Jan. 23, 1951 L. N. G. DE LÁZARO 2,539,297

ELECTRIC MUSICAL INSTRUMENT

Filed Feb. 5, 1948 2 Sheets-Sheet 1

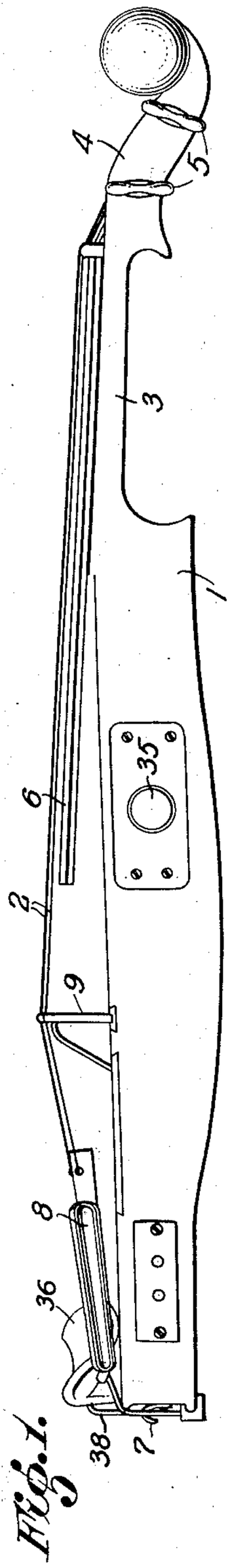

Fig. 1.

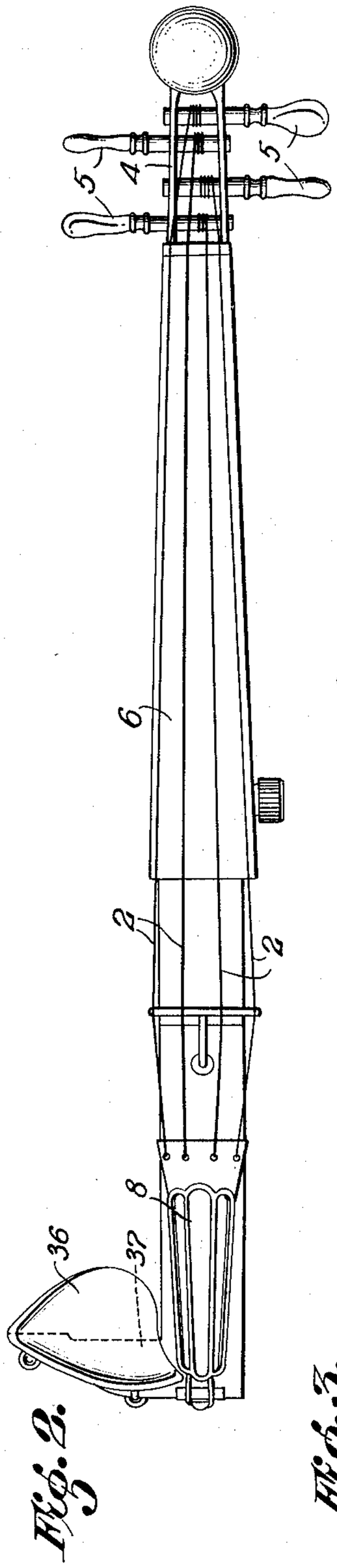

Fig. 2.

