United States Patent

Andersen

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[54] PORTABLE MUSIC LABORATORY

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[52] **U.S. Cl.** **84/470,** 35/6, 108/50, 312/237

[51] **Int. Cl.**.....**G09b 15/00**

[58] **Field of Search**.....84/1.01, 1.14, 1.17, 470, 477, 84/478; 108/50; 312/21, 30, 208; 35/6

[56] **References Cited**

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[57] **ABSTRACT**

A plurality of electronic pianos is mounted on a folding table. One piano is a teacher's piano, and the remaining pianos are students' pianos. The pianos are positioned with the teacher's piano at one end of the table, and with the students' pianos converging therefrom along the sides of the table, being angled somewhat to allow a clear view of the teacher by each student without looking completely away from his piano. Each piano has its own generators and can reproduce locally at a loudspeaker or earphones, or at the teacher's piano. A table folds, rising up at its center-line, and dropping down at the outer ends in a counterbalancing arrangement, whereby all of the pianos lie on outer faces of the table for movement of the table on casters, the entire assembly when folded readily fitting through a standard 30 inch interior door to allow movement from one room to another. The teacher's piano is coupled to a display panel showing musical staffs and a keyboard, whereby the students may observe visually the notes played by the teacher.

7 Claims, 5 Drawing Figures

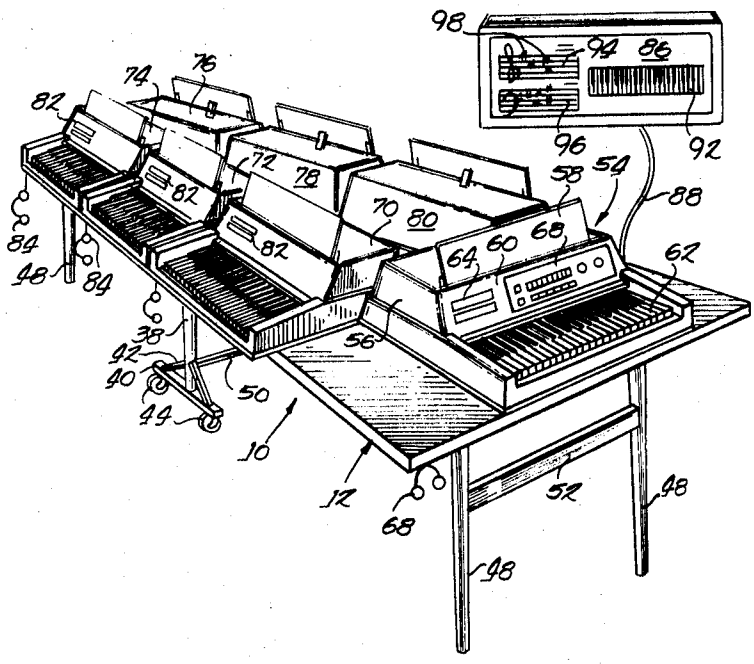

Fig. 1.

