

No. 789,827.

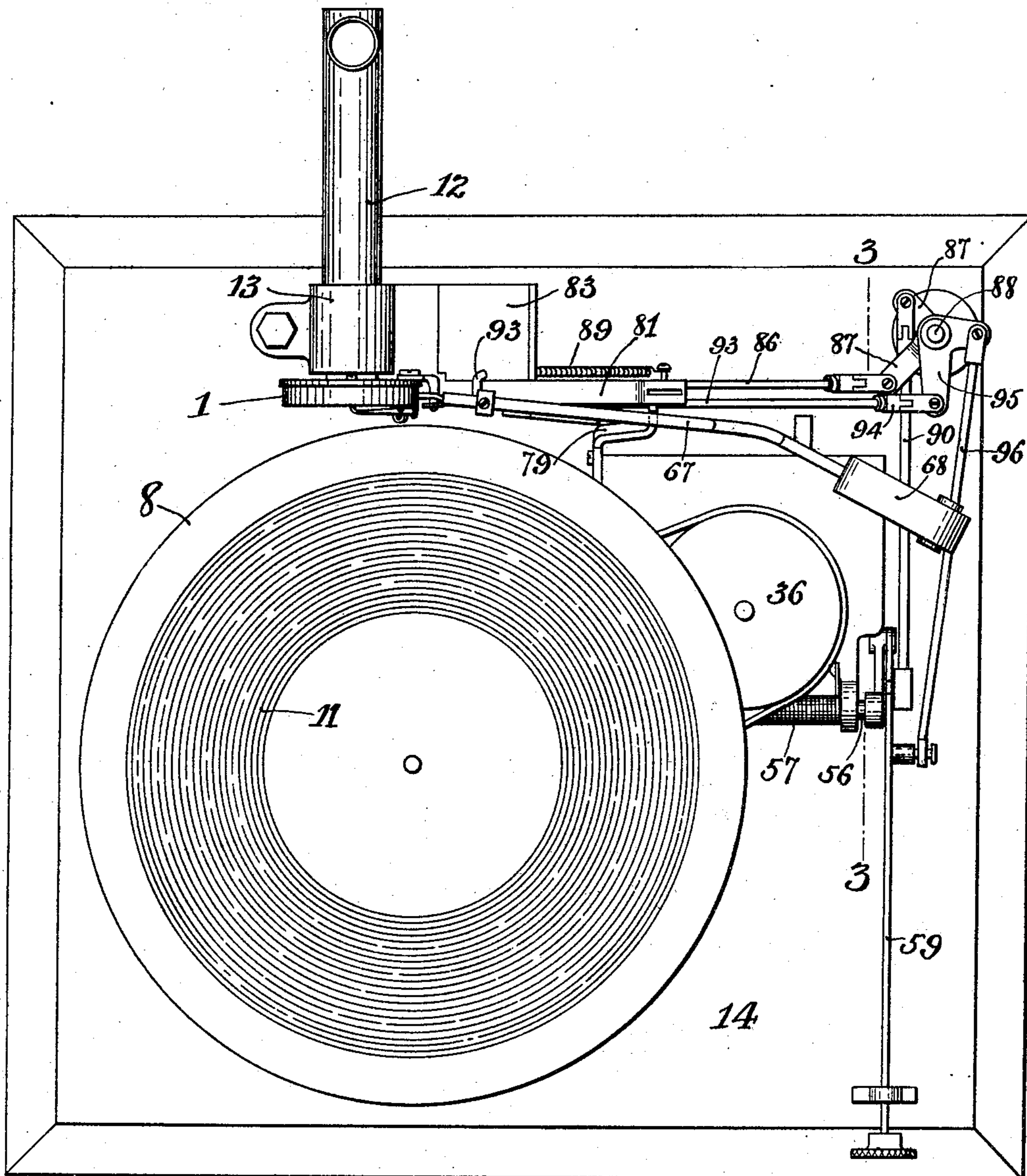
PATENTED MAY 16, 1905.

J. WELLNER.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 21, 1904.

5 SHEETS—SHEET 1.

*Fig. 1.*



WITNESSES:

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*H. Gamble*

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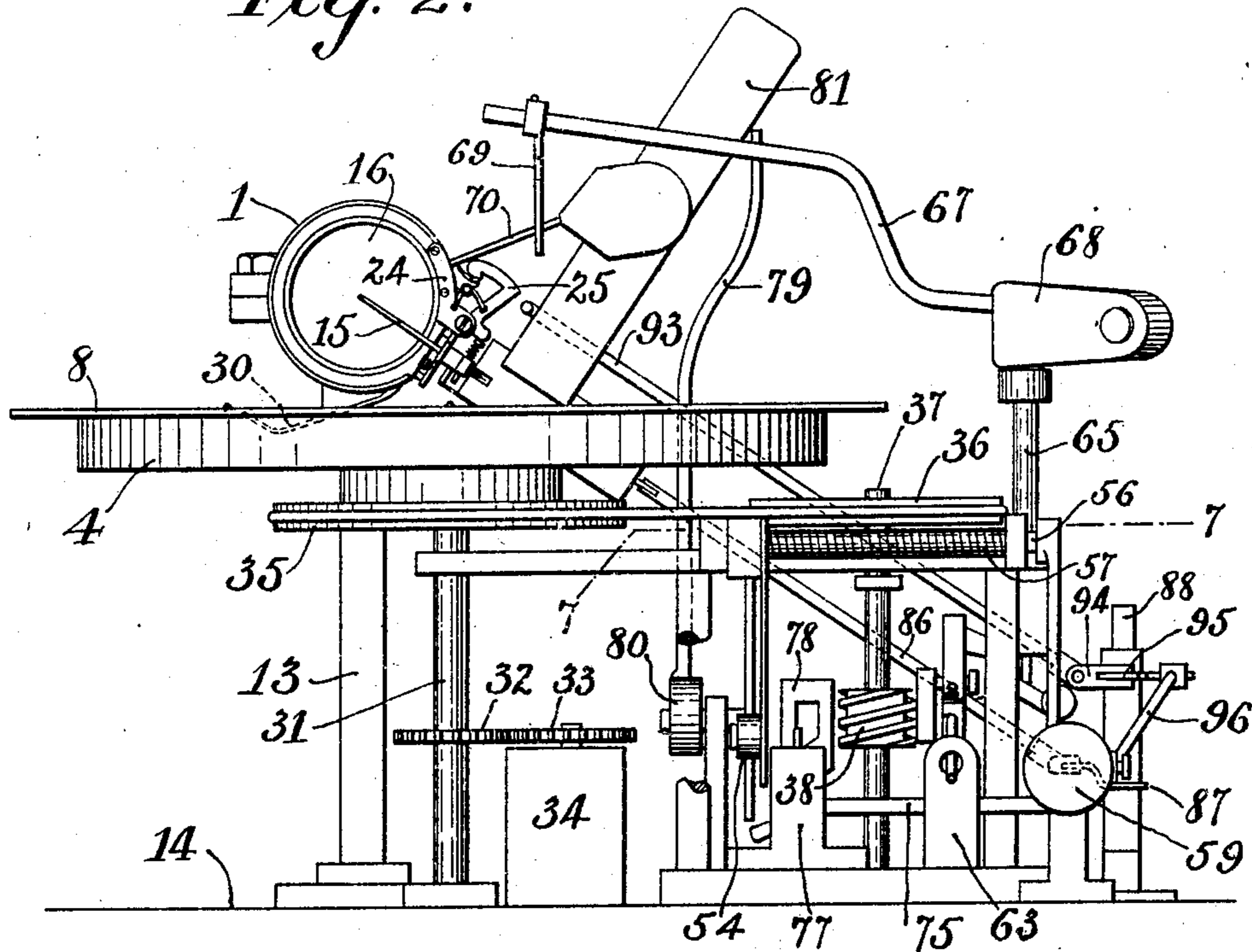
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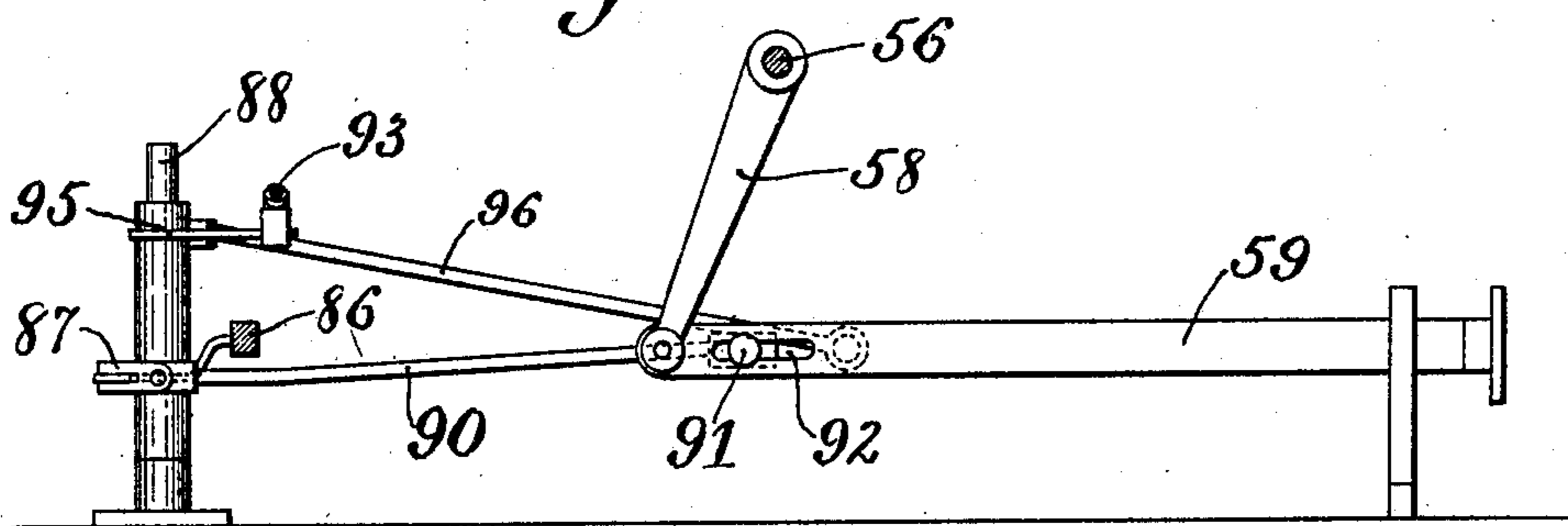
APPLICATION FILED MAR. 21, 1904.

