

No. 692,248.

Patented Feb. 4, 1902.

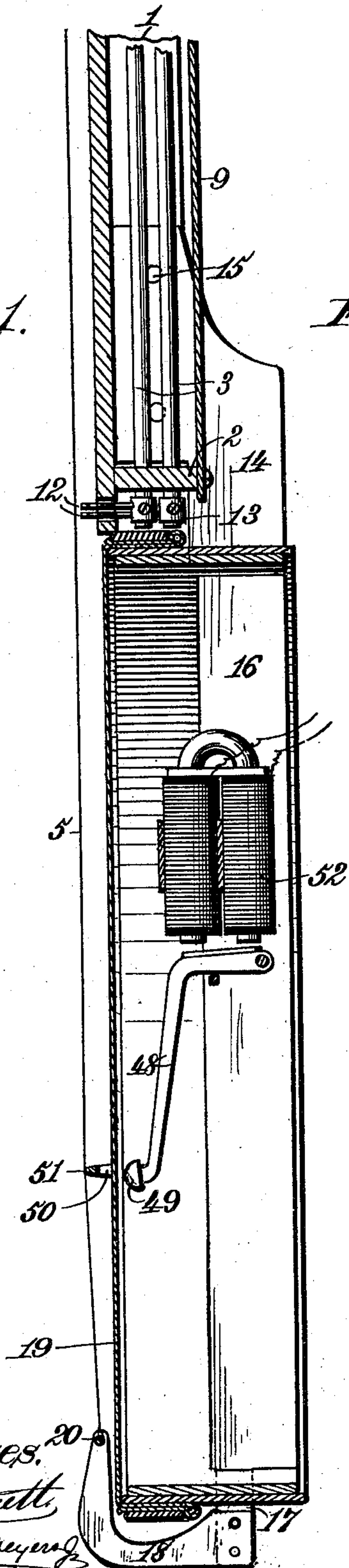
G. H. DAVIS.
MUSICAL STRINGED INSTRUMENT.

(Application filed Apr. 29, 1899.)

(No Model.)

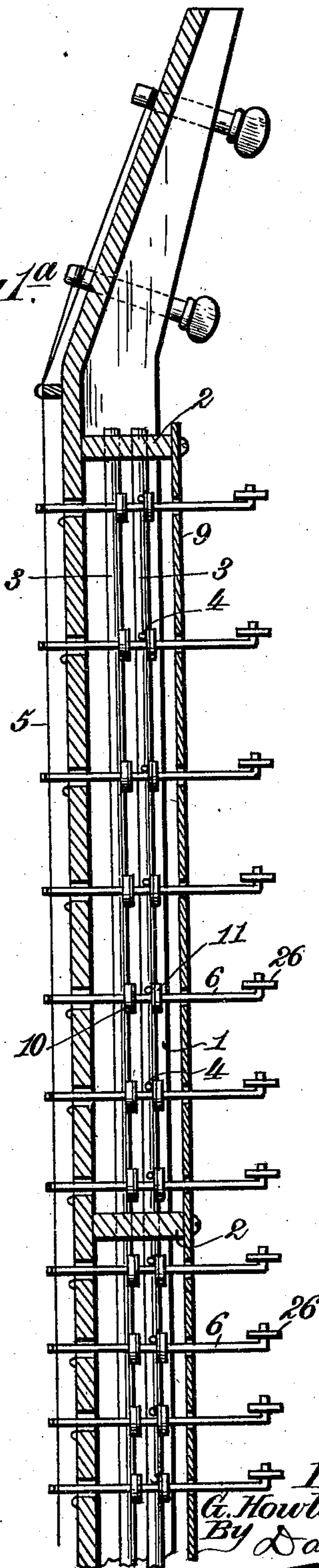
3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
Robert Everett
J. Granville Meyer

