July 10, 1923.

1,461,111

L. G. DANIELS

AUTOMATIC TALKING MACHINE

Filed Jan. 19, 1920

4 Sheets-Sheet 1

Fig. 1.

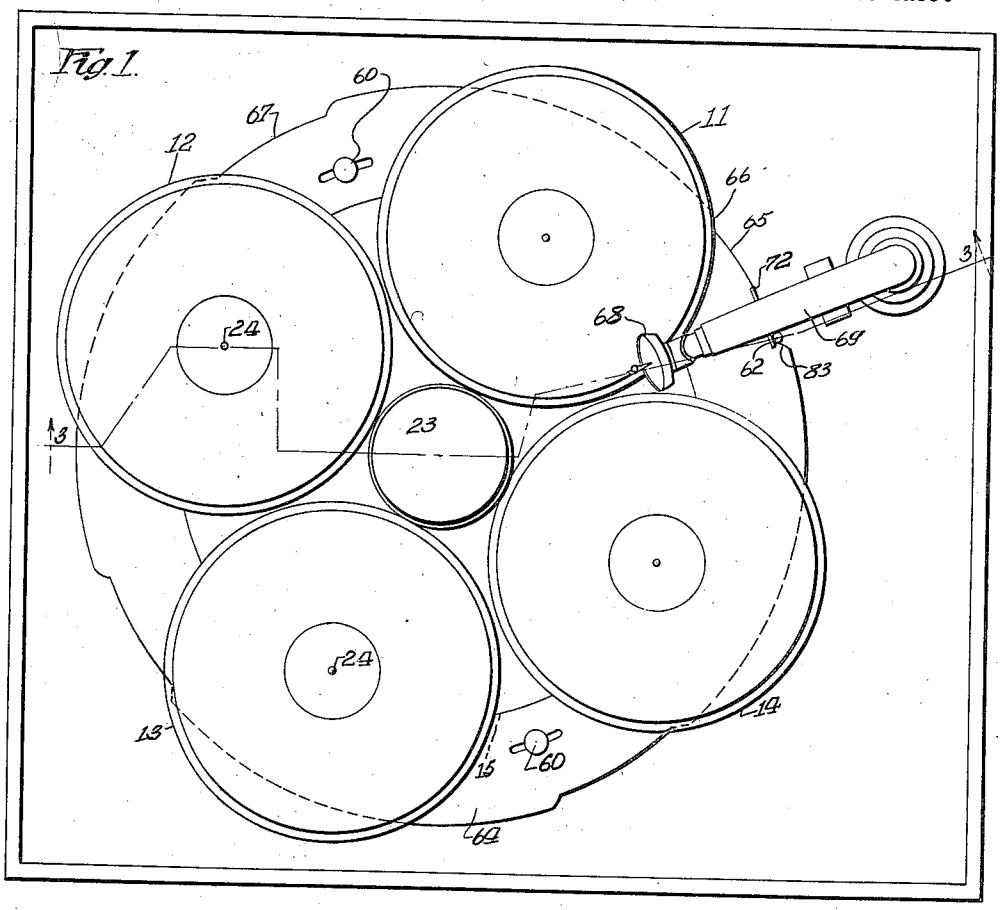


Fig. 6.

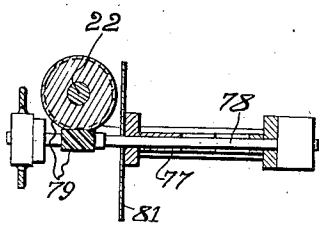
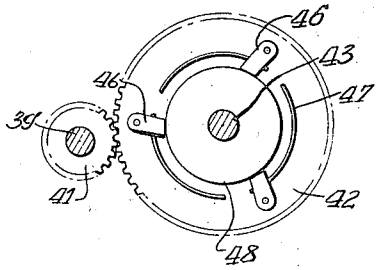


Fig 7.



