P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED MAY 29, 1911.

1,085,849.

Patented Feb. 3, 1914.

3 SHEETS—SHEET 1

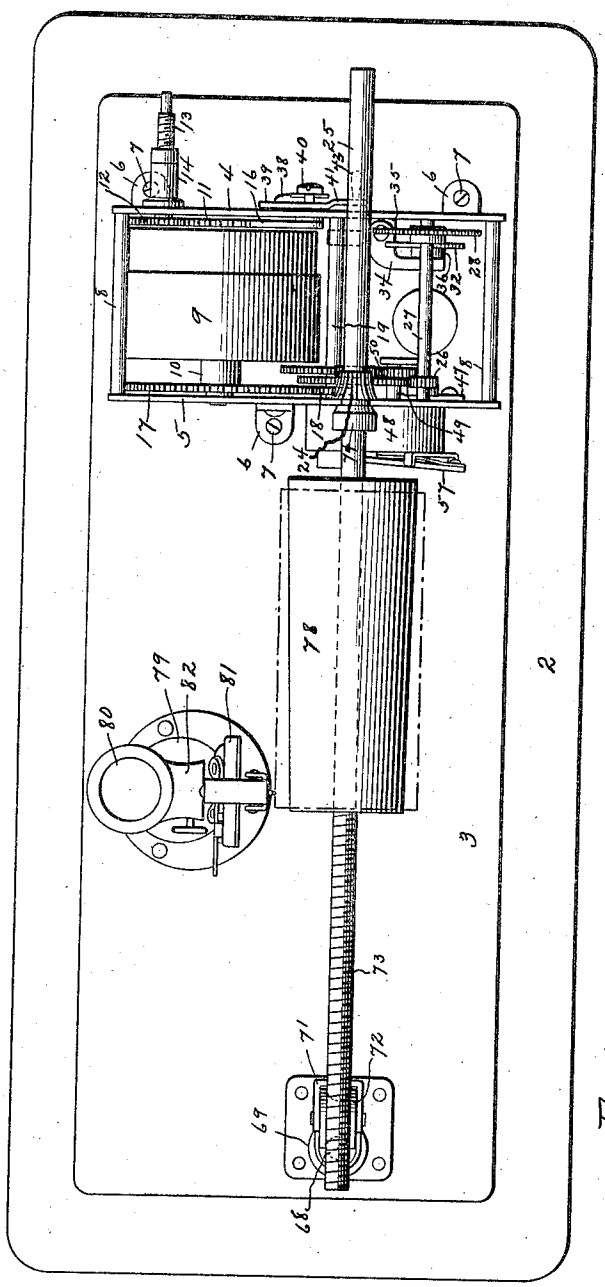


Fig. 1.

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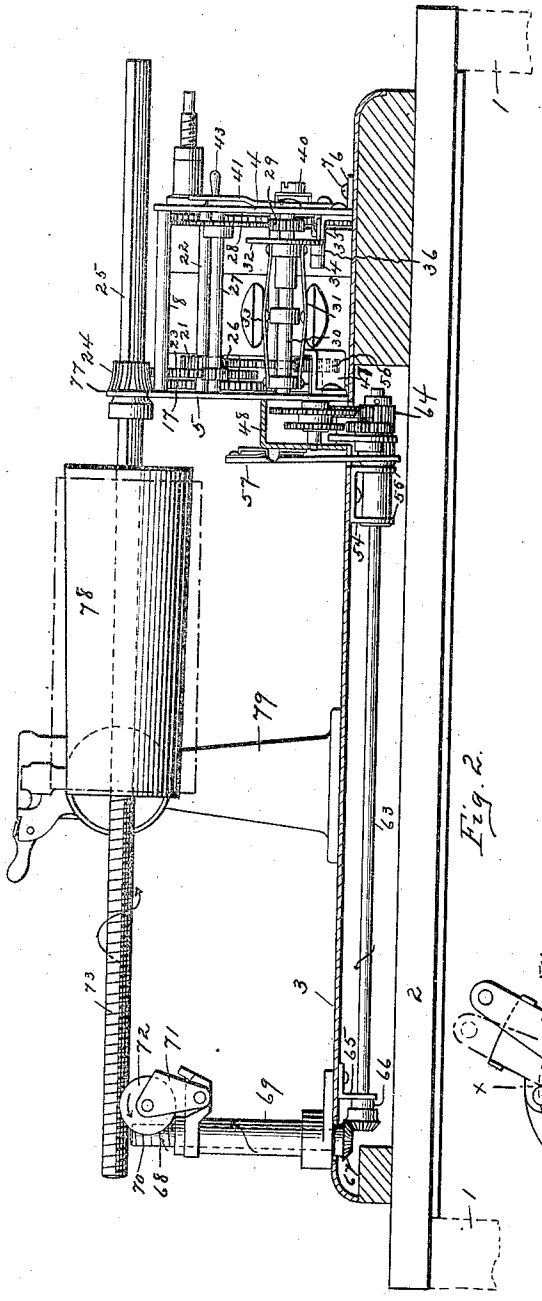


