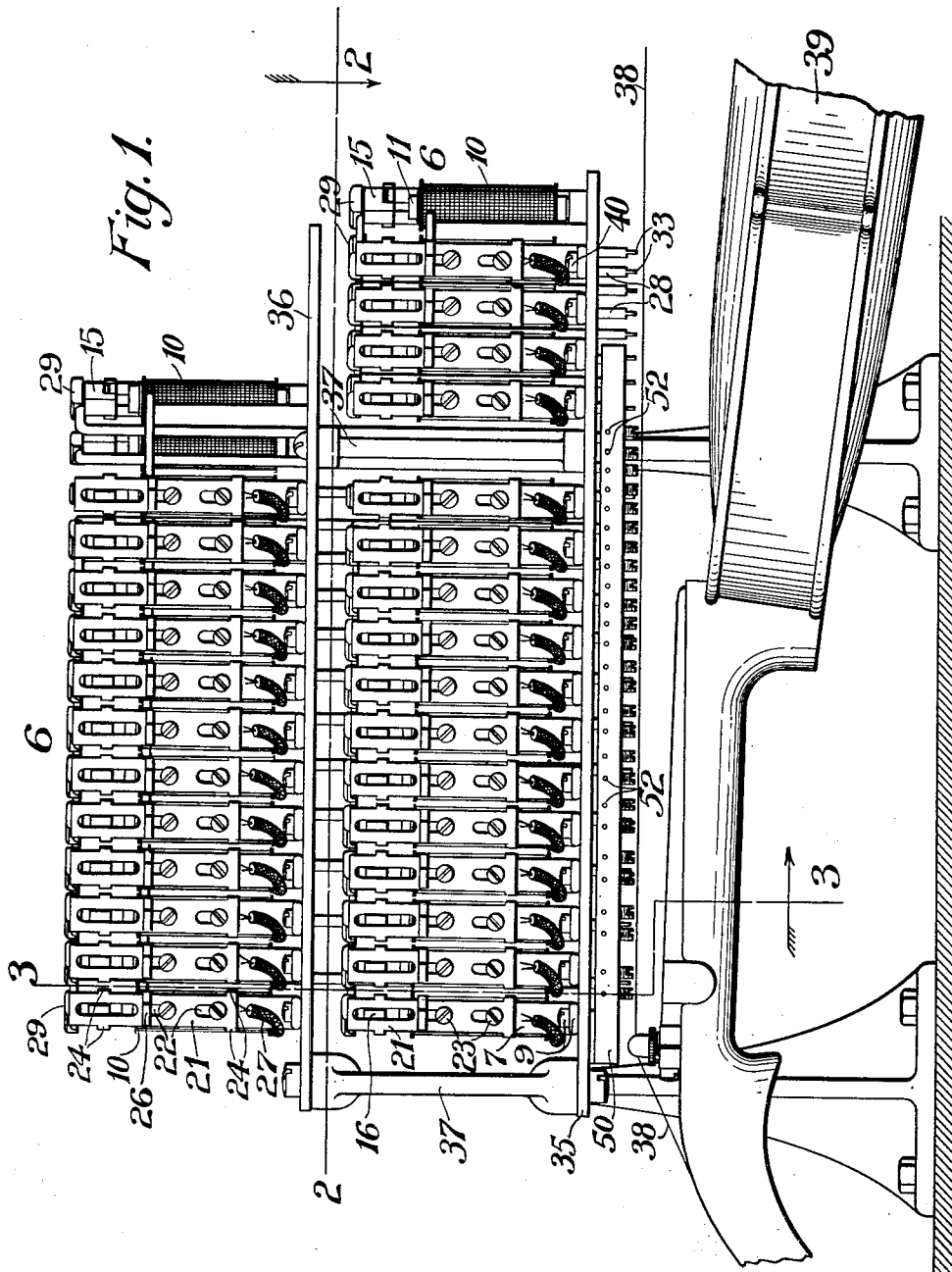


H. K. SANDELL.
ELECTRIC SELF PLAYING VIOLIN.
APPLICATION FILED NOV. 7, 1911.

1,031,292.

Patented July 2, 1912.