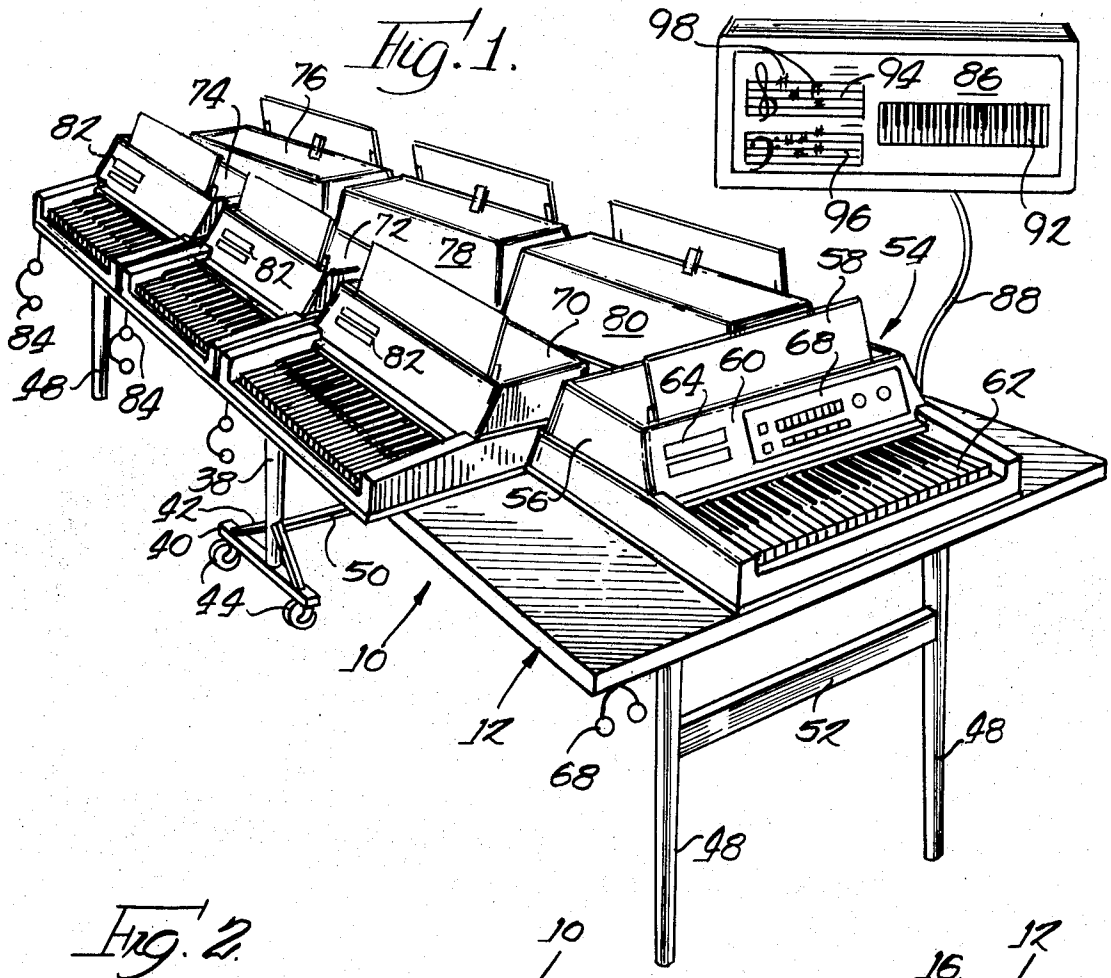

Fig. 2.

