

No. 693,417.

Patented Feb. 18, 1902.

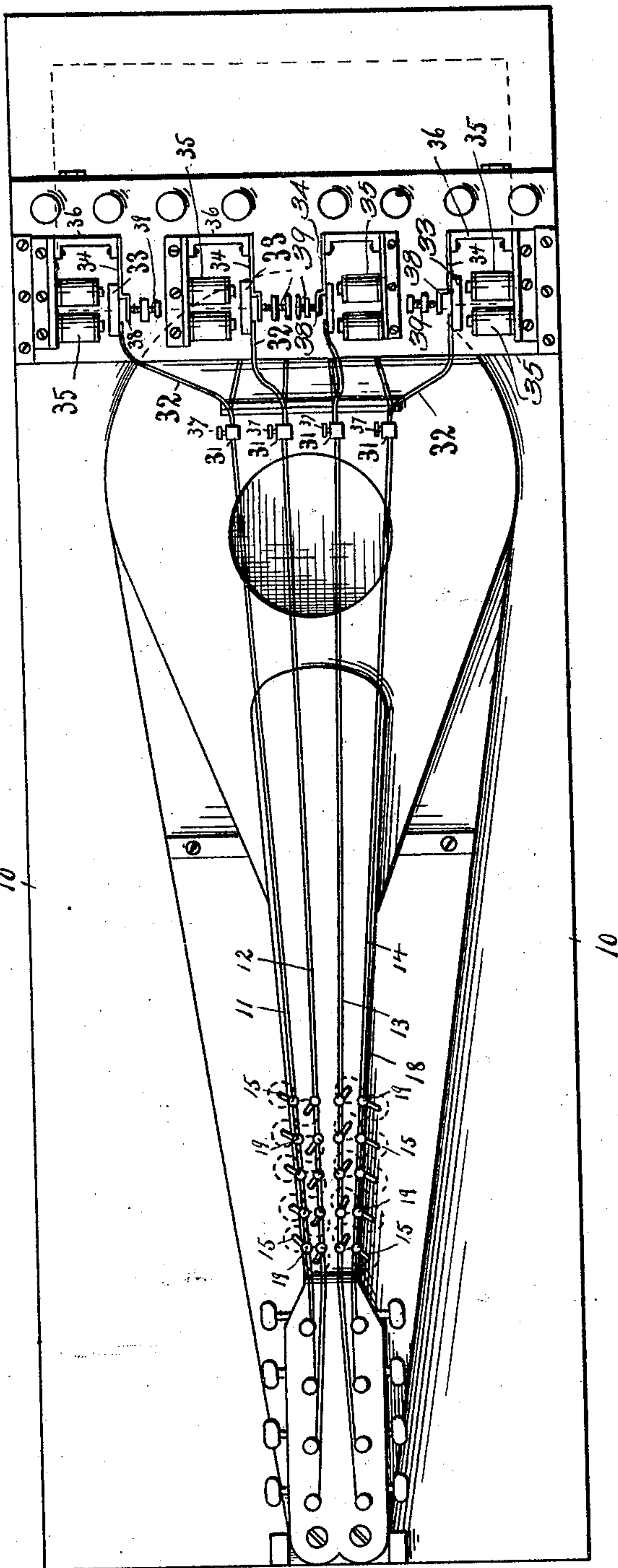
A. I. MITCHELL.
SELF PLAYING MANDOLIN.

(Application filed Apr. 4, 1901.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1



