

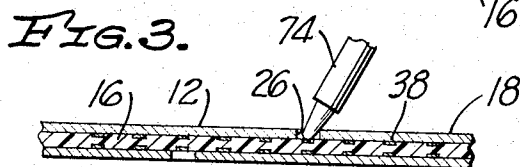
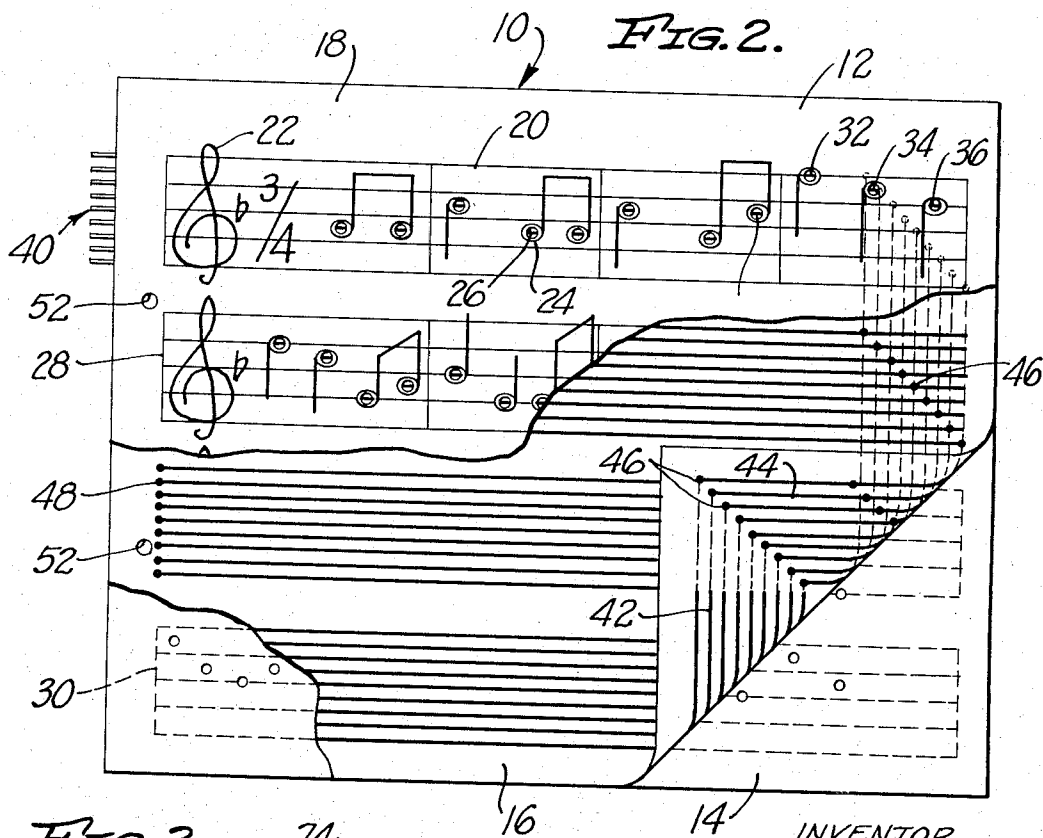
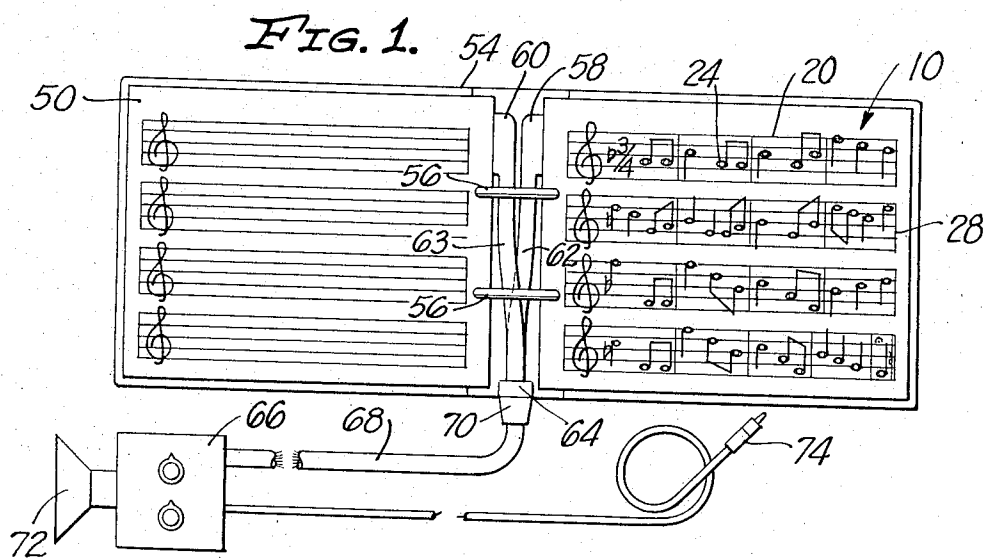
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ELECTRICAL MUSICAL INSTRUMENT WITH CONDUCTIVE TUNE SHEET