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BY Ira Wilson

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L. G. DANIELS

AUTOMATIC TALKING MACHINE

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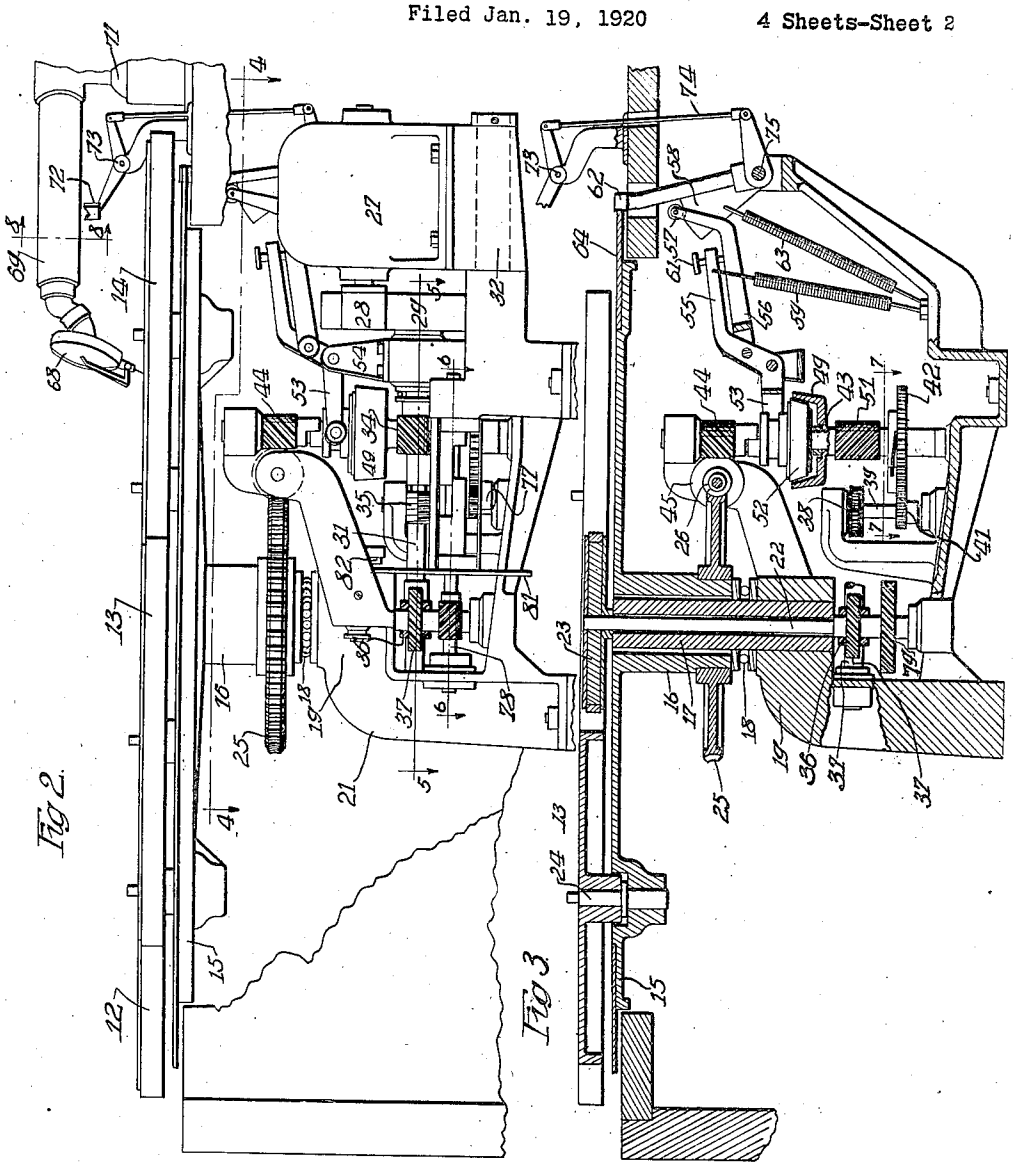

Fig 2.

Fig 3.

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Fig. 4.

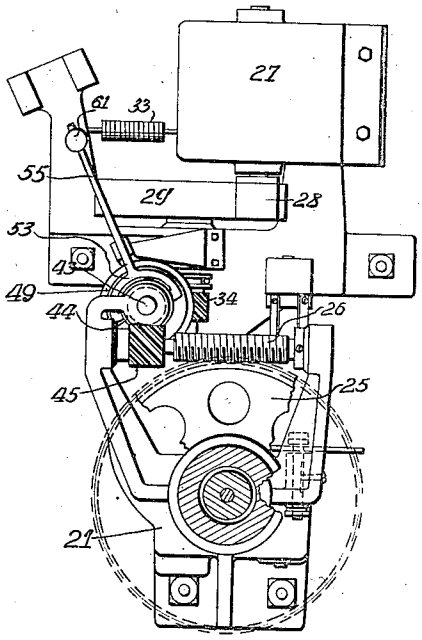

Fig. 5.

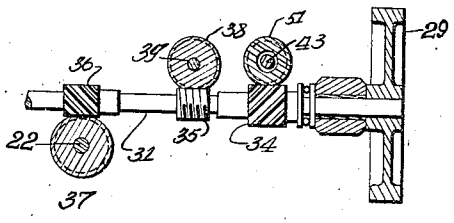

Fig. 8.

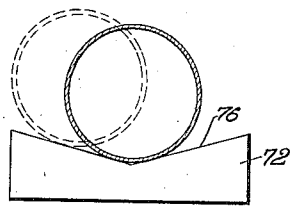

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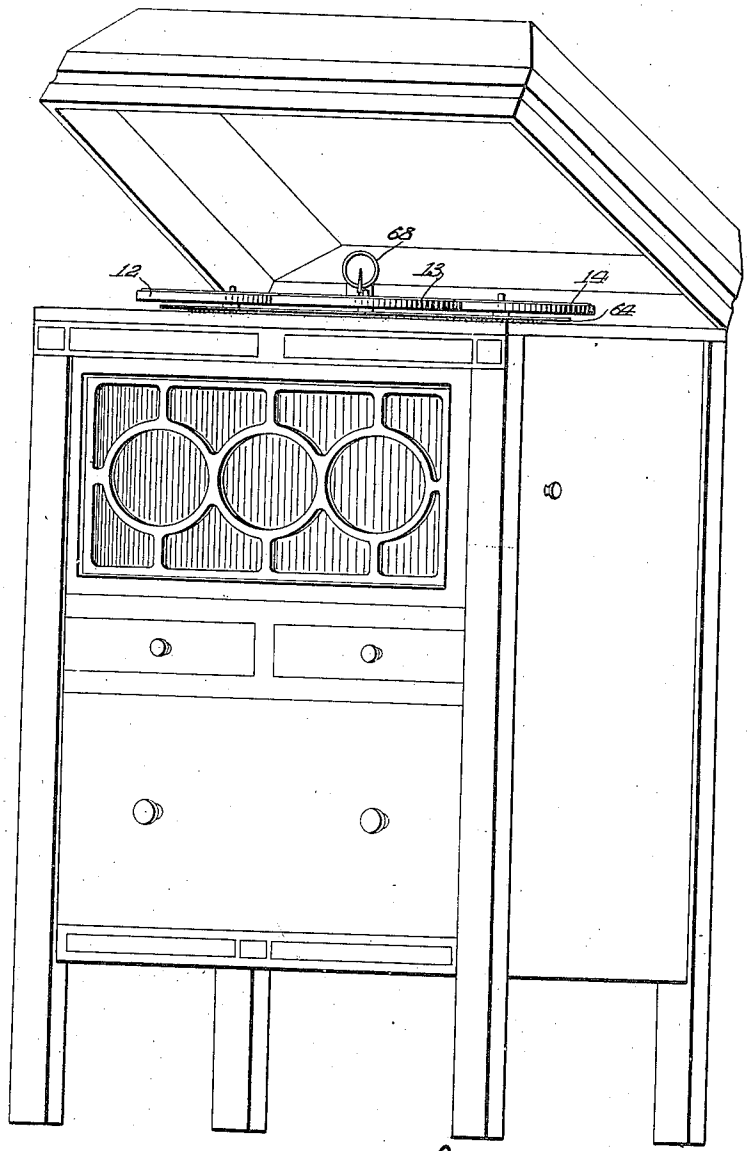
Fig. 9.