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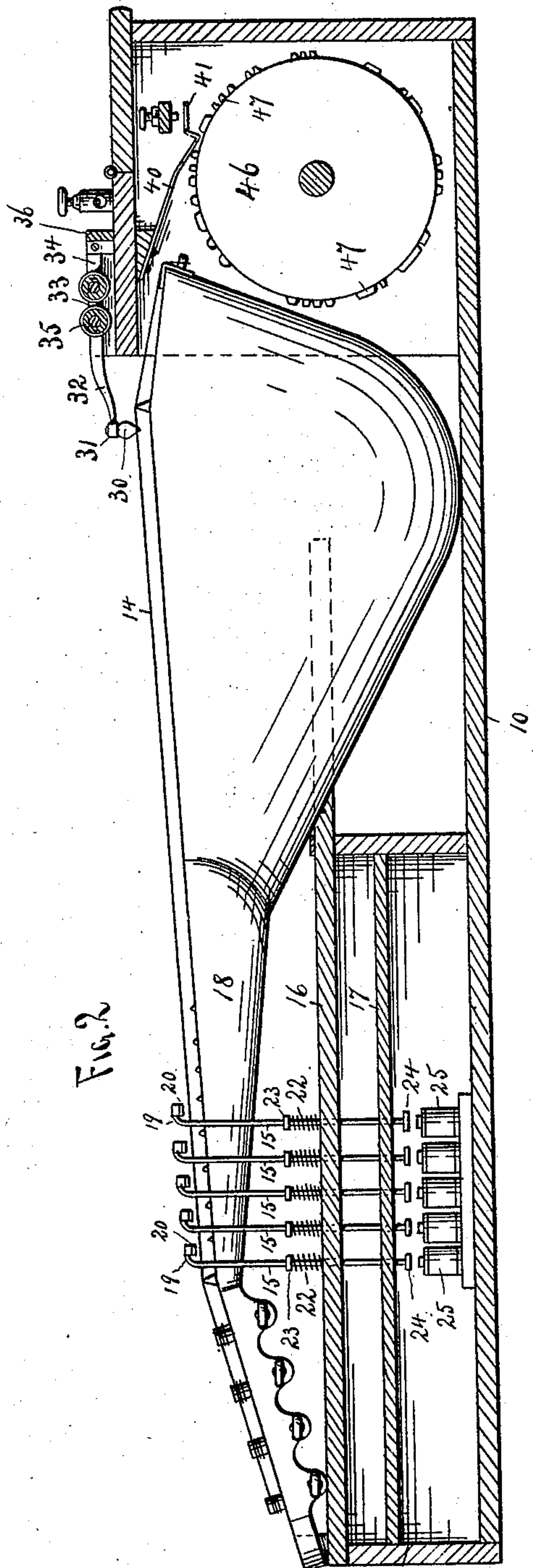
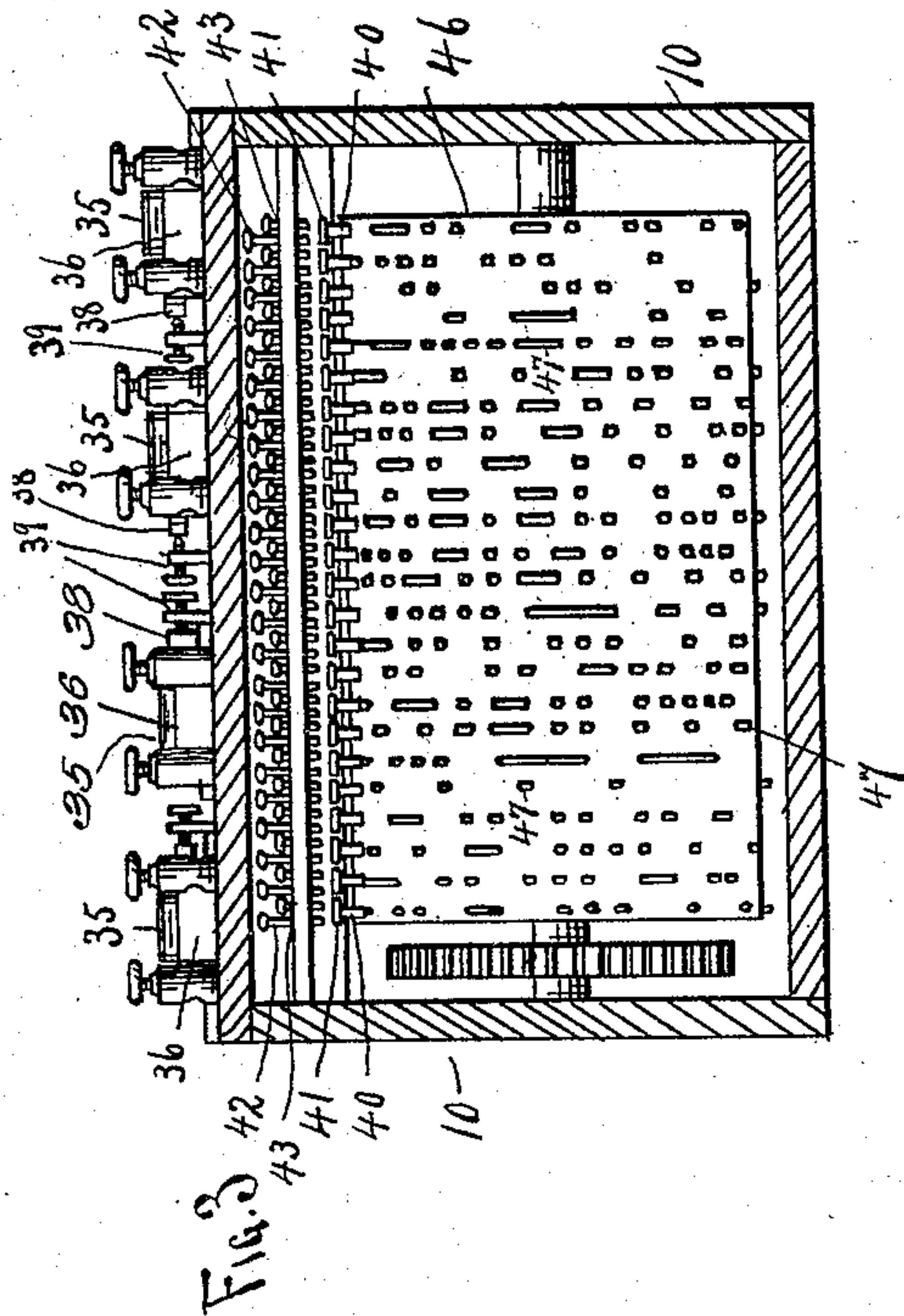
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3 Sheets—Sheet 2.