4 SHEETS—SHEET 1.



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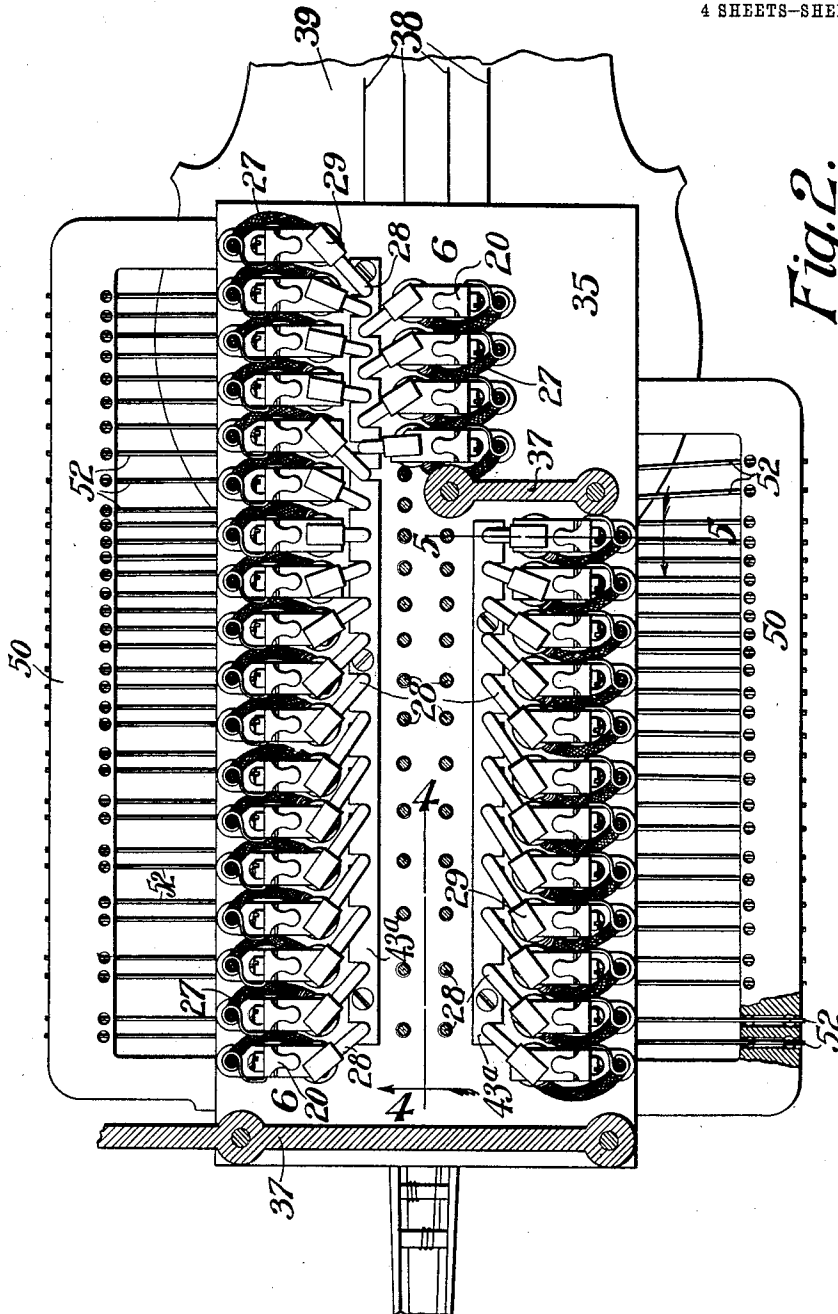


Fig. 2.

