

No. 610,706.

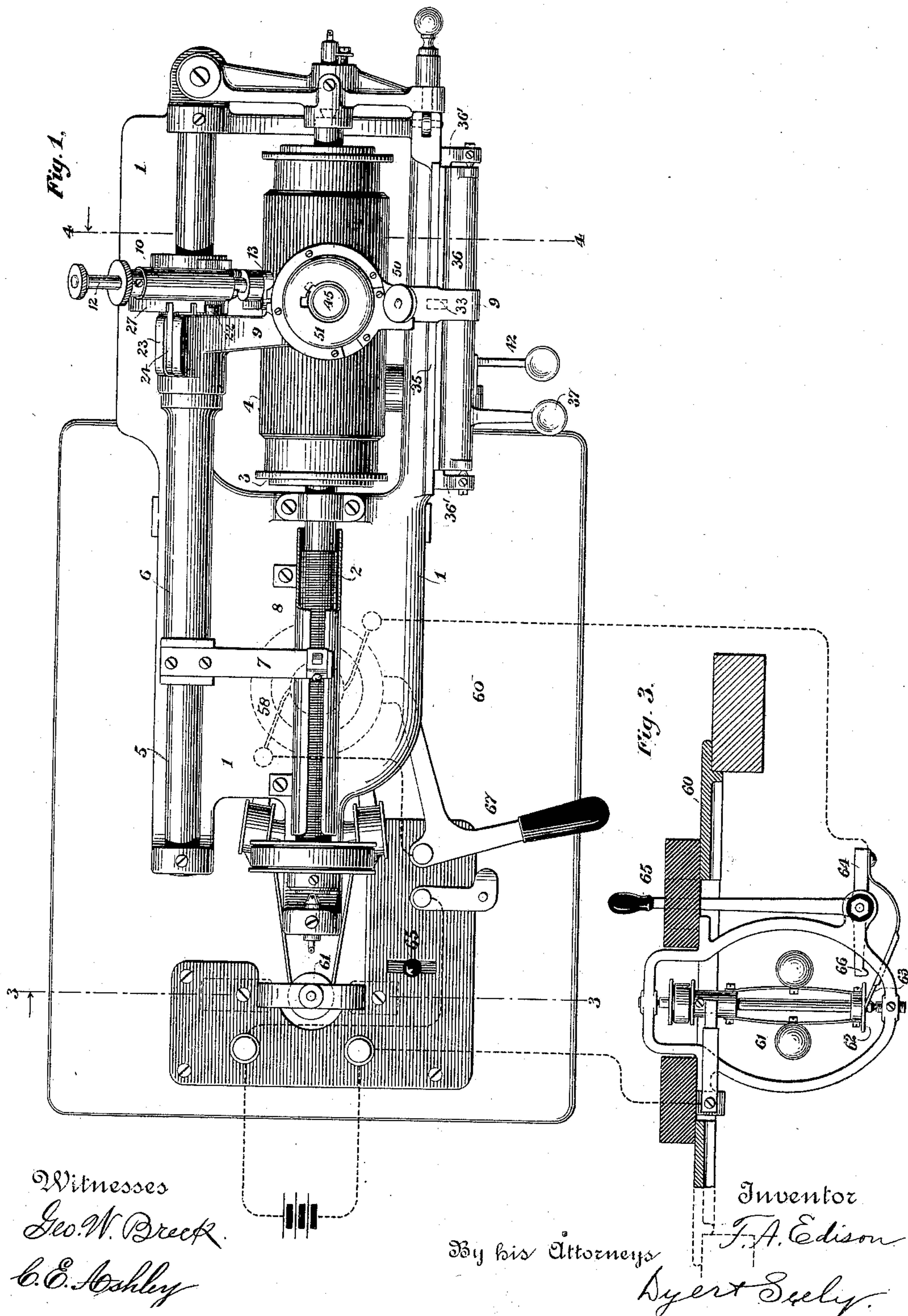
Patented Sept. 13, 1898.

T. A. EDISON.
PHONOGRAPH.

(Application filed Dec. 3, 1890. Renewed Feb. 4, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
Geo. W. Brock
C. E. Ashley

