

No. 624,301.

Patented May 2, 1899.

C. G. CONN.  
GRAPHOPHONE.

(Application filed June 1, 1898.)

(No Model.)

3 Sheets—Sheet 1.

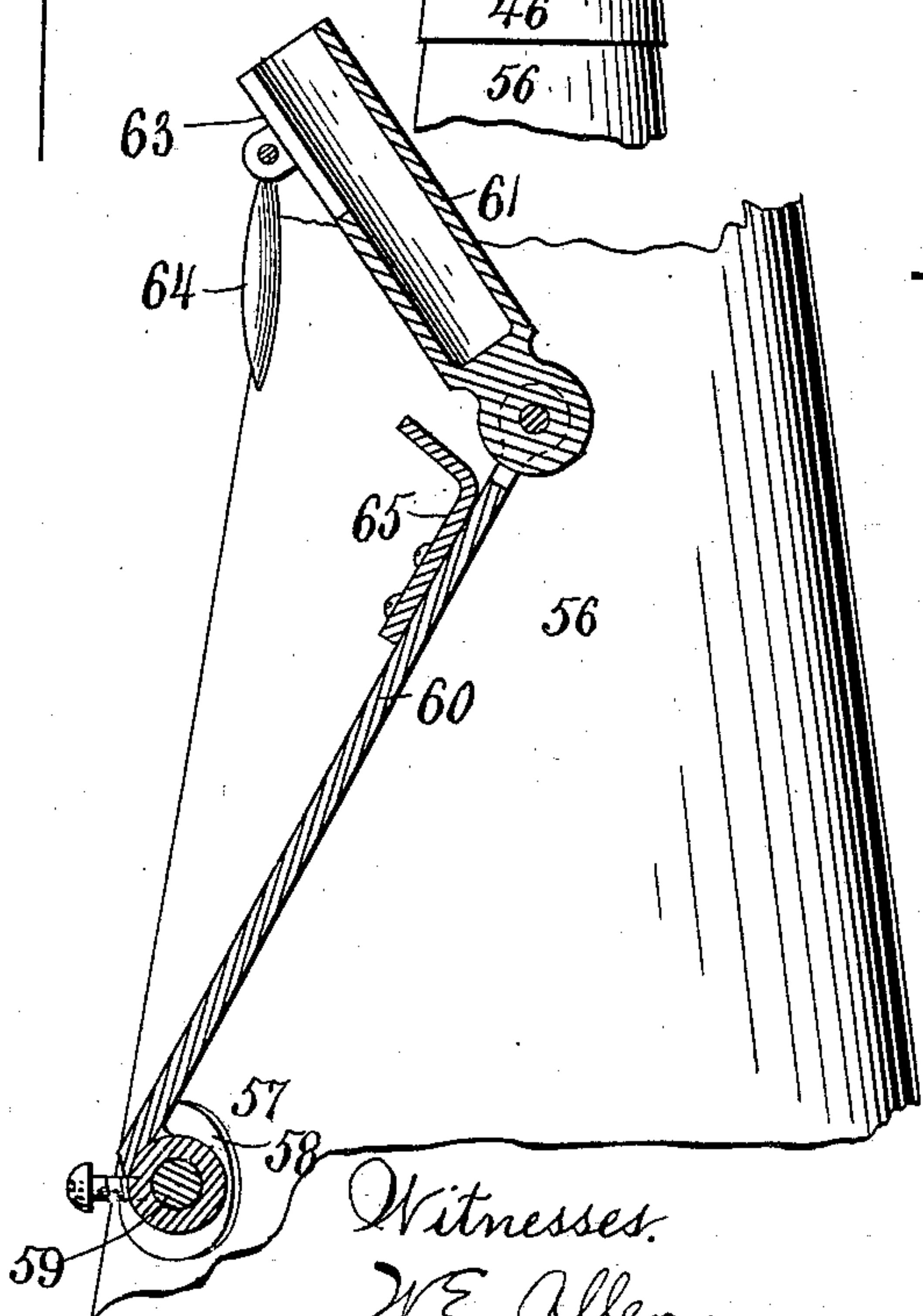
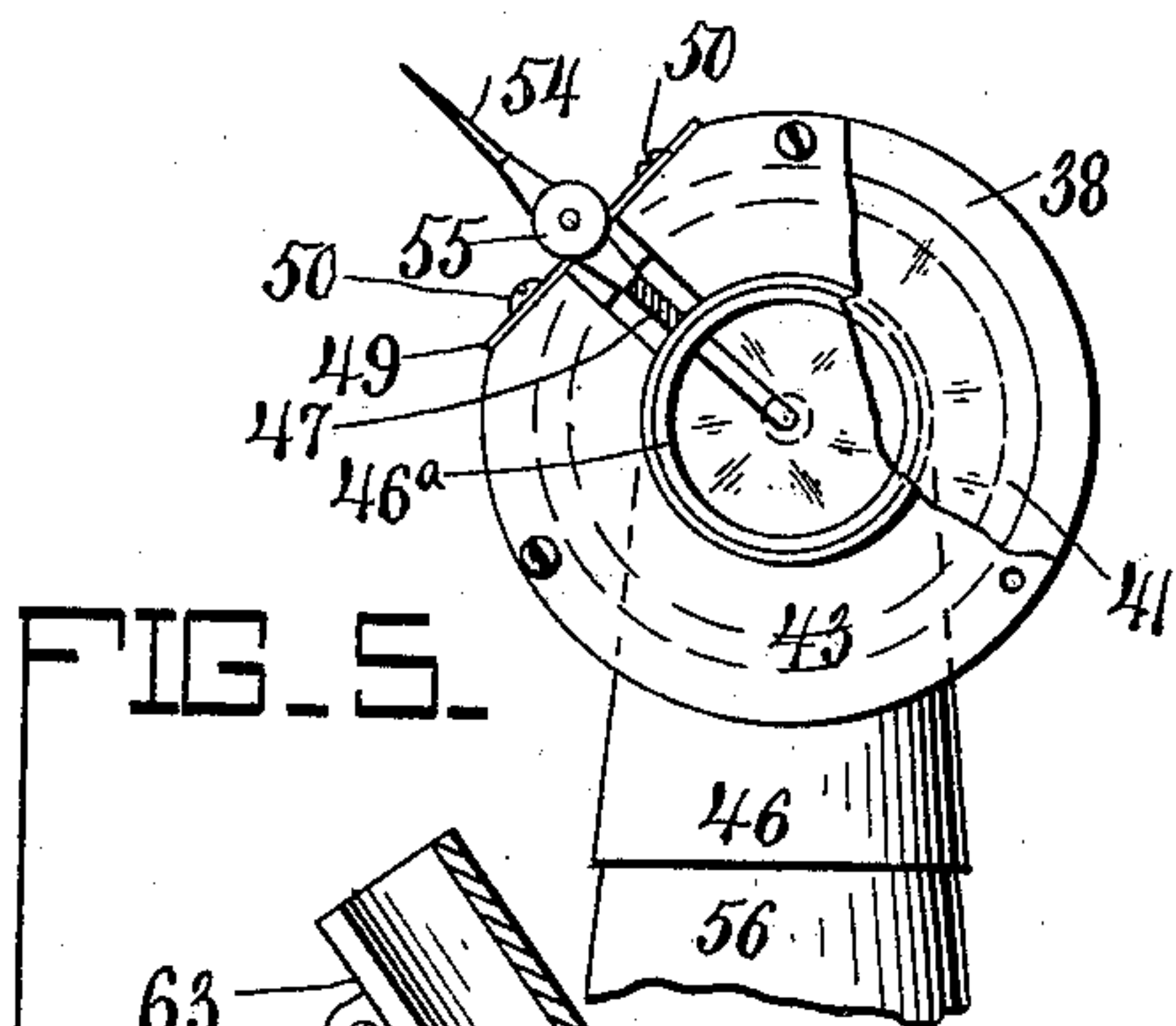
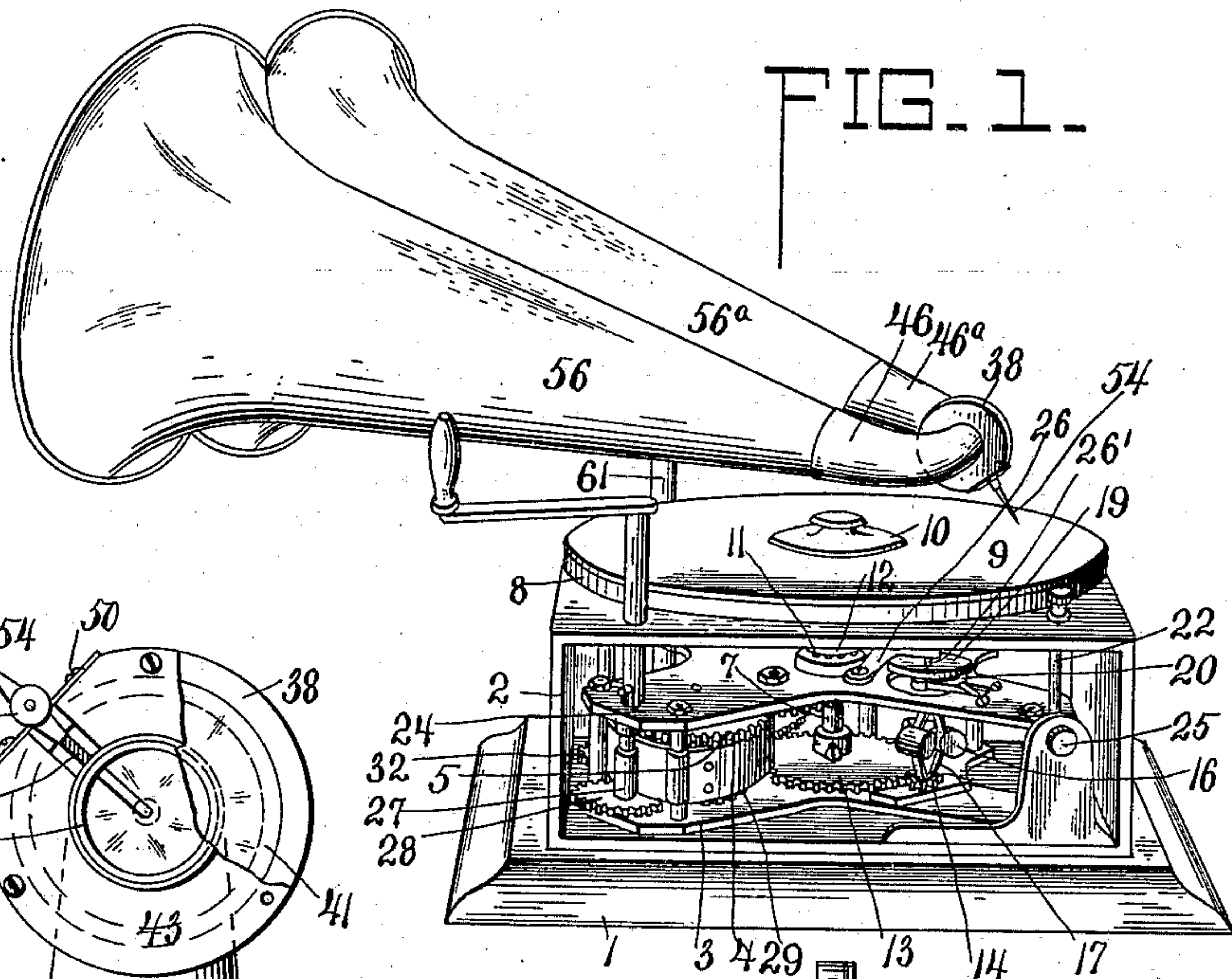
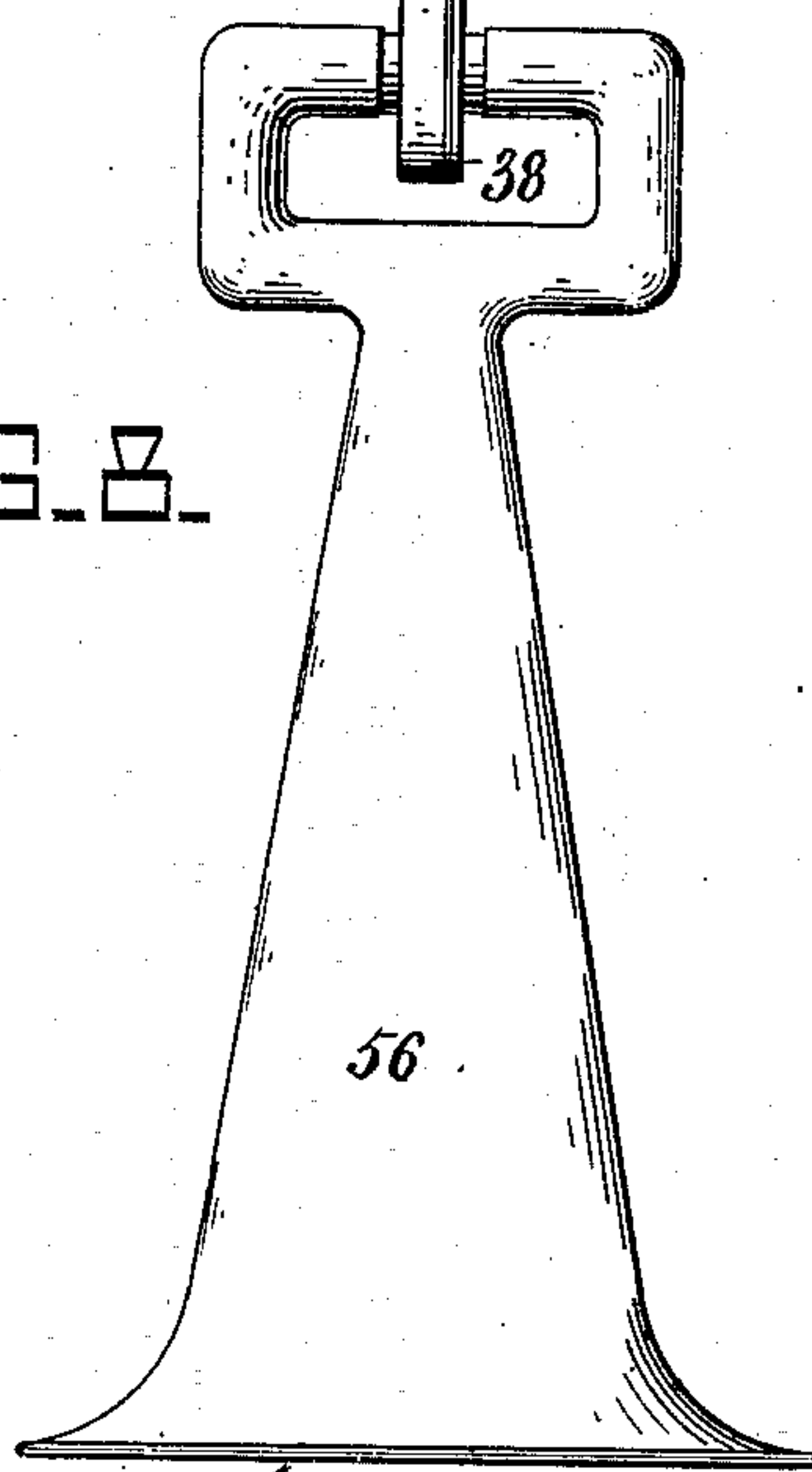