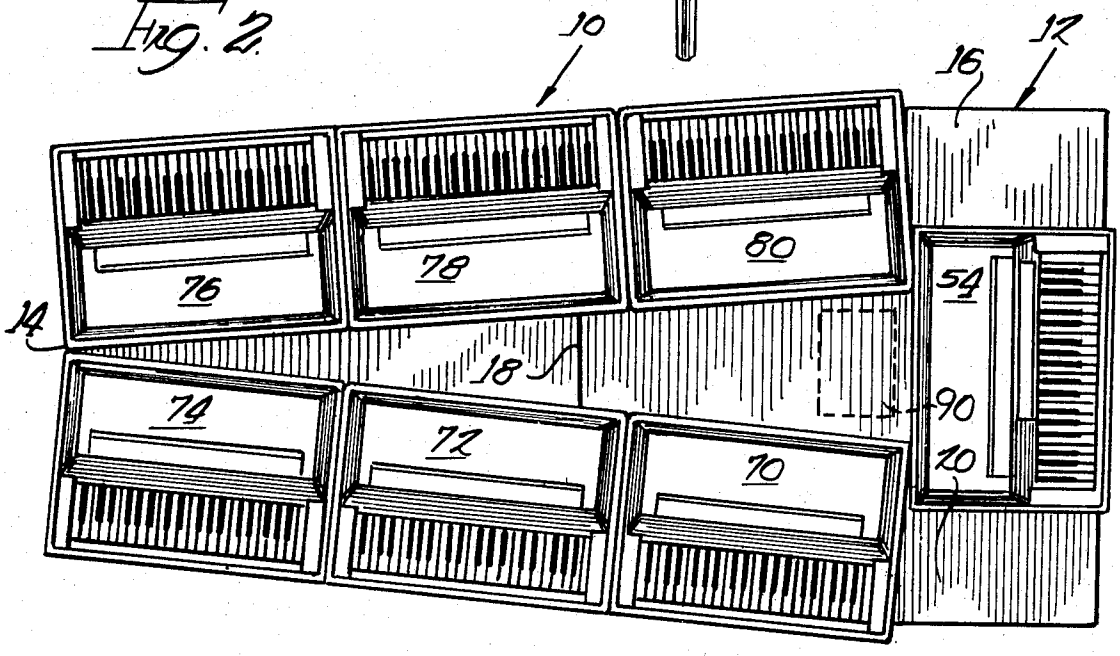

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Fig. 3.

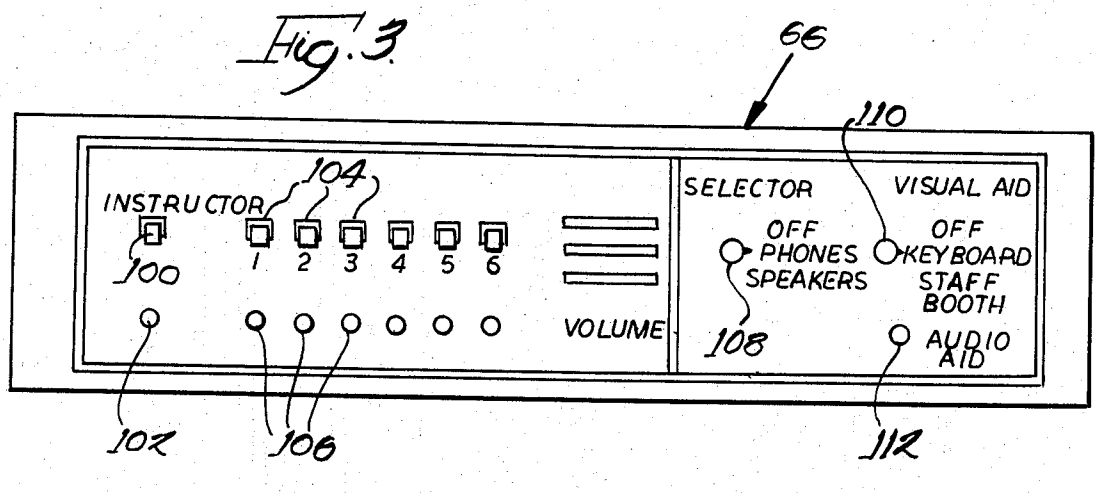


Fig. 4.

