

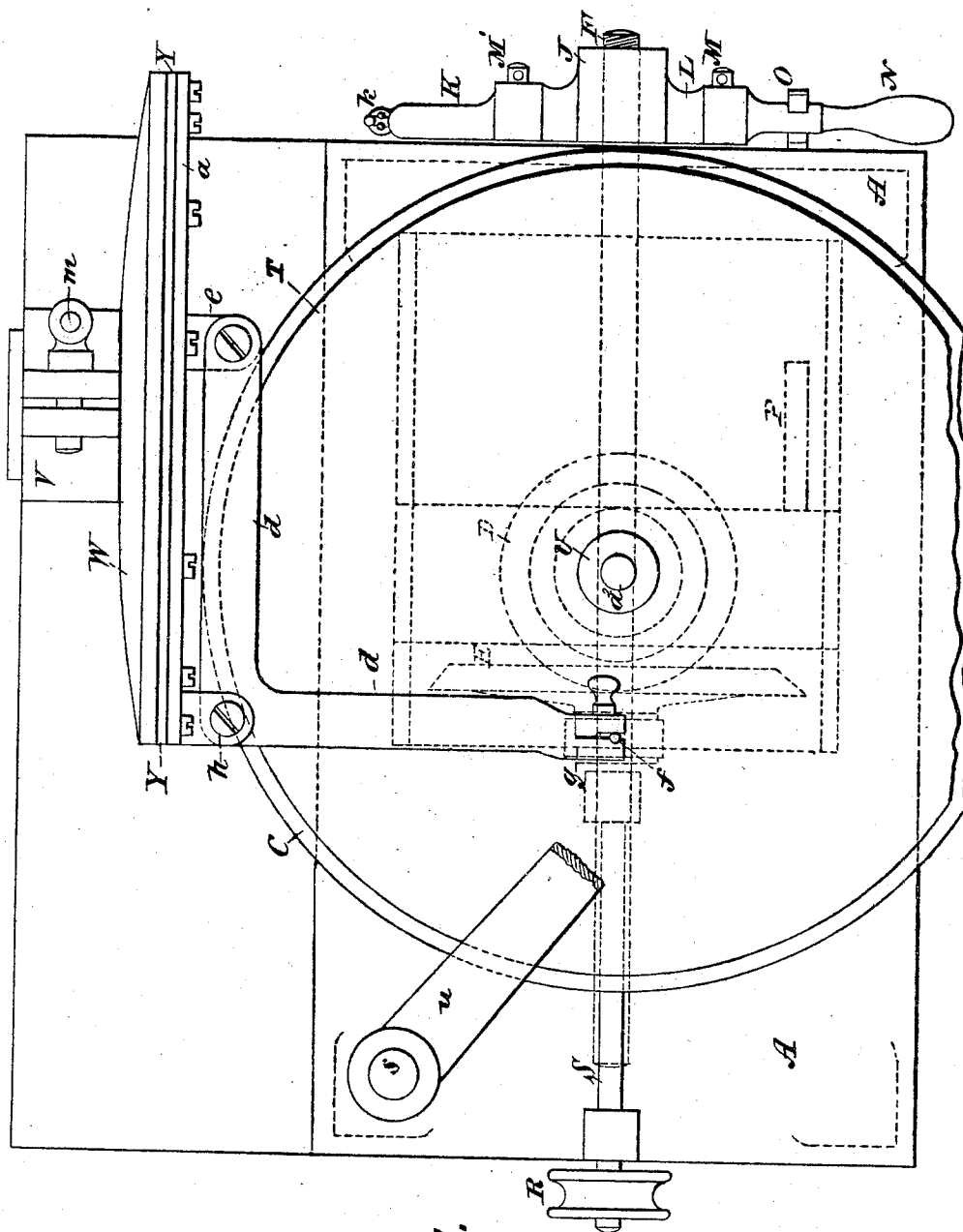
(No Model.)

4 Sheets—Sheet 1.

L. ROSENTHAL & S. FRANK.
APPARATUS FOR REPRODUCING SOUNDS.

No. 474,410.

Patented May 10, 1892.



WITNESSES:
Gustave Rieterich.
Geo. W. Taylor, Jr.

Fig. 1.

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BY *Briese & Knauth*
their ATTORNEYS.

(No Model.)