Fig. 1^a



Inventor:
G. Howlett Davis
By *Davis & Co*

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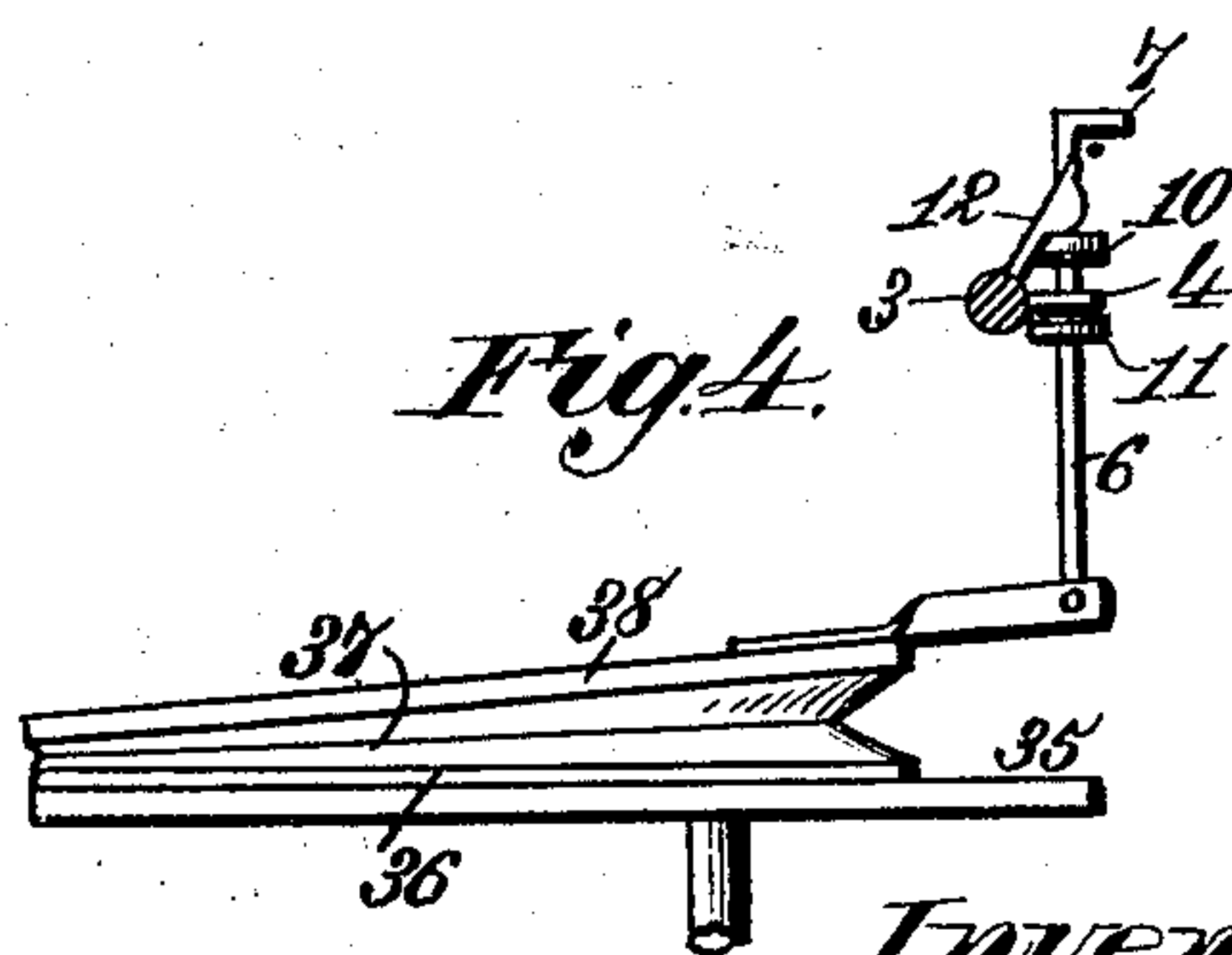
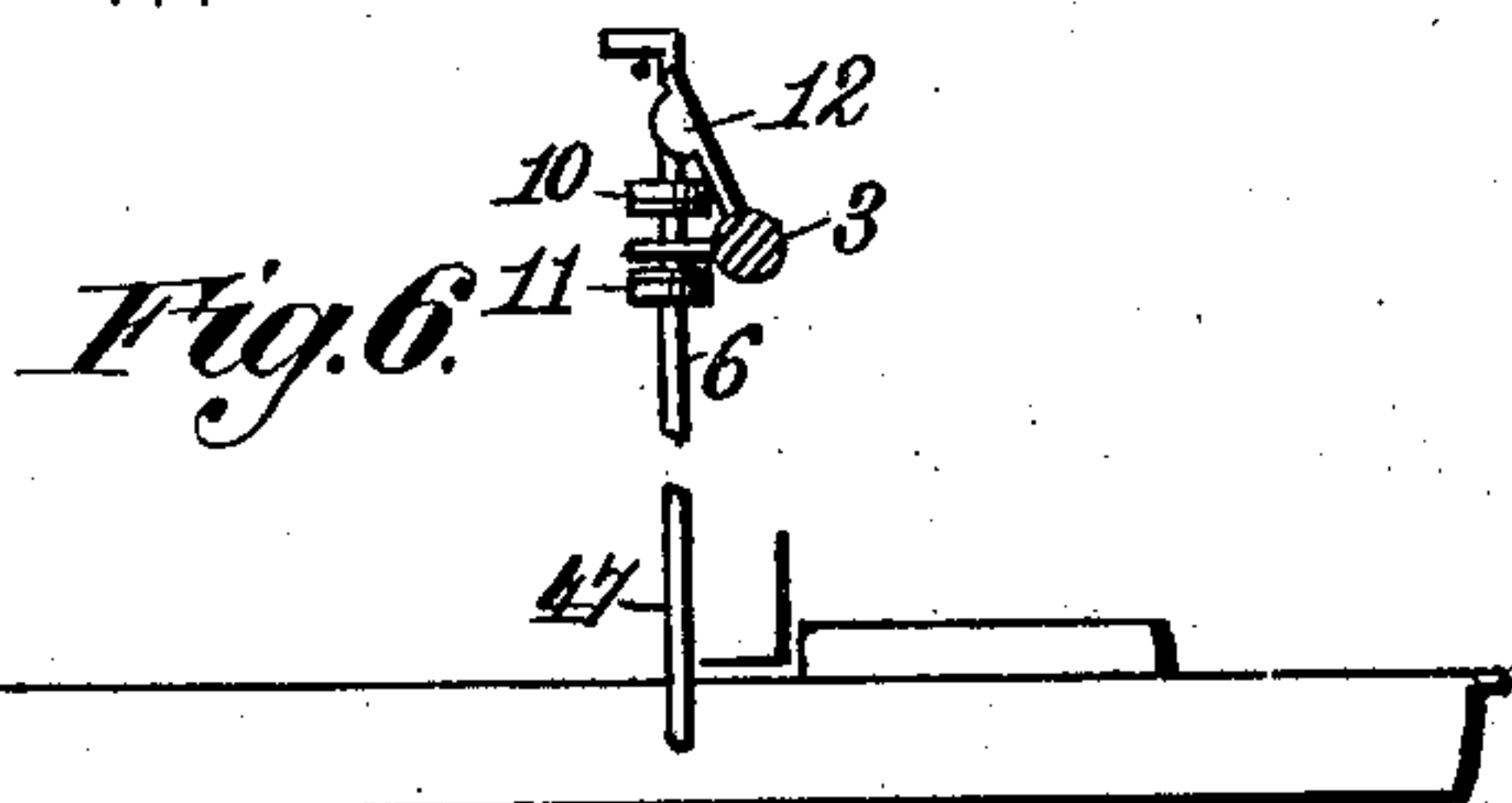
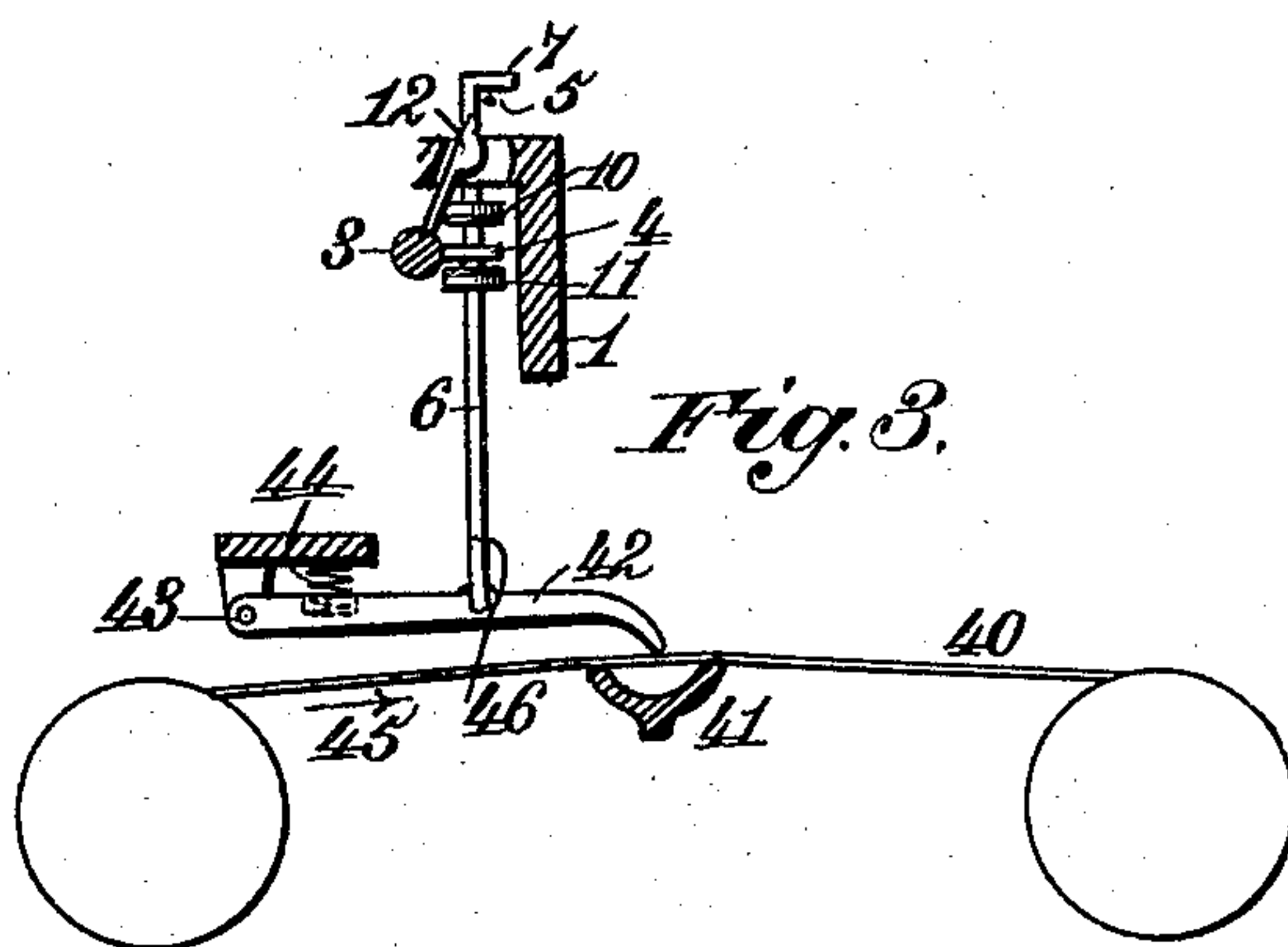
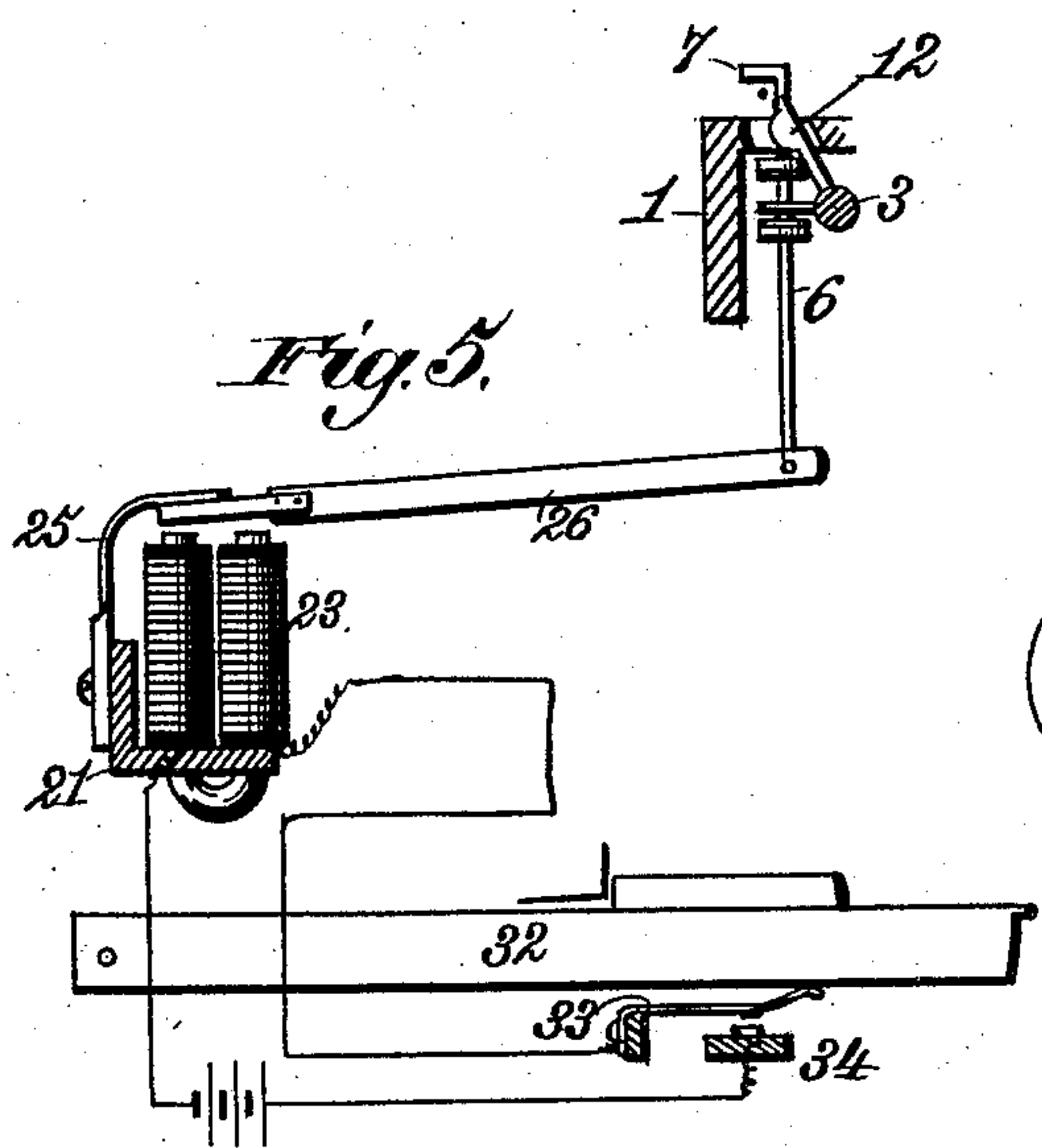
