


Fig. 9



INVENTORS.
William Franklyn Allen Jr.
and Edward J. Clark
BY
Leonard L. Kalish
ATTORNEY.

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MUSICAL COMPOSITION WRITING APPARATUS

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Fig. 7-a

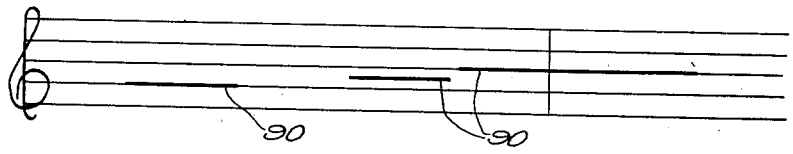


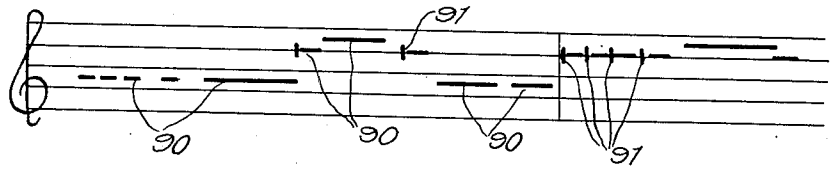
Fig. 7-b



Fig. 7-c



Fig. 7-d



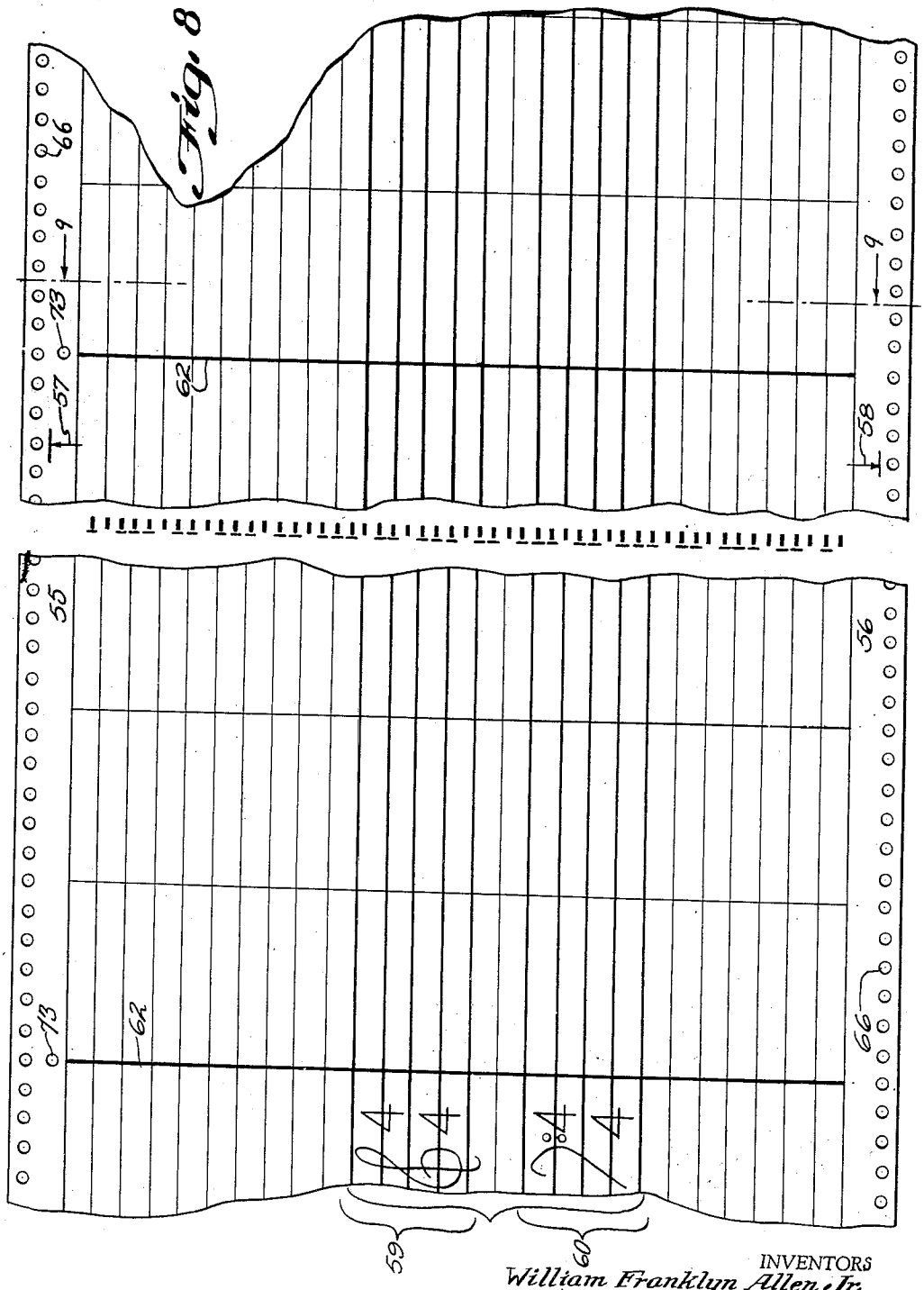
INVENTORS
William Franklyn Allen Jr.
BY and Edward J. Clark
Leonard L. Kalish
ATTORNEY.

