

No. 618,390.

Patented Jan. 31, 1899.

G. BETTINI.
PHONOGRAPH.

(Application filed Feb. 11, 1897.)

(No Model.)

4 Sheets—Sheet 1.

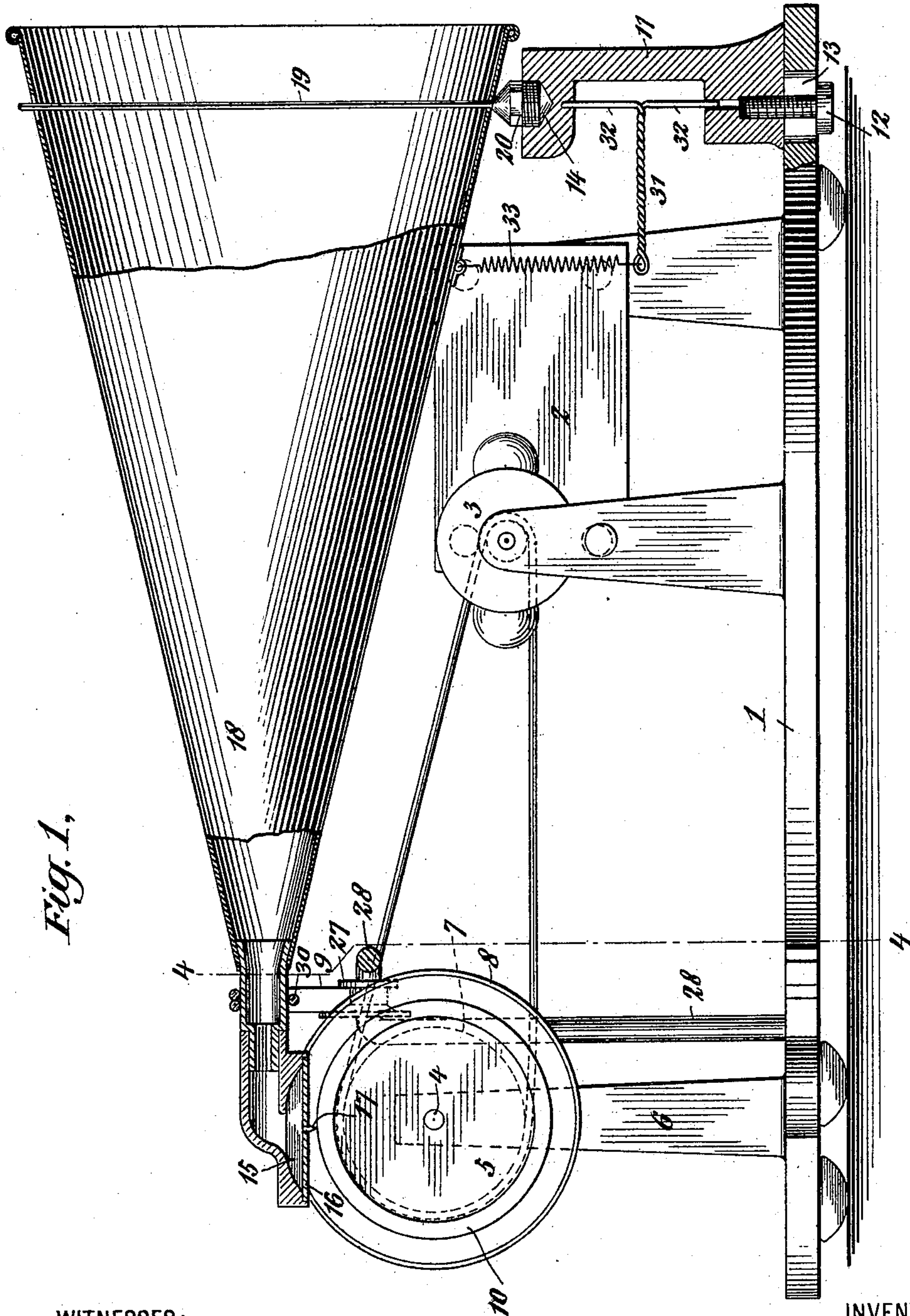


Fig. 1.

