

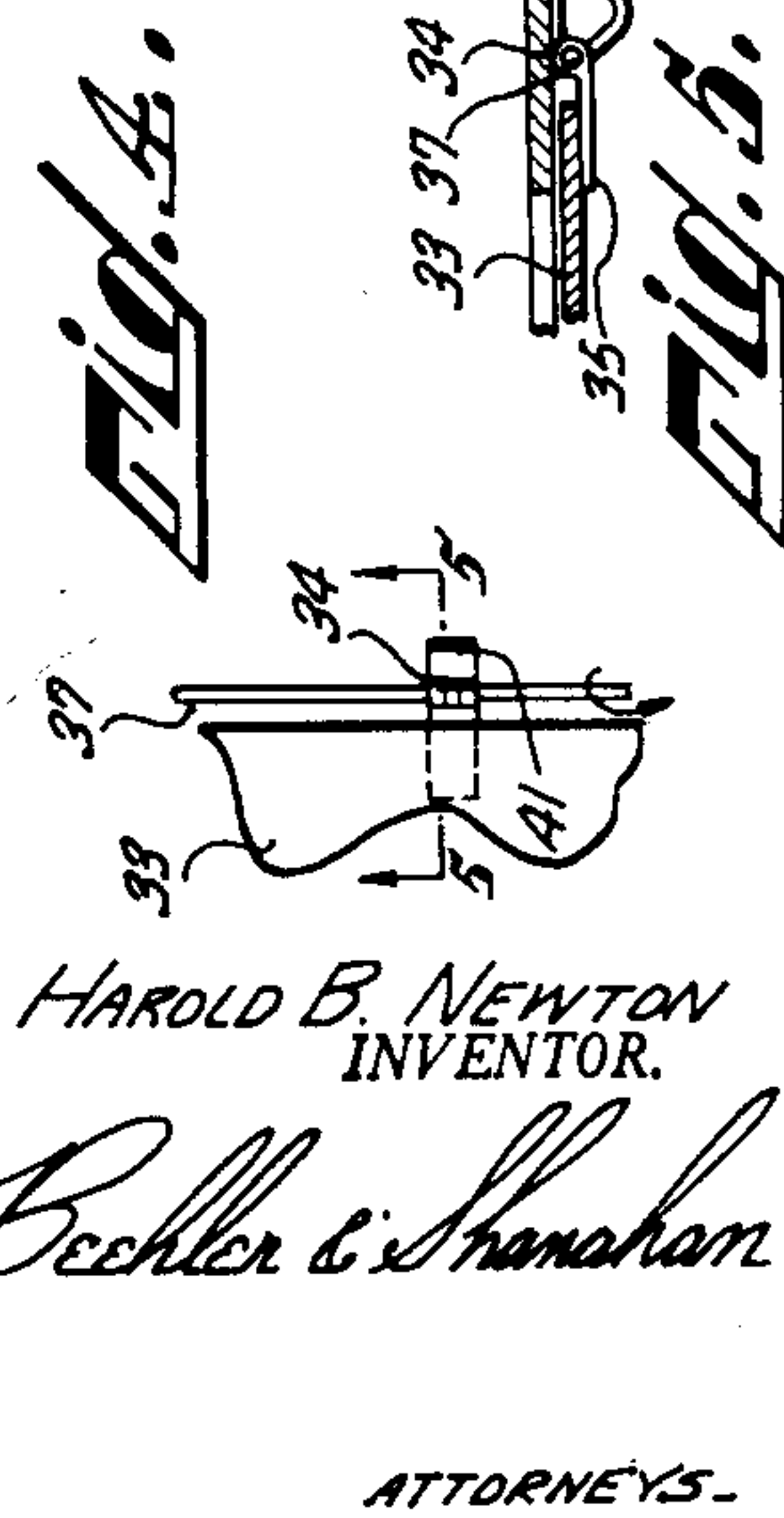
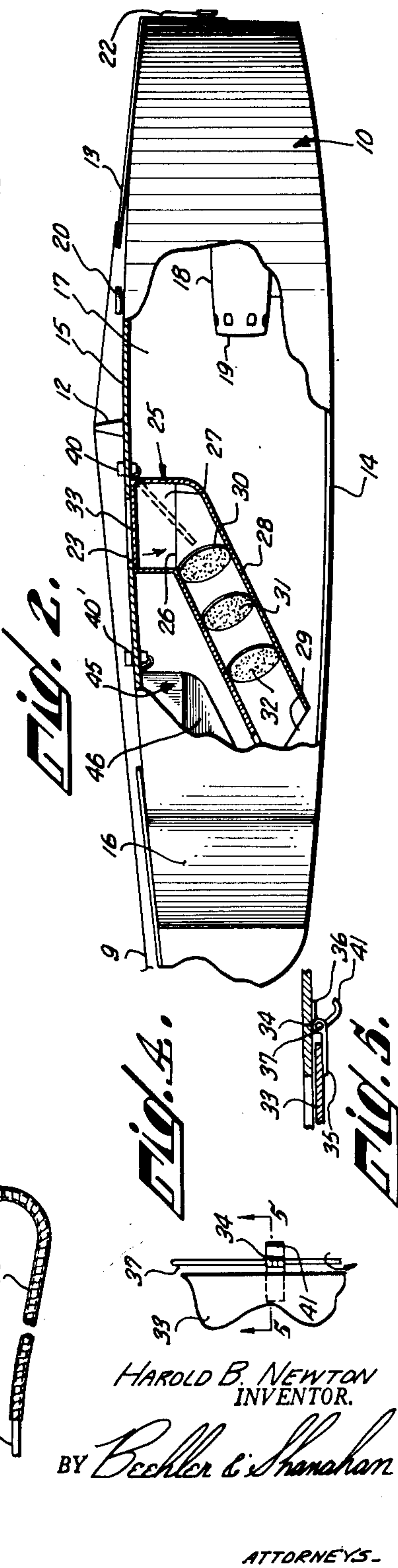