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ELECTRICAL MUSICAL INSTRUMENT WITH CONDUCTIVE TUNE SHEET

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ABSTRACT OF THE DISCLOSURE

This invention is directed to a music sheet, and particularly to a music sheet which is capable of being printed with conventional musical staves and of musical note arrangements thereon, and which notes are able to be contacted with a stylus so as to, through suitable electronic equipment, produce the audible tones corresponding to the notes. Furthermore, the music sheet of this invention is capable of being provided with a plurality of lines and staves of music on both sides of the sheet. Since the music is in sheet form, a plurality of such sheets can be secured into a single book, and preferably all of the sheets of the plurality are connected to common electronic equipment for reproduction of the corresponding notes as they are selected by the stylus.

Background

Prior attempts have been made to provide direct tone production in relation to the positioning of notes upon the musical staff. The prior structures were heavy and rigid. In view of this fact, a sufficient number of them to provide variety and to provide an adequate number for students in the classroom took up a considerable amount of space, were bulky and difficult to handle and militated against adequate variety. Furthermore, the provisions of a music sheet of such thinness and versatility that a plurality of them could be secured in a book, all connected to the electronic reproducing device has been absent from the prior art. Thus, the music sheet of this invention provides an outstanding structure for use in music teaching situations.

Description

Accordingly it is an object of this invention to provide a music sheet which is capable of being printed with musical notes, and which is capable of being connected to a tone generator and arranged so that contact with a printed note results in the corresponding audible tone. It is another object of this invention to provide a musical sheet which can be printed on both sides, and each side with a plurality of staves of printed music, each with the notes on the printed music being arranged so that contact therewith causes production of the corresponding tone. It is still a further object of this invention to provide a music sheet of sufficient thinness that a plurality of such music sheets can be secured together in a book so as to provide a wide variety of available music in a small space, each of the sheets being connectable to an electronic device for production of the tones indicated by the position of the musical notes. Other objects and advantages of this invention will become apparent from a study of the following portion of this specification, the attached claims and the drawings.

FIG. 1 is a plan view of a book containing a plurality of the music sheets of this invention.

FIG. 2 is an enlarged plan view, with parts broken away, showing a single music sheet of this invention.

FIG. 3 is a further enlarged transverse section, with parts broken away, through the music sheet of this invention.

Referring now to the drawings, the music sheet of this invention is generally indicated at 10. First describing the structure of the music sheet 10, it is seen in FIGS. 2 and 3 that the music sheet 10 comprises first and second facing sheets 12 and 14 and center sheet 16. Each of these sheets is preferably somewhat flexible. Each must have a reasonably high dielectric strength, and each is preferably made of deposited cellulosic material, so as to fall in the class of paper. Facing sheets 12 and 14 must have an exterior surface, such as the surface 18 of first facing sheet 12, of such nature as to accept the printing of indicia thereon. Center sheet 16 can be of synthetic polymer composition material, but is preferably of paper, as is indicated above.

