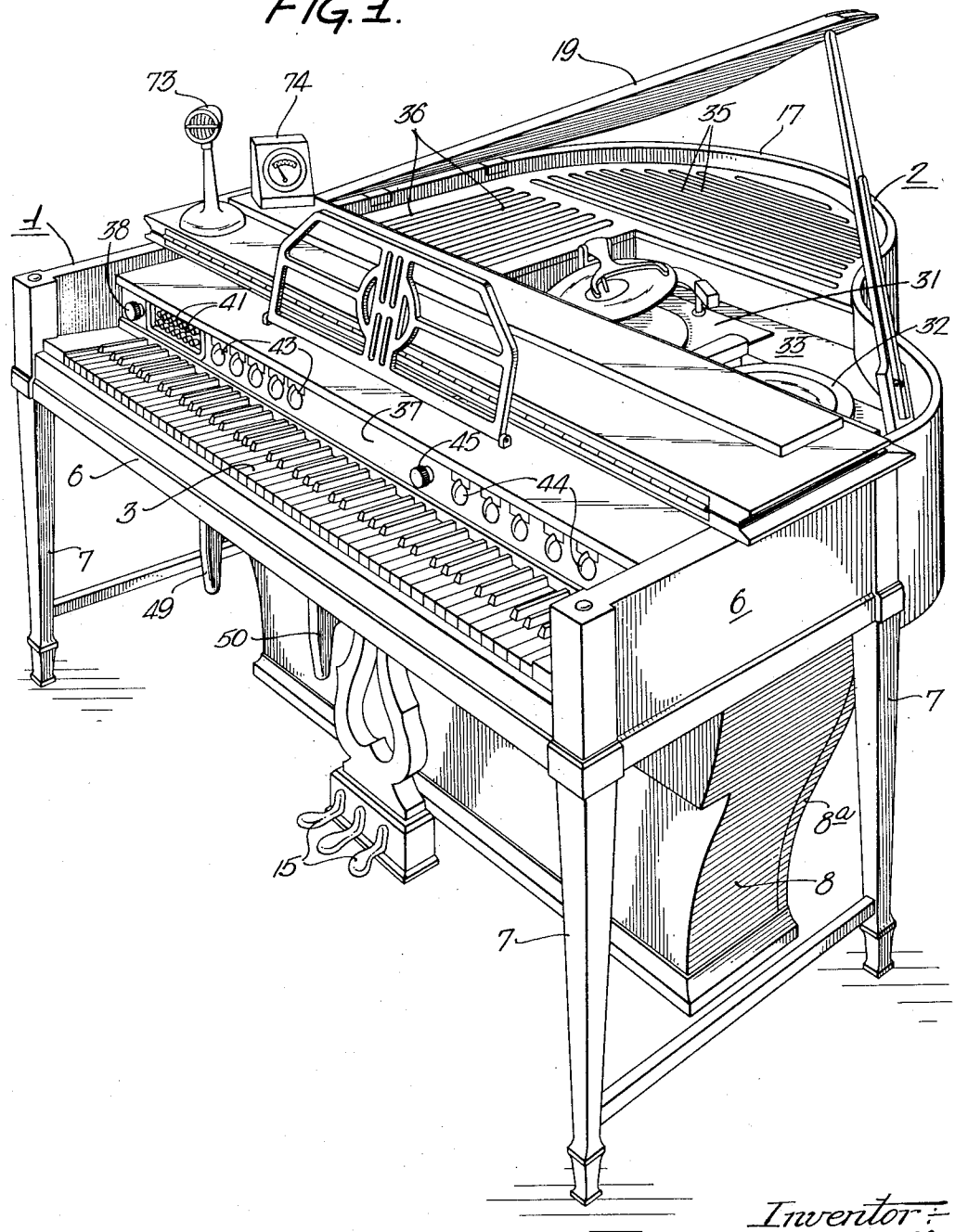
Nov. 14, 1950 L. LUBEROFF 2,530,251

PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 1

FIG. 1.



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PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 2