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Patented July 10, 1923. 1,461,111

UNITED STATES PATENT OFFICE.

LEE G. DANIELS, OF ROCKFORD, ILLINOIS.

AUTOMATIC TALKING MACHINE.

Application filed January 19, 1920. Serial No. 352,257.

To all whom it may concern:

Be it known that I, LEE G. DANIELS, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Automatic Talking Machines, of which the following is a specification.

This invention pertains in general to the art of graphophones, and has more particular reference to multiple record talking machines, that is, those adapted to successively play a number of records without changing the record by hand, as is necessary with the ordinary single record turn table machine.

The primary object of the present invention is to provide a talking machine of novel construction, which shall automatically play a plurality of records, one after another until all are played, and which will, if desired, continuously play the records in succession.

More particularly, my invention contemplates as an object, the provision of a talking machine including a revoluble table carrying a plurality of circumferentially spaced record turn-tables which are carried successively to a playing station beneath the reproducer, the stylus of the latter being lowered onto the record at this station, and when the playing is completed, being raised to an inoperative position. Suitable mechanism is provided for indexing the table to position the record turn-tables at each playing station and to automatically lower and raise the reproducer stylus at the desired intervals.

Another object of my invention is to feed the turn-table at the playing station laterally beneath the reproducer, so as to reduce to a minimum any strain or side thrust on the stylus and sound grooves as is imposed by the ordinary talking machine in which the reproducer and tone arm are carried across the record by the lead of the sound grooves. With my improvements, that is, by feeding the record laterally beneath the reproducer, such wearing of the sound grooves is eliminated and better reproduction is obtained, because the stylus rides freely in a sound groove with just the proper suspension to most effectually transmit sound waves. In this regard, it might be mentioned that by the use of a suitable reproducer, records having either the vertically or laterally undulating record grooves may be played.

Still another object of my invention is the provision of novel mechanism for raising and lowering the reproducer stylus at the proper intervals. One of the features of this mechanism is that although actuated at a predetermined point, preferably in the lateral travel or feed of each turn-table, nevertheless, the reproducer will be properly raised irrespective of its position at that time relative to the center of the record. In other words, in a series of records to be played those made by different manufacturers may be anywhere from 80 to 150 grooves per inch, consequently when any piece is finished, the reproducer stylus might be at a different distance from the center of the record from the finishing point on another record. My improvements, as will be more fully pointed out hereinafter are designed to meet these varying conditions. With reference to rotation of the table which carries the multiple of record turn-tables, my invention contemplates utilizing movement of said table for actuating the mechanism for raising and lowering the reproducer stylus at the proper intervals.

Another object is the provision in a talking machine of a reproducer or tone arm, which when in playing position, is in no way restrained or connected with any mechanism or operable parts which might by imposing resistance on the arm, impair the tone or quality of reproduction, this object being further attained by feeding the record laterally beneath the reproducer so as to render negligible any thrusts or strains due to the stylus riding inwardly of the record.

My invention further contemplates the provision of novel mechanism for driving the table in indexing and feed movements, including preferably, a continuously driven shaft, the speed of which varies and is controlled automatically for obtaining the requisite indexing and feed speeds, so that at all times in the operation the main table is in motion.

Other objects and attendant advantages and features pertaining to the preferred construction will be better understood by those familiar with this art by reference to the following description, when considered in connection with the accompanying drawings, in which—

Figure 1 is a plan view of an automatic talking machine embodying my improvements;

Fig. 2, a side elevation of the machine looking at the near side, as shown in Fig. 1;

Fig. 3, a fragmentary sectional view taken on the line 3—3 of Fig. 1;

Fig. 4, a fragmentary plan sectional view taken substantially on the line 4—4 of Fig. 2;

Figs. 5 and 6, detail sectional views taken substantially on the lines 5—5 and 6—6 respectively, of Fig. 2;

Fig. 7, a detail sectional view taken on the line 7—7 of Fig. 3;

Fig. 8, a detail sectional view taken on the line 8—8 of Fig. 2; and

Fig. 9, a front quarterly elevation of a talking machine embodying my improvements.

Referring now to the drawings, it will be observed that I have provided a plurality of record turn tables 11, 12, 13 and 14, revolubly mounted in circumferentially spaced relation on a main table designated generally by character 15. This table or carrier as shown in Fig. 3, has a hub 16 revoluble about a fixed sleeve or post 17 and upon a thrust bearing 18. In the present instance, the sleeve 17 is rigidly carried by the arm 19 of a main casting designated generally by the character 21, which is preferably formed to provide bearing support for practically all of the operating mechanism. A shaft 22 revoluble within the sleeve 17, is equipped at its upper end with a driving disk 23 having permanent frictional driving contact with the periphery of each of the record turn tables, as plainly shown in Fig. 1. Each turn table may be suitably revolubly mounted on the main table, as for example, to revolve about a fixed spindle 24, as shown in Fig. 3. Mechanism described hereinafter is provided for continuously revolving the turn-table driver 23 while the machine is in operation.

