

No. 778,271.

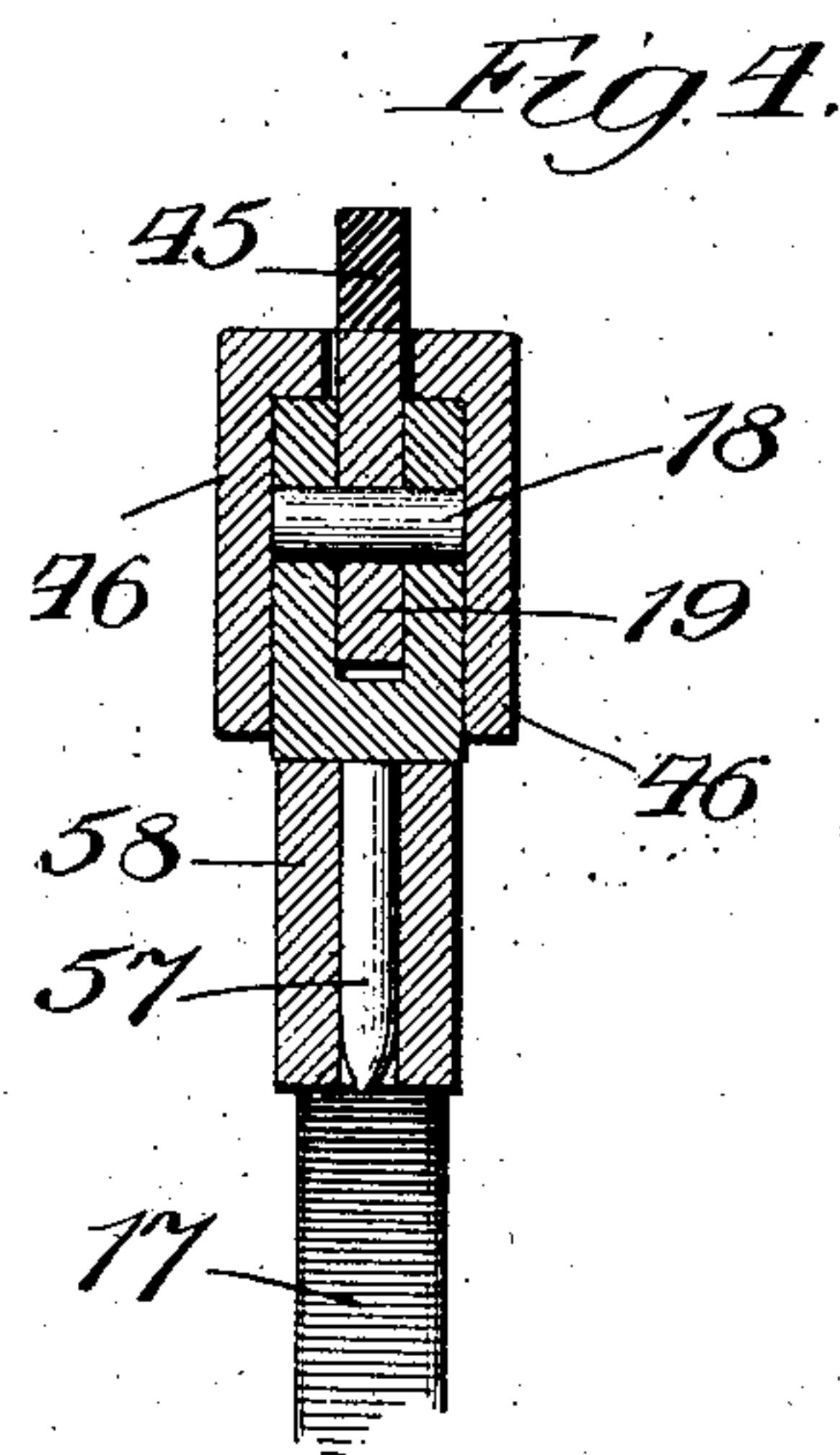
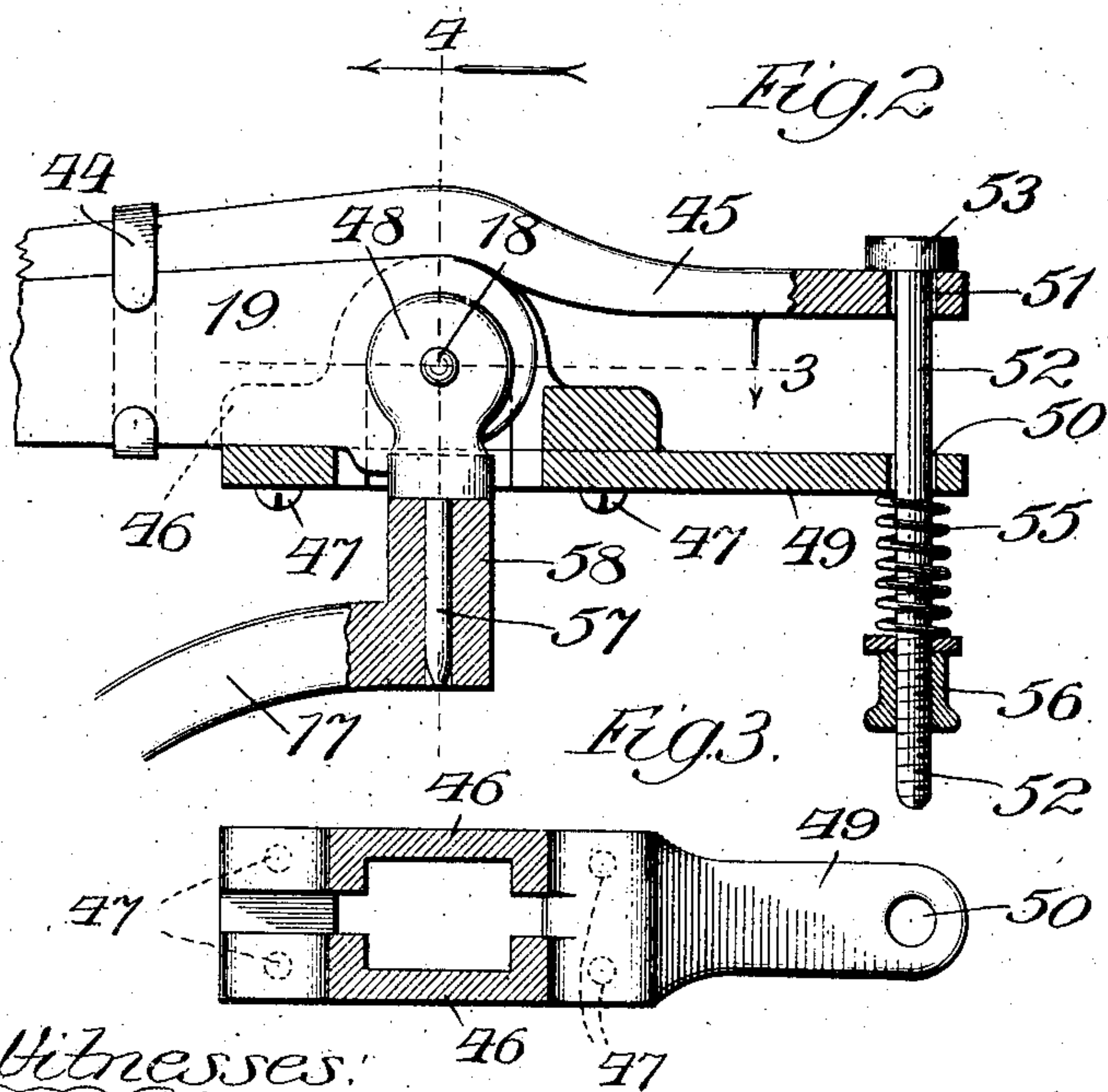