By his Attorneys

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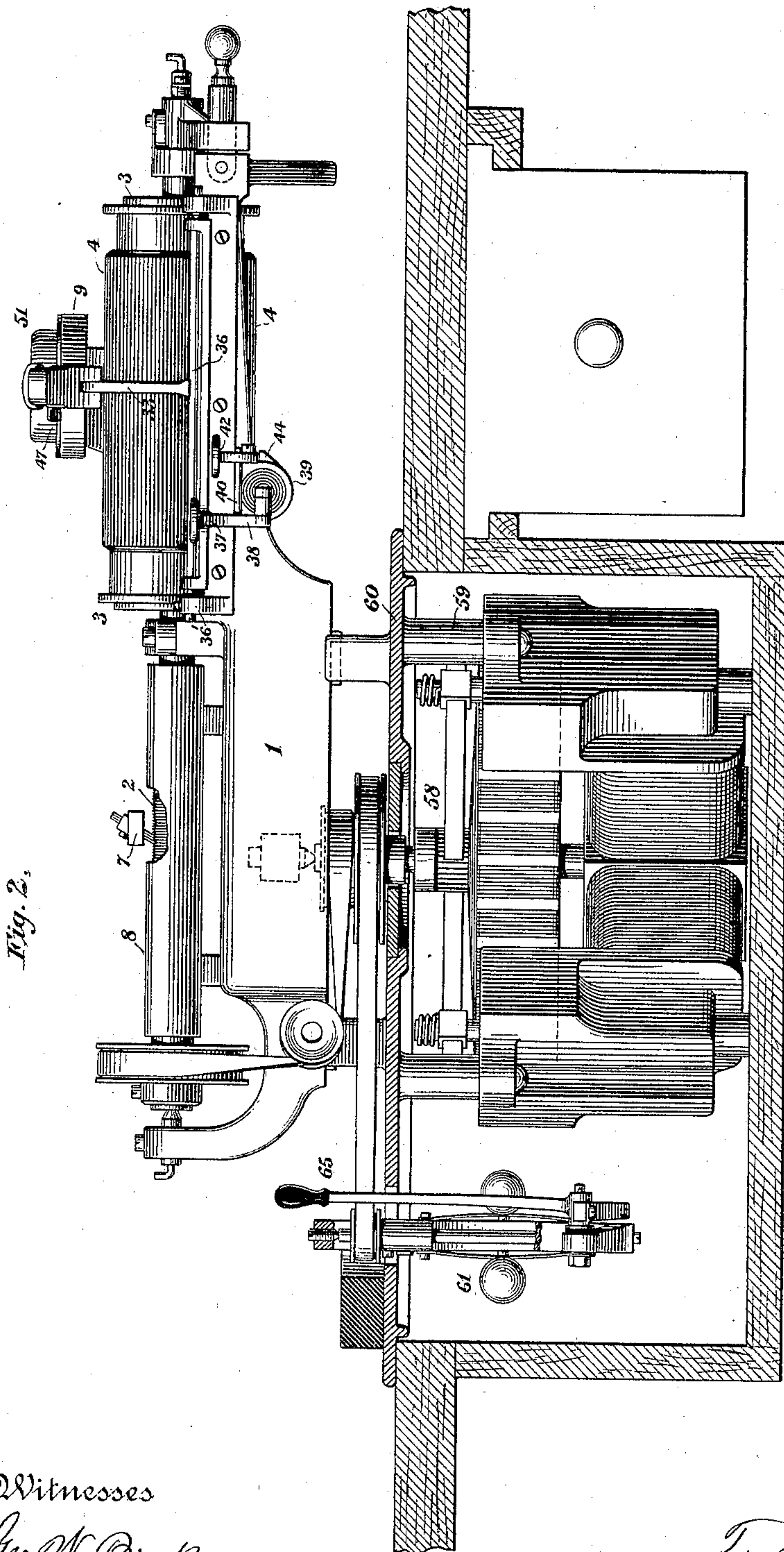
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3 Sheets—Sheet 2.



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Fig. 4.

