Aug. 26, 1941. M. M. GRUBER ET AL 2,254,066

TWO-SPEED DRIVE FOR TURNTABLES

Filed Aug. 31, 1939 2 Sheets-Sheet 1

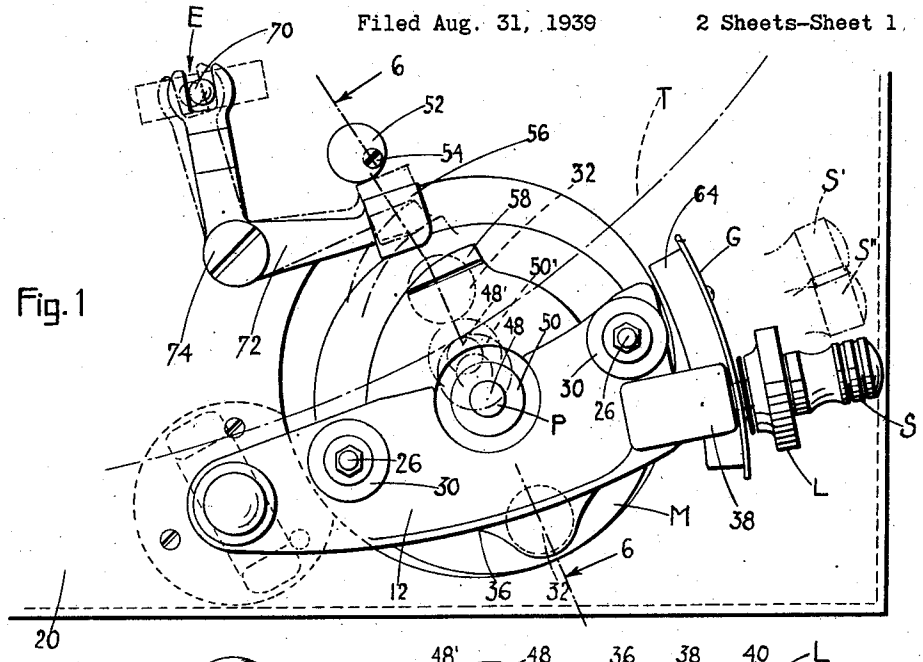


Fig. 1

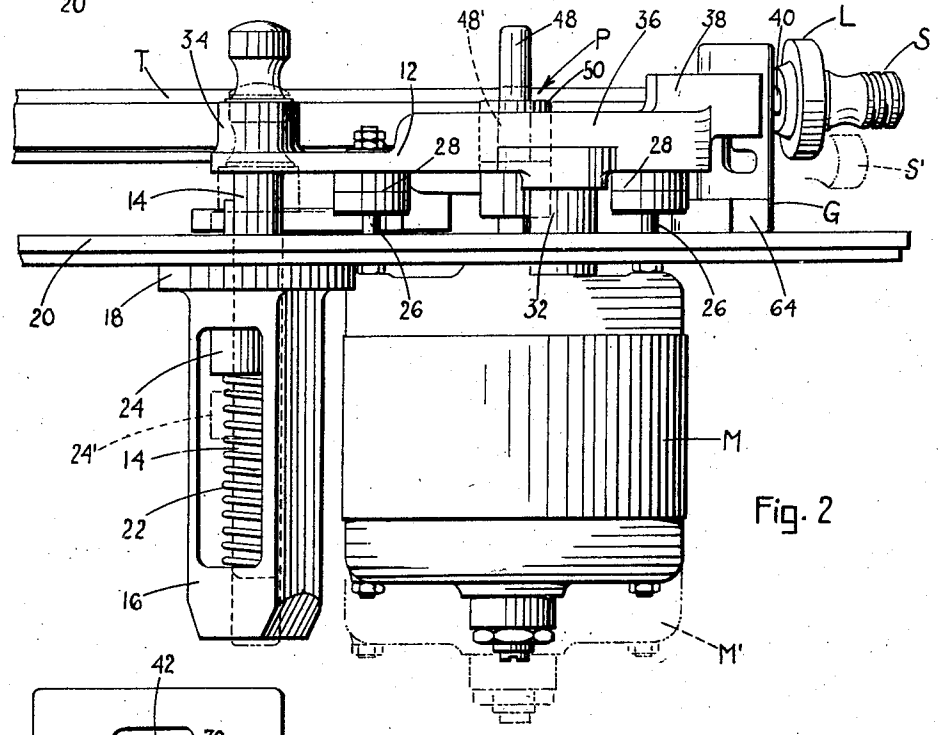


Fig. 2

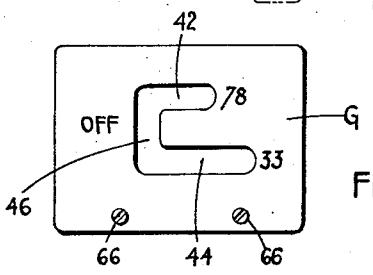


Fig. 3

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TWO-SPEED DRIVE FOR TURNTABLES