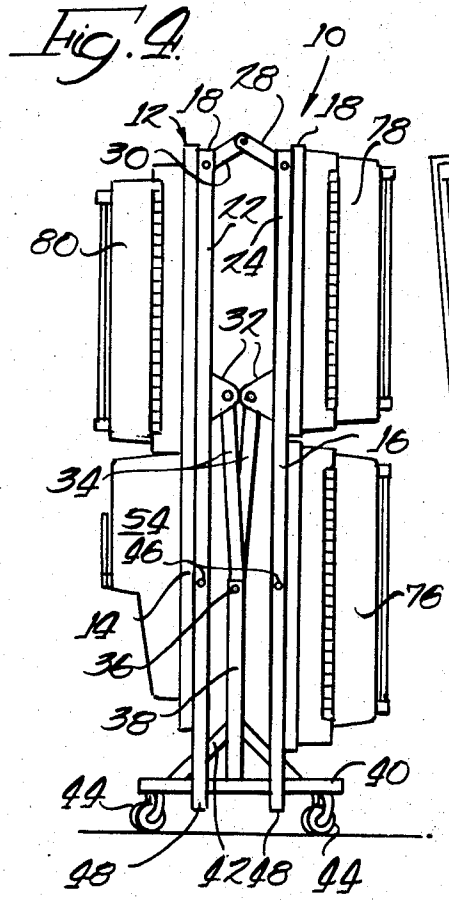
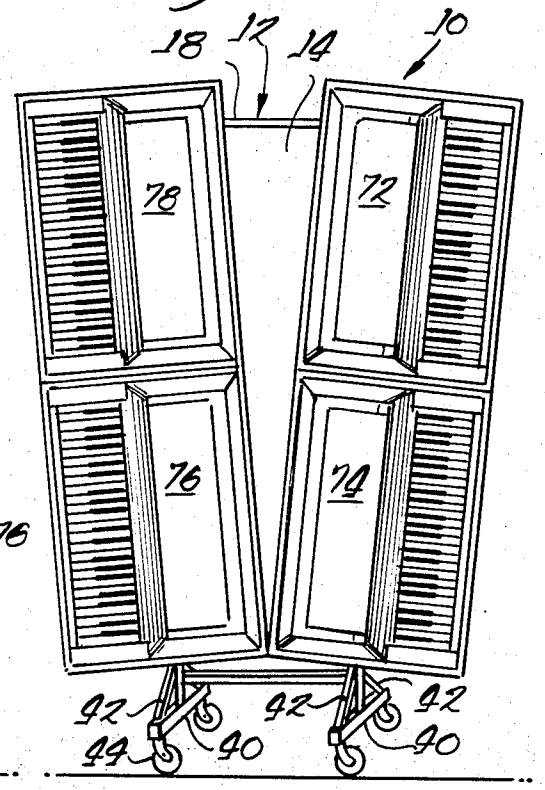


Fig. 5.



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PORTABLE MUSIC LABORATORY

BACKGROUND OF THE INVENTION

Electronic pianos have been used heretofore for group instruction. Such groups of pianos have been disclosed in my own prior patents: U.S. Pat. No. 3,011,431, and U.S. Pat. No. 3,475,833. In addition, such electronic pianos and controls for the operation thereof have been sold for some years commercially by the Wurlitzer Company. Such teaching systems of electronic pianos have found wide acceptance in schools, particularly on a secondary and on a university level. One feature of my previous systems that under some circumstances has proved to be a drawback has been the time consumed in moving the pianos from one room to another. In a university or in a secondary school it is usually possible to provide a music room in which the pianos can be set up more or less semi-permanently. However, some schools, particularly on the primary level, do not have a permanent music room, and it is necessary to move the pianos from one room to another. Although this has not been a particularly difficult task from a physical standpoint, it has taken a certain amount of time, since all of the pianos have had to be separated from the connecting cables, and the pianos have had to be moved one at a time from one room to another, following which the cables all had to be re-connected.

OBJECTS AND SUMMARY OF THE PRESENT INVENTION

It is an object of the present invention to provide a piano teaching system with discrete electronic pianos mounted on a common folding table whereby the table can be folded to move the pianos from one room to another for group instruction with the table folding so as to position all of the pianos on the outside thereof.

Another object of the present invention is to provide a plurality of students' electronic pianos and a teacher's electronic piano on a common table which folds in such a manner that part of the table is moved up and part drops down thereby providing a counterbalancing action simplifying the physical act of folding the table.

Yet another object of the present invention is to provide a piano teaching system comprising a plurality of student electronic pianos and a teacher's electronic piano mounted on a common supporting table with the students' pianos converging away from the teacher's piano, whereby to improve visibility of the teacher by the students and vice versa.

Other and further objects and advantages of the present invention will be apparent from the following description when taken in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a portable music laboratory constructed in accordance with the present invention;

FIG. 2 is a top view thereof;

FIG. 3 is a front view on an enlarged scale of the control panel on the teacher's piano;

FIG. 4 is a side view of the portable music laboratory showing the supporting table in folded position; and,

FIG. 5 is a view taken at right angles to FIG. 4 from the right side thereof.