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MUSICAL COMPOSITION WRITING APPARATUS

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Fig. 8



INVENTORS
William Franklyn Allen Jr.
BY and Edward J. Clark
Leonard L. Kalish
ATTORNEY.

Patented Mar. 18, 1941

2,234,948

UNITED STATES PATENT OFFICE

2,234,948

MUSICAL COMPOSITION WRITING APPARATUS

William Franklyn Allen, Jr., Seaford, Del., and Edward J. Clark, Camden, N. J.

Application March 24, 1938, Serial No. 197,880

10 Claims. (Cl. 84—461)

The present invention relates to musical composition writing apparatus, and it relates more particularly to apparatus for recording a musical composition as it is being composed by the composer, in the first instance, on a piano or other similar instrument having a keyboard.

The present invention further relates to musical composition writing apparatus for making a permanent record of a musical composition in the first instance on music paper or paper ruled to receive musical notes, so that the music may be read directly from such original notes recorded by the apparatus, or so that it may readily be transcribed according to any conventional system of music writing.

One of the objects of the present invention is to provide more or less automatic apparatus which may be associated with the keyboard of any musical instrument such as a piano, an organ, etc., whereby the depression of each key may be caused to energize electro-mechanical circuits terminating in corresponding writing or marking members disposed in operative juxtaposition to a band of paper carried and propelled by paper-propelling means operated at any predetermined speed according to the speed or tempo of the music to be played.

A further object of the invention is to enable a music composer to obtain a permanent and readable record of any original (and yet unrecorded) musical composition as it is being composed on the piano or similar instrument, without any need for interrupting the composition in order to make a record, and indeed, without any act of attention on the part of the composer.

One of the problems involved in composing music is to make a record of the composition. This is generally done step by step by the composer, by playing a chord or so and then stopping the composition and writing down the particular chord as nearly as the composer may be able to remember it, and then continuing with the further composition, and so on.

The object of the present invention is to obviate the necessity for such piece-meal manual recording or writing so as to enable the composer to work more rapidly; devoting his entire energy to the artistic composition rather than to the mechanics of manually recording the composition.

With the above and other objects in view, the present invention contemplates an electrical contact board or unit beneath the keyboard, piano or similar musical instrument, with a separate electrical contact beneath each key and adapted to be operated by the depression of the key; each electrical contact being operatively connected with an electro-magnet or other suitable electrical actuator acting upon a corresponding marker or writer arranged in suitable alignment and in spaced relationship across the width of a moving band of paper on a paper conveyer and timer, whereby the depression of any key will be caused to make a permanent mark upon the paper in spaced relation to the paper according to the position of the key and a mark of an extent corresponding to the value of the particular note.

The present invention further contemplates means whereby the sharps and flats may be recorded by the juxtaposition of a separate marker, in relation to the adjacent natural note, so that the sharps or flats will be written by the markers which write the natural notes but will be suitably identified as being flats or sharps.

The present invention further contemplates means whereby each beat will be audibly indicated to the musician or composer and whereby the first beat of every count will be also audibly indicated but with a contrasting sound, so that the musician or composer may perform in correct timed relation to the particular speed or tempo for which the recording apparatus is set.

The present invention further contemplates means whereby the tempo of the recording apparatus may be changed from time to time to correspond to various tempi such as presto, allegro, adagio, largo and lento.

