

No. 763,877.

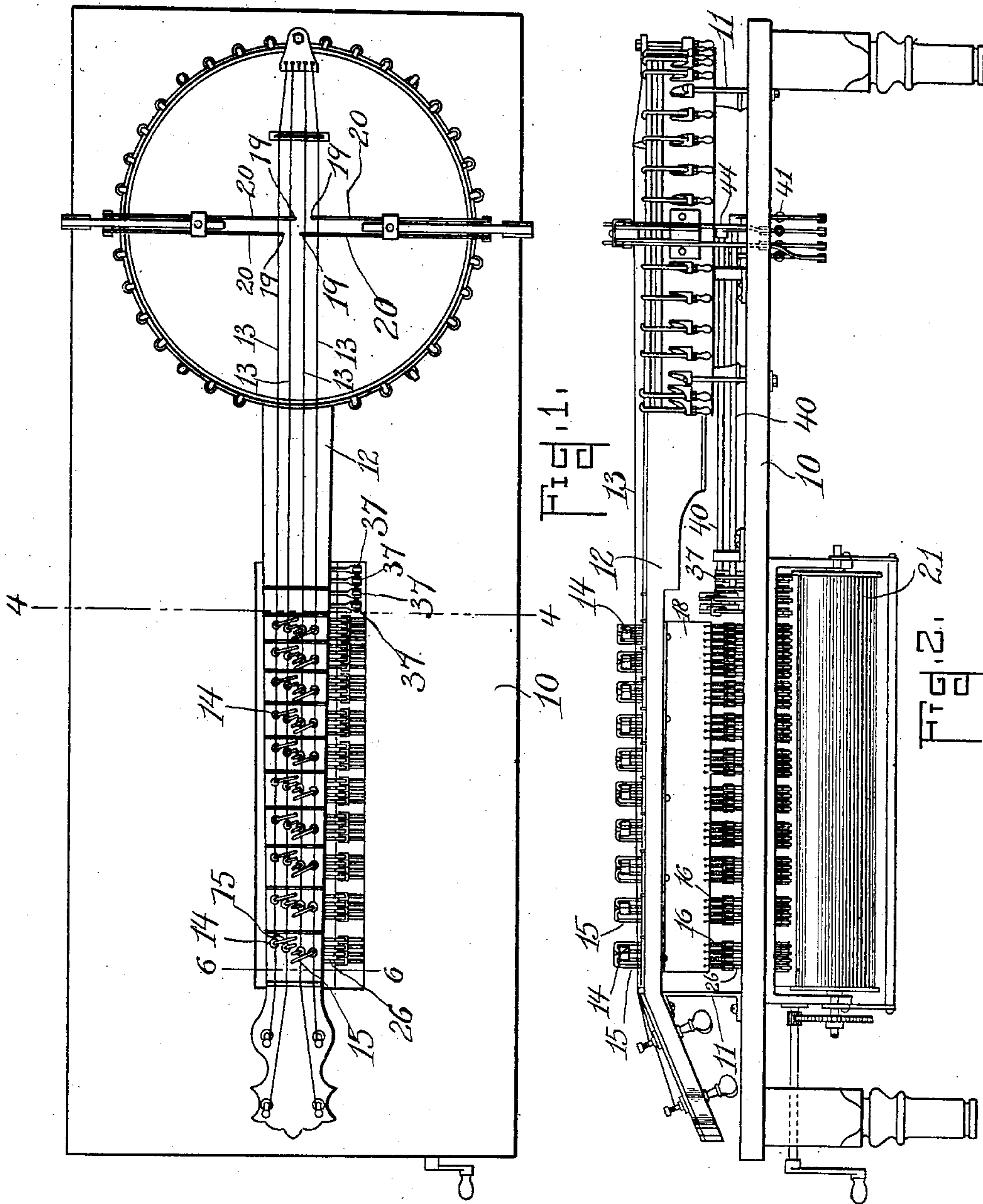
PATENTED JUNE 28, 1904.

W. H. GILMAN & J. P. TIRRELL.
AUTOMATIC MUSICAL INSTRUMENT.

APPLICATION FILED SEPT. 12, 1903.

NO MODEL.

