Dec. 31, 1929. W. HARDEN 1,741,934

SOUND WAVE TRANSMITTING AND AMPLIFYING DEVICE

Filed Aug. 29, 1927

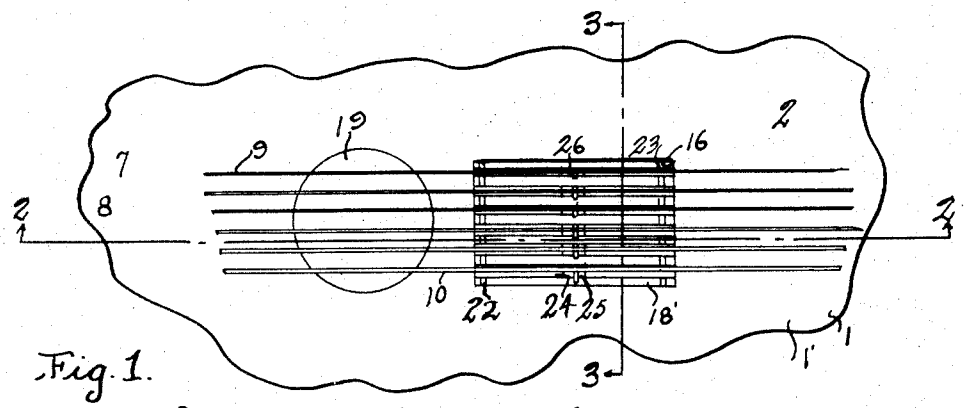


Fig. 1.

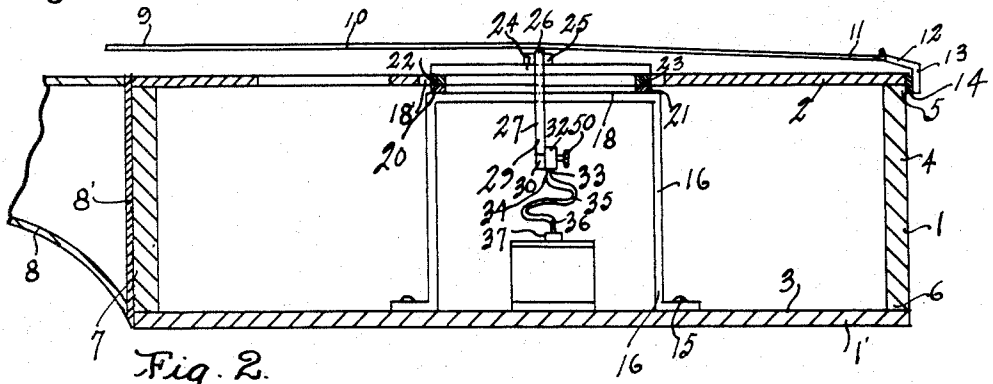


Fig. 2.

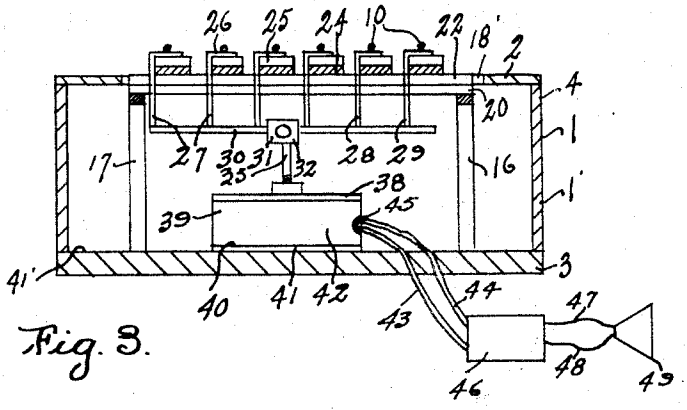


Fig. 3.

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UNITED STATES PATENT OFFICE

WALTER HARDEN, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-THIRD TO JOHN F. HOLLAND AND ONE-THIRD TO WILLIAM F. HOLLAND, BOTH OF CINCINNATI, OHIO

SOUND-WAVE TRANSMITTING AND AMPLIFYING DEVICE

Application filed August 29, 1927. Serial No. 216,176.

The invention relates to means adapted to reproduce and amplify the volume of the sound waves produced by stringed musical instruments.

Heretofore, considerable difficulty has been experienced by the makers and users of devices utilized to amplify the sound vibrations of stringed musical instruments in satisfactorily amplifying the musical tones, because of the fact that the sounds produced by the strings which have almost ceased vibrating intermingle with and disadvantageously affect the musical tones produced by the strings intended by the player to produce music, whereby the quality of the amplified music is importantly reduced. Also, the normal audible and inaudible vibrations of the strings usually are transmitted to the sound box to be amplified, as well as other vibrations of the box, as produced by the touch of the player, as a result of the amplified sound waves noticeably contain various undesirable noises.