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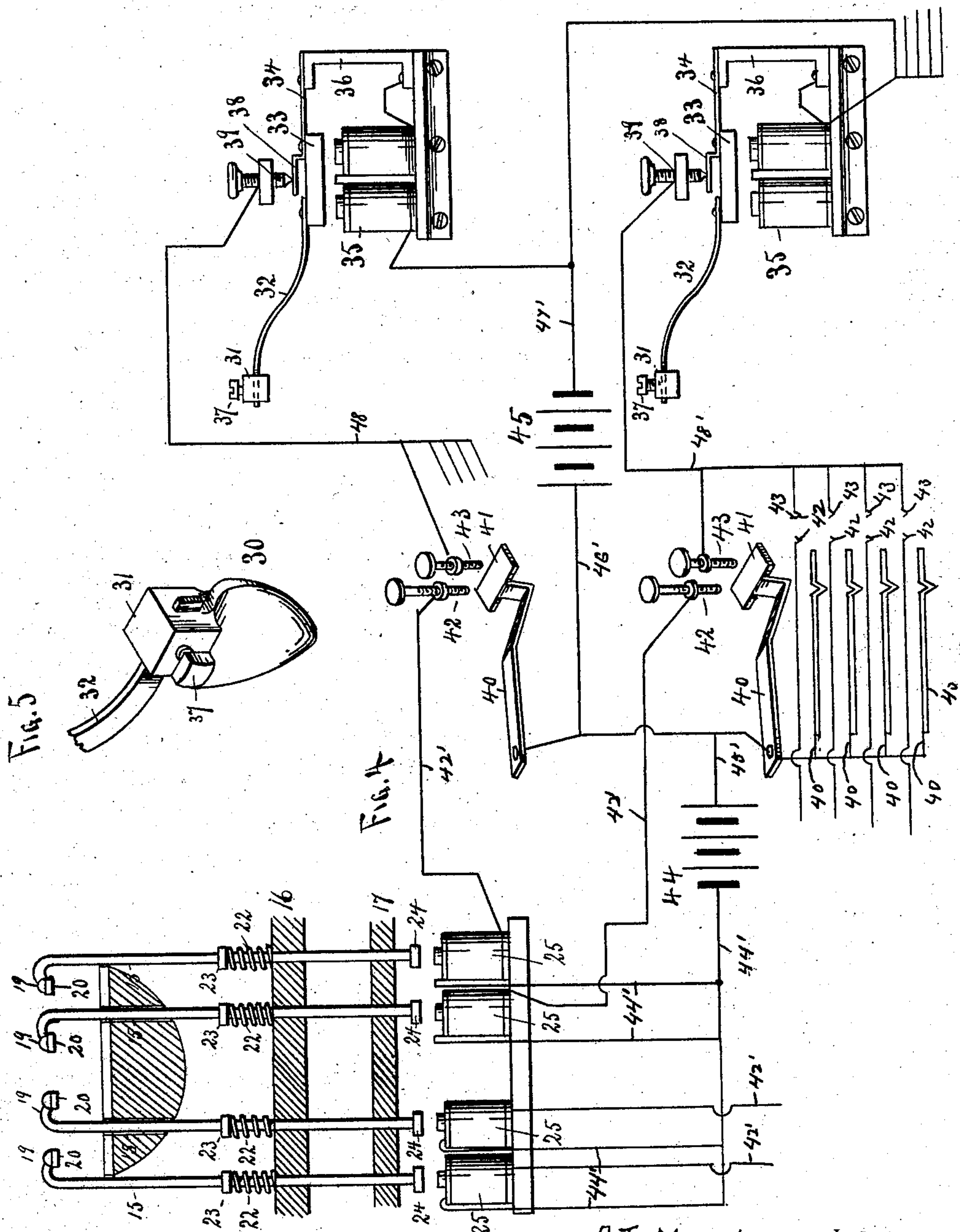
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ALEXANDER INNES MITCHELL, OF RUMFORD FALLS, MAINE.

