

(Model.)

W. W. JACQUES.

PHONOGRAPH.

No. 413,282.

Patented Oct. 22, 1889.

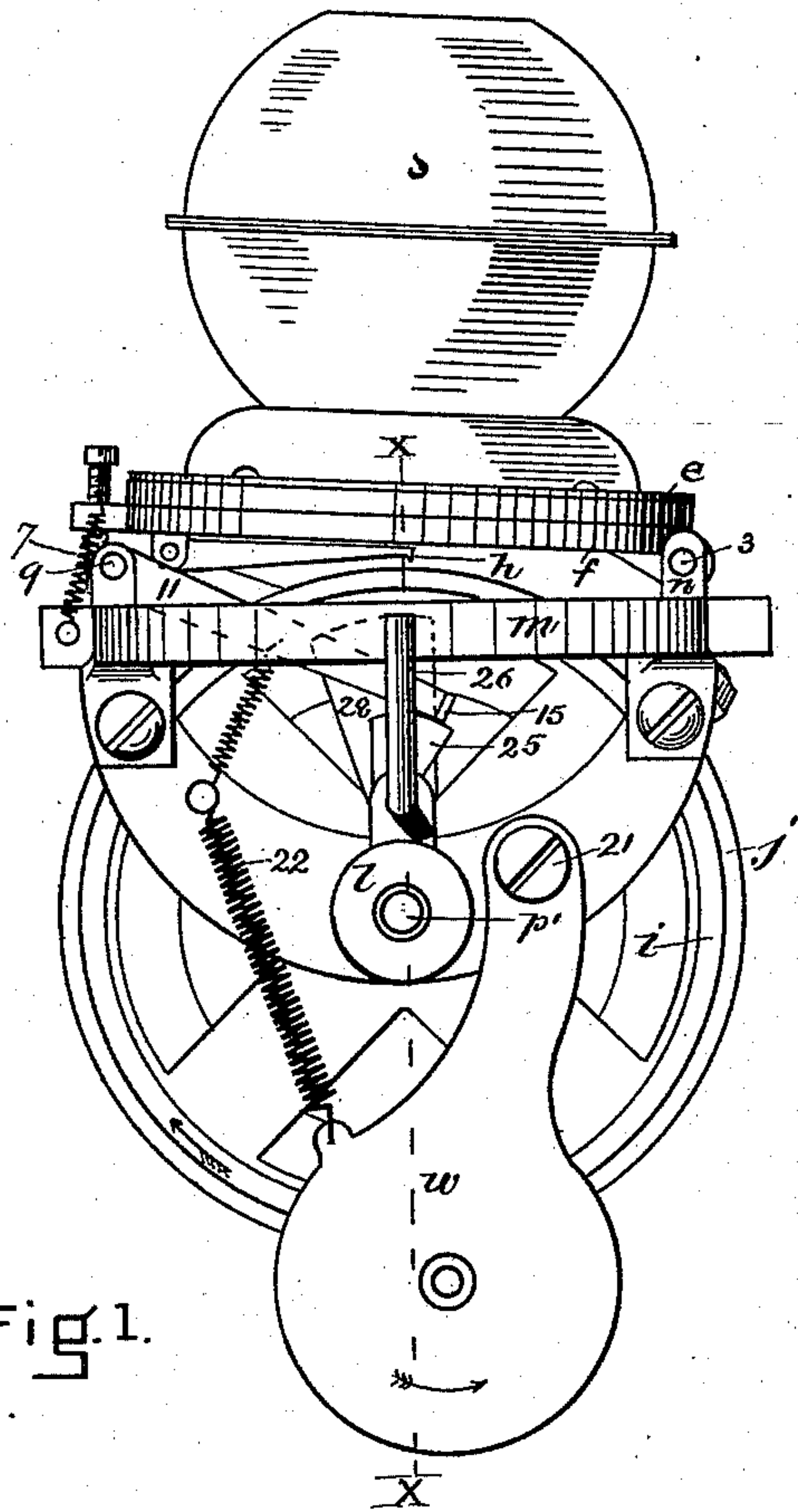


Fig. 1.