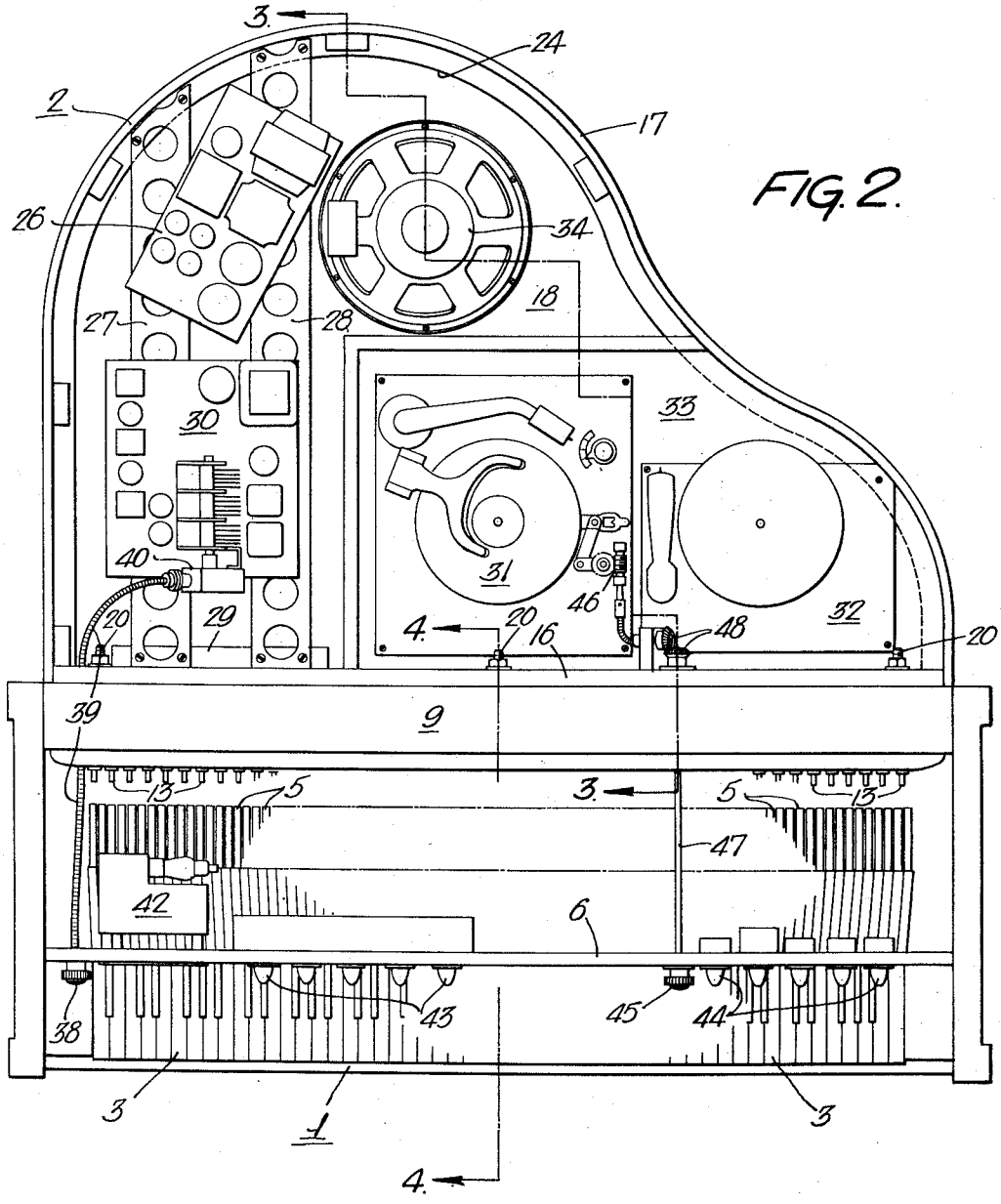


FIG. 2.

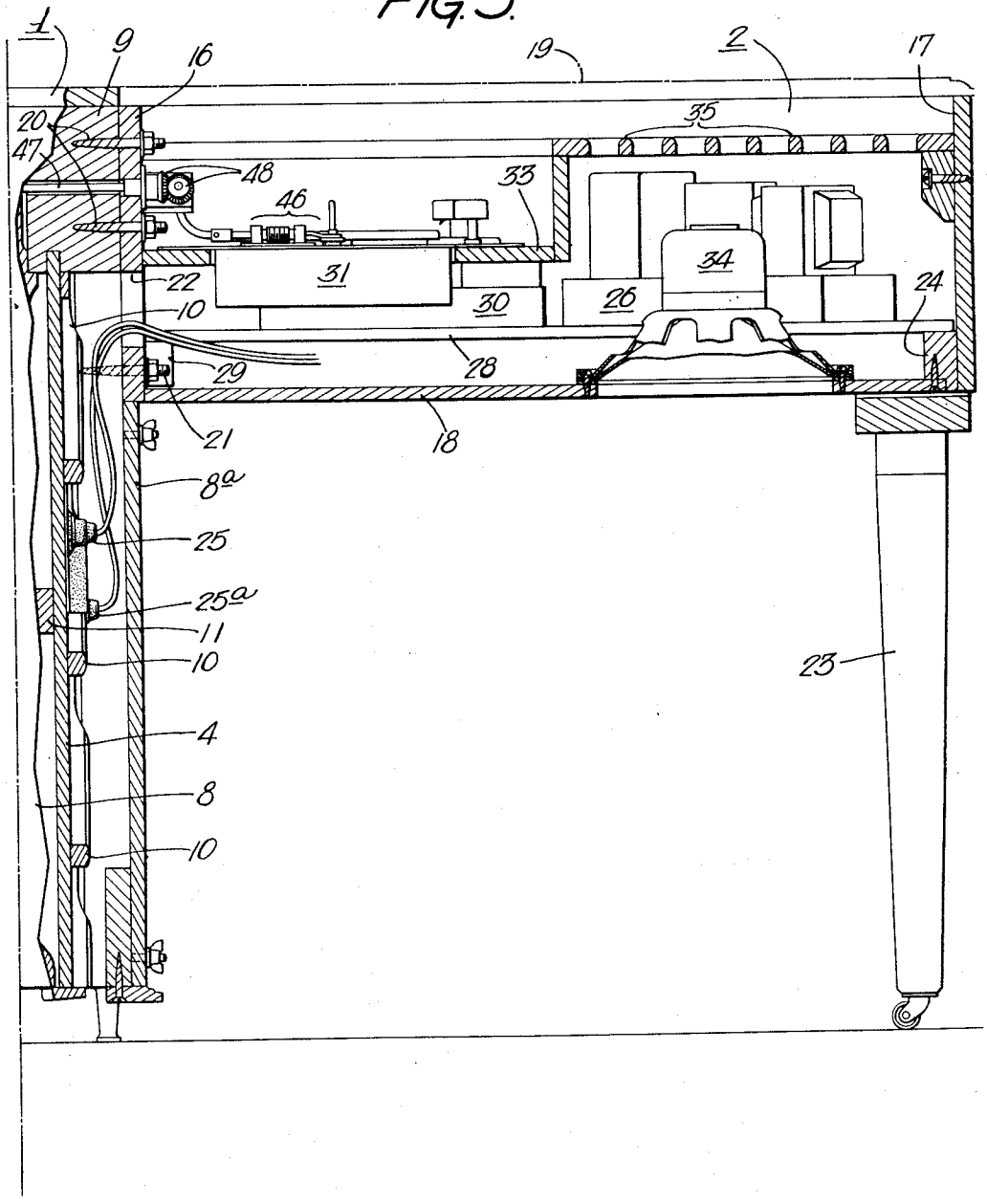
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PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 3

FIG. 3.



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Nov. 14, 1950 L. LUBEROFF 2,530,251

PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 4

FIG. 4.