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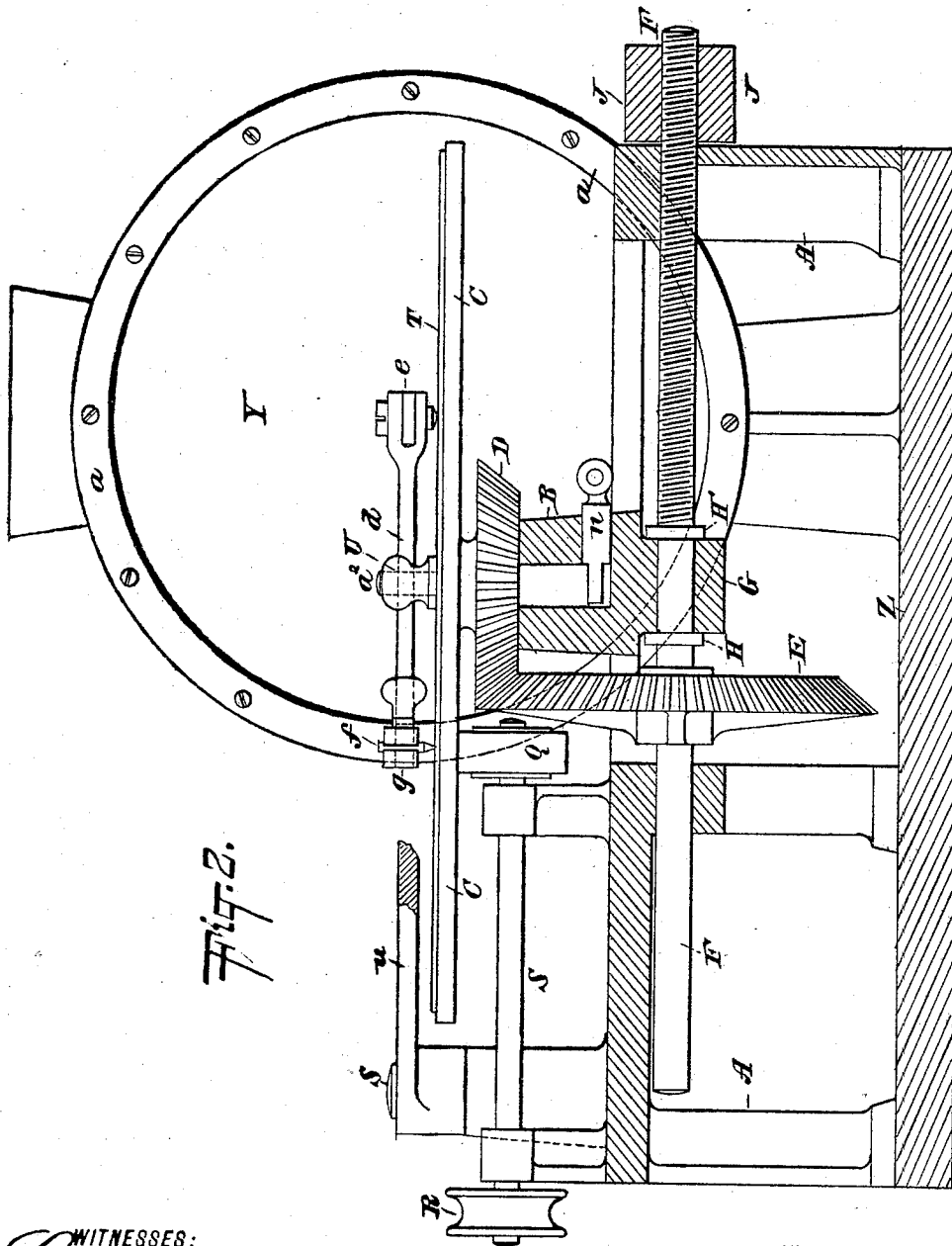


Fig. 2.