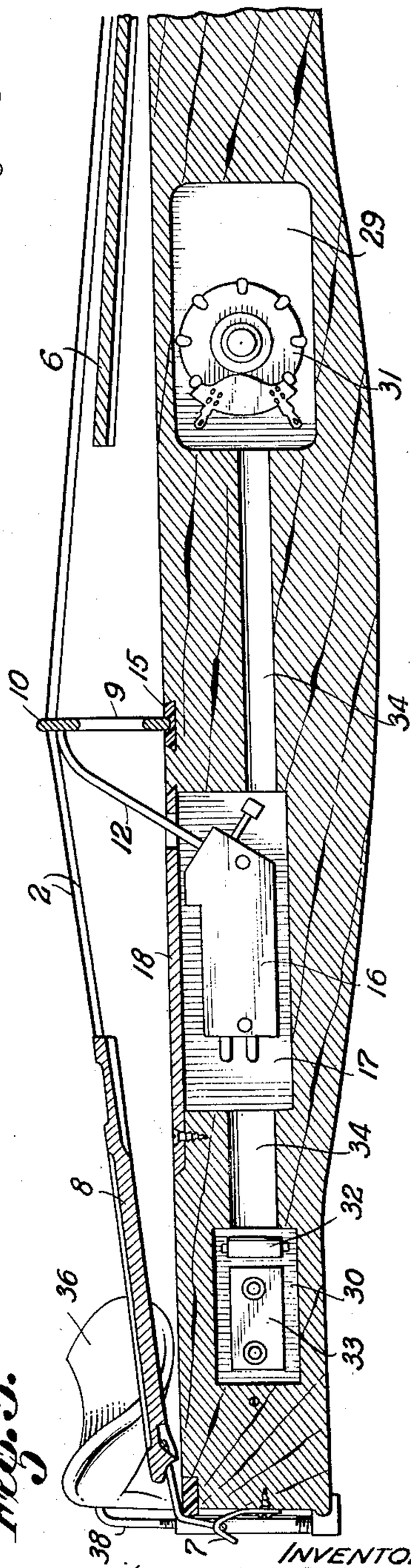

Fig. 3.

INVENTOR:
LUIS N. G. DELAZARO,
BY Haseltine, Lake & Co.
AGENTS

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Fig. 4.

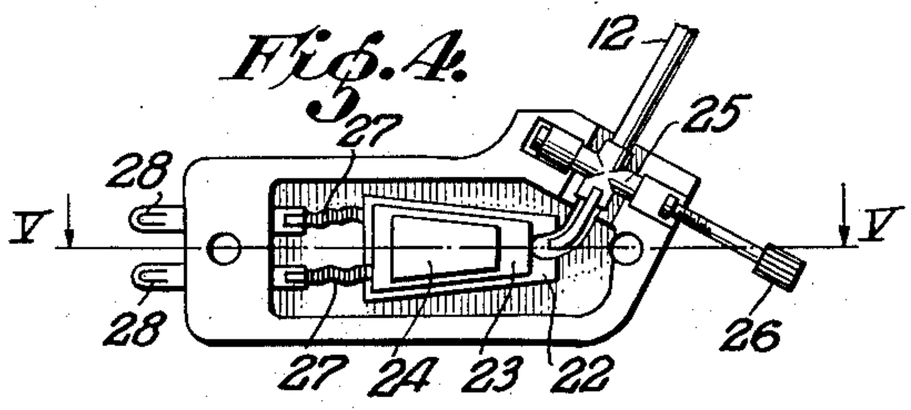


Fig. 6.

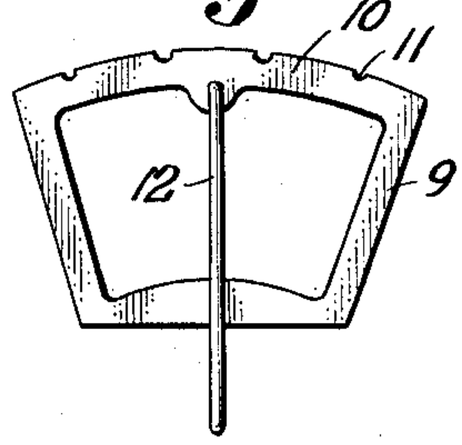


Fig. 5.

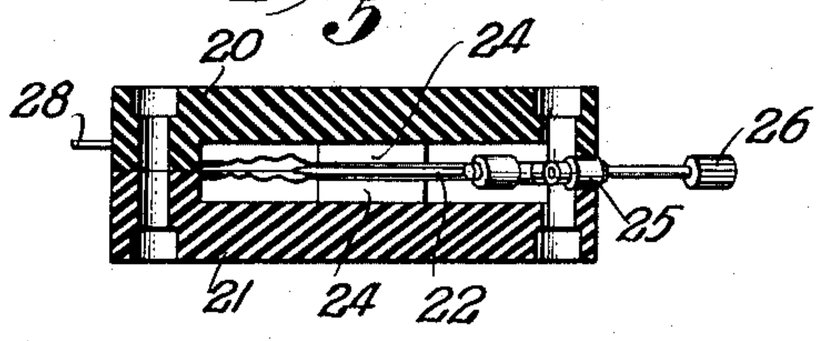


Fig. 7.