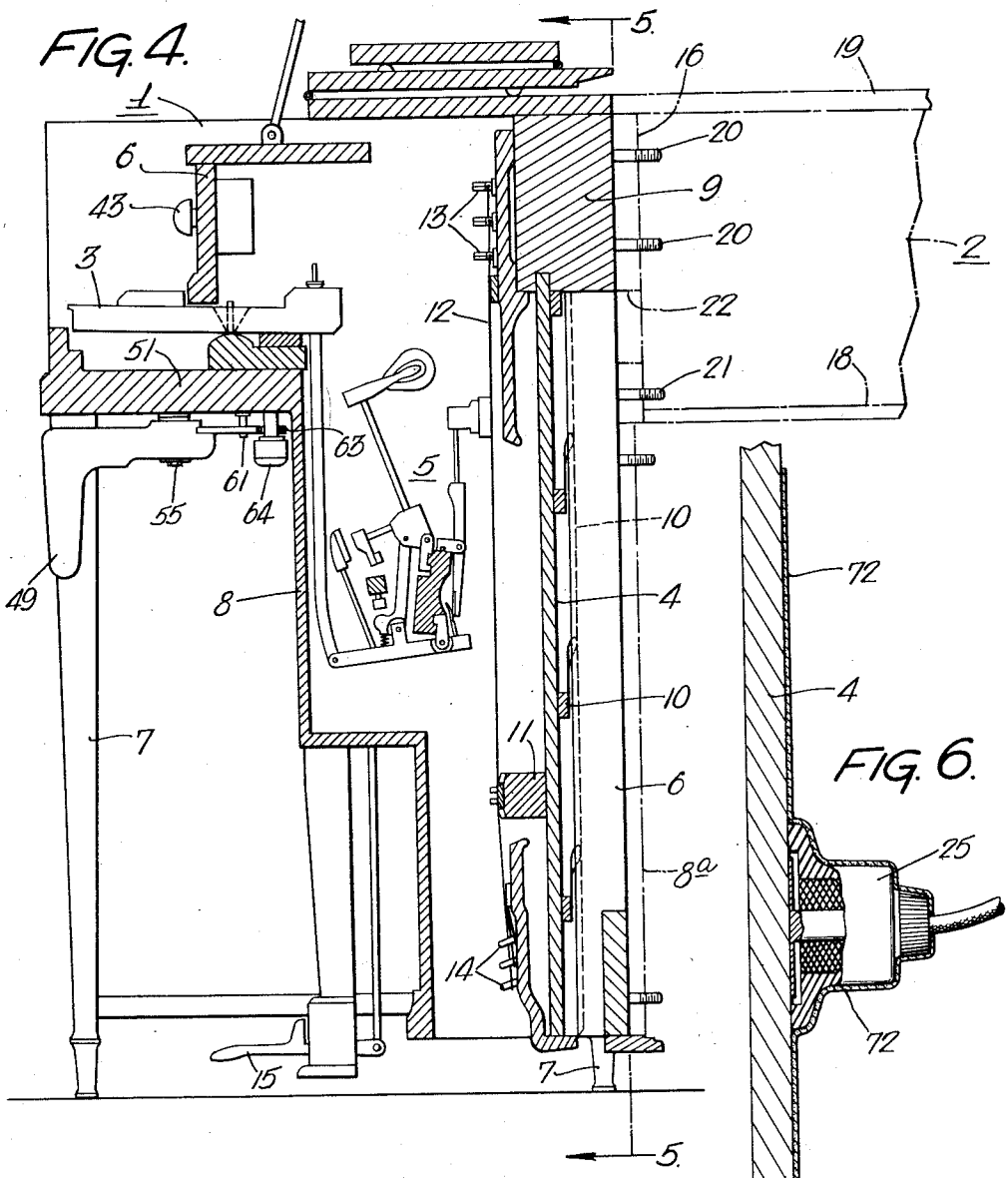


FIG. 6.

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Nov. 14, 1950 L. LUBEROFF 2,530,251

PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 5

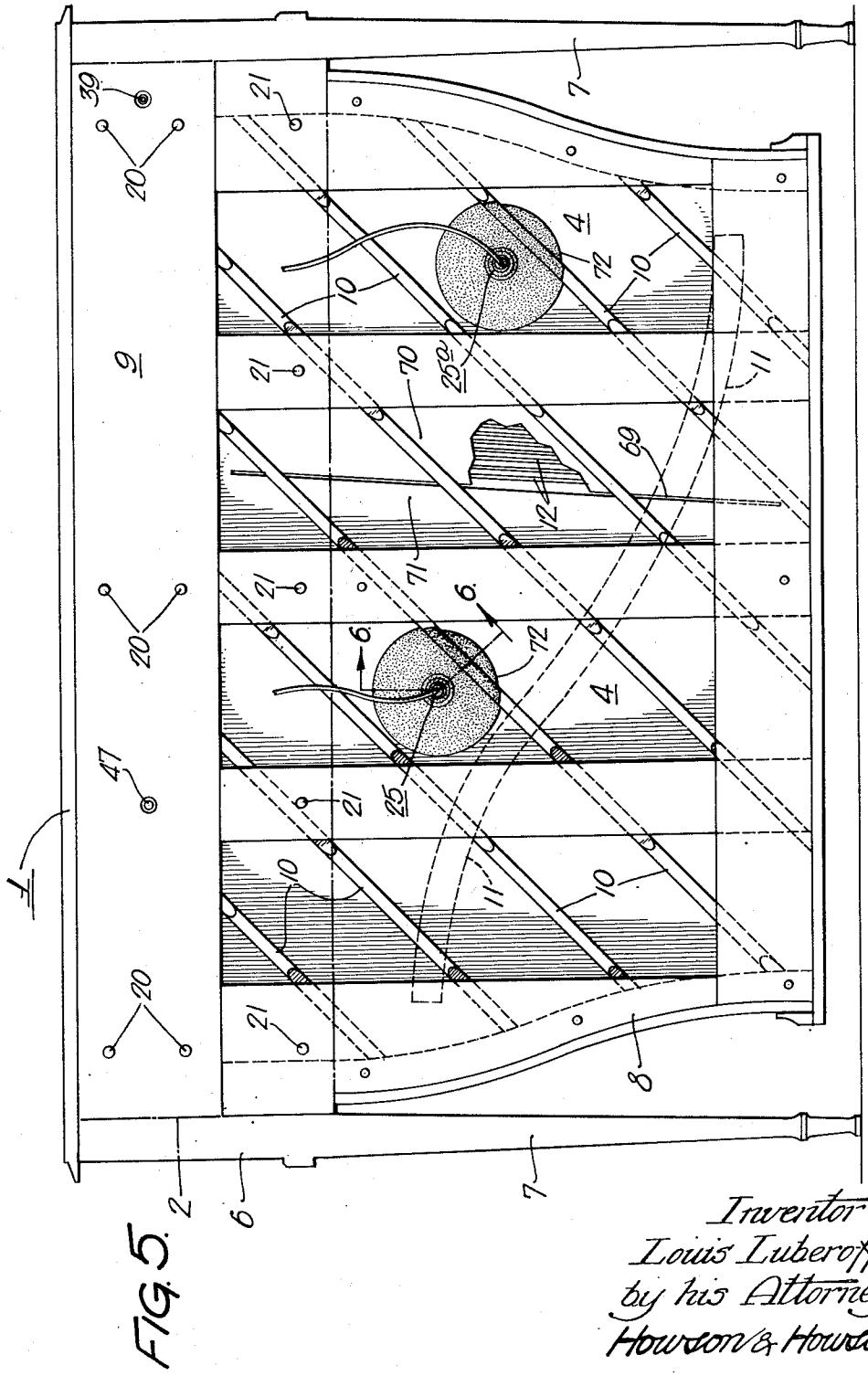


FIG. 5.

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PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Filed Aug. 9, 1945 6 Sheets-Sheet 6

FIG. 7.

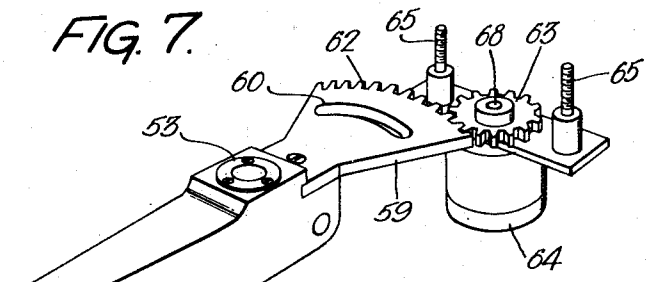


FIG. 8.

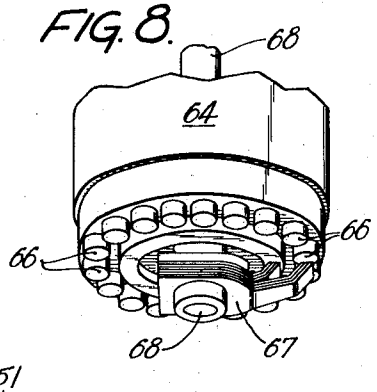


FIG. 9.

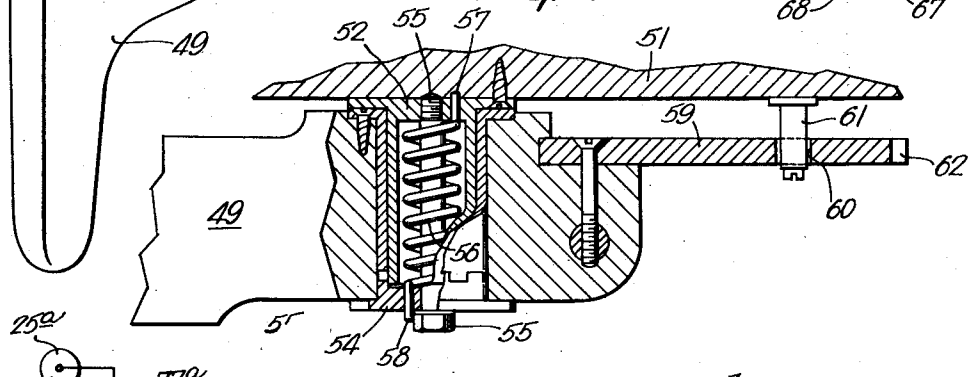
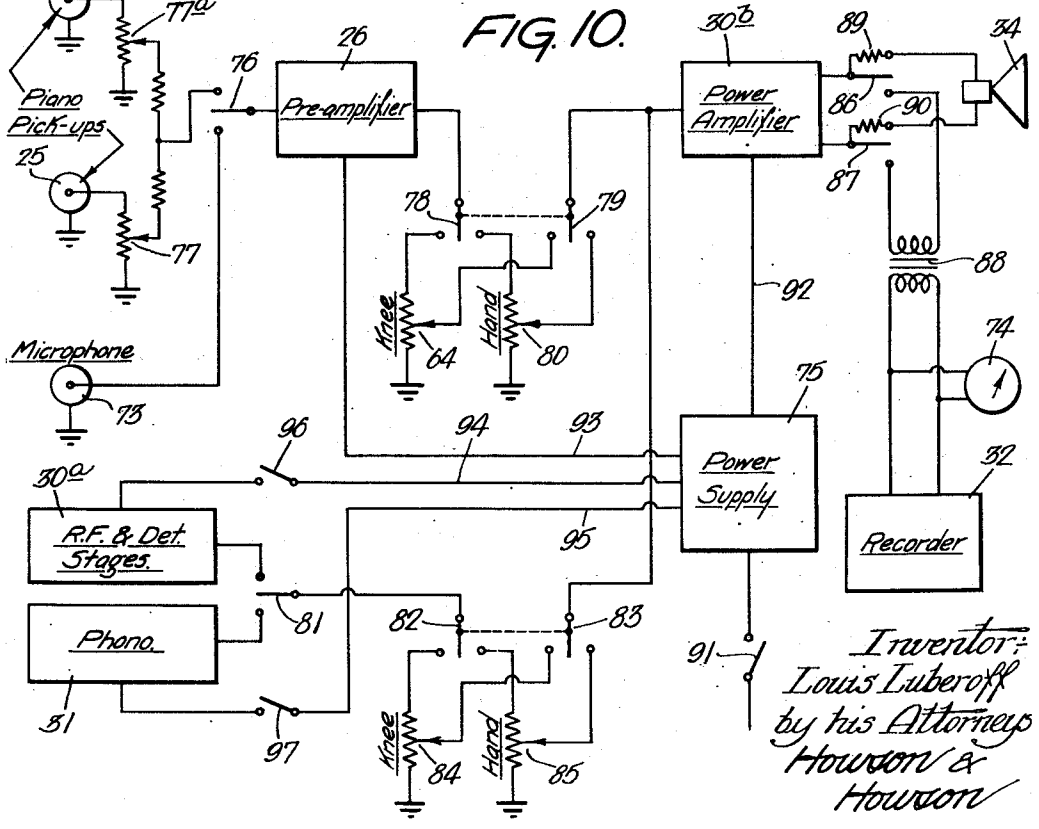


FIG. 10.