5 SHEETS--SHEET 1.



Witnesses:
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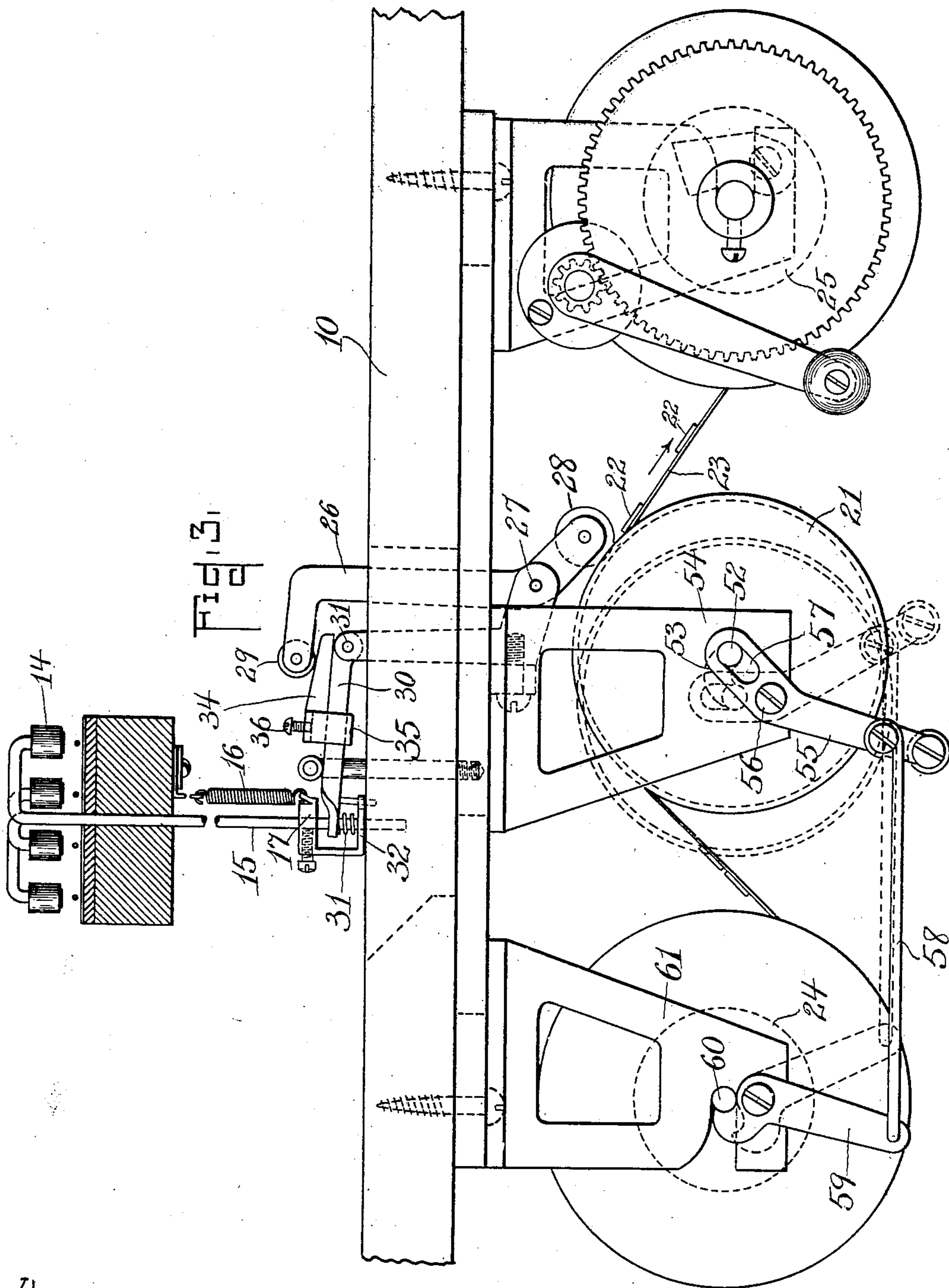
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5 SHEETS—SHEET 2.



