

May 7, 1929.

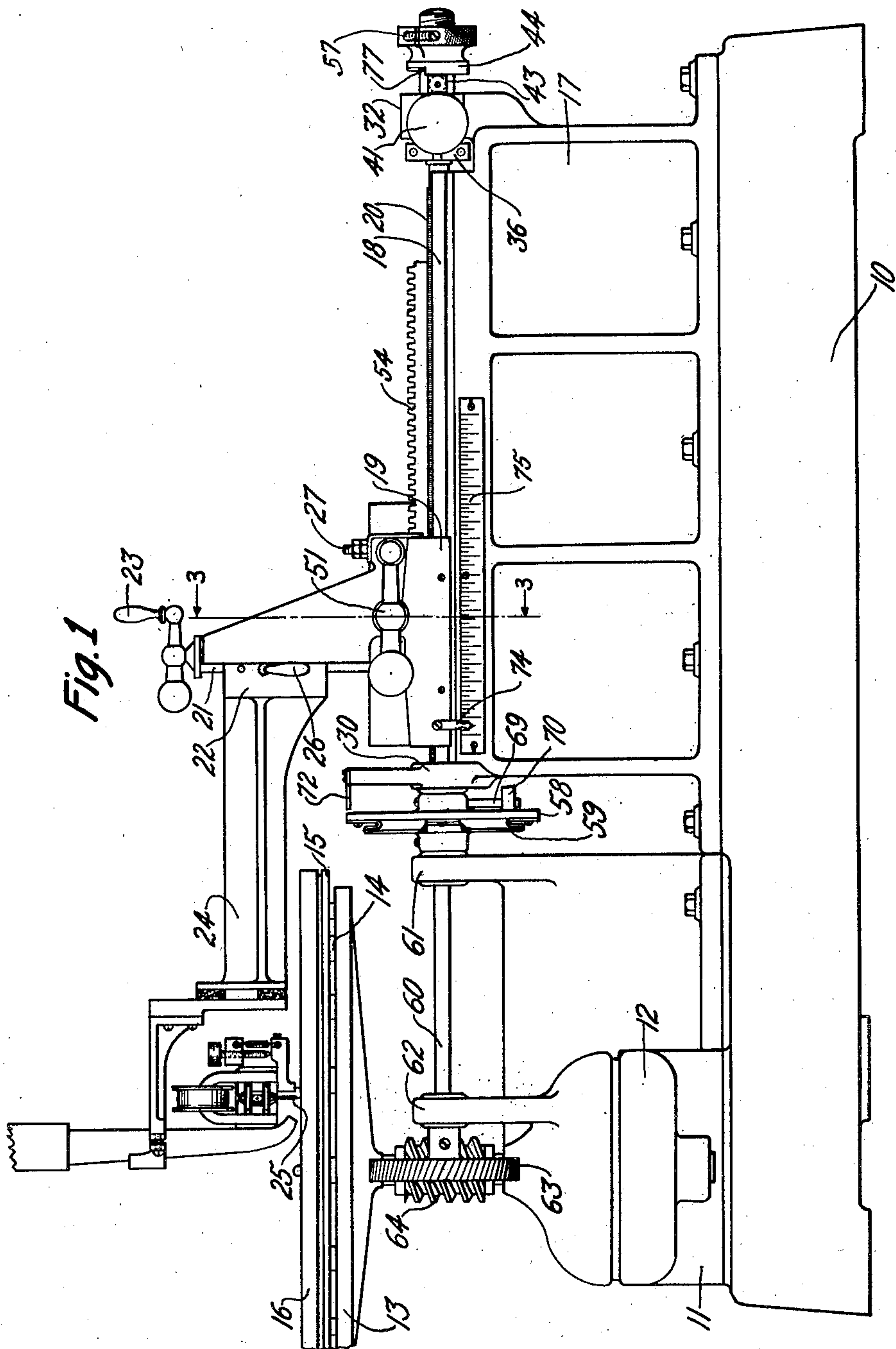
C. D. RICHARD

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PHONOGRAPH RECORD RECORDING MACHINE

Filed Dec. 30, 1925

2 Sheets-Sheet 1



Inventor:
Charles D. Richard
by *E. W. Jones* Att'y.

