Oct. 20, 1953 J. L. D. MORRISON 2,655,812

DRIVING MECHANISM FOR PHONOGRAPHS

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Fig. 1

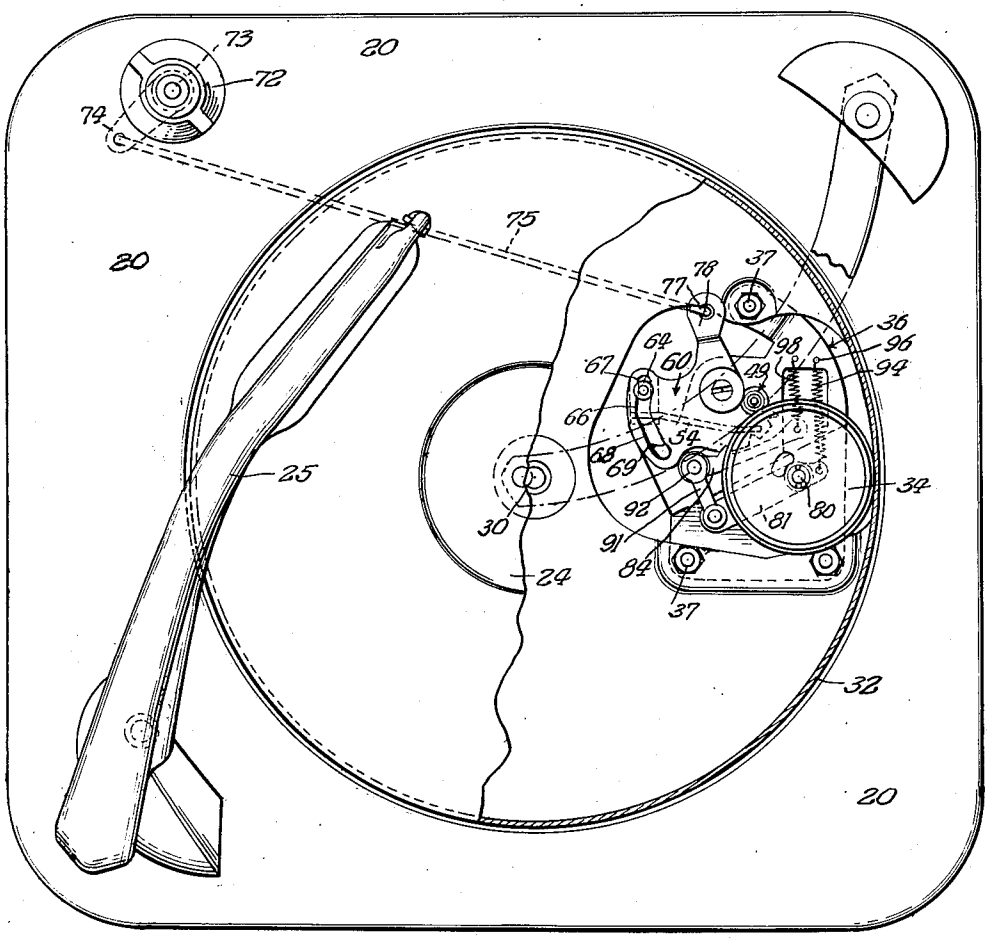



Fig. 2

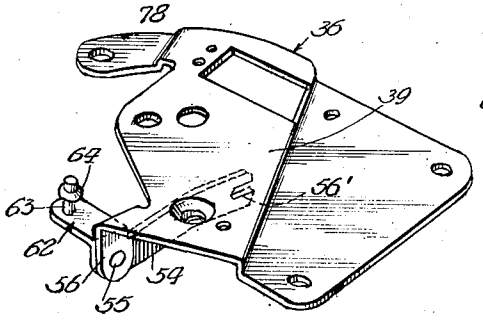