It is now proposed to revolve the main table 15 in indexing and feed movements, for the purpose of successively positioning the record turn-tables at a playing station in a comparatively quick movement, and for carrying such record laterally beneath a reproducer stylus during playing of the production at a slower speed, or what might be termed a feed motion. Such movements may be imparted to the table by means of a worm gear 25 driven by a worm 26, which in turn is adapted to be driven at different speeds from a motor 27 through the intermediary of suitable mechanism, which will now be described.

Referring more particularly to Figs. 4 and 5, it will be observed that the driving wheel 28 of the motor is in frictional engagement with a wheel 29 fixed to a shaft 31 mounted in suitable bearings in the casting 21. The motor is preferably pivotally mounted on the support 32 and is constantly urged by a suitable spring 33 in a direction to hold its driver 28 into frictional engagement with the driven member 29. As shown in Fig. 5, the shaft 31 carries fixed spiral gears 34 and 36 and worm 35. The spiral gear 36 meshes with a spiral gear 37 fixed to the turn-table driving shaft 22. The worm 35 drives a worm gear 38 fixed to an upright shaft 39 which carries a fixed pinion 41 meshing with a spur gear 42 loose on the upright shaft 43. By means of a friction clutch between the gears 42 and the shaft 43, the latter will be constantly driven by the motor and, in turn, will revolve the main table 15 at what I term a feed movement through the agency of gears 44 and 45 and gears 25 and 26. From the foregoing, it will be seen that a driving train is provided between the motor and the table at a considerable reduction in speed so that the table will be constantly driven at a predetermined slow speed, for feeding a record laterally beneath the reproducer stylus.

It will be observed that the driving train just described includes a friction clutch between the gear 42 and the shaft 43. This clutch is of a design peculiar to the conditions involved in this particular instance in that it permits the shaft 43 to be revolved at a higher speed and to drop back again to the speed of the gear 42, whereupon the drive will be instantly resumed by said friction clutch. Thus, the shaft 43 revolves continuously at comparatively fast and slow speeds as determined by certain control mechanism which will be presently described. The purpose of revolving this shaft 43 at the relatively fast and slow speeds is to index the main table at certain intervals for moving the record turn-tables successively to a playing station, and to revolve said table at a comparatively slower speed, which I term the feed, for feeding the record at the playing station laterally beneath the reproducer stylus. The friction clutch above mentioned between the gear 42 and shaft 43 is of such design as to be noiseless and to take effect instantly upon the speed of the shaft 43 dropping back to that of the gear 42. I prefer for this purpose to employ a friction clutch such as shown in Fig. 7, comprising a plurality of dogs 46 pivotally mounted on the gear 42 and urged by springs 47 against a disk 48 fixed to the shaft 43. It will thus been seen when the gear 42 is revolved in a counter-clockwise direction viewing Fig. 7, the shaft 43 will be likewise revolved, but in the event that the shaft 43 is revolved at a higher speed by some other agency, the disk 48 will simply revolve freely past the dogs 46 which continue to revolve at uniform speed.

The means for stepping up the speed of the shaft 43 as just mentioned, consists preferably of a friction clutch comprising a

driving member 49 loose on the shaft 43 and continuously revolved by means of a gear 51 meshing with the gear 34, above mentioned, and a driven member 52 rotatable with the shaft 43, but shiftable lengthwise thereon. Since the driving member 49 is revolved at a considerably higher speed than the shaft 43, it will be obvious that when the member 52 is shifted axially to engage the cone clutch, the shaft 43 will be revolved at the speed of the driving member 49. The cone clutch is engaged and disengaged by means of a shifter fork 53 pivotally mounted at 54 on a stationary part, the fork terminating at its opposite end in relatively adjustable arms 55 and 56, the latter of which is equipped with a roller 57 adapted to be actuated by a cam segment 58. A contractile spring 59 constantly urges the shifter in a direction to disengage the cone clutch and to hold the roller 57 against the cam surface of the segment 58. By turning the screw 61 the shiftable member 52 of the clutch may be adjusted to take up wear. The cam segment 58 is adapted to be oscillated by means of an upstanding arm carrying a cam follower 62 held by a spring 63 (thru the agency of the segment 58) in engagement with the periphery of a cam plate designated generally by character 64 carried by the table 15. Viewing Fig. 1, it will be observed that this annular cam plate is provided upon its periphery with a depression 65 for each record turn-table. When the cam follower 62 is disposed in one of said depressions as shown in the drawings, the traversing clutch consisting of the cone members 49 and 52 on the shaft 43 is disengaged. Consequently, the table 15 is being revolved by the feed clutch at the speed of the gear 42. That is, the table 15 is being revolved in a clockwise direction at a relatively slow speed, and when the cam follower 62 is moved outwardly by the rise 66 in the periphery of the cam plate, the cam segment 58, Fig. 3, will be moved in a clockwise direction, thereby actuating the shifter 53 and engaging the traversing clutch. This will revolve the table fastener to bring the next succeeding record turn-table 12 to a playing position beneath the reproducer, and when such position is reached, the cam follower 62 will enter the depression 67 in the annular cam plate, thereby disengaging the cone clutch and causing the table speed to fall back to that produced by the clutch member 42. The cam plate 64 is rotatably adjustable on the main table after loosening the nuts 60, for the purpose of varying the times for actuating the cam follower. It will be seen that when the parts are continuously driven by the motor, the table will be continuously revolved at alternate speeds, viz: the traversing speed for moving the next succeeding record turn-table to the playing station, and at a playing speed in which the record at the playing station is fed slowly beneath the reproducer.