Fig. 2.

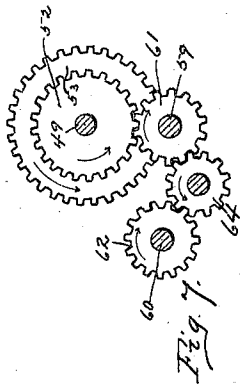


Fig. 7.

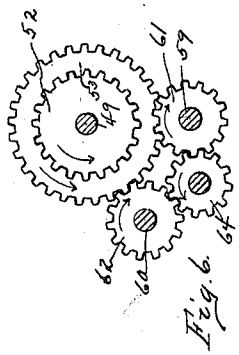


Fig. 6.

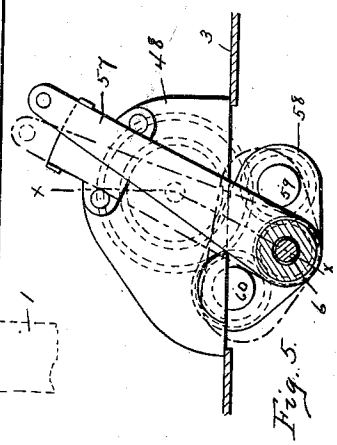


Fig. 5.

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3 SHEETS—SHEET 3.

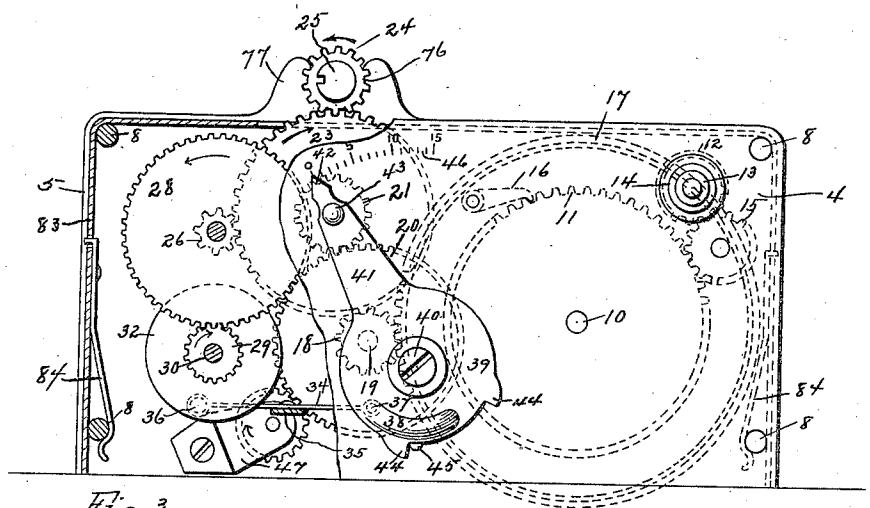
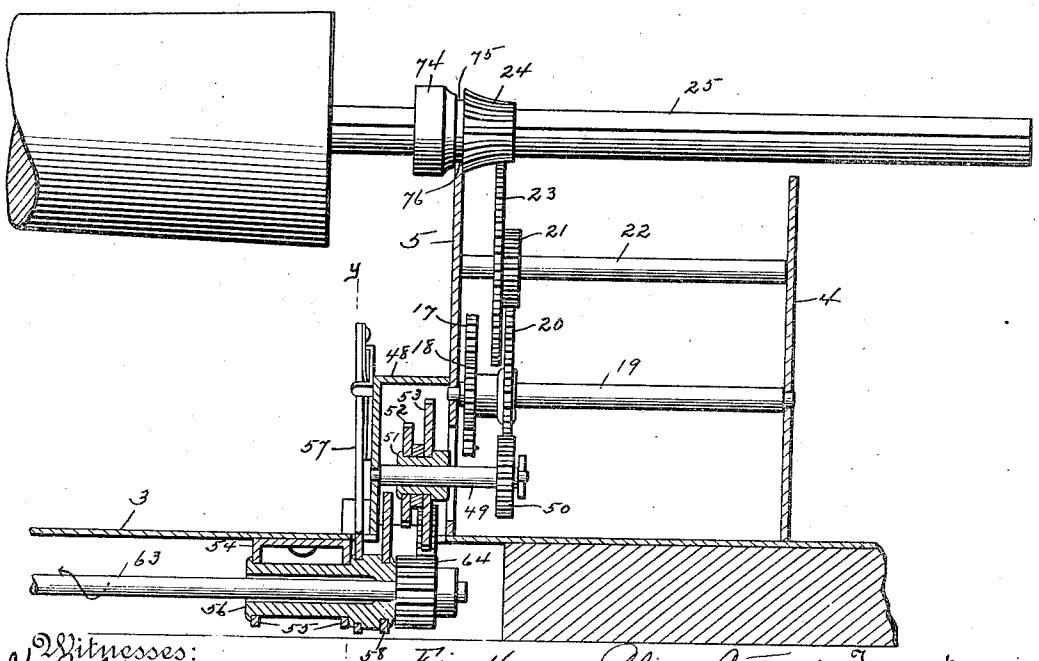


Fig. 3



Witnesses:
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Fig. 4.

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UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

1,085,849. Specification of Letters Patent. Patented Feb. 3, 1914.

Application filed May 29, 1911. Serial No. 630,170.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make, construct, and use the same.

The principal object of my invention is to so improve the construction of a phonograph as to materially increase its efficiency as a device for the reproduction of musical and other sounds, but also to reduce its cost of manufacturing to the lowest possible point, consistent with good material and workmanship.

In the development of the phonograph art it has been found that there is an increased demand for what is called the four minute cylindrical record. The two minute record—that is, a record that requires a period of two minutes to reproduce the entire matter placed thereon—has necessitated the use of a feed screw having 100 threads to the inch. The extreme fineness of this thread has laid it open to the objection that, in use, the thread was easily marred or damaged by coming in contact with other hard substances, and thereby, the delicacy and efficiency of this machine was very much impaired. If the pitch of the thread was decreased to, say fifty to the inch, the thread would be materially strengthened and much more capable of withstanding the hard usage to which such an instrument is usually put. Such a reduction in the pitch of the thread would correspondingly reduce the length of time occupied in reproducing the matter upon the cylindrical phonograph records.

By the former methods of construction, if a four minute record was desired, it was necessary to correspondingly increase the number of threads on the feed screw to 200 to the inch. It will be readily seen that a feed screw of this extreme fineness would be too delicate for the practical application of the phonograph to ordinary use.

By my improvement, I am enabled, not only to reduce the number of threads upon the feed screw to fifty to the inch, and thereby correspondingly increase their strength and resistance to ordinary rough usage, but other features of the improvement enable me to utilize both the two minute and four minute records.

