No. 651,904. Patented June 19, 1900.

L. P. VALIQUET.

GRAMOPHONE MOTOR.

(Application filed Apr. 21, 1899.)

(No Model.) 5 Sheets—Sheet 1.

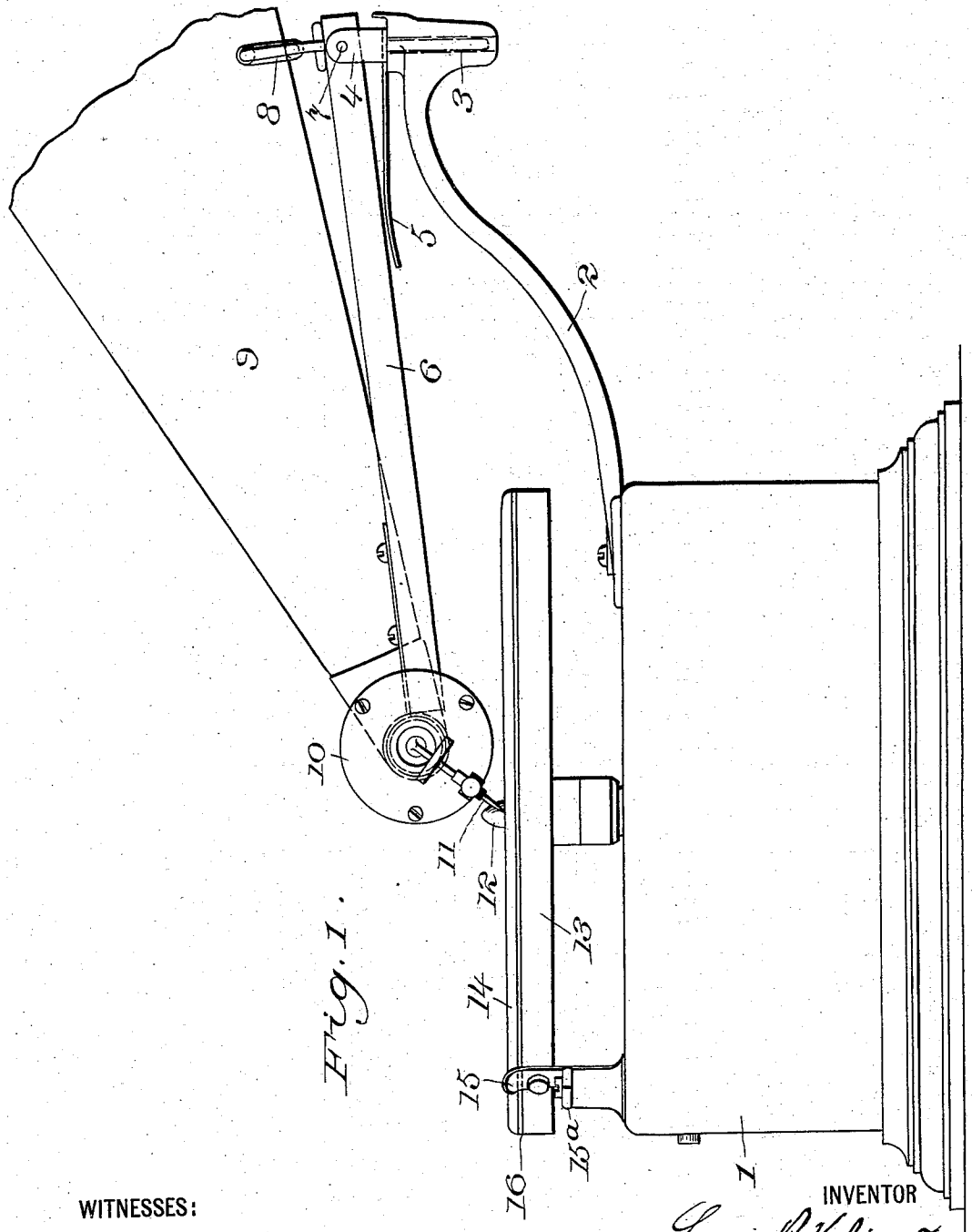

Fig. 1.