Means is now provided for automatically bringing a reproducer stylus into playing contact with a record when it is moved to the playing station and for raising the stylus therefrom after the record has been played. Any suitable reproducer or sound box may be employed, and in the present instance, I have shown one of conventional design, designated by character 68. This reproducer is of the type adapted to be shifted for playing records having either the vertically or laterally undulating sound grooves. As shown in the drawings, the reproducer is in the position for playing records having vertically undulating sound grooves. It is carried by a tone arm 69 mounted to swing laterally about a vertical axis and also to be capable of swinging vertically at its outer end. For this purpose the tone arm may be mounted through the agency of a ball or universal joint 71, which allows the desired movements. For raising the tone arm, I employ a lifter arm 72 pivotally mounted at 73 and adapted to be actuated by a link connection 74 from the shaft 75 to which the parts 58 and 62 are connected. That is, the lifter arm 72 will be operated from the same source, viz: the cam plate 64 from which the traversing cone clutch is operated. Viewing Fig. 8, it will be observed that the lifter arm is shaped to provide a V-shaped lifting surface 76 adapted to engage the tone arm. This surface 76 and the incline thereof is such that when it is lifted and brought into contact with the tone arm, it will raise the stylus from the record, irrespective of whether the tone arm is directly above or at one side of the center of the surface 76, whereupon the tone arm if laterally offset from the center of the surface 76, will gravitate along the inclined surface to the lowermost or central position. Thus, the tone arm is always at a central position on the lifting arm when the latter is raised, and each time the reproducer is lowered onto a record, the stylus will engage the record at a predetermined point. But in the event that one record has more or less grooves per inch than another, the position of the tone arm relatively to the lifter arm will be different when the lifter arm is actuated to lift the stylus. For example, the well known records now on the market have sound grooves ranging from approximately 80 to 150 per inch, the average records being 100 grooves per inch. Consequently, it is preferred that the present record feed, as will be explained more particularly hereinafter, shall be set at 100 grooves per inch, and in this event when the lifter arm is actuated to raise the stylus from the record the tone arm would be substantially directly above

the center or lowermost point of the lifter arm. If an 80 groove per inch record is played and the stylus is lifted at the same predetermined point in the lateral feed of the record beneath the stylus, the tone arm would be approximately in the dotted line position shown in Fig. 8, when the lifting arm is actuated. It will be here noted that the inclined surface 76 is such as not to cause lateral gravitation of the tone arm until after the stylus has been raised from the record, thus preventing scratching or marring thereof. It follows, therefore, that irrespective of the number of sound grooves per inch and the relative position of the tone arm with respect to the lifter arm 76, when the latter is raised, the tone arm will be properly lifted and retained in a centermost position.

A suitable governor may be provided for regulating the speed of the turn-tables, and in the present instance I employ a fly-ball governor 77 of conventional design, carried by a shaft 78 which is driven from the shaft 22, through means of gears 79. The governor actuates a disk 81, and when a predetermined speed is exceeded, this disk will be moved against a fixed friction member 82, thereby retarding the speed.

The general operation is as follows: A record is placed upon each turn-table, preferably when the machine is at rest, although it will be noted that records may be changed while the machine is in operation, on all turn tables except that carrying the record being played. Assuming that the machine is driven by a motor, the record turn-tables will be continuously revolved and with the parts as shown in the drawings, the table 15 will be driven at the slow or playing speed through the friction slip clutch carried by the gear 42. In the assumed position, the reproduced stylus is in playing engagements with the record on the table 11, having just been lowered thereonto by reason of the cam follower 62 having moved inwardly along the incline 83 to the depression 65. The record will now be played, the turn table 11 being fed laterally beneath the stylus at the desired speed as described above, so that the tone arm remains stationary, or might deviate slightly to the left or right, according to the character and number of the sound grooves of the particular record. When the production has been completed and the main table reached the point at which the cam surface 66 engages the follower 62, the latter will be moved outwardly. This outward movement of the cam follower produces two important results. One is to raise the reproducer stylus from the record as explained above, and the other to engage the traversing clutch to index the table and position the next succeeding turn table 12 at the playing station occupied by the turn table 11 in Fig. 1. When the turn table 12 is moved to this station, the cam follower will ride into the cam depression 67, thereby throwing out the traversing or indexing clutch and lowering the reproducer stylus onto the record carried by this turn table. The operation is then carried on seriatim until the motor is stopped.

An automatic talking machine embodying the principles of operation illustrated above serves very satisfactorily the purposes in mind, and more particularly, is capable of economical production and also meets the conditions and requirements of a commercial article. It is believed that the foregoing description conveys a clear understanding of the objects prefaced above and the principles and mode of operation of my invention, and while I have illustrated but a single working embodiment thereof, it should be understood that considerable change might be made in the construction and arrangement without departing from the spirit and scope of the invention as expressed in the appended claims, in which—

I claim:

1. In a talking machine, a revoluble carrier, a plurality of record turn tables circumferentially mounted on said carrier, means for revolving the record turn tables, a reproducer, and mechanism for continuously revolving the carrier to move each record turn table in succession into playing relation with the reproducer and to feed such turn table laterally therebeneath during the reproduction.

2. In a automatic talking machine, the combination of a plurality of record turn tables, a reproducer, a carrier for moving the turn tables one after another into playing relation with the reproducer and laterally therebeneath during the reproduction, and mechanism for continuously moving the carrier to so move the record turn tables.

3. In an automatic talking machine, the combination of a revoluble carrier, a plurality of record turn tables mounted in circumferentially spaced relation on said carrier, a reproducer, means for revolving the carrier to move the record turn tables one after another to a playing station and laterally beneath the stylus during the reproduction, and means for automatically moving the stylus into and out of contract with the record on the turn table at the playing station.