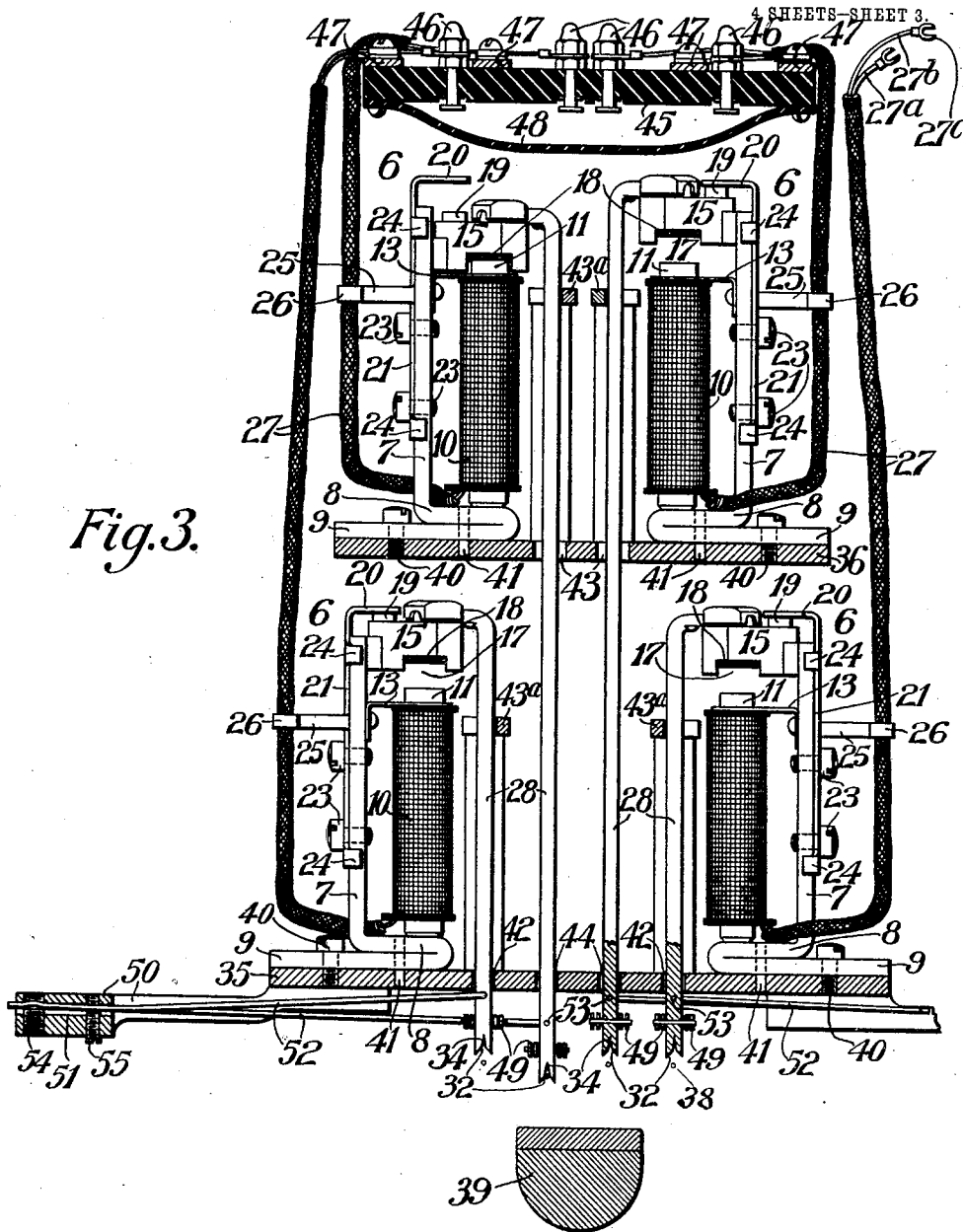
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4 SHEETS-SHEET 4.

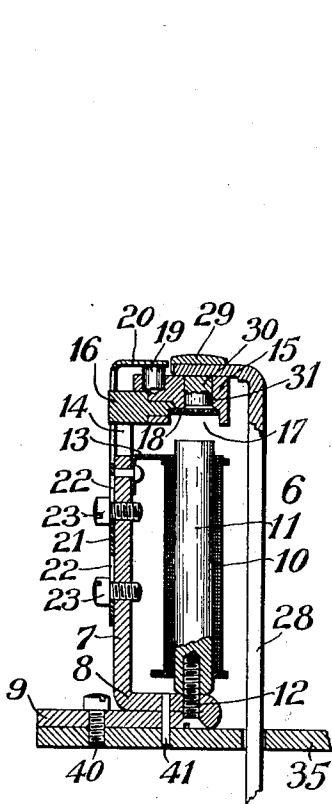


Fig. 5.