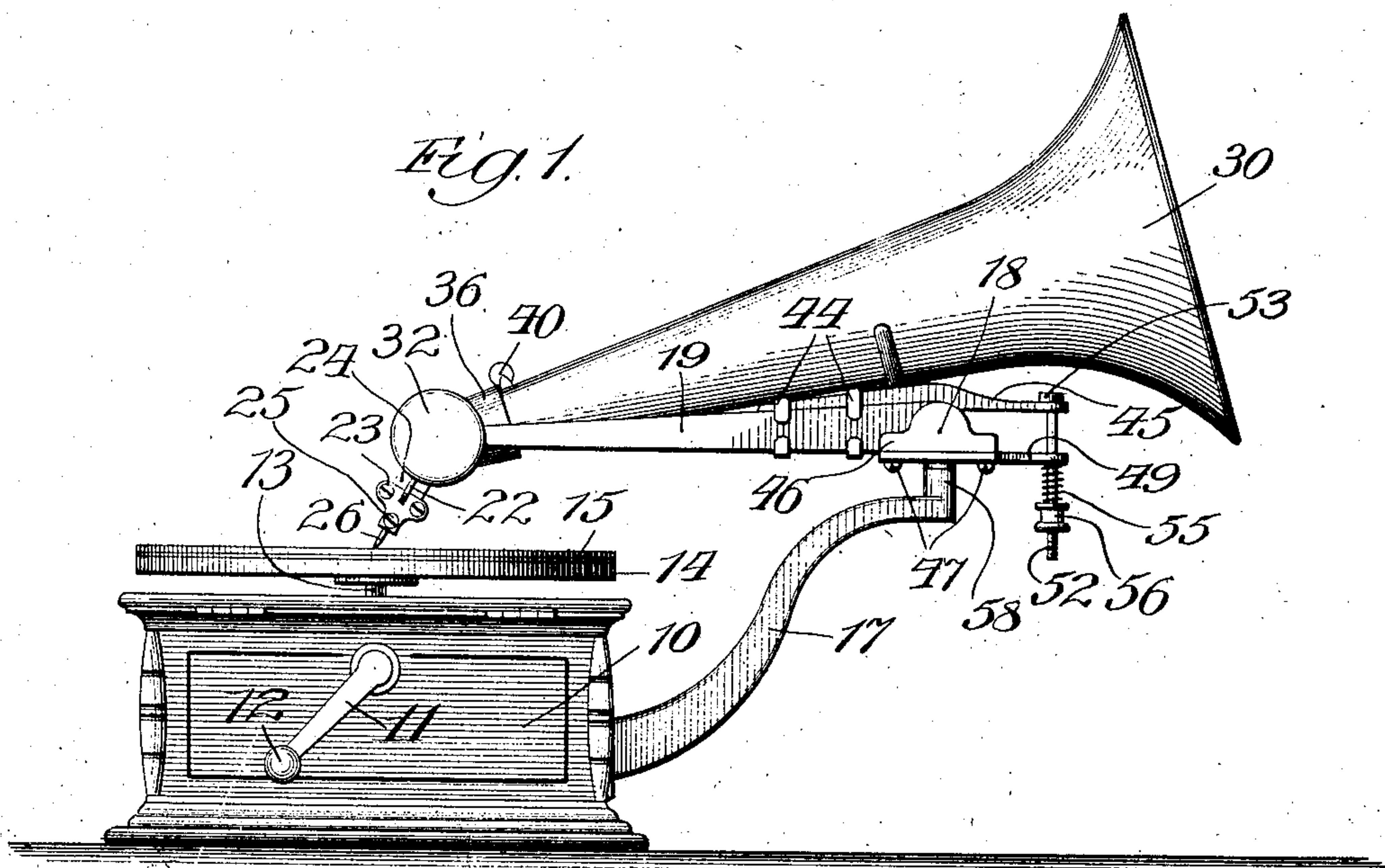
PATENTED DEC. 27, 1904.