4. In a automatic talking machine, a continuously revolving driving member, a plurality of record turn tables arranged circumferentially about said member and in constant driving connection therewith, a reproducer, and means for moving the record turn tables one after another into playing relation with the reproducer.

5. In a talking machine, a plurality of

record turn-tables, means for continuously revolving said turn-tables, a reproducer, means for successively moving the turn-tables to a playing station, means for lowering the reproducer onto the record at said station, and means for continuously feeding the turn-table at the playing station, laterally relatively to the reproducer in the opposite direction to and substantially corresponding in speed to the relative lateral travel of the stylus across the record.

6. In a talking machine, a plurality of circumferentially spaced record turn-tables, means for continuously revolving the turn-tables, a reproducer, and mechanism for successively carrying said turn-tables under the reproducer and for feeding each turn-table laterally beneath the reproducer during the playing of the record carried by such turn-table.

7. In an automatic talking machine, a plurality of record turn tables in circumferentially spaced relation, a friction driving member in constant driving connection with all of said turn tables for continuously driving the same, a reproducer, means for moving the record turn tables one after another to a playing station, and means for automatically moving the reproducer stylus into and out of contact with the record on the turn table at the playing station.

8. In a talking machine, a plurality of horizontally spaced record turn-tables, a reproducer, means for successively moving the turn-tables into playing position beneath the reproducer, means for automatically lowering the reproducer stylus onto the record carried by the turn-table so positioned, and means for feeding each turn-table so positioned, laterally relatively to the reproducer in the opposite direction to and at a speed approximately the relative travel of the stylus across the record.

9. In an automatic talking machine, the combination of a revoluble carrier, a constantly revolving driving member concentric with said carrier, a plurality of record turn tables on the carrier in constant driving connection with said member, a reproducer, mechanism for revolving the carrier to position the turn tables one after another at a playing station, and means for automatically bringing the reproducer stylus into and out of contact with the record on the turn table at the playing station.

10. In a talking machine, a revoluble table, a plurality of record turn-tables mounted in circumferentially spaced relation on said table, a reproducer disposed above said table and adapted to be raised and lowered into and out of playing relation to a record therebeneath, and mechanism for revolving the table in an indexing movement to substitute a different record turn-table beneath the reproducer and in a feed movement to carry the record so positioned, laterally relatively to the reproducer in the opposite direction to and at a speed approximating that of the stylus travel across the record.

11. In a talking machine, a revoluble table, a plurality of record turn-tables revolubly mounted on said table in circumferentially spaced relation, a driving member co-axial with said table and in constant driving connection with said turn-tables, a reproducer adapted to be lowered into playing relation to a record positioned therebeneath, and mechanism for imparting rotary movement to the table for successively moving in predetermined timed relation, the record turn-tables into playing position beneath the reproducer.

12. In a talking machine, a revoluble table, a plurality of record turn-tables revolubly mounted on said table in circumferentially spaced relation, a driving member co-axial with said table and in constant driving connection with said turn-tables, a reproducer adapted to be lowered into playing relation to a record positioned therebeneath, and mechanism for imparting rotary movement to the table for successively moving in predetermined timed relation, the record turn-tables into playing position beneath the reproducer and for carrying each turn-table so positioned laterally with respect to the reproducer in a feed movement substantially equal or corresponding to that of the stylus travel across the record.

13. In a talking machine, a plurality of record turn-tables in circumferentially spaced relation adapted to travel in a circular path successively through a playing period, a reproducer disposed above the turn-tables at a playing station and adapted to be lowered and raised to and from a record positioned therebeneath, and mechanism for successively moving the record turn-tables to said playing station and for feeding each turn-table so positioned laterally with respect to the reproducer stylus during the playing period.

14. In a talking machine, a plurality of record turn-tables in circumferentially spaced relation adapted to travel in a circular path successively through a playing period, a reproducer disposed above the turn-tables at a playing station and adapted to be lowered and raised to and from a record positioned therebeneath, mechanism for successively moving the record turn-tables to said playing station and for feeding each turn-table so positioned laterally with respect to the reproducer stylus during the playing period, and mechanism for automatically lowering and raising the reproducer stylus to and from the record therebeneath in predetermined timed relation

with said movement of the turn-tables to the playing station.

15. In a talking machine, a reproducer, a plurality of record carriers, and mechanism for successively moving the record carriers to a playing position beneath the reproducer and for feeding the record carrier so positioned laterally with respect to the reproducer while the record is being played.

16. In a talking machine, a reproducer, a plurality of record carriers, mechanism for successively moving the record carriers to a playing position beneath the reproducer and for feeding the record carrier so positioned laterally with respect to the reproducer while the record is being played, means for revolving the record carrier at the playing station, and means for automatically lowering the reproducer stylus onto the record after it has been moved to such playing station and for raising the stylus at the end of the playing period.

17. In an automatic talking machine, the combination of a reproducer, a plurality of record turn tables, mechanism for automatically moving the turn tables one after another to a playing station and forthwith feeding the turn table laterally beneath the stylus during the reproduction.

18. In a talking machine, a plurality of record turn-tables, a reproducer, means for successively moving the record turn-tables to a playing station beneath the reproducer, means for revolving the turn table at the playing station, means for automatically lowering the reproducer stylus onto the record carried by the turn-table at said playing station, and mechanism for feeding the turn-table at the playing station, laterally beneath the reproducer at a speed substantially corresponding to that of the stylus travel across the record.

19. In a talking machine, a record turntable, a tone arm equipped with a reproducer adapted to be moved into and out of playing relation to a record on the turntable by similar movement of the tone arm, and means for so moving the tone arm, including a part positioned beneath said arm and having upwardly diverging arm-engaging surfaces in a plane transverse to the major axis of said arm.