The present invention further consists of other novel features and combinations, all of which will appear more fully from the following detailed description and accompanying drawings.

For the purpose of illustrating the invention, there is shown in the accompanying drawings one form thereof which is at present preferred, since the same is believed to be conducive to satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

In the accompanying drawings, in which like reference characters indicate like parts, we have given merely a schematic or diagrammatic showing of the essential features of the present invention, and these drawings are not intended as restrictive, but merely as illustrative of the principles. In these drawings, we have not shown

the many mechanical and electrical details which may be supplied by any one skilled in the art of constructing electrical and mechanical apparatus, as these we regard as within the scope of mechanical skill.

Figure 1 represents a schematic side elevational view of the paper conveying and timing means and markers forming a part of the present invention.

Figure 2 represents a schematic side elevational view of one of the several electrical contacts beneath the keys of the musical instrument.

Figure 3 represents a top plan view of a portion of the key-board, showing the electrical contacts beneath the keys.

Figure 4 represents a fragmentary perspective view of the electrical contact board which is adapted to be placed beneath the keyboard of a piano.

Figure 5 represents a schematic top plan view of a few of the markers (in relation to the music paper) showing the natural markers in the right-hand column and showing the sharp or flat markers in the left-hand column.

Figure 6 represents a side elevational view (also schematic) of the means for audibly signalling the first beat of each count.

Figures 7—*a*, 7—*b*, 7—*c* and 7—*d* represent illustrative writings which may be produced by apparatus of the present invention.

Figure 8 represents a top plan view of a portion of the paper strip.

Figure 9 represents a section on line 9—9 of Figure 8.

The electrical contact unit which is placed beneath the keyboard of the musical instrument may be provided with a series of spring-contacts or circuit-makers, corresponding to the series of keys, and a common supply-contact adapted to coact with each of the individual key contacts. Thus, the charged contact member **20** may extend the entire length of the keyboard and may be carried by any suitable insulator strip **21**, to which a series of spaced and independent spring contacts **22** may be fastened by suitable fastening means such as the screws **24**; the common contact strip **20** being charged from a source of low voltage current, such as a transformer, which may be connected to the standard commercial wiring system and made to supply current of suitable low voltage such as, for instance, six volts (more or less). Batteries, such as indicated in Figure 1, may also be used as the source of electrical energy.

The movable spring contacts beneath some of the natural keys are also provided with a lateral extension **22**—*a*, projecting laterally beneath the adjacent flat (or beneath the adjacent sharp) so that upon the depression of a flat or a sharp, there will be two movable electric contact members depressed; one being the electrical contact which corresponds only to the particular sharp or flat key and another electrical contact corresponding to the natural immediately adjacent to it (either above or below, depending on choice).

The paper feeding and timing means includes any suitable table or paper support **25**, over which a paper tape or band **26** is adapted to travel; the table **25** serving to support the paper in position while being marked. The table **25** need not be of great extent, as it is only necessary to present a small part of the paper at any time. The table is preferably provided with lateral flanges **27** serving to guide the paper in a straight line.

The paper strip or band **26** is preferably supplied from a suitable supply roll **28**, preferably pivotally carried at **29** upon any suitable support **30**, with spring-pressed or weighted members **31** bearing against the surface of the roll with suitable force to prevent the roll from unrolling freely, so that the band will always be suitably taut.

The paper band may be propelled by any suitable cog wheel or toothed wheel **32** engaging either one or dual sets of perforations in one or both marginal zones of the paper band; the wheel **32** being driven by any suitable electric motor **33** of predetermined and controllable speed and any suitable speed-change device **51**, whereby the speed of travel of the paper may be set to correspond to certain predetermined tempi, such as presto, allegro, adagio, largo and lento, or corresponding to any of the recognized metronomical tempi.

The cog wheel or propelling wheel **32** may be suitably journalled at **34** upon any suitable pedestal or other support **35**.

Suitable idling guide rolls **36** may also be provided for maintaining the paper band flat upon the table **25**.

Across the effective width of the paper band **26**, two series of suitable markers **37** and **38**, respectively, are provided, for contact with the paper band in predetermined positions corresponding to the keyboard position of the musical instrument. The markers **37** and **38** may be either ink-bearing markers or they may be provided with any other suitable marking means at their contact ends **53**, or they may be arranged for suitably scoring or finely perforating the paper at closely spaced intervals.