E. M. ROBINSON.

PHONOGRAPH.

APPLICATION FILED MAY 12, 1904.

2 SHEETS—SHEET 1.



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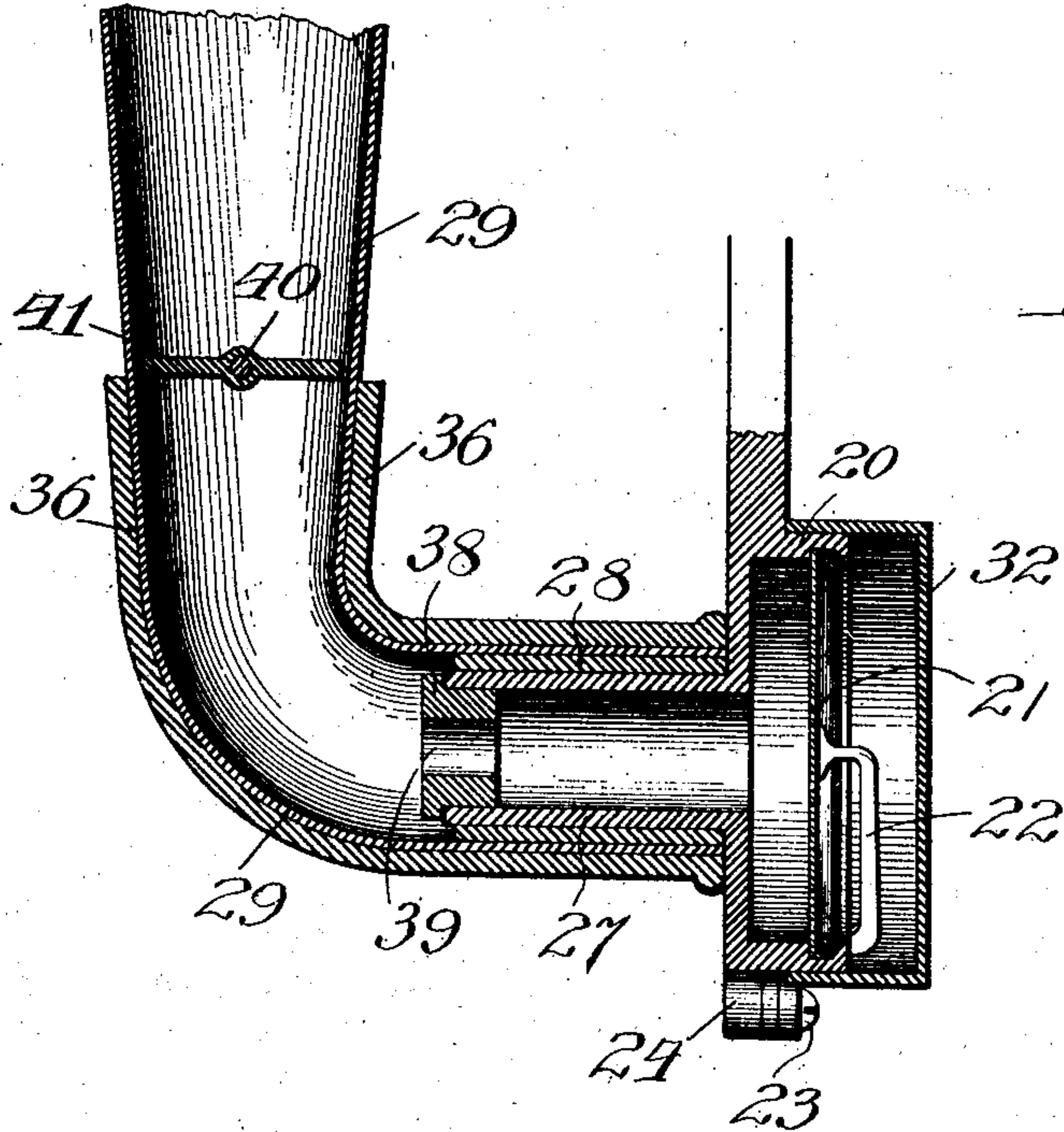


Fig. 5.

Fig. 7.