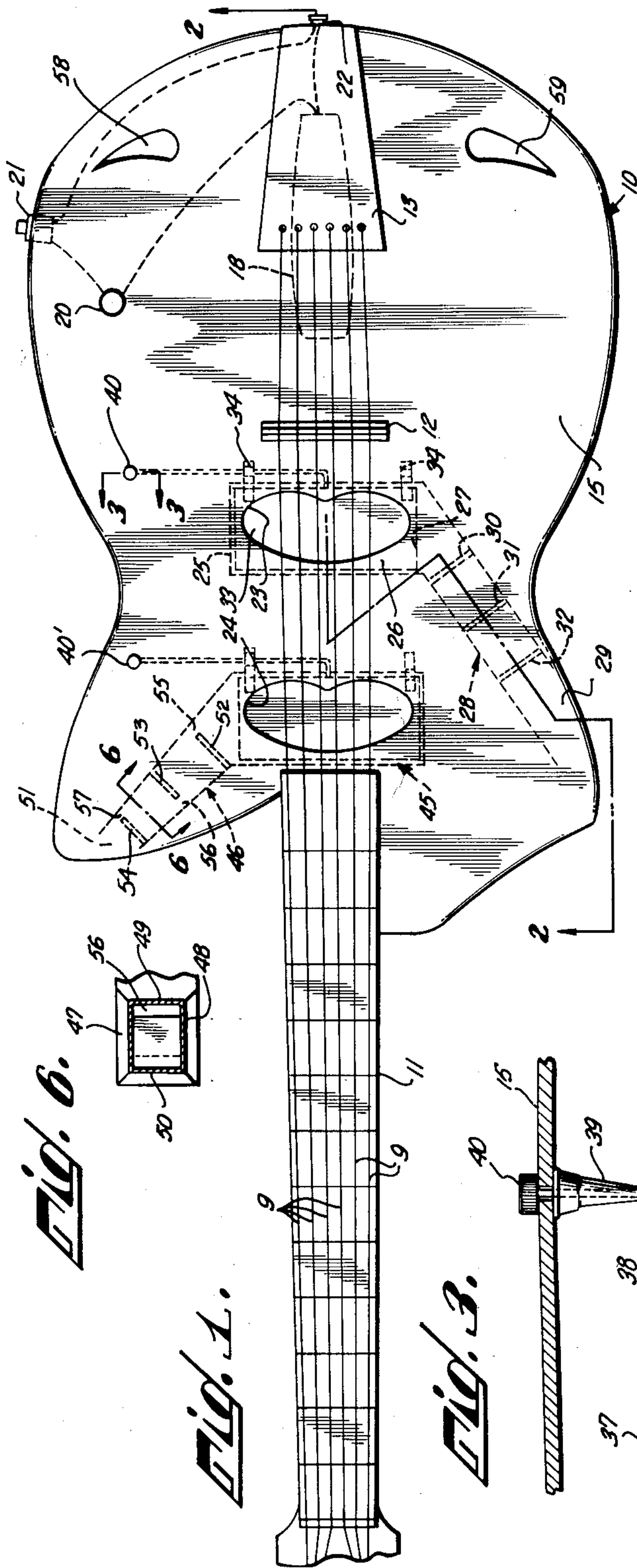
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H. B. NEWTON