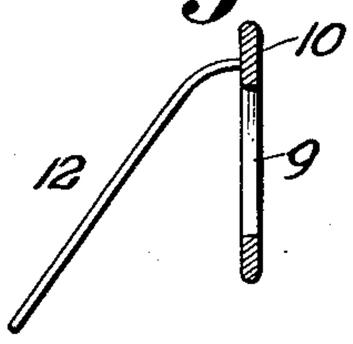


Fig. 8.

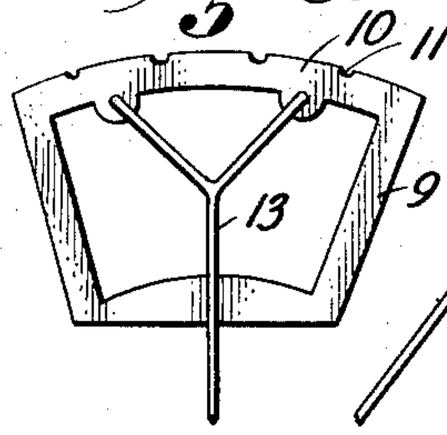


Fig. 9.

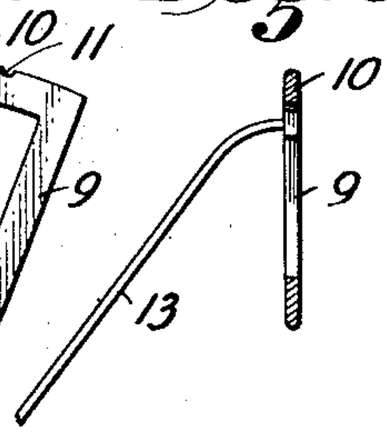


Fig. 10.

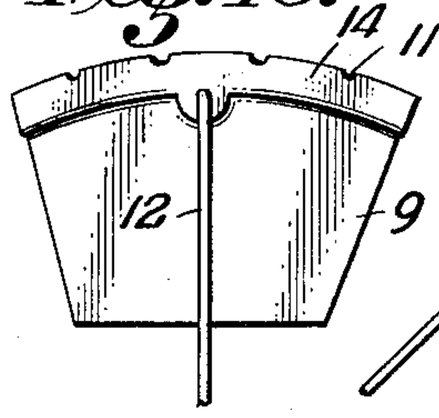


Fig. 11.

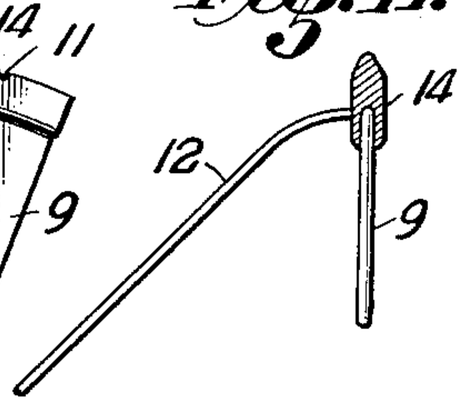
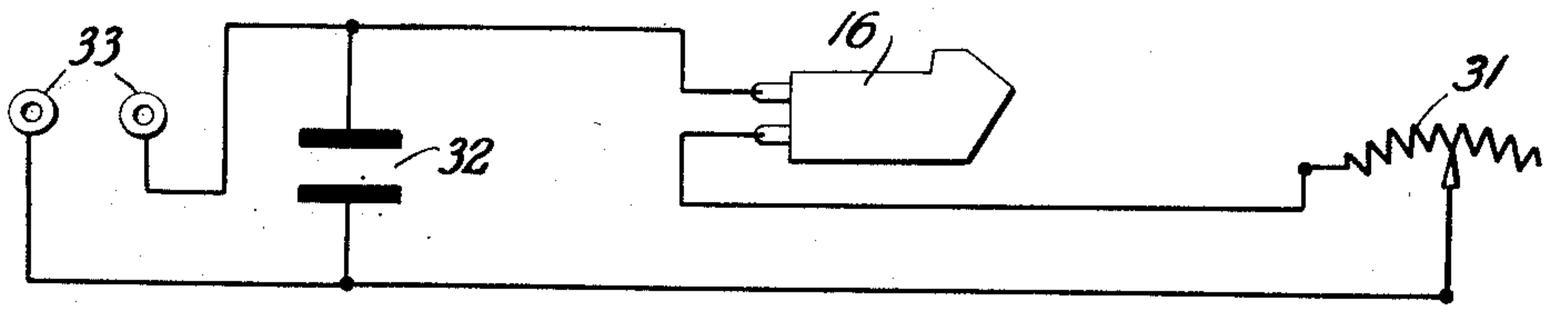


Fig. 12.