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Patented Nov. 14, 1950 2,530,251

UNITED STATES PATENT OFFICE

2,530,251

PIANO CONSTRUCTION FOR SOUND AMPLIFICATION

Louis Luberoff, Jenkintown, Pa.

Application August 9, 1945, Serial No. 609,747

3 Claims. (Cl. 84—170)

1

This invention relates to musical instruments, and more particularly to a novel piano-type instrument having the various characteristics and features hereinafter described.

One object of the invention is to provide a novel piano which has the appearance and tone quality of a grand piano, but which differs from the usual grand piano in that it has a vertical sounding board of relatively small dimensions.

Another object of the invention is to provide a high-quality piano-type instrument which may be manufactured at substantially lower cost and may be sold at a correspondingly lower price than a conventional grand piano having comparable tone quality.

A further object of the invention is to provide a piano having a vertical chamber in which is disposed a vertical sounding board, and also having a horizontal chamber and at least one air passage between the two chambers, whereby sounds generated by the sounding board are conveyed to the horizontal chamber for amplification by the latter.

Still another object of the invention is to provide such a piano which further includes means for electrically reproducing sounds from the vibrations of the sounding board, such means including a loud speaker within the horizontal chamber.

A further object of the invention is to provide a multi-section sounding board in such a piano.

Other objects of the invention will become apparent as the description proceeds.

In the accompanying drawings,

Fig. 1 is a pictorial perspective view of the musical instrument provided by the present invention, with the lid or cover raised;

Fig. 2 is a plan view of the instrument with the lid or cover removed to show the various components;

Fig. 3 is a fragmentary sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view taken along line 4—4 of Fig. 2;

Fig. 5 is a rear face view of the piano section of the instrument, taken along line 5—5 of Fig. 4;

Fig. 6 is a fragmentary sectional view taken along line 6—6 of Fig. 5, showing the pick-up mounting arrangement employed according to the invention;

Fig. 7 is an enlarged perspective view illustrating one of the knee-operated volume control devices employed according to the invention;

Fig. 8 is an enlarged fragmentary perspective

2

view showing the preferred form of the volume control devices;

Fig. 9 is an enlarged fragmentary sectional view of one of the knee-operated volume control levers, showing the mounting thereof; and

Fig. 10 is a diagrammatic illustration of the electrical system employed in the instrument, illustrating certain novel features thereof.

Referring first to Figs. 1 to 4, the musical instrument provided by the invention comprises a piano 1 and a tail section 2 removably attached together as will be described in further detail hereinafter. The piano 1 is a complete instrument in itself and comprises a keyboard 3, a vertical sounding board 4 (see Fig. 4), and key-actuated striking devices, one of which is shown in Fig. 4 and is designated generally by reference character 5. The various components are mounted within or on the piano casing which is designated generally by reference character 6, and which is provided with supporting legs 7. As may be seen in Figs. 1 and 4 the casing has a vertical rear portion 8 to accommodate the sounding board and the associated striking mechanisms. The sounding board is vertically disposed at the rear within the casing portion 8 which has a removable rear panel 8a, as shown in Fig. 3. The sounding board 4 is mounted in the customary manner, extending downwardly from the pin block 9, and has the usual supporting ribs 10 on its rear face or side, and the usual bridge 11 on its front face. The strings 12 extend between the upper and lower pins 13 and 14 over the bridge 11. The piano section is also provided with the usual foot pedals 15, which perform their customary functions through suitable associated mechanism.

While the piano is of the vertical type, i. e. it has a vertical sounding board, its height is substantially the same as that of the usual grand piano. As clearly shown in Figs. 1 and 2, the tail section 2, which is removably attached to the piano section, has substantially the shape and dimensions of the tail section of the usual baby grand piano. Therefore, the instrument as a whole has the general appearance of a grand piano.

The tail section 2 is of shallow depth and large horizontal area, and it extends rearwardly from the upper part of the piano section, as shown in Fig. 3. The tail section comprises a vertical forward wall 16, a curved wall 17 joined to the forward wall, a floor 18, and a hinged lid 19. The forward wall 16 is removably secured to the pin block 9 by means of suitable screws 20, and is

also secured to the casing or housing structure of the piano section by additional screws 21. The wall 16 has openings 22 therein through which sounds are conveyed from the sounding board 4 into the chamber formed by the hollow tail section. The latter serves as a sound-amplifying chamber as will be further described later. Thus, the portion 8 of the piano casing or housing constitutes a sound-generating chamber by reason of the presence of the sounding board therein, while the hollow tail section constitutes a sound-amplifying chamber which receives the generated sounds through the openings 22. The hollow tail section is supported at its rear by means of a supporting leg 23, which is removably secured to the tail section.

It will be noted that by virtue of the detachability of the piano section, the hollow tail section, and the rear supporting leg, the instrument may be readily moved or transported in sections.

As shown in Figs. 2 and 3, a rail 24 extends adjacent to the curved wall 17. The purpose of this rail is to strengthen the entire tail section and also to support certain components of the instrument as described hereinafter. The rail 24 is preferably formed of laminated material so as to increase its rigidity.

In order to produce sounds from the piano electronically as well as mechano-acoustically, a plurality of electrical pick-up devices 25 and 25a (see Fig. 3) are mounted on the rear face of the sounding board 4. These pick-up devices are mounted in a special manner, as will be described later. In the specific illustration, two pick-up devices are employed and are located so as to respond to vibrations in the low and high frequency portions of the operating frequency range. The pick-up devices (see Fig. 6) preferably take the form of conventional electro-magnetic pick-ups comprising an electromagnet and a movable magnetic armature, but any other suitable type may be employed. A suitable pick-up is that manufactured and sold by Amperite Co. under the trade name of "Kontak Mike." The pick-ups serve to generate electrical currents which are supplied to electronic amplifying devices mounted within the hollow tail section. As described hereinafter, the pick-ups are preferably mounted on different sections of the sounding board for response to different frequencies.