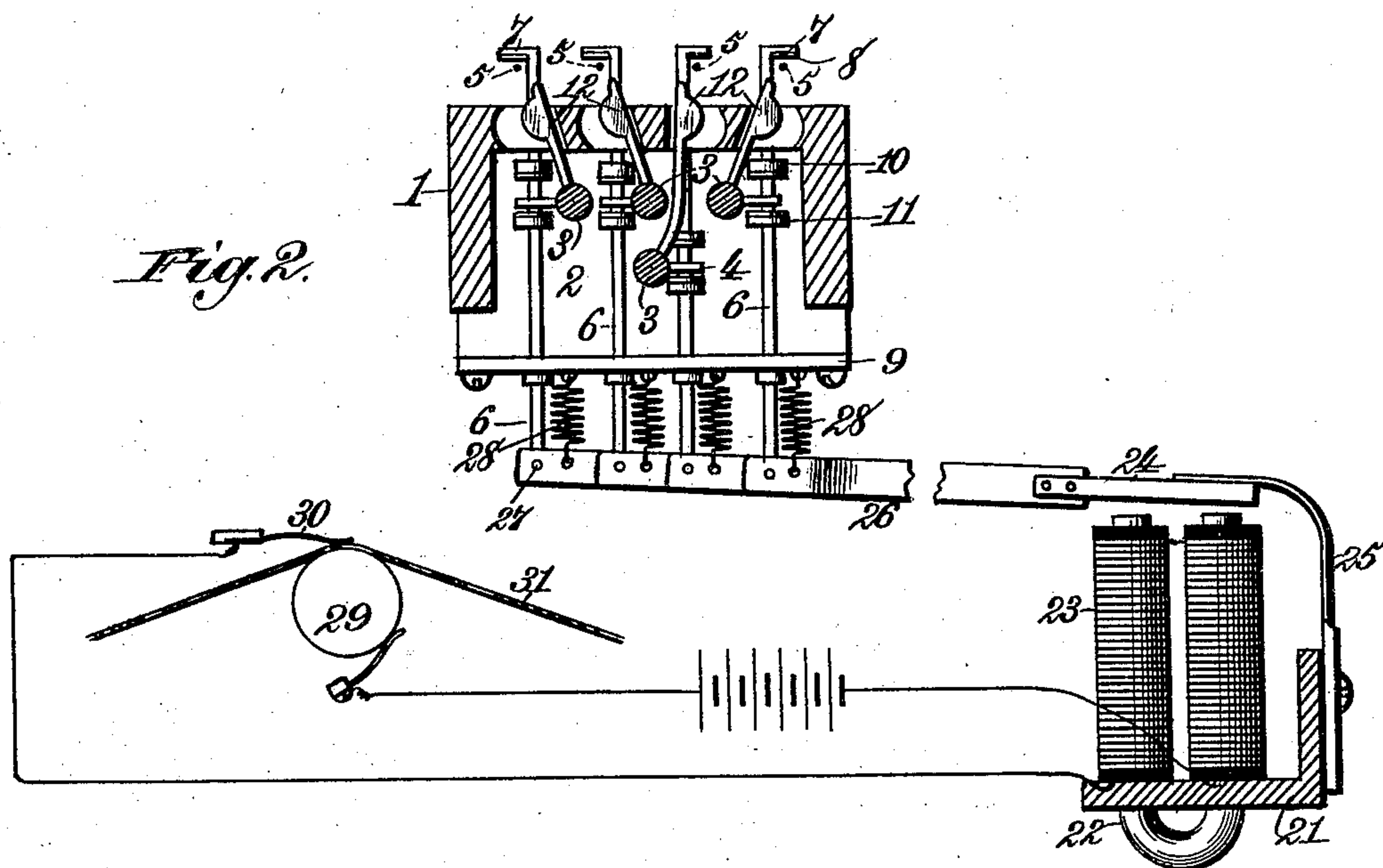
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3 Sheets—Sheet 2.