In one embodiment of our present invention, a sheet of carbon-paper **95** is superimposed upon the music score paper and the two held together along their marginal zones. The carbon paper sheet is later stripped off.

The score paper shown in Figure 9 with the sheet of carbon superimposed thereon and secured thereto along the marginal zones **55**, **56**, may be wound in a roll and supplied in that manner.

The carbon paper sheet is preferably of slightly lesser width than the music score paper and preferably extends to the width indicated by the arrows **57** and **58**. It may be fastened to the score paper **26** by a thin film of wax or by any other suitable adhesive means, preferably permitting ready separation after the "writing" of the music.

The two groups of heavier lines **59** and **60** represent the lines more customarily provided on ordinary music sheets, while the faint lines above and below these two groups of heavier lines are for the extensions for higher and lower notes, respectively. The faint line between the two groups of dark lines **59** and **60** is the middle C line.

The right-hand row of marks indicated across the paper in Figure 8 represents the positions of the series of natural markers, while the left-hand column of marks represents the positions of the series of markers of the sharps or flats.

The heavy transverse lines **62** mark the position of each first beat, while the faint transverse lines **63** mark the position of the subsequent beats of each count.

Each of the markers **37** and **38** is operatively related to a corresponding electro-magnetic actuator. These actuators are correspondingly marked as **39** and **40**, respectively. Thus, for instance, each of the markers may be carried by

corresponding pivoted arms 41 and 42, respectively, pivoted at 43 and 44, respectively, upon suitable supports 45 and 46, respectively, and held in their inoperative positions by corresponding springs 47 and 48, and adapted to be drawn into a marking position by corresponding electromagnets 49 and 50 and suitable armatures 51 and 52.

Each of the electro-magnets 50 of the bank of naturals is wired to the corresponding natural contacts 22 while each of the electromagnets 49 of the bank of sharps or flats (as the case may be) is wired to the corresponding electrical contact beneath the corresponding flat or sharp key.

In order to afford more space for the electromagnets 49 and 50, the arms 39 and 41 may be pivoted differently from what is shown in the diagrammatic drawing of Figure 1. Thus, the pivots may be placed closer to the markers 37 and 38 and the electromagnets spaced outwardly above the arms so as to pull the outer ends of the arm upwardly and so depress the marker ends 37 and 38. In that manner, the outer ends of the arms 39 and 40 may be bent out at gradually increasing angles from the center of the keyboards toward its ends so that the outer ends of the arms will diverge in fan shape or as the rays of the sun emanating from a more or less small central zone, and with electro-magnets placed at the outer and more widely separated ends of the arms. Moreover, the position of the electromagnets may be staggered somewhat also to allow more freedom in spacing.

The writing tips of the natural markers 38 are preferably of small transverse width so that they make a comparatively narrow line 90 when drawn along the paper 26 (or over the superimposed carbon paper) or more particularly, when the paper is drawn beneath the markers, while the writing tips of the sharp or flat markers 37 preferably have a slightly wider writing edge transversely of the paper so that they make a slight transverse line 91, as indicated in Figures 7 and 8.

The electromagnets 50 which operate the natural markers are so wired or balanced that they will stay down and in operative contact with the paper so long as the corresponding piano key is held depressed.

The electromagnets 49 corresponding to the sharp or flat keys are so wired or balanced, on the other hand, that they will produce but a single momentary contact between the writing tip of the marker and the paper so that for each depression of the corresponding key, regardless of how long the sharp or flat key is held down. In other words, the deflection of the armature-carrying arms 41 either causes the electrical circuit to be broken, or the parts are so proportioned and the writing tip so spaced from the paper and the magnet so balanced that only the momentum of the arm or moving parts (when initially set into motion by the magnet) will carry the writing tip into contact with the paper; whereas the static force or continued pull of the magnet against the spring 47 (or against gravity in the event the moving parts are weighted against the magnetic pull instead of being spring-tensioned) will not keep the writing tip in contact with the paper.

The means for getting a single stroke action is well known in the art, and any one of the well-known electrical or mechanical arrangements common in the art may be used for this purpose.