Filed Aug. 31, 1939 2 Sheets-Sheet 2

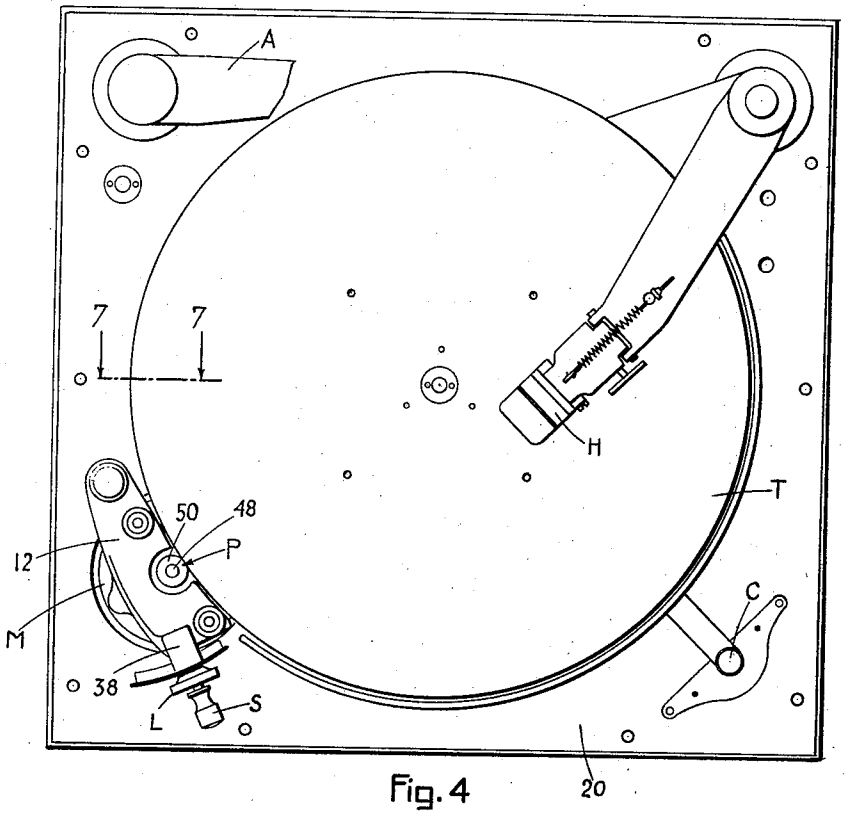


Fig. 4

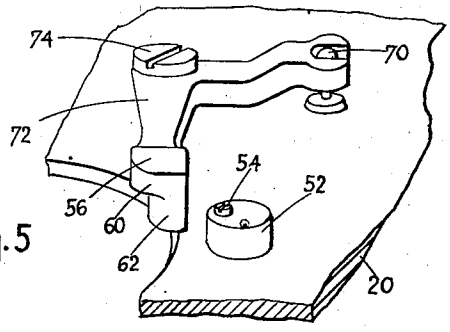


Fig. 5

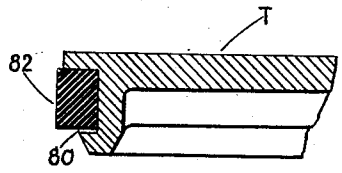


Fig. 7

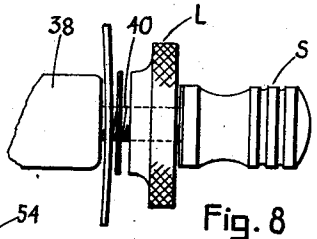


Fig. 8

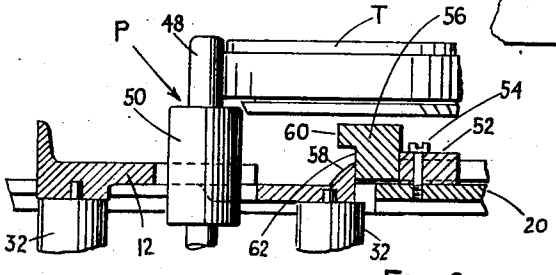


Fig. 6

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UNITED STATES PATENT OFFICE

2,254,066

TWO-SPEED DRIVE FOR TURNTABLES

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Application August 31, 1939, Serial No. 292,788

22 Claims. (Cl. 74—190)

This invention relates to sound recording or/and reproducing apparatus, and more particularly to a two-speed drive for such machines.

Two types of recording are now in use, one being at the formerly standard speed of 78 R. P. M., and the other being the so-called slow speed recording at 33⅓ R. P. M. A universal apparatus should therefore be designed to operate at either speed. In some cases two alternatively usable motors have been provided, but a less expensive and preferable method is to use a single motor of the synchronous type operating at one speed and provided with drive means capable of driving the turntable at either of the two speeds.

Broadly, such two-speed drive mechanisms are known, but they are commonly provided with intermediate wheels or idlers, and for this and other reasons have not proved entirely satisfactory, for the requirements for a turntable drive in high-grade sound apparatus are extremely stringent, it being essential to avoid the slightest irregularity or unevenness in the drive and the resulting turntable speed.

Accordingly a primary object of the present invention is to generally improve turntable drive mechanism of the character specified, and a more particular object is to devise a drive of the simplified and preferred type in which a small wheel or so-called "pulley" mounted directly on the motor shaft engages and frictionally drives the periphery or rim of the turntable. Considered in somewhat different aspect, one primary object of the invention is to provide a two-speed friction drive while completely eliminating the use of intermediate wheels or idlers between the motor and the turntable.

In accordance with the present invention, the motor shaft is fitted with a two-step pulley, and this pulley is shifted vertically to bring either the small step or the large step into driving engagement. In order to avoid any possibility of looseness or play in the turntable drive, the pulley is preferably fixed on the shaft and the entire motor is bodily moved with the pulley. The location of the axis of the shaft is preferably shifted when changing from one step to the other on the pulley, and a further feature and object of the invention is to provide a suitable mounting for the motor which will afford the desired vertical and horizontal displacement of the motor.