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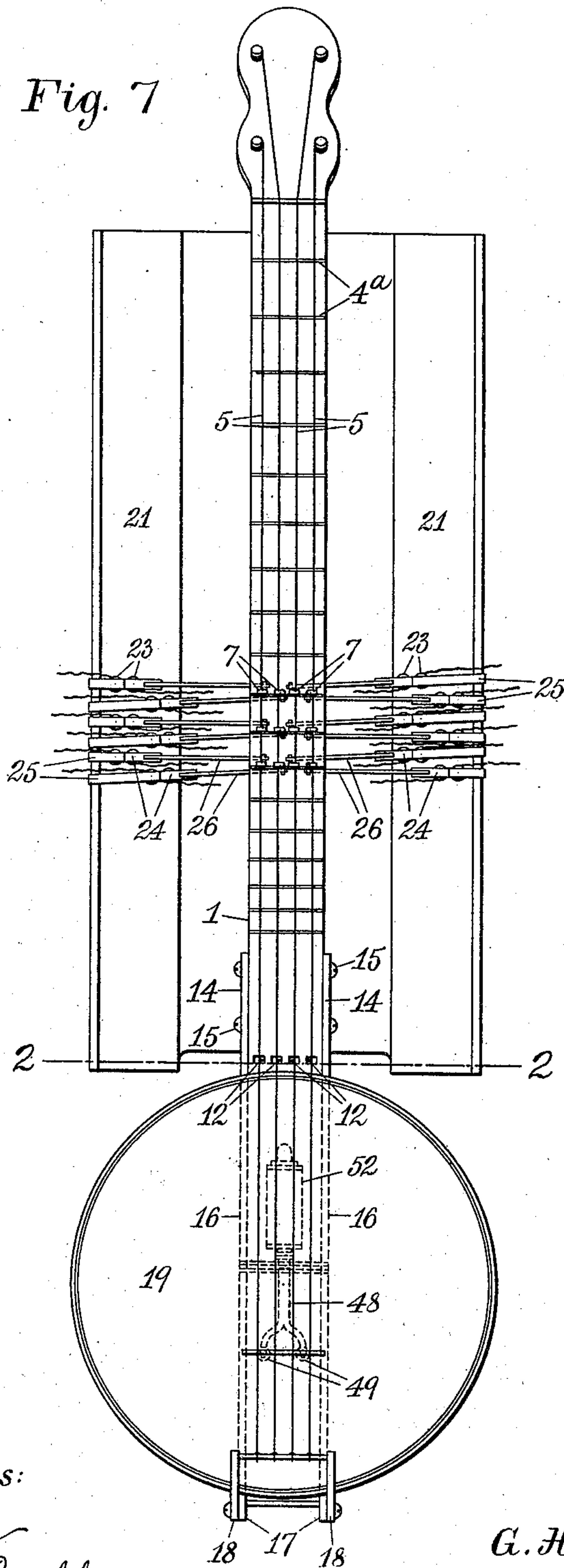
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3 Sheets—Sheet 3.