FIG. 3.



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FIG. 3.

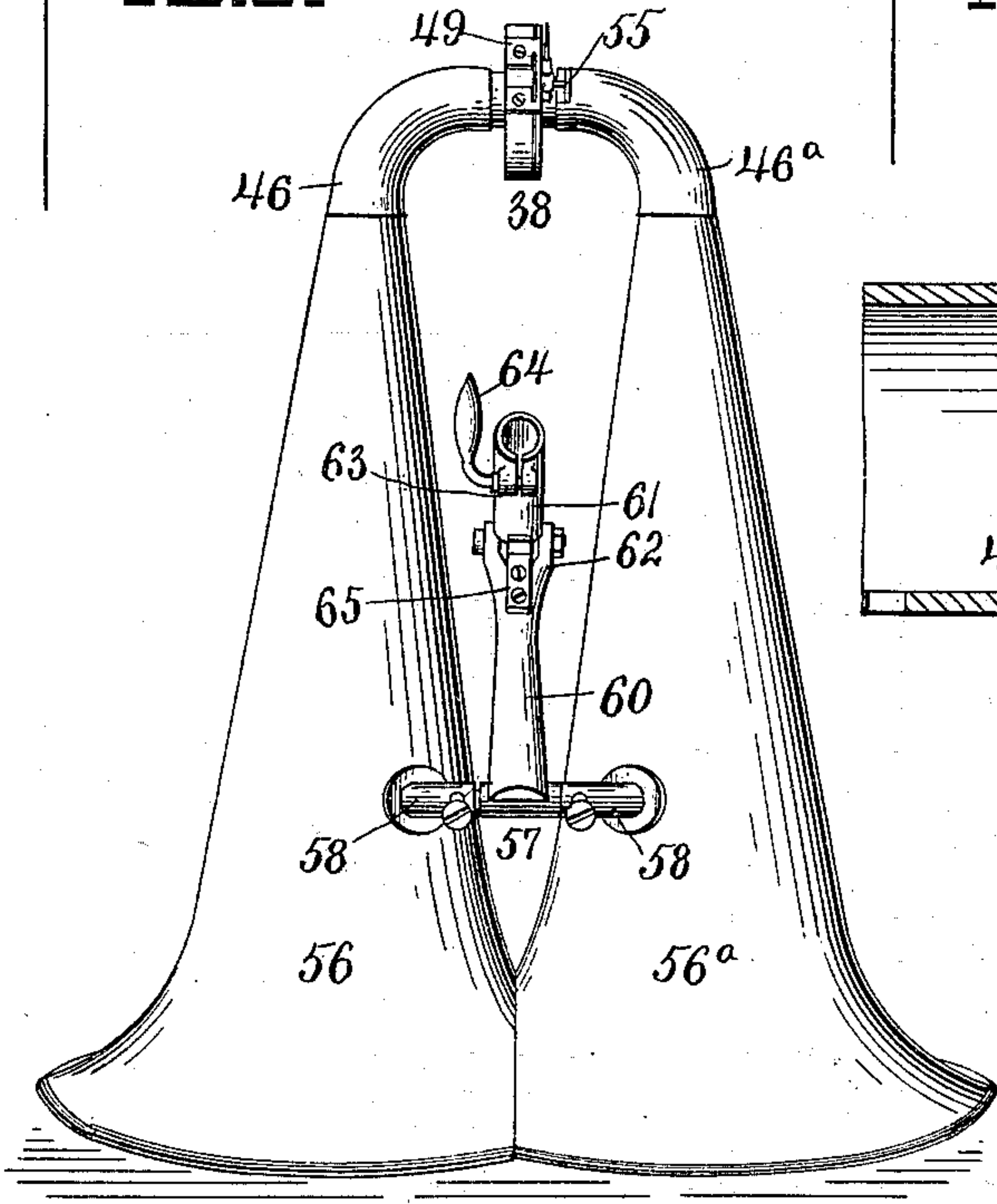


FIG. 6.