Sheets 12, 14 and 16 are laminated together, and before such lamination, the exterior surfaces of facing sheets 12 and 14 are printed with musical indicia. The musical indicia is preferably the conventional staff 20 with clef indicia 22, indicating the clef. The treble clef indicia is shown. Additionally, printed upon the staff are a plurality of notes. One of the notes is indicated at 24. The notes are arranged upon the staff 20 in conventional musical notation. In addition to the conventional printed music, however, each of the notes has an opening 26 thereon. The opening 26 extends all the way through first facing sheet 12 so that center sheet 16 is accessible therethrough.

In addition to staff 20, additional staves, together with their clef indicia and notes may be arranged one above the other upon the exterior surface of first facing sheet 12. An additional one of these staves is shown at 28 in FIGS. 1 and 2. Furthermore, the exterior face of the second facing sheet, facing away from the viewer in FIGS. 1 and 2, is printed with corresponding staves, one of which is indicated at 30. It is a necessary part of this invention that the staves on the face of the facing sheets 12 and 14 have their lines aligned with each other.

Center sheet 16 has several sets of conductors positioned thereon. There are five lines and four spaces in staff 20, as well as in each of the other staves, for such is the conventional arrangement of printed music. Nine conductors are associated with each of the staves. Each of the conductors comprises a conductor bar which lies behind one of the staff lines or one of the staff spaces. A number of the conductors related to staff 20 are seen through the opening 26 of the notes 24 shown on staff 20. For example conductors 32, 34, 36 and 38 are shown in the openings of the notes on staff 20. Similar conductors are positioned behind the remaining lines and spaces of staff 20. At the left end of music sheet 10 a terminal is connected to each of these conductors. The terminals are generally indicated at 40. External electrical connections are made to terminals 40 in the manner hereinafter described. Thus, the conductors behind staff 20 are electrically connected to terminals 40.

In order to connect the conductors behind the remaining staves, the conductors on the back side of center sheet 16, which are in alignment with the conductors on the front side, terminate short of the right end of the staff, as seen from the front side of the sheet. Thus, conductors 42 terminate short of the end of staff 30. Busses 44, of

which there is one for each of the conductors, are arranged at right angles to the conductors. Busses 44 are respectively connected to selected conductors by means of rivets 46 which pass through center sheet 16 and are in electrical contact with one of the conductors and one of the busses. Thus, each of the conductors in each of the sets of conductors on the front of center sheet 16 is connected appropriately to a bus on the rear. For example, the top conductor on each staff is connected to the leftmost buss 44 by means of a rivet 46. By this means each of the conductors on the front of center sheet 16 is connected to an appropriate terminal 40.

Since the conductors on the rear of the center sheet stop before they reach busses 44, they are not in electrical continuity therewith at that end of the sheet. However, rivets 48 extend through the sheet at the left side thereof so as to place the conductors on the front and on the rear into electrical continuity with each other. By this means all of the top conductors, on the front end on the back of the center sheet, are connected together and to one of the terminals 40. The same is true of each of the other corresponding conductors. The arrangement of placing the busses 44 where they are located provides for maximum use of the back side of the music sheet 10 because the busses are placed so that they will be covered by the clef indicia. In that location, no notes are needed. Thus, the entire effective line length is available for use.

As is seen in FIG. 3, the conductors can be embossed into the center sheet 16, or manufactured in any other convenient way. They can be deposited thereon, or the balance of the material etched away as in printed circuit techniques. Appropriate holes and printed staves, notes and the clef indicia are printed upon the facing sheets, and the three sheets are laminated together to produce a single structure which has some flexibility and is relatively thin so that a plurality of them take up a relatively small space.

Referring to FIG. 1, music sheets 10 and 50 are shown therein. Each is printed with appropriate notes, each note having a hole therethrough to the conductor below. Each of the music sheets is provided with edge holes 52 by which the music sheets are secured to book 54 by means of binding rings 56. Connectors 58 and 60 are respectively attached to terminals 40 of music sheets 10 and 50. Flexible multiple conductor cables 62 and 64 connect the connectors to plug 64. Plug 64 is preferably secured to the bottom edge of book 54 so that the book can be disconnected from the associated electronic structure.