Fig. 7



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UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN AUTOMUSIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

MUSICAL STRINGED INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 692,248, dated February 4, 1902.

Application filed April 29, 1899. Serial No. 715,006. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HOWLETT DAVIS, residing at New York, in the county of New York and State of New York, have invented a certain new, useful, and valuable Improvement in Musical Stringed Instruments, of which the following is a full, clear, and exact description.

This invention relates to self-playing musical stringed instruments; and it has for its object, primarily, to provide in an instrument of the character referred to mechanism whereby when any one of the fretting devices is operated to fret any one of the strings a corresponding picker-finger will be automatically actuated to pick the string fretted.

It also has for its object to improve and simplify the construction and render more efficient this class of instruments generally.

It is obvious that this invention may be applied to many kinds of musical stringed instruments. In the following specification an embodiment of the invention in a self-playing banjo will be described.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figures 1 and 1^a when taken together represent a central longitudinal section of my improved stringed instrument, which is here shown as a banjo. Fig. 2 is a transverse section taken on a line 2 2 of Fig. 7 of the picker-fingers and showing the electric operating mechanism wherein a perforated music-sheet is employed. Figs. 3, 4, 5, and 6 show modified forms of operating mechanisms. Fig. 7 is a front view of a banjo constructed in accordance with this invention in a scale slightly reduced from that of Figs. 1 and 1^a.

Self-playing banjos now in use are unnecessarily complicated, are of such delicate construction as to require very frequent repairs, and note-sheets which operate them have an unnecessary number of perforations and require great skill and study in the original arrangement thereof. In pneumatically-oper-

ated banjos having the aforesaid objectionable features and now in public use the pneumatics, (in addition to the objections named,) which must necessarily be very large as compared with an electromagnet, require a large cabinet to contain the various pneumatic mechanisms, whereas the mechanism of my improved banjo will not take up more than one-half the space of the type referred to. Another serious objection to the self-playing banjos now in use is that two distinct and separate mechanical movements, actuated by separate and distinct means, are required to produce one note or tone—that is, to produce a tone one device depresses the string upon the proper fret and a separate device operates a finger which picks the said string—whereas in my improvement no such complicated mechanism is necessary, as I provide a new, novel, simple, and practical mechanical action which performs both of the aforesaid functions—that is, the depression of the string and the picking thereof—with one movement.

Proceeding with a detailed description of my invention I will first describe the instrument as shown in Figs. 1 and 2, which illustrate my complete mechanical movement independent of any form of actuating mechanism.

The neck of my banjo is preferably made of a length of channel-iron 1, and when it is desired to secure lightness it is made of aluminium. Within the channel-iron are located three partition-plates 2, in which are journaled four rock-shafts 3, each having a series of crank-pins 4, corresponding with the number of strings to be fretted. Above each fret 4^a, which frets may of course be omitted, as in some banjos, violins, and other stringed instruments, considering the head of the banjo as the bottom thereof, is arranged slightly to the inner side of each string 5 a longitudinally-movable fret-rod 6, surmounted by an outwardly-projecting portion 7, faced on the under side with a piece of felt 8 or other flexible material. Said fret-rod works through holes in the face of the channel-piece 1 and has its lower bearing in the metal strip or cover 9. Upon each fret-rod are arranged

two metal collars 10 and 11, each faced with felt and fixed in such a position upon said fret-rod as to cause them to alternately engage the corresponding crank-pin 4 when the said fret-rod is raised and lowered, and thus cause the shaft 3 to rock in the direction of the movement of said fret-rod; but on account of the space separating the said collars 10 and 11 there is a certain amount of lost movement, the purpose of which will be hereinafter made apparent.

Each rock-shaft 3 is provided at its lower end with a picker-finger 12, which is preferably set in a collar 13, adjustably fixed therein by a set-screw, as more clearly shown in Fig. 1; and these picker-fingers obviously partake of the movement of the rock-shaft 3, but owing to the space between the collars 10 and 11 the picker-finger 12 does not move forward until after the fret-rod 6 has moved down fully one-eighth of an inch, pressing its string 5 against its fret, and at the same time that the string is thus lowered the collar 10 impinges the crank-pin 4, which causes the picker-finger 12 to move against and sweep under the lower string, the several movements occurring in the order named. At this point it should be carefully observed that were the string not lowered the picker-finger would move forward under the string, but would not touch it, and it is the simultaneous lowering of the string and the movement of the picker-finger which forms one of the leading features of this invention.

It is obvious that any means or power whatsoever may be employed for the depression of the fret-rods and the concurrent lowering of the string and the picking thereof. For instance, the fret-rods 6 may be operated manually, under which method the banjo will have the important advantage of allowing fully four or more tones to be struck simultaneously, as both hands may be used for the depressing of the fret-rods, whereas with the ordinary banjo one hand must be engaged in picking and the other in depressing the strings over the frets.

Before proceeding to describe any means for automatically operating my banjo I will describe several other improvements, which may be utilized in an ordinary banjo with or without a metallic neck.