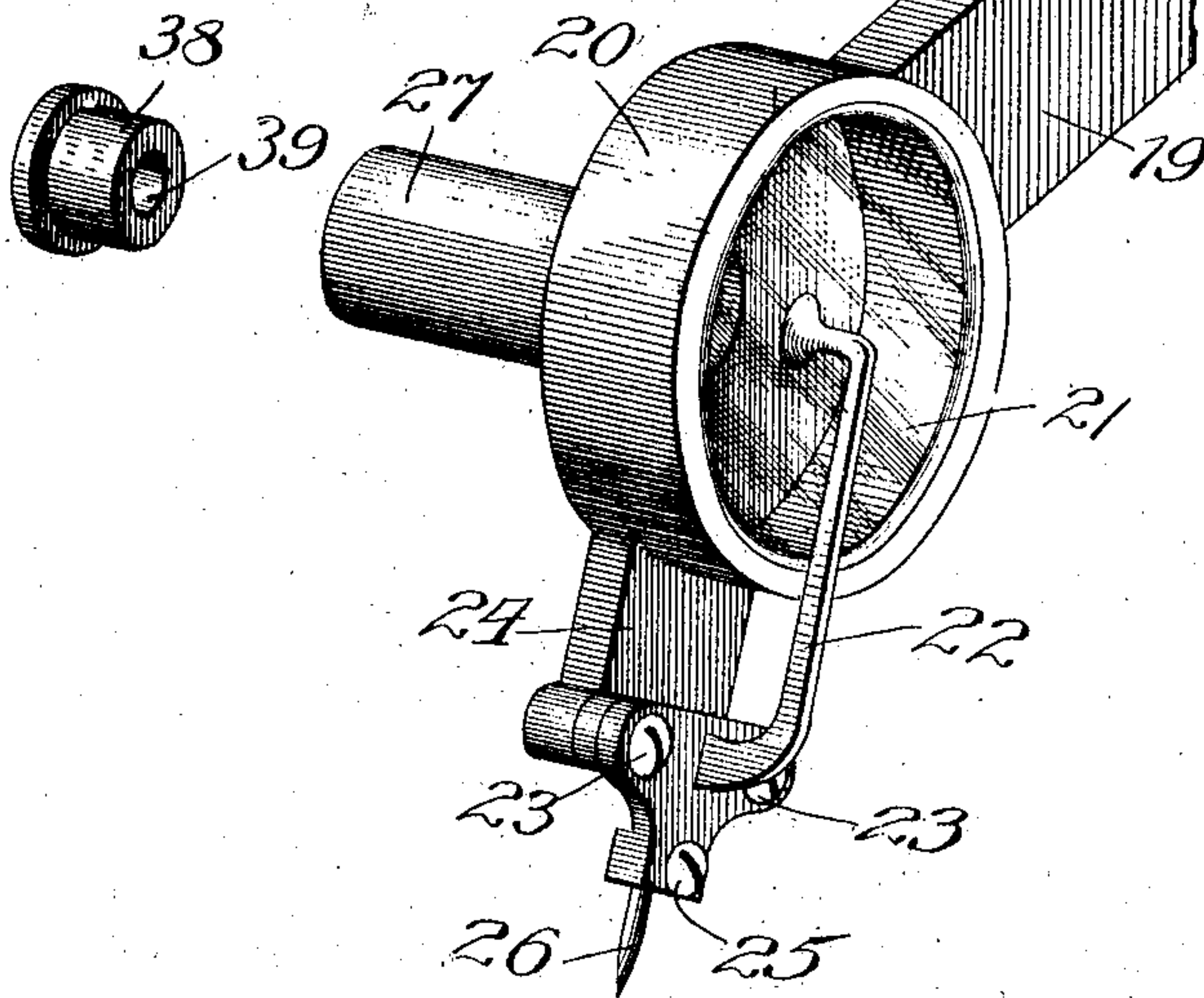