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ELECTRONIC ACOUSTICAL STRINGED INSTRUMENT

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HAROLD B. NEWTON
INVENTOR.

BY *Becker & Shanahan*

ATTORNEYS.

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ELECTRONIC ACOUSTICAL STRINGED INSTRUMENT

Harold B. Newton, 44859 Foxton Ave., Lancaster, Calif.

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The invention relates to stringed instruments which are adapted to be played in the normal fashion and which are additionally provided with an amplification system connected to a pick-up and loudspeaker so that the sound produced by the instrument can also be heard through the loudspeaker equipment. The invention has special reference to those instruments which embody a case with an opening therein over which strings are stretched in a manner such that the strings can be plucked to produce musical tones with the aid of the case which acts as a sounding box. Those instruments wherein the invention is especially advantageous are instruments of the nature of guitars, mandolins, the violin class of instruments, zithers, etc.

In instruments of the type made reference to where electronic equipment has heretofore been installed, certain objections have been found to the character of the music which reaches the ear through the amplification system. The objectionable characteristics are implemented by use of some form of pick which is used customarily to set the strings in vibration. Pick tone or pick slap, as this effect is frequently termed, comprises harsh sounds usually of high frequency which are irritating or uncomfortable when reaching the ear through the amplification system because the prominence of the objectionable sounds is emphasized in the system. In those electronic pick-ups heretofore employed, the microphone employed is one usually set in the case or sound box near the strings in such fashion that it picks up all of the sounds created when the strings are struck and though capable of being regulated with respect to volume, is incapable of filtering out the objectionable pick slap sounds. Although such filtering can and has been accomplished in the electric system, this type of regulation is not popular because of its complexity and the need for frequent adjustment.

It is, therefore, among the objects of the invention to provide a new and improved electronic acoustical stringed instrument which is of such construction that pick tones and related objectionable tones created when the strings are struck are filtered out so that they never reach the electronic pick-up and hence cannot be amplified in the amplification system.

Another object of the invention is to provide a new and improved electronic acoustical stringed instrument which is equipped with filtering media for directly filtering out objectionable pick tones before they reach the electronic pick-up, but which is also capable of emitting sounds normally expected of the instrument when played without employment of the electronic amplification system.

Still another object of the invention is to provide a new and improved electronic acoustical stringed instrument which may be provided with one or more dampers depending upon the particular construction of the device so that at the option of the player the instrument can be employed solely with its electronic

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pick-up, solely as a purely acoustical instrument or with both sources of tone production in operation simultaneously.

Still another object of the invention is to provide a and improved electronic acoustical stringed instrument provided with filters for filtering out pick tones and related tones within the sound box or case of the instrument, the filtering system being of such character that it is entirely concealed within the instrument and which, moreover, does not interfere in any manner, whatsoever, with the normal acoustical properties of the instrument, the filtering system moreover being of such a design and construction that it can be built into conventional instruments without alteration of design of the instrument.

With these and other objects in view, the invention consists of the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

Figure 1 is a plan view of a typical stringed instrument such as a guitar equipped with the invention.

Figure 2 is a fragmentary longitudinal sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary cross-sectional view of a shutter control taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary plan view of a hinge element for one of the shutters.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 4.

Figure 6 is a fragmentary cross-sectional view taken on the line 6—6 of Figure 1.

In an embodiment of the invention chosen for the purpose of illustration, a guitar type instrument is shown consisting of a case or sound box 10, a neck 11, a bridge 12, and a string mounting manifold 13 arranged in customary fashion whereby to support a set of six strings 9.

The case comprises a lower wall 14, an upper wall 15 and a side wall 16 extending entirely around the perimeter so as to enclose a chamber or resonant space 17.