Another object of the invention is to provide the mounting means with a shift guide which facilitates appropriate movement of the motor; which indicates the drive speed being used or selected; and which compels complete disengagement of the pulley from the turntable before permitting vertical movement of the pulley. Another object is to provide lock means for locking the motor in desired drive position. Still another object is to provide appropriate motion limiting or stop means for determining the driving pressure between the pulley and the turntable; to make such stop means readily adjustable; and to so design the stop means as to automatically provide appropriate stop positions for either the small or the large step of the pulley depending on which step is about to be used.

Still another object of the invention is to provide the motor control or shift mechanism with a motor switch so interconnected therewith that the switch is closed when either step of the pulley is moved against the turntable, and is opened when the pulley is disengaged from the turntable, the timing of the switch action being maintained the same relative to the time of engagement of the pulley with the turntable, despite the difference in movement of the motor when being engaged for different speed.

Still another object is to provide adequate friction and a silent drive, by the provision of rubber or like soft frictional material, yet at the same time to insure absolute accuracy of turntable speed. The motor is a synchronous or constant speed motor. A rubber band or rim is secured to the periphery of the turntable, and this makes it possible to use an all-metal pulley on the motor shaft. Such a pulley can be accurately dimensioned, and may even be ground to a highly polished finish. It will not experience any changes or variations in diameter, such as are experienced when attempting to use a rubber pulley. Any slight possible variation in dimension of the rubber rim is ignorable, because it is only a minute percentage of the diameter of the turntable, whereas a similar variation at the pulley, which is of very small diameter, might be noticeable. Moreover, the use of an all-metal pulley obviates any constructional difficulty which might arise in producing an accurately centered two-step pulley.