SELF-PLAYING MANDOLIN.

SPECIFICATION forming part of Letters Patent No. 693,417, dated February 18, 1902.

Application filed April 4, 1901. Serial No. 54,367. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER INNES MITCHELL, a citizen of the United States, residing at Rumford Falls, in the county of Oxford and State of Maine, have invented a new and useful Self-Playing Mandolin, of which the following is a specification.

This invention relates to mandolins in general, and more particularly to electromechanical mechanisms for playing a mandolin automatically, the object of the invention being to provide a construction wherein by rotation of a cylinder provided with pins circuits are energized to fret the mandolin and to vibrate the strings fretted to play music, further objects of the invention being evident from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a plan view showing a mandolin equipped with the mechanism of the present invention. Fig. 2 is a vertical section taken through the casing in which the mandolin is disposed and showing the fret-operating mechanisms, the picking mechanism, and the cylinder for closing the circuits therethrough. Fig. 3 is a section taken transversely through the casing of the mandolin and illustrating the cylinder in elevation with the circuit-closers occupied thereby. Fig. 4 is a diagrammatic view showing the circuits of one of the plectrum-operating devices and one of the fretting-magnets. Fig. 5 is a detail perspective view showing a plectrum and the manner of attaching it to the vibratory armature.

Referring now to the drawings, there is shown a casing 10, in which is disposed an ordinary mandolin having the usual strings arranged in pairs, (shown at 11, 12, 13, and 14,) and which strings are disposed in the usual manner.

To fret the strings, a fretting device is provided for each string at each fret, and each of these fretting devices consists of a rod 15, which is slidably disposed in bearings in vertically-spaced plates 16 and 17 within the casing 10 and below the neck 18 of the mandolin, and the upper end of each rod is bent laterally and downwardly, and upon this downturned end is fixed a plate 19, provided

with a felt damper 20, which when the rod is drawn downwardly is brought into contact with a string. For the outside strings 11 and 14 of the mandolin the rods are disposed outside of the neck and directly adjacent thereto, while for the inside strings 12 and 13 the rods are passed through perforations in the neck, so that the rods may not interfere one with another.

To hold the rods normally raised with the dampers from engagement with the strings, each rod is provided with an encircling helical spring 22, which bears at its lower end upon the upper plate 16 and at its upper end against a shoulder 23 on the rod, and when the rod is moved downwardly it is against the tendency of this spring.

At the lower end of each rod 15 is fixed an armature 24 in the field of an electromagnet 25, so that when the magnet is energized the armature, and therewith the rod and damper, is drawn downwardly to engage the damper with its proper string, it being understood that the dampers are disposed to engage the strings at the same points that they would be engaged if fingered manually. Thus by closing the circuits of the several electromagnets interchangeably any string may be fretted, and by closing the circuits in different combinations different chords may be formed.

To vibrate the strings of the mandolin, a plectrum 30 is provided for each string, the plectrum consisting of a flexible blade having a block 31 at its upper end and in which is formed a slot to slidably receive the arm 32 of a vibratory armature 33, which latter is fixed at one end to a spring 34 and lies in the field of an electromagnet 35, the spring 34 being attached to a support 36. The block 31 is provided with a set-screw 37 for holding it in adjusted position upon the arm on which it is mounted.