WITNESSES:

A. H. Haywood
Ernest S. Simpson

INVENTOR

Gianni Bettini
BY *E. W. Dickerson*
his ATTORNEY

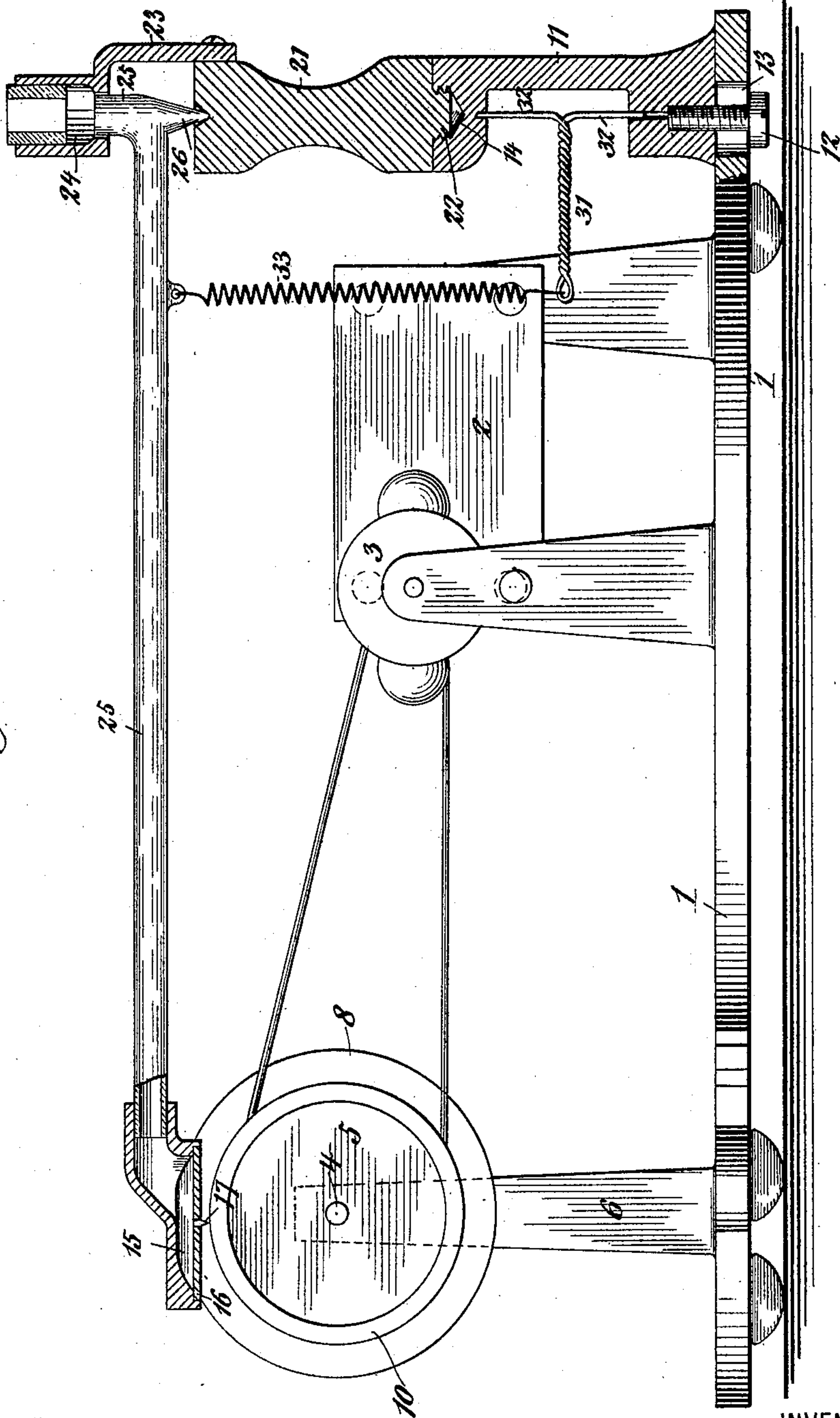
G. BETTINI.
PHONOGRAPH.

(Application filed Feb. 11, 1897.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2.



WITNESSES:

R. H. Hayward
Ernest Hopkinson

INVENTOR

Gianni Bettini
BY *E. N. Dickerson*
his ATTORNEY

No. 618,390.