In this manner, the depression of a sharp or flat key causes the corresponding sharp or flat marker to be brought into momentary contact with the paper for a single-point contact. This makes a slight transverse line 91, as indicated in Figures 7 and 8. In addition to this, however, the corresponding natural marker is also depressed and is kept depressed so long as the particular sharp or flat key is held depressed. In this manner, the note is in reality indicated by the natural marker with the length of the line designating the length of the note, and the flat or sharp mark merely labels the note as being either sharp or flat. The absence of the flat or sharp mark leaves the note designated as a natural note.

A six-toothed idle wheel 65 is suitably mounted in operative juxtaposition to the paper with the teeth engaging a series of perforations 66 in one of the marginal zones of the paper; the same perforations which serve to engage the propelling wheel 32. The perforations 66 are so spaced that every sixth one represents one beat. An eccentric member 67 carried by the wheel 65 raises a clapper arm 68 pivoted at any suitable point 69, and having a tapper 70 which drops onto a suitable sounding box or member 71 to give an audible signal of each beat as the paper travels in the direction of the arrow 72.

A second set of perforations 73 are also provided for each first beat, and a pivotally mounted electrical contact arm 74 (Figure 6) is caused to rest lightly on the marginal zone of the paper 26, in operative alignment with the perforations 73, so that each time one of the holes 73 passes beneath the contact member 74, the contact member 74 enters the perforation and contacts the metallic supporting table 25 upon which the paper rests. An electrical circuit is established between the contact arm 74 and the table 25 through suitable electrical circuits, indicated in Figure 6, which in turn is connected to a suitable electric sounding device 75 which gives another distinct audible signal to designate each first beat. The sound selected for this sounding device should be different from that produced by the sounding device 71 so as to obtain a suitable contrast.

The spacing of the holes 73 in relation to the holes 66 varies for the different times, and therefore a different paper is used for 4/4 time, for 3/4 time, for 6/8 time, etc.

While the motor 33, or preferably (or more particularly) the speed-change device 51, controls the tempo of the composition, the paper 26 itself is so constructed by the placement of the holes 73 in relation to the holes 66 (and in relation to the beat signaling means 65 to 71), as to indicate the "time" in which the composition is played.

Thus, with six of the holes 66 corresponding to each beat in the particular illustration shown, there is a hole 73 for every twenty-fourth hole 66 for a composition in 4/4 time, so that one out of every four beats will be distinguished by such means as indicated in Figure 6, to designate the first beat of the count. This 4/4 paper is the one particularly illustrated in Figure 8. For composition in 3/4 time there would be one hole 73 for every eighteenth hole 66. We likewise provide correspondingly perforated paper for compositions in 2/4 time and compositions in 6/8 time, etc.

Naturally, regardless of the "time" for which the particular paper is perforated, enough space should be allowed between each count, so that

the maximum number of notes can be played without crowding each other and with enough room allowed for the marks produced by the black keys.

As distinguished from the "time" in which the composition is played and which is determined by the placement of perforations 73 in relation to the perforations 66, the tempo is on the other hand, controlled by the rate of travel of the paper.

The speed change device 81 may be of any suitable type known in the art and is preferably one which may be remotely controlled through electrical circuits, so that a small push-button block 77 may be placed near the piano and connected with speed-change device 81 through multi-wire cable 78 so that the speed-change device may be selectively set at any one of the several speeds, *a*, *b*, *c*, *d*, and *e*, by merely pressing the corresponding button so that the composer may from time to time change the paper feed to correspond to the desired tempo. A shut-off switch 79 may also be provided in the block 77 for starting and stopping the motor 33.

The points of the markers 37 and 38 are preferably closely spaced, and with the minimum distance between natural or sharp or flat markers. This may be accomplished by bending the tip of one set of markers toward the other with just a sufficient space between them so that they do not bind or contact. In this manner, the slight transverse lines 91 on the paper which mark the sharp or flat notes may be more directly adjacent to the beginning of the regular or natural note marks.

Thus, the note is marked by the horizontal lines 90, while the sharps or flats are marked by the slight transverse lines 91.