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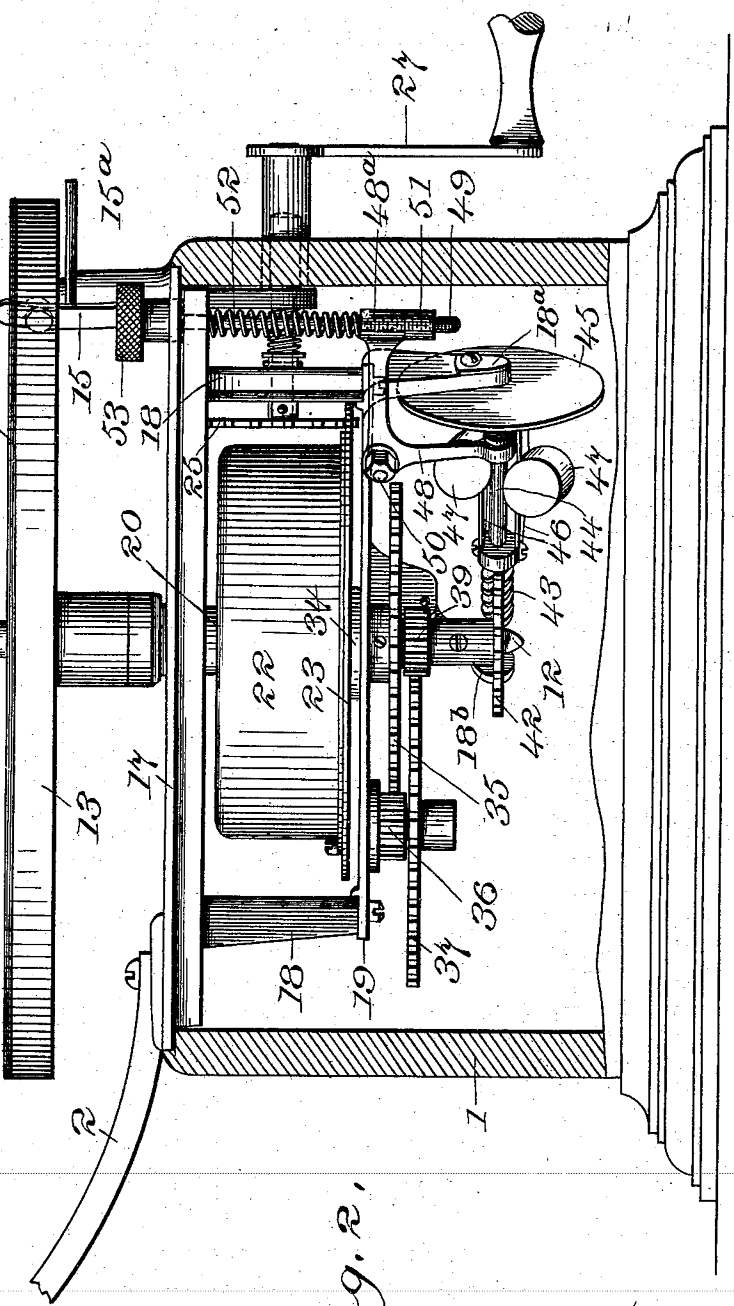

