Feb. 17, 1953 A. E. COMSTOCK 2,628,844

AUTOMATIC PHONOGRAPH

Filed Jan. 21, 1947 2 SHEETS—SHEET 1

FIG. 1.

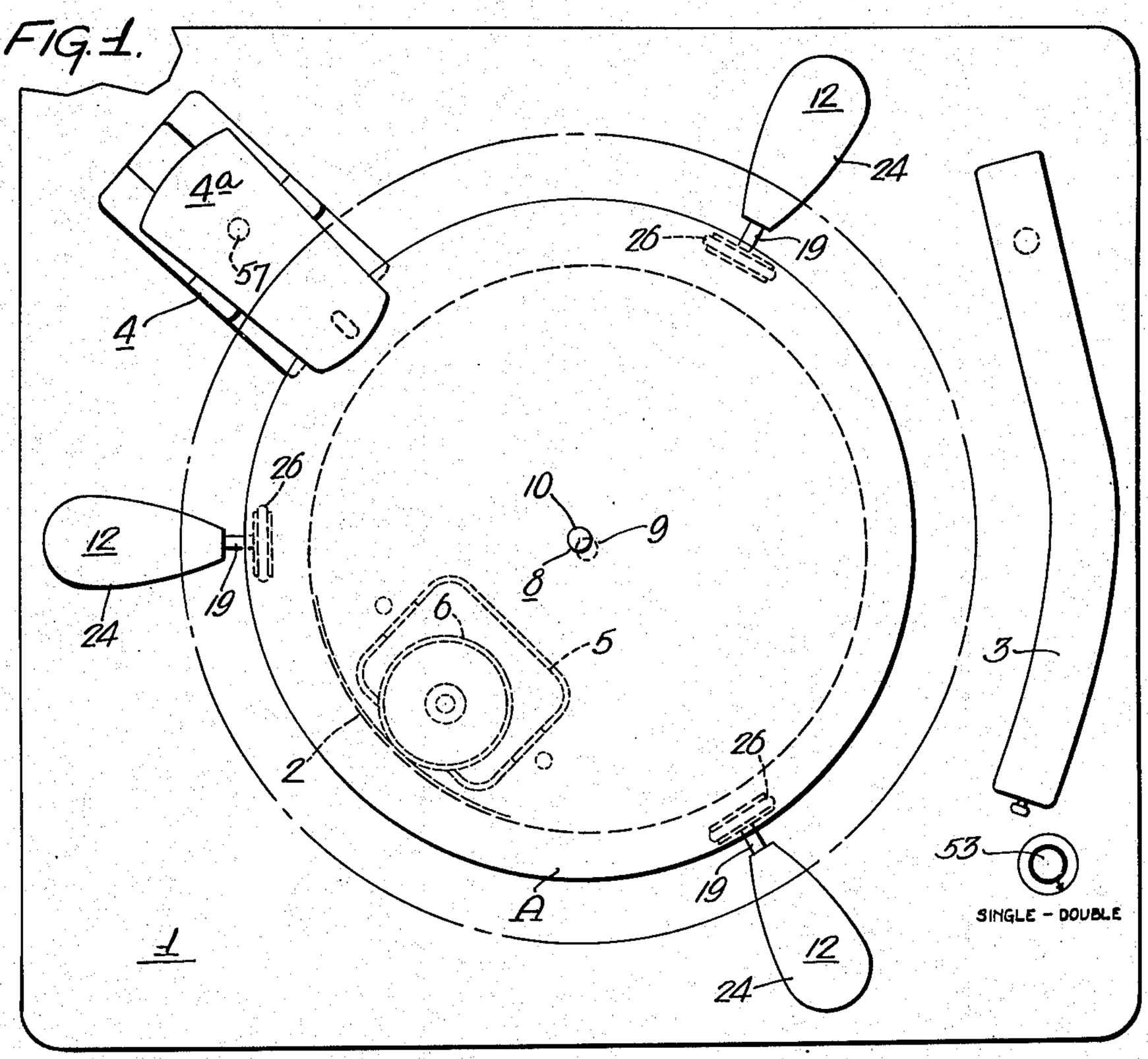
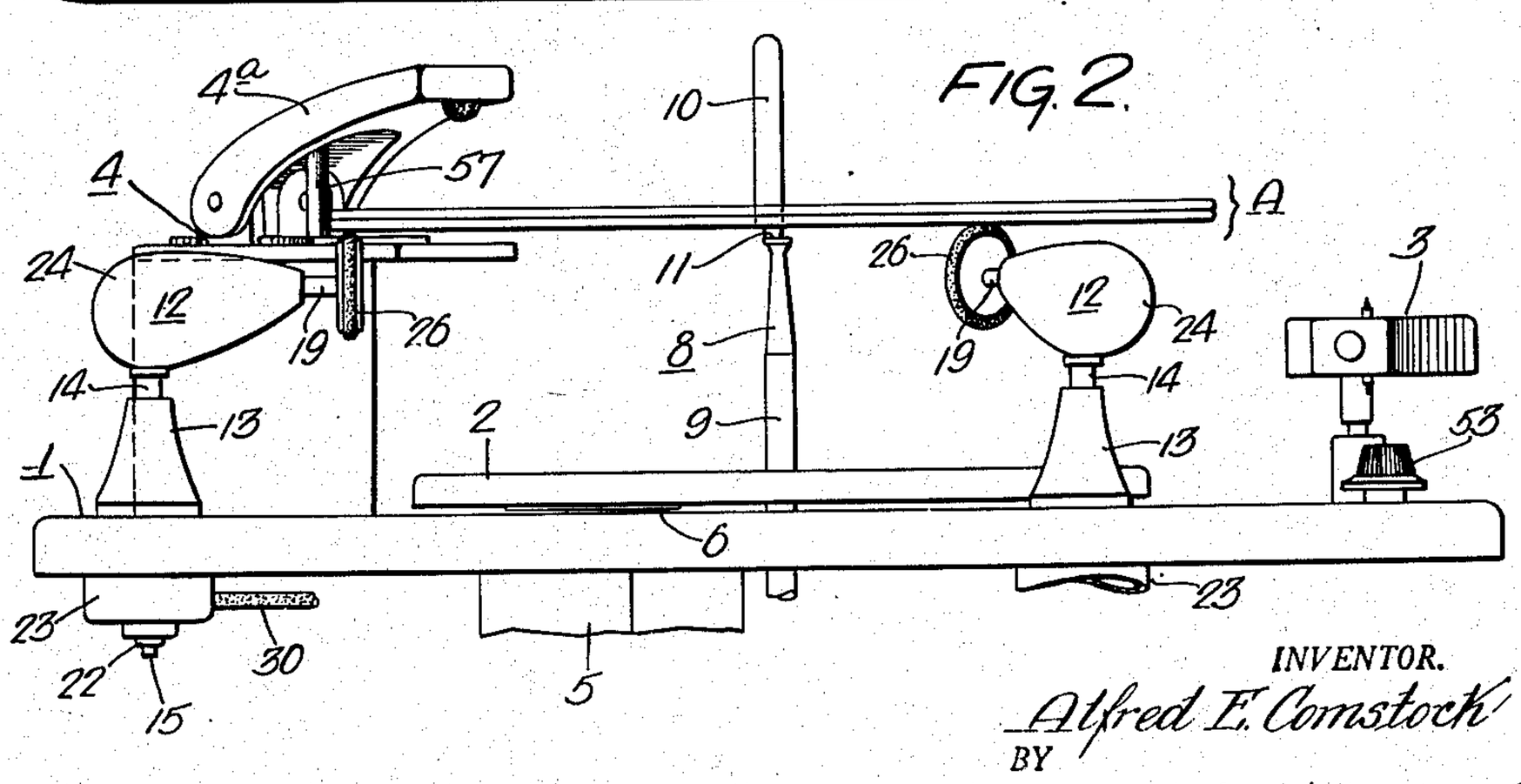