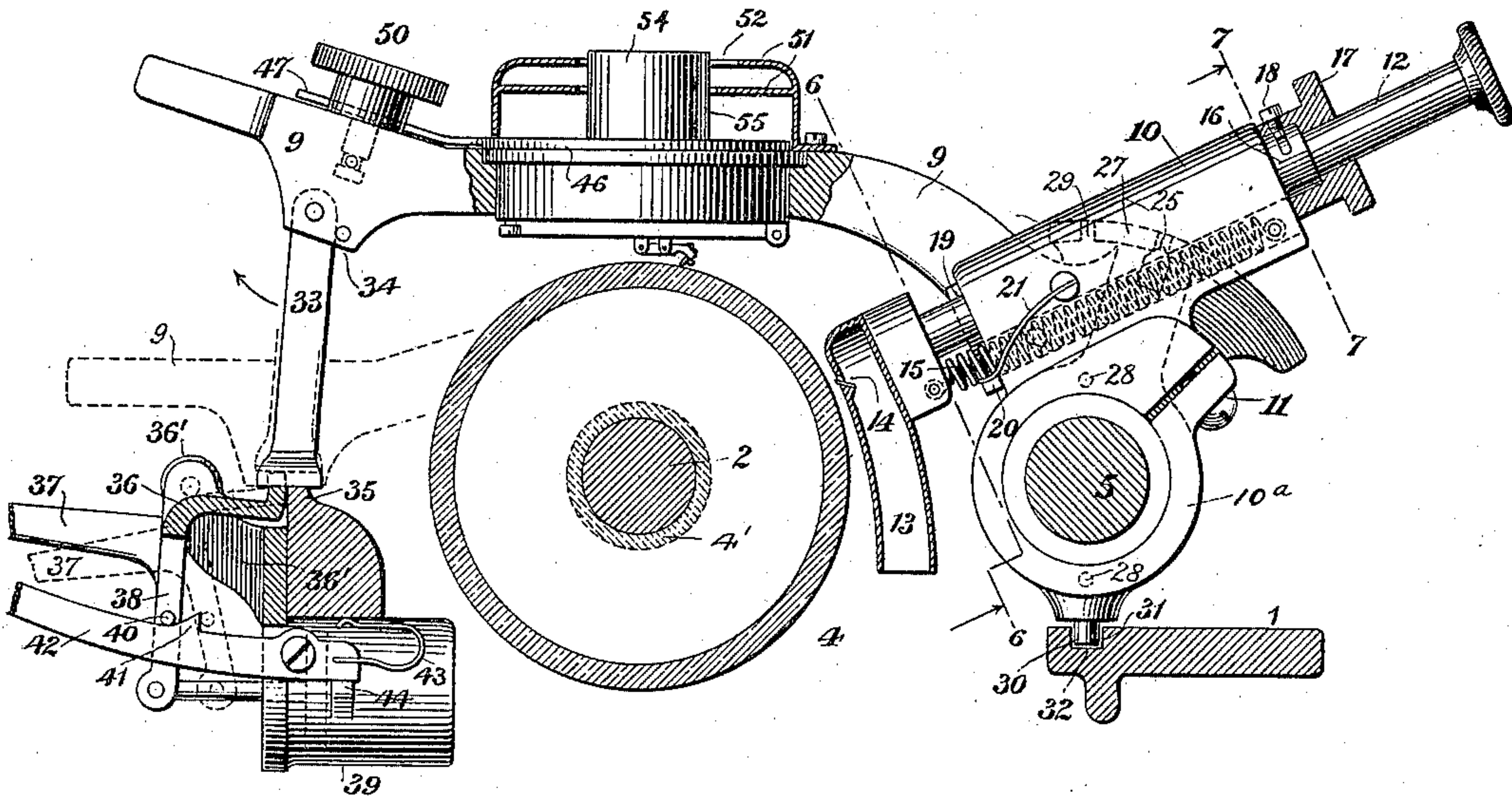


Fig. 6.

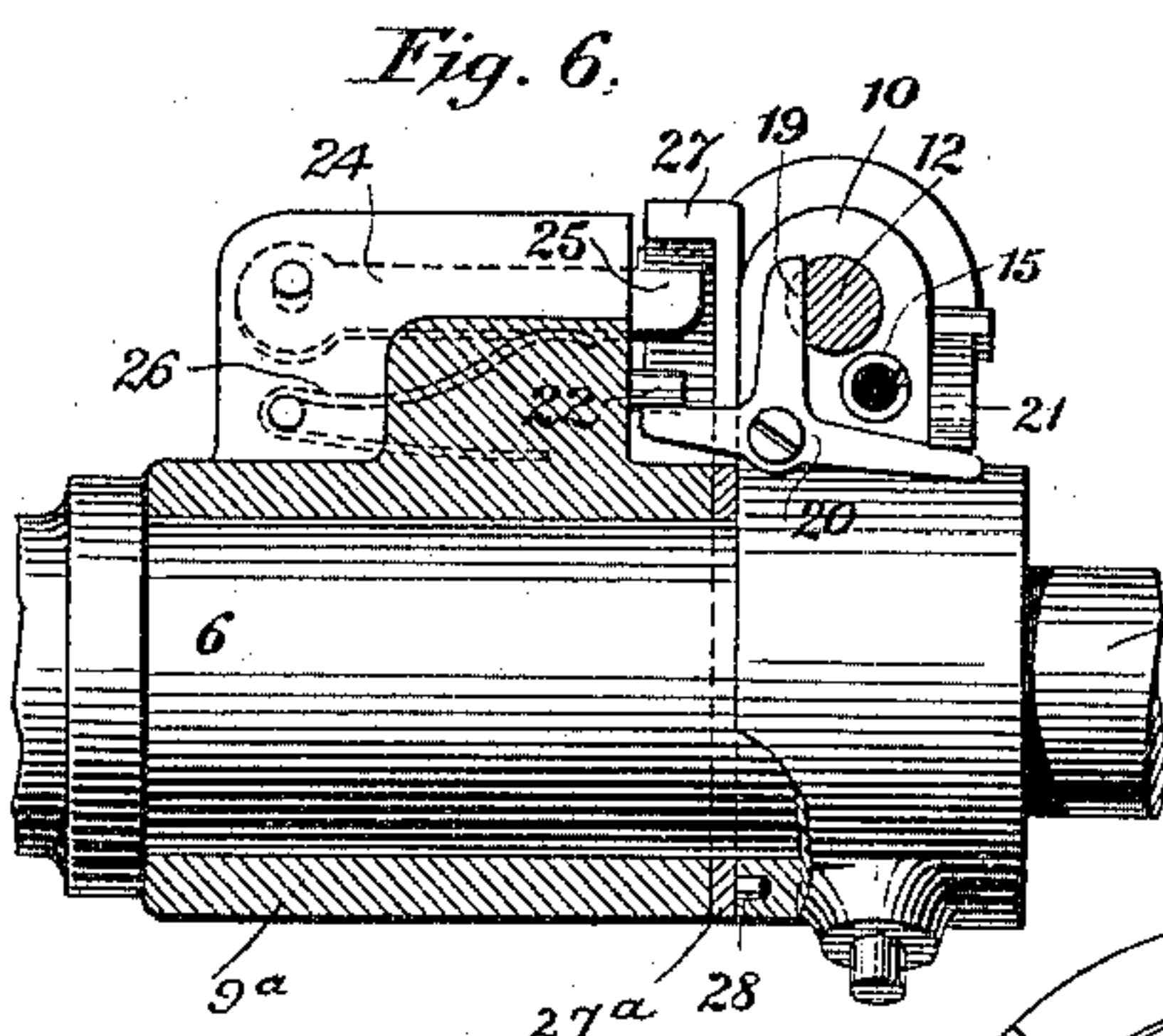


Fig. 7.