20. In a talking machine, a record turntable, a tone arm equipped with a reproducer adapted to be moved into and out of playing relation to a record on the turntable by similar movement of the tone arm, and means for so moving the tone arm, including a vertically movable part positioned immediately beneath the tone arm and having a substantially V-shaped arm engaging surface in a plane transverse to the major axis of said arm.

21. In a talking machine, a record turntable, a reproducer adapted to be lowered onto and raised from a record carried by said turn-table, mechanism for moving the turn-table laterally beneath the reproducer during the reproduction, and means for automatically lowering the reproducer stylus onto the record at a predetermined point in the lateral travel of the turn table.

22. In a talking machine, a plurality of record turn-tables, a reproducer stylus, means for successively positioning said turntables beneath the reproducer stylus and for feeding the turn-tables so positioned, laterally relatively to said stylus, the travel of the record turn-table to said position beneath the stylus being relatively faster than said feed movement laterally of the stylus, and means for lowering the stylus onto a record which has been moved to the playing station.

23. In a talking machine, the combination of a record turn-table, a reproducer stylus, means for feeding the turn-table laterally beneath the stylus, and means governed by lateral travel of the turn-table for automatically lowering the stylus onto the record and raising it therefrom at predetermined times.

24. In a talking machine, a record turntable, a reproducer stylus, means for feeding the record laterally beneath the stylus, means for lowering the stylus onto the record at a predetermined point during said feed, and means for raising the stylus from the record at a point governed by the lateral travel of the turn-table beneath the stylus, the stylus being raised at said point irrespective of the proximity of the stylus to the center of the record.

25. In a talking machine, a plurality of record turn-tables, a reproducer stylus, mechanism for moving the turn-tables successively to a playing position beneath the stylus, means for revolving the turn-table at the playing station, means for feeding the record at the playing station laterally with respect to the stylus, and means for automatically raising the stylus from the record at a predetermined point in the lateral travel or feed of said turn-table.

26. In a talking machine, a revoluble carrier, a plurality of record turn tables on said carrier, a reproducer, mechanism for indexing the carrier to move the turn tables in succession to a playing station, means for revolving the turn table at said station, an adjustable annular cam plate on the carrier, and means actuated by the cam plate for causing the reproducer stylus to be brought into playing contact with the record on the turn table at said station.

27. In an automatic talking machine, the combination of a revoluble carrier, a plurality of record turn tables thereon, a reproducer, a peripheral cam on the carrier, and mechanism controlled by said cam for in-

dexing the carrier and lowering and raising the reproducer stylus.

28. In an automatic talking machine, a revoluble carrier, a plurality of record turn tables thereon, a reproducer, an annular cam plate adjustable about the axis of the carrier, and mechanism controlled by said cam plate for indexing the carrier and for lowering and raising the reproducer stylus.

29. In a talking machine, the combination of a record turn table, a reproducer, mechanism for feeding the record turn table laterally beneath the reproducer, and means actuated by such feed movement for lowering the reproducer stylus onto a record and raising it therefrom.

30. In an automatic talking machine, the combination of a revoluble carrier, a record turn table thereon, a reproducer, cam faces on said carrier, and mechanism controlled by said cam faces for indexing the table and for raising and lowering the reproducer stylus.

31. In a talking machine, a revoluble table equipped with a plurality of circumferentially spaced record turn-tables, a reproducer stylus, mechanism for revolving the table in indexing movements to successively position the turn-tables at said playing station and in a relatively slower feed movement to carry the turn table at said station laterally beneath the stylus, and means actuated at predetermined points in the rotative movement of the table for causing the reproducer stylus to be lowered and raised.

32. In a talking machine, a revoluble table equipped with a plurality of circumferentially spaced record turn-tables, a reproducer stylus, mechanism for automatically revolving the table in indexing movements and feed movements to successively position the turn-tables at the playing station and to feed the turn-table so positioned laterally beneath the reproducer stylus, and means for automatically lowering the reproducer stylus, onto a record near the outer edge thereof when it has been positioned at said playing station and for automatically raising the reproducer stylus when the same has reached a position close to the center of the record by reason of lateral travel of such record beneath the stylus.

33. In an automatic talking machine, the combination of a plurality of record turn-tables, a reproducer stylus, means for feeding the turn-tables in succession to a playing station and laterally beneath the stylus during the reproduction, mechanism for bringing the reproducer stylus into and out of playing relation to each record at said station, and a control member for operating said mechanisms in predetermined timed relation.

34. In a talking machine, the combination of a table equipped with a plurality of record turn-tables, a reproducer stylus, and mechanism for alternately imparting indexing and feed movements to the table to position each record turn table in succession at a playing station and to feed such turn table laterally beneath the stylus during the reproduction.

35. In an automatic talking machine, the combination of a revoluble carrier equipped with a plurality of record turn tables, a reproducer, and mechanism controlled by rotative movement of the carrier for indexing said carrier and for raising and lowering the reproducer stylus.

36. In a talking machine, the combination of a revoluble carrier equipped with a plurality of record turn tables, and mechanism for rotatably indexing the carrier and for moving it at a relatively slow feed between the indexing movements, during which slow feed the record is played.

37. In a talking machine, the combination of a table carrying a plurality of record turn-tables, means for revolving the table at a fast and a slow speed, said speeds being controlled by the movement of the table.

38. In an automatic talking machine, the combination of a reproducer, a plurality of records, a continuously revolving cam, and mechanism controlled by said cam for moving the records in succession to a playing station and feeding each record thereat laterally beneath the reproducer.

39. In an automatic multiple record talking machine, a table carrying a plurality of record turn-tables, and a plate cam attached to the table for controlling the length of time that a record turn-table is in playing relation to the reproducer.