The objects of the invention are to provide a simple, efficient and economical stringed musical instrument having connection with a transmitter and amplified, whereby the vibrations of the respective strings are individually transmitted to the transmitter; and to provide means to prevent amplification of the vibrations of the sound box.

Other objects of the invention will become apparent by reference to the hereinafter description.

The invention consists in the combination of the elements, the arrangement of the parts, and in the details of the construction, as hereinafter specified and claimed.

In the drawings:

Fig. 1 is a plan view of the invention with parts broken away;

Fig. 2 is a section taken on the line 2—2 in Fig. 1, with parts broken away; and

Fig. 3 is a section taken on the line 3—3 in Fig. 1, with parts broken away.

In the preferred construction of the invention I provide the guitar type musical instrument 1 consisting of the box 1′ comprising the top 2 and the bottom 3 secured in parallel spaced apart relation as by the side strip 4 having its upper and lower edges 5 and 6, respectively, fixed to the outer edges of the top and bottom.

Secured to the front 7 of the box is the neck 8 having the front ends 9 of the strings 10 secured thereto in a manner usual with this type of instrument. The neck is insulated from sound vibrations from the box 1′, as by rubber strip 8′, to prevent transmission of the vibrations of the front ends of the strings to the box.

The rear ends 11 of the strings 10 are suitably secured to the tail pieces 12 having their outer ends 13 suitably secured or connected to the rubber blocks 14 suitably fixed to the upper edge of the rear of the strip 4, whereby vibrations of the strings 10 are prevented from being transmitted by the rear ends of the strings to the box 1′.

Secured to the bottom 3, of the box 1′, as by screws 15, are the spaced apart U-shape supports 16 and 17 having their tops 18 positioned directly beneath the rectangular hold 18′ in the top and extending parallel to the strings 10. The round sound hole 19 in the top is adjacent the hole 18′.

Suitably fixed to the outer ends of the tops 18 of the supports 16 and 17 and extending from one support to the other are the bars 20 and 21 having fixed to their upper sides the vibration non-conducting strips 22 and 23, formed of sponge rubber or the like material. Suitably secured to the upper sides of the strips 22 and 23 are the spaced apart plates 24 positioned directly beneath the respective strings 10. Suitably secured to the upper sides of the plates 24 are the blocks 25 aligned diametrically of the hole 18 in the top. Suitably secured to the upper sides of the blocks 25 are the ends 26 of the vibration conduction rods 27 whose bodies 28 extend at right angles to the ends 26 and inwardly of the box. Fixed to the lower ends 29 of the rods 27 is the vibration conduction staff 30 having fixed thereto the clamp 31 comprising the retainer 32 having therein at 33 a hole adapted to receive the upper end 34 of the transmission rod 35 having its lower end 36 threaded to the nut 37 suitably fixed to the diaphragm 38 of the usual microphone or

transmitter 39 fixed to the upper side 40 of the sound vibration non-conductor 41 formed of sponge rubber or the like material. The non-conductor 41 is secured to the upper surface 41′ of the bottom 3 of the box 1′.

The transmitter 39 may be of any suitable construction to facilitate in clearly and effectually reproducing the tones of the strings 10 of the instrument 1 by methods hereinafter explained.

The transmitter 39 may consist of the casing 42 having suitably arranged therein a magnet (not shown), having wound thereabout a coil (not shown), the ends of which are connected with conductors 43 and 44 which enter the casing through the hole 45 in the side thereof.

For the purpose of reproducing and amplifying the tones of the strings 10, of the musical instrument 1, any suitable device, circuit or arrangement of elements may be utilized.

One form of a usual reproducing and amplifying device is represented by the diagrammatical view shown in Fig. 3, in which conductors 43 and 44, of the transmitter 39, are respectively connected with the amplifier 46 having connection, through conductors 47 and 48, with the usual reproducing or loud speaker element 49.

It is apparent that various stages of transformer coupled, resistance coupled or other forms of suitable amplification, as desirable, may be incorporated in the circuit shown to increase the volume of the tones from the strings 10.

It is preferable that the transmission rod 35 is of serpentine form, as shown in Fig. 2, whereby when the upper end 34, of the transmission rod is properly adjusted in the hole at 33, in the retainer 32, the thumb-screw 50, threaded in the retainer, may be manually screwed inwardly in secure engagement with the transmission rod to retain the latter in fixed position with relation to the staff 30. Also, the serpentine rod acts as a damper.

The strings 10 are in contact with the ends 26 of the rods 27, in the same manner as the strings of musical instruments of the guitar type are in engagement with the usual bridge.

During playing of the musical instrument 1 the vibrations of the strings 10 are transmitted through the rods 27, staff 30, retainer 32, transmission rod 35, and nut 37 to the diaphragm 38 of the transmitter 39, whereby through the amplifying means previously described the sound vibrations produced by the strings 10 are amplified without amplifying the vibration from the box 1′.

