No. 887,429. PATENTED MAY 12, 1908.

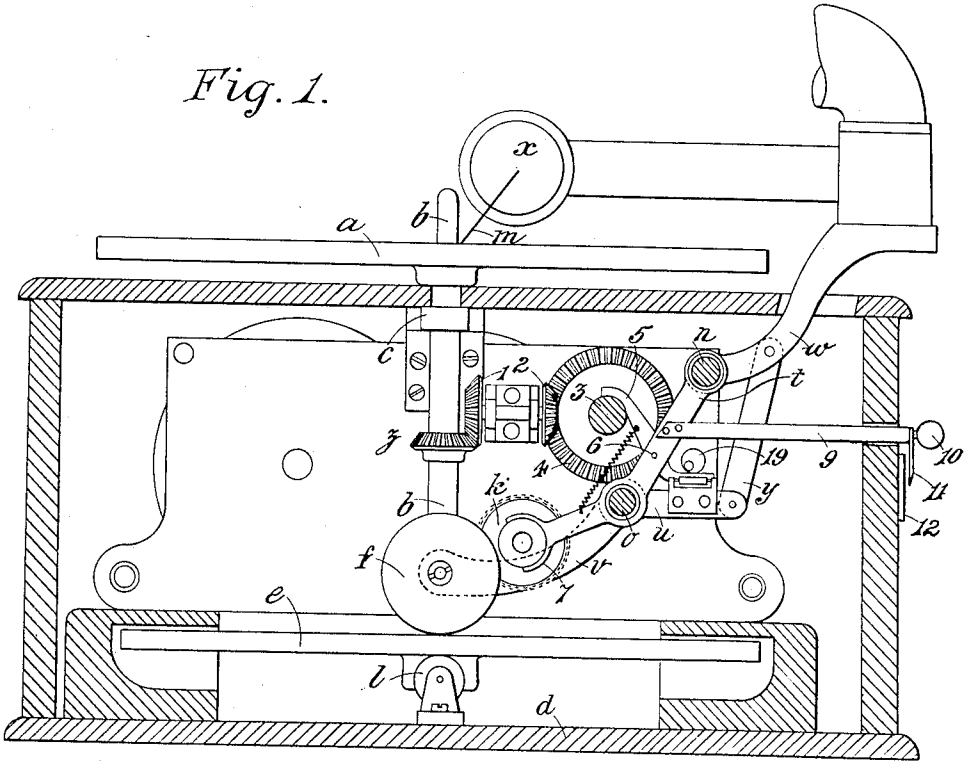
L. ROSENTHAL.

APPARATUS FOR RECORDING AND REPRODUCING SOUND.

APPLICATION FILED OCT. 10, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Wm. Bell

Elsie Kaufmann.

Inventor,

Louis Rosenthal

by Partridge & Lawrence,

Attys.

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APPARATUS FOR RECORDING AND REPRODUCING SOUND.

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2 SHEETS—SHEET 2.

Fig. 2.

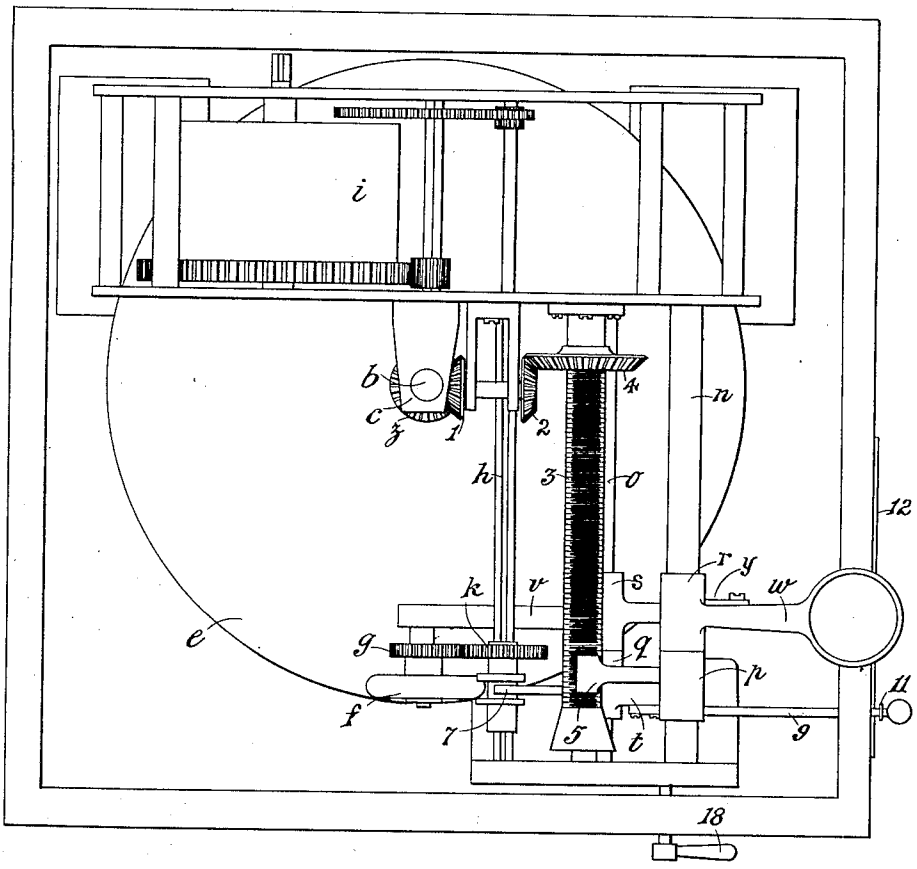
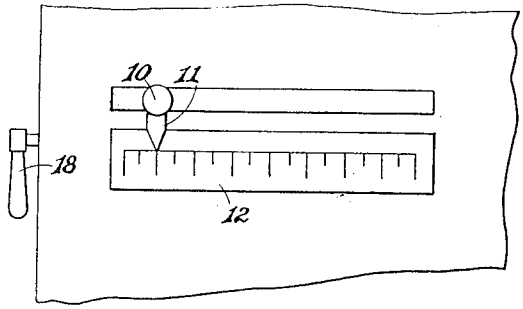