To the accomplishment of the foregoing, and such other objects as will hereinafter appear, the invention consists in the turntable drive elements and their relation one to the other, as are hereinafter more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings, in which:

Fig. 1 is a plan view of the drive mechanism with the turntable removed;

Fig. 2 is a side elevation of the same;

Fig. 3 shows a shift guide which is preferably employed with the invention;

Fig. 4 is a plan view of a recorder embodying the two-speed drive of the present invention;

Fig. 5 is a perspective view showing the stop mechanism and connected motor switch;

Fig. 6 is a section taken in the plane of the line 6—6 of Fig. 1;

Fig. 7 is a section through the rim of the turntable looking in the plane of the line 7—7 of Fig. 4; and

Fig. 8 is a detail explanatory of the locking mechanism.

Referring to the drawings, and more particularly to Fig. 4, the recorder there shown comprises a turntable T driven by a motor M through a two-step pulley P. The cutting head H of the recorder is fed over the turntable by feed mechanism which is located beneath the turntable, this feed mechanism being controlled by means of a control knob C which is shown in neutral position, but which may be moved to one side or the other, depending on whether the desired feed of the cutting stylus is to be from the inside of the record out, or from the outside of the record in. The particular feed mechanism, here referred to, is of the type disclosed and claimed in our co-pending application, Serial No. 273,168, filed May 12, 1939, and entitled "Reversible feed mechanism for recorders."

While the apparatus shown in Fig. 4 is a recorder, it will be understood that the turntable drive, here disclosed, is equally applicable to a phonograph. In fact, most recorders are provided with a suitable pick-up arm, such as the arm A, for immediate play-back of a disc which has just been recorded. Hence, the apparatus is a phonograph as well as a recorder.

Referring now to Figs. 1 and 2, the motor M and pulley P are preferably mounted for bodily movement as a unit. They are moved by a suitable shift handle S, the movement of which is preferably appropriately limited and guided by means of a shift guide plate G, and the position of which may be locked by means of an appropriate lock L. The operation of the motor is preferably controlled by electric switch E which is suitably connected with the shift mechanism to automatically control the operation of the motor, so that only a single handle, namely, the shift handle S, need be operated to fully control the turntable drive.

Considering the arrangement in greater detail, the motor M is carried on a motor-carrying plate 12, this plate being movable both vertically and horizontally. To this end the plate 12 is mounted on a slide rod 14 (Fig. 2), the latter affording vertical movement and a horizontal oscillation of the plate about the axis of the rod. The shift handle S is secured to the opposite end of plate 12, and inasmuch as the motor pulley P is located at an intermediate point on plate 12, it is moved horizontally when the plate is oscillated about the slide rod 14.

In the present case, the plate 12 is rigidly secured to the upper end of slide rod 14, and the latter is vertically slidable in a special bearing 16 which is fixedly mounted at flange 18 to the bottom of the cover plate 20 of the apparatus. A spring 22 is preferably provided to counterbalance the weight of the motor and associated mounting mechanism. In the present case, the spring 22 is a compression spring which surrounds the slide rod 14 and which is disposed between a collar 24 secured to the slide rod and the lower bearing of the fitting 16.

Motor M is mounted beneath the plate 12, it being suspended from the plate by rods 26 which are bolted to the plate through rubber cushions, the rubber cushions 28 being disposed below plate 12, and cushions 30 being disposed above the plate. This mounting, as so far described, would afford considerable sideward oscillation or floating mounting of the pulley and motor. Such movement is preferably limited to a comparatively small amount by the provision of additional rubber cushions 32 which are disposed diametrically opposite one another on a diameter at right angles to a diameter passing through the mounting bolts 26. Cushions 32 are also shown in Fig. 6. These cushions act solely in compression, and function to limit oscillation of the motor about the bolts 26.

While the motor-carrying element 12 has been referred to as a plate, it actually is a special casting which is preferably provided with a boss at 34 to securely receive the slide rod 14; with a flange at 36 to stiffen the plate, and with a block 38 which fixedly receives the inner end of a preferably threaded rod 40 (Fig. 8) leading to a shift handle S. The rod 40 passes through guide G previously referred to.