Returning now in greater particularity to the figures of the drawings, and first to FIGS. 1, 2, 4 and 5, there

will be seen a portable music laboratory constructed in accordance with the present invention and identified generally by the numeral 10. The portable music laboratory includes a folding table 12 which is available commercially, and which, therefore, need not be described in great detail. The table is available from the Howe Folding Furniture Company, Inc., 360 Lexington Avenue, New York, 10017, and includes a pair of panels 14 and 16 butting together at a parting or folding line 18 in coplanar relationship as in FIGS. 1 and 2 to form a table top 20. The panels 14 and 16 are respectively mounted upon metal frame members 22 and 24 (FIG. 4) which are hingedly interconnected by a hinge 28 having a pivot center 30 which, with the table in erected horizontal position, is spaced below the frame members 22 and 24, and along the vertical downward projection of the parting line 18. Hence, when the table is folded from the erected position of FIGS. 1 and 2 to the position of FIGS. 4 and 5, the panels 14 and 16 are spaced apart as shown in FIG. 4.

Each of the panels (FIG. 4) is provided relatively slightly toward the parting line 18 from the opposite ends thereof with depending ears 32 on which are hinged support rods 34, the latter being pivotally interconnected at 36 to a single upright leg 38 (there being duplicate structure on opposite sides of the table) connected at its lower end to a cross bar 40 and having diagonal braces 42. Casters 44 depend from opposite ends of the cross bar 40 for transporting the entire music lab.

More or less midway between the ears 32 on the opposite ends of the table and slightly displaced toward the opposite ends of the table, there are pivots 46 to which end legs 48 are pivotally connected. These legs are not provided with casters, and are of proper length, considering the geometry of the table structure, that they engage the floor with the table in erected, horizontal position and are spaced slightly above the floor with the table folded as in FIGS. 4 and 5. Transverse braces 50 and 52 extend between the pairs of legs 38 and 48 respectively.

An important feature of the folding of the table as may be understood from the foregoing, is that when the table is folded the center portion thereof rises up while the end portions thereof drop down. This produces a counterbalancing action in folding which is particularly important, as will be brought out further hereinafter.

Adjacent one end of the table (the right end as viewed in FIGS. 1 and 2) and facing the end thereof is a teacher's piano 54. The piano includes a case 56 having a music rack 58, a fallboard 60, and a plurality of black and white keys in the usual arrangement. As will be understood, the teacher's piano is an electronic piano, and a loudspeaker 64 is provided behind punched holes or grille cloth in the fallboard. A control panel 66 also is provided on the fallboard, and more will be said about this later.

The teacher's piano is of the type disclosed in my prior patent U.S. Pat. No. 2,974,555 and others. The keys 62 actuate more or less conventional piano actions, which cause felt-headed hammers percussively to engage vibratile reeds. The reeds are in electrostatic capacitive relation with a pickup, and the capacity between the reeds and the pickup varies in accordance with the reed vibration. A biasing potential across the

reeds and pickup varies in accordance with the variation in capacity, and this electrical variation is amplified and connected to the loudspeaker **64**. In addition, a pair of teacher's earphones or headphones **68**, shown as suspended below the table, is connected by means of a cable extending through the table into the teacher's piano, and the teacher may listen with the headphones **68** rather than with the loudspeaker **64**.

In addition to the foregoing, the table is provided with six student pianos **70, 72, 74, 76, 78** and **80**, each of which is substantially identical with the teacher's piano, but lacking the control panel **66** and functions thereof. Each includes a loudspeaker **82** and headphones **84**. The headphones for all of the pianos are shown only in FIG. **1** to avoid cluttering up subsequent figures.

As will be seen in FIG. **1**, but particularly with reference to FIG. **2**, the two student pianos **70** and **80** are mounted on the panel **16**, while the student pianos **72, 74, 76** and **78** are mounted on the panel **14**. The right ends (as used in FIG. **2**) of the pianos **72** and **78** extend past the parting line **18** and overlie the panel **16**, but it is to be understood that these two pianos are fixed to the piano **14** and simply overlie the panel **16** with the table in erected position.