5 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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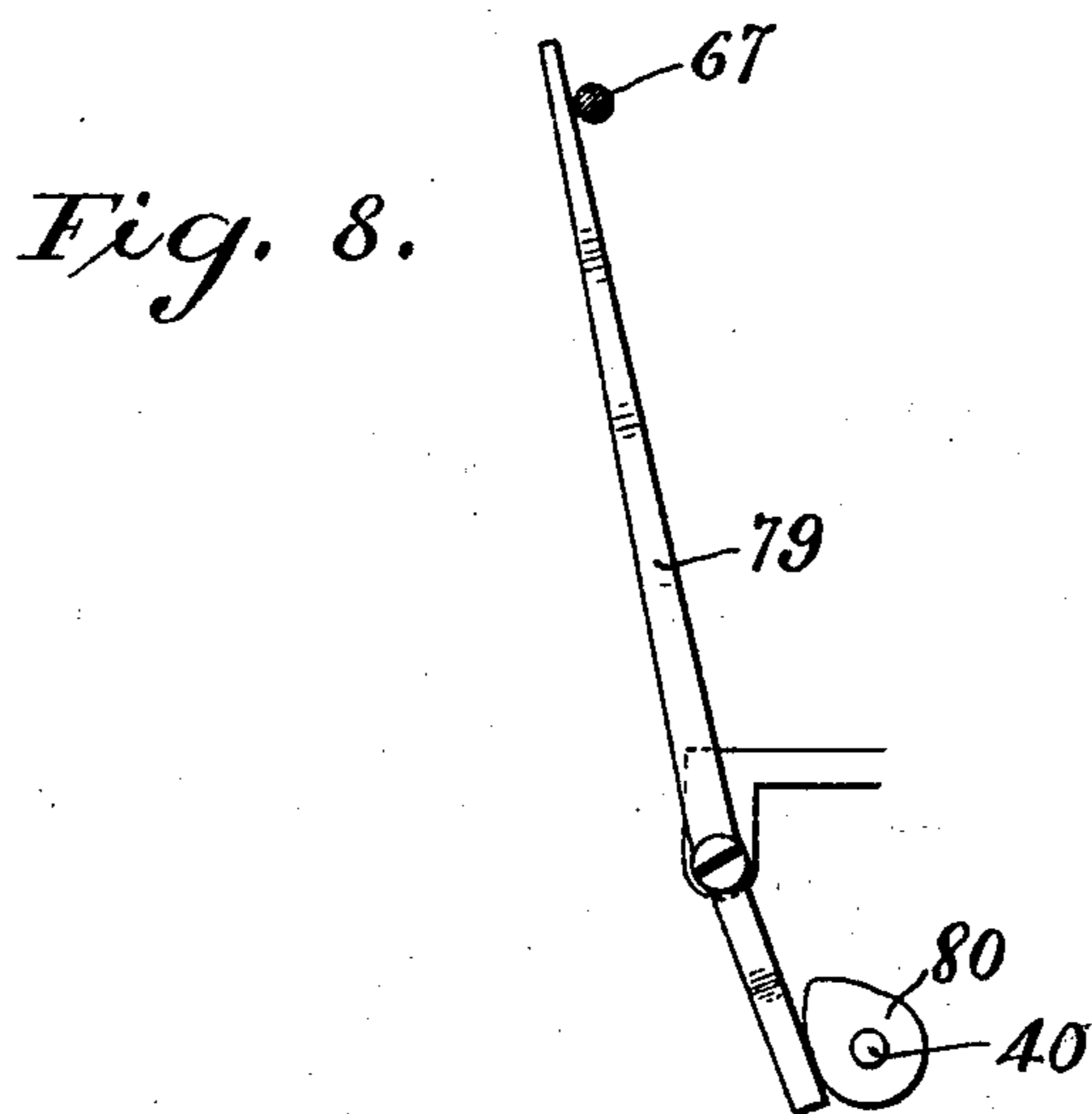
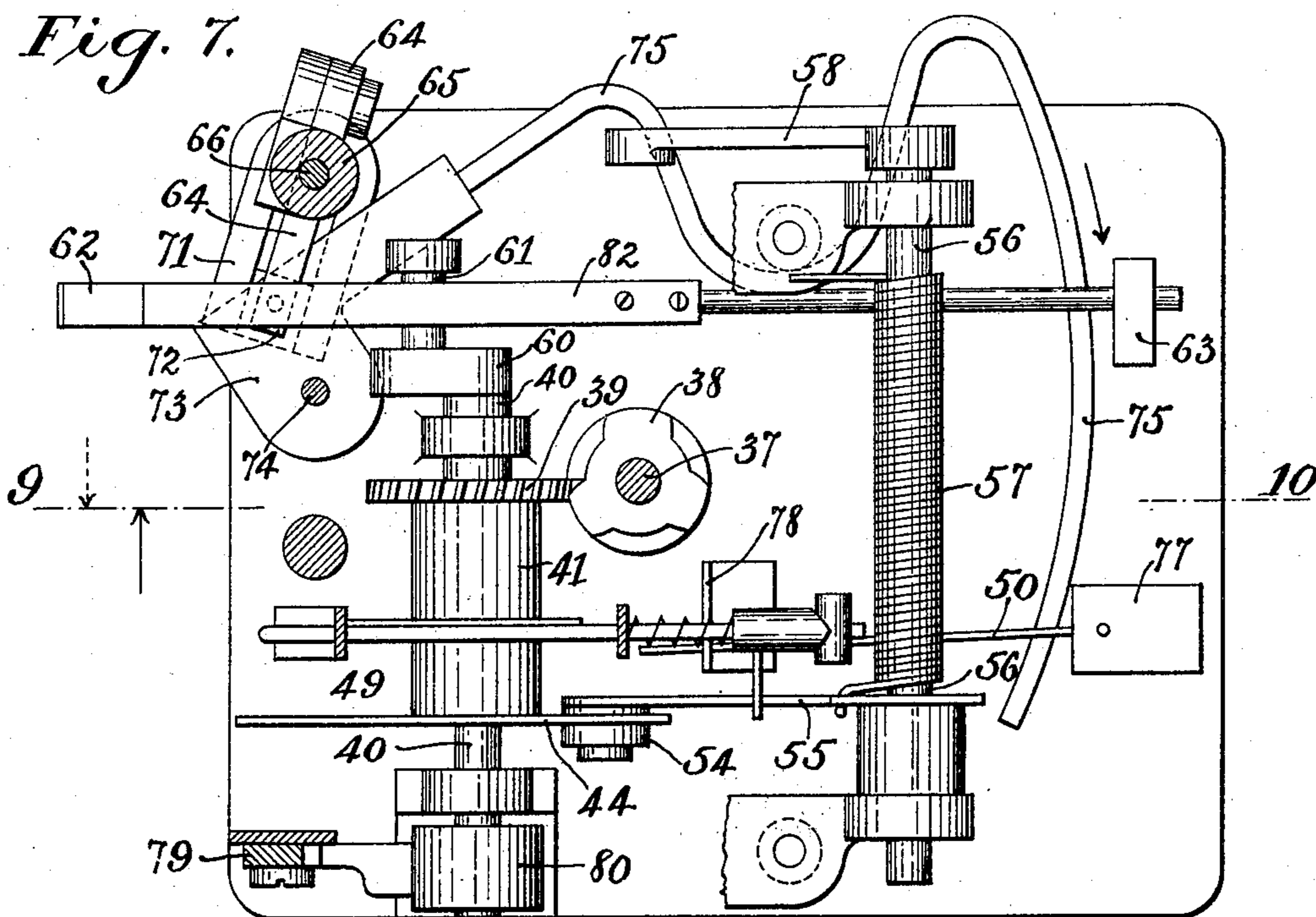
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5 SHEETS—SHEET 4.