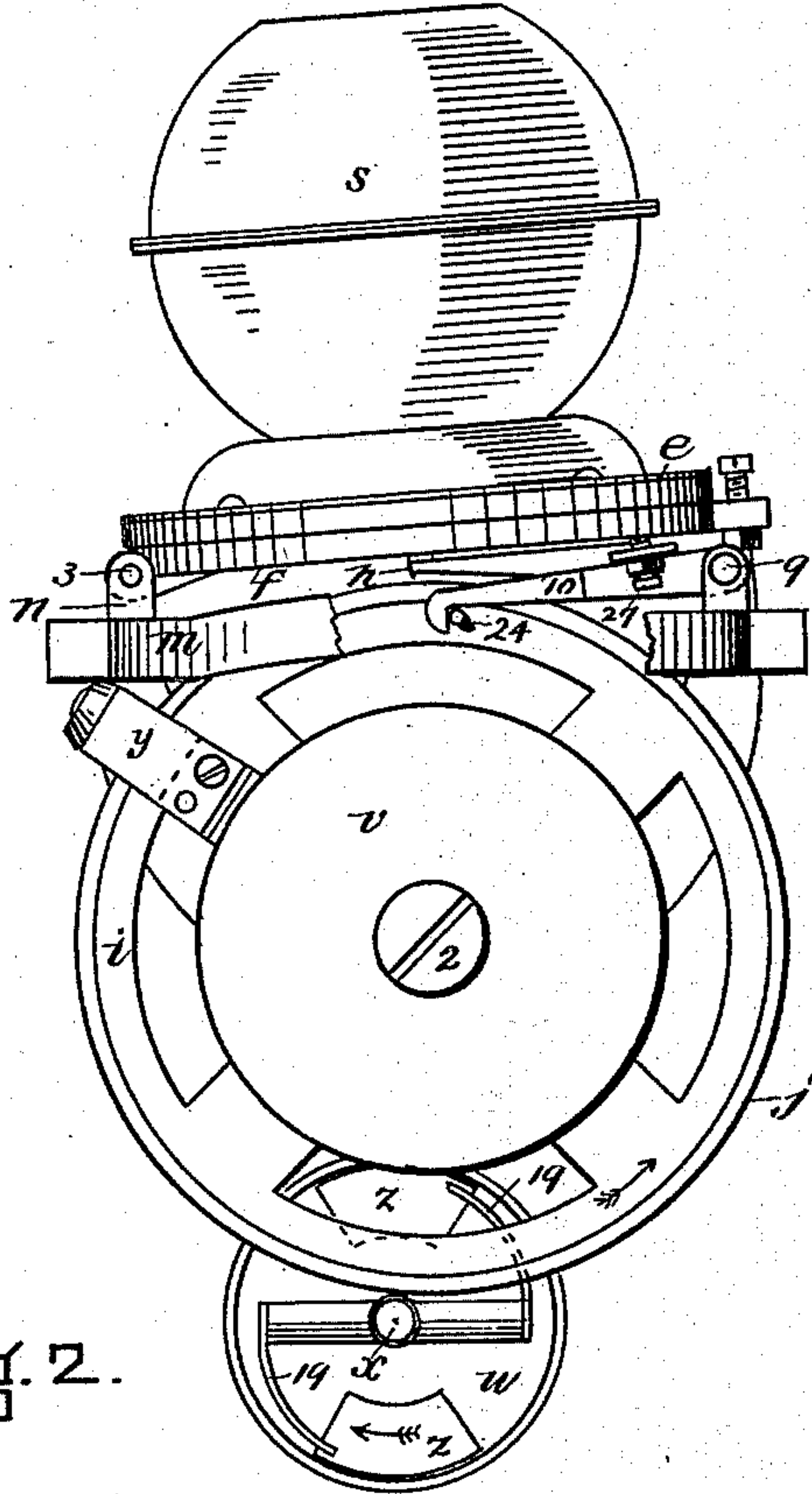


Fig. 2.