Secured to each side of the neck at its base are two metallic extension-rods 14, which are secured to the neck by means of screws 15, and the reduced portions 16 extend through the head of the banjo, and a second reduced portion 17 extends beyond the rim of the banjo. Secured to these two projecting portions 17 are two upwardly-extending arms 18, and through their free ends, close to the head 19, a cross-rod 20 is extended, and to this cross-rod the lower end of the strings 5 are secured. With these metallic neck-extension rods and string-arms I produce a banjo in which the strings are stretched between the opposite ends of a complete metallic frame,

which sustains the lengthwise tension of the strings independently of the rim or head, which therefore receives only the lateral pressure of the strings through the medium of the bridge 51, thus not only leaving the rim free to vibrate, but avoiding the constant slackening to which the strings are liable when they are attached to or supported by the rim of the instrument. I thus obviate the well-known and serious objections which have heretofore existed because of banjos getting out of tune so quickly, and this objection is particularly serious in the case of self-playing banjos which are located in public places, and as at present constructed of wood they require tuning fully once every day, whereas with my metal-frame banjo they will not require tuning more than once a week. In fact, they should not get out of tune any oftener than a piano.

I will now describe several methods by means of which the mechanism of my banjo may be actuated automatically and describe the preferred form first, which is electrical; but I will again direct attention to the fact that any power whatever may be used in connection with my banjo without avoiding the spirit of my invention.

In Fig. 2, 21 indicates an angle-iron, in which is set the iron cores 22 of a series of electromagnets, one for each of the fret-rods 6, the helices 23 being slipped over the cores. The armature 24 is supported by a blade-spring 25, and the armature-extension 26 is preferably formed of a thin strip of metal, the free end of which has a pivotal connection 27 with the fret-rod 6, which in this case may be kept normally raised by the spring 28 or alone by the tension of the armature-spring 25. The diagrammatic view shows the magnet in series with a metal roller 29, upon which rests a contact-finger 30, and intervening between the two is a note-sheet 31, having perforations therein, which serve to make and break the circuit through the electromagnet, and, as mentioned in the early part of this specification, a single perforation in the note-sheet causes a corresponding tone to be produced, whereas in other forms of banjos two lines of perforations have been necessary to produce a single tone—that is, one line of perforations would cause the depression of the string and the second line of shorter perforations to actuate the picker-fingers.

Instead of using a note-sheet 31 to make and break the circuit through the electromagnet I may make and break the circuit by the depression of a piano-key 32, which would cause a band-spring 33 to be depressed upon the bar 34 and close the circuit. Thus my banjo may be very skillfully played by connecting it with the keys of an ordinary piano, and it is easy to realize that results heretofore impossible by ordinary hand-playing may be obtained.

In Fig. 4 is illustrated a pneumatic comprising the base 35, the foundation-piece 36,

the bellows-leather 37, and the movable leaf 38, the free end of the latter having a pivotal connection with the fret-rod 6. Whenever the air is exhausted through the tube 39 by means well-known to those skilled in the art, it is obvious that the pneumatic will collapse and the movable leaf 38 moved down and carry with it the fret-rod. As pneumatic instruments are so well known a further description of this particular form of actuating mechanism is deemed unnecessary.

In Fig. 3 I represent a note-sheet 40, formed of thick paper and passing over a channel-bar 41. A selector-finger 42, pivoted at 43, normally bears upon the note-sheet above the channel-bar and is kept normally depressed by the spring 44. Imagining the note-sheet to be propelled forward in the direction of the arrow 45 it is obvious that whenever a selector-finger in line with a perforation is forced through the latter by the spring it will carry with it the fret-rod which is pivotally connected with the extension 46 and sound a note in the manner before described.

In addition to actuating my banjo by electricity, in which the contacts are made through the depression of the piano-key 32, as hereinbefore described, I may entirely dispense with the electrical mechanism and make a direct connection to the fret-rod 6 through a rod or extension 47 to a piano-key, as clearly shown in said Fig. 6.

Having described my improvements and the various methods by which they may be ordinarily operated, attention is again directed to Fig. 1, wherein I show means for producing pianissimo effects or soft music, said means comprising a lever 48, which is surmounted by two metal buttons 49, which rest directly under the feet 50 of the bridge 51. Said buttons 49 are so arranged as to be moved upward against a head, and thus lessening the depression thereof and producing softer music. In this particular instance I have shown the lever 48 actuated by an electromagnet 52 of the ordinary form of construction, which electromagnet may be energized by contacts formed in any suitable manner, either by a special line of perforations in a note-sheet or, for instance, by depressing the soft pedal of a piano to which it may be connected. It is equally obvious that instead of employing an electromagnet 52 to actuate the lever 48 I may employ some other form of pneumatic or mechanical movement.

Having now described my invention and the various ways in which it may be operated, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the string of a musical instrument, a picker, a series of fretting devices and means governed by any fretting device of the series for operating the picker.

2. In combination with the strings of a musical instrument, a series of fretting devices and a picker for each string, and means gov-

erned by any fretting device for operating the picker of its corresponding string.

3. In a musical stringed instrument, the combination of a device for fretting, and a device for vibrating a string, and means for directly connecting and simultaneously operating both of said devices.

4. In a musical stringed instrument, the combination of devices for fretting and vibrating a string, and means for directly connecting and positively operating both devices from a single motor.

5. In a musical stringed instrument, controlled by a note-sheet, the combination of the string-fretting devices, and a string-vibrating device, with means for operating both of the said devices under the control of a single row of note devices of the note-sheet, for each note to be played.

6. In combination, with the string of a musical instrument, controlled by a note-sheet, a vibrating device, and a series of fretting devices, and means for operating the string-vibrating device and the appropriate fretting device from a single row of note devices of the note-sheet, for each note to be played.