In the particular instrument shown for purposes of illustration, an electronic sound pick-up 18 is located near the end of the case 10 which is remote from the neck 11. The precise location of a microphone end 19 of the pick-up 18 is not of material consequence except that it preferably lies within a portion of the chamber 17 somewhat removed from the origin of sounds and tones which will ultimately be picked up. The sound pick-up is of substantially conventional construction such as is commonly available for this purpose, and is provided with a conventional volume control 20 on the upper wall of the case at a convenient location, a jack or instrument plug 21 of the usual sort and a switch 22 for turning the electrical system off and on.

Extending through the upper wall 15 in the chosen embodiment are two inlet openings 23 and 24. These openings lie immediately below the strings 9 so as to receive sounds produced by the strings when they are struck. Two inlet openings are shown only by way of illustration inasmuch as in a guitar type instrument the multiple type openings are useful, namely the opening 23 for emphasizing the treble tones and the other, opening 24, for emphasizing the bass tones.

Beneath the inlet opening 23, for example, is a box 25 which is closed on all four vertical sides and which is open at the top beneath the inlet opening 23. The box 25 has also a bottom 26 which closes the box on the lower side except for an outlet hole 27 which communi-

cates with a tube 28. The tube may be of any convenient cross-sectional shape which, in one chosen example, is round and molded integrally with the box 25. The tube 28 extends obliquely downwardly and forwardly from the box in a direction generally toward the end of the chamber 17 remote from the pick-up 18. An outlet opening 29 opens into the chamber 17 at the end of the tube. Within the tube are located filters 30, 31 and 32. These may be mounted by any convenient means so that they remain fixed in position once assembled. The filters may be constructed of various materials such as cloth or porous cellulose material, or may be merely in the nature of baffles. They should, in any event be constructed in such fashion and so mounted that they do not obstruct the passage of sound through the tube, but merely filter out objectionable sounds which usually occur at high frequencies.

Mounted at the upper end of the box 25 is a shutter 33 large enough in area so as to completely cover the inlet opening 23. Hinges 34 have one end 35 of each attached to the shutter 33 and the other end 36 attached, preferably to the underside of the upper wall 15. A hinge pin 37 is fastened to the end 35 by some adequate conventional means providing not only a pivot between the ends 35 and 36, but also an agency for rotating the shutter 33 between the closed position illustrated by the solid lines in Figure 2, and open position illustrated by the broken lines. For convenience, the hinge pin is flexible in character and contained within a sheathing 38 attached to a fixture 39, the fixture in turn being secured to the underside of the upper wall 15. A button 40 attached to the pin 37 on the outside face of the upper wall 15 can be rotated by hand in order to adjust the shutter between open and closed positions. A stop 41 on the end 35 of the hinge may be employed to limit opening movement of the shutter to the position shown in Figure 2.

Similarly, there is provided a box 45 beneath the inlet opening 34 constructed in substantially the same fashion as the box 25 and equipped with a comparable shutter operating in the same fashion by manipulation of a button 40'. In this instance a tube 46 extending outwardly from the box 45 is illustrated as being rectangular in cross-sectional shape provided with an upper wall 47, a lower wall 48 and side walls 49 and 50. The tube 46 similarly extends in a somewhat oblique direction so that an opening 51, thereof, is directed away from the pick-up 18, but on a side of the chamber 17 opposite from the opening 29. In the tube 46, a different type of filtering device is employed embodied in a set of baffles 52, 53 and 54 which may be of wood or an appropriate plastic material. The baffles are mounted in the tube in such fashion that they provide openings 55, 56 and 57 on alternately opposite sides of the tube 46. Constructed in this fashion and of appropriate filter material as suggested, the major portion of pick tones which find their way into the box 45 are filtered out as the sound travels back and forth from one side to the other of the tube 46 before it emerges from the opening 51. Those portions of pick tones which emerge are modified effectively before they finally reach the pick-up and the resulting amplified effect is consequently of a greatly improved character.

Outlet openings 58 and 59 are provided in the upper wall 15 adjacent the pick-up 18 and at a location removed from the inlet openings 23 and 24. This permits the filtered sound to escape from the chamber 17 and avoid a muffled effect which would otherwise occur.