FIG. 2.



INVENTOR.
Alfred E. Comstock
BY
Howson & Howson
Attys.

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AUTOMATIC PHONOGRAPH

Filed Jan. 21, 1947 2 SHEETS—SHEET 2

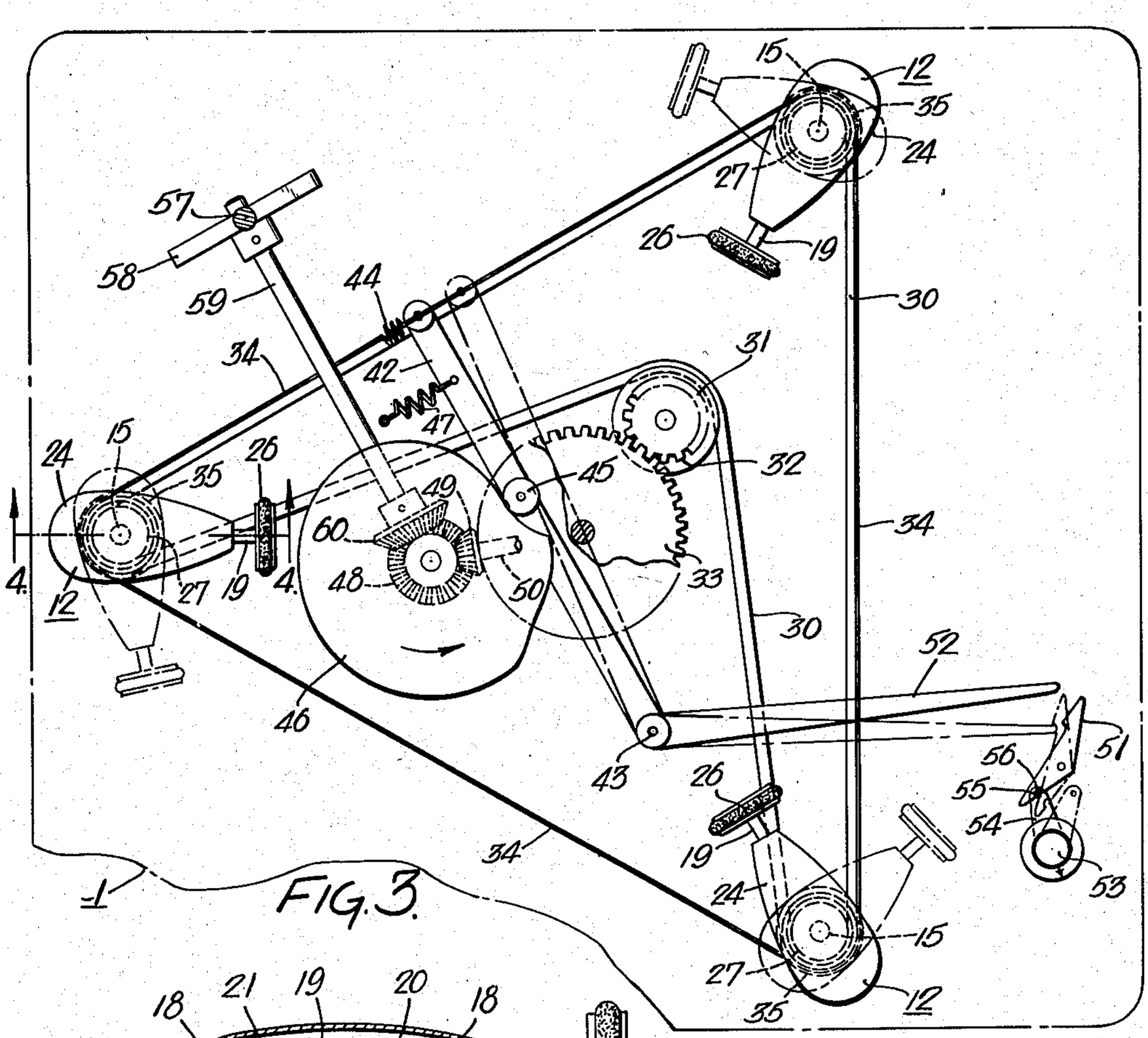

FIG. 3.

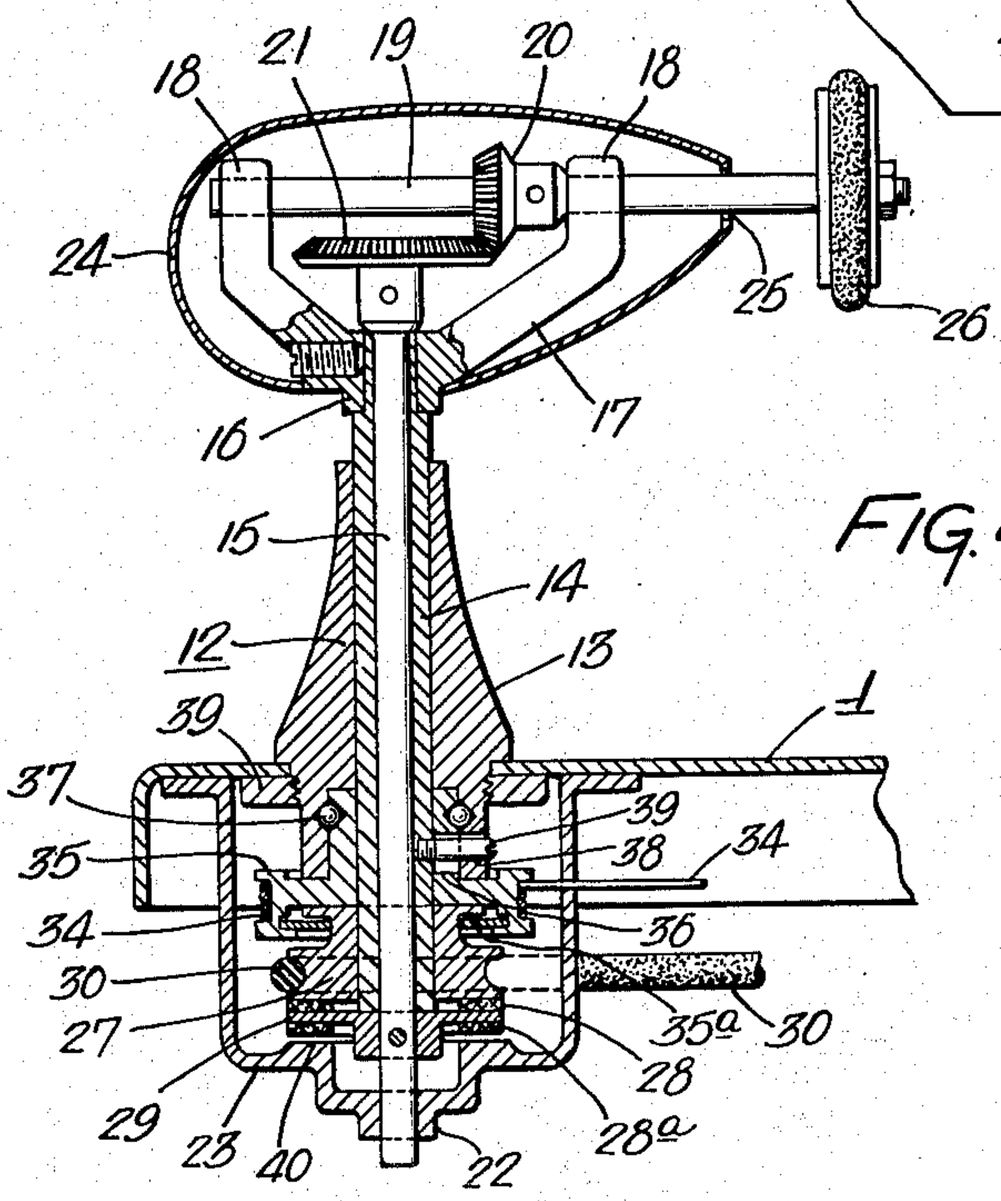

FIG. 4.

INVENTOR.
Alfred E. Comstock
BY
Howson & Howson
Attys.

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UNITED STATES PATENT OFFICE

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AUTOMATIC PHONOGRAPH

Alfred E. Comstock, Chicago, Ill.