7. In a musical stringed instrument the combination with the picking mechanisms for vibrating the strings and the fretting devices of a set of operating mechanisms each of which actuates both its fretting devices and its string-vibrating mechanism.

8. In a musical stringed instrument the combination with the pickers and the string-displacing devices, of power mechanism and a single set of connections each of which connects the power mechanism with a picker and with a string-displacing device for actuating them.

9. In a musical stringed instrument the combination with a series of pickers, and a series of fretting devices, of a series of fret-rods which operate both the pickers and the fretting devices and means for actuating said rods.

10. In a musical stringed instrument the combination with a series of pickers and a series of fretting devices of a stencil with a single set of perforations for operating both the picking and fretting devices and a single set of connections between the stencil and the picking and fretting devices.

11. In a musical stringed instrument the combination with a series of pickers and a series of fretting devices of a stencil with a single set of perforations for operating both the picking and fretting devices, a series of electromagnets controlled by said stencil and a single set of connections between the magnets and the picking and fretting devices.

12. In a musical stringed instrument, the combination with picker-fingers for vibrating the strings, and fretting devices, of means actuated by the fretting devices for operating the picker-fingers.

13. In a musical stringed instrument, the

combination with picker-fingers for vibrating the strings and fretting devices, of means for operating the fretting devices, and means actuated by the fretting devices for operating the picker-fingers.

14. In a self-playing musical stringed instrument, the combination with picker-fingers and fretting devices, of means for automatically operating the fretting devices, and mechanism actuated by the fretting devices for operating the picker-fingers.

15. In a musical stringed instrument, the combination with fretting devices, of picker-fingers normally lying below the strings, and means for causing said picker-fingers to engage the strings when the latter are depressed by the fretting devices.

16. In a musical stringed instrument, the combination with fretting devices, of picker-fingers normally lying below the strings, and means for causing said picker-fingers to engage and sweep beneath the strings when the latter are depressed by the fretting devices.

17. In a musical stringed instrument, the combination with picker-fingers normally lying beneath and out of contact with the strings, of fretting devices operating to shorten the vibrating length of the strings and depress the latter into operative position relatively to the picker-fingers, and means for actuating the picker-fingers to vibrate the strings when the latter are depressed.

18. In a musical stringed instrument the combination with the neck thereof, of a series of longitudinally-movable rods projecting through the neck and provided with ends overlying the strings, a rock-shaft extending lengthwise of the neck in operative engagement with the rods, and means for actuating said rods and shaft.

19. In a musical stringed instrument the combination with the neck thereof of a series of longitudinally-movable rods projecting through the neck and provided with ends overlying the strings, a rock-shaft mounted in and extending lengthwise of the neck, in engaging relation to the rods, and means for actuating said shaft and either of its rods independently of the other rods.

20. In a musical stringed instrument, the combination with the neck thereof, of longitudinally-movable rods projecting transversely up through the neck and provided with ends overlying the strings, means for depressing said rods to shorten the vibrating lengths of the strings, picker-fingers for vibrating the strings, and mechanism actuated by the said rods for operating the picker-fingers.

21. In a musical stringed instrument, the combination with the neck thereof, of longitudinally - movable rods projecting transversely up through the neck and provided with ends overlying the strings, means for depressing the rods to shorten the vibrating lengths of the strings, rock-shafts each pro-

vided with a picker-finger arranged in operative relation to one of the strings, and means actuated by the said rods when the latter are depressed for operating the picker-fingers.

22. In a musical stringed instrument, the combination with the neck thereof, of longitudinally - movable rods projecting transversely up through the neck and provided with ends overlying the strings, means for depressing the rods to shorten the vibrating lengths of the strings, rock-shafts arranged longitudinally beneath the neck, picker-fingers mounted on said shafts in operative relation to the strings, and means actuated by the said rods when the latter are depressed for operating the picker-fingers.

23. The combination, with the neck of a musical stringed instrument, of an extension reaching beyond the opposite side of the head of the instrument and supporting the lengthwise tension of the strings, independently of the rim.

24. The combination, with the neck of a musical stringed instrument, of an extension, attached to the neck and extending beyond the head of the instrument, provided at its rear end with an arm extending beyond and above the head and supporting the lengthwise tension of the strings, independently of the rim.

25. In a musical stringed instrument, the combination with the neck thereof, of longitudinally - movable rods projecting transversely up through the neck and provided with ends overlying the strings, means for depressing the rods to shorten the vibrating lengths of the strings, rock-shafts arranged longitudinally beneath the neck and provided with crank - pins, a projection arranged on each of the said rods in position to engage the corresponding crank-pin when the rod is depressed and rock the rock-shaft, and picker-arms on said rock-shafts operating, when the latter are rocked, to pick the strings.

26. In a musical stringed instrument, the combination with a neck thereof, of longitudinally-movable rods projecting transversely up through the neck and provided with ends overlying the strings, means for depressing the rods to shorten the vibrating lengths of the strings, rock-shafts arranged longitudinally beneath the neck and provided with crank-pins, two collars arranged on each of the said rods and operating to engage the corresponding crank-pin and rock the shaft in opposite directions when the rod is depressed and raised, and picker-arms on said rock-shaft operating, when the latter is rocked to pick the strings.

Signed in presence of two witnesses.

GEORGE HOWLETT DAVIS.

Witnesses:

JAS. H. VORIS,

GEORGE BURRELL.