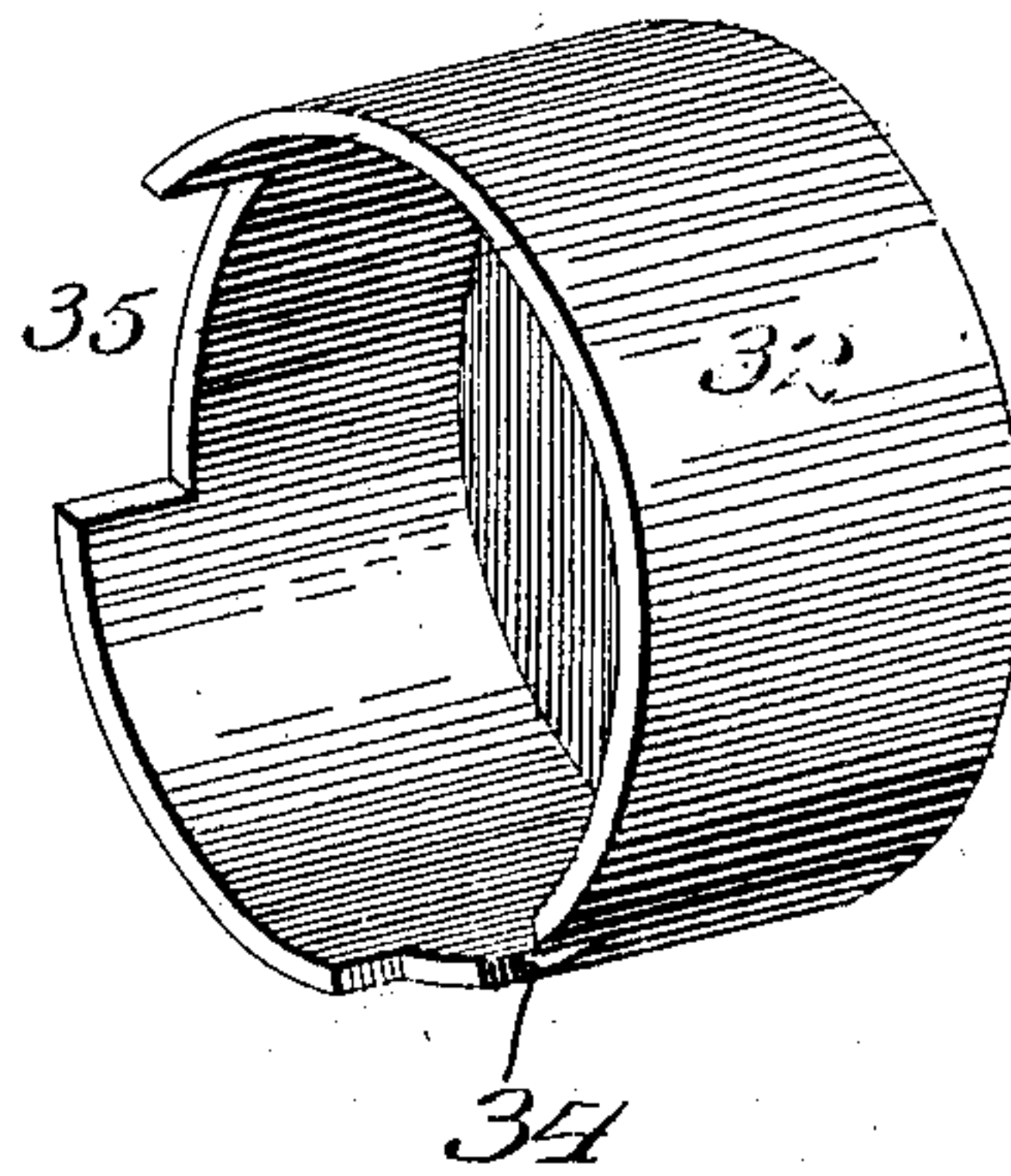