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

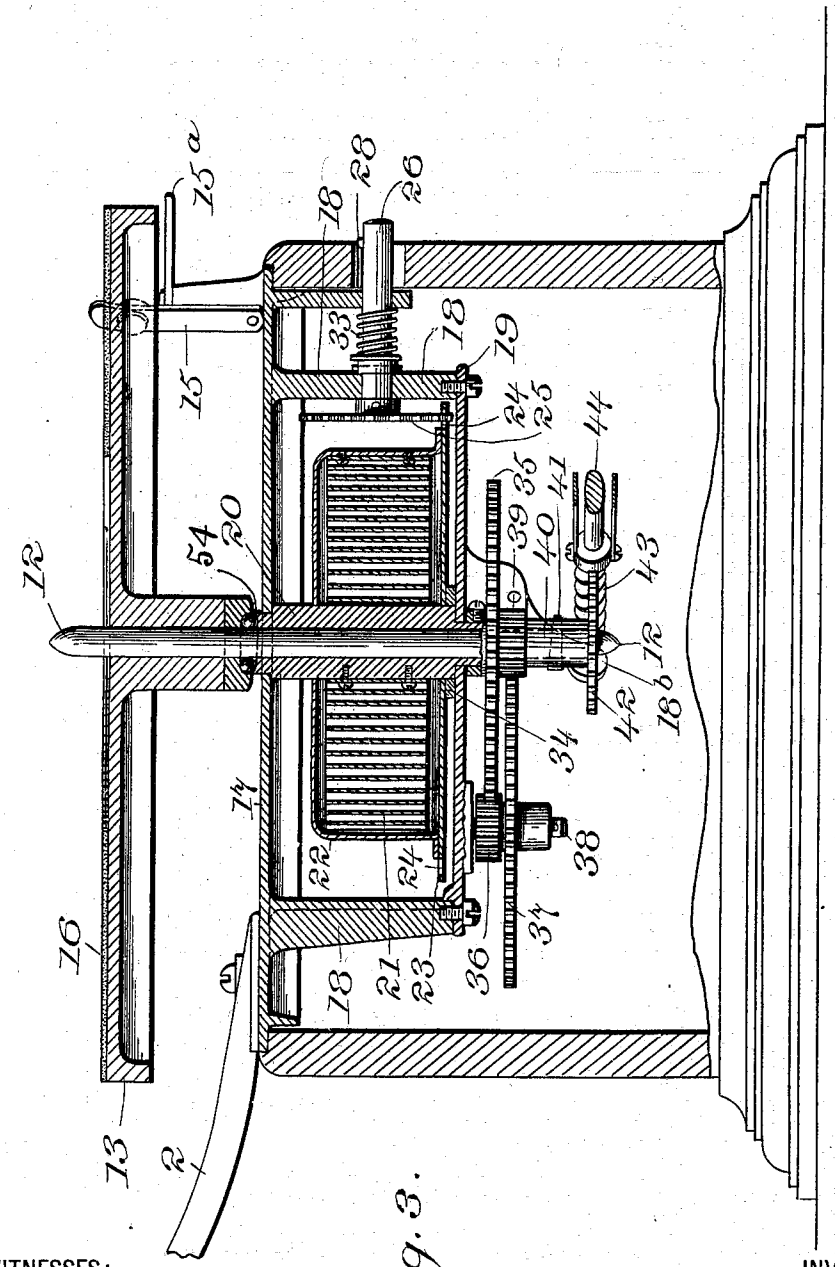

Fig. 3.

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L. P. VALIQUET.

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(Application filed Apr. 21, 1899.)

(No Model.) 5 Sheets—Sheet 4.