INVENTOR:
LUIS N. G. DELAZARO
BY Wasserman, Lake & C.
AGENTS

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UNITED STATES PATENT OFFICE

2,539,297

ELECTRIC MUSICAL INSTRUMENT

Luis Nicolás Gómez de Lázaro, Santander, Spain

Application February 5, 1948, Serial No. 6,530
In Spain February 27, 1947

9 Claims. (Cl. 84—1.16)

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My invention relates to musical stringed instruments in which the vibrations of the strings are amplified by electrical means instead of using the sound box of ordinary instruments. The invention may be applied to any type of musical instrument in which the sound is produced through the vibrations of one or more strings, but for the sake of greater clearness and to make it easier to understand the invention, is described as applied to an instrument of the violin type, it being understood, however, that this reference to a violin is solely for the purpose of the description of the invention and does not constitute any kind of limitation of the possibilities or extent of the invention, which, as has already been stated above, is capable of application to all kinds of musical string instruments in general.

The primordial object of this invention is to obtain a musical stringed instrument capable of producing a pure and clear sound comparable to the sound of the most celebrated instruments of antiquity.

Another object of the invention is to provide a stringed instrument capable of producing a sound sufficiently powerful to accompany large jazz orchestras, where the sound of a violin or ordinary stringed instrument is to all intents and purposes annulled.

Another object of the invention is to obtain a stringed instrument of the electric type, of very simple construction, resistant and easy to handle and that will, at the same time, allow the violinist to easily graduate at will and within very extensive limits, the intensity or modulation of the sound produced.

Another object of the invention is to provide a stringed instrument of the electric type that, should a breakdown occur in the electric part, will be capable of easy repair by substituting, in a very short time, the damaged part by another.

The violin or other electric musical instrument constituting the object of this invention affords the musician, moreover, a great facility in its management or handling and apart from the fact that it is lighter and less voluminous than the ordinary instruments, it offers the advantage that the method of playing is exactly the same as with the ordinary instruments and, therefore, the player has no difficulty in handling this instrument nor does he need any special study, but can play this instrument exactly in the same way as an ordinary instrument, and has not to bother himself in the least about the electrical part, with the sole exception of graduating the intensity of the sound produced.

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Other objects and advantages of this invention will be deduced from the description that follows, in connection with attached drawings, which represent, as an example, the invention incorporated in a musical instrument of the violin type, and in which,

Figure 1 is a lateral elevation of a violin in which this invention has been incorporated.

Figure 2 is a plan view.

Figure 3 is a detail, on a larger scale, in longitudinal section, showing how the electric parts are lodged in the body of the violin.

Figure 4 is a view of the crystal pick-up.

Figure 5 is a section of this crystal pick-up through the line V—V of Figure 4.

Figures 6 and 7 are, respectively a front elevation and an upright section of the bridge that transmits the vibrations of the strings to the crystal pick-up.

Figures 8 and 9 are a similar elevation and section of another form of construction of the bridge.

Figures 10 and 11 represent in a similar manner a third form of construction of the bridge.

Figure 12 shows a schematic drawing of the electric connections.

In connection with these figures that represent a preferable form of carrying out or adapting the invention, it will be seen that the violin has, externally, an appearance similar to that of ordinary violins, with the sole difference that it does not contain the usual sound-box.

The body of the violin is formed by a bar 1 of wood or of some other material to form, as it were, the central stem of the instrument and that is not necessarily of greater width than that necessary to hold the strings 2. The body 1 forms, at one of its ends, the neck 3, as in the ordinary violins, and the tuning-head 4 provided with the keys or pegs 5 for tensioning and fixing the strings.

At a point half-way along the body 1 of the violin the bridge 9 is placed, on which the strings 2 rest. This bridge, as shown in greater detail in Figures 6 and 7 is constituted by a metallic piece the upper arched edge of which 10 has four small cuts or grooves to fix the position of the four strings of the violin, and from this edge extends a rod 12 that is soldered or rigidly attached in some other way to the metal edge 10 of the bridge, to transmit the vibration to a quartz pick-up 16 placed in a cavity 17 of the body of the violin.

In this way the vibrations of the strings 2 are transmitted to the metallic bridge 9 and, through the rod 12 they are transmitted to the crystal pick-up 16.