It further will be observed that the pianos **70, 72** and **74** are in a straight line, while the pianos **76, 78** and **80** are in a straight line, with the two straight lines diverging from left to right. The pianos **76** and **78** substantially contact one another, while the pianos **70** and **80** are spaced a substantial distance apart, comprising more than half the width of the teacher's piano **54**. The table top is shaped accordingly.

With the foregoing arrangement, the teacher seated at the teacher's piano **54** can simply look down more-or-less straight ahead, and observe each of the six students without making a great effort to look from side-to-side, and without having one student blocked from view by another. Conversely, the students can also look at the teacher with a slight side glance without looking completely away from the music on the respective music rack.

No sustaining pedals are shown in connection with the various pianos, but it will be understood that such sustaining pedals readily could be provided, such as in my prior U.S. Pat. No. 3,002,412. Furthermore, for sake of compactness, each piano has a shortened keyboard, comprising **40** keys in one illustrative embodiment of the invention, the keys being arranged in the usual combination of white keys for playing the natural notes and black keys for playing the sharps and flats. It is well recognized that approximately the top two octaves and the bottom two octaves are rarely used in beginning piano, and they can readily be omitted in the present instance.

In addition to the foregoing, and as shown only in FIG. **1**, there is a display board or panel **86** interconnected by the cable **88** with the teacher's piano **54** and with a control box **90** (FIG. **2**) conveniently disposed beneath the table panel **16** adjacent the teacher's piano **54**. The display panel **86** is provided with a representation of keyboard **92**, the surface of the display panel **86** being translucent, and there being one light bulb under each of the **40** keys represented at **92**. Electric contacts are provided beneath the keys **62** of the teacher's piano, whereby when any key **62** is depressed, the corresponding key on the keyboard representation **92** is illuminated from an underlying bulb, there being one light bulb per key.

To the left of the representation of the keyboard **92** is a representation of the treble staff **94**, and also a representation of a bass staff **96**. The normal wiring is for the key of C, and there are light bulbs provided behind the staff lines and spaces which light up respectively when any white key of the teacher's piano is depressed. Alternatively, sharp designations can be applied to the translucent piano as with a grease pencil, as indicated at **98** (or alternatively, flat designations), and internal wiring can be switched in the control box **90**, whereby music written in any key can be accommodated.

The control panel **66** of the teacher's piano **54** may be seen in some detail in FIG. **3**. At the left of the panel **66**, there is a toggle switch **100** under the label "Instructor" which, when actuated, allows the instructor or teacher to hear his own playing, either by means of the loudspeaker **64**, or by means of the earphones **68**, as will be noted shortly hereinafter. A volume control **102** is provided for the teacher's piano.

To the right of the toggle switch **100**, there is a row of six toggle switches **104**, respectively numbered **1** through **6**, which, when actuated singly or in combination, permit the instructor to listen to various students' pianos. A row of volume controls **106** corresponding to the toggle switches **104** is provided so that the instructor may individually adjust the volume of the student pianos as he listens to them.

At the right end of the panel **66** there is a selector switch **108** which allows the teacher to listen alternatively with his earphones or with the speaker, or neither. A switch **110** also is provided for control of the display panel **86**, allowing it to be turned off or to provide a visual display on the keyboard representation **92**, or on both the staffs **94** and **96** in addition to the keyboard representation **92**. Finally, a jack **112** is provided for the plugging in of an audio aid, such as a tape recorder.

Each of the toggle switches **100** and **104** can be moved down, center or up, and each lights up a different color in accordance with its position. In the center position each student hears his own piano.

If the teacher pulls down the instructor's switch **100**, and also pulls down, for example, the student's switch No. **1**, then the teacher can hear student piano No. **1**, and also can talk to the student through a microphone on the teacher's headset. The first student can also hear the teacher's piano. If the teacher wishes to pull down more than one student piano switch, for example, switches **1, 3** and **5**, all three of these pianos are interconnected in an ensemble. The teacher can hear all three, and the three students can hear one another. In the same example, the teacher can move switches **2, 4** and **6** and the teacher's switch up, and have student pianos **2, 4** and **6** in an ensemble. Alternatively, there can be two ensembles of two each, with the additional two student pianos independent, each of these two students hearing only himself.