Referring to the components or devices disposed within the hollow tail section, an audio frequency amplifier 26 (see Fig. 2) is mounted on suitable supports 27 and 28 carried by the supporting rail 24 and an auxiliary rail 29. A radio receiver 30 is also mounted on the said supports. A phonograph 31 and recorder 32 are mounted on a platform 33 (see Fig. 3). A loud speaker 34 is mounted on the floor 18 which serves as a baffle and which is free of the other devices mounted within the hollow casing. A grill 35 serves to cover the loud speaker and the amplifier 26 as may be seen in Fig. 1, and a second grill 36 serves to cover the radio receiver 30. The electrical connections of the various devices will be described later.

The vertical panel 37 (see Figs. 1 and 4) at the front of the piano section 1 and immediately adjacent the keyboard 3 is made to serve as a control panel on which various control elements are mounted. At the extreme left-hand end of this panel (Fig. 1) there is provided a rotatable knob 38 which is connected by means of a flexible cable 39 (Fig. 2) to the tuning condenser gang 40 of the radio receiver 30. Adjacent to the knob 38 there are provided a plurality of push buttons 41 and an associated tuner 42 which is electrically connected to the radio receiver and provides for remote push button tuning. Adjacent the push buttons there are a plurality of knobs designated generally by reference character 43, and at the right-hand side of the control panel there are other control knobs designated generally by reference character 44. These various knobs are employed to effect switching and volume control operations, which will be described hereinafter. Finally there is provided a control knob 45 which enables "micro-tuning" of the phonograph speed control mechanism 46 (Fig. 2) by means of a shaft 47 and suitable gearing 48. The shaft 47 extends through an opening in the pin block 9, as may be seen in Fig. 3. The specific purpose of this phonograph tuning control will be described later. Thus it will be seen that all the various hand controls are within easy reach of a person seated in the piano playing position.

In addition to the above-mentioned hand controls there are also provided two levers 49 and 50 (see Fig. 1) which are operable by the knees of the person playing the piano. These knee control levers are adapted to operate volume control devices so as to control the volume of sounds reproduced by the loud speaker 34 during the playing of the piano either alone or in conjunction with the radio or phonograph. Figs. 7 to 9 illustrate the left knee control lever and the associated volume control device, it being understood that the knee control mechanisms are similar, being arranged for actuation in opposite directions. As shown in Fig. 9 each knee control lever is pivotally mounted at the underside of the key bed 51 (see Fig. 4), which also serves to support the piano keys. A suitable mounting arrangement is shown in Fig. 9, wherein an inner cylindrical member 52 is fixedly secured to the panel 51, and an outer cylindrical member 53 is secured to the lever 49. The lower end of the cylindrical member 53 is closed by a disc 54 which is interlocked with the cylindrical member 53. A bolt 55 is supported within the hollow cylindrical structure, and a helical spring 56 encircles the bolt and has its ends anchored at 57 and 58 to the relatively movable parts of the hollow cylindrical structure. The lever 49 carries a gear sector 59 which is arcuately slotted at 60 to accommodate a stop pin 61 mounted on panel 51. Thus the stop pin and the associated slot 60 serve to limit the range of rotary movement of the gear sector about the pivot axis of the lever 49. The spring 56 serves to maintain the lever normally in the position for minimum volume.

The teeth 62 on gear sector 59 mesh with a pinion 63 mounted on the rotatable shaft of the associated volume control device 64. The latter is also secured to the panel 51, as shown in Fig. 4 by means of screws 65. Preferably the volume adjustment is effected in steps or increments, and to this end the volume control device has a plurality of stationary contacts 66 (see Fig. 8) which are engaged by a wiping contact arm 67 carried by the rotatable shaft 68.

Mention has been made previously that at least two pick-up devices are employed, one for the low frequency or bass notes, and the other for the high frequency or treble notes. Fig. 5 shows the rear face of the sounding board with the pick-up devices attached thereto. In accordance with a further feature of the invention, a division of the bass and treble sections 70 and 71

is effected by splitting the sounding board **4** and/or the bridge **11**. Preferably both the sounding board and the bridge are split, as shown at **69**. In the illustration, the split **69** does not extend the full height of the board, but it may do so if desired. The purpose of this feature is to prevent the bass and treble overtones from running together objectionably when the loud sustaining pedal is used and the piano is being played electronically. This objection is very pronounced in the ordinary electronic piano. By dividing the sounding board and/or the bridge into sections, I have found that the running together of the treble and bass overtones can be controlled or substantially eliminated. Contrary to the prevailing notion that splitting the sounding board and/or the bridge of a piano will deleteriously affect its tone quality, I have found that the splitting of the board enhances the tone quality of an electric piano employing pick-ups on the sounding board.

As previously mentioned, I prefer to employ a certain method of attaching the pick-up devices to the sounding board. In any electronic piano employing one or more pick-up devices attached to the sounding board, it is very important that each pick-up shall remain in a fixed position and shall be maintained at all times in firm engagement with the board. This has been difficult of achievement owing to the fact that the sounding board tends to swell or move with changes in weather and climatic conditions and with variations in temperature. In accordance with the present disclosure, this difficulty is overcome by attaching each pick-up device to the sounding board by means of an adhesive material, consisting of rubber, a resin derived from gum or wood rosin, a filler such as zinc oxide, and a softener such as lanolin. As shown in Figs. 5 and 6, each pick-up device is secured to the sounding board by placing the adhesive material **72** about and over the pick-up device and over a substantial area of the sounding board. I have found that this adhesive material becomes hardened and effectively becomes a part of the sounding board, which is due to a chemical reaction between the shellac or other coating on the sounding board and the chemicals with which the adhesive material is treated. This method of attaching the pick-up devices is very effective in providing permanent fixation of said devices despite any swelling or moving of the board that may take place.