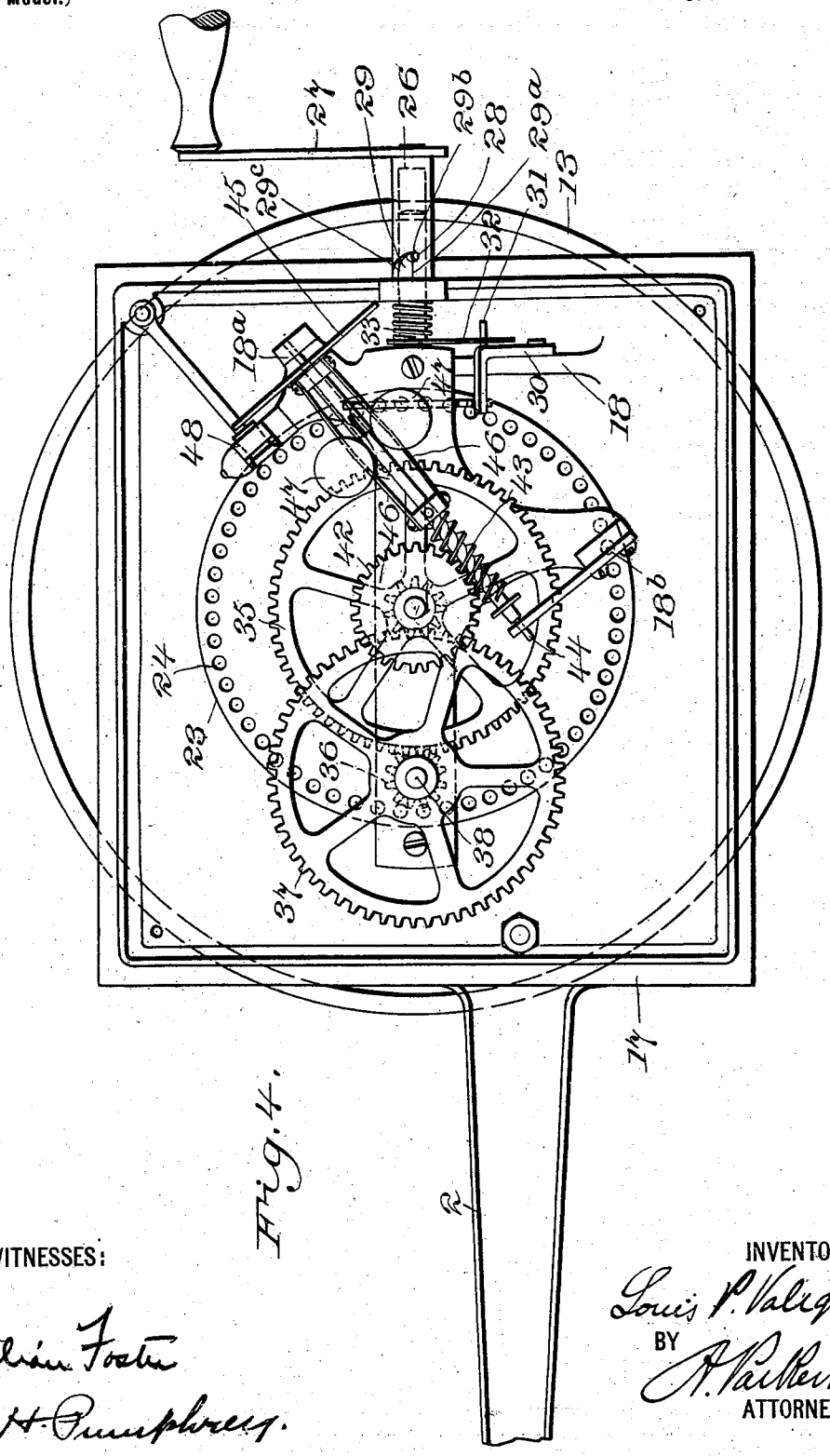

Fig. 4.

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No. 651,904. Patented June 19, 1900.

L. P. VALIQUET.

GRAMOPHONE MOTOR.

(Application filed Apr. 21, 1899.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 5.