WITNESSES:

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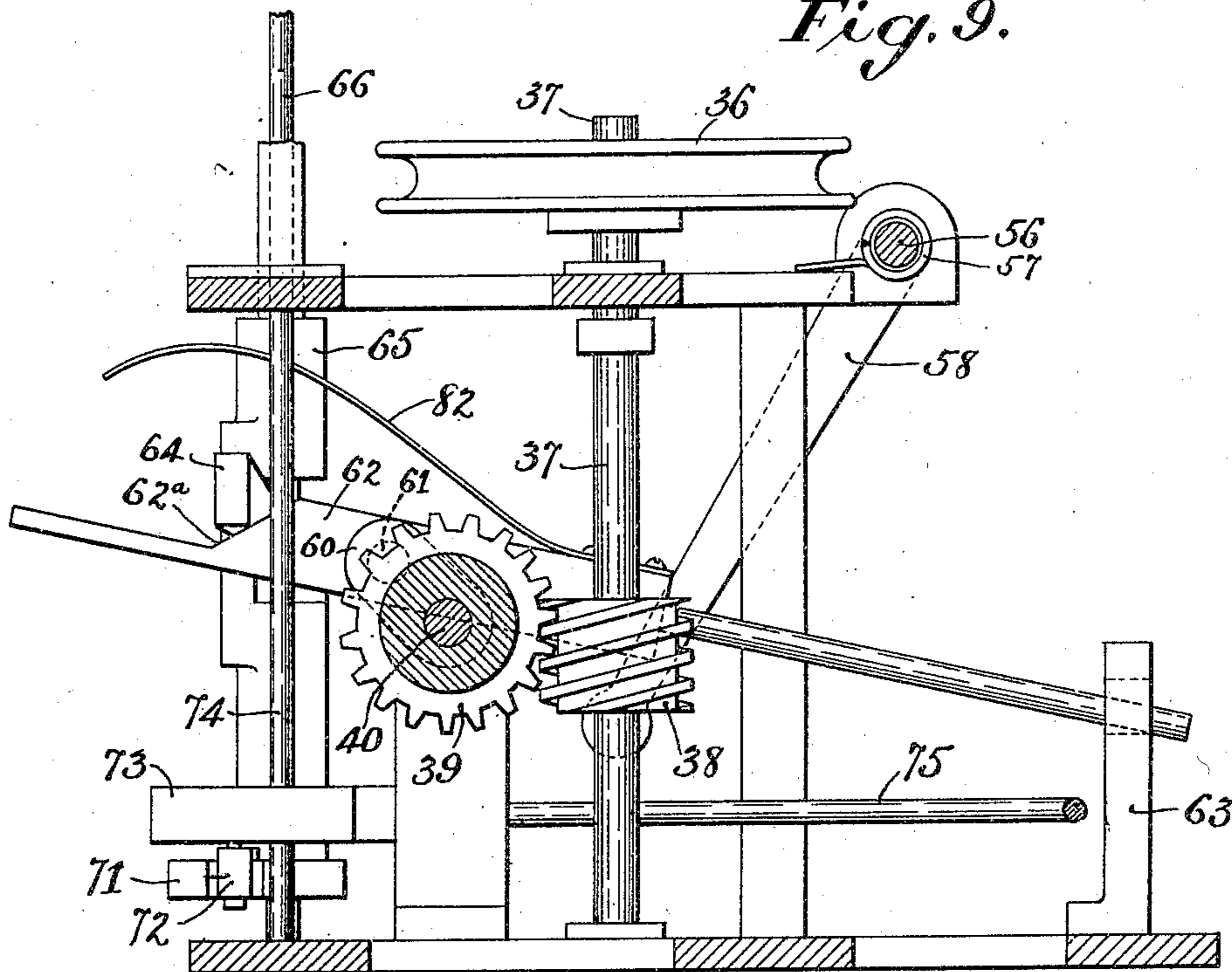
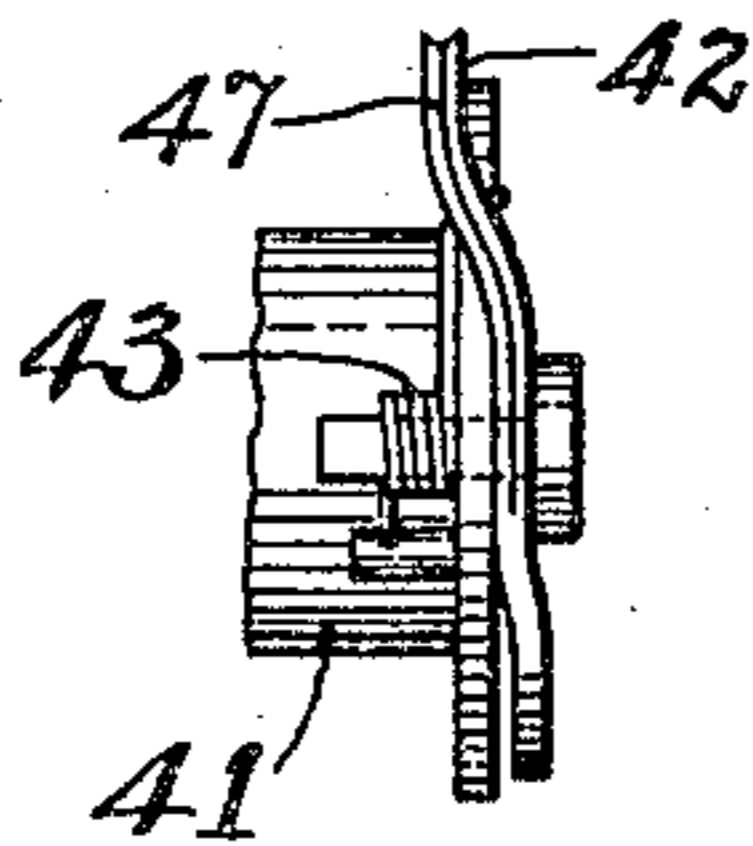
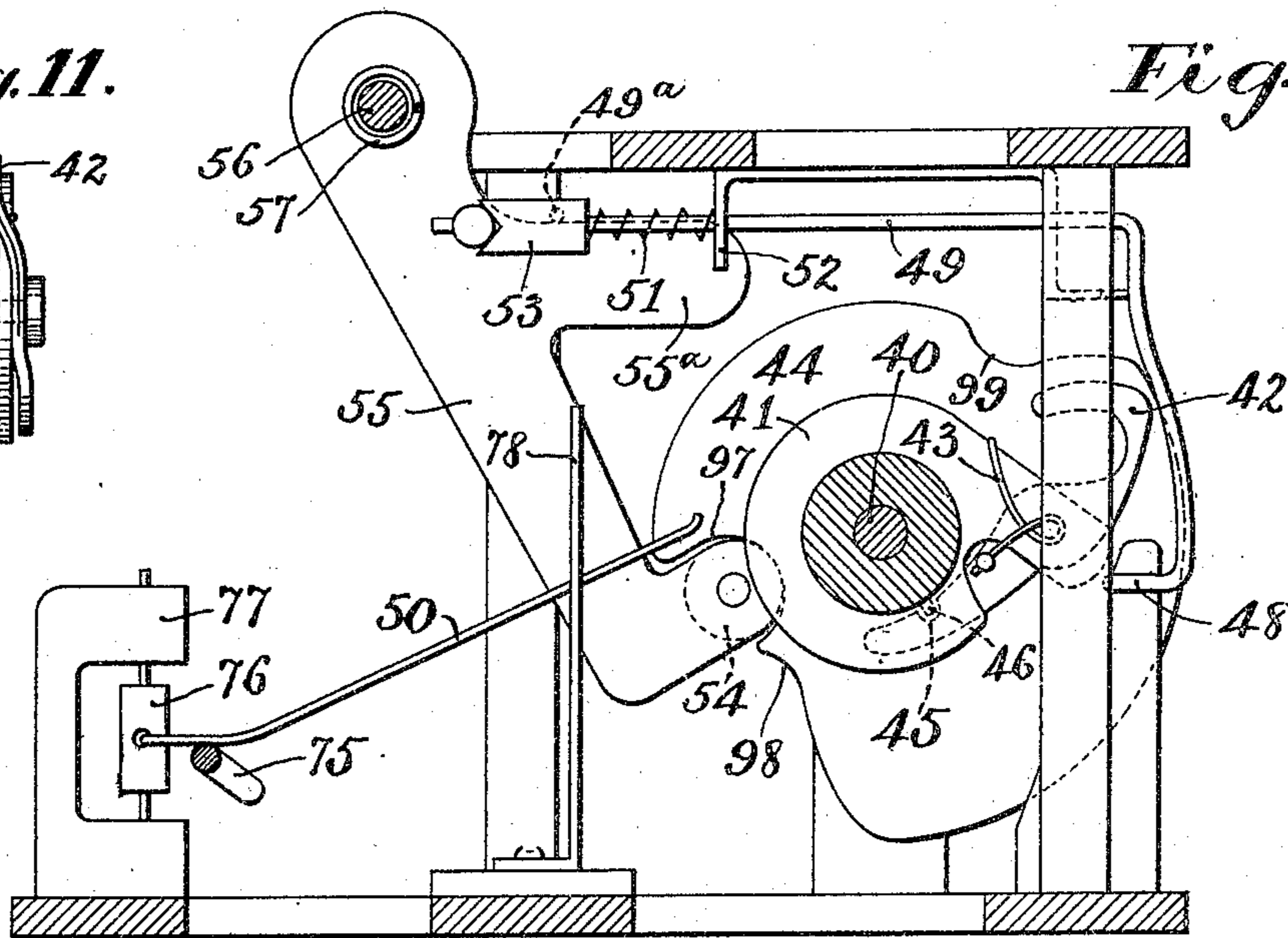
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5 SHEETS—SHEET 5.