Fig. 3

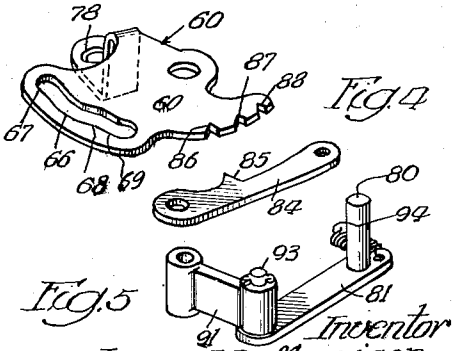



Fig. 4

Fig. 5

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Fig. 6

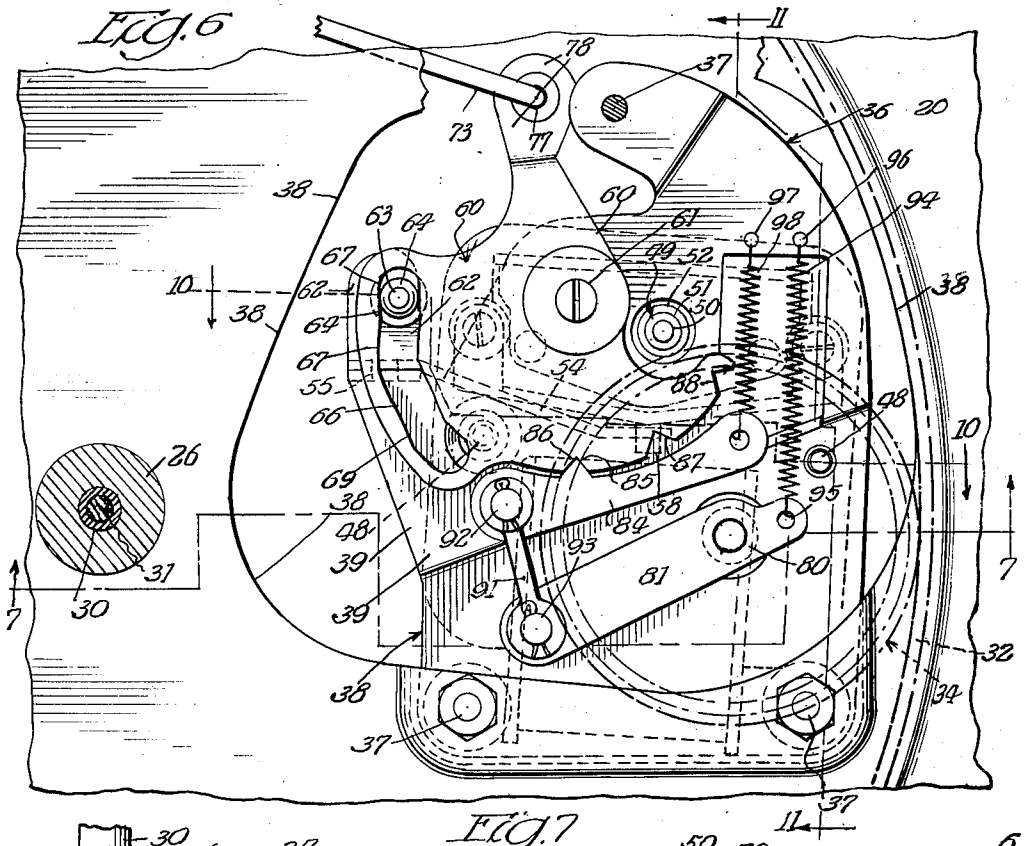
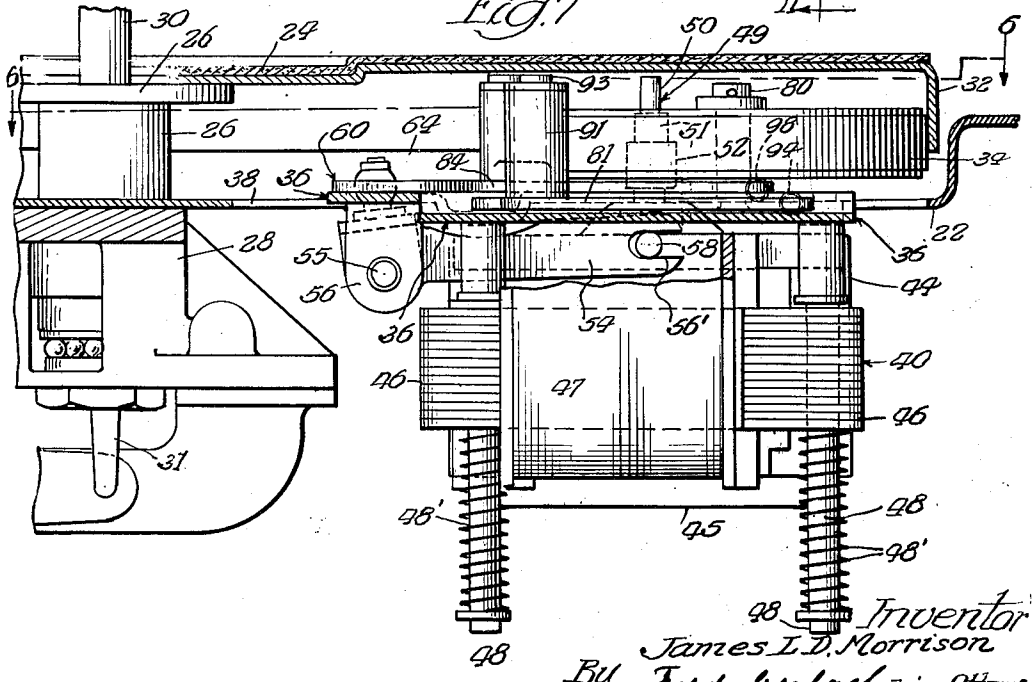