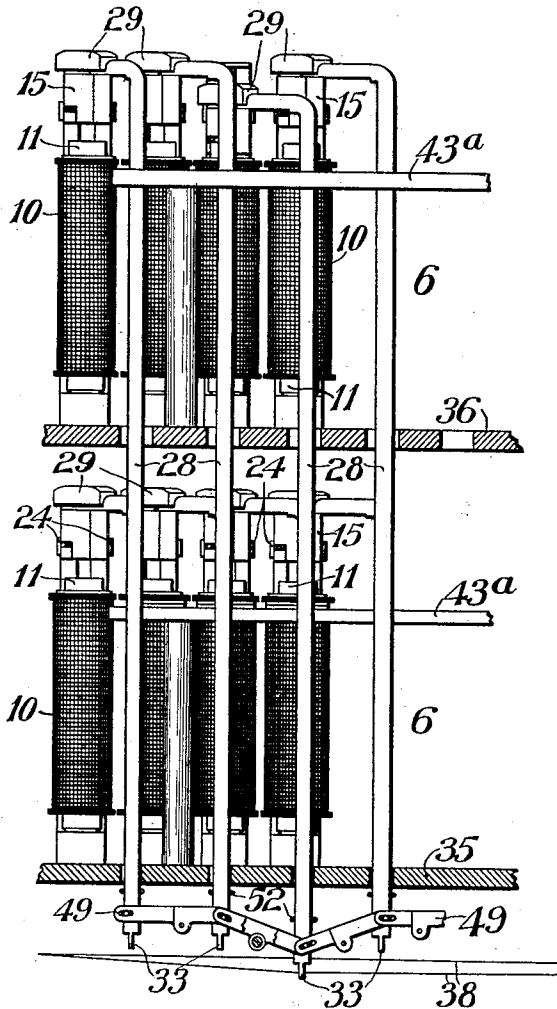


Fig. 4.

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UNITED STATES PATENT OFFICE.

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ELECTRIC SELF-PLAYING VIOLIN.

1,031,292.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed November 7, 1911. Serial No. 659,053.

To all whom it may concern:

Be it known that I, HENRY K. SANDELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric Self-Playing Violins, of which the following is a specification.

My present invention is primarily designed as an improvement on the self-playing instrument of the viol-class, for which Letters Patent No. 807,871 were granted to me December 19, 1905.

As in the aforesaid patent, while the improved features hereinafter described are more especially for use with a violin, they are also applicable to other varieties of stringed instruments and are intended to be covered herein for any such application.

The primary object of the present improvement is to render inaudible the operation of the devices which finger the strings, thereby to prevent any marring in the playing of the instrument due to such operation being audible. To best accomplish this object, the finger-board of the instrument should be omitted, thereby to prevent it from presenting an impact-surface to the fingering-devices, such impact being the main cause of the objection referred to; and the invention herein in that behalf relates to novel means for supplanting the finger-board.

Other features of invention are herein-after described.

In the accompanying drawings, Figure 1 shows the bank of fingering-devices by a view in side elevation, surmounting the strings of a violin, shown broken; Fig. 2 shows the same by a plan section on line 2—2, Fig. 1; Fig. 3 is an enlarged section on the irregular line 3—3, Fig. 1; Fig. 4 is an enlarged section on line 4—4, Fig. 2 and Fig. 5 is a section on line 5—5, Fig. 2.

The fingering-devices 6 are all alike, each being of the construction of the one best shown in Fig. 5.

A vertical iron supporting-bar 7 is bent at its lower-end portion to a right-angle, extending in one direction to form a bearing 8, and is again bent in the opposite direction, parallel with and against the bottom of the

bearing, to form a shoe 9. An electromagnet 10 is supported in vertical position on the bearing, being rigidly fastened thereto by a screw 12 inserted into the magnet-core 11 through the bearing and shoe, with its head countersunk in the latter. An arm 13, riveted through its wider, flanged end to the inner face of the bar 7 extends at its opposite end, containing an opening, about the upper projecting end of the core 11 to there rigidly sustain the electromagnet. In the upper end of the supporting-bar is a vertical guide-slot 14 for the armature 15, shown of general rectangular form, with a tongue 16 projecting from one end into the slot 14 for guiding the armature in its reciprocating movements, and with a recess 17 in its under side containing a disk 18, or cushion, of sound-deadening material, as soft rubber, to receive the impacts of the armature against the adjacent end of the electromagnet-pole and thus render them inaudible. Another sound-deadening disk 19 projects from the top of the armature to encounter, in the rise of the latter, a stop 20, formed as a horizontally-bent upper-end portion of a metal strip 21, which may be brass, and fits and is longitudinally adjustable against the outer face of the bar 7, being provided with longitudinal slots 22, through which pass clamping-screws 23 on the bar; and the strip has lips 24 on its lateral edges, at its upper and lower ends, to embrace the bar at its edges for guidance in raising and lowering the strip to adjust the height of the finger 20 and its stop-function upon the armature. The strip 21 also has extending from one of its edges an arm 25 terminating in a loop 26 for confining the cable 27 of insulated electric wires which connect the source of current-supply (not shown) with the electromagnet. The finger 28 is a cylindrical rod of hard metal having its upper-end portion bent to a right-angle and flattened to fit into a horizontal hole shown to be formed through a head 29 having a stem 30, which is driven into a vertical hole 31 in the armature and securely fastened therein, as by upsetting the inner end of the stem to rivet it in the hole. The finger 28 is preferably reduced in width, as

shown at 33, (Fig. 4) at its lower end and in this reduced end is formed a notch 32 to straddle the string of the instrument with which it coöperates; and from the notch extends centrally a vertically-tapering slot 34, for the purpose hereinafter explained.