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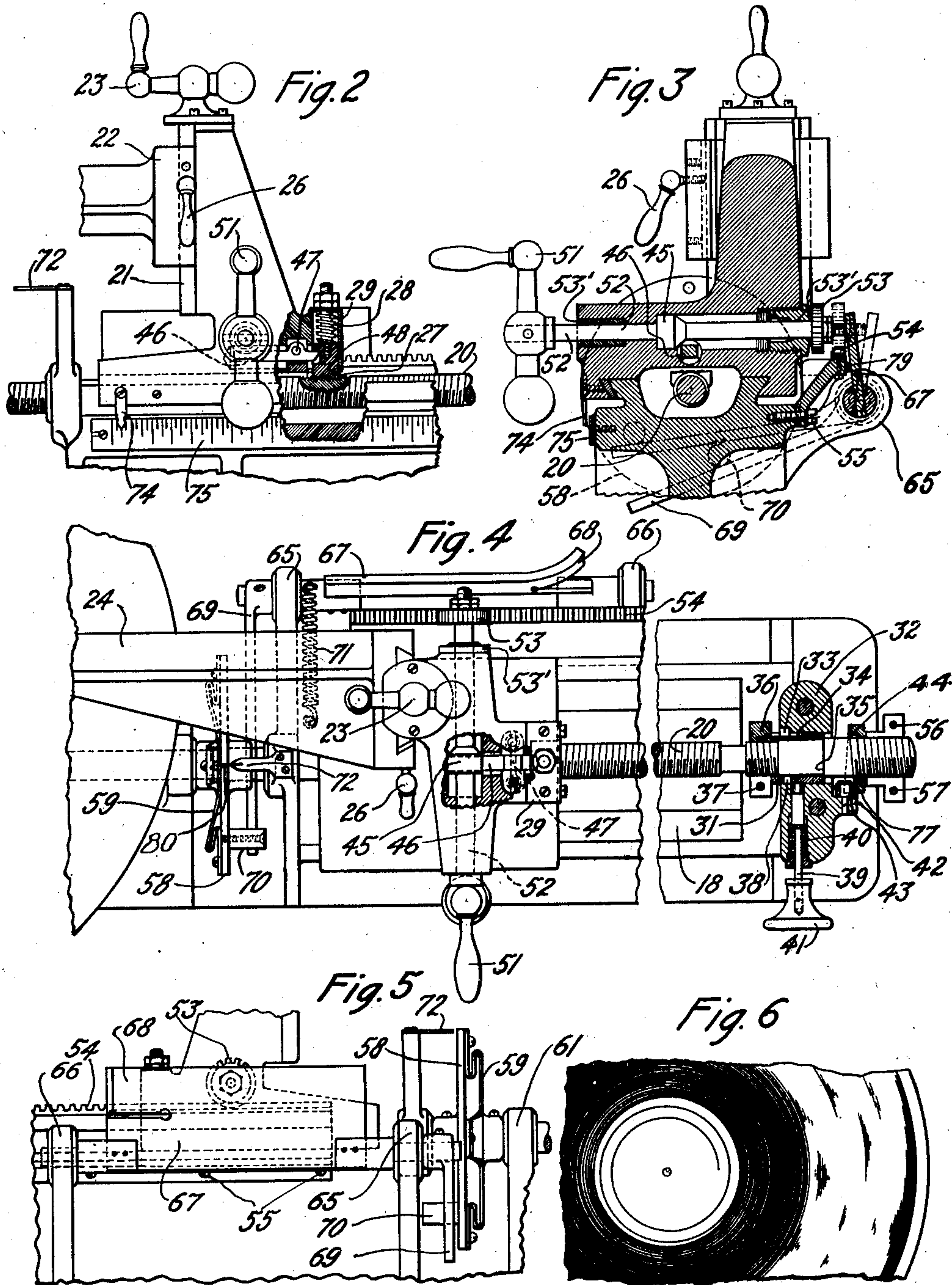
C. D. RICHARD

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Inventor:
Charles D. Richard
by E. W. Adams Att'y.

Patented May 7, 1929.

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UNITED STATES PATENT OFFICE.

CHARLES D. RICHARD, OF NEW BRIGHTON, NEW YORK, ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PHONOGRAPH-RECORD-RECORDING MACHINE.

Application filed December 30, 1925. Serial No. 78,264.