The following is a full description of the means I employ to carry out the various objects of my invention.

Figure 1 is a plan view of my improvement with the cover for the motor removed to disclose the interior. Fig. 2 is a side elevation partly in section of the completed structure. Fig. 3 is an end elevation partly in section of the motor, and its governing mechanism. Fig. 4 is a sectional view on line X, X, of Fig. 5. Fig. 5 is a vertical view on line Y, Y, of Fig. 4. Fig. 6 is a diagrammatic section of the subtramental gear train for reproducing two minute records. Fig. 7 is a similar view showing the gear shifted to reproduce the four minute records. Figs. 6 and 7 are taken in substantially the same positions as represented in Fig. 5, in the full line and dotted line positions of the shifting lever 57.

Similar letters of reference refer to like parts throughout the specification and drawing.

In the drawings, 1, represents the containing case which is provided with a cover 2, on the underside of which is rigidly secured the base 3, in such manner that when such cover is lifted off the case and inverted, it may rest upon the case with the operating mechanism exposed as shown in Fig. 2. All of the working parts of the machine are mounted upon the base 3 as shown.

The motor for driving the phonograph mandrel is constructed in the following manner: Upon the base 3, are the two upright plates 4 and 5, rigidly secured to the base 3 by means of the lugs 6, and screws 7. The upright plates 4 and 5 are spaced apart by the spacing rods 8, located in the corners of the plates as shown. These two upright plates 4 and 5 serve as bearing supports for the pivots of the various gear

wheels and parts which form the motor structure. The main driving spring is contained in the spring box 9, which is mounted upon a shaft 10. Upon one end of this shaft and rigidly secured thereto is the winding gear 11, which is driven through a gear 12, mounted upon the inner end of a stub shaft 13, the latter being carried in an extension arm 14. An ordinary crank secured upon the outer end of the stub shaft is utilized for winding up the spring in the spring box 9, its motion being communicated through the gear 12, and an idler gear 15, as clearly illustrated in Fig. 3. In order to retain the spring in its wound up condition, I provide an ordinary pawl 16, which engages the teeth of the gear wheel 11. At the opposite end of the shaft 10 is rigidly mounted a gear wheel 17, which meshes with a small pinion 18, mounted upon a shaft 19, mounted in the side plates 4 and 5.

Rigidly secured to the shaft 19, is a gear 20 meshing with a pinion 21 on the shaft 22. Also mounted upon the shaft 22, is a large gear wheel 23, the latter meshing with a pinion 24, upon the feed shaft 25. The gear wheel 23 also meshes with a pinion 26 upon the shaft 27, and through the gear wheel 28, and pinion 29, leads down to the governor shaft 30. The governor 31, upon shaft 30 is of a usual spring and weight type, having the disk 32, weights and supporting springs 33, as is well-known in governors of this kind. The regulating lever 34, for the governor is pivoted upon the bracket 35, and has at one end a friction brake 36, to bear upon the friction disk 32. The opposite end of this lever is provided with a pin 37, projecting through the side plate 4, into engagement with the snail cam 38, upon the disk 39, the latter being pivoted to the side plate 4, by means of a screw 40. The disk 39, is provided with an extension arm 41, pointer 42, and handle 43. Stops 44 are also provided upon the disk 39, to engage with the stop pin 45, whereby the limit of the throw of the disk and consequently of the snail cam 38, is effected. This snail cam 38, consists of an inclined depression in the side of the disk 39, such depression being concentric with the center of the disk. It will thus be seen that oscillation of the disk 39, will cause the snail cam 38, to engage the pin 37, and thereby oscillate the lever 34, so that its opposite brake end 36, will be pressed down upon the disk 32, or be withdrawn therefrom, thereby permitting the disk 32 to slide along the governor shaft 30, under the centrifugal action of the governor weighted spring 33. This operation is well-known to those skilled in the art, and needs no further description. The upper or index end 42 of the arm 41 oscillates along the scale 46, so that the speed of the motor may be regulated accordingly.