The fingering-devices are supported in a suitable frame shown to comprise a pair of parallel horizontal lower and upper plates 35 and 36 spaced and held apart by end-members 37. For each string 38 of the instrument 39, which is supported to present its strings uppermost with the fingering-devices above them, as shown in said patent, a longitudinal series of the fingering-devices 6 is provided to depress the fingers 28 against the string at proper intervals—ordinarily chromatic intervals.

According to the preferred disposition shown in the drawings, the fingering-devices for the E and G strings of the instrument are supported in two parallel rows on the lower frame-plate 35, and those for the D and A strings are similarly supported on the upper plate 36, being screwed to the respective plates, as shown at 40, through the shoes 9, which also carry depending pins 41 to enter holes in the plates for properly placing the fingering-devices and supplementing the screws 40 in fastening them. The fingers 28 of the lower series of devices 6 work through holes 42 properly disposed in the plate 35, and the relatively-longer fingers of the upper series of devices work through holes 43 provided in the plate 36 and holes 44 alining therewith in the plate 35. Guides 43^a are provided on the plates for the fingers.

The terminals of each electromagnet 10 are respectively connected with wires 27^a and 27^b in a cable 27, the opposite ends of these wires, which project beyond the cable, terminating in forks 28^c (Fig. 3) to facilitate their connection with binding-posts. Above the uppermost series of the devices 6 extends a horizontal board 45 equipped with binding-posts 46, to each of which a different wire 27^a is connected, and bus-bars 47, to which the wires 27^b are connected. The binding-posts 46 project through the board 45 to adapt them to have connected with them the wires which lead from the brushes that contact through the perforated music-sheet with a contact-roller for closing the circuit for energizing the electromagnets 10 to attract their armatures and depress the fingers 28 against the violin-strings to play the instrument, all as described in the aforesaid patent, except that in the present case the strings are actually depressed. To hold the wires that come from the brushes against sagging, a hood 48 is shown (Fig. 3) to be provided under the board 45.

In Fig. 4 is shown at 49 a series of link-

devices on the lower ends of the fingers 28, which, though of somewhat different construction from the corresponding devices of the aforesaid patent, operate in substantially the same way for a like purpose, and need not, therefore, be herein further described.

In the playing of the instrument the depression of any armature, as shown of one in each of Figs. 3 and 4, by energizing the electromagnet controlling it, causes the notch in the lower end of the finger on that armature to straddle and bear downwardly the string, as represented in Fig. 4. The strings ordinarily used on the violin, in the present connection, are metal. The frequent action of the notches against such strings tends to wear the edges of the notches at their apexes, and thus to prevent true attack of the strings by the fingers. The attack to be true, should be at the aforesaid apex. The slots 34 prevent the imperfect attack in the event of the wear referred to, since they insure making it at the apex of the notch.

The violin 39 employed is devoid of any finger-board, to avoid the impact against it of the fingers 28, when depressed, and consequent noise; and the sound-deadening disks 18 and 19 interposed in the path of reciprocation of each armature render its action inaudible. In the absence of the finger-board the consequent lack of any bed to be struck by the fingers 28 when depressed deprives them of the bracing function of the finger-board in holding them steadily against the strings, against tendency of the latter, particularly under the rotary action of the sounders of the aforesaid patent, to strain them laterally. Moreover, it is necessary to automatically raise each armature after the electromagnet controlling it is de-energized. To resist the tendency referred to and also effect automatic raising of the armatures, spring-devices are provided of the preferred construction described as follows: A flat bar 50, of general U-shape, is rigidly fastened at its ends to the bottom of each lateral edge-portion of the frame-plate 35 to extend the straight section of the bars parallel with the edges of the plate. Holes 51 are formed transversely through the straight sections of each bar 50 at intervals adapting stiff spring-wires 52 confined at their outer ends in the holes to be connected at their inner ends straightway each with a different finger 28 near its lower end, where it is provided with a hole 53 to receive the laterally-bent or hooked adjacent end-portion of a wire. The wires preferably used are piano-strings, because of their stiffness and resilient quality; but they should be stretched to their utmost before using them for the present purpose, to insure against stretching thereof in that use, which

would impair the required accuracy of attack of the fingers, referred to. For securing the wires firmly in the holes 51, each is clamped in its hole by two set-screws 54 and 55, as shown in Fig. 3, whereby it may also be accurately adjusted relatively to the fingers to which it applies. The springs 52 thus serve both to produce the required trueness in attack of the fingers and raise the armatures.