Fig. 3.



Witnesses

Wm. Wells.

Elsie Kaufmann.

Inventor,

Louis Rosenthal

by Gartner & Stewart,

attys.

UNITED STATES PATENT OFFICE.

LOUIS ROSENTHAL, OF FRANKFORT-ON-THE-MAIN, GERMANY.

APPARATUS FOR RECORDING AND REPRODUCING SOUND.

No. 887,429. Specification of Letters Patent. Patented May 12, 1908.

Application filed October 10, 1907. Serial No. 396,757.

To all whom it may concern:

Be it known that I, LOUIS ROSENTHAL, a subject of the Emperor of Germany, residing at Frankfort-on-the-Main, Germany, have invented certain new and useful Improvements in Apparatus for Recording and Reproducing Sound, of which the following is a specification.

It is a generally felt disadvantage in the known machines or apparatus for recording and reproducing sounds that the capacity of the record-disks for recording the sounds is very limited in proportion to the size of the disks. This results from the fact that the length of the spiral path of the stylus on the rotating disk corresponding to one revolution of said disk increases with each revolution of the same so that, since the speed of rotation of the disk remains the same, continuously increasing intervals must occur between the records of the separate sounds in the spiral grooves in order to maintain uniform sequence of the sounds in reproduction. If this were not so, disks of the size at present in general use could easily receive up to three times the number of sounds heretofore possible. Recognizing this disadvantage, it has been proposed to drive the said disk carrier through a stationary friction disk and to move the disk carrier laterally by means of its support in proportion to the relative advance of the stylus, but this suggestion has not been carried out practically because the apparatus would become too bulky on account of having to provide room for the two extreme positions of the disk carrier, an even more cogent reason being that the lateral motion of the disk carrier causes loosening in the bearings, which gives rise to vibrations detrimental to sound reproduction. This latter effect is enhanced by the direct driving of the disk carrier from the friction disk which, since it exercises a one-sided pressure on the disk carrier, is liable to cause wabbling and jamming. By the solution found in the present invention these disadvantages are obviated. The disk carrier is driven in such a manner as to completely remove the load therefrom, and its speed of rotation is decreased in proportion to the advance of the stylus.

The inclosed drawings show in Figure 1 a side view, Fig 2 top view, Fig. 3 a detail.

The disk carrier *a* is firmly mounted on shaft *b* which has an upper bearing *c* and runs at the bottom in a step bearing on the base *d*. On the same shaft near *d* is firmly mounted a disk *e* equal in size to the disk carrier *a*, and by which shaft *b* is driven. Disk *e* is driven by the friction disk *f*, coupled with a spur wheel *g* gearing with a spur wheel *k* on shaft *h* which is driven by a clockwork *i* in known manner. For the purpose of resisting the pressure exercised by friction roll *f* on disk *e* underneath the latter near its periphery a roll *l* is arranged, on which disk *e* runs.