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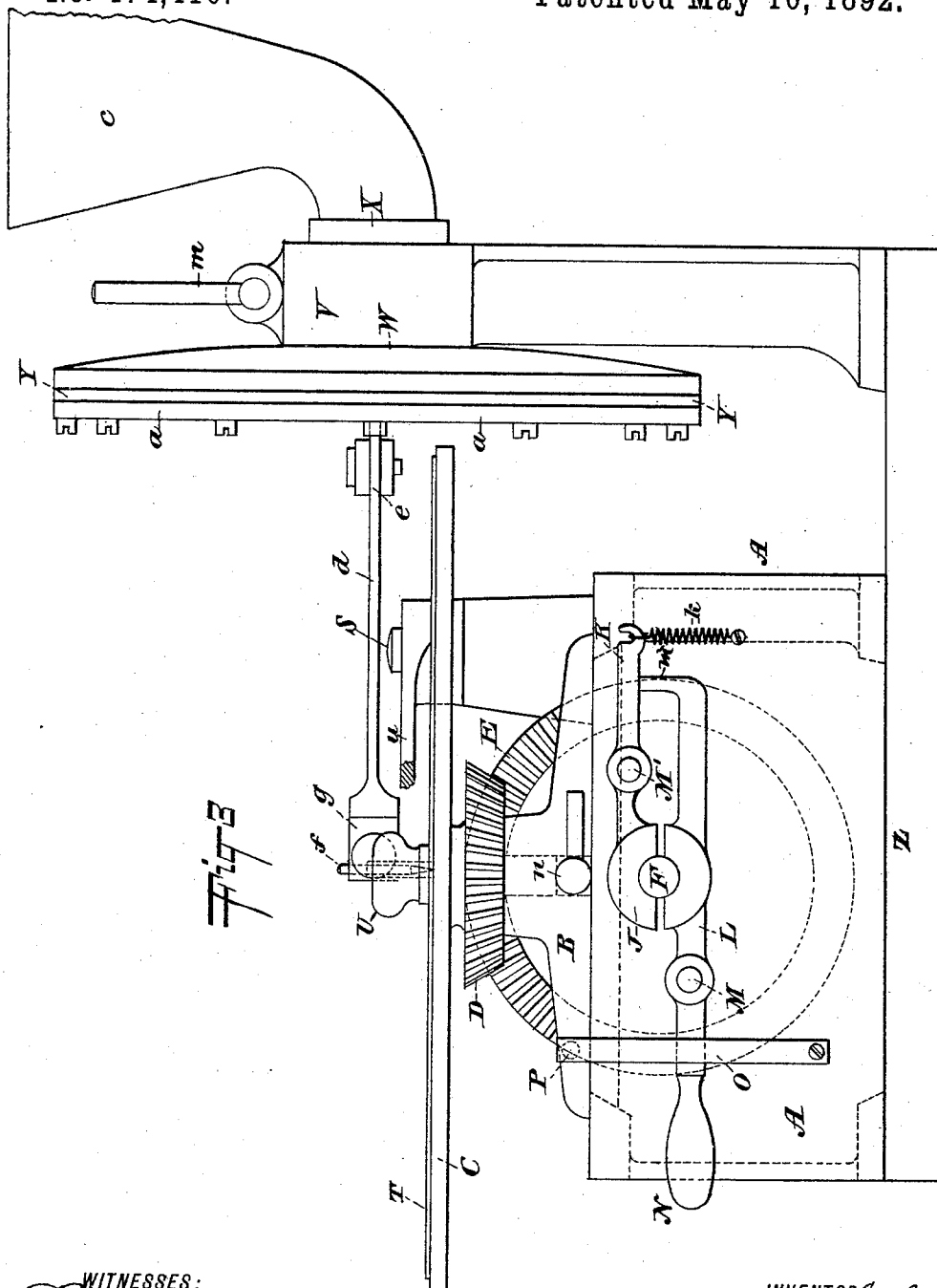
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Patented May 10, 1892.



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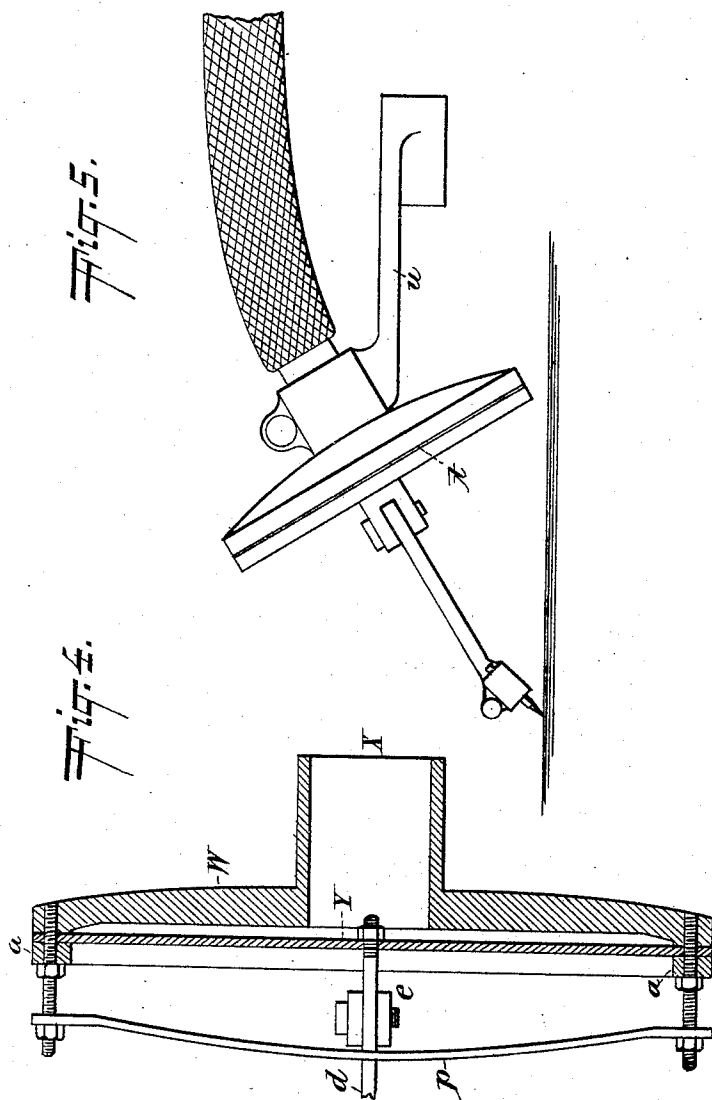
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No. 474,410.