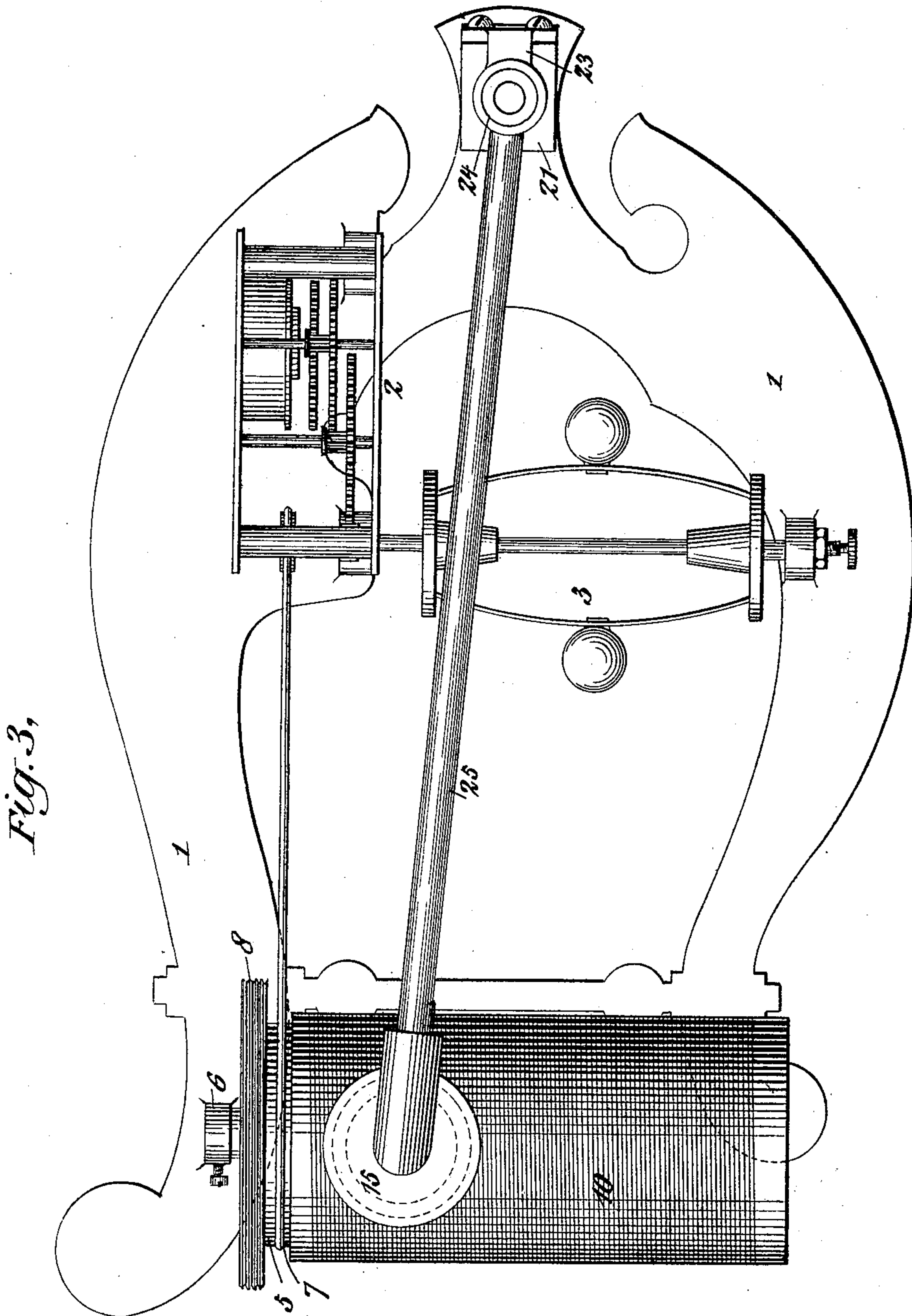
Patented Jan. 31, 1899.

G. BETTINI.
PHONOGRAPH.

(Application filed Feb. 11, 1897.)

(No Model.)

4 Sheets—Sheet 3.



WITNESSES:

N. H. Hayworth
Trust Hopkinson

INVENTOR

Gianni Bettini

BY
E. H. Dickerson
his ATTORNEY

No. 618,390.

Patented Jan. 31, 1899.

G. BETTINI.
PHONOGRAPH.

(Application filed Feb. 11, 1897.)