*Fig. 9.**Fig. 11.**Fig. 10.*

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# UNITED STATES PATENT OFFICE.

JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 789,827, dated May 16, 1905.

Application filed March 21, 1904. Serial No. 199,092.

*To all whom it may concern:*

Be it known that I, JULIUS WELLNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention relates to that class of sound-reproducing machines wherein a stylus in connection with a diaphragm is adapted to coact with a record-groove for the reproduction of sound.

The object of the invention is to provide a simple and efficient construction and organization of mechanism whereby the stylus may be automatically removed from its support after the reproduction of a record and a new stylus automatically substituted for the old one.

With this object in view the invention consists in the novel construction and combinations of parts which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is a plan view of a sound-reproducing machine embodying my invention. Fig. 2 is an elevation thereof. Fig. 3 is a sectional detail of the bar for starting the machine in motion and adjuncts as on the line 3 3 of Fig. 1. Fig. 4 is an elevation of the sound-box and adjuncts. Fig. 5 is a sectional detail thereof as on the line 5 5 of Fig. 4. Fig. 6 is a detail as on the line 6 6 of Fig. 5, showing the stylus clamped. Fig. 7 is a sectional plan as on the line 7 7 of Fig. 2. Fig. 8 is a detail, in elevation, of one of the levers for moving the sound-box. Figs. 9 and 10 are sectional elevations as on the line 9 10 of Fig. 9, Fig. 9 as seen from the dotted-line and Fig. 10 as seen from the full-line arrow. Fig. 11 is a detail of Fig. 10 as seen from the right-hand side of the latter.