Application January 21, 1947, Serial No. 723,369

23 Claims. (Cl. 274—10)

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This invention relates to new and useful improvements in automatic phonographs of the type adapted to play both sides of one or a plurality of records.

More particularly, the invention relates to automatic phonographs of the stated type wherein provision is made for rotatably supporting a stack of records above the usual turntable of a phonograph in position for playing the underside of the lowermost record of the stack, after which the record is ejected from the stack and deposited by gravity upon the turntable in position for playing the upper side of the record.

One object of the present invention is to provide novel mechanism for supporting and at the same time rotationally driving a stack of one or more records above the usual turntable so that it is possible to play the underside of the lowermost record of the stack.

Another object of the invention is to provide a novel support and drive mechanism for an elevated stack of records as described which is operable in conjunction with other mechanisms of a phonograph to effect the playing of first one side and then the other side of a succession of records deposited from said stack onto the usual turntable or which may be rendered inoperative to effect the playing of one side only of such a succession of records.

A further object of the present invention is to provide a novel mechanism of the character set forth which is operable to support and rotationally drive an elevated stack of records only when the underside of the lowermost record of the stack is being played, the said records at all other times resting in a non-rotating condition upon a suitable support provided therefor.

A further object of the invention is to provide novel drive and support means for an elevated stack of records which is operable to stop rotation of the supported records just prior to returning the same to rest position upon said support.

Another object of the invention is to provide novel record supporting and driving means of the type described which may be employed in conjunction with conventional record change mechanisms such as, for example, the edge push-off type, hole pull-off type with rotating eccentric stem segment, separating finger type that works upon the edge of the records, etc.

Still another object of the invention is to provide novel support and drive means having the features and characteristics set forth which is of relatively simplified and inexpensive construction and which is highly efficient and effective in operation and use.

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These and other objects of the invention and the various features and details of the construction and operation thereof are hereinafter fully set forth and described with reference to the accompanying drawings; in which:

Fig. 1 is a top plan view of an automatic phonograph embodying the present invention.

Fig. 2 is a side elevational view thereof.

Fig. 3 is a view in plan of the phonograph shown in Fig. 1 with the top panel and turntable removed to illustrate certain details of the mechanism; and

Fig. 4 is an enlarged fragmentary sectional view taken on line 4—4, Fig. 3.

Referring now to the drawings and more particularly to Figs. 1 and 2 thereof, reference numeral 1 designates the horizontal supporting panel or platform of the phonograph which has mounted thereabove the usual record turntable 2, tone arm 3 and suitable record discharge means 4.

The turntable 2 may be rotationally driven in clockwise direction with respect to Fig. 1 of the drawings, for example, by means of a motor 5 driving a wheel 6 having a friction surface positioned in engagement with the inner surface of the depending peripheral skirt of the turntable as shown. Vertical movement and positioning of the tone arm 3 for selective engagement with records supported above and below said arm, as well as horizontal swinging movement or traverse of said arm to and from positions between the records, may be effected and controlled, for example, in the manner and by the mechanisms shown and described in detail in my co-pending application Serial No. 702,331, filed October 9, 1946.

Extending vertically upward through the usual central opening in the turntable 2 is a spindle support structure 8 which, in the illustrated embodiment of the invention, preferably is stationary and does not rotate with the turntable 2. With reference particularly to Fig. 2 of the drawings, it is to be noted that the spindle 8 has its lower portion 9 arranged coaxially of the turntable 2 and has an upper portion 10 thereof disposed slightly offset laterally from the axis so that the upper end of the lower spindle portion 9 provides a supporting surface or shoulder 11 which is adapted to support a stack of records except during playing of the underside of the lowermost record of the stack as hereinafter described.

In addition to being laterally offset the upper portion 10 of the spindle 8 is spaced vertically from or above the support surface or shoulder 11 a distance slightly in excess of the thickness of a record disc so that the lowermost record disc of the stack supported on said shoulder 11 may be actuated by the change means 4 to position the center opening of such record in alignment with the spindle lower portion 9 so that the record will travel down the spindle under the influence of gravity and be deposited in playing position upon the turntable 2. Any suitable discharge means 4 may be employed for actuating the lowermost record resting on the support or shoulder 11 to bring its central opening into alignment with the spindle portion 9 for deposit onto the turntable 2 as described and, in the illustrated embodiment of the invention, the record discharge mechanism 4 employed is of the conventional edge push-off type which may be actuated in controlled relation with respect to the other mechanisms of the phonograph in the usual manner.

As previously stated, the present invention contemplates the provision of novel mechanism for supporting and rotationally driving an elevated stack of records A so that the underside of the lowermost record thereof will be played when engaged by the stylus of the tone arm 3 and, in the embodiment of the invention illustrated in the drawings, this is accomplished by providing at intervals about the turntable 2 a plurality of drive assemblies generally designated 12 which are operable in controlled relation to the movements of the tone arm 3 and other mechanisms of the phonograph, as hereinafter described. These drive assemblies 12 each comprise an upright support or standard 13 which is secured to the phonograph top panel 1 and journalled in each such support or standard 13 by means of a sleeve or bushing 14 is a shaft 15. To the upper end of the sleeve or bushing 14 there is secured the hub portion 16 of a spider 17 having aligned spaced apart journal portions 18, 18 which rotationally support a horizontal shaft 19.