Fig. 6.

Fig. 8.



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# UNITED STATES PATENT OFFICE.

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## PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 778,271, dated December 27, 1904.

Application filed May 12, 1904. Serial No. 207,713.

*To all whom it may concern:*

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonographs, of which the following is a specification in its best form now known to me, reference being had to the accompanying drawings, in which similar numerals indicate the same parts throughout the several views.

My invention relates to phonographs; and the object of my invention is to so improve a reproducing-phonograph, particularly one designed for rendering music, that it can be satisfactorily used in a small room.

While a commercial phonograph-reproducer may be operated upon the sound-reproducing cylinder or disk record to produce music or spoken words of low volume of sound, it has been frequently demonstrated that such a device does not properly improve and round out the reproduced sound, and it is therefore substantially universally the practice to supply such instruments with a horn. Such a horn is in practice applied to one side of the reproducer, and the vibrations from that side only of the reproducer are collected in the horn. When a phonograph equipped with such a horn is used in a small room without there being any obstructions whatever in the horn, the tone of the instrument is much too loud for the air-space in the room. Where such instruments have been used in private houses, it has frequently been found necessary in order to have satisfactory results to place the instrument in one room and the audience in another at some distance; but this has the disadvantage of compelling the operator of the instrument to remain away from his friends and also to endure the discomfort of the loud sound of the instrument. As an alternative for this method of getting satisfactory results it has been attempted to muffle the phonograph sounds by stuffing some sort of an obstruction, usually a cloth wadding, in the bell of the horn; but I have found this method very unsatisfactory, for the reason that it destroys in a large measure the quality of the tone coming from

the horn. Furthermore, I have found that at all times the sound-waves from the side of the producer on which the horn is not attached can be heard by noticing them, but that when the horn itself is muffled, as just described, these sound-waves from the uninclosed side of the reproducer become very noticeable and unpleasant, because they are not properly taken care of and rounded out as they would be if a horn were also placed upon that side of the reproducer. It is also a fact that when a thin metallic horn, such as is commonly used, is muffled in some such manner as just described the sound-waves within the horn between the reproducer and the muffler are transmitted to the open air by the metallic body of the horn. Another disadvantage with many phonographs is that the reproducing-needle bears too heavily upon the record, thereby tending to unduly wear the record and destroy both its accuracy and its life and to cause an unpleasant and scratching sound.

The object of my invention is to provide means by which the horn of the phonograph may be muffled without injuring the quality of the tone coming from it, to provide means whereby the horn itself will not transmit through its walls any material volume of sound, to provide means by which the heretofore open side of the reproducer will be closed and substantially all sounds produced by it be retained within the instrument, and to provide means for adjusting the pressure of the needle-point upon the record to reduce the scratch. My invention also consists in many details of construction, which will be hereinafter more fully described and claimed as the specification proceeds.

In the drawings, Figure 1 is a side elevation of one of the commercial forms of phonographs having my invention applied thereto. Fig. 2 is a side elevation of the details of mechanism for varying the weight or pressure of the needle upon the record-plate. Fig. 3 is a plan view of this mechanism, taken on line 3 of Fig. 2. Fig. 4 is a sectional end elevation taken on line 4 of Fig. 2. Fig. 5 is a center sectional detail view taken vertically through the horn and reproducer, showing my



invention applied thereto. Fig. 6 is a perspective view of an ordinary reproducer. Fig. 7 is a detail view of a plug to be inserted in the reproducer tube or horn to reduce the volume of vibrating air passing through it. Fig. 8 is a detail perspective view of a cap to be applied to the reproducer.

As heretofore described, my invention consists in improvements in phonographs of commercial use, and except as hereinafter pointed out the parts named, shown, and described are to be understood as merely representing for illustration one of the several commercial forms of devices to which my invention may be applied.