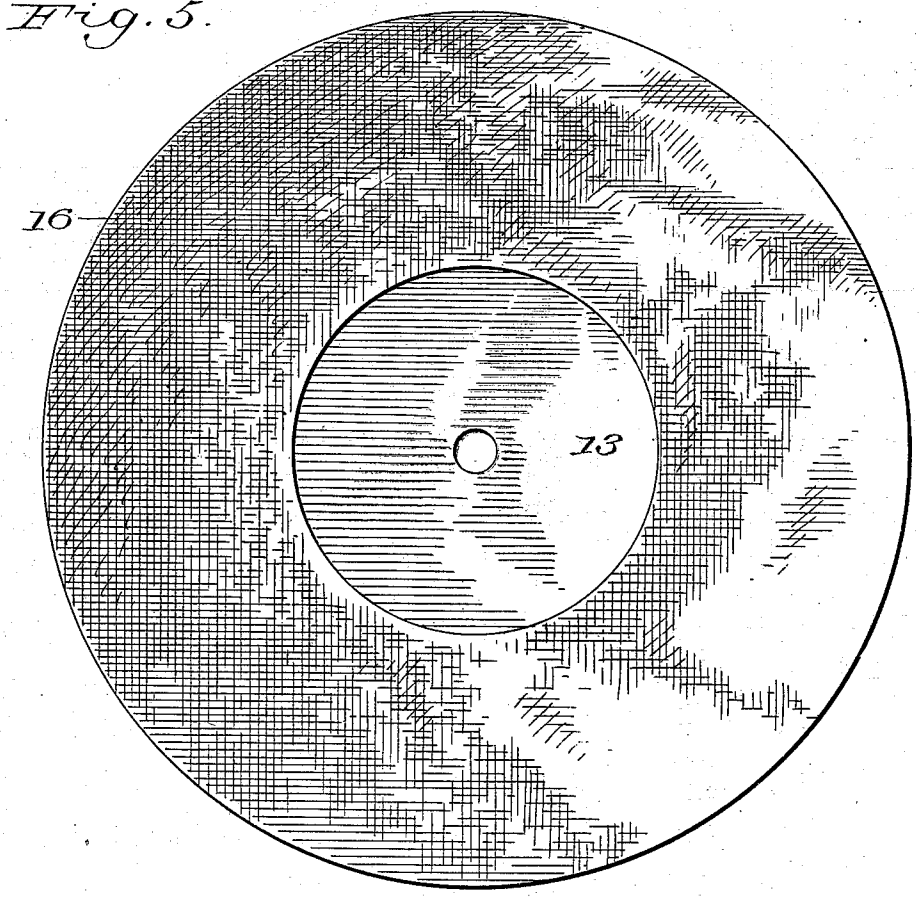
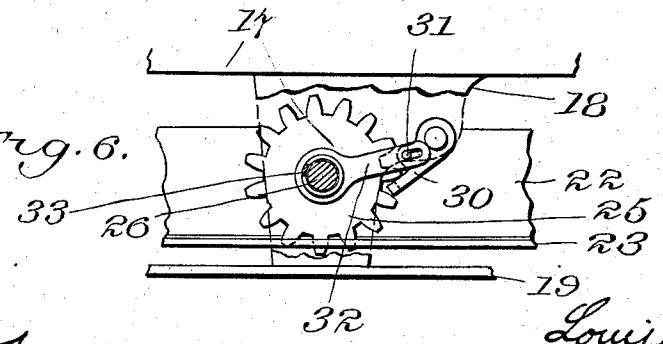


Fig. 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO THE UNIVERSAL TALKING MACHINE COMPANY, OF SAME PLACE.

GRAMOPHONE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 651,904, dated June 19, 1900.

Application filed April 21, 1899. Serial No. 713,984. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of New York city, county of New York, State of New York, have invented certain new and useful Improvements in Gramophone-Motors, of which the following is a specification.

My invention relates to mechanical movements and spring-motors, and is more specifically designed to produce an improved compact noiseless spring-motor for rotating the sound-record on a gramophone, the said motor being so designed that it can be wound up without stopping the mechanism. The invention also includes certain improvements in the mechanism of the gramophone coöperating with said motor.

The preferred form of apparatus embodying my invention is illustrated in the accompanying five sheets of drawings, in which—

Figure 1 is a side elevation of a gramophone containing my motor and embodying my improvements. Fig. 2 is a vertical section at right angles to the plane of Fig. 1, showing the mechanism within the casing. Fig. 3 is a similar section taken through the center of the mechanism itself. Fig. 4 is a bottom view of the top plate and mechanism carried thereby. Fig. 5 is a detail plan view of the record-carrying table. Fig. 6 is a detail of the locking-pawl.

Throughout the drawings like reference-figures refer to like parts.