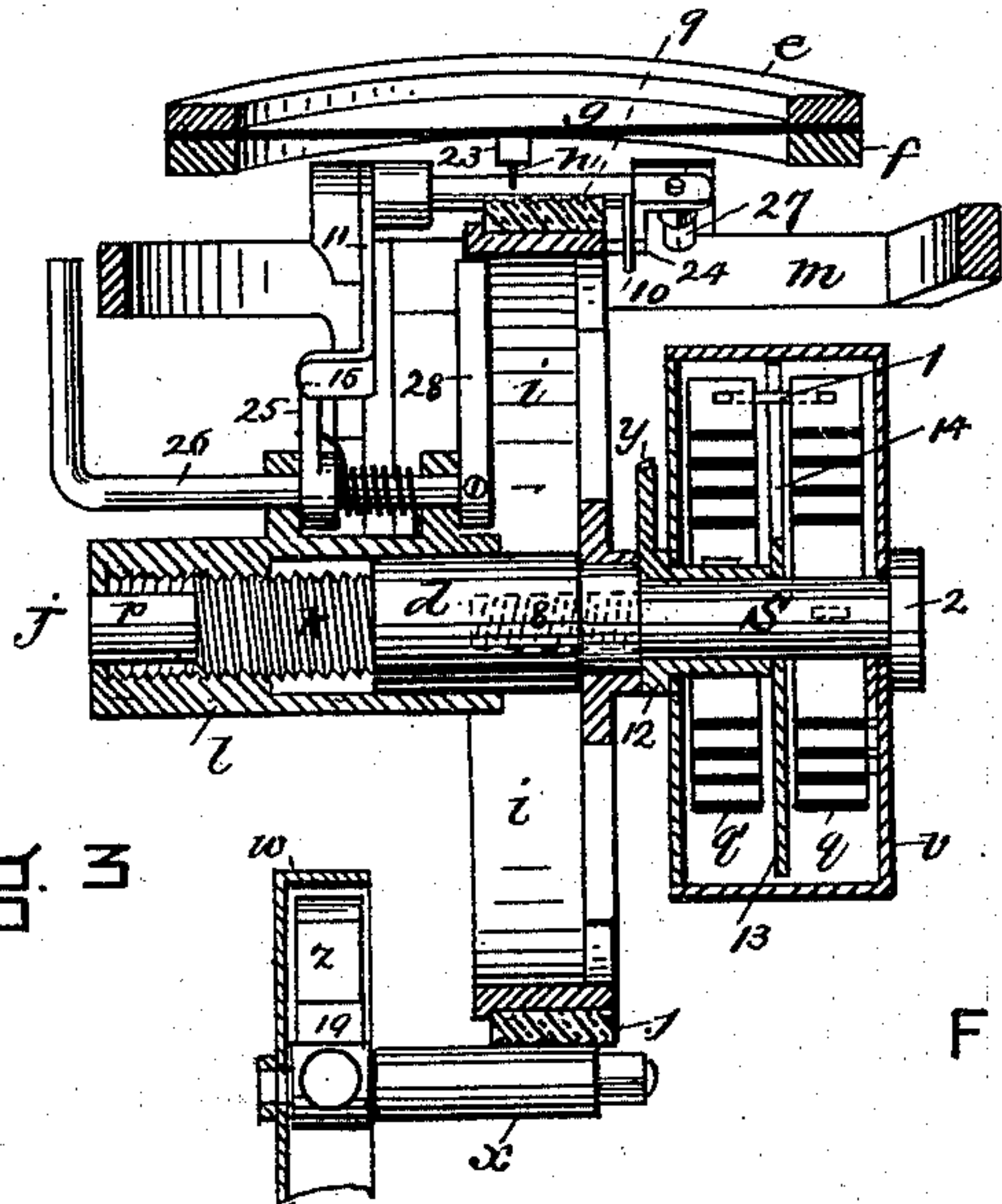


Fig. 3.