Fig. 7




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Fig. 8

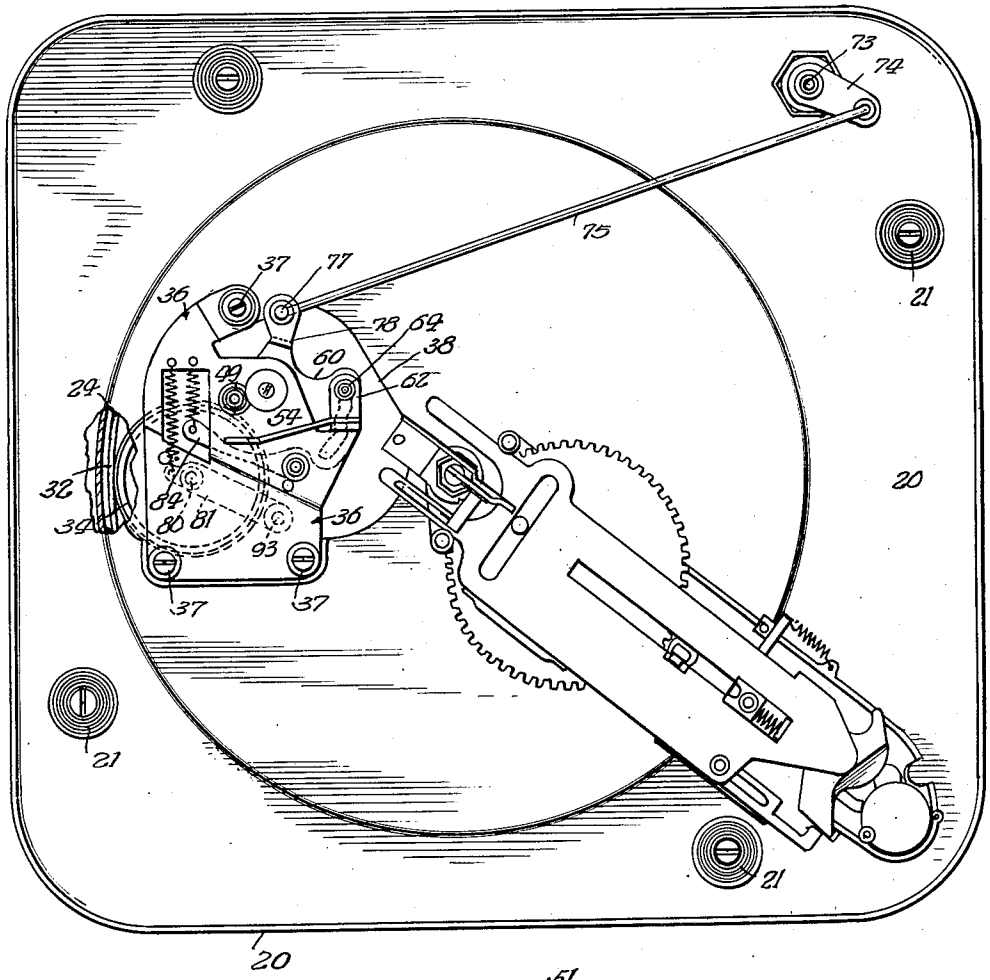
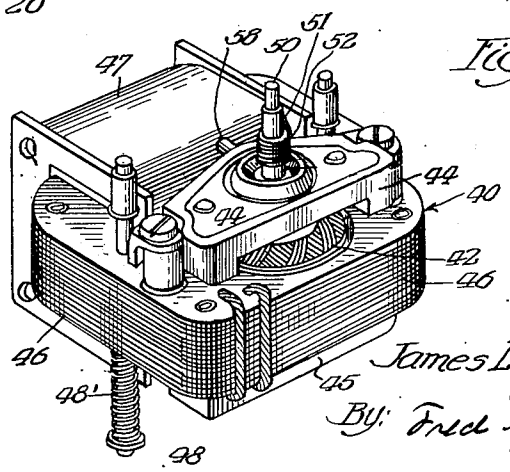