Reference may now be had to Fig. 10 which is a diagrammatic illustration of the electric system embodied in the instrument. In addition to the aforementioned devices, the system includes a microphone **73** and a recording meter **74**, these devices being shown in Fig. 1. The radio receiver hereinbefore mentioned is of conventional form, and for convenience its components are represented in Fig. 10 by the blocks of rectangles **30***a* and **30***b*. The block **30***a* represents the radio frequency and detector stages, while the block **30***b* represents the audio amplifier section of the receiver. The phonograph **31**, hereinbefore mentioned, is also of conventional form and is represented by a block or rectangle. The same is true of the amplifier **26** and the recorder **32**. The necessary power for operating the various devices is supplied in accordance with conventional practice, and for convenience the power supply is represented in Fig. 10 by means of the rectangle **75**. The diagram of Fig. 10 is a simplified single line diagram of the various electrical connections. The various switches shown and the various potentiometers are controlled by means of the knobs **43** and **44** hereinbefore mentioned.

The pick-ups **25** and **25***a* are connected to a double-throw switch **76**, as is also the microphone **73**. The pick-ups are preferably connected to the switch through individual potentiometers or voltage dividers **77** and **77***a*, by means of which the outputs of the pick-ups may be relatively varied. Thus the amplitude of the electrical signal derived from each section of the sounding board may be controlled as desired. By means of the switch **76**, either the pick-ups or the microphone may be connected to the pre-amplifier **26**, which in turn may be connected to the audio amplifier **30***b* through the ganged double-throw switches **78** and **79**. The left-hand knee-operated volume control device, hereinbefore described, is shown at **64**, and an associated hand-operated volume control device is shown at **80**. By means of the ganged switches **78** and **79**, either of these volume control devices may be rendered operative, regardless of the position of the hand-operated volume control device **80**.

The phonograph **31** and the portion **30***a* of the radio receiver are connected to a double-throw switch **81**, by means of which either of the said devices may be connected to the audio amplifier **30***b* through the ganged switches **82** and **83**. The latter serve to control the right-hand knee-operated volume control device **84** and the associated hand-operated volume control device **85**. That is to say, by means of the ganged switches **82** and **83**, either of the said volume control devices may be rendered operative, regardless of the previous position of either volume control device.

The output of the audio amplifier **30***b* may be supplied to either the loud speaker **34** or the recorder **32** by means of ganged double-throw switches **86** and **87** (or a double-pole double-throw switch). The connections to the recorder may include a transformer **88**. The recording meter **74** may be connected across the secondary winding of the transformer, as shown. In accordance with a further feature of the invention, provision is made for using the loud speaker **34** as an audible indicator during recording. To this end, there are provided resistors **89** and **90** connected to the switches **86** and **87** in the manner illustrated. When the switches are in the upper position, the resistors are short-circuited and the loud speaker is connected directly to the audio amplifier, and the recorder is disconnected. At such time, the loud speaker is used in the usual manner to reproduce sounds emanating from one or more of the various devices employed in the instrument. When the switches **86** and **87** are in the lower positions, the recorder is connected to the audio amplifier **30***b*, and the loud speaker is also connected to the amplifier through the resistors **89** and **90**. The values of these resistors are such that they permit a small percentage, preferably about 5%, of the sound currents to pass into the loud speaker, which thus serves as an audible indicating device and enables the operator to tell when the recording should be started and stopped. At the same time, the volume of sound emanating from the loud speaker is insufficient to cause mechanical feedback to the recorder. This feature, together with the volume control devices and the recording meter **74**, enables the operator to control the recording very accurately and without assistance. During any sound recording operation, the amplitude of

the sound signals must be accurately controlled to prevent under-cutting or over-cutting of the sound grooves in the recording disc, and this necessitates proper variation of the amplitude throughout the recording operation. The necessary accurate control is enabled by means of the arrangement provided by the present invention.

The power supply unit 75 is energized by means of the main power switch 91, and it supplies the necessary power and voltages to the various devices through the connections 92, 93, 94 and 95. Switches 96 and 97 serve to control the operation of the radio receiver and the phonograph respectively.

Referring now to the operation of the musical instrument, it may be assumed first that it is desired to play the piano by itself and not as an accompaniment to any of the other devices. In such case, the switches 96 and 97 will be opened. The piano may be operated with or without the operation of its associated electronic system. In the latter case, the main power switch 91 will be opened. The casing or enclosure formed by the hollow tail section 2 serves as a sound-receiving chamber and it functions in the manner of a megaphone to amplify the sounds emitted by the sounding board. The casing or enclosure thus functions as an acoustic amplifier and it also functions as a box-type baffle for the loud speaker 34. The acoustic output of the loud speaker is very substantially increased by reason of its being disposed within the said enclosure. Further, the shape of the enclosure, and the location of the speaker adjacent the rear curved wall thereof, contribute greatly to the effects produced.

Usually it will be desired to utilize the electronic system associated with the piano in order to obtain the improved tone quality resulting therefrom. In such case, the main power switch 91 will be closed, and the switch 78 will be closed in its upper position to connect the pick-ups 25 and 25a to the preamplifier 26. The switches 86 and 87 will also be closed in their upper position to connect the loud speaker directly to the amplifier 36b. The switches 78 and 79 may be closed in either position, depending upon whether or not it is desired to use the knee-operated volume control device 84. With the electronic system in operation, the piano operates both mechano-acoustically and electronically. Although the piano itself it relatively small, the instrument as a whole is comparable to a high quality concert grand piano from the standpoint of both volume and tonal quality. This has been demonstrated by an instrument constructed as illustrated and described herein.

The selective knee-hand volume control arrangement is a highly desirable feature. If it is desired to play the piano electronically without electrical variation of the volume, the ganged switches 78 and 79 may be adjusted to their right-hand position merely by turning one of the control knobs on the control panel, and the volume control device 80 may be set to a desired volume level merely by adjusting another of the control knobs. If it should be desired to vary the volume electrically during the playing of the piano, the ganged switches 78 and 79 may be thrown to their left-hand position simply by turning the appropriate control knob. Thereafter the volume may be controlled by actuating the left knee lever so as to produce any desired volume variation. Moreover, the pianist may switch from hand volume control to knee volume control, or vice versa, during the playing of a selection, since this merely requires the turning of a single control knob, which can be done very quickly and without interrupting the playing of the piano selection.