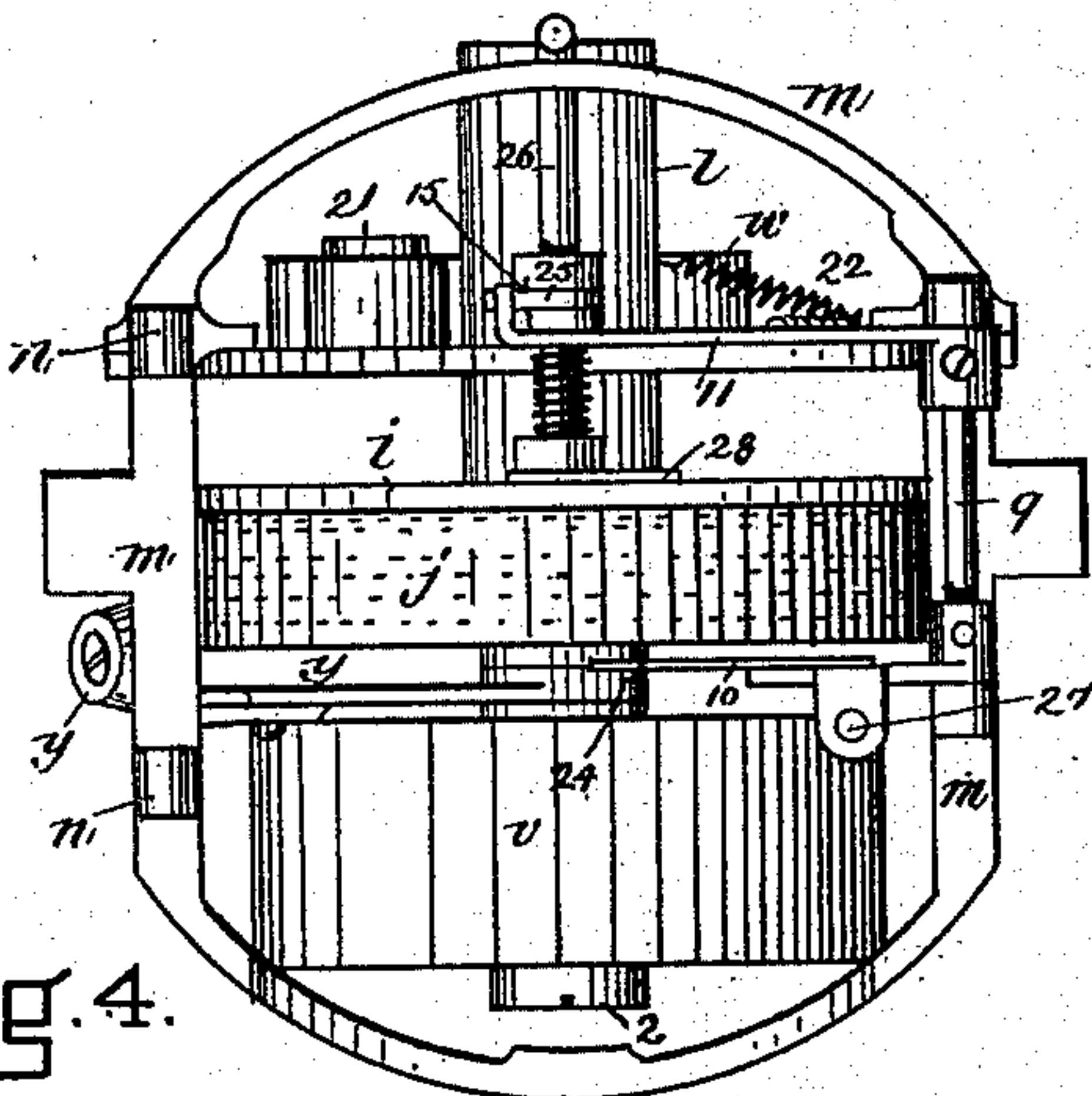


Fig. 4.

WITNESSES.
R. L. Roberts.
Walter Campbell.

INVENTOR
William W. Jacques

UNITED STATES PATENT OFFICE.

WILLIAM W. JACQUES, OF NEWTON, MASSACHUSETTS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 413,282, dated October 22, 1889.

Application filed May 16, 1889. Serial No. 311,070. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM W. JACQUES, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to certain improvements in the phonographic apparatus especially applicable to use with toys, as described in Letters Patent No. 383,299, granted to me May 22, 1888; and it consists in the improved construction of the shipping device by which the stylus is withdrawn from the record-plate when it is given a reverse motion and the cylinder is stopped when the stylus has completely traversed the record; in the application of the spring which gives the record-cylinder its forward revolution; in the regulating device and its application to the phonographic apparatus, and in the record-plate to be used in phonographs.

In the drawings forming a part of this specification, Figure 1 is an elevation of the phonograph viewed from the side upon which the regulator is attached, also showing the shipping devices in a position which raises the stylus from the record. Fig. 2 is an elevation of the apparatus viewed from the side opposite to that shown in Fig. 1, with a portion of the frame broken away to show the stopping and shipping device, and also showing the interior of the regulator. Fig. 3 is a central vertical section of all the parts, excepting the journal of the phonograph-cylinder, on line $x x$, Fig. 1, but with the resonating-chamber removed. Fig. 4 is a plan or top view of the apparatus in the position shown in Fig. 2, with the diaphragm, its frame, and the resonator removed.

Similar letters and figures in the several views indicate the same parts of the apparatus.

e and f are the upper and lower portions, respectively, of the diaphragm-frame, which is pivoted to the frame m of the apparatus at $n n$ by pivots 3 3.