The motor-casing and base of the gramophone is in the form of any convenient box 1. From the top plate of this casing is supported the usual projecting arm 2, which in its outer end has a vertical bearing for the pivot 3, upon which is mounted any convenient form of pivot-piece 4 and the supporting-spring 5. The swinging arm 6 is hinged to the pivot-piece 4 by the horizontal pivoted shaft 7 and carries any convenient form of support 8 for the horn 9, which extends from the sound-box 10 on the end of the arm 6, said sound-box having the reproducing-stylus 11, engaging with the undulatory groove of the sound-record 14. This sound-record is supported on a revolving table 13 of the same general form as now in use, said table being carried by a vertical rotating shaft 12, which is also a centering-shaft for the sound-record 14, having its upper end preferably tapered to a point, as shown. Any convenient form of brake 15 coöperates with said rotating table, the form which I have illustrated in Figs. 1 and 2 being operated by the eccentric lever 15^a.

Instead of covering the entire upper face of the table 13 with a layer of baize cloth or similar frictional material, as is customary, and employing a thumb-screw on the shaft 12 to hold the record down on the table I simply employ a narrow annular strip 16 of baize or other frictional material and dispense with the ordinary thumb-screw.

While the body of the casing 1 may preferably be made of wood, the top plate 17 is formed of metal, and this plate carries the entire mechanism of the record-rotating motor. From this plate project any suitable number of studs 18 18, which in the preferred construction support the bed-plate 19 for the mechanism of the motor, said bed-plate being parallel to the top plate 17. Journaled in one or both of these plates is the rotating sleeve 20, within which is journaled the previously-described shaft 12, which projects through both said plates 17 and 19. To the exterior of the sleeve 20 is fastened one end of the spiral spring 21, the other and outer end of said spring being attached to the inclosing drum 22. The plate 23 is fastened to the lower face of said drum and preferably forms the inclosing lower wall of said drum, and in the projecting portion of said plate or other rigid projecting flange of the drum 22 I form a circular series of perforations 24. A star-wheel 25, at right angles to said plate 23, has projecting teeth which enter said perforations 24 and engage the perforated flange of the drum formed by the plate 23. This star-wheel 25 is mounted on the winding-shaft 26, which is journaled in rigid projections from the top plate 17, and the winding-crank 27 is adapted to engage said winding-shaft, but to be detachable therefrom at will, by means of the pin or projection 28 in the shaft 26 and the engaging notch 29 therefor in the end of the sleeve of the crank 27. This engaging notch 29 has an engaging edge 29^a, parallel to the axis of the sleeve, and preferably terminates at its inner end in the semicircular recess 29^b. The other side has a helical dis-

charging edge 29^c. A locking-pawl 30 of any convenient shape is pivoted to a suitable projection from the top plate 17 and engages the star-wheel 25 of the winding mechanism to prevent the backward rotation of the same. This pawl has a pin 31, engaging a slotted arm 32, mounted on the shaft 26 and kept in frictional contact with the said shaft or some projection thereon by means of the spiral spring 33 or equivalent means.

The washer or collar 34 forms a bearing for the lower face of the spring-drum and keeps the same at a proper distance from and parallel to the bed-plate 19. The gear-wheel 35 is fastened to the lower end of the sleeve 20 (said sleeve projecting through the bed-plate 19 for this purpose) by means of the set-screw or other equivalent means, as shown. This gear-wheel 35 meshes with the pinion 36, which is rigidly connected to a gear-wheel 37, both rotating freely and in unison on the stud-shaft 38. The gear-wheel 37 meshes with the pinion 39, fastened to the vertical rotating shaft 12 by any convenient means, such as the sleeve 40 and key 41. This sleeve 40 also carries the worm-gear 42, which meshes with the worm 43 of high pitch, formed on shaft 44, journaled in projections 18^a 18^b from the main frame, said shaft being in a plane at right angles to the vertical rotating shaft 12. Preferably I make this worm 43 double-threaded to insure smoothness of action. On the other end of the shaft 44 is loosely mounted the axially-sliding friction-plate 45, attached to a collar on said shaft by means of the spring-strips 46 46, which carry the ordinary governor-weights 47 47. This friction-plate 45 coöperates with the brake-lever 48, which I preferably make in the form of a bell-crank, the other arm being perforated at 48^a to permit the passage of a screw-shaft 49 therethrough. This brake-lever is pivoted to the main frame at 50. The screw-shaft 49 carries the stop 51 at its lower end, and the spiral spring 52, which is always under compression, holds the sleeved arm 48^a of the brake-lever and the screw-shaft 49, which engages therewith, down. The sleeve on the end of the arm 48^a is internally threaded and loosely meshes with the thread on the shaft 49, so that by turning said shaft 49 through the agency of the thumb-screw 53 or equivalent device the position of the brake-arm can be adjusted. The stop 51 limits the downward motion of the sleeved arm 48^a and so establishes a limit of speed for the governor.