In some cases it would be as well to make sure of obtaining a more ample transmission of these vibrations, to adopt the dispositions shown in Figures 8 and 9, in which the metal bar 13 that transmits the vibrations from the bridge to the crystal pick-up, instead of being straight, as in Figure 6, is forked in the shape of a Y, and in this case the two branches of the rod are joined at the upper part 10 of the bridge at points approximately at equal distances from the two notches at the right and the two at the left in which the strings rest.

It is obtained as a result of this arrangement that the distance that the vibrations have to travel along the upper edge 10 of the bridge until they reach one or other of the branches of the rod 13 is the same for all the strings, as a consequence of which a more faithful transmission of the sound vibrations from the strings to the pick-up is obtained.

Instead of constructing the bridge entirely of metal, as has been suggested up to this point, the bridge may also be constructed of some non-metallic material, as for instance, of "plexiglas" or other synthetic resin, if we dispose along the upper edge of such non-metallic bridge, as shown in Figures 10 and 11, a metallic piece 14 completely covering the edge of the bridge. This piece will serve as a rest for the strings 2, as explained earlier herein, and has, moreover, attached or soldered to it the rod 12 or 13 to transmit the vibrations to the pick-up.

The bridge 9 rests on the violin with the interposition of a piece 15 which will isolate the vibrations. This piece 15 is usually made of rubber, but can also be made of different kinds of other materials, and in particular, excellent results can be obtained by having this rest-piece 15 made of synthetic resin, such as methyl methacrylate that is known in the trade by the name of "plexiglas."

The bridge 9 is not rigidly fixed to this rest-piece 15, nor, either, to the body of the violin, but merely rests on the piece 15, made of rubber, plexiglas or of other material, and is kept firmly pressed against the said piece by the tension of the strings. When fitted up in this manner, the bridge will offer the most excellent conditions for transmitting the vibrations of the strings to the crystal pick-up in all their intensity and purity.

The crystal pick-up 16 is contained in a small cavity 17 made inside the body of the violin in the proximity of the bridge 9 and is closed by a lid 18 that can be lifted up when necessary in order to repair any damage or breakdown.

In Figures 4 and 5 the construction of this crystal pick-up is shown in greater detail. It comprises a box or cover made up of two parts 20 and 21 made of some insulating material, joined to each other by screws, rivets or any other suitable means, and are so moulded that on being placed one on top of the other they leave a cavity on the inside of the box.

In the interior cavity of this box there is placed a sheet of quartz 22, having on its two opposite faces metallic coverings or platings 23, and that is fixed between the two walls of the box with the interposition of pieces of rubber 24. One of the ends of this plate of quartz 22 is unchangeably joined to a metallic piece 25 that is approximately in the shape of a cross and the central body of which presents an opening into which the rod 12 or 13 can be introduced

and fixed in place by means of the screw 26 in such a way that this piece will transmit to the quartz plate 22 the vibrations that it receives through the rod 12.

At the opposite end of the piece of quartz 22 the metal coverings of its two surfaces or faces 23 are connected by means of very flexible metallic ribbons 27 to the terminals 28 attached to one of the two pieces 20, 21 of insulating material to which, moveover, the conductors or wires that make the electric connections are soldered.

This crystal pick-up 16 is placed, as has been described above, in the interior of the cavity 17 in the body of the violin and, if so desired, the empty space in this cavity may be filled with glass fibre or some other material to isolate vibrations or shocks.

The body 1 of the violin has, furthermore, one or two cavities 29, 30 to contain the accessory apparatus such as a rheostat 31, a condenser 32, the plug socket for the current 33 to connect the violin with the amplifying apparatus and loud speaker. The cavities 29 and 30 should preferably, be arranged as shown in Figure 3, one of them 29 being situated between the bridge 9 and the neck 3 of the violin and containing a small rheostat 31 that can be graduated by a button 35 that projects on the outside for the purpose of regulating the intensity of the sound, the other cavity 30 being situated near the end of the violin and containing a condenser 32 and the plug socket 33. The situation of these accessories as shown in the drawing is particularly well suited because the lead or conducting wire coming from the plug socket 33 does not in the smallest degree hamper the player nor interfere with the playing or handling of the violin, or of the button 35 of the rheostat.

These cavities are connected with each other by means of the conduits 34 through which the electric wires pass to make the connections.