If desired, the marker tips may be made of a soft silver or similar soft metal which will readily leave a mark on certain specially surfaced papers. In this manner, the carbon paper may be eliminated and ink may also be avoided.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having thus described the invention, what is hereby claimed as new and desired to be secured by Letters Patent is:

1. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electromagnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions and arranged to mark the paper so long as energized, another set of electromagnetically actuated intermediate note markers in operative juxtaposition to said score-paper and extending across the paper band in operative alignment with the corresponding natural-note markers and arranged to make only a single-point contact with the paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, with the electric circuit-makers corresponding to each intermediate note being also effective to operate the electric circuit-maker beneath the natural key immediately adjacent to it, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the natural keys and each of the electromagnetic markers corresponding to the natural-notes for moving said markers into the marking position and for retaining the same in the marking position whenever and so long as the corresponding natural key is depressed, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electromagnetic markers, for moving said markers into the marking position only for a single-point mark for each movement of the key and for thereafter releasing the marker from the marking position, means associated with the score paper for audibly signaling each beat in timed relation to the movement of said score paper and the markings on said score paper, and means for audibly signaling the first beat of every count in timed relation to the movement of the score paper and the markings thereon; said means for audibly signaling each beat and said means for audibly signaling the first beat of every count being of contrasting sounds.

2. Musical composition writing apparatus including means for selectively propelling a long band of apertured score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electromagnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions and arranged to mark the paper so long as energized, another set of electromagnetically actuated intermediate note markers in operative juxtaposition to said score-paper and extending across the paper band in operative alignment with the corresponding natural-note markers and arranged to make only a single-point contact with the paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, with the electric circuit-makers corresponding to each intermediate note being also effective to operate the electric circuit-maker beneath the natural key immediately adjacent to it, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the natural keys and each of the electromagnetic markers corresponding to the natural-notes for moving said markers into the marking position and for retaining the same in the marking position whenever and so long as the corresponding natural key is depressed, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electromagnetic markers, for moving said markers into the marking position only for a single-point mark for each movement of the key and for thereafter releasing the marker from the marking position, and beat signal means controlled by said moving band of apertured score paper for signalling each beat.

3. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electromagnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions and arranged to mark the paper so long as energized, another set of electromagnetically actuated intermediate note markers in operative juxtaposition to said score-paper and extending across the paper band in operative alignment with the corresponding natural-note markers and arranged to make only a single-point contact with the paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, with the electric circuit-makers corresponding to each intermediate note being also effective to operate the electric circuit-maker beneath the natural key immediately adjacent to it, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the natural keys and each of the electromagnetic markers corresponding to the natural-notes for moving said markers into the marking position and for retaining the same in the marking position whenever and so long as the corresponding natural key is depressed, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electromagnetic markers, for moving said markers into the marking position only for a single-point mark for each movement of the key and for thereafter releasing the marker from the marking position, said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding to the first beat of each count, and an electrical signal including an electrical circuit and an electrical circuit maker adapted to operate through said last mentioned apertures for audibly signaling the first beat of every count.

4. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electromagnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions and arranged to mark the paper so long as energized, another set of electromagnetically actuated intermediate note markers in operative juxtaposition to said score-paper and extending across the paper band in operative alignment with the corresponding natural-note markers and arranged to make only a single-point contact with the paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, with the electric circuit-makers corresponding to each intermediate note being also effective to operate the electric circuit-maker beneath the natural key immediately adjacent to it, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the natural keys and each of the electromagnetic markers corresponding to the natural-notes for moving said markers into the marking position and for retaining the same in the marking position whenever and so long as the corresponding natural key is depressed, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electromagnetic markers, for moving said markers into the marking position only for a single-point mark for each movement of the key and for thereafter releasing the marker from the marking position, said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding to the first beat of each count, and an audible beat signal operatively connected with said first mentioned row of apertures for signaling each beat.

5. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electromagnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions and arranged to mark the paper so long as energized, another set of electromagnetically actuated intermediate note markers in operative juxtaposition to said score-paper and extending across the paper band in operative alignment with the corresponding natural-note markers and arranged to make only a single-point contact with the paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, with the electric circuit-makers corresponding to each intermediate note being also effective to operate the electric circuit-maker beneath the natural key immediately adjacent to it, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the natural keys and each of the electromagnetic markers corresponding to the natural-notes for moving said markers into the marking position and for retaining the same in the marking position whenever and so long as the corresponding natural key is depressed, electrical circuits including a source of electrical energy intermediate each of said electric circuit-makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electromagnetic markers, for moving said markers into the marking position only for a single-point mark for each movement of the key and for thereafter releasing the marker from the marking position, said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding the first beat of each count, an audible beat signal operatively connected with said first mentioned row of apertures for signaling each beat, and an electrical signal including an electrical circuit and an electrical circuit maker adapted to operate through said last mentioned apertures for audibly signaling the first beat of every count.