This invention relates to sound record recording machines and is particularly well adapted for use in a phonograph recording machine of the type disclosed in H. Pfannenstiehl's application filed Dec. 24, 1925, Serial No. 77,475. In such machines, the carriage supporting the cutting stylus is moved along a supporting table during the recording operation of the disc by means of a lead screw operatively connected to a motor. A mechanism is provided for manually releasing a follower nut for operatively engaging the stylus carriage with the lead screw, and a device associated with the lead screw operates upon the start of the turn table for moving the carriage and the stylus carriage at a greater linear speed than the normal pitch of the lead screw for cutting a number of coarse spiral grooves in the record at the start of the recording operation. A manually operable mechanism is also provided for returning the stylus to normal position toward the central portion of the record subsequently to the manual disconnection of the follower nut from the lead screw. In the operation of such a machine, however, the carriage supporting the stylus must be operatively connected to the lead screw through the manual release of the follower nut before the turntable is started or simultaneously therewith and failure to do so results in cutting a circumferential groove in the record instead of a spiral groove.

This invention contemplates the improvement of such machines by providing a novel mechanism whereby the carriage supporting the stylus is operatively connected with the lead screw automatically upon the starting of the turn table thereby avoiding the liability of spoiling the record.

This invention also provides a simple and efficient device whereby the lead screw and the turn table are kept positively in phase during the entire length of the recording operation, and wherein the vibrations set up by the great number of moving parts present in such machines is entirely eliminated.

Other features of invention and advantages will appear from the following description, and by the claims appended thereto, reference being had to the accompanying drawings in which Fig. 1 is a front elevation view of the machine, Fig. 2 is a fragmentary view of Fig. 1 partially in section showing the carriage assembly and the manner of connecting

it to the lead screw, Fig. 3 is a sectional view of the machine taken approximately on line 3—3 of Fig. 1 and looking in the direction indicated by the arrows, Fig. 4 is a top view of the machine partially in section, Fig. 5 is a partial rear view of that part of the machine showing the mechanism for automatically connecting the carriage to the lead screw and Fig. 6 is a fragmentary view of a recorded disc.

Similar reference characters refer to similar parts throughout the description.

The recording machine of this invention generally consists of a rectangularly shaped base 10 shown in Fig. 1 provided at one end portion with a support 11 which may be either secured on the top plane surface of the base by means of ordinary screw bolts or cast integrally with the base. On this support is mounted an electric motor 12, the armature shaft of which is disposed at right angles with respect to the top plane surface of the base 10. On the upper extending end portion of the armature shaft of the electric motor 12 is mounted a phonograph turn table 13 provided with a plurality of equally spaced pads or bearing members 14 and a felt disc 15 on which a disc 16 to be recorded is adapted to rest. On the base 10 and adjacently disposed to support 11 is mounted a bench 17 disposed in line parallel with respect to the length of base 10. This bench is provided with a table 18 along which a carriage 19 is adapted to be moved by means of a lead screw 20 actuated by motor 12 and a manually operable mechanism which will be hereinafter described in detail.

The carriage 19 is provided with a vertically disposed table 21 on which the carriage 22 is adapted to be moved by means of a hand wheel 23 in a well known manner. This carriage is provided with a bracket 24 which extends laterally therefrom for supporting the recording apparatus as shown in Fig. 1 and which may be of the type disclosed in Henry C. Harrison's application filed May 5, 1924, Serial No. 711,044. The carriage 22 and the recording apparatus may be moved in a direction perpendicular to the plane surface of the turn table 13 for adjusting the stylus of the recording apparatus with respect to the phonograph record 16 wherein the carriage 22 may be secured by means of a set screw 26.

On the right hand portion of carriage 19

there is mounted a follower nut screw 27 normally held in engagement with the lead screw 20 by means of a spring 28 which has one end portion in abutment against the under surface of angular piece 29 and the other end portion against the head portion of follower nut screw as shown in Fig. 2. The lead screw 20 is journaled at one end portion in bracket 30 and the other end in bushing 31 which in turn is slidably arranged in the bracket 32 but held against rotation therein by means of a key 33 which extends in engageable relation in the longitudinally disposed slot 34 in the periphery of the bushing. The lead screw 20 is held against lateral movement in the bushing 31 by means of a shoulder 35 formed by the enlarged portion of the lead screw and an adjustable collar 36 provided with a set screw 37 adapted for locking the collar in adjusted position. Bushing 31 is provided with an aperture 38 shown in Fig. 4 which cooperates with plunger 39 for locking the bushing 31 against lateral movement in the bracket 32 and thereby preventing any accidental longitudinal movement of the lead screw 20 during the recording operation. Plunger 39 is slidably mounted in bracket 32 and is held resiliently in engageable relation with the aperture 38 by means of a spring 40. A knob 41 is provided for manually disengaging the plunger from aperture 38 and thereby releasing the bushing 31.