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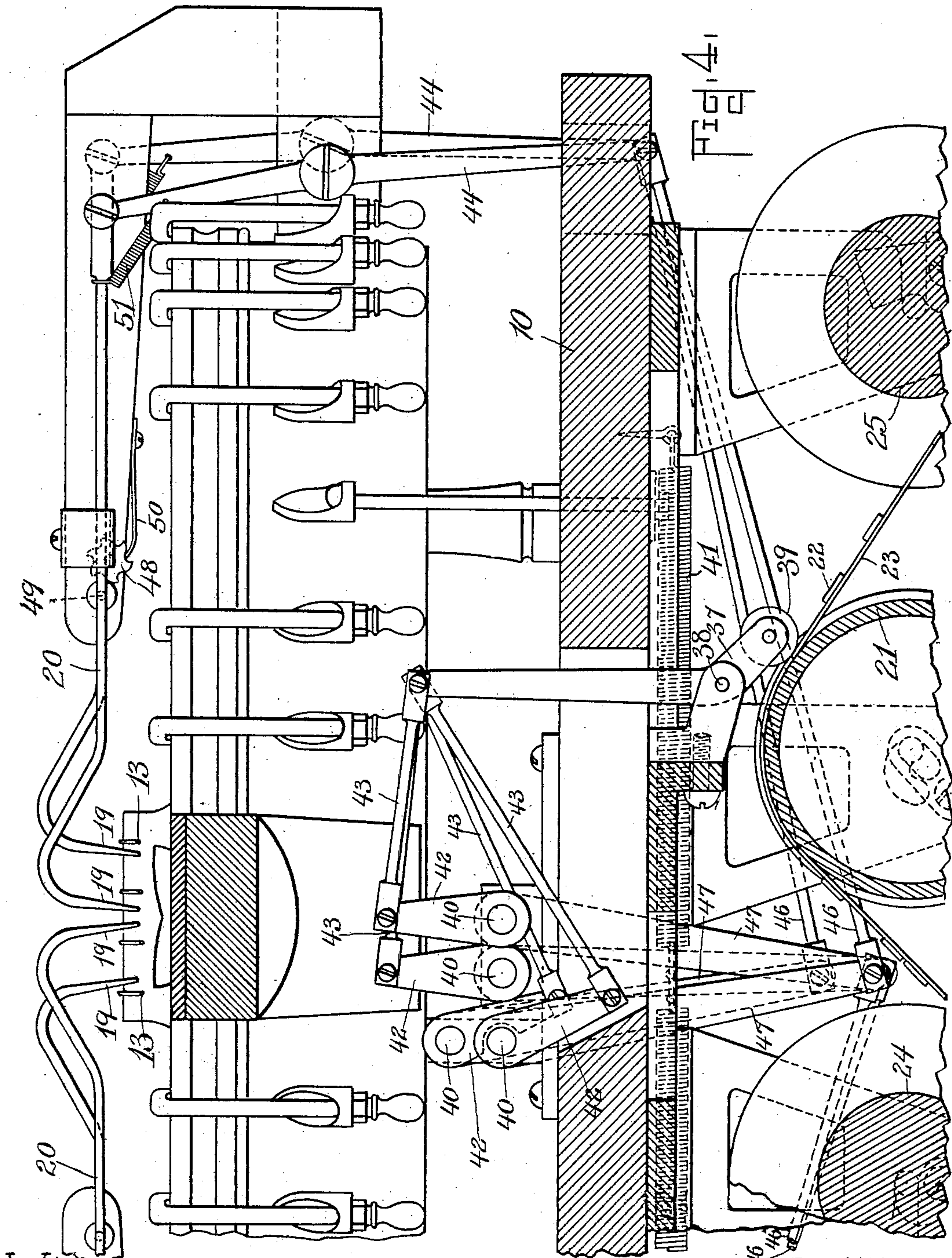
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5 SHEETS—SHEET 3.



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NO MODEL.