The simultaneous and uniform advance of the stylus *m* is synchronized with that of friction roll *f* as follows:—Two guide rods *n*, *o* are arranged across the casing of the apparatus for guiding four boxes *p*, *q*, *r*, *s*. Two of these *p* and *q* are rigidly joined by a rod *t* preventing them from turning, whereas *r* and *s* are rotatable but is coupled with the non-rotatable box mounted on the same guide rod in such manner that all four boxes can only move together. On the box *s* is mounted the two-armed lever *u*, *v*, the arm *v* of which carries at its end the friction disk *f* with the spur wheel *g*; on the box *r* is mounted the arm *w* which is suitably formed to carry the sound box *x* with the diaphragm. The joint piece *y* connects the arms *u*, *w*. From the shaft *b* by means of bevel-wheels *z*, 1, 2, is driven the spur wheel 4, mounted on the shaft 3. Shaft 3 is screw threaded, and on it rests the spring-pressed hammer 5, which on rotation of shaft 3 moves along said shaft like a nut. The hammer 5 is pivotally mounted at 6 on the bar *t*. The hammer when moving therefore takes with it all four boxes *p*, *q*, *r*, *s* and all the parts mounted thereon including the sound box and the friction roll *f*. In order that the spur-wheel *k* shall participate in this simultaneous movement, there is provided a fork 7 mounted on the box *q*.

When the whole mechanism has arrived at its end position, it is released to permit its return by lifting the hammer 5, the diaphragm and the friction roll *f*. For this purpose, by means of the handle 18, a cam 19 is moved which consists of a transversely extending rod. At the commencement of this movement, the cam presses on the tail of the hammer 5 thereby lifting it from shaft 3. The further rotation of the cam actuates the arm *u* thereby moving simultaneously the sound box *w* and the arm *v*, whereby the diaphragm and the friction roll *f* are lifted. To render the returning of the mechanism to its origi-

nal position quick and handy, there is provided a rod 9 having a button 10 serving as a handle. A hand or pointer 11 likewise mounted on the rod 9 and moving in front of a scale 12 is arranged for the purpose of enabling record disks of the old systems to be used in my improved apparatus. The record disks now in common use require to be rotated at a definite speed in order to give correct reproduction of the sounds, and scale 12 indicates the speed at which the disk carrier rotates at each different position of the pointer. As in this case the speed of rotation should not be variable, the cam 8 must be turned till the hammer 5 is released; the friction roll *f* and the diaphragm however still remain in the driving position.

What I claim is:—

1. An apparatus for recording and reproducing sounds, said apparatus comprising a rotatably mounted carrier-disk for a record-plate, a motor, a friction-roller coacting with a plane surface rotating with said disk, a sound-box, means controlled by the sound-box for positively moving said friction-roller axially in a direction substantially radial to said surface, and means for rotatably and movably connecting said friction roller with said motor.

2. An apparatus for recording and reproducing sounds, said apparatus comprising a rotatably mounted carrier-disk for a record plate, a friction-disk fixed to and rotating with said carrier-disk, an anti-friction roller for supporting said friction-disk, a motor, a shaft driven by said motor, a friction-roller driven by said shaft and adjustably connected thereto so as to be capable of moving in a direction substantially radial to said friction-disk, a sound-box, guides for said sound-box, gearing connecting said carrier-disk and said sound-box and a positive connection between said sound-box and said friction-roller.

3. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing said friction-roller, and means for moving said guide-sleeves along said guides.

4. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing said friction-roller, a rotatably mounted record-carrier disk driven by said friction-roller, a feed-screw, gearing connecting said carrier-disk and said feed-screw, and a hammer mounted on said guide-sleeves and having female screw-threads and detachably engaging said feed-screw.

5. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing said friction-roller, a rotatably mounted record-carrier disk driven by said friction-roller, a feed-screw, gearing connecting said carrier-disk and said feed-screw, a hammer mounted on said guide-sleeves and having female screw-threads and detachably engaging said feed-screw, and gearing mounted in said frame and connecting said friction-roller and said motor-shaft.

6. An apparatus for recording and reproducing sounds, said apparatus comprising a record-carrier-disk, a rotatably mounted shaft bearing said carrier-disk, a friction-disk fixed on said shaft, an anti-friction roller supporting said friction-disk, a feed-screw, gearing connecting said carrier-disk and said feed-screw, guide-ways, a carriage movable on said guide-ways, a sound-box on said carriage, a segmental nut on said carriage, means for bringing said nut into and out of engagement with said feed-screw, a friction-roller rotatably mounted in said carriage and coacting with said friction-disk, a motor, a shaft driven by said motor, and gearing mounted in said carriage and rotatably connecting said motor shaft and said friction-wheel.

7. In an apparatus for recording and reproducing sound, the combination of a rotary part comprising the record carrier disk, means for rotating said part comprising a friction roller, bearing against said part and movable radially thereof, the sound-box, operative connecting means between the friction roller and the sound-box whereby to effect the movement of the friction roller radially of said rotary part and means for rotating the friction roller, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LOUIS ROSENTHAL.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.