6. Musical composition writing apparatus in-

cluding means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electro-magnetically actuted natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions, another set of electro-magnetically actuated intermediate note markers in operative juxtaposition to said score-paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, electrical circuits including a source of electrical energy intermediate each of said electrical circuit-makers beneath each of the natural keys and each of the electro-magnetic markers corresponding to the natural-notes for moving said markers into the marking position, electrical circuits including a source of electrical energy intermediate each of said electric circuit makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electro-magnetic markers, for moving said markers into the marking position, and means for audibly signaling the first beat of every count in timed relation to the movement of the score paper and the markings thereon.

7. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electro-magnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions, another set of electro-magnetically actuated intermediate note markers in operative juxtaposition to said score-paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, electrical circuits including a source of electrical energy intermediate each of said electrical circuit-makers beneath each of the natural keys and each of the electro-magnetic markers corresponding to the natural-notes for moving said markers into the marking position, electrical circuits including a source of electrical energy intermediate each of said electric circuit makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electro-magnetic markers, for moving said markers into the marking position, means associated with the score paper for audibly signaling each beat in timed relation to the movement of said score paper and the markings on said score paper, and means for audibly signaling the first beat of every count in timed relation to the movement of the score paper and the markings thereon; said means for audibly signaling each beat and said means for audibly signaling the first beat of every count being of contrasting sounds.

8. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electro-magnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions, another set of electro-magnetically actuated intermediate note markers in operative juxtaposition to said score-paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, electrical circuits including a source of electrical energy intermediate each of said electrical circuit-makers beneath each of the natural keys and each of the electro-magnetic markers corresponding to the natural-notes for moving said markers into the marking position, electrical circuits including a source of electrical energy intermediate each of said electric circuit makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electro-magnetic markers, for moving said markers into the marking position; said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding to the first beat of each count, and an electrical signal including an electrical circuit and an electrical circuit maker adapted to operate through said last mentioned apertures for audibly signaling the first beat of every count.

9. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electro-magnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions, another set of electro-magnetically actuated intermediate note markers in operative juxtaposition to said score-paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, electrical circuits including a source of electrical energy intermediate each of said electrical circuit-makers beneath each of the natural keys and each of the electro-magnetic markers corresponding to the natural-notes for moving said markers into the marking position, electrical circuits including a source of electrical energy intermediate each of said electric circuit makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electro-magnetic markers, for moving said markers into the marking position; said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding to the first beat of each count, and an audible beat signal operatively connected with said first mentioned row of apertures for signaling each beat.

10. Musical composition writing apparatus including means for selectively propelling a long band of score paper at any one of several predetermined speeds, whose ratio to each other is more or less approximately the metronomic ratio between the several generally accepted metronomic tempi, a series of electro-magnetically actuated natural note markers in operative juxtaposition to said score-paper band and extending across the paper band in operative alignment with the corresponding natural note positions,

another set of electro-magnetically actuated intermediate note markers in operative juxtaposition to said score-paper, electric circuit-makers corresponding to and adapted to be disposed beneath each key of the piano key-board, and adapted to be operated thereby, electrical circuits including a source of electrical energy intermediate each of said electrical circuit-makers beneath each of the natural keys and each of the electro-magnetic markers corresponding to the natural-notes, for moving said markers into the marking position, electrical circuits including a source of electrical energy intermediate each of said electric circuit makers beneath each of the intermediate (sharp or flat) keys and each of the intermediate-note electro-magnetic markers, for moving said markers into the marking position; said score paper including a row of apertures therethrough corresponding to the beats and another row of apertures paralleling the score and corresponding to the first beat of each count, an audible beat signal operatively connected with said first mentioned row of apertures for signaling each beat, and an electrical signal including an electrical circuit and an electrical circuit maker adapted to operate through said last mentioned apertures for audibly signaling the first beat of every count.

WILLIAM FRANKLYN ALLEN, JR.
EDWARD J. CLARK.