Mounted in the bracket 47, and a box 48, outside of the plate 5, is short shaft 49, carrying the gear 50, which meshes with the gear 20, and is driven thereby. Rigidly secured also to the shaft 49, and outside of the plate 5, is the sleeve 51, said sleeve carrying two spaced gear wheels 52 and 53, the diameters of the latter being in the ratio of two to three. Secured beneath the base 3, and adjacent to the box 48, is the bracket 54, with downwardly extending apertured arms 55, within which is the pivotally mounted sleeve 56. This sleeve extends outside of the lever 57, which projects upward through the base 3, and serves as an operating arm for oscillating the sleeve 56, for a purpose hereinafter to be described. Also rigidly secured upon the sleeve 56, is a plate 58, which carries the short stub shafts 59 and 60, upon which are mounted the two pinions 61 and 62, the latter being staggered, and arranged to mesh respectively with the two gear wheels 52 and 53 on the shaft 48, as the lever 57, is oscillated either forward or back.

Carried in the sleeve 56, such sleeve forming a bearing, therefor, is the long shaft 63, such shaft carrying at its outer end a pinion 64, rigidly mounted thereon, and in constant engagement with each of the gear wheels 61 and 62. From this construction it will be seen that as the plate 58 is oscillated in one direction, the gear wheel 61 will be brought into engagement with the gear wheel 52, and when oscillated in the opposite direction, the gear wheel 62, will be brought into engagement with the gear wheel 53. And inasmuch as the motion of the shaft 49, is communicated through the gear wheels 52 or 53, to the gear wheels 61 or 62, the motion of the shaft 49, will be communicated to the shaft 63 through the gear 64, and the speed of the shaft 63 will be varied accordingly. The opposite end of the shaft 63 is carried in a bearing bracket 65, beneath the base 3, and has rigidly secured at its outer end, a miter gear 66, the latter meshing with the miter gear 67 at the lower end of an upright shaft 68, the latter being carried in the bearing bracket 69 as clearly illustrated. The upper end of the shaft 68, is provided with a screw thread 70, which in practice has 50 threads to the inch. Mounted also upon the upper end of the bracket 69, is a swiveled bearing 71, carrying at its upper end a worm 72, which is normally in mesh with the thread 70 on the shaft 68. This worm 72, serves the purpose of supporting the feed shaft 25, the outer end of which is threaded as at 73, with fifty threads to the inch.

As above described, the pinion 24, meshes with the gear 23, and is mounted upon the feed screw 25. It should also be stated that such pinion is splined to said feed screws so that the rotation of the pinion 24, will cause the rotation of the feed shaft 25. This pinion 24, is provided with a collar 74, and groove 75, said groove being for the purpose of engaging a semi-circular notch 76, formed in an upward extension 77, of the plate 5, so that if the pinion 24, is rotated, the feed shaft 25, may slide through, without in any way shifting such pinion. The feed shaft 25, carries the usual mandrel 78, upon which the usual phonograph record is placed.

The numbers of teeth in the gears and pinions in the main gear train are such as to give the ratio of the rates of revolution of the pinions 24 and 50 as 3 to 1; that is the pinion 24 makes three (3) revolutions to one (1) revolution of the pinion 50.

Secured to the base 3, and back of the mandrel 78 is the upright horn and sound box support 79. I have not illustrated the horn in connection with the support, as it will be readily understood that the small bent end of the horn is simply inserted into the upper aperture 80 of the horn support, and that the sound box 81, is secured in the lateral tubular opening, 82, of this support, so as to bring the stylus of the sound box against the surface of the cylinder record, mounted upon the mandrel 78.