The mode of operation of my invention is as follows: The winding-crank 27 being in position and the brake 15 engaging the rotating table 13, the machine can be wound up by turning the crank from left to right in the direction of the hands of a watch, the engaging edge 29^a or recess 29^b of the notch in the crank-sleeve bearing against the pin or projection 28 and winding-shaft 26. This of course rotates the star-wheel 25 and tends to turn the frictional arm 32 in the same direction and does turn said arm far enough to lift the locking-pawl 30 out of engagement with the star-wheel by means of the pin 31 engaging the slot in said frictional arm 32. Of course further rotation of the frictional arm 32 is prevented, and it merely slips around on the winding-shaft. The star-wheel 25 noislessly engages the circular line of perforations 24 in the plate 23 and rotates the same, together with the spring-drum 22, thereby winding up the spring 21, contained therein. When the operator desires to stop winding, he merely reverses the motion of the crank and the same disengages itself from the winding-shaft by reason of the helical discharging edge 29^c of the notch 29 coming in contact with the pin or projection 28 on the winding-shaft. Backward rotation of the winding-shaft is prevented, of course, by reason of the fact that the slightest backward turn causes the friction-arm 32 to travel with it far enough to bring the locking-pawl 30 into engagement with the star-wheel 25.

Whenever the brake 15 is taken off, the motor will begin to run by reason of the fact that the spring 21 will cause the sleeve 20 to slowly rotate, and this will cause the gear-wheel 35 to rotate at the same rate. This motion is transmitted through the pinion 36 and gear-wheel 37 back to the pinion 39 on the vertical rotating shaft 12, causing the same to rotate at a much higher rate of speed and carrying with it the table 13 and record 14, resting thereon. This shaft 12 is of course fastened to the table 13 by means of a projecting boss on said table, as shown, or otherwise. Said boss runs on ball-bearings 54 in the upper end of the sleeve 20, thereby forming a supporting-bearing for the shaft 12 and all mechanism carried thereby. With the shaft 12 rotates the worm-gear 42, and this causes the high-speed worm 43 to rotate the governor-shaft 44. By the phrase "high-speed" or "high-pitch" worm I mean a worm the pitch angle of whose thread to the axis of the worm is great enough to enable motion to be transmitted from the worm-gear to the worm as well as from the worm to the worm-gear, it being a well-known fact that in the more ordinary forms of low-pitch gearing motion can only be transmitted from the worm to the worm-gear, any attempt to run the gearing backward resulting in a locking of the mechanism through the friction created. The centrifugal action of the governor-weights 47 pulls out the springs 46, thereby drawing the axially-sliding friction-plate 45 toward and into frictional contact with the brake 48. This brake can be adjusted by means of the thumb-screw 53, as before described, and thus the speed of the governor adjusted.

It is evident that when the winding-gear is at rest it is a means for holding the spring-drum 22 rigid with reference to the main frame; but it is also evident that said winding-gear can be operated to further wind up

the spring even while the motor mechanism is in operation. The apparatus thus constitutes what is called a "continuous-winding motor."