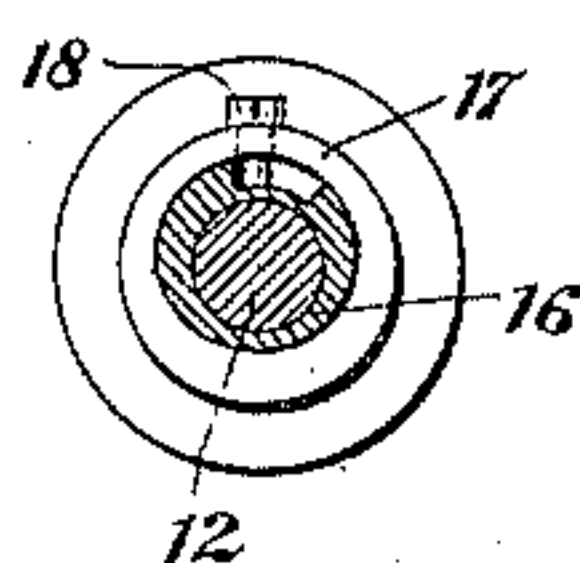


Fig. 5.

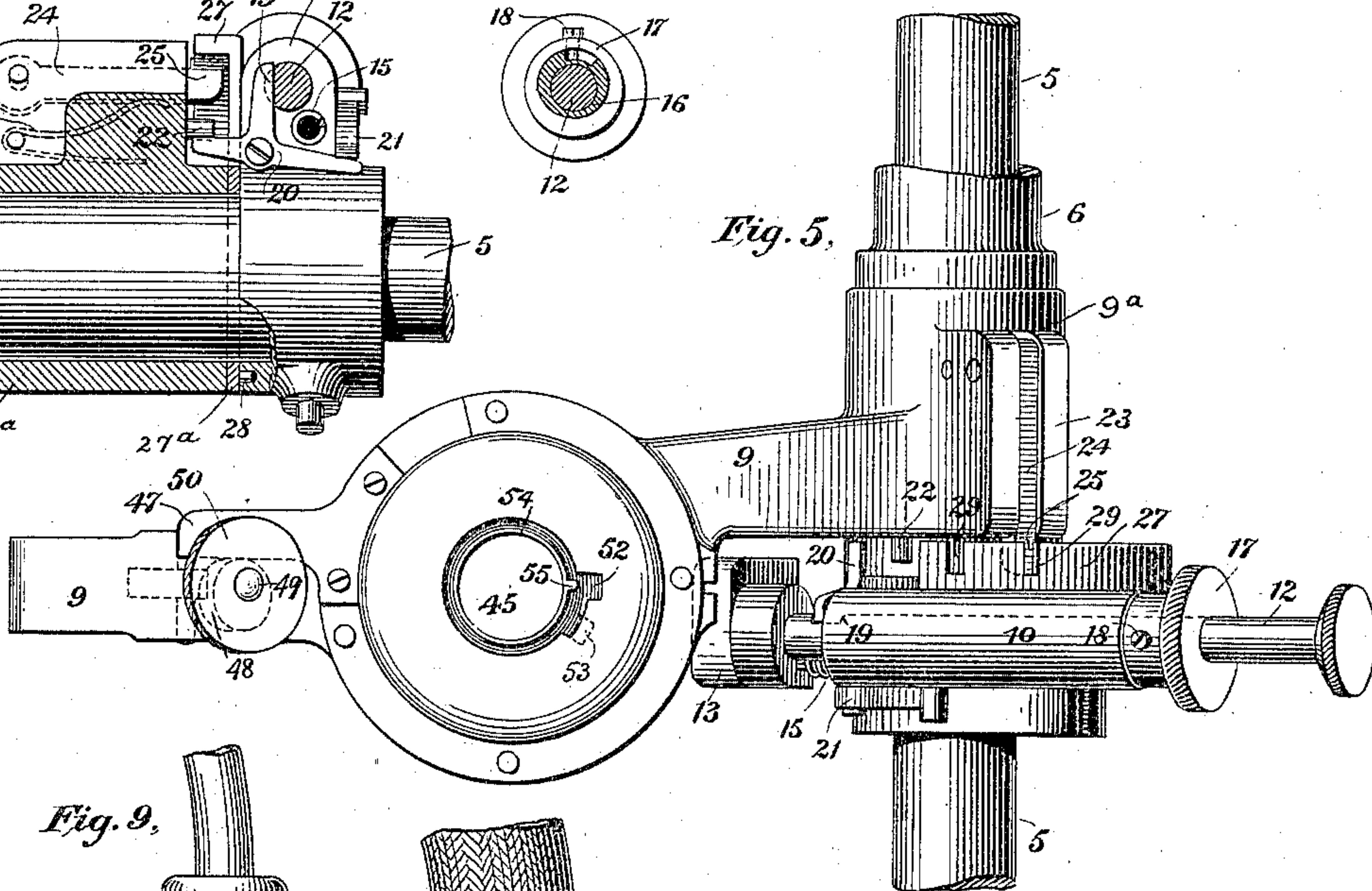


Fig. 9.