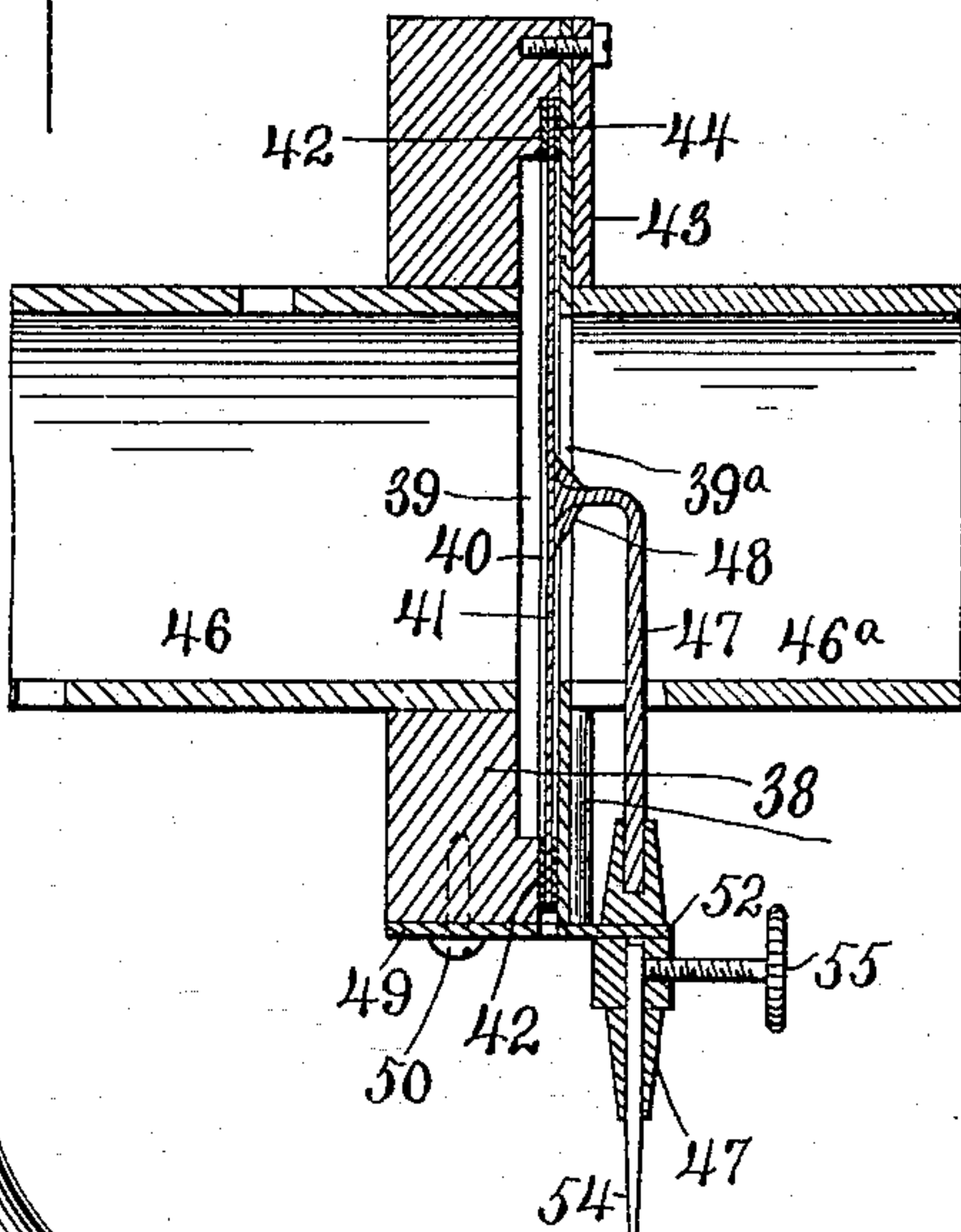


FIG. 8.

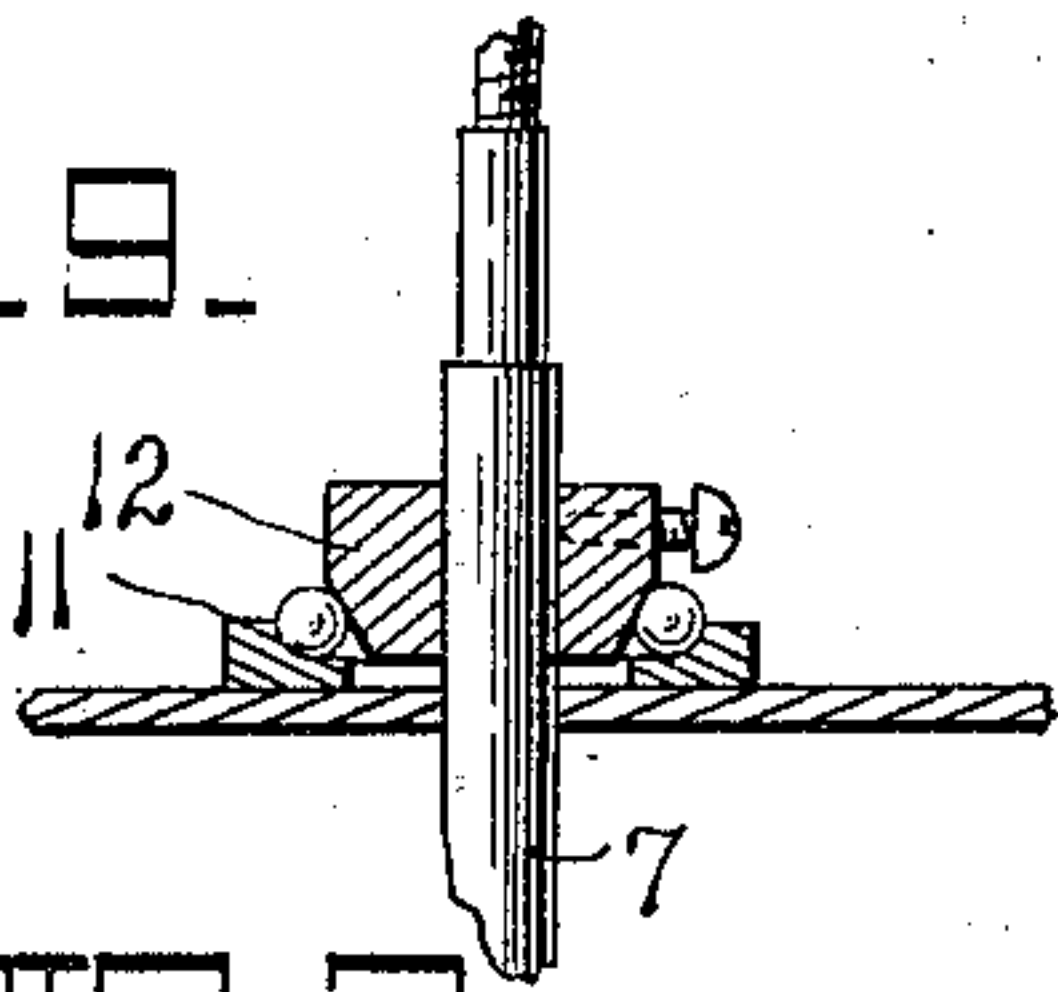


FIG. 2.