In the drawings, numeral 10 indicates the box or case of such a commercial instrument having within it a motor or engine adapted to be wound up by the operation of a crank 11, having on its end a handle 12. Attached to this motor 11 is a vertical rotatable shaft 13, having on its upper end a permanent disk 14. On this rotatable disk 14 are placed in succession different detachable record-plates or "records" 15, having impressed upon their surfaces the sound-record either of words or music or of other sounds which are to be reproduced by the instrument. Extending from the box 10 is a stationary support 17, having in its end 58 a pivoted post 57, bearing at its upper end a block or casting 48. Pivoted to this casting 48 at 18 is another arm, 19. Either integral with or rigidly secured to the end of this arm 19 is a usually cylindrical case 20, wholly open on one face, as shown, and opened into the restricted passage-way 27 on the opposite side, as shown, having within it at approximately its center a vibrating diaphragm 21, usually of mica. Rigidly secured to this mica disk 21, which will be hereinafter referred to as the "reproducer-disk," is a depending arm 22, adapted to vibrate, having its lower end supported, while allowing free vibration, by the screws 23, which enter the depending rigid support 24, secured to the bottom of the cylinder 20. Detachably secured to the lower end of this depending vibratory arm 22 by a screw 25 is a detachable needle 26, adapted to bear in a spiral groove in the surface of the record-plate 15. Inclosing the tube 27, heretofore referred to, is a rubber bushing 28, on which fits the horn 29. This bushing 28 may be secured either to the tube 27 or to the inside of the horn 29 and slip along the other of said members. The function of this bushing 28 is to make an air-tight joint between the horn and the tube.

In the operation of this commercial phonograph just described the propelling-motor rotates shaft 13 and the disk 14, with the record 15 upon it, under the needle 26. The needle 26 is thus given by the irregularities of the path of the record made therein at the time the record itself is made a sidewise vibratory motion, and this motion is communi-

cated, through the vibratory arm 22, heretofore described, to the reproducer-diaphragm 21, which diaphragm vibrates and gives the sounds which were impressed upon the record when it was made. The vibrations of the front of this diaphragm are open, as shown in the front of Fig. 6, and the vibrations of the other side of the diaphragm travel through the tube 27 and out through the horn 29 into the air, this horn being used to collect and amplify the sound tones. When only the parts described are used, the sound thus amplified by the horn is so great that except by placing one's ear near the reproducer-disk 21 the sounds coming from the reproducer shown in the front, as in Fig. 6, are not particularly noticed. The volume of sound, however, coming from the horn of the phonograph of ordinary size is, as heretofore described, altogether too great for use in an ordinary room, and it has heretofore been the practice to stuff a muffler, consisting usually of a wad of something, in the bell of the horn. As soon as this is done the volume of sound passing through the horn is reduced and rendered unsatisfactory, and at the same time the sound-waves which escape from the front of the reproducer-disk are greatly accentuated. Under these conditions I also find that even the neck of the horn adjacent to the tube 27 vibrates and sends out sound-waves into the room. All of these conditions render the use of the instrument almost as unsatisfactory in a room of ordinary size as when an unmuffled horn is used. In order to avoid these disadvantages, I provide the following mechanism: I first provide a cap 32, made (in the case of the instrument shown) cylindrical in form to fit over the flange 20, inclosing the reproducer-disk. If, however, the reproducer-disk is inclosed in a case of a different shape, this cap should be made to conform to that shape. I make this cap of some material which does not readily transmit vibratory sounds, and if a substance which does not transmit any such sounds can be obtained such substance should preferably be used. In practice I have found a cap made of heavy cardboard very satisfactory. This cap fits upon the face of the reproducer very closely, but has cut in its lower edge a notch 34, through which the depending vibratory arm 22 passes and in which it can freely vibrate. I also provide a notch 35 to engage the arm 19. This notch merely serves as a guide, so that the cap will always be in the same position, thereby insuring that the vibrating arm 22 shall be free to vibrate in notch 34 without any danger of coming in contact with the cap. I furthermore find it of great advantage to inclose the elbow of the horn in a non-sound-vibration-transmitting tube 36, preferably a thick piece of hose made of soft rubber. In practice I have found that such a piece of hose about an eighth of an inch thick stops



substantially all perceptible transmission of sound through this elbow of the horn. In order to dispense with the muffler-wad in the end of the horn, I provide a plurality of rubber plugs 38, each adapted to fit inside of the tube 27 and each having an orifice 39 of a different size in its center. By removing the horn 29 from the tube 27 and substituting a plug of different-sized openings 39 I am able to regulate the volume of sound-waves passing into the horn from the reproducer. In order to further regulate the volume of sound-waves passing through the horn, I pivot at 40 within the horn a damper 41, made like an ordinary stovepipe-damper, adapted to be opened and closed either by an extension of the rod 40 through the surface of the horn or by an instrument inserted in the bell of the horn, thereby in different positions of the damper 41 regulating the volume of sound-waves passing through the horn.