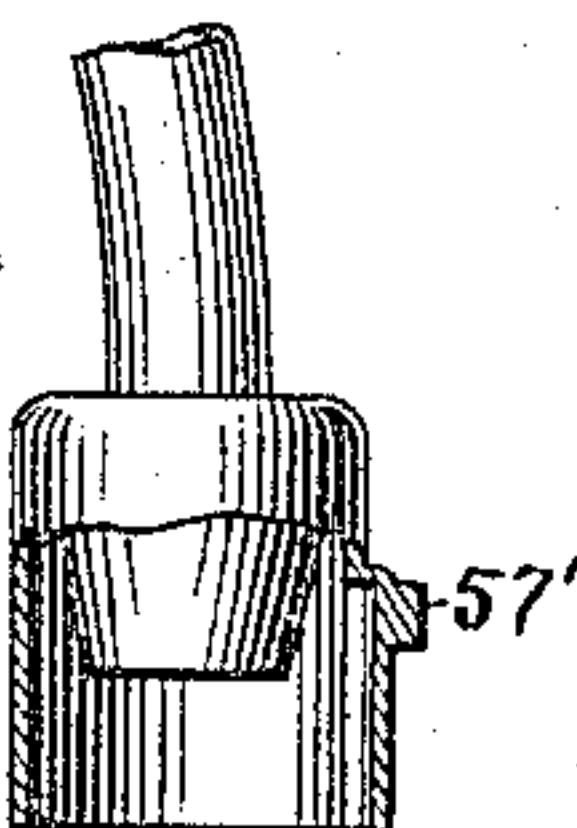
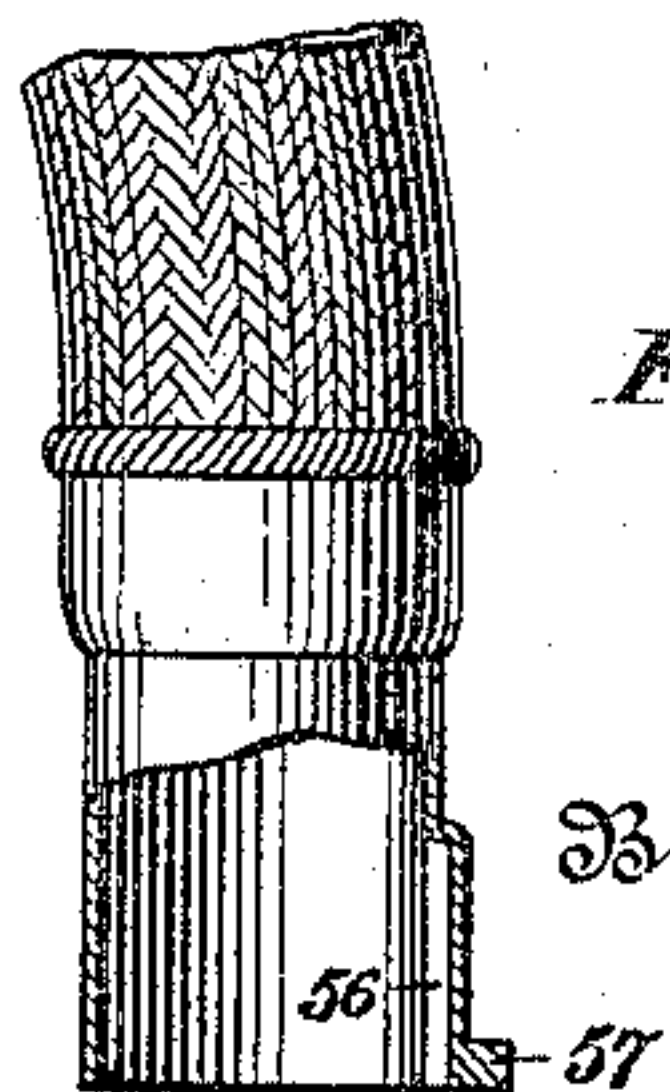


Fig. 8.



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 610,706, dated September 13, 1898.

Application filed December 3, 1890. Renewed February 4, 1897. Serial No. 622,022. (No model.) Patented in England September 8, 1891, No. 15,206; in Belgium September 8, 1891, No. 96,313; in France September 8, 1891, No. 215,994; in Switzerland September 8, 1891, Nos. 4,348, 4,371, and 4,372; in Italy September 30, 1891, No. 30,353; in Spain October 16, 1891, No. 12,488; in Norway October 24, 1891, No. 2,527; in Austria-Hungary February 14, 1892, No. 42,615 and No. 80,937; in Cape Colony March 31, 1892, No. 752; in New South Wales April 28, 1892, No. 3,728; in Victoria April 29, 1892, No. 9,605; in South Australia May 4, 1892, No. 2,218; in Tasmania May 4, 1892, No. 1,059, and in Portugal November 23, 1892, No. 1,735.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographs, Case No. 900, (for which patents have been granted in the following countries: Great Britain, No. 15,206, dated September 8, 1891; Austria-Hungary, Vienna, No. 42,615, Budapest, No. 80,937, dated February 14, 1892; Belgium, No. 96,313, dated September 8, 1891; Cape Colony, No. 752, dated March 31, 1892; France, No. 215,994, dated September 8, 1891; Italy, No. 30,353, dated September 30, 1891; New South Wales, No. 3,728, dated April 28, 1892; Norway, No. 2,527, dated October 24, 1891; Portugal, No. 1,735, dated November 23, 1892; South Australia, No. 2,218, dated May 4, 1892; Spain, No. 12,488, dated October 16, 1891; Switzerland, Nos. 4,348, 4,371, and 4,372, dated September 8, 1891; Tasmania, No. 1,059, dated May 4, 1892, and Victoria, No. 9,605, dated April 29, 1892,) of which the following is a specification.