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UNITED STATES PATENT OFFICE.

LOUIS ROSENTHAL AND SALOMON FRANK, OF FRANKFORT-ON-THE-MAIN,
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APPARATUS FOR REPRODUCING SOUNDS.

SPECIFICATION forming part of Letters Patent No. 474,410, dated May 10, 1892.

Application filed January 21, 1892. Serial No. 418,862. (No model.)

To all whom it may concern:

Be it known that we, LOUIS ROSENTHAL and SALOMON FRANK, both residing at Frankfort-on-the-Main, Germany, have invented new and useful Improvements in Apparatus for Reproducing Sounds, of which the following is a specification.

This invention relates to phonographs, and has for its object to obviate the difficulties incidental to phonographs and graphophones, particularly in regard to the disk and diaphragms, the object being to produce durable and efficient phonograph disks and diaphragms.

In our improved instrument we actuate the phonograph-disk by a friction-wheel, which preserves a constant position in relation to the stylus, while it actuates the disk at a gradually-variable radius corresponding to that of the stylus, so that the angular velocity of the disk is diminished exactly in proportion as the point at which the stylus acts recedes from the center of the disk. We are enabled thereby to produce a record from which an accurate and uniform reproduction of the sounds may be obtained.

In the drawings forming part of this specification, Figure 1 is a top or plan view of the improved graphophone. Fig. 2 is a side view thereof, partially sectional. Fig. 3 is an end view of the same. Fig. 4 shows a special arrangement of the recording-diaphragm; and Fig. 5 shows the arm carrying the transmitting-diaphragm and stylus, which are only partly shown in the first three figures.

The table C, supporting the phonograph-disk, is mounted and rotates on an axis a^2 , carried by the sliding carriage B, which is supported on the frame A. The table C is traversed under the stylus f by the screw-shaft F, which engages said carriage B by means of flanges H H' and fits a fixed nut J. This screw-shaft F is driven by the bevel-gear D E, the gear-wheel D being securely fastened to the table C and the other gear-wheel E being splined to the screw-shaft F. The nut J is by preference made in two parts, which are respectively connected with levers K and L, that are pivoted to the frame A at M' and M. The one end of lever K is actuated by the spring k , which prevents the upper half of

the screw-nut from becoming engaged with the screw-shaft F. An arm m^2 of the lever L, which connects to the lower half of the screw-nut J, reaches under the lever K, as in Fig. 3, and thus by the spring k the lower half of the screw-nut is also kept away from the threaded portion of the shaft F. By pressing on the handle N of lever L both halves of the screw-nut are simultaneously thrown into engagement with the screw F, in which position they are retained by a spring-latch or other catch O. When the shaft F is rotated by the bevel-gear D E, it moves longitudinally by means of the nut J and carries the carriage B, together with the table C, along. As soon as the stud P, which is fastened to the carriage B, strikes the latch O the screw-nut halves J are pulled apart by the spring k . This will cause the carriage B to remain stationary and nevertheless allow the shaft F and table C to rotate. When thus released, the carriage B is free to be traversed by hand back to its starting-point, the phonogram-table C being then raised out of contact with the friction-roller Q by an eccentric n or other device. The phonogram-table is rotated about its axis a^2 on the carriage B by the frictional contact of the roller Q, which receives its motion from the shaft S and pulley R, and which is situated at its under side immediately beneath the stylus f , so that the radial distance of said roller Q from the center of the table always corresponds or bears a fixed relation to that of the stylus. The part of the phonogram upon which the stylus is for the time acting will always travel under the stylus at a constant velocity, and the sound-waves are recorded uniformly over the whole phonogram-disk. On the table C rests the real phonogram-disk T, which is preferably made of zinc and which is fastened to the table C by a clamp-nut U or otherwise.