While I have used the rubber plug 38 with success, I recommend that when the devices are made in commerce that a damper like the one 40 be placed in the reproducer-tube 27 in place of the plug.

Another great difficulty in commercial practice lies in the fact that the needle 26 presses too hard upon the record, thereby wearing it out, and also, what is more important, accentuating in the sound produced any irregularities impressed upon the record. In order to do away with this difficulty, I attach to the arm 19, heretofore described, by clips 44 a horizontal member 45, and I also inclose the casting 48 with a supplemental member 46. To the member 48 I secure, by means of screws 47, another horizontal member 49. These parts become when attached practically a part of the casting 48. In the arm 49 is a hole 50, and in the arm 45 is a hole 51, and through these holes 50 and 51 I pass a bolt 52, having its head 53 bearing against the pivoted moving member 45 and having on its shank a spring 55, bearing against a detachable thumb-screw 56. By turning this thumb-screw 56 up and down on screw 52 against the action of spring 55 I am able to move the movable arm 45 to and from the arm 49, thereby adjusting the weight of the horn and the reproducer upon the needle 26, and therefore regulating the pressure of the needle upon the record. In other words, the action of this device is just the same as though I hung a variable counter-weight on the arm 45.

When any of the commercial types of phonographs are equipped with these attachments just described, I find that I can, first, by regulating the thumb-screw 56 vary the pressure of the needle 26 upon the record, thereby decreasing the "scratch" of the needle upon the record. I also find that by using the cap 32 the sound-waves transmitted from the open side of the reproducer are almost entirely eliminated, thereby rendering the instrument

much more useful in an ordinary room irrespective of whether or not the other features of the device were used. By using either or both of the adjustable devices 38 and 41 I am able to reduce the volume of sound passing through the horn without injuring the quality, and I therefore improve the instrument. The use of the covering 36 over the elbow of the horn does away with the transmission of sounds through the elbow of the horn and renders it still more effective for use in an ordinary room.

By the use of the above devices here shown I can readily convert a large phonograph suitable only for concert purposes so that it can be satisfactorily used in ordinary rooms without its being distasteful to the audience in the same room.

I do not wish to be limited as to the form of phonograph to which my invention shall be applied. All of these features are by mere slight changes in form as readily adaptable for a phonograph of the cylindrical type as one of the disk type, as here shown, without departing from my invention.

I do not wish to be limited to the exact details of construction, which may be varied within reasonable limits without departing from the principles of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph the combination of a record, a standard, an arm pivoted to said standard carrying a reproducer bearing on said record, a supplemental arm secured to said standard, a supplemental arm secured to said main arm, and means engaging both of said supplemental arms adapted to vary the angle of the arm to the standard, whereby the pressure of the reproducer on the record is varied.

2. As an article of manufacture for use in a phonograph a removable cap made of substantially imperforate substantially non-sound-transmitting material, adapted to slidably fit over and cover one side of the reproducer of the phonograph.

3. As an article of manufacture for use in a phonograph a removable cap made of substantially imperforate substantially non-sound-transmitting material, adapted to slidably fit over and cover one side of the reproducer of the phonograph, there being a notch or notches cut in the sides of said cap adapted to fit over fixed points on a reproducer whereby said cap can only be inserted upon the reproducer in a predetermined proper position.

4. In a phonograph, in combination with a record, a reproducer in operative connection therewith and a horn attached to said reproducer, adjustable means within the horn for restricting the opening within the horn for the passage of sound.

5. In a phonograph in combination with a



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record, a reproducer in operative connection therewith and a horn attached to said reproducer; adjustable means within the horn near the reproducer adapted to restrict the opening within the horn for the passage of sound and other adjustable means between said first adjustable means and the end of the horn adapted to restrict the volume of sound passing through the horn.

10 6. In a phonograph the combination of a record, a reproducer in operative connection therewith and a horn attached to said reproducer; a damper mounted in the path of sound-waves passing from the reproducer through

the horn adapted to be turned upon its axis 15 to different positions to restrict the volume of sound-waves passing through the horn.

7. In a phonograph, the combination of a reproducer, a horn attached thereto, a damper or sound-restricting device within the horn 20 and a substantially non-sound-transmitting covering inclosing the portion of the horn between the reproducer and said damper.

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