1 designates the sound-box, 2 the stylus, 4 the rotatable turn-table, and 8 the record supported thereon and rotatable therewith. The record 8 is provided with the usual helical groove 11 or composition to be reproduced, and the sound-box is mounted on a telescopic tube 12, so as to be radially movable to permit the stylus to traverse the rec-

ord-groove and partially rotatable to permit the stylus to be moved into and out of engagement with said groove. The telescopic tube is supported on a post 13, rising from the bed-plate 14.

Suitably mounted on the sound-box 1 is an arm 15, one end of which is connected with the diaphragm 16 and the other end of which is enlarged and provided with an opening 17 for the reception of the stylus 2. Extending transversely through the enlarged end of the arm 15 and one side of the opening 17 is a pin 18, provided with a notch 19, one side of which is adapted to engage and retain the stylus within the opening 17, as seen in Fig. 6. The pin 18 extends outwardly beyond the arm 15 and is provided with an encircling spring 20, which, bearing against the arm 15 and a head 21 on the end of the pin 18, tends normally to maintain the side of the notch 19 in engagement with the stylus 2. The pin 18 is provided with a stop 22, which, taking against the arm 15, limits the movement of the pin 18 by the spring 20 when there is no stylus within the opening 19.

Secured to the sound-box 1 is one end of a spring 23, the other end of which extends to and bears against the inner end of the stylus 2 when the stylus is within the opening 17, to the end that when the pin 18 is moved against the action of the spring 20 to remove its pressure from the stylus 2 said stylus will be ejected by the action of the spring 23.

Pivoted to a bracket 24 on the sound-box 1 is a lever 25, having one of its ends arranged directly above the head 21 on the pin 18. The other end of the lever 25 is offset, as at 26, and is adapted to be engaged by the short end 27 of a lever 28, which is pivoted to the sound-box, as at 29<sup>a</sup>. Secured to the bracket 24 and the lever 25 are the respective ends of a spring 29, which when the lever 25 is released from engagement with the arm 27 of the lever 28 is adapted to move the lever 25 into engagement with the head 21 and depress the pin 18 against the action of the spring 20, the force of the spring 29 being sufficient to overcome that of the spring 20. The long end 30 of the lever 28 extends to a position directly above the record 8 when the

stylus 2 is in engagement with the groove 11 whereby when the sound-box is turned to disengage the stylus 2 from the groove 11 the long arm 30 of the lever 28 will engage the record and be rocked to release its short end 27 from engagement with the lever 25 and permit the spring 29 to move the lever 25 to depress the pin 18, thereby freeing the stylus 2 and permitting its ejection from the opening 17 by the action of the spring 23.

The turn-table is mounted on a shaft 31, which is provided with a gear-wheel 32 in mesh with a gear-wheel 33 on the driving-shaft of a spring-motor 34, which tends normally to rotate the turn-table 4 and which may be of any approved type. The shaft 31 is provided with a pulley 35, which is belted with a pulley 36 on the upper end of a vertical shaft 37. This shaft 37 carries a worm 38 in engagement with a worm-wheel 39, which is mounted to rotate freely upon a horizontal shaft 40. The hub of the worm-wheel 39 carries a projection 41, to which is pivoted a latch-lever 42. The inner end of the lever 42 is by the action of a suitable spring 43 held normally against the hub of a cam 44, hereinafter referred to, which is fixed to the shaft 40. The inner end of the lever 42 is provided with a notch 45, which is adapted to engage a projection 46 on the hub of the cam 44, and thereby lock the shaft 40 to rotate with the worm-wheel 39. The outer end of the lever 42 is bent laterally, as shown in Fig. 11, and is provided in its edge with a cam-groove 47, which during the rotation of the shaft 40 is adapted to engage the lower end of an arm 48, depending from a horizontal rock-shaft 49 and also to engage the free end of an arm 50, hereinafter referred to, in a manner to move the notch 45 from engagement with the projection 46. The arm 48 is held normally in position by the tension of a spring 51, engaging the bearing 52 of the shaft 49, and a collar 53, secured to said shaft. Bearing against the cam 44 is a roller 54 on the free end of an arm 55, projecting from a rock-shaft 56. Encircling the shaft 56 is a spring 57, which engages the arm 55 and tends normally to maintain the roller 54 in engagement with the cam 44. Projecting from the shaft 56 is an arm 58, which is connected to a bar 59, adapted to be operated by hand to set the machine in motion, as will be hereinafter explained.

The shaft 40 is provided with a crank-arm 60, carrying a projecting pin 61, which extends through and supports one end of a bar 62, the other end of which extends freely through an opening in a lug 63, projecting from the frame, to the end that when the shaft 40 is rotated the bar 62 will be raised and lowered and at the same time longitudinally reciprocated. The bar 62 is arranged to engage the under side of the free end of an arm 64, the other end of which is pivoted to

a vertically-arranged shaft 65. Extending through the upper portion of the shaft 65 and slidingly fitted thereto is a rod 66. The lower end of this rod 66 rests upon the arm 64, and resting upon the top of the rod 66 is a horizontal arm 67, one end of which is pivoted to an extension 68 on the upper end of the shaft 65. Secured to the end of the arm 67 is a downwardly-extending member 69, provided with an opening through which freely extends a weighted arm 70, projecting from the sound-box 1.

The lower end of the vertical shaft 65 is provided with a bifurcated projecting arm 71, to which is fitted a block 72, pivoted to an arm 73, projecting from a vertical shaft 74, to the end that when the shaft 65 is rocked the arm 73 will also be rocked. The arm 73 carries a projection 75, provided with a curved end, which is arranged to be moved back and forth beneath the arm 50, hereinbefore referred to, when the arm 73 is moved. One end of the arm 50 is horizontally pivoted to a block 76, which in turn is vertically pivoted to a bracket 77 on the main frame. The arm 50 rests normally upon the curved end of the projection 75 and its other or free end extends through an opening in a plate 78, projecting from the main frame, the free end of the arm 50 being arranged to engage the cam-groove 47 in the lever-arm 41.