It will be observed, as a further advantage of the present construction, that the fingering-devices are thereby rendered conveniently accessible for individual removal, as for repair, replacement and adjustment, without disturbing the others, since all that is required to enable any device 6 to be taken out is to withdraw its fastening-screw 40 and disconnect the respective cable at the wire-ends 27.

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

1. In combination, a stringed instrument, a fingering-device for a string of the instrument comprising a support and a rod forming a finger thereon depressible against said string, means for depressing the finger, and means depressible with the finger, holding it against lateral deflection while undergoing depression.

2. In combination, a stringed instrument, a fingering-device for a string of the instrument comprising a support and a rod forming a finger thereon depressible against said string, means for depressing the finger, and spring-means depressible with the finger, holding it against lateral deflection while undergoing depression.

3. In combination, a stringed instrument, a fingering-device for a string of the instrument comprising a support and a rod forming a finger thereon depressible against said spring and provided with a notch in its string-engaging end, means for depressing the finger, and spring-means depressible with the finger, holding it against lateral deflection while undergoing depression and returning it, when released, to normal position.

4. In combination, a stringed instrument, a fingering-device for a string of the instrument comprising a support and a rod forming a finger thereon depressible against said string and provided in its string-engaging end with a notch and a slot extending from the notch, means for depressing the finger, and spring-means depressible with the finger, holding it against lateral deflection while undergoing depression and returning it, when released, to normal position.

5. In combination, a stringed instrument, fingering-devices for the strings comprising a support and rows of rods forming fingers thereon depressible against said strings,

means for depressing the fingers, and spring-wires secured at their outer ends to said support and connected at their inner ends with the fingers near their lower ends, said wires holding the fingers against lateral deflection while undergoing depression and returning them, when released, to normal position.

6. In combination, a stringed instrument, a frame extending over the strings of the instrument and having a perforated plate, fingering-devices reciprocally supported on said plate in rows extending lengthwise of the strings, and having fingers notched at their lower ends, means for depressing the fingers against the strings, a bar secured to the plate and extending along an edge thereof, and spring-wires secured at their outer ends to said bar and connected at their inner ends with said fingers, said wires holding the fingers against lateral deflection while undergoing depression.

7. In combination, a stringed instrument, a frame extending over the strings of the instrument and having upper and lower perforated plates, fingering-devices reciprocally supported on said plates in rows extending lengthwise of the strings, and having fingers notched at their lower ends, means for depressing the fingers against the strings, bars secured to the lower plate to extend along its opposite edges, and provided with transverse holes at intervals, and spring wires secured at their outer ends in said holes and connected at their inner ends with said fingers.

8. A fingering-device for playing a stringed instrument, comprising, in combination, a supporting-bar having a bearing on one end, an electromagnet secured at one end to said bearing, an armature having a guide-tongue reciprocally confined in said bearing and a sound-deadening cushion on its under side to strike the adjacent pole of the electromagnet, and a depending finger on the armature to bear at its lower end against a string of the instrument by depressing the armature.

9. A fingering-device for playing a stringed instrument, comprising, in combination, a supporting bar having a bearing and a shoe on one end through which to secure it in upright position on a support, and a guide-slot in its opposite end, an armature having a guide-tongue reciprocally confined in said slot and a recess in its under side with a sound-deadening cushion in the recess to strike the adjacent pole of the electromagnet, a stop on the bar extending over the path of movement of the armature, and a depending finger on the armature to bear at its lower end against a string of the instrument by depressing the armature.

10. A fingering-device for playing a

stringed instrument, comprising, in combination, a supporting bar, an electromagnet secured to said bar, an armature supported to be reciprocated relative to a pole of the
5 electromagnet, and a depending finger on the armature having a diametrically-reduced end containing a notch to straddle a

string of the instrument, and a slot extending from the apex of the notch.

HENRY K. SANDELL.

In presence of—

A. U. THORIEN,

R. A. SCHAEFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