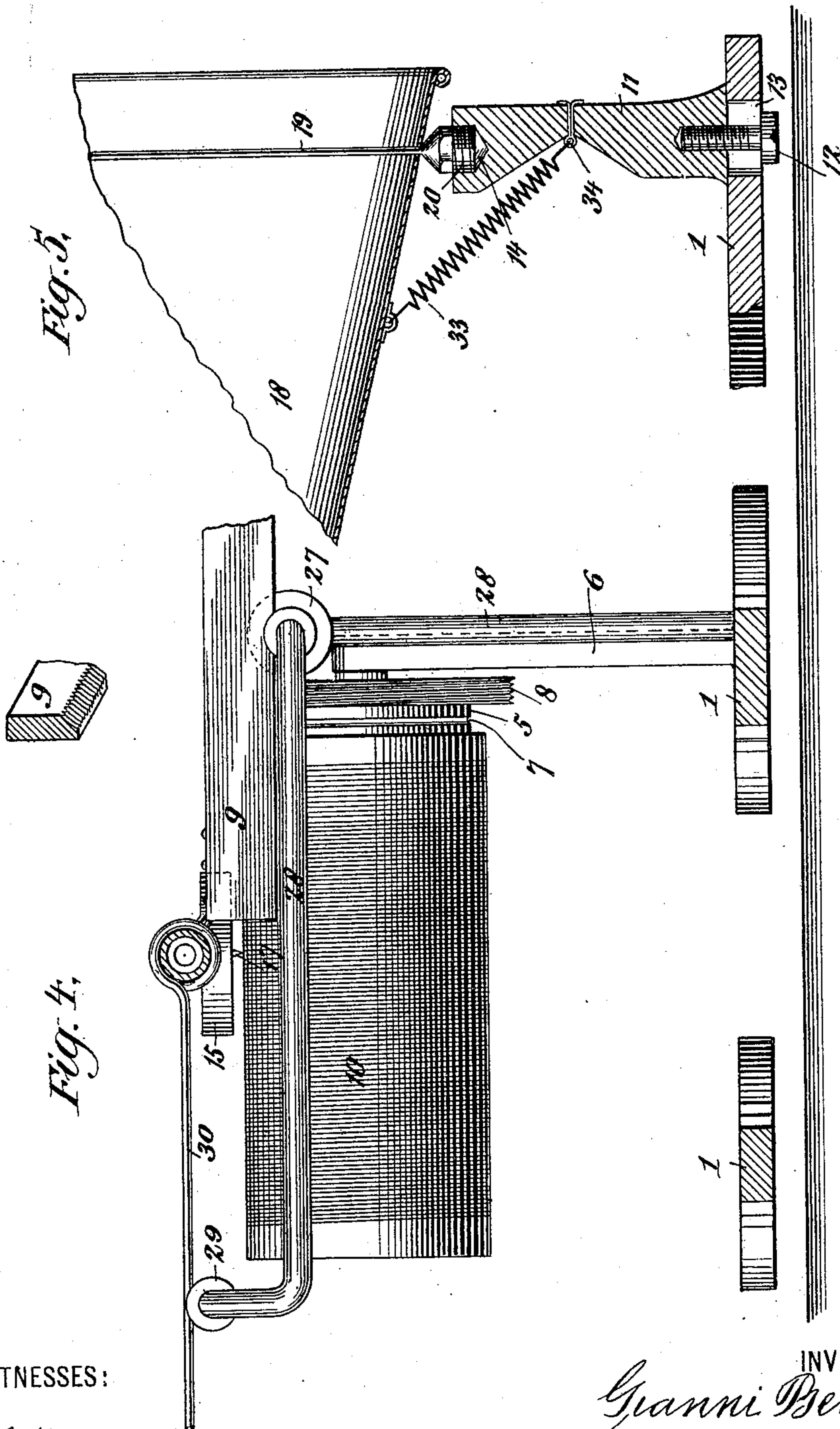
(No Model.)

4 Sheets—Sheet 4.

Fig. 5.

Fig. 6.

Fig. 4.



WITNESSES:

O. H. Raymond
Ernest Hopkinson

INVENTOR

Gianni Bettini

BY

E. H. Dickerson
his ATTORNEY

UNITED STATES PATENT OFFICE.

GIANNI BETTINI, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LYROPHONE COMPANY, OF WEST VIRGINIA.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 618,390, dated January 31, 1899.

Application filed February 11, 1897. Serial No. 622,887. (No model.)

To all whom it may concern:

Be it known that I, GIANNI BETTINI, of the city, county, and State of New York, have invented a new and useful Improvement in Phonographs, of which the following is a specification, reference being had to the drawings accompanying and forming a part thereof.