5 SHEETS—SHEET 4.

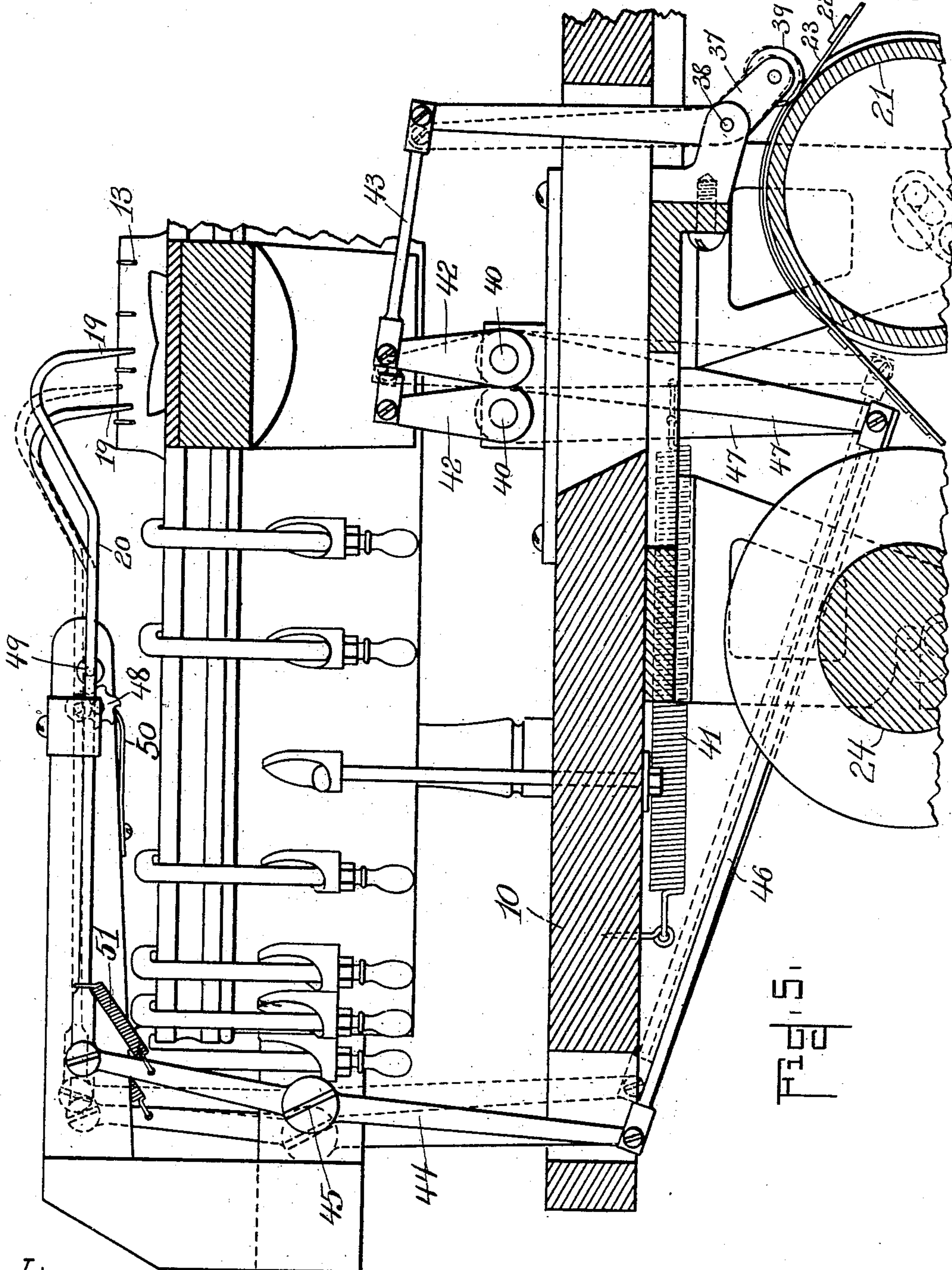


Fig. 5.