The operation of the device is as follows: It is understood that the spring within the spring box is wound up, and that a record is put upon the mandrel 78. If now, the record is a four minute record, the operator will shift the lever 57 into position to bring gear 62 into engagement with the large gear wheel 52 on the shaft 48, then operating the arm 41 of the governor control, the motor is started, and it will cause the rotation of the feed shaft 25, and inasmuch as the screw thread 73 of such feed shaft engages with the worm 72, such feed shaft will be driven longitudinally to cause the record and mandrel to travel transversely of the sound box, but with the four minute record the record groove will be 200 to the inch, while the threads 73 are 50 to the inch. This, however, would cause the mandrel to travel laterally four times as fast as required, were it not for the fact that the worm 72 is also in engagement with the threads 70 of the shaft 68. Now, since the shaft 68 is rotated in a direction to cause the rotation of the worm wheel 72, in the direction of the arrow, the result is, lateral motion of the feed shaft 25, and mandrel 78, is one fourth of what it would be if such mandrel and feed shaft were to travel under the influence of the threads 73 alone, thereby giving the mandrel a travel equivalent to what would be under the influence of a thread 200 to the inch.

When the small wheel 53 is utilized as the driving mechanism for the shaft 63 through the gear wheels 61, the shaft 63, will travel with decreased speed, and with the result that the decrease of speed is communicated to the worm 72, through the connecting rotating parts, with the result that the lateral traveling of the feed shaft and its mandrel will be reduced to what it would be under the influence of a thread 100 to the inch.

It will thus be seen that with my improved structure I am able by the mere shifting of the lever 57, to accordingly shift the mechanism, to operate with either two-minute records where the record grooves are 100 to the inch, or with four minute records where the record grooves are 200 to the inch, the whole being accomplished by means of the differential screw feed mechanism embodied in the screw thread upon the mandrel shaft. It will be noted that the mandrel rotates in the direction of the arrow thereon, and this would cause a motion of translation in the mandrel shaft in the direction of the arrow, but since the vertical shaft 68 rotates in the direction of the arrow thereon, and meshes with the worm wheel 72, causing a simultaneous rotation of said worm wheel in the direction of the arrow thereon, the resultant is, a reduction of the motion of translation of the mandrel shaft, and amount of this reduction depends upon which of the differential change gears 61 or 62 is in engagement with the gears 52 or 53.

As a means for protecting the motor from dust and dirt I provide a cover 83, which is located over the space bars or rods 8, as clearly shown in Fig. 3. This cover is held in position by the snap spring 84, which takes over the lower space bars 8, as shown. I also provide a slot in the upper portion of this cover, so that the gear wheel 23 may project through such slot into engagement with the pinion 24, on the mandrel shaft 25.

When it is desired to place a record upon the mandrel 78, it is only necessary to lift said mandrel with its said feed screw free from semi-circular notch 76, and the worm wheel 72, when the record may be slipped over the mandrel and the mandrel together with its shaft replaced in position with the grooves 75 within the notch 76.

When the phonograph is not in use, the mandrel shaft may be removed from its position, and placed within the case, after which the cover, 2, may be reversed and placed upon the case, so as to completely inclose all of the working parts of the phonograph.

I do not limit to the phonograph my claims to the differential screw feed struc-

ture, as such a device is capable of use in other relations. I desire, therefore, to claim this feature broadly as well as in combination with the phonograph motor.

I claim:

1. In a phonograph the combination of a pair of screw threaded shafts, a record mandrel rigidly mounted upon one of said shafts, gear connections between said shafts for producing simultaneous rotation thereof and a worm wheel in normal engagement with the threads of said shafts for producing a motion of translation of said mandrel shaft in the direction of its axis.

2. In a phonograph, the combination of a pair of screw threaded shafts, a record mandrel rigidly mounted upon one of said shafts, a gear connection between and for simultaneously rotating said shafts, and a worm gear engaging the threads of said shafts for producing a motion of translation of said mandrel shaft in the direction of its axis.