7 is the spring which holds the diaphragm and its frame in operative relation to the record-surface.

g is the diaphragm; h , the stylus held to the

diaphragm at its center with an interposed piece of india-rubber 23.

i is the phonograph-cylinder; j , a metal ring upon which the record of the sound-vibrations is cut; J , the journal of the cylinder, screw-threaded at k , which works in the screw-threaded portion of the bearing l . The journal has also a smooth cylindrical portion d , which works in a cylindrical chamber within the bearing l , where it not only revolves, but also traverses in and out by the operation of the screw-threaded portion. On the end of the said journal there is also another smooth cylindrical portion p , in which a suitable hole p' is made to insert a key for winding the motive spring of the apparatus when a spring is used to give it motion. The form of spring for this purpose which I have found preferable is that consisting of two helices $q q'$, joined together at their outer ends by a strip of metal 1. The inner end of the helix q is attached to the spindle S , having a head 2 at one end and a "left-handed" screw 8 cut upon the other end, which is screwed into the hub of the cylinder i . The inner end of the helix q' is attached to a sleeve 12, which is loose upon the spindle S , and has an arm y attached, which bears against the frame m when the spring $q q'$ is wound up. In order to cause the two portions of the spring to wind evenly and not interfere with one another, they are surrounded with a case v , and a disk 13 is placed between them, which is provided with a slot 14 to accommodate the connecting-strip 1.

s is a resonator connected with the chamber above the diaphragm.

My improvements in the construction of the regulator for giving uniformity of motion to the record-cylinder consist in pivoting the case w of the regulator to the frame of the apparatus eccentrically to the axis of the cylinder, as at 21, and holding the spindle x of the regulator in contact with the cylinder i by a spring 22. Thus when the record-cylinder is revolved in the direction to cause the phonograph to "talk," as indicated by the arrows, Figs. 1 and 2, the friction of the spindle x upon the cylinder i will tend to turn the case w upon its pivot 21 in the same direction, or toward the axis of the cylinder, and thus

cause the spindle x to bear with greater force upon the record-cylinder, and any increase in the speed of the cylinder i will correspondingly increase the pressure of the spindle x upon it, as also the friction between the case w and the weights z , which are attached to the hub of the regulator by springs 19.

When winding up the motive spring of the apparatus, the cylinder i will be turned in the direction opposite to that indicated by the arrows, which will tend to turn the case w upon its pivot 21 in that direction or away from the axis of the cylinder, thereby decreasing the pressure of the spindle x upon the record-cylinder proportionately to the increase of the speed of the cylinder, so that in winding up the apparatus its cylinder may be turned as rapidly as desired without causing the regulator to act as a brake upon it.

When a spring is employed to give progressive motion to the record-cylinder, the improved construction of the shipping devices for automatically stopping the cylinder when the stylus has completely traversed the record, and at the same time withdrawing the stylus from the record-plate, consists of the latch-lever 10 and arm 11, which are made fast to opposite ends of the pivot-rod 9, the latch-lever 10 being provided with a hook-shaped end turned downward, Fig. 2, and when the cylinder i , by its revolution upon the screw-threaded shaft k , has moved toward that latch 10, a distance equal to the width of the cylinder a stud or finger 24 projecting from the side of the cylinder will strike beneath the latch 10 and thus raise it until the stud 24 engages with the hook upon the end of the latch, which will stop the cylinder. The arm 11, being made fast to the rod 9, will be raised at the same time as the latch 10, and a cam 25, fastened to a crank-rod 26, which is pivoted in bearings upon the top of the hub or bearing l , will be thrown beneath the horizontal portion of the arm 11 through the action of a spring coiled about the crank-rod 26, one end of which is attached to the cam 25 or to the crank-rod and the other end to one of the bearings of the crank-rod.

By means of an adjusting-screw 27, working through an offset upon the latch-lever 10 in a position to bear against the under side of the diaphragm-frame whenever the latch 10 is raised, it will also raise the diaphragm-frame slightly against the action of the spring 7, and thus withdraw the stylus h from contact with the record-surface. The end of the arm 11, raised upon the top of the cam 25, will hold the stylus h away from contact with the record-plate while the mainspring within the case v is being wound up. During the operation of winding the spring the phonograph-cylinder is prevented from its progressive revolution by means of a cam-brake 28, also made fast to the crank-rod 26 and bearing upon the inner surface of the rim of the phonograph-cylinder in such a position as to cause it to bind and hold the cylinder from

such progressive movement while the arm 11 rests upon the top of the cam 25. In order to start the phonograph-cylinder in its progressive revolution, the crank-rod 26 is turned to one side a distance sufficient to allow the horizontal projection 15 of the arm 11 to drop off from the curved surface of the cam 25. This will withdraw the cam-arm 28 from contact with the rim of the phonograph-cylinder and allow it to revolve until it has moved in the direction of the latch-lever 10 a sufficient distance to again cause the finger 24 to engage with the hook upon the end of the latch 10 and stop the cylinder, at the same time raising the arm 11, so that its horizontal portion 15 will again rest upon the top of the cam 25, as shown in Figs. 1, 3, and 4.