The present invention relates to new and improved apparatus for recording and reproducing sound, and has for its object to provide a construction which may be used for recording sound and reproducing the same either in the same or a magnified volume, and this by means of simple interchangeable parts capable of use in the same construction. Besides this the present invention provides a new and improved association of sound recording and reproducing parts, as the stylus-diaphragm and sound-chamber, as well as means for controlling the movement of the stylus with and yet independently of the recording-cylinder. One of the constructions of the present invention enables an immediate, exact, and loud reproduction of the vibration produced by the record to be converted into sound without any intermediate mechanism. The sound-producing diaphragm of the reproducing mechanism has supported upon it without contact with any other body the reproducing-stylus. This reproducing-stylus being directly connected to the diaphragm and, by preference, centrally located with reference to said diaphragm, conveys directly to the diaphragm the recorded sound-vibrations. The stylus follows the recorded sound-vibrations by the spiral of the cylinder itself and is therefore always exactly in register. The sound-amplifying horn connects directly with the diaphragm and is supported by the stylus, its weight being carried to the stylus through the diaphragm. The diaphragm therefore performs directly the double function of supporting the horn and of causing it to follow the spiral of the record, this effect being produced by the force conveyed directly through the diaphragm to the horn from the moving stylus. An equally good result cannot be accomplished in a machine in which the diaphragm does not rest

directly upon the record and in which there is some intermediate vibration-transmitting mechanism, such as a pivoted lever.

In the drawings I have illustrated a construction embodying the features of the present invention, in which—

Figure 1 is a side elevation, certain parts being in central vertical section. Fig. 2 is a similar view showing a different arrangement of parts. Fig. 3 is a plan view of the devices shown in Fig. 2. Fig. 4 is a section along line 4 4 of Fig. 1. Fig. 5 is a detail view, in vertical section, of parts shown in Fig. 1, but showing a modified form of tension-spring. Fig. 6 is a detail view, partly broken away, of a device for converting a rotary motion into a lateral motion and imparting the same to the stylus-carrying part at a rate proportional to the speed of rotation.

Like letters of reference refer to like parts of the several views of the drawings.

Referring to the drawings in detail, 1 represents the base of the instrument, which may be in any desired form; but it is shown as being made in the form of the conventional representation of a lyre.

2 represents a motor for actuating the spool carrying the record-cylinder, this being of any character and here shown as a spring-motor.

A governor 3 is shown for controlling the movements of the motor, this governor being likewise in any desired form.

A spindle 4 is provided for carrying the record-cylinder spool 5, said spindle being supported at one end only on a standard 6. The spool 5 has formed on it a portion 7, adapted to receive a belt transmitting rotary motion from the motor 2. On the spool is a worm-wheel 8, meshing with a part 9 to give lateral motion to the stylus-carrying part.

10 represents the record-cylinder, which is composed of any plastic material suitable for receiving and preserving a graphic representation of the movements of a sound, the diaphragm transmitting to it by a stylus.

Suitably positioned on the base is a post 11, adjustably secured in place by means of a screw 12, passing through a slot 13. This post is for the purpose of interchangeably

supporting different forms of sound-recording and sound-reproducing parts, and for this purpose is provided with a threaded socket 14.

Situated over or approximately over the central line of the record-cylinder are the devices which transmit the sound-vibrations to the recording-cylinder and which, acting conversely, reproduce them. These devices consist of a sound-chamber 15, having a diaphragm 16, to which is attached or integrally formed a stylus 17.

The construction here illustrated as embodying the invention is so constituted as to be capable of use with different forms of sound-conduits, whether for the purpose of transmitting sound-waves to the diaphragm to be by it graphically recorded on the cylinder through the medium of the stylus or for the purpose of reproducing from the record-cylinder the sound-waves so recorded. For instance, in Fig. 1 a bell-mouthed tube or megaphone 18 is shown, which may be used as a receiver for collecting, concentrating, and directing upon the diaphragm sound-waves entering it or may be used for the purpose of reproducing, magnifying, and distributing from the recording-cylinder sound-waves graphically represented thereon. This bell-mouthed tube is pivoted at its flaring end upon a stem 19, passing through it and having a threaded head 20 screwing into the socket 14, the narrow end being connected with the sound-chamber by means of a nipple 20.

In Figs. 2 and 3 the instrument is shown as designed for use in connection with an ear-tube. For this purpose the post 11 supports an extension 21, which is shown as secured to said post by means of a threaded projection 22, screwing into the socket 14. Secured to the extension 21 is a bracket 23, which is provided with a tube-section 24, into one end of which fits a flexible ear-tube, the other end receiving a tube 25, having a pivot-point 26 fitting a recess in the extension 21, the other end of this tube fitting into and carrying the sound-chamber, with its diaphragm and stylus.