Important features of the present invention will now be understood, including the fact that the center portion of the table rises up while the opposite ends lower

during folding of the table, whereby there is a counterbalancing action and the weight of the several electronic pianos (each of which weighs on the order of 50 lbs.), is not particularly significant in the folding of the table. Obviously, this would not be the case if one part of the table had to be lifted up and folded over the other part. Furthermore, it will be observed that the pianos are simply mounted on the table, preferably being held by bolts extending up through the table and threaded into the respective pianos (or into nuts therein). Thus, if any one piano should need servicing for any reason, it readily can be detached from the table. In addition, the convergence of the lines of student pianos, as viewed from the teacher's position, facilitates observation of the students by the teacher, and vice versa. In combination with all of the foregoing, the display panel **86** provides a visual indication for the students of just what the teacher is doing musically. As will be understood, the display panel **86** normally is mounted behind the teacher's back, in alignment with the teacher's head, whereby the students need only raise their eyes slightly above the teacher in order to see the visual display of just what the teacher is doing.

As is implicit in what has gone before, each piano has its own complete tone generating system whereby each plays individually, and there is no problem of confusion as there could be with a single generating system conjointly controlled by all of the keyboards. In the later case, if one student were to play a note, and then a second student were to play the same note, it would not be possible to tell who played the note.

The specific example of the present invention as herein shown and described is for illustrative purposes only. Various changes in structure will no doubt occur to those skilled in the art, and will be understood as forming a part of the present invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A portable music laboratory comprising a pair of supporting structures hingedly connected to one another, said structures having a substantially coplanar horizontal operative position and a folded travelling position with adjacent portions raised and outboard portions lowered and said structures in generally vertical position, pivot means under each of said structures, a first plurality of keyboard musical instruments one one of said structures with portions thereof on opposite sides of the respective pivot means, a second plurality of keyboard musical instruments on another of said structures with portions thereof on opposite sides of the respective pivot means, transport and support means for resting on the floor or the like in horizontal operative position of the structures, said transport and support means including a central portion and two outboard portions on either side of said central portion and relatively toward opposite ends of said supporting structures, and means interconnecting said transport and support means and said pivot means whereby upon folding of said support structures about the hinged connections portions of each plurality of musical instruments adjacent the hinged connection rise and other portions thereof outboard of the pivot means lower in a counterbalancing arrangement, the outboard portions of said transport and support means moving toward one another and lying at least in part closely adjacent the undersides of the respective supporting structures in close coupled relation therewith and with the central portion for transport of the folded assembly, said keyboard musical instruments in travelling position lying outwardly of said supporting structures in readily accessible position.

2. A portable music laboratory as set forth in claim **1**, wherein the supporting structure is comprised of panels which in coplanar relation comprise a table.

3. A portable music laboratory as set forth in claim **1**, wherein the hingedly connected structures together present an elongated configuration, one of said musical instruments being at the end of said configuration, at least some of said instruments being in two rows along opposite sides of said configuration.

4. A portable music laboratory as set forth in claim **3**, wherein one instrument is at the end and the two rows of instruments have a maximum spacing adjacent the end instrument and converge therefrom.

5. A portable music laboratory as set forth in claim **4**, and further including a display panel having note indicating means thereon and interconnected with the keys of the end instrument for displaying the notes played by a teacher, said display panel being positioned off the end at which the teacher's instrument is positioned.

6. A portable music laboratory as set forth in claim **5**, wherein the note displaying means comprises at least one musical staff and a keyboard representation.

7. A portable music laboratory as set forth in claim **1**, wherein each of the keyboard musical instruments comprises an electronic piano, each having its own generating system and sound reproducing means.

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