The bracket 32 is provided with a lug 42 which extends laterally therefrom and on which a roller 43 is mounted. This roller is disposed in engageable relation with a side cam 44 and cooperates therewith to impart an axial movement to the lead screw 20 upon the starting of the motor 12. The cam 44 is saw-slotted as shown and is loosely screw threaded on to the lead screw 20 and is held in adjusted position with respect to its associated roller 43 by means of screws 56 and 57.

The motion of motor 12 is transmitted to the lead screw 20 by means of a coupling which consists of a disc 58 secured on one end portion of the lead screw adjacent the bracket 30 and a spider spring 59 having its arms secured on the plane surface of disc 58, the spider spring, in turn, being mounted on one end portion of a shaft 60. The spider spring 59 normally holds the lead screw 20, the bushing 31 and the cam 44 in starting position as shown in Fig. 4.

Shaft 60 is journaled in brackets 61 and 62 and on its opposite end portion there is mounted a worm gear 63 disposed in engageable relation with the worm screw 64 mounted on the armature shaft of the motor.

The manually operable mechanism for returning the carriage and the stylus carried thereby in starting position toward the center of the disc consists of a hand wheel or crank 51 mounted on one end of a rotatable and axially movable shaft 52 journaled in bush-

ings 53' in the carriage 19 and disposed at right angles with respect to the longitudinal axis of lead screw 20. On the other end portion of shaft 52 is securely mounted a spur gear 53 adapted to be moved in mesh with an associated stationary gear rack 54 which is disposed in lines parallel to the movement of carriage 19 and securely held on the bench 17 by means of a number of screws such as 55 shown in Fig. 3. On the middle portion of shaft 52 there is securely mounted a conical member or cam 45 disposed in engageable relation with the arm 46 of a trigger pivoted as at 47 in the carriage 19 and extending therefrom into a recess 48 in the follower nut screw 27 as shown in Fig. 2 in such a manner that when the shaft 52 is moved axially to the position shown in Fig. 4 and by the dotted line in Fig. 3, that is, to the position wherein the pinion 53 meshes with the rack 54, the cam 45 causes the trigger 46 to lift and disengage the follower nut screw 27 from the lead screw 20 thereby permitting the free movement of the carriage 19 along the table 18 and the adjustment of the stylus 25 at any distance from the center of the disc 16 through the rotation of crank 51.

Preferably integrally formed and extending laterally from the left hand portion of the bench 17 there is provided a pair of brackets 65 and 66 in which a rocking bar 67 is journaled. This bar is provided with a cam portion 68 disposed in engageable relation with the rear end portion of shaft 52 for moving the bar in a non-operated position upon the return of the carriage 19 and the stylus toward the central portion of the record. The bar 67 carries an arm 69 which is disposed in operable relation with a cam in the form of stud 70 carried by the coupling disc 58 and a spring 71 is provided for normally holding the bar 67 and the arm 69 carried thereby in operative position. But it is to be noted that the pressure exerted on the shaft 52 by spring 28 through trigger 46 is sufficient to hold shaft 52 and the gear 53 carried thereby in engagement with the rack 54 against the resistance of spring 71. On carriage 19 there is mounted a pointer member 74 adapted to move adjacent a graduated scale 75 mounted in the bench 17 and is adapted to indicate the distance between the center of the record and the stylus 25.

The starting position of cam 44 with respect to roller 42 and therefore the position of stud 70 with respect to the arm 69 is indicated by means of pointer 72 and the mark 80 on the periphery of disc 58.