3. In a phonograph, the combination of a pair of worm threaded shafts, a record mandrel mounted upon one of said shafts, a worm wheel engaging the screw-threads of said shafts, and a spur gear connection between said shafts for producing rotation, thereof and in conjunction with said worm wheel a longitudinal motion of said record mandrel shaft.

4. In a phonograph, the combination of a pair of angularly disposed screw-threaded shafts, one of which carries a record mandrel, a worm wheel engaging the screw threads of said shafts, and intermeshing change gears connecting said shafts, for producing a simultaneous rotation thereof and longitudinal motion of said record mandrel shaft.

5. In a phonograph, the combination of a pair of angularly disposed screw-threaded shafts, one of which carries a record mandrel, a worm wheel meshing with the threads of both of said shafts, a gear wheel splined to said record mandrel shaft, and intermeshing change gears connecting said gear wheel with the other shaft, whereby the rotation of said gears will produce a simultaneous rotation and longitudinal translation of said record mandrel shaft.

6. In a phonograph, the combination of a pair of angularly disposed screw threaded shafts, a worm wheel normally in constant engagement with the threads of said shafts, a record mandrel mounted upon one of said shafts, and means for producing simultaneous rotation of both of said shafts at different relative rates and a consequent longitudinal translation of said mandrel shaft.

7. In a phonograph, the combination of a screw threaded mandrel shaft, and a supplemental screw threaded shaft, a worm wheel engaging the threads of both of said shafts, and change gear connections between said shafts for producing simultaneous rotation thereof and a longitudinal feeding motion of said mandrel shaft.

8. In a phonograph, the combination of a record mandrel shaft, having screw threads thereon, a second screw threaded shaft angularly disposed with respect to said mandrel shaft, a worm wheel meshing with the threads of both of said shafts, a gear wheel splined to said record mandrel shaft, a gear train connecting said gear wheel to said second shaft, and a motor for driving said gear train and rotating said shafts at different relative rates, whereby said mandrel shaft will also have a feeding motion in the direction of its axis.

9. In a phonograph, the combination of a motor gear train, a record mandrel shaft, a screw thread of comparatively low pitch upon said shaft, a pinion splined to said shaft and in operative engagement with a gear of said train to rotate said shaft, a supplemental gear train driven from said motor gear train, a screw threaded shaft driven by said supplemental gear train and a worm wheel engaging the threads of said shafts, said worm wheel being driven from said supplemental gear train in a direction to reduce the progressive feeding motion of said mandrel shaft due to the low pitch of the thread thereon.

10. In a phonograph, the combination of a motor gear train, a screw threaded record mandrel shaft rotated by said gear train, a supplemental gear train driven by said motor gear train, a supplemental screw threaded shaft driven by said supplemental gear train, a worm wheel meshing with the threads of both of said shafts and driven by said supplemental shaft to give said mandrel shaft a feeding motion in the direction of its length, and change gears in said supplemental train whereby the relative rates of feed of said shaft may be changed.

11. In a phonograph, the combination of a motor gear train, a screw-threaded mandrel shaft, a pinion splined to said shaft and in engagement with a gear wheel of said train to be rotated thereby, a supplemental gear train including a screw-threaded shaft driven by said motor gear train, a worm wheel meshing with the threads of said shaft respectively and driven by said second named shaft to give said mandrel shaft a feeding motion in the direction of its length, and change gears in said supplemental gear train whereby the relative rates of feed of said mandrel shaft may be changed.

12. In a phonograph, the combination of a motor gear train, a record mandrel shaft, a screw thread of comparatively low pitch upon said shaft, a pinion splined to said shaft and in operative engagement with a

gear of said train to rotate said shaft, a supplemental gear train including a screw threaded shaft driven from said motor gear train, a worm wheel engaging the threads of both of said shafts, said worm wheel being driven from said supplemental gear train in a direction to reduce the progressive feeding motion of said shaft due to low pitch of the thread thereon, and change gears in said supplemental train whereby the relative rates of feed of said mandrel shaft may be changed.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."