The present invention relates to a phonograph adapted to employ phonogram-blanks of either large or small diameter; and the object of the invention is to enlarge the usefulness of the machine and to provide means for readily controlling and operating the several parts of the machine.

The invention consists in an improved recorder or reproducer carrying arm and in means for raising or lowering it.

The invention consists also in mechanism for turning off the surface of the phonogram-blanks and in means for adjusting the diaphragm to bring the recorder or reproducer into operative position for use; and the invention consists also in a holder for the speaking and hearing tubes and in certain other features and combinations hereinafter fully described and claimed.

In the accompanying drawings, which illustrate the invention, Figure 1 is a plan view

of a phonograph embodying the improvements. Fig. 2 is a side view, partially in section, of the same machine. Fig. 3 is a section on line 3 3 of Fig. 1. Fig. 4 is a section on line 4 4 of Fig. 1. Fig. 5 is a plan on a large scale of the recorder and reproducer carrying arm and the turning-off tool. Fig. 6 is a section on line 6 6 of Fig. 4. Fig. 7 is a section on line 7 7 of Fig. 4. Fig. 8 shows the end of a speaking-tube adapted to be used with this instrument, and Fig. 9 is a similar view of a hearing-tube.

Upon or above the casting 1 are mounted the feed-screw 2, the phonograph-cylinder 3, a phonogram-blank 4, (which is shown on a carrier such as described in my application, Case No. 889, Serial No. 373,407, filed December 3, 1890,) and the guide-rod 5, on which the sleeve 6 is movable. At one end of said sleeve is a feed-arm 7, which has a bearing on screw 2 through a longitudinal slot in a protecting-tube 8, which is held by standards rising from the casting or base-plate 1, as shown in Figs. 1 and 2. At the opposite end of the sleeve the recorder and reproducer carrying arm 9 is supported. This arm has at its base a sleeve 9^a, which fits onto the guide-sleeve and is adapted to turn thereon. At one side of the arm is a cutting or turning off tool, which is carried by a holder 10, having a collar 10^a, which is clamped onto the guide-sleeve 6 by means of the screw 11 or otherwise. Within the holder slides a rod or handle 12, having at its lower end a chute 13 and cutting-knife 14, which is preferably of sapphire and is mounted on one edge of a slot or opening in one side of the chute, as shown. In this position it is protected from mechanical injury and serves to guide the shavings cut from the blank into the chute.

15 is a spring connected to the rod 12 and to the holder, preferably being held in a passage through the body of the holder. The spring tends to draw the knife away from the phonogram-blank. At the upper end of the holder, around the rod 12, is an extension or

sleeve 16, forming a part of or fixed to the holder. This extension is in the form of an eccentric, as most clearly shown in Fig. 7, and over this eccentric is a clamping-nut 17. A screw 18, passing through one side of the nut, extends into a groove in the extension, so that although the nut can turn it is held from moving away from the holder. As the nut is turned very slightly it binds against the rod 12 and holds it in any position to which it is set. In one side of the rod or handle 12 a portion is cut away, as shown at 19, and in the notch thus formed rests one arm of a T-lever 20, pivoted as shown. A spring 21 normally holds the lever in engagement with the rod. The third arm of the lever projects into the path of a pin 22 on the recorder-carrying arm. The notch 19 is as wide as the available thickness of a phonogram-blank. This makes it impossible for a user to turn off the surface when the blank has been turned down as many times as it was intended to have it used. The upper side of the sleeve 9^a is provided with two flanges 23, between which is pivoted a lever 24, having a locking-dog 25. A spring 26 (see Fig. 6) underneath the lever 24 forces the locking-dog into notches 29 in a flange 27. This flange projects from a collar 27^a, which is fixed to the collar 10^a by pins 28. The locking-dog 25 is beveled on two sides, so that it may be readily disengaged from the notches by slight pressure on the arm 9 to adjust the position of the recording or reproducing device for recording-cylinders of different diameters or to raise the recording or reproducing device away from the blank. The locking-dog and flange 27 are provided for the purpose of locking the sleeve 9^a to the collar 10^a, so that when the arm 9 is raised or lowered by the tilting bar 36 the sleeve 6 will be turned on the guide-rod 5 and the feed-arm 7 caused to engage with or disengage from the feed-screw. To enable the locking-dog to be readily disengaged from the notches 29, the collar 10^a is provided with a pin 30, which projects into a groove 31 formed in the base-plate 1. This pin permits only a slight rotation of the sleeve 6 and collar 10^a, sufficient to engage and disengage the feed-arm from the feed-screw. The pin 30 is located so that when the presser-foot of the arm 9 rests on the guide-bar 35 it will not be in contact with the sides 31 of the groove 32, and hence will cause no friction at that point when the machine is in operation.