Referring to Fig. 3, the guide G is provided with horizontal slots 42 and 44 connected at their left-hand or outer ends by means of a vertical slot 46. It will be evident that the entire motor mounting must be moved downwardly before it can be moved inwardly along slot 44, and at this time the upper or smaller diameter step 48 of the pulley will engage the periphery of the turntable, as is indicated by the broken line position 48' in Fig. 2, and the solid line position 48 in Fig. 6. It will also be evident, from inspection of Fig. 3, that the motor and pulley cannot be moved upwardly without first moving the pulley away from the turntable to a fully disengaged position (shown in solid lines in Fig. 1) corresponding to the vertical slot 46 in guide G. After moving the pulley outwardly an adequate amount to disengage the same from the turntable, it may then be moved vertically in slot 46 and inwardly along slot 42, at which time the larger diameter pulley 50 will engage the turntable, as is indicated in Figs. 2 and 4. The three possible positions of the parts are indicated in Fig. 1, the disengaged position being shown in solid lines, the slow speed or 33⅓ R. P. M. position being shown at 48', S', and the large pulley or 78 R. P. M. position being shown between the two at 50'', S''. In Fig. 1 the turntable has been removed, and the position of the rim of the turntable is represented by the broken line T.

The slot 42 in shift guide G is shorter than the slot 44, because the required inward movement is less. However, the slots 42 and 44 are preferably not relied upon to limit the inward movement of the motor, and instead special motion limiting means or stop means are preferably provided. Referring to Figs. 1, 5 and 6, an adjustable stop 52 is mounted on cover plate 20, it preferably being a cylinder which is eccentrically mounted on and locked in position by a screw 54, thereby affording adjustment of the stop position, which in turn determines the pressure between the pulley and the turntable. An additional stop abutment or block 56 is provided between stop 52 and a part 58 on motor-carrying plate 12. This

block or abutment 56 is preferably a two-step abutment, as is best shown in Figs. 5 and 6, it comprising an upper larger step 60 and a smaller lower step 62. The difference in dimension between the steps 60 and 62 corresponds accurately to the difference in radius of the pulleys 48 and 50. When the motor-carrying plate 12 is in raised position, it engages the upper stop 60, and when it is in lowered position it engages the lower stop 62, as is indicated in Fig. 6. With this arrangement, the motion of the pulley toward the turntable is appropriately limited and is automatically varied depending upon whether the small or large pulley is being used. The single adjustment at the eccentric stop 52 applies equally to both pulleys.

The shift guide G is secured at its lower edge to the cover plate 20, as by means of a support bar 64 (Fig. 2) to which it is screwed at 66 (Fig. 3). The motor may be locked in desired position as by means of a large, knurled wheel L. This is internally threaded to mate with the threaded rod 40. By turning the wheel L in a clockwise direction, guide G is clamped between lock 38 and wheel L, and the motor-carrying plate 12 is thus held securely in position. It may be locked in either the slow speed or high speed or disengaged positions.

The supply of current to the motor M is controlled by a suitable switch E. This is normally biased to open position, and is controlled by a lever 70 which projects above cover plate 20, the switch and connected wires being located below the plate. The switch is preferably so linked or related to the motor-carrying plate 12 that the switch is turned on automatically when the pulley is moved into driving position, and can be turned off only after moving the pulley to disengaged position. This is of great advantage, because on the one hand, during starting, the motor is permitted to start and gain a little speed before it is moved into engagement with the turntable, and on the other hand, during stopping, it is of advantage in guarding against the possibility of the motor being stopped while leaving the pulley in engagement with the turntable, for if the latter are left in engagement for considerable length of time, they may develop a "flat" or irregular portion which will interfere with the desired true precision uniform movement. These advantages are in addition to the simplification of control arising from the use of only a single control S.

The problem of exact timing of the closing of the switch is complicated by the fact that the movement of motor-carrying plate 12 is different for the two different pulleys. This difficulty is overcome, in the present case, by connecting the switch lever 70 through an angle lever 72 to the two-step abutment 56 previously referred to. Angle lever 72 is pivoted at 74 on cover plate 20. The abutment 56 is normally moved away from stop 52 to the solid line position shown in Fig. 1, this movement being caused by the spring action within switch E. On reflection, it will be evident that the movement of abutment 56 is the same for either speed, because the differfence in movement of motor-carrying plate 12 is compensated for by the two-step construction of the abutment. Consequently, the movement of switch lever 70 is the same for either speed, and the switch is closed and opened in proper timed relation to the engagement of the pulley with the turntable.