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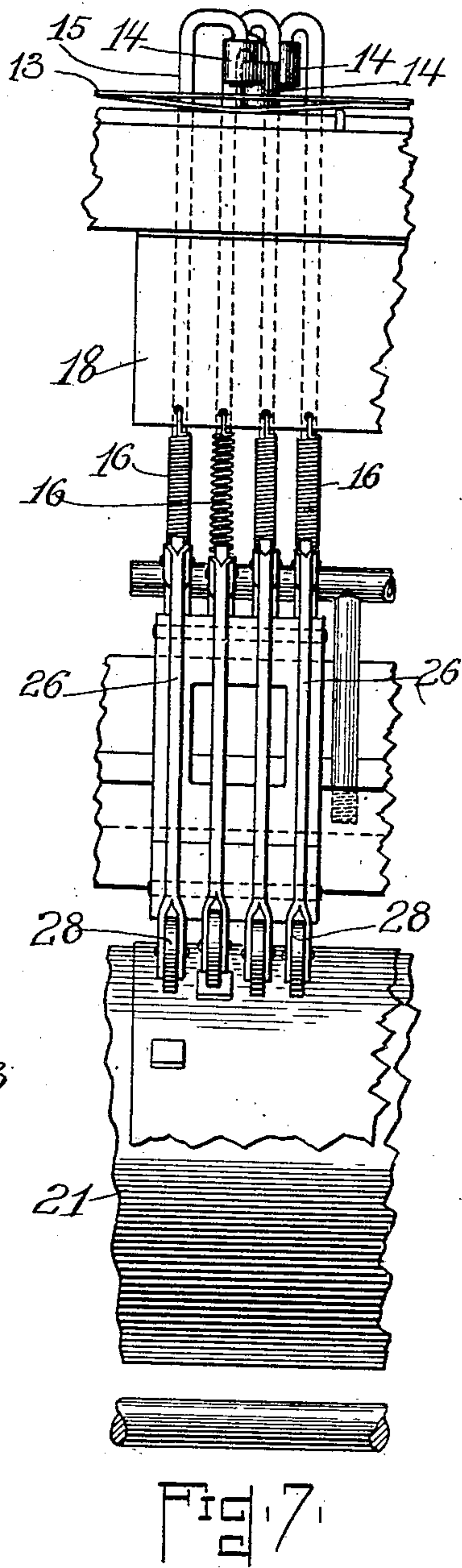
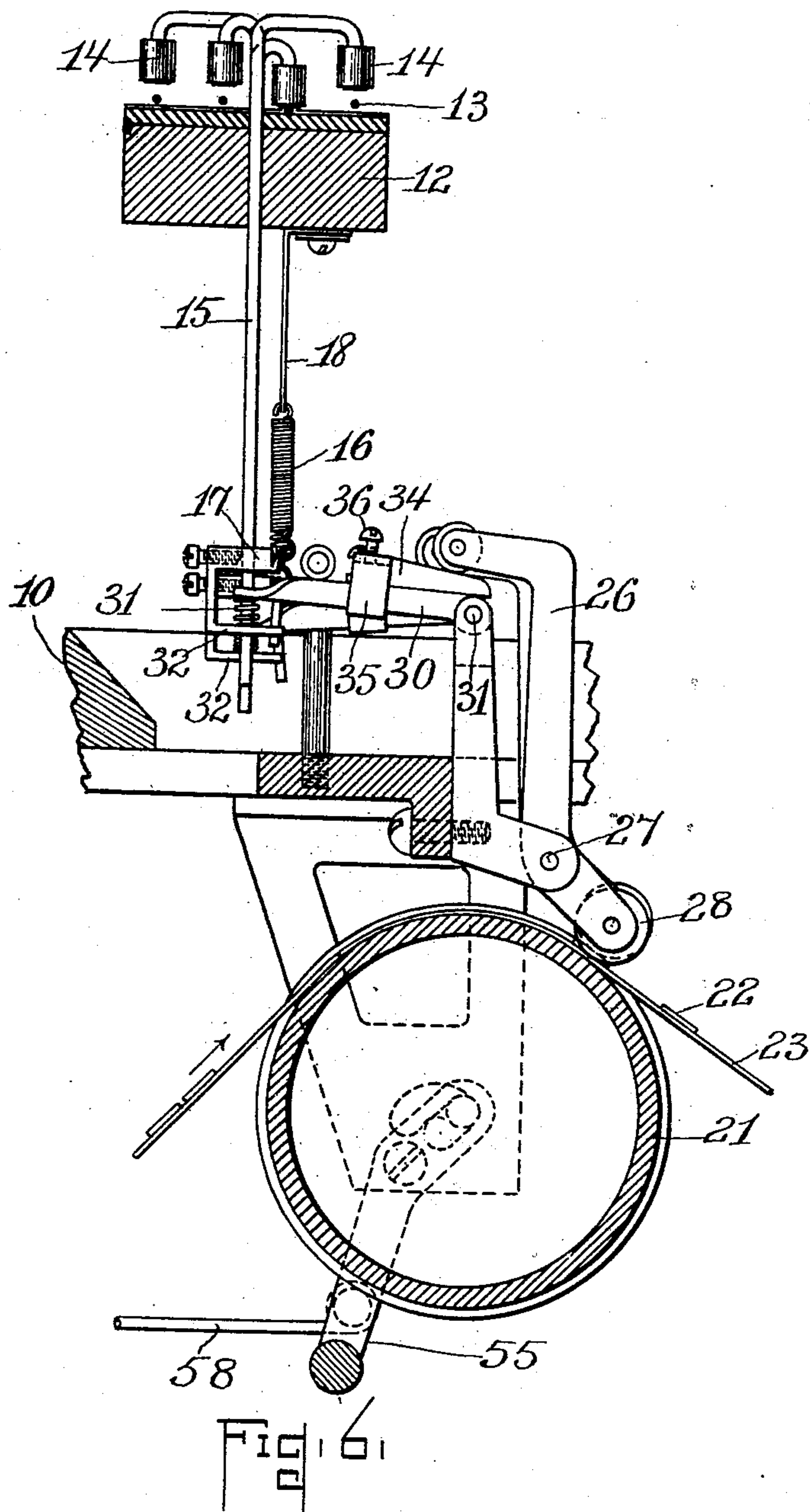
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NO MODEL.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

WILLARD H. GILMAN AND JACOB P. TIRRELL, OF BOSTON, MASSACHUSETTS, SAID TIRRELL ASSIGNOR, BY MESNE ASSIGNMENTS, TO W. H. GANNETT, OF AUGUSTA, MAINE.

AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 763,877, dated June 28, 1904.

Application filed September 12, 1903. Serial No. 172,931. (No model.)

To all whom it may concern:

Be it known that we, WILLARD H. GILMAN and JACOB P. TIRRELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Musical Instruments, of which the following is a specification.

This invention relates to mechanical musical instruments in which the sound-producing portion is provided with strings, a resonant body, and a neck.

It is the object of our invention to provide a simple and efficient mechanism for operating the strings of a banjo or other like instrument the strings of which are vibrated by pickers.

The invention consists in the improvements which we will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a top plan view of an apparatus embodying our invention. Fig. 2 represents a side elevation of the same. Fig. 3 represents an end elevation of a portion of the apparatus, the neck of the banjo being shown in cross-section. Fig. 4 represents a section on line 4 4 of Fig. 1. Fig. 5 represents a view corresponding to Fig. 4 and showing certain portions of the apparatus that are omitted in Fig. 4. Fig. 6 represents a section on line 6 6 of Fig. 1. Fig. 7 represents a side elevation of the portions of the apparatus shown in Fig. 6.

The same reference characters indicate the same parts in all the figures.

In the drawings, 10 represents a supporting bed or table, above which is supported on suitable legs or standards 11 a stringed musical instrument 12, which is preferably a banjo, having the usual strings 13.

14 14 represent spring-depressing members or fingers, which are located over the neck of the instrument and are adapted to press the strings into contact with the neck, the said fingers being arranged in groups, with the different groups at different distances from the resonant body of the instrument. The fingers are divided into rows, each row being

located over one of the strings, the members of each row being at different distances from the body of the instrument, so that the depression of each finger in a row gives the string a different operative length. The fingers 14 are mounted on links or rods 15, which extend through orifices formed in the neck of the banjo, the arrangement being such that when any rod 15 is moved endwise in one direction the finger supported by it is brought in contact with the corresponding string, and when the rod is moved in the opposite direction the finger is raised to release the string. Each finger is normally raised by means of a spring 16, there being a series of springs, one for each finger. Each spring is attached at one end to an arm or ear 17, affixed to the accompanying finger-rod 15, and at its upper end to a plate or flange 18, fixed to the neck of the instrument.

19 19 represent the spring-vibrating members or pickers, of which there are four in this embodiment of our invention. Said pickers are preferably formed as the hooked outer ends of rods 20, which are movable back and forth in a substantially horizontal direction over the resonant body of the instrument, means being provided, as hereinafter described, for reciprocating the pickers and for raising them during parts of their reciprocating movements and depressing them during other parts, so that each picker will move in a direction across the accompanying string while in contact therewith and will then move back while raised above and out of contact with the string.

All the string-operating members, including the fingers 14 and pickers 19, are actuated by an operating mechanism which includes a single elongated cylinder 21, journaled in bearings affixed to the supporting-frame, and a series of projections 22, supported by said cylinder, said projections being arranged in accordance with a predetermined plan to actuate the string-operating members in the order required to produce a given air or tune. The projections 22 are preferably thin blocks affixed to and raised above the surface of a flexible sheet 23, which is adapted to be un-

wound from a delivery-spool 24 and wound upon a corresponding accumulating-spool 25, the sheet 23 passing over the cylinder 21 in moving from one spool to the other, as clearly indicated in Fig. 3. The said mechanism also includes a series of levers 26, one for each finger-rod 15, said levers being pivoted side by side at 27 and having rolls 28 at their lower ends, bearing upon the portion of the sheet 23 that is supported by the cylinder 21, and rolls 29 at their upper ends, bearing upon arms 30, which are pivoted at 31 at their inner ends, the outer end of each arm embracing one of the finger-operating rods 15 and being adapted to depress said rod when the arm 30 is swung downwardly. Each arm 30 acts, through a spring 31, on an arm 32, affixed to one of the finger-operating rods 15. For convenience the arms 32 are connected with the arms 17, as clearly shown in Figs. 3 and 6. The finger-raising springs 16 act, through the arms 32, springs 31, and pivoted arms 30, to hold the rolls 28 of the levers 26 yieldingly against the traveling sheet 23. When a projection 22 comes under the roller 28, the latter is swung outwardly and the upper end of the lever 26, including the roller 29, is swung downwardly, thus depressing the arm 30 and causing a corresponding depression of the rod 15 and finger 14, engaged with said arm. When the projection 22 passes from under the roller 28, the parts assume their former position, the finger being raised by the spring 16. I have here shown the arm 30 provided with an adjustable section or piece 34, having a sleeve or collar 35, which embraces the arm 30 and is attached thereto by a set-screw 36. The section 34 has an inclined upper edge. By adjusting the section 34 lengthwise the height of the portion against which the roll 29 bears may be varied. This constitutes a convenient provision for adjusting the parts of the finger-operating mechanism in setting up the machine.