Pivoted to the main frame is a lever 79, the upper end of which occupies a position adjacent to the arm 67 and the lower end of which is arranged adjacent to a cam 80 on the shaft 40, whereby when the shaft 40 starts to rotate the cam 80 will engage the lower end of the lever 79 and cause its upper end to move the arm 67 and therewith the sound-box 1 to bring the stylus 2 to a position above the outer portion of the record 8.

81 designates a magazine adapted to contain a number of styluses arranged one above the other, as shown in Fig. 4. This magazine is supported by and projects upwardly from a bracket 83, which extends fixedly from the post 13. The bottom of the magazine 81 opens into a guideway 84, to which is fitted a reciprocative plunger 85. The guideway 84 and plunger 85 are arranged in line with the opening 17 when the sound-box is in the normal or inoperative position, whereby when the plunger is projected toward the sound-box it will engage the lowermost stylus in the magazine and project it into the opening 17 against the action of the spring 23, and when the plunger 85 is retracted the styluses in the magazine will fall by gravity and the lowermost stylus will pass into the guideway 84 in line with the plunger 85 for a succeeding operation. The plunger 85 is connected by a link 86 with one arm of a bell-crank lever 87, which is loosely mounted on a shaft 88, rising from the bed-plate, and secured at its respective ends to

the link 86 and bracket 83 is a spring 89, which tends normally to move the plunger 85 toward the sound-box. The other arm of the bell-crank lever 87 is connected to one end of a rod 90, the other end of which is provided with a pin 91, arranged within a slot 92 in the bar 59, to the end that when the bar 59 is moved outwardly by hand the end of the slot 92 will engage the pin 91 and operate the bell-crank lever 87 in a manner to retract the plunger 85, and when the bar is moved inwardly by the action of the machine the plunger will be projected toward the sound-box 1 to automatically insert a stylus within the opening 17.

Supported by the bracket 83 is one end of a rod 93, which is arranged adjacent to the lever 25. The other end of this rod 93 is connected by a link 94 to one arm of a bell-crank lever 95, which is loosely mounted on the shaft 88 and has its other end connected by a rod 96 to the bar 59, whereby when said bar is moved outwardly by hand the rod 93 will engage and move the lever 25 against the action of the spring 29 for a purpose hereinafter explained.

The cam 44 is provided with a deep notch 97 and two other notches 98 and 99, and after the record upon the turn-table has been reproduced the machine is automatically brought to rest by the roller 54 engaging the deep notch 97 and locking the parts against further movement by the motor 34. When the machine comes to rest, the parts occupy the positions shown in the drawings, wherein the roller 54 rests in the deep notch 97, the notch 45 of the lever 42 is in engagement with the projection 46, the lower end of the arm 48 is in position to engage the inner end of the cam-groove 47, and the sound-box occupies a position above and beyond the record 8, the weighted arm 70 being raised to bring the opening 17 in line with the plunger 85.

The operation of the machine may be briefly described as follows: When it is desired to start the machine in motion, the bar 59 is moved outwardly by hand. The first movement of the bar 59 projects the rod 93 to move the lever 25 against the action of the spring 29 and away from the head 21 on the pin 18, thereby permitting the spring 20 to move the pin 18 to engage and clamp the stylus 2 within the opening 17, and at the same time moving the offset 26 in the lever 25 into register with the short arm 27 of the lever 28, which by the weight of its long arm 30 is moved into engagement with said offset to maintain the lever 25 out of engagement with the head 21. By this time the end of the slot 92 reaches the pin 91, which through its connections retracts the plunger 85 to bring its forward end rearwardly beyond the styluses in the magazine 81, whereupon the lowermost stylus drops into the guide-way 84 in line with the plunger 85. During

the outward movement of the bar 59 the shaft 56 is being moved thereby against the action of the spring 57, and as the bar 59 reaches the limit of its outward movement the roller 54 is disengaged from the notch 97 to permit the motor 34 to start the operation of the machine. Immediately following the starting of the machine the outward pull or pressure of the bar 59 is removed and the spring 57 moves the roller 54 into engagement with the notch 98. Just as the roller 54 enters the notch 98 the cam-groove 47 in the lever 42 engages the arm 48, and thereby moves its notch 45 from engagement with the projection 46, whereupon the shaft 40 remains idle while the worm-wheel 39 is turned a complete revolution to permit the turn-table to acquire the desired speed before engaging the stylus 2 with the groove of the record. It will be observed that as the end of the arm 48 traverses the groove 47 it is cammed out of position to reengage the inner end of the groove 47 and that when the lever 42 again meets the arm 48 the side of the lever 42 engages the arm 48 and moves the latter still farther out of position. Therefore after the worm-wheel 39 has made a complete revolution the spring 43 causes the lever 42 to ride over and engage its notch 45 with the projection 46. This being done, the shaft 40 is turned by the worm-wheel 39 about a half-revolution, thereby causing the cam 80 to move the lever 79 to bring the stylus to a position over the outer portion of the record and causing the crank-arm 60 to lower the bar 62, whereupon the arm 64, the rod 66, and the arm 67 are lowered by gravity, and the weighted arm 70 turns the sound-box 1 to engage the stylus 2 with the record away from the groove thereof. It will be observed that the bar 62 is provided with a curved projection 82, which extends over the arm 64, and that the crank 60 not only lowers, but also retracts, the bar 62 during the half-turn of the shaft 40. This retraction of the bar 62 causes the projection 82 to engage the arm 64 by friction, and thereby turn the shaft 65 until the arm 67, carried thereby, moves the sound-box 1 inwardly to engage the stylus 2 with the outer turn of the groove of the record, whereupon the shaft 65 ceases to be turned by the projection 82, and the said projection passes idly over the said arm. After the shaft 40 has been turned a half-revolution, as above stated, the roller 54 engages the notch 99 to prevent further rotation of the shaft 40, and at the same time the groove 47 of the lever 42 engages the free end of the arm 50 and rocks said lever to disengage its notch 45 from the projection 46, and thereby disconnect the shaft 40 from the worm-wheel 39. We have now reached what we term "the playing position"—that is, the record-disk upon the turn-table 4 is being rotated and the stylus 2 is traversing