The violin further comprises a chin rest 36 for the purpose of permitting the player to rest the violin conveniently, and as the violin has no resonating box to which this chin rest may be attached, the body of the violin 1 has, at its end, a lateral arm 37 suitably curved, to which the chin rest is fixed by means of some pressure or press screws 38 or by any other convenient means.

In Figure 12, I have shown the scheme of the electric connections, that are, as may be seen clearly in this figure, exceedingly simple. Of the two terminals of the crystal pick-up 16 one connects directly with one of the terminals of the plug socket 33 and the other is connected with the rheostat 31 and on leaving this rheostat it connects with the other terminal of the plug socket 33.

Between the two terminals of the plug-socket 33 a condenser 32 is shunted. The plug-socket 33 is brought into connection by means of a suitable electric wire or cord conductor with a circuit that comprises an amplifying apparatus similar to the amplifiers used with wireless sets, a loud speaker and a source of current.

When the violin has been prepared in this manner, the violinist plays in the usual way and has not to bother about any other graduation than that of the rheostat 31 by turning the button 35 to regulate the intensity of the sound. As has been stated above, the placing of this rheostat in the body of the violin in the manner described above allows the violinist to regulate the

instrument at will without having to interrupt his playing.

The absence of a resonator box in this violin has the further advantage of facilitating its use, for, in the ordinary violins with a resonator box there are certain moments in which the resonator box hampers the position of the violinist's left hand, whilst in the violin of my invention this inconvenience does not exist and the left hand is always able to maintain a natural position.

As will be seen from the foregoing, my invention provides an electric violin, and, in general, an electrical stringed musical instrument of an exceedingly simple and robust construction, little liable to breakdowns, and which, should such a breakdown occur, can easily be repaired, for it is sufficient to lift the lid of the cavity in which the damaged part is situated and substitute another piece for it.

As will be understood, the above description refers to a preferential manner of applying the invention, and all kinds of modifications of detail that may be considered suitable may be introduced into it without departing from the spirit of the invention, as is pointed out in the claims. In particular, and for the purpose of facilitating possible changes or repairs in the instrument, the bridge **9**, the rod **12** and the crystal pick-up **16** may be assembled in such a way as to form one single and interchangeable whole or unit that may easily be substituted.

I claim:

1. In an electrical musical instrument of the stringed type comprising a non-resonant body, means for holding the strings at opposite ends and for tensioning said strings, the combination of a string bridge, a crystal pick-up mounted in said body, a branched vibration transmitting rod connecting said bridge and pick-up, and means coupling the pick-up to an output circuit, said rod being branched at its bridged end with the branches thereof secured to the bridge at spaced points thereon.

2. Musical instrument according to claim 1, wherein the strings are arranged in groups on each side of a longitudinal center and said branches are attached to the bridge at points respectively between strings of groups.

3. Musical instrument according to claim 1, wherein said bridge is of non-metallic material and carries at its upper edge a metal piece, said piece having its top edge adapted to receive and support the strings, and being connected to said rod.

4. Musical instrument according to claim 3, wherein said metal piece is arch-shaped.

5. Musical instrument according to claim 3, including vibration insulating means supporting the bridge.

6. Musical instrument according to claim 1, including a vibration insulating piece supported on said body and carrying said bridge, the bridge being held on said piece by the string tension.

7. Musical instrument according to claim 6, wherein said vibration insulating piece is methyl methacrylate.

8. Musical instrument according to claim 1, including a regulatable resistance in the circuit of the pick-up and wherein the means for coupling the pick-up to an output circuit includes a plug socket and a condenser across the pick-up circuit.

9. Musical instrument according to claim 8, wherein the pick-up is located in a body cavity in front of the bridge, the plug socket and the condenser are located in a body cavity near the tailpiece end, and the regulatable resistance is located in the central part of the body and has a regulating button projecting opposite the field of action of the bow hand of the player.

LUIS NICOLÁS GÓMEZ DE LÁZARO.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,324,222	Babcock et al.	Dec. 9, 1919
1,861,717	Pfeil	June 7, 1932
1,900,489	Eisenberg	Mar. 7, 1933
1,915,858	Miessner	June 27, 1933
2,209,016	Dickerson	July 23, 1940
2,222,057	Benioff	Nov. 19, 1940
2,228,881	LeClair	Jan. 14, 1941
2,288,463	Kislingbury	June 30, 1942
2,313,129	Dohan	Mar. 9, 1943