When it is desired to use a smaller phonogram-blank, the large blank and the phonograph-cylinders are removed and a small blank 4' placed directly on the phonograph-shaft or on a smaller cylinder. The pivoted arm 33, carried at the outer end of the recorder-carrying arm, is swung to the left, so that the foot 34 can rest on the guide-bar 35 instead of the end of arm 33, as is the case when a large blank is used. The guide-bar preferably consists of a part of the casting 1, as clearly shown in Figs. 1 and 4. The low-

ering of the arm brings the recorder and reproducer down into operative relation to the small blank, as indicated by the dotted-line position of arm 9 in Fig. 4. By exerting sufficient force on the recorder-carrying arm the tension of the spring 26 is overcome, arm 25 is forced back out of its notch, and the recorder-carrying arm turns on the sleeve 6. 25 presses against the flange 27 with sufficient force to prevent the arm falling rapidly against the blank even if the operator should accidentally release it after moving arm 33, as above explained. As arm 9 moves downward the pin 22 strikes the T-lever, moving the vertical arm out of the notch in which it rests. This makes it possible to move the cutting-tool forward far enough to shave the surface of the small blank.

The tilting bar 36 is pivoted or journaled in standards 36' beside the guide-bar and is provided with a key 37. The depression of this key tilts the bar 36 upward, as shown in dotted lines in Fig. 4, and raises the recording or reproducing point from the blank and disengages the feed-arm from the feed-screw. As the tilting bar moves to this position the arm 38 moves toward the right and operates a piston in the dash-pot 39. In the course of this movement pin 40 on the arm 38 passes over the detent 41 on the key-lever 42, and a spring 43 throws the lever 42 to its normal position and locks the key-lever 37 in its depressed position. This holds the bar 36 in its tilted position. To lower the recorder or reproducer, key-lever 42 is depressed to release the key-lever 37, when the tilting bar 36 will move slowly back to its normal position, the movement being retarded by the piston in the dash-pot, so that the recording or reproducing point will come into contact with the blank without jarring the recorder or reproducer and without injuring the blank.

44 is a projection on the dash-pot, which serves as a limiting-stop for the lever 42.

The phonograph-diaphragm 45, which carries the recorder and reproducer, is so mounted that when the diaphragm is in one position the recorder is in operative position and when moved the reproducer is brought into operative position, as shown and described in my Patent No. 465,972, dated December 29, 1891, or in any other suitable manner. The diaphragm is supported in a ring 46, carried by the arm 9. To this ring is connected a projecting arm 47, which extends by the cam 48, fixed on the shank 49 of the head 50. By turning this head in one direction the arm 47 and hence the ring and diaphragm are turned in the direction of the hands of a watch. By oppositely turning the cam and pressing against the arm 47 the diaphragm will be moved backward. This furnishes a very delicate means for adjusting the diaphragm to bring the reproducer into line with the track made by the recorder.

It is customary to employ two tubes with phonographs, one a speaking-tube for use in

recording and one a hearing-tube for use during reproduction, and the tubes are so shaped that the former cannot be put in place while the diaphragm is in position for reproducing, nor can the latter be put in place while the diaphragm is in position for recording. In the present case I show a double-topped cap 51 over the diaphragm and diaphragm-support. This cap is shown in cross-section in Fig. 4. The upper plate has an L-shaped slot, as shown in Figs. 1 and 5, and the lower plate has an opening 53 out of line with the wider portion of the first-mentioned slot. 54 is a short tube rigidly connected to the diaphragm or diaphragm-support. At one side of said tube is a rib 55, connected to the tube or to the diaphragm-support. The end of the speaking-tube which is intended to be placed next to the diaphragm is shown in Fig. 8. The inner bore of the tube is grooved, as shown at 56, or is otherwise adapted to engage with the rib 55. On the outer side of the tube is a lug 57. To put the tube in position, it is placed over 54 with the lug in line with the radial extension of the slot. The tube drops down until it reaches the lower plate of the cover. It is then turned until lug 57 comes in line with the opening 53, when it drops entirely into place, the diaphragm being brought into recording position by the same movement. To remove this tube, it is necessary to raise it to turn the diaphragm backward and then to raise the tube again. The hearing-tube can then be placed in position, the lug 57' passing through the opening in the upper plate of the cover and resting on the lower plate.

In order to shorten the machine and thus save space, the driving-motor 58 is placed directly under the phonograph-shaft instead of at one end, as heretofore. The motor is normally held in place by the posts 59, extending downward from plate 60. At the upper end of the armature-shaft is a pulley belted to the phonograph-shaft and a second pulley belted to a governor 61 in a well-known manner. The governor is adapted to break the motor-circuit when the motor reaches the limit of speed for which the governor is set. This is done by the centrifugal action of the balls raising disk 62 until it separates from the brush 63. Arm 64 can be turned by handle 65, thereby changing the position of the stop 66, and the position of said stop determines the point at which the circuit shall be broken. The motor-circuit is clearly indicated on Sheet 1, the connection passing from Fig. 1 to Fig. 3 to show the circuit through the governor. Switch 67 is shown open.

I do not claim the herein-described governor or any of the features thereof, this being claimed in a division of the present application, Patent No. 513,097, granted January 23, 1894.