its groove to reproduce the composition in the well-known manner, and at the same time the stylus is moving toward the center of the record. As the stylus 2 moves toward the center of the record the arm 67 is moved therewith in a manner to slowly turn the shaft 65 and arm 71 to gradually move the arm 73 and the curved end of its projection 75 in the direction indicated by the arrow in Fig. 7. As the curved end of the projection moves in this direction it engages the arm 50 by friction and tends to maintain the latter in the position shown—that is, against the wall of the opening in the plate 78. During each successive revolution of the worm-wheel 39, while the composition is being reproduced, the free end of the arm 50 engages the lever 42 and prevents the notch 45 from engaging the projection 46, and each time the arm 50 engages the lever 42 it is cammed to one side by the groove 47 and out of line with the inner end of said groove; but before the lever 42 again meets the arm 50 the latter is moved by the friction of the curved end of the projection 75 to its normal position to engage the inner end of the groove 47. Thus the arm 50 is rocked back and forth during the playing of the record. After the stylus has reached the inner end of the groove of the record-disk it ceases to move inwardly, and consequently the projection 75 also ceases to move. Therefore when the arm 50 is cammed to one side by the groove 47 it is not returned to its normal position by the projection 75. Consequently the notch 45 of the lever 42 is permitted to engage the projection 46 and lock the shaft 40 to rotate with the worm-wheel 39 until the shaft 40 has been given another half-revolution and returned to its original position, as follows: The first movement of the shaft 40 causes the crank-arm 60 to raise the bar 62, which raises the arm 64, the rod 66, the arm 67, and the weighted arm 70, thereby turning the sound-box 1 to disengage the stylus 2 from the record 8 and at the same time moving the long arm 30 of the lever 28 into engagement with the record 8, thereby rocking the lever 28 to disengage its short arm 27 from the lever 25, which being free will be moved by the spring 29 to depress the pin 18 and unclamp the stylus 2, which will then be ejected by the spring 23. This being done, the crank-arm 60 moves the bar 62 longitudinally, thereby causing a shoulder 62<sup>a</sup> on the bar 62 to engage the arm 64 and turn the shaft 65 in a manner to cause the arm 67, carried by the shaft 65, to move the sound-box 1 outwardly to its original position, whereupon the roller 54 engages the deep notch 97 of the cam 44 and locks the shaft 40, and perforce the entire machine, against further movement. The arm 55 is provided with a projection 55<sup>a</sup>, which when the roller 54 enters the notch 97 is adapted to engage a pin projecting from the shaft 49<sup>a</sup>,

and thereby move the arm 48 to its original position for reengagement by the lever 42. When the roller 54 enters the notch 97 by the action of the spring 57, the shaft 56 is rocked and the arm 58 moves the bar 59 inwardly to its original position, thereby permitting the spring 89 to move the plunger 85 toward the sound-box 1, and thus automatically insert the opposing stylus into the opening 17. Thus it will be seen that the parts come to rest in their original positions for a succeeding operation by the automatic action of the machine itself.

I claim—

1. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of means for automatically inserting a stylus in the stylus-support.

2. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and its support, of means for automatically moving the stylus from its support and means for automatically inserting a new stylus in the stylus-support.

3. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and the stylus-support carried by the sound-box, of means for automatically moving the stylus from said support, and means under the control of the movement of the stylus by the record-groove for automatically stopping the machine.

4. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box the stylus and its support, of means for automatically moving the stylus from its support, means for automatically inserting a new stylus in the stylus-support, and means under the control of the movement of the stylus by the record-groove for automatically stopping the machine.

5. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and its support, of means under the control of the movement of the stylus by the record-groove for automatically moving the stylus from its support.

6. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box and the stylus-support, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically inserting a stylus in the stylus-support, and means for automatically stopping the machine.

7. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box, the stylus and its sup-

port, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically moving the stylus from its support, and means for automatically stopping the machine.

8. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box, the stylus and its support, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically moving the stylus from its support, means for automatically inserting a new stylus in the stylus-support and means for automatically stopping the machine.

9. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of means for automatically inserting a stylus in the stylus-support and means for clamping the inserted stylus.

10. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of a magazine adapted to contain a plurality of styluses and means for automatically moving a stylus from the magazine and into the stylus-support.

11. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of a magazine adapted to contain a plurality of styluses, a reciprocative plunger adapted to engage one of the styluses in the magazine and move it into the stylus-support and means for automatically operating the plunger.

12. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support and means adapted to be operated to move a stylus from the magazine and into the stylus-support.

13. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support, and means for automatically moving a stylus from the magazine and into the stylus-support.

14. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out

of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support, a reciprocative plunger adapted to engage and move a stylus from the magazine and into the stylus-support and means for automatically operating said plunger.

15. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of means for automatically moving the stylus from its support when the sound-box is turned to disengage the stylus from the record.

16. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support and means for automatically operating said device to release the stylus when the sound-box is turned to disengage the stylus from the record.

17. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box, the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support, means for automatically operating said device to release the stylus when the sound-box is turned to disengage the stylus from the record and means for ejecting the stylus from its support when released by the clutch device.

18. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box, the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support, a rocking lever adapted to operate said device to release the stylus and means for automatically rocking said lever when the sound-box is turned to disengage the stylus from the record.

In testimony whereof I affix my signature in presence of two witnesses.

JULIUS WELLNER.

Witnesses:

A. V. GROUPE,  
RALPH H. GAMBLE.