Whenever desired, the piano may be played as an accompaniment to either the radio or the phonograph, simply by closing one or the other of the switches 96 and 97 and by properly positioning the switch 81. In such case, the volume of the radio or phonograph reproduction may be set at a desired level, by throwing the switches 82 and 83 to their right-hand position and by setting hand volume control device 85 according to the desired volume level. If desired, however, the volume level of radio or phonograph reproduction may be varied by means of the knee-operated volume control device 84, merely by throwing the switches 82 and 83 to their left-hand position. Thus it is possible for one to play the piano as an accompaniment to either the radio or phonograph, and at the same time vary the respective volume levels of the piano and the accompanying instrument by operating the right and left knee control levers. It is possible in this way to obtain desirable and artistic musical interpretation.

When it is desired to play the piano as an accompaniment to the phonograph, the latter may be "tuned" to the pitch of the piano by means of the knob 45. Rotation of this knob varies the speed of the phonograph turntable and thus varies the pitch of the phonograph reproduction. Since the knob 45 is located within easy reach of the player, the phonograph may be easily adjusted to the same pitch as the piano by aural comparison while adjusting the said control knob. Since there is substantial resistance to the turning of knob 45, due to inherent friction in the actuating mechanism between the knob and the speed control mechanism 46, this tuning arrangement not only enables fine exact tuning of the phonograph to the pitch of the piano while in playing position, but also serves to maintain the steady desired pitch or tone of the phonograph, preventing the latter from getting "out of tune."

With respect to the piano and phonograph and the associated controls, the instrument has utility features which might not be apparent to the casual observer. There are now available recordings of piano concertos, and other compositions involving a piano part, in which the piano part is omitted so that it may be supplied as an accompaniment by the user. Such recordings, known as "Add-a-Part" records, are sold with printed music showing the parts recorded and the part omitted. The volume control and phonograph "tuning" features of the present instrument especially adapt it for the use of such recordings in conjunction with the piano, since the pianist has absolute control of the reproduction both as to volume and pitch and he also has control of the piano volume.

Moreover, by virtue of the features above mentioned, the instrument may be used to advantage in the teaching or learning of piano. The piano pupil or student may practice with special recordings of the type above-mentioned which may be adapted for various degrees of advancement of the pupil. In such case, the recording will serve as a musical metronone.

Whenever desired, the recorder 32 (Fig. 10) may be connected for recording by throwing the ganged switches 86 and 87 to their lower position. A recording may be made during the play-

ing of any of the several instruments or devices individually or in combination, by proper positioning of the switches, as will be apparent from the foregoing description. In addition it is also possible to reproduce or record voice from the microphone 73 either alone or as an accompaniment to the radio or phonograph by proper positioning of the switches. During any recording operation, the knee-operated volume control devices may be utilized to advantage, as previously described.

It is important to note that recording of piano is effected directly from the sounding board by means of the pick-ups and the amplifier system. This is much more satisfactory than the conventional method of recording piano by means of a microphone, which has never been very satisfactory, especially since piano recording is most difficult. The present invention provides a solution of this problem.

From the foregoing description, it will be seen that the invention provides a novel musical instrument which is fundamentally an electronic piano, but which combines various features that greatly extend its utility and make it an all-purpose instrument. It will be apparent, of course, that the invention is not limited to the various structural details but is susceptible to modification within the scope of the appended claims.

I claim:

1. A piano comprising a walled structure forming a vertical chamber, said structure having front and rear vertical walls of substantial width and height, and relatively narrow side walls extending between the front and rear walls, whereby the vertical chamber defined by said walls is of substantial width and height but is of relatively narrow dimension from front to rear, a vertical sounding board and associated vertical strings disposed within said chamber, a hammer mechanism also disposed within said chamber in cooperative relation with said strings, a key board extending forwardly from the front of said chamber at the upper part thereof and including keys operatively connected with said hammer mechanism, a second walled structure forming a horizontal chamber extending from the rear of said first chamber at the upper part thereof, said horizontal chamber being of substantial horizontal area but of relatively small vertical dimension, supporting means for said second structure at the rear thereof, and at least one air passage between said vertical chamber and said horizontal chamber, whereby sounds generated by the sounding board in said vertical chamber are conveyed by said passage to said horizontal chamber for amplification by the latter.

2. A piano comprising a walled structure forming a vertical chamber, said structure having front and rear vertical walls of substantial width and height, and relatively narrow side walls extending between the front and rear walls, whereby the vertical chamber defined by said walls is of substantial width and height but is of relatively narrow dimension from front to rear, a vertical sounding board and associated vertical strings disposed within said chamber, a hammer mechanism also disposed within said chamber in cooperative relation with said strings, a key board extending forwardly from the front of said chamber at the upper part thereof and including keys operatively connected with said hammer mechanism, a second walled structure forming a horizontal chamber extending from the rear of said first chamber at the upper part thereof, said horizontal chamber being of substantial horizontal area but of relatively small vertical dimension, supporting means for said second structure at the rear thereof, at least one air passage between said vertical chamber and said horizontal chamber, whereby sounds generated by the sounding board in said vertical chamber are conveyed by said passage to said horizontal chamber for amplification by the latter, and means for electrically reproducing sounds from the vibrations of the vertical sounding board, said last means including a loud speaker mounted within the horizontal chamber on a part of said second walled structure which acts as a baffle.

3. A piano according to claim 2, wherein the vertical sounding board comprises a plurality of sections which are vibrational substantially independently of each other, each section covering a predetermined portion of the audio frequency range covered by the entire sounding board, and wherein individual pick-ups are provided on the respective sections of the sounding board.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,681,161	Baldwin	Aug. 21, 1928
1,739,680	La Joie	Dec. 17, 1929
1,915,177	Berghane	June 20, 1933
2,001,722	Hammond, Jr.	May 21, 1935
2,078,385	Kato	Apr. 27, 1937
2,200,718	Miessner	May 14, 1940
2,219,539	Riechers	Oct. 29, 1940

FOREIGN PATENTS

Number	Country	Date
491,985	Great Britain	of 1938

OTHER REFERENCES

Pub., Radio-Craft for January 1939 (pages 398 and 433).