The armature 33 carries one member 38 of a make-and-break for engagement with a second member 39, which members are connected in series with the electromagnets 35 to make and break the circuit of said magnet to cause the armature to vibrate in the well-known manner to vibrate the plectrum, it being understood that, as shown in Figs. 1 and 2 of the drawings, the plectrums and their vibrating electromechanisms are disposed so

that as the plectrum is vibrated it will engage the corresponding strings to actuate them. Thus to sound a tone it is only necessary to energize one of the fretting-magnets and at the same time the corresponding plectrum-magnet, when the string will be fretted and vibrated to produce the tone.

In order that the strings may be fretted and vibrated automatically, a number of circuit-closers are provided, one for each of the fretting-magnets, and each of these circuit-closers, as shown in Fig. 4 of the drawings, consists of a spring-metal plate 40, which is fixed at one end and which adjacent to its opposite end is bent downwardly and then upwardly and terminates in a laterally-extending head 41, above which are disposed two contacts 42 and 43, so that when this downwardly-projecting portion of the plate is engaged and moved upwardly the head will engage both of the contacts. A battery 44 is provided for the fretting-magnets, and one end of the winding of each magnet is connected direct to one terminal of the battery by wire 44', while the other end of the winding is connected with its respective contact 42 by a wire 42', and thus whenever two or more spring-plates are raised to engage the contacts 42 the corresponding fretting-magnets are connected in multiple, it being understood that the second terminal of the battery is connected direct to all of the spring-plates of the circuit-closers by wire 45' and its branches.

A battery 45 is provided for the plectrum-magnets, and one terminal thereof is connected to all of the spring-plates by wire 46' in opposition to the battery 44, while the other terminal is connected to one end of the wings of all of the plectrum-magnets by wire 47' and its branches, the other terminals of the windings of the plectrum-magnets being connected with their corresponding contacts 43 through the make-and-break by wire 48' and its branches.

To move the spring-plates or circuit-closers into engagement with the contacts 42 and 43, a drum 46 is provided and may be rotated from a spring or electric motor, and this drum has pins 47 disposed in its face, which when the drum rotates engage the slanting sides of the downwardly-bent portions of the spring-plates to press the plates upwardly and contact the heads thereof with the points 42 and 43. By properly disposing these pins after the manner of the cylinder of a music-box the magnets may be energized to fret and vibrate the strings to play an air corresponding to the pins.

It will be understood that in practice modifications of the specific construction shown may be made and that any suitable materials and proportions may be used for the various parts without departing from the spirit of the invention.

The object in using separate batteries for the two sets of magnets is that the plectrum-operating mechanism transforms or converts

its current from continuous to pulsating, which would cause the fretting-fingers to jump up and down if their operating-magnets were connected in series in the circuits of the plectrum-operating magnets. For this reason separate batteries are used. It is desirable, however, that a common circuit-closer be used for closing a circuit to fret a string and for operating the plectrum that vibrates that string, and for this reason a contact of one series of magnets is disposed adjacent to a contact of the other series and a common circuit-closer is provided for them. There being separate batteries, they must of course be disposed in opposition to confine the currents of the two batteries to their proper circuits.

What is claimed is—

1. The combination with a musical instrument and its strings, of an electromagnet, its armature, a string-depressing finger connected with the armature and disposed to engage and depress the string, a second electromagnet and its armature, a plectrum operatively connected with the armature and disposed to vibrate a string, a battery for each magnet, and a circuit-closer including a member common to each battery.

2. The combination with a musical instrument and its strings of an electromagnet and its armature, a string-depressing finger connected with the armature for operation thereby, a second electromagnet and its armature, a plectrum connected with the second armature for operation thereby and disposed in operative relation to the string to vibrate it, a battery for each magnet, a separate contact-point for the circuit of each magnet, and a circuit-closing device common to both batteries and magnets and adapted for engagement with the contact-points simultaneously.

3. The combination with a musical instrument and its strings, of string-depressing fingers for each string, an electromagnet having an armature connected with each finger for operating it, a plectrum for each string, an electromagnet for each plectrum and having an armature operatively connected with its respective plectrum, a battery with which all of the finger-operating magnets are connected in multiple, a separate battery with which all of the plectrum-operating magnets are connected in multiple, a contact-point for each of the magnets, and a circuit-closer common to both batteries and provided one for each finger-operating magnet, the contacts of the finger-operating magnets being disposed each adjacent to a contact of a plectrum-operating magnet for engagement of them both by the circuit-closer.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ALEXANDER INNES MITCHELL.

Witnesses:

FRED O. STEARNS,
ELWIN H. GLEASON.