In operation of the device the instrument is played in the usual fashion by fingering the strings 9 to produce tones of different pitch, the strings being struck with a customary pick or plectrum. When the instrument is to sound both acoustically and electronically, the shutters are adjusted so that the inlet openings 23 and 24 are open. The electronic system is turned on by use of the

switch 22 and the sounds travel in several directions. Some sounds pass through the tubes 28 and 46, thence outwardly from the openings at the ends of the tubes and into the chamber 17. There the properly filtered sounds and tones are picked up by the pick-up 18 to be passed through the amplification system and subsequently through a loudspeaker (not shown). Sounds also are emitted through the openings 58 and 59. A portion of the sound, however, when reflected by the bottoms of the boxes 25 and 45, passes outwardly from the openings 23 and 24.

On those occasions where the instrument is to be played only acoustically, it is only necessary to shut off the amplification system by opening the switch 22 and leaving the shutters in open position.

Some selective adjustment with respect to tone quality can be achieved, however, by manipulating one or the other of the shutters 33. If treble tones are to be emphasized, the shutter for the opening 24 is closed and the shutter for the opening 23 is open. If bass tones are to be emphasized, the shutter for the opening 24 is opened and that for the opening 23 is closed. Where both bass and treble tones are to be blended, both shutters are opened.

In either event, the filtered tones pass through the tubes and thence around the interior of the chamber 17 wherein they are picked up by the amplification system only after filtering takes place.

There has accordingly been provided a musical instrument wherein the initially produced sounds from the strings are filtered by a simple filtering system before it is possible to have those tones picked up electronically, and hence only desirable tones will be emitted from the amplification system. Therefore, even though pick tones be present, they can be heard only close to the instrument and are insignificant in view of the dominance of pure tones coming from the amplification system. The filtering system, moreover, is of simple character such that the boxes and tubes can be molded from conventional synthetic plastic materials and fastened to the upper wall 15 without it being necessary to change the construction of the instrument case in any fashion. It will be understood that in those instruments where only one opening is provided in the upper wall, the shutter and shutter mechanism can be dispensed with thereby making the device still simpler but without, however, impairing in any way the operation of the filtering system herein described.

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures and devices.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An electrically amplified stringed instrument comprising a case having wall portions forming a sound chamber, a bridge on the upper wall portion, a neck, strings extending from the neck across the upper wall portion of the case and an electronic pick-up element in the chamber, means forming an inlet opening in said upper wall portion beneath the strings intermediate the neck and the bridge, a box within the chamber and surrounding the under side of the inlet opening, an outlet tube extending from the box into the chamber forming a sound path between the box and the pickup, and sound modifying means in the tube.

2. An electrically amplified stringed instrument comprising a case having wall portions forming a sound chamber, a bridge on the upper wall portion, a neck, strings extending from the neck across the upper wall portion and an electronic pick-up element in the cham-

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ber, means forming an inlet opening in said upper wall portion beneath the strings intermediate the neck and the bridge, means forming an outlet opening in the case, a box for the inlet opening within the chamber and surrounding the underside of the inlet opening, an outlet tube extending from the box into the chamber, and sound modifying means in the tube.

3. An electrically amplified stringed instrument comprising a case having wall portions forming a sound chamber, a bridge on the upper wall portion, a neck, strings extending from the neck across the upper wall portion and an electronic pick-up element in the chamber, means forming an inlet opening in said upper wall portion beneath the strings intermediate the neck and the bridge, means forming an outlet opening in the case, a box for the inlet opening within the chamber and surrounding the under side of the inlet opening, a tube extending from the box into the chamber in a direction away from the pick-up, and a plurality of spaced sound modifying elements in the tube.

4. An electrically amplified acoustical stringed instrument comprising a case, side, bottom and upper wall portions forming a sound chamber, a bridge on the upper wall portion, a neck, strings extending from the neck across the upper wall portion and an electronic pick-up element in the chamber adjacent the end remote from said neck, means forming a plurality of inlet openings in said upper wall portion beneath the strings inter-

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mediate the neck and the bridge, and means forming an outlet opening, a box for each inlet opening within the chamber and surrounding the under side of each respective inlet opening, an outlet tube extending from each box in a generally oblique direction relative to the strings and discharging into the chamber in a direction away from the pick-up, and a plurality of spaced sound modifying baffles extending transversely in each tube, a shutter for each inlet opening hinged to the case at one side thereof having one position closing the respective inlet opening and another position lowered into the box leaving said inlet opening clear, and a control attached to each said shutter and located on the case enabling optional opening and closing of said inlet openings.

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