Secured on the horizontal shaft 19 intermediate the spider journal portions is a bevel gear 20 which is meshed with another bevel gear 21 that is secured upon the upper end of the aforesaid shaft 15. The shaft 15 extends entirely through the support 13 and sleeve 14 and has its lower end journalled in the hub portion 22 of a housing 23 which is secured at the underside of the phonograph panel or top platform 1. Secured to the hub portion 16 of the spider 17 and enclosing the journals 18 thereof as well as the aforesaid bevel gears 20 and 21 and the major portion of the shaft 19, is a housing 24 which may be streamlined in the modern decor, for example, as illustrated.

One end of the horizontal shaft 19 projects outwardly through an opening 25 in one end of the housing 24 and has secured adjacent its outer end a frictional drive roller 26. These rollers 26 of the several drive assemblies are arranged to engage the underside of the lowermost record of the stack of record discs A resting upon the support or shoulder portion 11 of the spindle 8 and to raise or lift the stack from the shoulder 11 and support the same above and free of said shoulder 11 while simultaneously rotationally driving the said stack to permit the underside of the lowermost record thereof to be played when engaged by the stylus of the tone arm 3.

The shaft 15 of each drive assembly is rotationally driven to in turn drive the horizontal shaft 19 through the bevel gears 20 and 21 by means of pulley 27 which is journalled upon the sleeve or bushing 14. Driving connection from the pulley 27 on the sleeve or bushing 14 to the shaft 15 is provided by a friction surface 28 on a flexible annular disc 29 that is secured to the shaft 15 at the underside of the aforesaid drive pulley 27. The pulley 27 of each drive assembly is driven continuously by means of a rubber belt 30 from a main pulley 31 which in turn is driven by a gear 32 that is meshed with a larger gear 33 secured at the underside of the phonograph turntable 2 and hence rotates therewith.

The drive assemblies, including drive rollers 26, housing 24 and sleeve 14, are constructed and arranged for limited pivotal movement between the solid line positions shown in Figs. 1, 2 and 3 of the drawings in which the drive rollers 26 are in supporting and driving engagement with the underside of the lowermost record of the elevated stack, and the dotted line positions thereof shown in Fig. 3 of the drawings wherein the drive rollers 26 are removed from engagement beneath the elevated stack of records and are positioned outward and clear of the peripheral edges of the elevated stack of records.

Limited pivotal movement of the drive assemblies between the two positions just described is effected by means of a single cable 34 which embraces a shive 35 suitably keyed to the sleeve 14 and having a hub portion 36 journalled by means of ball bearings 37 in a recess provided in the lower end of the supports or standard 13. The lower face of the shives 35 is recessed and undercut as indicated to receive a clip 35*a* that retains the pulleys 27 in the desired axial position. Preferably, a plurality of turns of the cable 34 embraces the shive 35 of each of the several drive assemblies. The base portions of the standards 13 each have formed therein an inclined helical or spiral slot 38 which receives a laterally extending pin 39 that is fixedly carried by the sleeve or bushing 14 and extends through an elongated opening 36 in the hub of the shive.

The construction and arrangement of the pins 39 and inclined helical slots 38 are such that, as the drive assemblies are actuated in the counterclockwise direction with respect to Fig. 3 by the shives 35 and cable 34 to thereby move the friction drive rollers 26 from the dotted line positions to the solid line positions shown, the said pin and slot arrangements operate to raise the bushings 14, housings 24 and drive rollers 26 thereby causing the latter to engage the underside of the lowermost record of the elevated stack A and lift the same clear from its rest position upon the spindle surface or shoulder 11. At the same time this upward movement causes the friction surface 28 on disc 29 to be moved into engagement with the underside of the pulley 27 to establish the driving connection to the rollers 26 which operate to rotationally rotate the stack of records so as to play the underside of the lowermost record of the stack when engaged by the stylus of the tone arm 3.

Upon completion of playing of the underside of the lowermost record of the upper stack A, actuation of the shives 35 in the clockwise di-

rection in respect to Fig. 3 of the drawings operates to move the drive assemblies from the solid line positions to the dotted line positions shown, and during this movement the pin and inclined slot arrangements operate in the reverse manner to lower the drive assemblies so that the drive rollers **26** are gradually dropped downwardly to deposit the upper stack of records again upon the supporting surface or shoulder **11** of the spindle **8** for subsequent ejection and transfer of the lowermost record onto the turntable **2** by means of the transfer mechanism **4**.

At the same time driving connection from pulley **27** to the disc **29** and shaft **15** is broken by the downward movement of the latter so that the drive to the rollers **26** is interrupted and, in addition to utilizing this downward movement of shaft **15** to break the drive to the rollers **26**, advantage also may be taken of such downward movement to provide a positive braking action to stop rotation of the drive rollers **26**. This may be accomplished, for example, by providing a friction member **28***a* on the underside of the disc **29** which is brought into braking contact with the underlying surface **40** of the hub portion **22** of the housing **23**. This arrangement serves to stop rotation of the upper stack of record discs before they are returned to their rest position on the spindle surface or shoulder **11** and thus prevents undue wear of the records.

Actuation of cable **34** to effect rotation of the shives **35** and consequent shifting of the positions of the drive assemblies is accomplished, for example, by means of a lever **42** which is mounted for horizontal pivotal movement about a pivot point **43** at one end thereof and which has its other or free end fixedly secured or connected to the cable **34**. A spring or other resilient means **44** is interconnected between the cable **34** and lever **42** and provides sufficient give or relief in the cable system to prevent damage to the mechanisms and records in the event, for example, the drive assemblies are restrained against rotation upon positive actuation of the lever **42**.