That part of the operating mechanism which relates to the pickers includes a series of levers 37, pivoted at 38 and having a roll 39 bearing on the sheet 23, there being four of these levers, one for each string, a series of four rock-shafts 40, arranged substantially parallel with the axis of the cylinder 21 and extending under the resonant body of the instrument, said rock-shafts being journaled in fixed bearings on the frame of the machine, connections between said rock-shaft and the levers 37, whereby a movement of either lever caused by a projection 22 will cause a corresponding movement of the accompanying rock-shaft, springs 41, connected with the rock-shaft, as presently described, in such manner as to move the rock-shaft in the opposite direction, thus holding the levers 37 against the sheet 23 and also holding the pickers normally at one extreme of their movement, and connections between the rock-shafts and the pickers whereby

the rocking movements of the rock-shaft are caused to reciprocate the pickers.

The connections between the levers 37 and the rock-shafts comprise shorter arms 42, affixed to the rock-shafts, and rods 43, connecting said shorter arms with the levers 37, as best shown in Fig. 4. The connections between the rock-shafts and the picker-rods 20 comprise levers 44, pivoted at 45 and connected at their upper ends with the rods 20, and rods 46, connecting the lower ends of the levers 44 with longer arms 47, affixed to the rock-shafts. The springs 41, above referred to, are each connected at one end with the supporting-frame and at the other end with one of the longer arms 47.

It will be seen from the foregoing that the passage of a projection 22 under the roll 39 of either lever 37 will cause a turning movement of the accompanying rock-shaft 40 in one direction, said movement being imparted through the described connections to the corresponding picker-rod 20, the picker thereon being moved across one of the strings.

48 represents a multiple cam-wheel, which is journaled on a fixed support beside one of the picker-rods 20, there being a wheel 48 for each picker-rod. The recesses formed by the perimeter of the wheel 48 are arranged to engage a pin 49 on the picker-rod when the latter is being moved by the passage of a projection 22 under a lever 37, the rod being therefore raised, as indicated by dotted lines in Fig. 5, after it has picked the string and held in a raised position until the forward movement of the rod, caused by one of the springs 41, carries the picker back over its string, the picker being then allowed to drop to a point slightly below the level of the string. The wheel 48 is prevented from rotating in one direction by a spring dog or pawl 50, so that when the picker-rod is making its return movement this movement is guided by the uppermost cam on the wheel 48, the wheel being then stationary, the shape of the said cam being such as to hold the picker at an elevated point until it has passed across the string, the picker dropping when the pin 49 slides off from the guiding-cam. Each picker is pressed downwardly by means of a spring 51, connecting the rod 20 with the lever 44.

The accumulating-spool 25 may be rotated by power applied in any suitable way, preferably by a spring-motor.

It will be seen that the described mechanism whereby a single cylinder supporting a series of projections is enabled to actuate all the string-operating members of a banjo or other like instrument constitutes an extremely simple as well as effective and easily-operated apparatus. It is obvious that the projections 22 might be fixed to the periphery of the cylinder 21; but we do not recommend such arrangement, because of the obvious advantage afforded by the spools 24 and 25 in accommo-

dating a large number of projections on a single sheet.

The cylinder 21 is movable laterally to separate it from the levers 26, as indicated by dotted lines in Fig. 3, the cylinder being moved to this position whenever it is desired to insert a sheet between the cylinder and the levers at the commencement of the operation.

The journals 52 of the cylinder 21 are movable in segmental slots 53 in the hangers or brackets 54, supporting the cylinder 21. 55 55 are levers pivoted at 56 to said bracket and having slots 57 in their upper portions, which receive the journals 52. When the levers 55 are moved to the dotted-line position shown in Fig. 3, they force the cylinder 21 sidewise, its journals passing to the opposite ends of the segmental slots 53. The levers 55 may be moved by links 58, connecting their lower end portions with the hooked levers 59, which secure the journals 60 of the spool 24 in place in the hangers or bearings 61, which support the said spools.