The sound-record 14 is centered by the shaft 12 passing through the center of the table 13, and by reason of the fact that the frictional material 16 is arranged in annular form in the shape of a narrow strip about the outer circumference of the table close contact is insured between the outer circumference of the record and said frictional material, and the friction so created, operating at or near the circumference of the record, where the resistance of the stylus is itself applied, exerts sufficient force to turn the record against the resistance afforded by the stylus 11 without the use of any thumb-screw or other means for forcing the record down upon the table than the weight of said record and the downward pressure of the stylus thereon.

When the reproducer is swung to one side to put in a new needle or to put a new record on the machine, the supporting-spring 5 holds the arm 6 up and prevents the reproducer from dropping on the table and being injured.

The advantages of my invention, in addition to those above referred to, are the neatness and compactness of the motor mechanism, which is all carried by the top plate 17 of the motor-casing, so that by removing said top plate the entire mechanism is taken with it and exposed to view for inspection, oiling, or repair. The driving mechanism, winding mechanism, and governor mechanism are all noiseless in their action and do not require the exact cutting of as many gear-teeth as is the case with ordinary clockwork, the worm-gear on the governor taking the place of the usual train of several gear-wheels and the winding-gearing operating without the rattling of the ordinary ratchet. The advantage of the continuous-winding feature of my invention lies in the fact that where the motor runs down in the middle of the reproduction of a record it can be wound up again without stopping the mechanism, while in the ordinary form of motor the winding up thereof immediately takes the power off the rotating shaft and stops the action of the motor during the operation of winding.

It is evident, of course, that various changes could be made in the details of the apparatus disclosed without departing from the spirit and scope of my invention so long as the relative arrangement of parts shown in the drawings or the general principle of operation described in the specification is preserved. Thus, for instance, it is immaterial which of the two elements connected by the spring 21 operates to drive the rotating shaft so long as the other can be held rigid with reference to the main frame. Other forms of winding-gear might be substituted for that shown, other forms of governor might be employed, the intermediate gearing between the sleeve 20 and the shaft 12 might be modified in many ways, the form of spring-drum might be changed, and various of the novel sub-combinations of elements described might be used with other apparatus and for other purposes than those specified; but all these I consider changes of form and not of substance and still within the scope of my invention.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a mechanical motor the combination of the motor-casing, the top plate removably attached to said casing, the frame supported from the under side of said plate, the sleeve journaled in said frame, the rotating vertical driving-shaft journaled in the sleeve, extending therethrough and projecting through the top plate, the turn-table carried by said shaft, the gear-wheel on the sleeve, the pinion on the shaft, intermediate gearing from said gear-wheel to said pinion supported on the frame, the drum journaled on the sleeve, the spiral spring in said drum having one end fastened to the drum and the other to the sleeve, and the winding-gear mounted in the frame and directly connected to the drum.

2. In a mechanical motor the combination of the motor-casing, the top plate removably attached to said casing, the frame supported from the under side of said plate, the sleeve journaled in said frame, the rotating vertical driving-shaft journaled in the sleeve, extending therethrough and projecting through the top plate, the turn-table carried by said shaft, the gear-wheel on the sleeve, the pinion on the shaft, intermediate gearing from said gear-wheel to said pinion supported on the frame, the drum journaled on the sleeve, the spiral spring in said drum having one end fastened to the drum and the other to the sleeve, and the winding-gear mounted in the frame and directly connected to the drum, together with the worm-wheel on the rotating driving-shaft, the governor and the shaft for said governor provided with a worm-gear meshing with the worm-wheel, all said governor parts and shaft being also journaled in the frame.

3. In a gramophone the combination of the vertical pivot-bearing for the swinging arm supported on a projection from the gramophone-base, a pivot-piece journaled in said pivot-bearing, a swinging arm hinged to said pivot-piece on a horizontal axis, and the supporting-spring projecting from said pivot-piece and adapted to engage and support the swinging arm when the reproducer is not supported by the sound-record.

Signed by me at New York city, New York, this 18th day of April, 1899.

LOUIS P. VALIQUET.

Witnesses:
A. PARKER-SMITH,
LILIAN FOSTER.