It is apparent that I have invented a practical and highly desirable invention for the purposes intended, and which may be utilized to effect amplification of the musical tones particularly of the strings of musical instruments. Moreover, if desirable, only selected instruments in an orchestra may have the invention operatively attached thereto, whereby the desirable effect of the music may be regulated by increasing or reducing the volume of the tones of the respective instruments. In this manner the reproduction or reproduction and amplification of the music produced by a single instrument or several instruments in an orchestra will effect practically the same results as where a greater number of instruments are used without amplification of the normal sound vibrations.

It will now be apparent that I have devised a novel and useful structure, which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will give in practice satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit of the invention or sacrificing any of its advantages.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, a box comprising a spaced apart bottom and a top having a hole therein, means securing said top and bottom in spaced apart relation, a neck secured to said box and sound insulated therefrom, spaced apart strings capable of vibrating secured to said neck and said box and sound insulated therefrom, a pair of spaced apart supports secured to said bottom and positioned beneath said hole, a pair of spaced apart bars having their ends secured to the tops of said supports, vibration non-conductor strips secured to said bars, a plurality of plates having their ends secured to said strips and positioned beneath said strings, respectively, a plurality of spaced apart vibration conductor rods secured to said plates and having said strings respectively in engagement therewith, a vibration conductor secured to said rods, a transmitter secured to said bottom and insulated therefrom, and a transmission rod operatively connecting said staff with said transmitter, substantially as described.

2. In combination with a stringed musical instrument of the guitar type, a transmitter sound insulated from the box of said instrument, an electrical amplifying circuit for said transmitter, a plurality of spaced apart vibration conductors operatively connected with said transmitter and with the strings of said instrument, substantially as described.

3. A vibration rod of serpentine form for an instrument of the guitar type, a microphone operatively connected with said rod, means whereby the strings of said instrument are in engagement with said rod, means whereby the box of said instrument is sound

insulated from said rod, and means to reproduce the sound vibrations of said strings.

4. In a device of the class described, a box comprising a spaced apart bottom and a top having a hole therein, means securing said top and bottom in spaced apart relation, spaced apart strings capable of vibrating secured to said box, a pair of U-shape spaced apart supports secured to said bottom and positioned beneath said hole, a pair of spaced apart bars having their ends secured to the tops of said supports, means secured to said bars, a plurality of spaced apart vibration conductor rods supported by said last mentioned means and having said strings respectively in engagement therewith, a vibration staff secured to said rods, a transmitter, a transmission rod operatively connecting said staff with said transmitter, and electrical amplifying means connected with said transmitter.

5. In a device of the class described, a box comprising a spaced apart bottom and a top having a hole therein, means securing said top and bottom in spaced apart relation, spaced apart strings capable of vibrating secured to said box and sound insulated therefrom, a pair of spaced apart supports secured to said bottom and positioned beneath said hole, a pair of spaced apart bars having their ends secured to the tops of said supports, vibration non-conductor strips secured to said bars, a plurality of plates having their ends secured to said strips and positioned beneath said strings, respectively, a plurality of spaced apart vibration conductor rods secured to said plates and having said strings respectively in engagement therewith, a staff secured to said rods, a transmitter secured to said bottom and vibration insulated therefrom, and a transmission rod of serpentine form operatively connecting said staff with said transmitter, substantially as described.

6. In a device of the class described, a box comprising a spaced apart bottom and a top having a hole therein, means securing said top and bottom in spaced apart relation, spaced apart strings capable of vibrating secured to said box and sound-vibration insulated therefrom, a pair of spaced apart supports secured to said bottom and positioned beneath said hole, a pair of spaced apart bars having their ends secured to the tops of said supports, vibration non-conductor strips secured to said bars, a plurality of plates having their ends secured to said strips and positioned beneath said strings, respectively, a plurality of spaced apart vibration conductor rods secured to said plates and having said strings respectively in engagement therewith, a staff secured to said rods, a transmitter and a transmission rod operatively connecting said staff with said transmitter substantially as described.

7. In a device of the class described, a box comprising a spaced apart bottom and a top having a hole therein, means securing said top and bottom in spaced apart relation, spaced apart strings capable of vibrating secured to said box and sound-vibration insulated therefrom, a pair of spaced apart supports secured to said bottom and positioned beneath said hole, a pair of spaced apart bars having their ends secured to the tops of said supports, vibration non-conductor strips secured to said bars, a plurality of plates having their ends secured to said strips and positioned beneath said strings, respectively, a plurality of spaced apart vibration conductor rods secured to said plates and having said strings respectively in engagement therewith, a staff secured to said rods, a retainer fixed to said staff and having a hole therein, a transmitter, a transmission rod of serpentine form having its upper end received in said last mentioned hole, the lower end of said transmission rod operatively connected with said transmitter, and means to retain said transmission rod in adjusted position in said hole in said retainer.

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