40. In an automatic multiple record talking machine, the combination of a table carrying a plurality of record turn-tables, a reproducer, and mechanism for continuously revolving the table alternately at relatively fast and slow speeds to feed one record after another under the reproducer.

41. In an automatic talking machine, the combination of a plurality of continuously revolving turn tables, a reproducer, a continuously revolving cam, and mechanism controlled by said cam for moving the turn tables one after another into playing relation with the reproducer and for moving the reproducer stylus into and out of contact with the record on such turn table.

42. In a talking machine, a record turn table, a reproducer, and mechanism including a change-speed device for moving the turn table in a quick traverse movement into playing relation to the reproducer and in a feed movement laterally relatively to the reproducer during the reproduction.

43. In a talking machine, a record turn table carrier, a plurality of turn tables thereon, a reproducer, and change-speed mecha-

nism for moving the carrier alternately in quick traverse and feed movements to position the turn tables one after another at a playing station and to feed the records laterally beneath the reproducer stylus.

44. In a talking machine, the combination of a revoluble carrier, a turn table driving member above and concentric with the carrier, a plurality of record turn tables on said carrier adapted to be driven by said driving member, a worm gear beneath and fixed to the carrier concentric therewith, a drive shaft fixed to said driving members and revoluble within the worm gear, and mechanism for driving the worm gear at a relatively slow speed and for driving said shaft at a higher speed.

45. In an automatic multiple record talking machine, the combination of a reproducer, a plurality of records, means for moving the records one after another to a playing station, means for lowering the reproducer stylus onto the record at the playing station and for lifting the stylus at the end of the reproducer, a continuously revolving control device, and mechanism actuated by said device for causing each record to be moved to said playing station in a quick traverse movement and laterally beneath the stylus during the reproduction and for causing the stylus to be moved into and out of playing position.

46. In an automatic talking machine, the combination of a reproducer, a plurality of records, a continuously revolving cam, mechanism controlled by said cam for moving the records in succession to a playing station and feeding each record thereat laterally beneath the reproducer, and mechanism controlled by said cam for bringing the reproducer into and out of playing relation with each record at said station.

47. In an automatic talking machine, the combination of a revoluble carrier adapted by indexing movements to position one record after another at a playing station, a reproducer stylus adapted to be lowered onto the record at the playing station and lifted therefrom, cam surfaces on said carrier, a cam follower, and mechanism operated by said cam follower for indexing the carrier and lowering and lifting the reproducer.

48. In an automatic multiple record talking machine, the combination of a reproducer, means for moving a plurality of records one after another to a playing station and laterally beneath the reproducer, and mechanism for operating said means including a feed clutch for moving each record laterally beneath the stylus, and a rapid traverse clutch for moving each record to the playing station.

49. In a talking machine, the combination of a tone arm equipped with a reproducer and adapted to be raised and lowered for carrying the reproducer stylus into and out of contact with a record, a lever pivoted beneath the tone arm and equipped at its free end with a cross head having upwardly diverging faces disposed beneath the tone arm, means for feeding a record laterally beneath the stylus, and means for moving the lever on its fulcrum to lower and raise the tone arm.

50. In a talking machine, the combination of a reproducer, a record, means for feeding the record laterally beneath the reproducer, and means for automatically lowering the reproducer stylus onto the record at a predetermined distance from its center when at a given station in its lateral travel and for lifting the stylus from the record at a subsequent given point in its lateral travel irrespective of the distance of the stylus from the center of the record.

51. In a talking machine, the combination of a record, a reproducer, and means for raising and lowering the reproducer stylus in a substantially common plane and for automatically rectifying any lateral deviation of the stylus from such plane after the stylus has been lifted from the record.

52. In a talking machine, the combination of a record, a reproducer, means for feeding the record laterally beneath the reproducer, and means for lowering and raising the reproducer stylus when the edge and a point near the center of the record, respectively pass beneath the stylus.

53. In a talking machine, the combination of a record, a reproducer, means for feeding the record laterally beneath the reproducer, and means for lowering and raising the reproducer stylus when the edge and a point near the center of the record respectively pass beneath the stylus and for correcting lateral deviation of the stylus resulting from variations in the width of the sound grooves of different records.

54. In a talking machine, the combination of a central driving wheel, a plurality of record turn tables arranged around said wheel in constant driving connection therewith, a reproducer, and means for moving the turn tables one after another into playing relation with the reproducer without interrupting the drive of the turntables.

55. In a talking machine, the combination with a tone arm, of a vertically movable member under the tone arm having downwardly inclined ways approaching from opposite sides for bringing the tone arm to a given starting position when said member is operated to raise the tone arm.

56. In a talking machine, the combination of a continuously revolving central driving member, and a plurality of record turntables circumferentially spaced about said

member and all of said turntables being in continuous frictional driving connection with said member.

57. In a talking machine, the combination of a central driving wheel, and a plurality of record turntables arranged around said wheel and in continuous driving connection therewith.

58. In a talking machine, the combination of a reproducer, a plurality of records adapted to be moved one after another to a playing station, a lever for raising and lowering the reproducer to bring its stylus into and out of playing relation to the record at said station, and means controlled by said lever for moving the records to said station.

59. In an automatic talking machine, the combination of a rotary carrier equipped with circumferentially spaced turn-tables, a reproducer, circumferentially spaced cams on said carrier, means for imparting rotative movement to the carrier, and mechanism controlled by said cams for indexing the carrier to move the turn-tables in succession to a playing station and for bringing the reproducer stylus into and out of operation with respect to each record at the playing station.

60. In a talking machine, the combination of a reproducer stylus, and means for raising and moving it to a predetermined position including an angular face disposed in a plane transverse to the plane of said stylus movement and operable by upward movement against a stylus-connected part for moving the stylus in said plane to said starting position.

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