When the instrument is used as a sound-recorder, it is essential that motion be given to the stylus in a direction longitudinally of the revolving recording-cylinder while the stylus is in contact therewith; and also when the instrument is used for the purpose of reproducing sounds previously recorded and graphically represented on the record-cylinder it is desirable (although not essential) that the stylus should be guided and controlled to follow the record-line of sound representations independently of the guiding action such line would have upon the stylus if it were left free to be guided thereby. These objects are accomplished by means of the worm-wheel 8 and part 9. This part 9 is formed of some material which may be easily serrated or indented, such as wood, and is provided with corrugations or teeth which are

the reciprocal of or are adapted to engage the spiral of the worm-wheel 8 to transform from the rotary motion of said wheel to the stylus a movement longitudinally of the recording-cylinder at a rate corresponding to the rate of revolution of the record-cylinder, said corrugations being formed in the piece 9 by pressing the same in contact with a worm-wheel similar to the one with which it is designed to coact when in operation. The part 9 is guided in its lateral movement by a grooved friction-roller 27, carried on a support 28, which support extends transversely across the instrument and is provided at the opposite side with a friction-roller 29, which supports and guides a rod 30, attached to the stylus-carrying part. (See Fig. 1.) The part 9 is secured to the stylus-carrying part on the opposite side.

An important feature of the present invention consists in the devices by which tension is imparted to the stylus-carrying part to cause the stylus to be kept in contact with the record-cylinder with a uniform degree of pressure. It is essential to the best operation of the instrument that the stylus should bear upon the record-cylinder always at right angles to the axial line of said cylinder and without any inclination, and as the stylus moves across longitudinally from end to end of the record-cylinder about a center of rotation the tension device to exert the required tension must be one which varies correspondingly. To provide for this, I have devised the constructions illustrated in the drawings, that construction shown in Figs. 1 and 2 consisting of a rod 31, provided with arms 32, pivoted in line with the point about which the stylus-carrying part oscillates. To the end of the arm 31 is secured a spiral spring 33, whose other end is attached to the stylus-carrying part. By this construction it will be seen that the spring exerts a constant tension upon the stylus-carrying part, and the arm 31, moving about the same center of oscillation as the stylus-carrying part itself, causes the spring to exert upon the stylus, through the medium of its support, a pressure always at right angles to the axial line of the record-cylinder, whatever the position of the stylus may be, and this irrespective of whether the instrument is placed in a true horizontal position or not. In Fig. 5 I have illustrated a modification of this tension device, in which the spring, instead of being secured to a rod, as in Figs. 1 and 2, is secured directly to an eye 34 in line with the pivotal point of the stylus-carrying part.

While I have described the use of the worm-wheel 8 and the part 9 for the purpose of controlling the movement of the stylus-carrying part longitudinally of the recording-cylinder both in the operation of recording sound and reproducing it, it is only absolutely essential when the instrument is used for the purpose of recording sound; but the use of these parts for controlling the movement of the stylus

during the operation of reproducing sound is an advantage in that the stylus is compelled to follow the line of sound representations upon the cylinder absolutely, as it is controlled by exactly the same devices which actuated it during the operation of recording the sounds, so that danger of the stylus leaving the line or groove of sound-records is obviated and the danger of injuring the cylinder by the stylus leaving the record-line and abrading the surface of the cylinder is done away with.

What is claimed as new is—

1. In an instrument for recording and reproducing sound, the combination of a sound-chamber having a diaphragm carrying a stylus and located in juxtaposition to the record-cylinder, of an adjustable post consisting of a fixed part 11 and the removable part 21 and sound-conduits of different forms adapted to be interchangeably supported thereby, substantially as specified.

2. In an instrument for reproducing sound, a pressure device consisting of a rod having pivotal arms in line with the pivotal point of the stylus-carrying part, and a spring attached to said rod and to the stylus-carrying part, substantially as specified.

3. In an instrument for recording and reproducing sound, the combination with a revoluble record-surface, of a sound-chamber carrying a diaphragm and stylus, a pivoted sound-conduit having its free end supported only by the sound-chamber, and its stylus, means for moving the pivoted sound-chamber and stylus about the pivotal point, means for pivotally supporting different forms of sound-conduits, and a pressure device operating to cause the stylus to press upon the record-cylinder at right angles to the axial line thereof throughout its path of movement, substantially as described.

4. In an instrument for reproducing sound, a pivoted stylus-carrying part, and a pressure device consisting of a rod having arms pivoted in line with the center about which the stylus-carrying part oscillates, and a spring secured to said rod and to the stylus-carrying part, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GIANNI BETTINI.

Witnesses:

E. D. GREENE,
B. L. CLARKE.