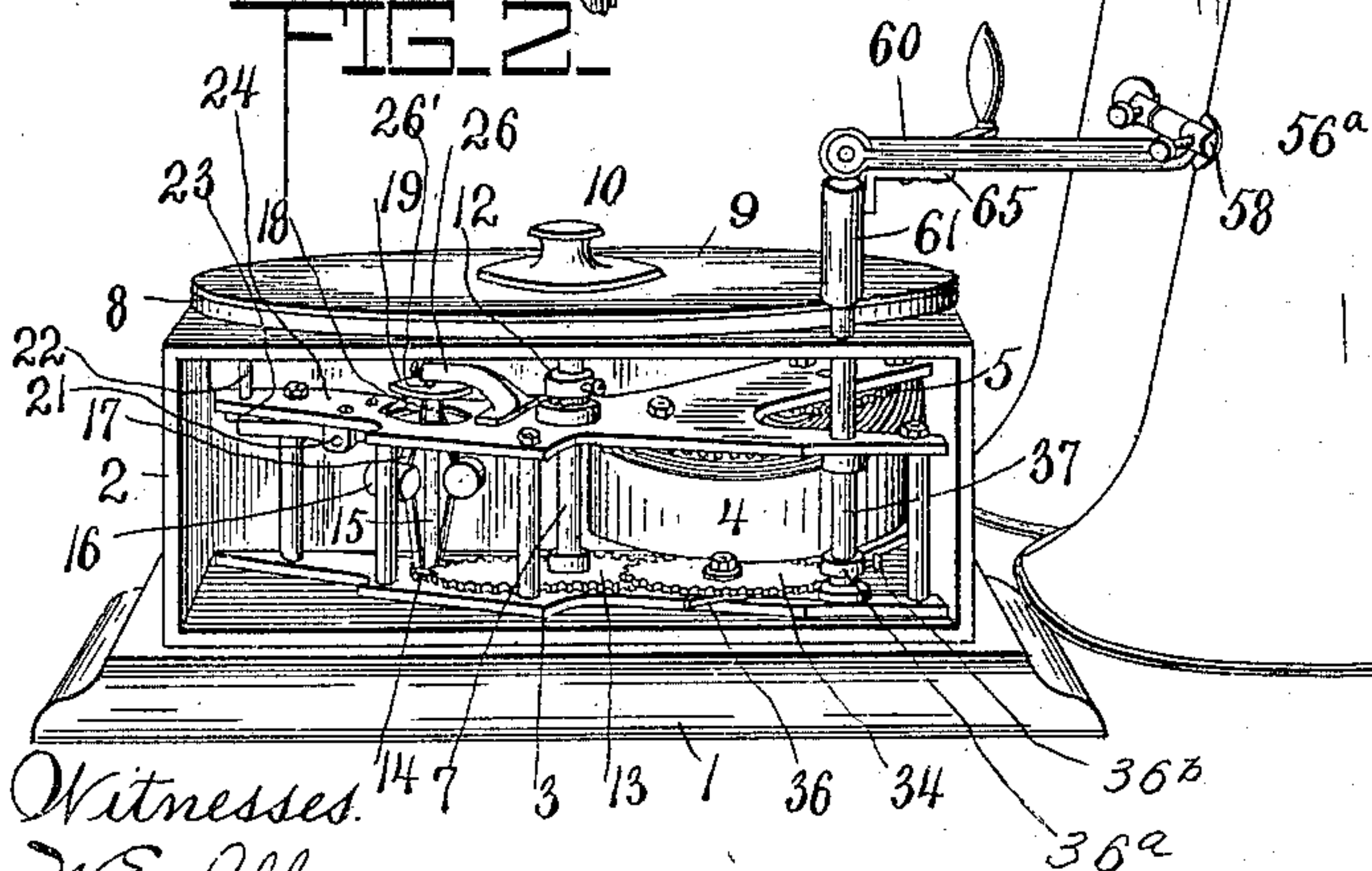
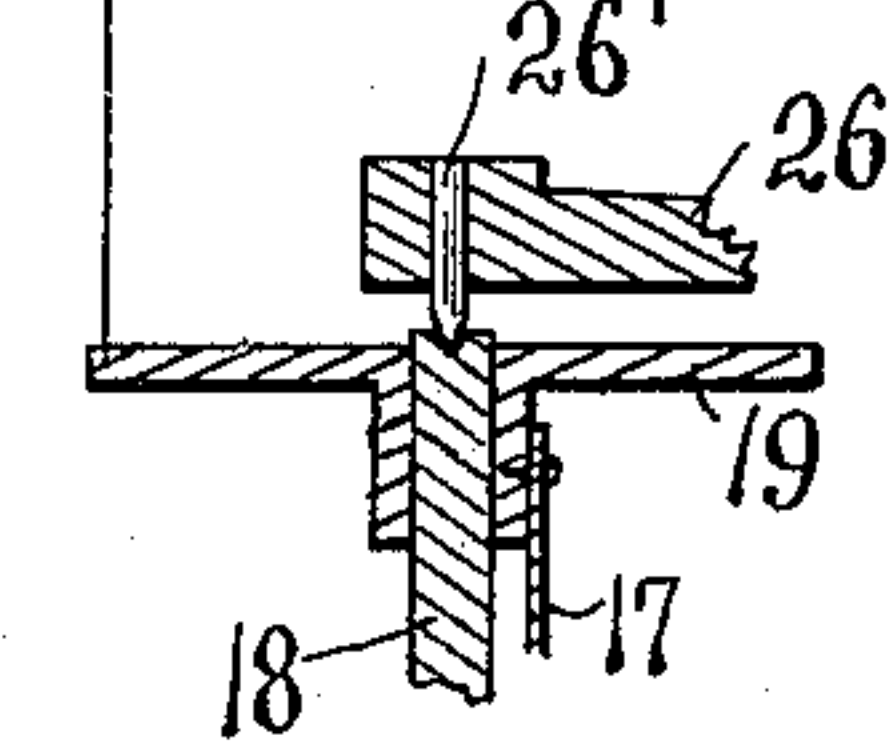


FIG. 10.



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FIG. 4.