Heretofore the record of sound-vibrations for use in the phonograph has been made by indenting or bending a flexible metal foil in lines of undulations corresponding to the sound-waves by means of a smooth-pointed stylus or by cutting the record in wax or similar soft substances by means of a sharp-pointed stylus. Such a record upon wax and upon most of the metal foils, however, is extremely perishable, and will endure the rubbing action of the reproducing stylus but a few times without being so much worn away as to make the "talking" of the phonograph very indistinct and soon entirely unintelligible.

In order to make the record substantially permanent—that is, capable of reproducing the sound-vibrations a great number of times, and clearly and distinctly—I employ a plate of metal, preferably of tin alloyed with small quantities of copper and antimony (for example, one part of copper and one and one-half of antimony to twenty-two parts of tin) and of such thickness as to be inflexible, so that it will not be bent by the operation of the stylus upon it, as is the result when indenting a foil, and upon the surface of this plate I impress or cut the record of the sound-vibrations by means of a strong diaphragm and sharp-pointed stylus. I have also found an economical and advantageous way of producing a metal record-plate for this purpose to be by depositing a layer of the above-mentioned alloy of tin about one thirty-second of an inch thick upon the surface of an iron disk or cylinder by the electroplating process, and then cutting the record upon this surface by means of a sharp-pointed stylus.

For the purpose of economy lead may also be mixed with the tin in various proportions, and also the proportions of copper and antimony may be varied to change the degree of hardness of the record-plate; but the proportions mentioned above I have thus far found most satisfactory.

The novelty and utility of this part of my invention are that by the use of a record-plate of tin or other metal of substantially the same density and ductility, or alloys thereof, sub-

stantially such as described, a record of sound vibrations can be impressed or cut thereon by a phonographic apparatus having a sharp-pointed stylus which is substantially permanent, while any of the substances heretofore employed for the purpose, excepting the foil claimed in my said patent of May 22, 1888, are so extremely perishable that they would be of no practical value in a phonograph for use in a toy or when required to reproduce the sound-vibrations any considerable number of times.

I claim—

1. In a phonograph, the combination of a diaphragm supported in a hinged frame which is held by a spring in operative relation with the record-surface and an automatic shipping device operated by contact with the record-cylinder to stop the record-surface and withdraw the stylus therefrom when it has completely traversed the record contained thereon, substantially as described.

2. In a phonograph having a diaphragm pivoted at one side and a spring to hold its stylus in operative relation to the record-surface, the combination of a latch-lever adapted to engage with the phonograph-cylinder and stop the record-plate and to withdraw the stylus therefrom, an automatically-actuated arm to hold said lever in its raised position, and a cam-brake to withhold the said record-plate from progressive rotation while the motive spring of the apparatus is being wound up, substantially as described.

3. In combination with a phonograph provided with a spring-actuated cylindrical rec-

ord-plate having a traversing motion parallel with its axis, a latch-lever pivoted at one side to stop the cylinder and raise the stylus therefrom when the stylus has completely traversed the record thereon and an automatically-operated retaining-arm pivoted at the other side of the cylinder to hold the stylus in its raised position while the said actuating-spring is being wound up, substantially as described.

4. In combination with the revolving record-plate of a phonograph, a regulator pivoted to a fixed portion thereof eccentrically to the axis of the record-plate and a spring to hold it in frictional contact therewith, substantially as described.

5. In combination with the record-plate of a phonograph, a motive spring consisting of two helices, one of which is attached to the journal of the record-plate and the other to a loose sleeve thereon, and an arm projecting from said sleeve adapted to act in opposition to the winding of the actuating-spring by its bearing upon a fixed portion of the apparatus, substantially as described.

6. In a phonograph, an inflexible enduring record-plate, substantially such as described, having lines of undulations corresponding to a series of sound-waves impressed or cut thereon in contradistinction to a flexible perishable plate or foil indented or bent in lines of such undulations, or a plate of soft or waxy material in which they have been produced.

WILLIAM W. JACQUES.

Witnesses:

R. L. ROBERTS,

WALTER S. CAMPBELL.