It will be observed that the levers 26 and 37, which receive motion from the projections 22, are arranged side by side in a row or series, so that their rolls or terminals 28 and 39 are arranged in a straight rank, which is parallel with the axis of the cylinder 21. All the said terminals therefore are adapted to bear simultaneously on the cylinder or on the sheet 23, supported thereby. This arrangement enables a single actuating-sheet or actuator, supported so as to present a straight surface across its width, to actuate all the levers required to operate the fingers and pickers of a banjo.

We do not limit ourselves to an actuating-sheet or actuator supported by a cylinder, as the sheet may be supported and caused to present a straight supporting-surface to the lever-terminals by any other suitable means. The actuating members with which the actuator is provided (here shown as projections on the surface of the actuator) may be of any suitable form and construction adapted to secure the desired result—viz., to cause or permit the displacement of the levers from the position they occupy when resting on the plain surface of the actuator.

We claim—

1. An apparatus of the character specified, comprising a stringed musical instrument, a series of string-operating members arranged to act directly on the strings, a series of levers, one for each of the string-operating members, a corresponding series of arms pivotally mounted adjacent said levers and extending substantially parallel therewith, a moving actuator arranged to support the said levers simultaneously and having actuating members, connections between the contiguous ends of said arms and said levers, means for returning said arms and levers to a normal position,

and connections between said arms and the string-operating members.

2. An apparatus of the character described, comprising a stringed musical instrument, a series of string-operating members arranged to act directly on the strings, a series of levers, one for each of the string-operating members, a corresponding series of arms pivotally mounted adjacent said levers and extending substantially parallel therewith, a moving actuator arranged to support the said levers simultaneously and having actuating members, connections between the contiguous ends of said arms and said levers, springs acting upon said arms, whereby said levers are returned to their normal positions, and connections between the said arms and the string-operating members.

3. An apparatus of the character described comprising a stringed musical instrument, string-operating fingers, rods supporting the same, springs for normally raising the rods and fingers, a moving actuator having actuator members, levers held by said springs against the actuator and arranged to be moved by said actuating members, connections between the levers and rods, and means for engaging said levers, whereby the extent of movement of said rods may be regulated.

4. An apparatus of the character described, comprising a stringed musical instrument, a series of pivoted levers, pickers pivotally mounted upon said levers, springs extending from said levers to said pickers, means for normally holding said levers in one position, a moving actuator having actuating members, actuating-levers arranged to be moved by said members, and connections between the actuating-levers and the pivoted levers, whereby movement imparted to said actuating-levers is correspondingly imparted to the pickers.

5. In an apparatus of the character specified, a picker provided with a projection, means for reciprocating the same, a cam-wheel arranged to cooperate with and be rotated by said projection, and means for preventing backward rotation of the cam-wheel.

6. In an apparatus of the character specified, the combination of a cylinder, a flexible sheet supported thereby and having actuating projections on one side, means for moving the sheet over the cylinder, levers arranged to be actuated by the projections on the blocks, string-operating members actuated by said levers, and means for shifting said cylinder.

7. An apparatus of the character specified comprising a stringed musical instrument, string-operating fingers, rods supporting the same, springs for normally raising the rods, actuating-levers adapted to operate said rods, and means for engaging said levers, whereby the extent of movement of said rods may be regulated.

8. An apparatus of the character specified,

comprising a stringed musical instrument, string-operating fingers, rods supporting the same, springs for normally raising the rods, pivoted levers connected to said rods, and actuating-levers provided with overhanging portions bearing against said pivoted levers.

9. An apparatus of the character specified, comprising a stringed musical instrument, string-operating fingers, rods supporting the same, springs for normally raising said rods, pivoted levers connected to said rods, actuating-levers provided with overhanging portions bearing against said pivoted levers, and means for regulating the extent of movement of said rods.

10. An apparatus of the character specified, comprising a stringed musical instrument, string-operating fingers, rods supporting the same, springs for normally raising said rods, pivoted levers connected to said rods, wedge-shaped blocks adjustably mounted on said levers, and actuating-levers provided with overhanging portions bearing against said blocks.

In testimony whereof we have affixed our signatures in presence of two witnesses.

WILLARD H. GILMAN.
JACOB P. TIRRELL.

Witnesses:

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