Tone generator 66 is connected by cable 68 to plug 70 which is connectable to plug 64. Tone generator 66 has suitable controls and has an audio output 72. The audio output may either be in the form of a loud speaker or ear phones. Also connected to tone generator 66 is stylus 74. Stylus 74 is selectively contactable through any one of the openings 26 to the corresponding conductor below. When it contacts that conductor, it makes continuity through a particular conductor and through a particular terminal 40 to a tone generator 66. The tone generator 66 produces a corresponding tone.

By this structure, a music student can directly see the notes on the printed conventional staff and can produce the corresponding note by means of contacting the stylus with the conductor available in the note opening. Thus, direct correlation between the printed note and the sound heard is obtained. Since the music sheets are relatively thin, quite a few can be placed in a single book 54 so that many pages of music are available to the student. Furthermore, each of the pages, in the form of a music sheet, is printed on both sides with music to thereby double the music storage and availability. Each book 54 is disconnectable by the pulling of plug 70 so that the books may be readily stored and the tone generator 66 separately handled.

This invention having been described in its preferred embodiment, it is clear that it is susceptible to numerous

modifications and embodiments within the skill of the routine artisan and without the exercise of the inventive faculty. Accordingly, the scope of this invention is defined by the scope of the following claims.

I claim:

1. A music sheet, said music sheet having first and second external surfaces, a plurality of music staves printed on each of said external surfaces, music notes printed on said staves, said music sheet comprising at least first and second facing sheets, said first external surface being on said first facing sheet and said second external surface being on said second facing sheet, an opening through said first facing sheet corresponding to each of the music notes printed thereon, and an opening through said second facing sheet corresponding to each of the music notes printed thereon, a conductor positioned below each of the lines and each of the spaces of the music staves on each of the facing sheets, there being a conductor thus corresponding to each of the lines and spaces, electrical interconnection means connecting corresponding conductors so that the conductor below a particular space on each staff is electrically connected to the conductors below the same space on the other staves, terminal means on said music sheet, said terminal means adapting said music sheet to be connected to a tone generator so that contact of a stylus through an opening through one of said facing sheets causes electrical contact with the conductor therebelow to generate a particular tone.

2. The music sheet of claim 1 wherein said music sheet is comprised of first and second facing sheets and a center sheet positioned therebetween, said center sheet separating said interconnection means from said conductors.

3. The music sheet of claim 2 wherein said interconnection means comprises busses, said busses being positioned in one side of said center sheet and said conductors corresponding to one of said facing sheets terminating short of said busses.

4. The music sheet of claim 3 wherein there are conductors on the other side of said center sheet, said conductors on said other side of said center sheet extending over said busses, said conductors on said other side of said center sheet being in electrical contact with the busses through said center sheet.

5. The music sheet of claim 1 wherein a center sheet is positioned between said first and second facing sheets, said center sheet having a first side toward said first facing sheet and a second side toward said second facing sheet, said conductors accessible through said note openings through said first facing sheet being positioned on said first side of said center sheet and said conductors accessible through said note openings through said second facing sheet being positioned on said second side of said center sheet, said conductors on said first side and said conductors on said second side of said center sheet being electrically connected together.

6. The music sheet of claim 5 wherein said center sheet has a first end and a second end, said conductors terminating adjacent each other at said first end of said center sheet and said conductors being electrically connected together by conductive means passing through said center sheet adjacent said first end of said center sheet.

7. The music sheet of claim 6 wherein at said second end of said center sheet said conductors on said first side thereof extend beyond the conductors on the second side thereof, busses arranged on said second side thereof, said busses being positioned beyond the ends of said conductors on said second side of said music sheet and being in electrical contact with said conductors of said first side of said center sheet by connection means passing through said center sheet.

8. The music sheet of claim 1 wherein a plurality of said music sheets are secured together in a book, said music sheets in said book being connectable to a tone generator.

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9. The music sheet of claim 8 wherein each of said music sheets in said book is connected to a plug, said plug being disconnectably attached to said tone generator.

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