Near the frame A is erected on its base-plate Z or otherwise the frame V, which carries the large sound-recording diaphragm. This diaphragm Y is clamped marginally to a concave or casing W, having at its back a central tube X, which is held in a fixed clamp and to which the trumpet-shaped mouthpiece is connected. The diaphragm Y is clamped tightly to the casing W by a ring a . To the

center of the diaphragm is connected a swivel-pin *e*, to which one arm of a bell-crank lever *d* is pivoted, the lever at its elbow being fulcrumed at *h* to the casing or frame, the
 5 other arm carrying the stylus *f* by means of the clamp *g*, said stylus being made of suitable hard material. The advantage of this lever over those heretofore used is that the transmission to the diaphragm of vibrations
 10 of the stylus, caused by the working of the instrument or by inequalities of the phonogram-disk, is prevented. When large diaphragms are used, a strong check-spring *p*, Fig. 4, is applied to act on the diaphragm at
 15 its center joint *e* to prevent false or disturbing oscillations. The unusual stoutness of the diaphragm enables the stylus to indent the record of the most delicate sound-waves directly in the phonogram-disk in which the
 20 sound-wave is produced in the form of a close spirally-wound sinuous or serpentine line or furrow.

The reproduction of the sound is effected by means of another diaphragm *t*, (illustrated
 25 in Fig. 5,) supported by a swinging arm *u*, mounted on pivot *S*. As it has not to perform the same mechanical work as the recording-diaphragm, it may be made of much smaller dimensions, the stylus being carried by an
 30 arm jointed to the center of the diaphragm, which is so held by its supporting-bracket that when brought into position over the phonogram the stylus and arm will be at an acute angle to the plane thereof. When this dia-
 35 phragm is brought into use, the recording-diaphragm *Y* is turned round in its clamp *V*, loosening the screw *m*, so as to lift the recording-stylus *f* off the table. Thereupon the reproducing-diaphragm *t* and its stylus are
 40 brought into action by turning their supporting-bracket *u*.

Having described our invention, what we claim is—

1. The combination of a diaphragm *Y*, elbow-lever *d*, pivoted at its inner end to a central stud on said diaphragm, clamp *g*, secured to the outer end of said lever, stylus *f*, adjust-
 45 ably secured in said clamp at right angles to the plane of said lever and parallel with the
 50 plane of the diaphragm and receiving its de-

sired lateral motion therefrom, table *C*, and mechanism for moving said table under said stylus, all said parts being arranged and adapted to operate substantially as described, and for the purposes set forth. 55

2. The diaphragm *Y*, combined with the tension-spring *p*, elbow-lever *d*, pivoted to said diaphragm *Y* between the tension-spring *p* and the diaphragm, and stylus *f*, substantially as and for the purposes herein shown 60 and described.

3. The combination of the rotary table *C* and its shaft *a*² with the sliding carriage *B*, screw-shaft *F*, divided nut *J*, pivoted lever *K*, connected to the upper portion of said divided 65 nut, spring *k*, automatically controlling said lever *K*, lever *L*, connected to the lower portion of said divided nut and provided with an arm at its inner end adapted to bear against the lever *K*, and handle *N*, secured to the 70 outer end of lever *L* and adapted, in connection with spring *k*, to operate both levers *K* and *L* for opening or closing said divided nut, all substantially as described, and for the purposes set forth. 75

4. The combination of the rotary table *C* and its shaft *a*² with the sliding carriage *B*, having prong *P*, screw-shaft *F*, divided nut *J*, levers *K* *L*, spring *k*, and catch *O*, all arranged substantially as herein shown and de- 80 scribed.

5. The combination of the table *C* with the stylus *f* and friction-wheel *Q* for rotating said table *C*, said stylus and wheel being 85 placed on opposite sides of said table and in direct line with each other and at an equal distance from the axis of the table and with the screw-shaft *F*, gearing from the table *C* to the shaft *F*, carriage *B*, nut *J*, levers *K* *L*, and spring *k*, all arranged substantially as and for 90 the purposes specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

LOUIS ROSENTHAL.
 SALOMON FRANK.

Witnesses:

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 FRANZ BORG,