Having thus described my invention, what I claim is—

1. In a phonograph, the combination of a

rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm adjustable for cylinders of different diameters, and means independent of the blank for supporting said arm in different positions to positively sustain the recording or reproducing device for engagement with cylinders of different diameters, substantially as set forth.

2. In a phonograph, the combination of a shaft having a tapering mandrel adapted to receive phonogram-cylinders of small diameter, a tapering shell adapted to be placed on said mandrel to receive phonogram-cylinders of large diameter, a driving connection for rotating said shaft, and a recording or reproducing device carried by an arm adjustable for cylinders of different diameters, substantially as set forth.

3. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm adjustable for cylinders of different diameters, means independent of the blank for supporting said arm in different positions to positively sustain the recording or reproducing device for engagement with cylinders of different diameters, and a feed-screw for moving said arm longitudinally of the phonogram-cylinder, substantially as set forth.

4. In a phonograph, the combination of a shaft having a tapering mandrel adapted to receive phonogram-cylinders of small diameter, a tapering shell adapted to be placed on said mandrel to receive phonogram-cylinders of large diameter, a driving connection for rotating said shaft, a recording or reproducing device carried by an arm adjustable for cylinders of different diameters, and a feed-screw for moving said arm longitudinally of the phonogram-cylinder, substantially as set forth.

5. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm traveling on a guide-rod, a feed-screw for moving said arm on said guide-rod, and means for positively sustaining the recording or reproducing device for engagement with cylinders of different diameters, substantially as set forth.

6. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm, a sleeve upon which said arm is adjustably mounted, whereby the same is adjustable for cylinders of different diameters, means for locking said sleeve in different positions, a guide-rod upon which said sleeve travels, and a feed-screw for moving said sleeve on the guide-rod, substantially as set forth.

7. In a phonograph, the combination of a

rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm, a sleeve upon which said arm is loosely
5 mounted, a notched flange carried by said sleeve, and a locking device carried by the arm, whereby said arm is adjustable for cylinders of different diameters, a guide-rod on which said sleeve travels, and a feed-screw
10 for moving said sleeve on the guide-rod, substantially as set forth.

8. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by an arm, a sleeve upon which said arm is adjustably mounted, whereby the same is adjustable for cylinders of different diameters, a feed-screw for feeding the recorder or reproducer arm longitudinally of the phonogram-cylinder, a feed-arm carried by the sleeve and engaging said screw, a guide-rod upon which said sleeve travels and which sleeve is capable of partial rotation thereon to disengage
20 the feed-arm from the feed-screw, and means for limiting the extent of rotation of the sleeve, substantially as set forth.

9. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by a pivoted arm movable longitudinally of the cylinder, a guide-rest for supporting the free end of said arm, and means for varying the
30 distance between said arm and guide-rest to adjust the arm for cylinders of different diameters, substantially as set forth.

10. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by a pivoted arm movable longitudinally of the cylinder, a guide-rest for supporting the free end of said arm, and a pivoted presser-foot
40 on said arm also adapted to bear upon said guide-rest, whereby the arm is adjusted for cylinders of different diameters, substantially as set forth.

11. In a phonograph, the combination of a rotating support adapted to receive phonogram-cylinders of different diameters, a recording or reproducing device carried by a pivoted arm movable longitudinally of the cylinder, a guide-rest for supporting the free
50 end of said arm, means for varying the distance between said arm and guide-rest to adjust the arm for cylinders of different diameters, and a tilting bar for raising said arm to re-

move the recording or reproducing device from the surface of the cylinder, substantially as set forth. 60

12. In a phonograph, the combination with a recorder or reproducer carrying arm movable toward and away from a phonogram-cylinder, a tilting bar on which said arm rests, and which is tilted to raise said arm and remove the recording or reproducing device from the surface of the cylinder, a key-lever for operating said tilting bar, and a locking-key for holding said tilting bar in its tilted
70 position, substantially as set forth.

13. In a phonograph, the combination with a recorder or reproducer carrying arm movable toward and away from a phonogram-cylinder, a tilting bar on which said arm rests and which is tilted to raise said arm and remove the recording or reproducing device from the surface of the cylinder, and a retarding device for retarding the downward movement of the recorder or reproducer arm, substantially as set forth. 80

14. A tool for turning off phonogram-cylinders, comprising a tool carried by a shank working through a support, a locking device for holding the tool when adjusted relative to the cylinder, a device for limiting the length of movement of the shank through the holder when operating on cylinders of large diameter, and means for disengaging said limiting device to permit the operation of said
90 tool on cylinders of much smaller diameter, substantially as set forth.

15. In a phonograph, the combination of an arm movable over a phonogram, a reproducing device rotatably carried by said arm, and a cam for partially rotating said reproducing device on said arm to adjust the point of the reproducing device relative to the record, substantially as set forth. 95

16. In a phonograph, the combination with a diaphragm provided with a recording and a reproducing point, of a support for the diaphragm adapted to be partially rotated, means carried by said support for receiving a speaking-tube which coöperates with said
105 means to turn the diaphragm-support and bring either the recording or reproducing point into operative position, substantially as set forth.

This specification signed and witnessed this 110 1st day of December, 1890.

THOS. A. EDISON.

Witnesses:

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W. PELZER.