Carried by the lever **42** is a roller or follower **45** which normally is held in contact with the periphery of a cam **46** by means of a spring or the like **47**. In the present instance the cam **46** is rotationally driven by a bevel gear **48** from another bevel gear **49** secured upon a shaft **50** which, for purposes of illustrating and describing the operation of the present invention, may be considered to be the shaft identified by reference numeral **25** in my co-pending application Serial No. 702,331 aforesaid. Thus the shaft **50** is adapted to rotate through a single complete revolution and then come to rest each time that it is actuated, and two such complete revolutions of the shaft **50** are required for each complete record playing and changing cycle of the phonograph. Consequently the drive ratio from the shaft **50** through the bevel gears **48** and **49** to the cam **46** is such that the latter rotates through one-half a revolution only, or 180°, for each complete single revolution of the shaft **50**.

Bearing the foregoing in mind, in operation of the mechanism and with the cam **46** in the relative or zero position shown in Fig. 3 of the drawings, the shaft **50** and consequently said cam **46** are at rest and the stylus of the tone arm **3** is playing the underside of the lowermost record of the upper stack A thereof which is supported and rotationally driven by the rollers

26 of the drive assemblies which are in the solid line positions shown. Upon completing play of the underside of the lowermost record of the upper stack the shaft **50** is rotated through a single complete revolution thereby rotating the cam **46** through one-half a revolution, or 180°, at which point it again comes to rest. During this half revolution of the cam **46** the tone arm **3** is disengaged from the underside of the lowermost record of the upper stack and caused to move laterally outwardly from between the upper stack of records and the turntable **2**. At the same time the cam **46** actuates the roller **45** and lever **42** into the dotted line position thereof shown in Fig. 3 of the drawings thereby actuating the drive assemblies **12** from the solid line positions to the dotted line positions thereof in which they are clear of the upper stack of records that has been returned to its rest position upon the spindle shoulder **11**.

When the drive assemblies **12** have been moved to the dotted line positions as described, the record change mechanism **4** engages the lowermost record of the stack A to align the central opening therein with the lower portion **9** of the spindle so that that record is deposited by gravity onto the turntable **2**. The tone arm **3** then is moved to engage its stylus with the upper side of the record just deposited on the turntable **2**. While the upper side of the record deposited on the turntable **2** is playing the cam **46** and shaft **50** remain stationary with the cam **46** in the 180° position to which actuated as previously described.

At the completion of play of the upper side of the record on the turntable **2** the shaft **50** again is actuated through a single complete revolution to in turn rotate the cam **46** through another half revolution thereof from 180° to 360°, or, in other words, return it to the zero position at which point the cam again comes to rest. As the cam **46** traverses its second half revolution from the 180° position to the 360° or 0° position the tone arm **3** is moved laterally outboard and clear of the turntable and upper stack of records in the usual manner, and the contour of the cam **46** is such to cause the spring **47** to return the lever **42** to the solid line position as shown in Fig. 3 of the drawings with the result that the drive assemblies are actuated inwardly from the dotted line position to the solid line positions thereof.

As the drive assemblies **12** move inwardly to their solid line positions shown, the pin and slot connections **39** and **33** operate to elevate the drive rollers **26** to engage and lift the upper stack of records A from their rest position upon the spindle shoulder portion **11** so that the upper stack of records is supported free of the spindle by the drive rollers which operate simultaneously to rotationally drive the upper stack of records in the appropriate direction. As the drive rollers **26** move into supporting and driving engagement with the upper stack of records the tone arm **3** is moved inwardly into playing engagement with the underside of the lowermost record of said upper stack and upon completion of play of the underside of this lowermost record the described operating cycle of the mechanism is repeated.

The above operations occur successively and in repeat cycles when the device is set for fully automatic operation. However, when automatic operation in this manner is not desired, means are provided to render the cam **46** ineffective and

to retain the drive assemblies in the outer or dotted line positions shown in Fig. 3. Thus, a pivoted latch 51 is provided and arranged to engage an extension or arm 52 of the lever 42. An appropriately marked manual control button 53 is provided and connected therewith is a control finger 54 which carries a pin 55 that is arranged to engage with a detent or recess 56 in the latch.

The manually operative button 53 is operable either to maintain the latch 51 in a position disengaged from the lever extension 52 as shown in solid lines or in restraining engagement therewith as illustrated in dotted lines. In this latter position, the lever 42 is held in the dotted line position thereof (Fig. 3) so that the cam 46 is rendered ineffective with the drive assemblies 12 remaining in the dotted line positions illustrated, and the phonograph thereupon will operate to play only the upper sides of successive records deposited upon the turntable 2.

In the embodiment of the invention illustrated in the drawings the record change means 4 is of a conventional type comprising the usual hold-down finger 4*a* which is adapted to engage downwardly upon the top of the uppermost record of the upper stack A to restrain the same during ejection or discharge of the lowermost record thereof. However, continuous engagement of the hold-down finger 4*a* upon the record stack A would interfere with proper operation of the drive assemblies 12 to elevate and rotationally drive the upper record stack A in the manner described and, accordingly, means are provided for disengaging the hold-down finger 4*a* from the record stack A at least during the time that the drive wheels 26 are in engagement with the underside of the lowermost record of the stack A.