The operation of the machine above described is as follows:

A disc 16 to be recorded is laid properly on the turn table 13 and the shaft 52 moved in a position wherein the pinion 53 carried thereby engages the gear rack 54. The axial movement of this shaft causes the disen-

engagement of the follower nut screw 27 from the lead screw 20 and its rotary movement is effective to move the carriage 19 and the recording apparatus carried thereby in adjusted position with respect to the center of the disc 16. The vertical adjustment of the stylus 25 may then be effected by means of the carriage 22 where it may be secured by means of set screw 26. The lead screw 20 is then manually set in position wherein roller 43 registers with the depression 77 of cam 44 and the stud 70 in operable relation with the arm 69, this position being indicated by means of pointer 72 in registry with the mark 80 on the disc 58. This manual operation may be effected by turning the table 13. Upon the starting of the motor and thereby the lead screw 20 together with the phonograph disc 16, the stud 70 depresses the arm 69 and imparts a rocking movement to the bar 67 which in turn imparts an axial movement to the shaft 52 for disengaging the pinion 53 from the rack 54 and causing the engagement of follower nut 27 with the lead screw through the release of trigger 46 by the cam 45. Upon the first turn of lead screw 20 the side cam 44 carried thereby is effective to impart a bodily movement to the lead screw 20 and thus moves the carriage 19 and the recording stylus 25 a distance equal to the raise of cam 44 wherein plunger 39 automatically engages the aperture 38 for locking the lead screw against accidental longitudinal movement, but it is to be noted that the carriage 19 and the recording device mounted thereon continue to move according to the pitch of lead screw 20 to the conclusion of the recording operation. The spring 71 holds the bar 67 resiliently against the stop 79 on the rack 54 in order to prevent the stud 70 striking the arm 69 at each revolution during the recording operation. Side cam 44 is effective to move the carriage 19 a linear distance of about $\frac{1}{8}$ " and since the speed ratio of the turn table with respect to the lead screw is 2 to 1 the side cam causes the stylus 25 to cut two grooves with relatively large clearance surfaces between them. This feature greatly assists in placing the needle of the reproducer apparatus at the exact starting point of the sound record. This feature is particularly desirable when the phonograph record is reproduced in connection with talking moving picture machines where an exact synchronism is necessary.

What is claimed is:

1. In a phonograph record recording machine, a turn table, a motor for operating said table, a normally ineffective recording device, and means automatically operable to connect said recording device and said motor upon the starting movement of said motor.

2. In a phonograph record recording machine, a turn table, a recording device, a motor for actuating said table and said device, said motor being normally ineffective with re-

spect to said device, and a mechanism automatically operable for operatively connecting said device to said motor for a comparatively small number of turns of the armature shaft of said motor.

3. In a phonograph record recording machine, a turn table, a recording stylus, a carriage for supporting said stylus, a lead screw for moving said carriage, means for connecting said carriage to said lead screw, and means operable upon a small angular movement of said screw for causing the engagement of the first mentioned means with the lead screw.

4. In a phonograph record recording machine, a turn table, a recording device, manually operable means effective for moving said device adjacent the plane surface of the record for adjustment, a normally ineffective power driven means for moving said device, and automatically operating means to render ineffective the first mentioned means and to render effective the second mentioned means with respect to said record.

5. In a phonograph record recording machine, a turn table, a motor for actuating said turn table, a stylus, a manually operable mechanism for adjusting said stylus with respect to the record, a normally ineffective mechanism actuated by said motor for moving said stylus, and means automatically operable upon the starting of the motor to render said latter mechanism effective with respect to said stylus for recording on the record spiral grooves of different pitches.

6. In a phonograph record recording machine, a turn table, a recording device, a mechanism for moving said device, said mechanism including a lead screw, a follower nut normally disengaged from said screw, a motor for actuating said screw, and means operated by the movement of said motor for causing the engagement of the follower nut with the lead screw.

7. In a recording machine, a turn table, a cutting stylus, manual and power driven mechanisms for actuating said stylus, said power mechanism being normally ineffective with respect to said stylus, and a device automatically operated by said power mechanism to render the power actuated mechanism effective with respect to said stylus.

8. In a phonograph record recording mechanism, a turn table, a recording device, a lead screw movable in directions at right angles with respect to each other for moving said device one way at different speeds, a motor for actuating said screw, and a yieldable coupling to permit the movement of said screw in one of said directions.

In witness whereof, I hereunto subscribe my name this 28th day of December, A. D. 1925.

CHARLES D. RICHARD.