Referring now to Figs. 2, 6 and 7, the periphery of turntable T is grooved at 80 to receive a comparative heavy rubber rim 82, the outside surface of rim 82 projecting somewhat beyond the metal periphery of the turntable. By using a rubber rim on the turntable, the pulley P may be made wholly of metal, and this is desirable, so that it may be turned and ground to accurate concentric relation with the shaft and accurate diameter. A corresponding accuracy would not be obtainable when using a rubber pulley for engagement with a metal turntable rim. While it is true that some slight departure from accuracy may take place in rubber rim 82, this departure is ignorable because its effect is manifest relative to the diameter of the turntable, which is very large, it commonly being a matter of sixteen inches in present day apparatus, particularly for slow speed recording. This is to be contrasted with the effect of any inaccuracy on the pulley, for the latter is extremely small in diameter, and would readily produce a noticeable percentage change in turntable speed.

It is believed that the construction and operation, as well as the many advantages of the present improved turntable drive mechanism, will be apparent from the foregoing detailed description thereof. The operator simply seizes the handle S, and moves the same toward either the numeral 78 or the numeral 33 on the shift guide, and then turns the knurled wheel L to lock the handle in position. The motor is started in proper timing, and the maximum inward movement of the pulley is appropriately limited, regardless of which the two-drive speeds is being used. The motor cannot be stopped without first disengaging the pulley from the turntable.

It will be apparent that while we have shown and described our invention in a preferred form, many changes and modifications may be made in the structure disclosed without departing from the spirit of the invention defined in the following claims.

We claim:

1. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber or like frictional rim fitted directly around the outside of the periphery of said turntable, a single speed driving motor arranged with its axis upright at one side of the turntable for driving said turntable at either of two standard record speeds, a very small-diameter accurately-finished two-step metal pulley on said motor adapted to frictionally engage the single rubber rim of the turntable, and means affording both vertical and horizontal movement of the pulley in order to bring either the smaller or the larger step into position for bearing against said single rubber rim for turntable directly without the use of intermediate or idler wheels, said pulley steps being subtsantially different in diameter and so selected as to provide the desired two record speeds.

2. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber band or like frictional rim fitted directly around the outside of the periphery of said turntable, a single speed driving motor for said turntable, said motor being mounted with its axis upright and outside of the turntable for driving said turntable at either of two standard record speeds, a small-diameter aoccurately-finished two-step metal pulley on said motor ar-

ranged to frictionally drive the turntable directly without the use of intermediate or idler wheels, each step of said pulley having a length approximately equal to the vertical height of the turntable periphery, and means affording axial and transverse movement of the pulley in order to bring either the smaller or the larger step into direct engagement with the single rubber rim of the turntable, said steps being substantially different in diameter and so selected as to provide the desired two record speeds.

3. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber band or like frictional rim fitted around the outside of the periphery of said turntable, a single speed driving motor for said turntable, said motor being mounted with its axis upright and outside of the turntable for driving said turntable at either of two standard record speeds, a small-diameter accurately-finished two-step metal pulley fixedly mounted on the motor shaft and arranged to frictionally drive the turntable, each step of said pulley having a length approximately equal to the vertical height of the turntable periphery, and means mounting the motor for bodily movement in both vertical and horizontal directions, whereby either the smaller step or the larger step of the pulley may be brought into position for bearing against said single rubber rim for driving the turntable directly without the use of intermediate or idler wheels, said steps being substantially different in diameter and so selected as to provide the desired two record speeds.

4. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber rim on the outside periphery of said turntable, a single speed driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable for driving said turntable at either of two standard record speeds, a very small-diameter accurately-finished two-step metal pulley on said motor arranged to frictionally drive the turntable, means mounting the motor for bodily movement in vertical and horizontal directions, a spring for counterbalancing the weight of the motor to facilitate vertical movement thereof when changing from one speed to the other, and additional means for locking the motor in desired position, whereby either the smaller step or the larger step of the pulley may be brought into position for bearing against said single rubber rim for driving the turntable directly without the use of intermediate or idler wheels.

5. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber or like frictional rim fitted directly around the outside of the periphery of said turntable, a single speed driving motor for driving said turntable at either of two standard record speeds, mounting means for said motor arranged to afford horizontal movement of the motor, said mounting means supporting said motor with its axis upright at one side of the turntable, a very small-diameter accurately-finished two-step metal pulley on said motor arranged to frictionally drive the turntable, said pulley being vertically movable, whereby either the smaller step or the larger step of the pulley may be used to bear against the single rubber rim in order to drive the turntable directly without the use of intermediate or idler wheels, said steps being substantially different in diameter and so selected as to provide the desired two record speeds.

6. In combination, a recorder or/and phonograph turntable for disc records, means mounting the same for rotation on a vertical axis, a single rubber or like frictional rim fitted directly around the outside periphery of said turntable, a single speed driving motor for driving said turntable at either of two standard record speeds, mounting means for said motor arranged to afford both vertical and horizontal movement of the motor, said mounting means supporting said motor with its axis upright at one side of the turntable, a very small-diameter accurately-finished two-step metal pulley fixedly mounted on the motor shaft and adapted to frictionally engage the single rim of the turntable, the movable mounting of the motor making it possible to bring either the smaller step or the larger step of the pulley into direct engagement with the single rim of the turntable, or to disengage the pulley entirely from the turntable, said steps being substantially different in diameter and so selected as to provide the desired two record speeds.

7. In combination, a recorder or/and phonograph turntable, a driving motor, a carrying plate for said motor arranged to afford both vertical and horizontal movement of the motor, said motor being mounted with its axis vertical at one side of the turntable, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, a handle for moving said carrying plate, and means to lock the same in desired position, the movable mounting of the motor making it possible to bring either the smaller step or the larger step of the pulley into engagement with the turntable, or to disengage the pulley entirely from the turntable.

8. In combination, a recorder or/and phonograph turntable, a driving motor, mounting means for said motor arranged to afford movement of the motor, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movable mounting of the motor making it possible to bring either the smaller step or the larger step of the pulley into engagement with the turntable, or to disengage the pulley entirely from the turntable, and adjustable means to limit the movement of the motor and to thereby determine the pulley pressure on the turntable.

9. In combination, a recorder or/and phonograph turntable, a driving motor, mounting means for said motor arranged to afford movement of the motor, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movable mounting of the motor making it possible to bring either the smaller step or the larger step of the pulley into engagement with the turntable, or to disengage the pulley entirely from the turntable, a motor switch, and means so interconnecting the motor switch and the motor mounting that the switch is closed when either pulley is moved against the turntable, and is opened when the pulley is disengaged from the turntable.

10. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, means whereby said motor may be moved vertically and

horizontally, a shift guide having appropriate horizontal slots connected at one end by a vertical slot for guiding the movement of the motor, and a two-step pulley on said motor arranged to frictionally drive the turntable, whereby either the smaller or the larger step of the pulley may be used to drive the turntable, the shift guide insuring ample disengagement of the pulley from the turntable during vertical movement of the pulley.

11. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, means whereby said motor may be moved vertically and horizontally, a shift guide having appropriate horizontal slots connected at one end by a vertical slot for guiding the movement of the motor, a handle projecting through said guide for moving said motor, a lock wheel on said handle adapted to be screwed against said shift guide to hold the motor in desired position, and a two-step pulley on said motor arranged to frictionally drive the turntable, whereby either the smaller or the larger step of the pulley may be used to drive the turntable, the shift guide insuring ample disengagement of the pulley from the turntable during vertical movement of the pulley.

12. In combination, a recorder or/and phonograph turntable, a rubber rim on said turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, a motor-carrying plate, means whereby said plate may be moved vertically and horizontally, a shift guide having appropriate slots for guiding the movement of the plate, a handle projecting through said guide for moving said plate, a lock wheel on said handle adapted to be screwed against said shift guide to hold the plate in desired position, and a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, whereby either the smaller or the larger step of the pulley may be moved into engagement with the turntable.

13. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, a motor-carrying plate, a vertical slide rod at one end of said plate so arranged that the plate may be moved vertically and oscillated horizontally, a handle for moving said plate, a lock means to hold the plate in desired position, and a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, whereby either the smaller or the larger step of the pulley may be moved into engagement with the turntable.

14. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, a motor-carrying plate, a vertical slide rod at one end of said plate so arranged that the plate may be moved vertically and oscillated horizontally, a shift guide at the opposite end of said plate having appropriate slots for guiding the movement of the plate, a shift handle projecting through said guide for moving said plate, a lock wheel on said handle adapted to be screwed against said shift guide to hold the plate in desired position, and a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, whereby either the smaller or the larger step of the pulley may be moved into engagement with the turntable.

15. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis upright at one side of the turntable, means whereby said motor may be moved vertically and horizontally, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, and two-step stop means for automatically limiting the movement of the motor in order to determine the desired pulley pressure for either the small or the large pulley.

16. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, means whereby said motor may be moved vertically and horizontally, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, a motor switch normally biased to open-position, and means moved by said motor for moving said switch to closed position when either the small or the large pulley is moved into engagement with the turntable.

17. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, means whereby said motor may be moved vertically and horizontally, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, an adjustably mounted stop for limiting the movement of the motor in order to determine the desired pulley pressure, and a two-step abutment located between said motor and said stop in order to automatically provide appropriate stop positions for either the small or the large pulley.

18. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, means whereby said motor may be moved vertically and horizontally, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, an adjustably mounted stop for limiting the movement of the motor in order to determine the desired pulley pressure, a movable stop block located between said motor and said stop, said stop parts including a two-step surface to automatically provide appropriate stop positions for either the small or the large pulley, a motor switch normally biased to the open position, and means connected to and movable with said block for moving said switch to closed position when the pulley is moved into engagement with the turntable.

19. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, a motor-carrying plate, a slide rod in vertical position at one end of said plate, whereby said plate may be moved vertically and oscillated horizontally, a

shift guide at the opposite end of said plate having appropriate slots for guiding the movement of the plate, a handle projecting through said guide for moving said plate, lock means to hold the plate in desired position, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said plate and motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, adjustable stop means for limiting the movement of the plate in order to determine the desired pulley pressure, said means including a two-step surface to provide appropriate stop positions for either the small or the large pulley.

20. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, a motor-carrying plate, a slide rod in vertical position at one end of said plate, whereby said plate may be moved vertically and oscillated horizontally, a shift guide at the opposite end of said plate having appropriate slots for guiding the movement of the plate, a handle projecting through said guide for moving said plate, lock means to hold the plate in desired position, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said plate and motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, a motor switch normally biased to the "open" position, and means movable with said plate for moving said switch to the "closed" position when the pulley is moved into engagement with the turntable.

21. In combination, a recorder or/and phonograph turntable, a rubber rim on said turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, a motor-carrying plate, a slide rod rigidly secured in vertical position at one end of said plate, a bearing slidably receiving said rod whereby said plate may be moved vertically and oscillated horizontally, a shift guide at the opposite end of said plate having appropriate slots for guiding the movement of the plate, a handle projecting through said guide for moving said plate, a lock wheel on said handle adapted to be screwed against said shift guide to hold the plate in desired position, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said plate and motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, an adjustably mounted stop for limiting the movement of the plate in order to determine the desired pulley pressure, and a two-step block located between said plate and stop to automatically provide appropriate stop positions for either the small or the large pulley.

22. In combination, a recorder or/and phonograph turntable, a driving motor for said turntable, said motor being mounted with its axis vertical at one side of the turntable, a motor-carrying plate, a slide rod in vertical position at one end of said plate, whereby said plate may be moved vertically and oscillated horizontally, a shift guide at the opposite end of said plate having appropriate slots for guiding the movement of the plate, a handle projecting through said guide for moving said plate, lock means to hold the plate in desired position, a two-step pulley on said motor adapted to frictionally engage the rim of the turntable, the movement of said plate and motor being such that either the smaller or the larger step of the pulley may be moved into engagement with the turntable, adjustably mounted stop for limiting the movement of the plate in order to determine the desired pulley pressure, a two-step block located between said plate and stop to provide appropriate stop positions for either the small or the large pulley, a motor switch normally biased to the "open" position, and means connected to and movable with said block for moving said switch to the "closed" position when the pulley is moved into engagement with the turntable.

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