Thus, as shown in the drawings, there is reciprocably mounted beneath the hold-down finger 4*a* a push rod or the like 57 which has its upper end engaging beneath the said finger 4*a* and its lower end disposed in contact with the periphery of a disc cam 58 fixed on a shaft 59 that is rotationally driven in synchronism with the main drive control cam 46 by a gear 60 from the gear 48; the configuration and rotation of the said cam 58 being such that the push rod 57 is elevated to disengage the finger 4*a* from the record stack A during engagement of the lowermost record thereof by the drive wheels 26.

From the foregoing description it will be apparent that the present invention provides a novel mechanism for supporting and rotationally driving an elevated stack of records in a manner that makes it possible to play the underside of the lower-most record of the elevated stack. The invention also provides a mechanism as described which is operable in conjunction with other phonograph mechanisms to effect the playing of first one side and then the other side of a succession of records deposited from said stack onto the turntable, or which may be rendered inoperative to thereby effect the playing of one side only of such a succession of records.

Furthermore, the mechanism of the present invention has the advantage of being operable to support and drive the elevated stack of records only during the time that the underside of the lowermost record of the stack is being played, the records at all other times resting in a non-rotating condition upon a suitable support provided therefor. In addition, the novel drive means of the invention is operable to stop rotation of the upper stack of records prior to returning them to rest position upon the support, and has the advantage of being capable of use with conventional record change mechanisms of the several usual types.

While a particular embodiment of the present invention has been illustrated and described herein, it is not intended to limit the invention to such disclosure, and changes and modifications in and to the disclosed mechanism may be made within the scope of the claims.

I claim:

1. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, drive means including a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying the upper stack of records, means for moving said rollers vertically upward to engage and lift the stack of records from said support, means to drive said rollers to rotate said upper stack of records, and means to shift said drive rollers between said inoperative and operative positions in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable.

2. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying the upper stack of records, means for moving said rollers vertically upward to engage and lift the stack of records from said support, means to drive said rollers when in engagement with the stack to thereby rotate said upper stack of records, means actuable to shift said drive rollers between said inoperative and operative positions, and mechanism to actuate said last-mentioned means in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable.

3. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying the upper stack of records, means for moving said rollers vertically upward to engage and lift said upper stack, means to drive said rollers when in said operative positions to rotate said upper stack of records, means actuable to shift said drive rollers between said inoperative and operative positions, mechanism to actuate said last-mentioned means in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, and means operable

when said rollers are in said inoperative position to effect transfer of the lowermost record of the upper stack into playing position on the turntable.

4. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying the upper stack of records, means for moving said rollers vertically upward to engage and lift said upper stack, a source of rotary power for driving said rollers, clutch means associated with said drive means operable in the operative position of said rollers to establish driving connection between the same and said power source to rotate said upper stack of records, and means to shift said drive rollers between said inoperative and operative positions in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable.

5. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying the upper stack of records, means for moving said rollers upwardly to engage and lift said upper stack, a source of rotary power for driving said rollers, clutch means associated with said drive means operable in the operative position of said rollers to establish driving connection between the same and said power source to rotate said upper stack of records, means to shift said drive rollers between said inoperative and operative positions in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, and means operable when said rollers are in said inoperative position to effect transfer of the lowermost record of the upper stack into playing position on the turntable.

6. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for pivotal movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies, means for moving the rotary elements vertically upward to engage the underside of the lowermost record on the support and lift the records clear of said support, and means controlled by the vertical moving means for driving said rotary elements to rotate said upper stack of records to play the underside of the lowermost record thereof.

7. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and movable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, and means to elevate said rotary elements into lifting engagement with the records during traverse of the drive assemblies from inoperative to operative positions.

8. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and movable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rollers carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means to elevate said rollers into lifting engagement with the records during traverse of the drive assemblies from inoperative to operative positions, and means to drive said rollers to rotationally drive said upper stack of records to play the underside of the lowermost record thereof.

9. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and movable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rollers carried by said drive assemblies, means actuable to move said drive assemblies between said inoperative and operative positions, means controlled by said drive assembly moving means for raising the rollers into engagement with the lowermost record in said upper stack to lift said stack from the supporting means, and mechanism to actuate said drive assembly moving means in predetermined timed relation synchronized with the playing of records.

10. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and movable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rollers carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, and means controlled by said drive assembly shifting means to elevate said rollers into lifting engagement with the records during traverse

of the drive assemblies from inoperative to operative positions.

11. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and movable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rollers carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, means controlled by said drive shifting means for elevating said rollers into lifting engagement with the records during traverse of the drive assemblies from inoperative to operative positions, and means to drive said rollers to rotationally drive said upper stack of records to play the underside of the lowermost record thereof.

12. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having an offset to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, means to elevate said rotary elements into lifting engagement with the records during movement of the drive assemblies from inoperative to operative positions and to lower said records onto the support during movement of said assemblies from operative to inoperative positions, and means to drive said rotary elements when in their operative positions to rotationally drive said upper stack of records to play the underside of the lowermost record thereof.

13. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means to shift said drive assemblies between said inoperative and operative positions, and means controlled by said drive shifting means for

elevating said rotary elements into lifting engagement with the records during movement of the drive assemblies from inoperative to operative positions and to lower said records onto the support during movement of said assemblies from operative to inoperative positions.

14. In a phonograph of the type for successively playing records supported in vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies, means for vertically raising said rotary elements to engage the underside of the lowermost record on the support and lift the upper stack of records clear of said support, and means controlled by said vertical raising means to drive said rotary elements when in said operative positions to rotate said upper stack of records to play the underside of the lowermost record thereof.

15. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means to shift said drive assemblies between said inoperative and operative positions, and means operable to drive said rotary elements when in said operative positions to rotationally drive said upper stack of records to play the underside of the lowermost record thereof.

16. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, mechanism to actuate said last-mentioned means in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, and means controlled by said drive shifting

means to elevate said rotary elements into lifting engagement with the records during movement of the drive assemblies from inoperative to operative positions and to lower said records onto the support during movement of said assemblies from operative to inoperative positions.

17. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, mechanism to actuate said last-mentioned means in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, and means controlled by said drive shifting means to drive said rotary elements to rotationally drive said upper stack of records to play the underside of the lowermost record thereof.

18. In a phonograph of the type for successively playing records supported in a vertically spaced relation, a record turntable adapted to be rotationally driven in one direction, means to support an upper stack of one or more records in spaced relation above the turntable comprising a spindle mounted coaxially of the turntable and having a shoulder portion to receive the records thereon, a plurality of drive assemblies arranged circumferentially of the turntable and mounted for movement between an inoperative position laterally clear of the records on said support and an operative position underlying said records, rotary elements carried by said drive assemblies arranged in the operative position of the latter to engage the underside of the lowermost record on the support and lift the records clear of said support, means actuable to shift said drive assemblies between said inoperative and operative positions, mechanism to actuate said last-mentioned means in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, mean controlled by said drive shaft means for elevating said rotary elements into lifting engagement with the records during movement of the drive assemblies from inoperative to operative positions and to lower said records onto the support during movement of said assemblies from operative to inoperative positions, and means controlled by said elevating means to drive said rotary elements to rotate said upper stack of records to play the underside of the lowermost record thereof.

19. In drive means for phonographs of the type for successively playing records supported in a vertically spaced relation having a record turntable adapted to be rotationally driven in one direction and means to support an upper stack of one or more records in spaced relation above the turntable, a drive roller movable between an inoperative position laterally clear of the upper stack of records and an operative position underlying said records, means to move said drive roller between said inoperative and operative positions, means controlled by said roller moving means to elevate said drive roller into supporting engagement with the stack of records during movement of said roller from inoperative to operative positions and to lower the same during movement of said roller from operative to inoperative positions, means to drive said roller to thereby rotationally drive said stack of records to play the underside of the lowermost record thereof, and clutch means operable to establish driving connection between said last-mentioned means and the roller upon elevation of the latter when moved into operative position and to break the driving connection therebetween upon lowering of the roller when moved from said operative position.

20. In drive means for phonographs of the type for successively playing records supported in a vertically spaced relation having a record turntable adapted to be rotationally driven in one direction and means to support an upper stack of one or more records in spaced relation above the turntable, a drive roller movable between an inoperative position laterally clear of the upper stack of records and an operative position underlying said records, means to move said drive roller between said inoperative and operative positions, means controlled by said roller moving means to elevate said drive roller into supporting engagement with the stack of records during movement of said roller from inoperative to operative positions and to lower the same during movement of said roller from operative to inoperative positions, means to drive said roller to thereby rotationally drive said stack of records to play the underside of the lowermost record thereof, clutch means operable to establish driving connection between said last-mentioned means and the roller upon elevation of the latter when moved into operative position and to break the driving connection therebetween upon lowering of the roller when moved from said operative position, and braking means associated with said clutch means operable to stop rotation of the roller following breaking of said driving connection thereto.

21. In a phonograph of the type for successively playing records supported in vertically spaced apart relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, drive means including a plurality of rollers arranged circumferentially of the turntable and shiftable between inoperative positions laterally clear of the records on said support and operative positions underlying and supporting the upper stack of records free of said support, means to drive said rollers to thereby rotationally drive said upper stack of records, means to shift said drive rollers between said inoperative and operative positions in predetermined timed relation synchronized with the playing of records supported respectively above and on said turntable, record change means operable to discharge the lowermost record from the upper stack while said drive means are in said inoperative positions, hold-down means associated with said record change means and normally engaging downwardly on said upper stack of records, and mechanism operable in timed relation with said drive means to disengage said hold-down means from the rec-

ords while the drive means are in said operative positions.

22. In a phonograph of the type for successively playing records supported in vertically spaced apart relation, a record turntable adapted to be rotationally driven in one direction, support means to support an upper stack of one or more records in spaced relation above the turntable, a plurality of drive assemblies arranged circumferentially of the turntable and shiftable between an inoperative position laterally clear of the records on said support and an operative position underlying said records, means to shift said drive assemblies between said inoperative and operative positions, record change means operable to discharge the lowermost record from the upper stack while said drive means are in said inoperative positions, hold-down means associated with said record change means and normally engaging downwardly on said upper stack of records, and mechanism operable in timed relation with said drive means to disengage said hold-down means from the records while the drive means are in said operative positions.

23. In a phonograph of the type for successively playing records supported in a vertically spaced relation, means to support and drive a lower stack of records, means to support an upper stack of one or more records in spaced relation above the lower stack, a plurality of drive assemblies arranged circumferentially of the stacks and movable between an inoperative position laterally clear of the records on said support and an inoperative position underlying said records,

rollers carried by said drive assemblies, means actuable to move said drive assemblies between said inoperative and operative positions, means controlled by said assembly moving means for moving the rollers vertically upward to engage the underside of the lowermost record on said supporting means and lift said upper stack, and mechanism to actuate said assembly moving means in predetermined timed relation synchronized with the playing of records.

ALFRED E. COMSTOCK.

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