Fig. 9




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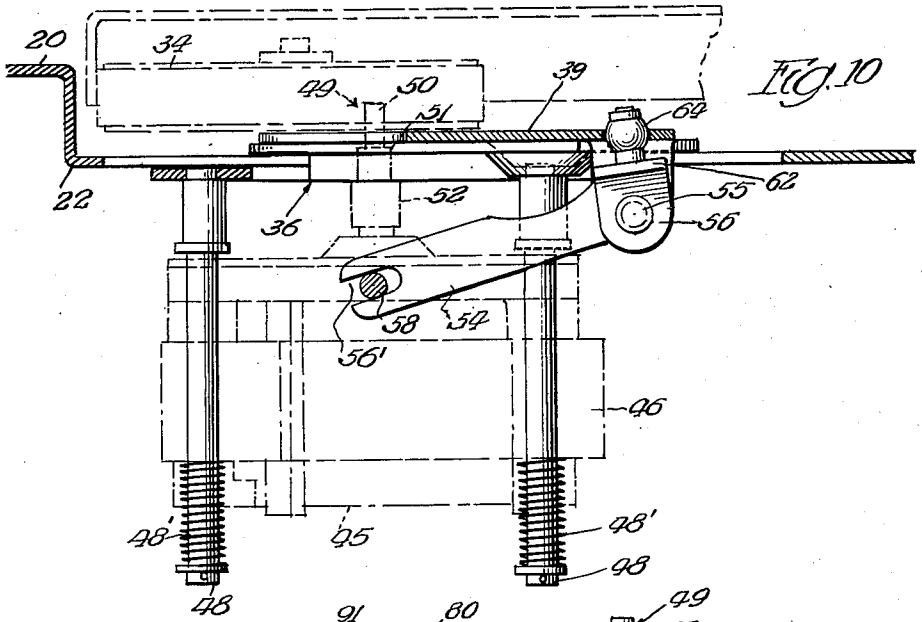



FIG. 10

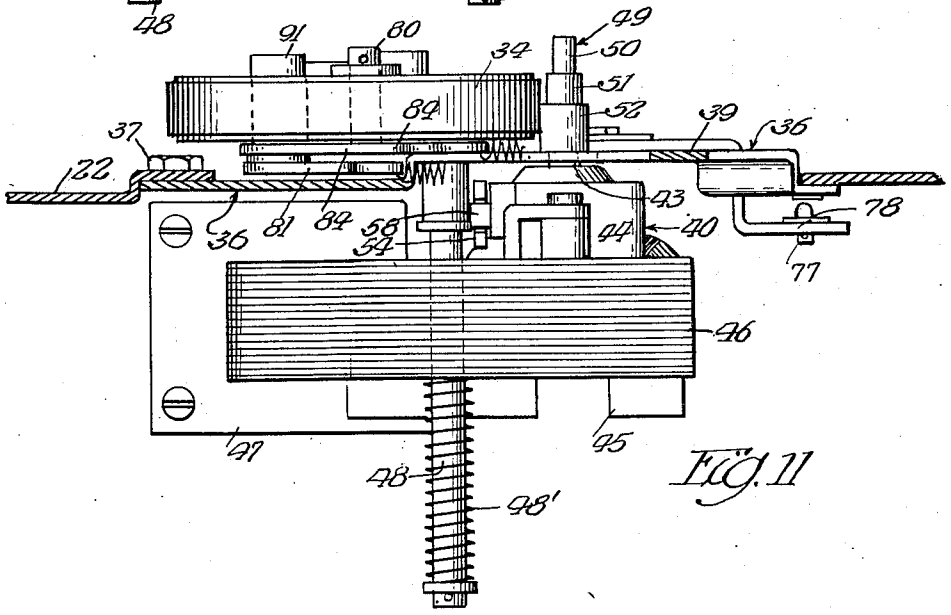



FIG. 11

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Patented Oct. 20, 1953

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# UNITED STATES PATENT OFFICE