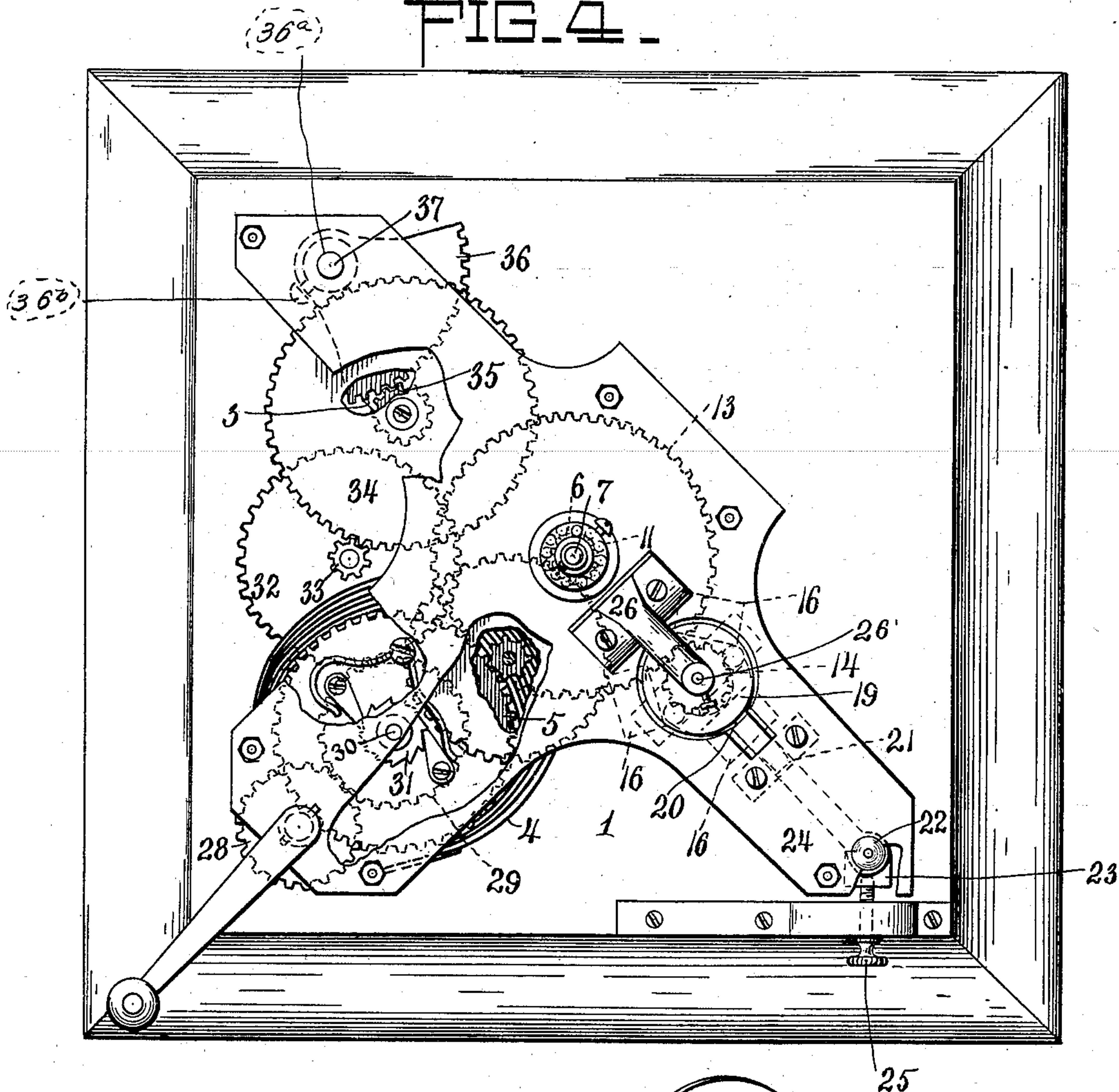
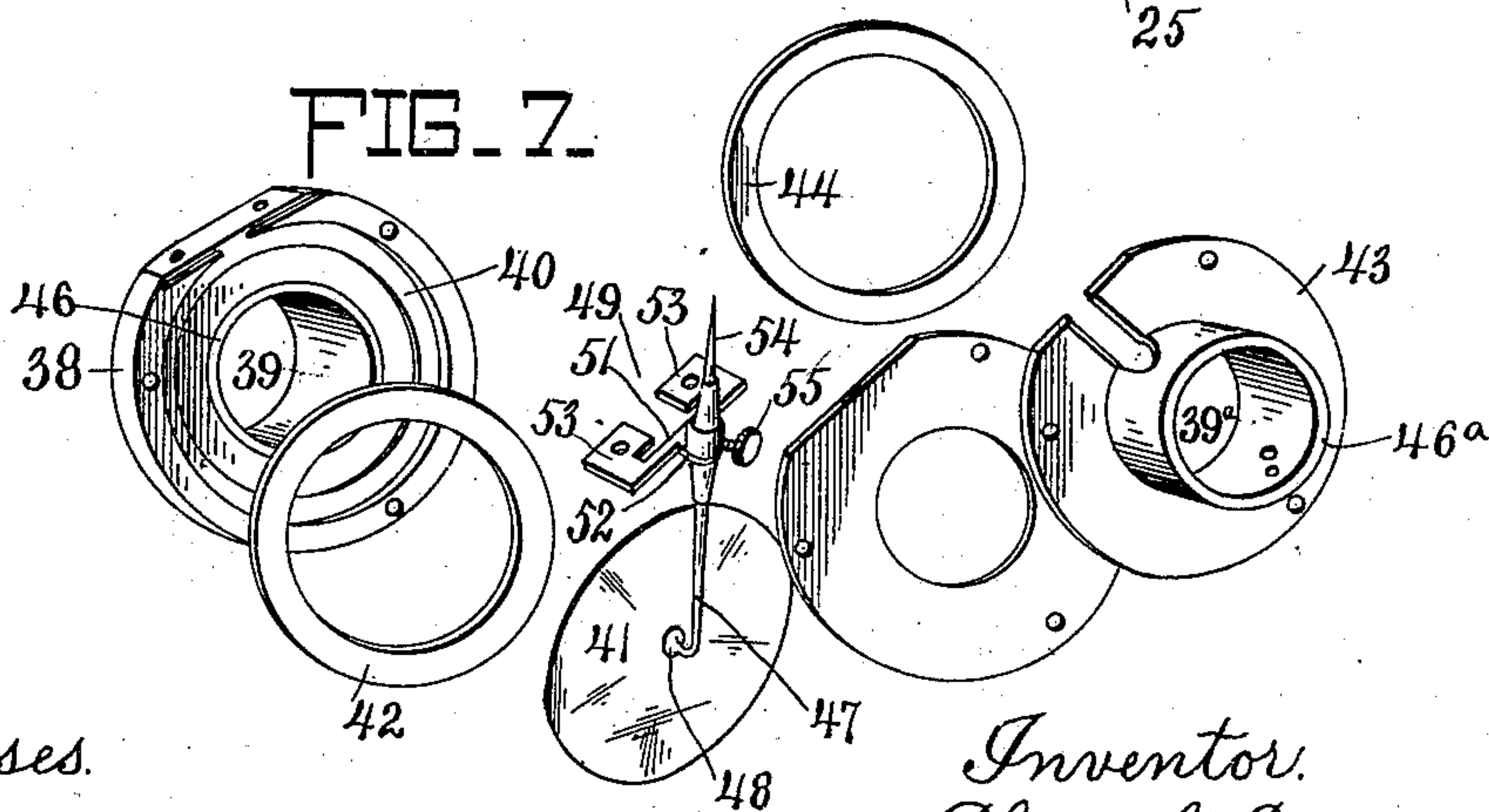


FIG. 7.



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# UNITED STATES PATENT OFFICE.

CHARLES G. CONN, OF ELKHART, INDIANA.

## GRAPHOPHONE.

SPECIFICATION forming part of Letters Patent No. 624,301, dated May 2, 1899.

Application filed June 1, 1898. Serial No. 682,268. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES G. CONN, a citizen of the United States, and a resident of Elkhart, in the county of Elkhart and State of Indiana, have invented certain new and useful Improvements in Graphophones, of which the following is a specification.

My invention relates to that class of graphophones commonly called "gramophones," being designed more particularly for the purpose of producing or reproducing from sound-records upon flat rotary disks or platens; and my invention consists in certain novel features of construction, which will hereinafter be fully described, and particularly pointed out in the claims.

One object of my invention is to improve the driving mechanism, whereby it is better adapted to impart a constant speed to the rotating platen and permitting said plate to be regulated at will and to simultaneously impart to the recording or reproducing instrument a movement across the record corresponding accurately with the revolution of the platen in a manner that will retain the stylus in the proper position to form the spiral groove in recording or to retain the stylus in the grooves of the record when reproducing.

A further object is to provide a sound-box communicating with and delivering vibrations simultaneously from both sides of the diaphragm, whereby the quality and quantity of the produced tones are magnified twofold.

A further object is to provide a special form of amplifying-bell, whereby the sound is delivered from the opposite sides of the diaphragm to the best advantage, this object being attained by employing either a double or single bell, through which the sound is blended and delivered in a combined or unitary volume.

A further object relates to the use of the discharging-bell as an arm or mounting by which to support the sound-box over the mounting, by which it is fed across the record, and to provide simple and effective means for mounting these parts in their proper relations, whereby the stylus is properly fed during the operation of the machine, but may nevertheless be moved manually backward and forward over the record at will or lifted

away from the record when it is desired to remove the platen.