2,655,812

## DRIVING MECHANISM FOR PHONOGRAPHS

James L. D. Morrison, Benton Harbor, Mich., assignor to V-M Corporation, Benton Harbor, Mich., a corporation of Michigan

Application June 9, 1950, Serial No. 167,001

19 Claims. (Cl. 74—199)

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The invention relates to mechanism for driving the turntable of a phonograph which carries the record disk, at three speeds.

One object of the invention is to provide an improved variable three-speed driving mechanism for the turntable which is compact in construction and includes a friction roller which operates on the periphery of a downward flange on the turntable.

Another object of the invention is to provide improved mechanism for efficiently driving the turntable at three speeds.

Another object of the invention is to provide improved variable speed driving mechanism for the turntable in which an electric motor and three-speed pulley elements for driving said mechanism are vertically movable in effecting speed changes.

Another object of the invention is to provide improved variable speed driving mechanism for the turntable which is compact in construction, can be readily installed and removed and is efficient in operation.

The invention consists in the several novel features hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a plan of a phonograph embodying the invention, parts being broken away;

Fig. 2 is a perspective of the mounting plate for the variable speed driving mechanism;

Fig. 3 is a perspective of the cam-plate for vertically shifting the electric motor and disengaging the roller which engages the turntable and the stepped drive pulley on the motor;

Fig. 4 is a perspective of the cam-controlled arm for disengaging the roller which drives the turntable from the pulley on the motor;

Fig. 5 is a perspective of the linkage which carries the roller which engages the turntable;

Fig. 6 is a plan of the variable speed driving mechanism;

Fig. 7 is a section taken on line 7—7 of Fig. 6;

Fig. 8 is an inverted plan, parts being shown in section;

Fig. 9 is a perspective of the vertically movable electric motor;

Fig. 10 is a vertical section taken on line 10—10 of Fig. 6, the motor being shown in low-speed driving position;

Fig. 11 is a vertical section taken on line 11 of Fig. 6, the motor being shown in high speed driving position.

The invention is exemplified in a phonograph which comprises a substantially rectangular base

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20 which is supported on feet 21 and is provided with a central circular depressed portion 22. A turntable 24 for rotating the record disks relatively to the needle carried by a tone-arm 25 is provided with a bearing 26 which is suitably journalled in a bearing bracket 28 which is fixedly supported on the depressed portion 22 of the base 20. The phonograph usually includes record changing mechanism with an upstanding spindle 30 which is fixedly supported in bracket 28, for supporting a stack of records, an ejector (not shown) for successively displacing the records from an offset on the spindle so they will drop on the turntable, and a rod or stem 31 which extends through the spindle for operating the ejector, all of which parts may be of known construction. The turntable 24 is provided with a depending cylindrical flange 32, having a friction face on its inner periphery which is adapted to be driven by a roller 34 having a friction periphery usually of elastic material.

The variable speed driving mechanism is supported on a mounting plate, generally designated 36, which is removably secured by three screws 37 to the underside of the base. The depressed portion 22 of base 20 is provided with an opening 38. Mounting plate 36 is provided with an upwardly offset portion 39 for supporting parts of the variable speed driving mechanism above the depressed portion 22 of the base 20 and under the turntable.

An electric motor, generally designated 40, is disposed below mounting plate 36 and drives the variable speed mechanism below the turntable. The motor 40 comprises a rotor 42 which is journalled in an upper bracket 44 and a lower bracket 45, a laminated stator 46 and a field coil 47. The motor is mounted for vertical sliding movement on a pair of rods 48 which extend through the stator 46. The upper ends of the rods 48 are fixed in the mounting plate 36 and coil springs 48' surrounding said rods are applied between the stator and a shoulder on the lower ends of said rods for yieldingly urging the motor upwardly.

The rotor 42 is provided with an output pulley 49 which includes friction driving elements 50, 51 and 52 of three different diameters for driving the turntable through the roller 34 at low, intermediate and high speeds. Said pulley rotates with the rotor of the electric motor and is movable vertically with the motor for positioning said elements for individual engagement by roller 34. The friction roller 34 is supported for lateral movement to engage and disengage the elements

of pulley 49 according to the vertical position of the motor and said elements.