A further object is to improve the means for recording vibrations of the diaphragm or for reproducing in the diaphragm the record of such vibrations—that is to say, to provide an improved mounting for the stylus, whereby it is held in position with sufficient rigidity to insure its accurate retention in the groove of the record, but at the same time to allow it a vibration lateral to the line of feed and directly transverse to the diaphragm to be vibrated, or, in other words, in the direction of the vibration to be produced without the necessity of using intermediate levers or connections. This object is accomplished in the main by employing a torsion-spring before the stylus-bar, the same being preferably in the form of a plate projecting transversely from the stylus-bar and having a reduced portion to which the stylus-bar is connected, whereby the necessary resiliency is obtained.

The several objects of my invention, as well as the various novel features of construction instrumental to the carrying out of the several objects, will be fully understood upon reference to the accompanying drawings, in which—

Figure 1 is a perspective view of a complete machine constructed in accordance with my present invention, the parts being in the positions assumed during operation of the machine, the side of the inclosing box being removed to disclose the driving mechanism. Fig. 2 is a similar view from the opposite side, showing the mounting of the amplifying-bell, whereby it is permitted to fold up out of the way when it is desired to wind the machine or to exchange the platen. Fig. 3 is a similar view showing the amplifying-bell detached. Fig. 4 is a plan of the driving mechanism employed for imparting rotary movement to the platen and feeding the stylus across the record. Fig. 5 is a longitudinal section through the reproducing mechanism. Fig. 6 is a vertical axial section of the sound-box and the stylus. Fig. 7 is a perspective view showing the parts of the sound-box, stylus, and stylus-spring segregated.

Referring to Figs. 1, 2, and 4, 1 represents a



suitable base or bed upon which the machine is mounted, and 2 an inclosing case or housing for the machine. These parts may be of any suitable construction and arrangement or even omitted without affecting my invention. 3 is a bed-plate upon which the driving mechanism is mounted. Said mechanism consists of a driving-spring 4, carrying an upper driving-wheel 5, which is geared to the pinion 6 on the main spindle 7, which receives a plate 8 for the platen. The platen is represented at 9, and it may be secured in place by a bur or nut 10 on the upper end of spindle 7. The spindle is preferably provided with a ball-bearing 11, with an adjustable cone 12, whereby the accuracy of the spindle may be maintained for the obvious purpose of improving the quality of the work of the machine. At its lower end the spindle 7 carries a multiplying-wheel 13, which meshes with a pinion 14 on a governor-shaft 15. The governor-weights 16 have their spring 17 suitably connected with the hub 18 of friction-disk 19, while beneath the disk 19 there is mounted a brake-shoe 20 in such position that when the governor-balls 16 expand by abnormal speed of the motor the disk 19 will be drawn down upon the shoe 20 and the motor will be retarded by the resulting friction, so that the speed will be maintained at a uniform rate. The brake-shoe 20 is pivoted at 21 and receives at its outer end an adjusting-screw 22 for the purpose of changing the position of the shoe 20, and consequently the degree of expansion allowed in the governor-weights before the frictional retardation will result. The set-screw 22 thereby becomes the means of accurately adjusting the speed of the machine. In order to better fix the shoe 20 to its adjusted position, a wedge 23 extends between the outer arm of the brake-shoe 20 and the upper plate 24 of the motor, so that the arm of the brake-shoe may be clamped upon said wedge and the parts held firmly to adjustment. A set-screw 25, shouldered against the outer casing 2 of the machine and threaded into the wedge 23, affords a convenient means for adjusting the latter beneath the arm of the brake-shoe. The upper end of the governor-shaft 15 may be held in position by a pin-bearing 26' in a bracket 26.

By referring to Fig. 2 it will be seen that the spring-motor is wound by an arbor 27, carrying a winding-wheel 28, which meshes with a driving-wheel 29 on the lower end of winding-shaft 30, which carries the upper winding-wheel 5, already referred to. A dog and ratchet 31 may be provided between the spring-shaft and its driving-wheels in the usual manner. The lower driving-wheel 29 of the spring-motor meshes with a reducing-gear 32, the pinion 33 of which meshes with a second reducing-wheel 34, whose pinion 35 engages a segmental rack 36 upon a post 37. The gearing thus interposed between the

spring-shaft 30 and the post 37 is such that a rotary movement less than a revolution will be imparted to the post 37 at each time the motor is allowed to run. The driving mechanism between the spring and the post 37 bears a fixed and constant relation to mechanism existing between said spring-motor and the rotary spindle 7. Said spindle 7 and post 37 are thereby moved in a fixed ratio, and they are controlled by the same governor, so that the transverse or feeding movement of the stylus will always bear the proper relation to the record upon the platen at whatever rate the latter may be rotated. It will be also seen from the construction described that not only is the stylus fed across the record proportionately to the revolution of the latter, but the post is always returned to starting position by the act of winding the motor, so that the feed is always ready without requiring special attention of the operator to this part of the mechanism. The connection between the segment 36 and post 37 is made through the medium of the hub 36<sup>a</sup> on the segment, in which the post 37 is inserted, and a binding-screw 36<sup>b</sup>, which is threaded into the hub and impinges against the cylindrical face of the spindle. By this means the above-described driving and return movements may be imparted to the spindle through the segment; but at the same time the connection is a frictional one and it provides for slipping between these parts in the event that resistance is offered to the swinging movement of the stylus—such, for instance, as might arise from irregularities of the record. This slip connection also enables me to return the stylus to the starting-point for repeating without stopping the motor of the machine and rewinding when it is desired to repeat a record.

Having thus described means for producing a constant rotary movement to a record-platen as well as means for regulating the revolution thereof and simultaneously producing movement in the post which will swing the sound-record or reproducing mechanism across the record at a rate bearing an unchangeable relation to the rotation of the record, I will now proceed to describe the improved mechanism for recording and reproducing sound and which is adapted to be mounted upon the post.

38 represents the sound-box, which is preferably of solid-metal construction and provided with a recess 39, forming a sound-chamber on one side of the diaphragm, and with a ledge 40, that receives the diaphragm 41, with an interposed washer 42, while the outer plate 43, with an interposed washer 44, clamps said diaphragm upon the ledge 40 and forms a sound-chamber 39<sup>a</sup> on the other side of said diaphragm. The diaphragm is thus held in the sound-box with sound-chambers on both sides of it, which receive vibrations from the diaphragm alike in quality and strength of tone. Communication with the respective sides of



the diaphragm is established through the tubes 46 46<sup>a</sup>, carried, respectively, by the box 38 and a cap 43.

47 represents the stylus-bar, the upper end of which is secured to the diaphragm at 48 in a manner well known in machines of this character, while said stylus-bar is supported by a peculiarly-formed spring-plate 49, attached to the lower side of the box 38 by screws 50. The construction of the spring-plate 49 is shown more clearly in Fig. 7, wherein it will be seen it consists of a main bar 51, which forms a torsional spring and is attached by a laterally-protruding lug 52 to the stylus-bar 47, also attaching-ears 53, which receive the screws 50, by means of which the spring-plate is secured to the box. By having the intermediate portion of the plate 49 cut away or weakened an effective torsional stylus-spring is provided, said spring also having ample rigidity to hold the stylus accurately as it is fed across the record-plate. I prefer to make the stylus 54 removable, and for that reason it is secured in the stylus-bar 47 by a set-screw 55, as shown. It will be seen that the stylus-bar and stylus extend transversely through the torsional spring-bar 51, and the vibration produced upon the end of the stylus 54 is transverse to the frame of the diaphragm, and consequently directly corresponds to the vibrations to be produced by the diaphragm without requiring the use of intermediate levers or connections involving joints, where a large part of the vibratory movement would necessarily be lost.

To render the doubly-acting diaphragm most effective, I employ a peculiar construction of double bell 56 56<sup>a</sup>, the small ends of which are attached to the respective tubes 46 46<sup>a</sup>, leading from the respective sides of the diaphragms. These bells are preferably united or blended at their discharge ends or are otherwise juxtapose, so as to make them discharge uniformly and in a single volume of twofold force the vibrations produced by the opposite sides of the diaphragm. This bell, however, need not necessarily be made double, as shown in Fig. 3. The sound-waves from the two sides of the diaphragm can as well be conducted into a single bell (shown in Fig. 8) by employing suitable connections, and the result will be fully as satisfactory so far as the added volume of tone from the use of the two sides of the diaphragm is concerned.

A further advantage of using a bell, either single or double, as a part of the arm carrying the stylus, arises from the convenient support which it affords for the sound-box. To adapt the bell to serve this purpose, it is provided with a cross-brace 57, made up of sockets 58, swivel-pin 59, and supporting-arm 60, swiveled upon said pin 59. The outer end of the arm 60 carries a socket 61, hinged upon a pintle 62 to said arm and provided with a lower split end 63 with a clamping-screw 64. The socket 61 is constructed to fit

over the post 37 of the feeding mechanism, and it is clamped upon said post, through means of the screw 64, with sufficient pressure to cause the bell and the sound-box carried by it to be fed transversely across the record as the post 37 turns. The friction may, however, be insufficient to prevent manual adjustment of the bell and the parts carried by it, when desirable, for the purpose of repeating a part of the record or adjusting the stylus in starting the machine.

65 represents a stop or angle brace carried by the arm 60 in a position to engage the socket 61 and support the arm 60 at the proper angle, so as to offer a fixed support at its outer end to the bell at the cross-brace 57. With the arm 60 thus fixed the bell then becomes hinged at a single point—namely, upon the pin 59. The location of the cross-brace 57 is such as to bear any desirable portion of the weight of the bell and to impose upon the stylus 54 only the necessary weight to cause it to take properly into the grooves of the record.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A reproducing mechanism for a graphophone, comprising a sound-box containing a diaphragm, a stylus controlling the diaphragm and supported by and having a flexible connection with the sound-box, a double discharging-bell having independent inner ends connected with the sound-box on opposite sides of the diaphragm, said bell projecting outwardly with its axes on opposite sides of and parallel to the vertical plane of the diaphragm and a support for the reproducing mechanism connected with the double bell at a point distant from the sound-box, substantially as and for the purpose set forth.

2. In a graphophone, a double bell, the parts of which have substantially parallel axes, and independent inner ends and a sound-box carried by said bell supported between its said inner ends and having a diaphragm dividing it into two chambers communicating with the respective ends of the bell, substantially as described.

3. In a graphophone the combination of a suitable motor, a platen-spindle driven by said motor, an oscillating post frictionally driven from said motor and receiving therefrom movement bearing a fixed relation to the platen and spindle in one direction as the motor rotates the spindle in running down and in the opposite direction as the motor is wound up, a record-plate suitably mounted upon said spindle and a sound-box and stylus suitably mounted upon said oscillating post, substantially as and for the purposes set forth.

4. In combination with a motor, a spindle driven positively by said motor, an oscillating post frictionally connected with a segmental rack, gear-wheels positively connecting said segmental rack with the motor and arranged to impart a restricted movement thereto in opposite directions corresponding



to the running down and the winding up of the motor, a record-plate suitably mounted upon the spindle and a sound producing or recording device mounted upon said post, substantially as and for the purposes set forth.

5. In a graphophone, the combination of suitable driving mechanism, a governor-shaft connected with said driving mechanism, a friction-disk carried by said governor-shaft, a pivoted brake-shoe secured adjacent to said friction-disk, an adjusting-screw controlling said brake-shoe, a wedge interposed between the brake-shoe and a fixed part to permit the brake-shoe to be clamped in position, and an adjusting-screw for said wedge, substantially as and for the purposes set forth.

6. In a graphophone, the combination of the sound-box 38 formed with a recess 39 and with a ledge 40, the diaphragm 41 mounted upon the ledge 40, the cap-plate 43 secured over said diaphragm with an interposed packing 44, and the oppositely-projecting tubes 46, 46<sup>a</sup>, carried respectively by the box 38 and plate 43, substantially as and for the purposes set forth.

7. In a graphophone, a double bell, a sound-box connected to and carried by the inner ends of said bell.

8. In a graphophone, the combination with a double bell, of a sound-box entirely supported and carried by the bell, thereby connecting the inner ends of said bell.

9. In a graphophone, the combination with a double bell, a sound-box connecting the inner ends of the same, and a swivel-support for the bell adapted to be attached to the motor of the machine, substantially as described.

10. In a graphophone, the combination of a sound-box carrying recording or reproducing means, a double collecting or amplifying bell having independent inner ends to which opposite sides of said sound-box are rigidly attached and by which it is supported, and a pivotal mounting for said bell, substantially as and for the purposes set forth.

11. In a graphophone, the combination of a sound-box containing a diaphragm dividing

the same into two sound-chambers and a collecting or amplifying bell formed in two parts having inner ends connected to and supporting the sound-box and with blended or united outer ends, substantially as and for the purposes set forth.

12. In combination with the collecting or amplifying bell, the supporting-arm 60 swiveled at one end to said bell and having hinged to its other end a socket by which the arm and bell may be mounted in position, substantially as set forth.

13. In combination with the two-part bell, the cross-brace 57 secured between the parts of said bell, the supporting-arm 60 having swiveled connection with the bell through said cross-brace and the socket carried by the inner end of said arm, substantially as herein explained.

14. In a graphophone-bell, the combination of the supporting-arm 60 connected to said bell, the attaching-socket 61 and the angle-brace 65 secured to one of said parts and bearing against the other for the purpose of maintaining their angle and offering rigid support for the one upon the other, substantially as herein explained.

15. In combination with the post 37, the socket 61 having a split lower end provided with a clamping-screw 64, the supporting-arm 60 attached to said socket, and supported through it, upon the post, and the bell supported by said arm 60, substantially as and for the purposes set forth.

16. In a graphophone, the combination of the sound-box containing a diaphragm, the stylus secured at one end to the diaphragm and the herein-described torsion-spring 49 comprising a bar 51 having a lateral attaching-lug 52 which receives the stylus and having ears 53 by which it is secured in place, substantially as and for the purposes set forth.

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