A lever 54 is fulcrumed at 55 on a lug 56 which is integral with and depends from the mounting plate 36 and its distal end is provided with a slot 56' for a stud 58 which is fixed to the inner side of the upper bracket 44 of the electric motor. Downward pivotal movement of lever 54 on its fulcrum 55 lowers the motor and the pulley 49 against the force of springs 48'. Upward swinging of lever 54 controls the lift of the motor by said springs.

The movement of arm 54 for raising and lowering the motor is controlled by a cam-plate, generally designated 60, which overlies the raised portion 39 of the mounting plate 36 and is pivoted on said mounting plate by a screw 61. Lever 54 has fixed thereto a laterally extending arm 62 which carries an upwardly extending stud 63 on which a spherical roller 64 is journalled. Cam-plate 60 is provided with a slot 66 into which roller 64 extends. Slot 66 is provided with three steps 67, 68 and 69 which are adapted to hold roller 64 to lock the motor 40 and the pulley carried thereby in three predetermined vertical positions for driving roller 34, and with cam portions between said steps for shifting the roller 64 between said positions.

A control button or handle 72 over the base plate 20 is fixed to a shaft 73 which extends through and is journalled in base 20. Under base plate 20, an arm 74 is fixed to shaft 73 and a link 75 is pivotally connected to arm 74 and at 77 to an arm 78 on the cam-plate 60. Arm 78 is formed on a depressed extension of the plate 60. This button and connection are adapted to swing the cam-plate 60 for selectively positioning the pulley members 50, 51 and 52 for driving the roller 34 at different speeds.

Roller 34 is movable laterally to engage and disengage the pulley on the rotor and is journalled on a stud 80. Stud 80 and roller 34 are carried by a linkage for permitting said roller while engaged with the friction face on the depending flange 32 of the turntable to be shifted for clearance between the pulley on the motor and said roller during the vertical shift of the motor. Stud 80 is supported on a link 81 which is pivoted by a stud 93 to a link 91 which is pivoted on a stud 92 which is fixedly supported on the mounting plate. A spring 94 connected at 95 to link 81 and at 96 to the mounting plate, urges the roller 34 into engagement with the pulley 49 and the friction face on the turntable.

The peripheral face of roller 34 extends below the lower edge of the flange 32 on the turntable to provide sufficient friction area for driving the roller 34 from the stepped elements 50, 51 and 52 of the pulley 49. By extending the lower end of the friction face on roller 34 below flange 32, it becomes possible to drive the roller at three speeds by said elements without increasing the height of the turntable and to provide a compact three-speed drive for the turntable.

A detent 84 is pivoted on stud 92 and is operable by a cam-plate 60 for shifting roller 34 out of engagement with the members 50, 51 and 52 of pulley 49 on the motor during the vertical shift of the motor. Detent 84 is provided with a tooth 85 which is adapted to ride on arcuate edge portions of the cam-plate 60 and to pass into notches 86, 87 and 88 in said edge portions. A spring 98 is applied to one end of detent 84 and connected at 97 to the mounting plate 36 for urging the tooth 85 of the detent into engagement with the edge of cam plate 60 and snapping it into the notches therein. When cam-plate 60 is shifted on its fulcrum 61 and tooth 85 is positioned in one of the notches in said cam-plate, spring 98 will hold detent 84 away from link 81 and permit the spring 94 to hold the periphery of roller 34 in engagement with one of the elements of pulley 49. When cam-plate 60 is shifted to force tooth 85 to the adjacent edge of the cam plate and out of its engaged notch, the detent 84 will abut against link 81 and move roller 34 away from the pulley on the motor to provide clearance for the vertical movement of said pulley. The pressure applied to the detent 84 by spring 98 causes the tooth 85, during shift of the cam-plate 60 to snap into the notches in the edge of the cam-plate and spot the cam-plate in one of its three predetermined positions.

When cam-plate 60 is in one of its three positions, roller 64 which is carried by lever 54 will be held at one of the steps in the slot 66 and the motor and lever 54 will be locked in one of their three positions. During each step of movement of the cam-plate 60 it will initially force the tooth 85 on detent 84 out of the notch and the detent 84 will abut against the hub on link 81 and force the roller 34 against the force of spring 94 a sufficient distance to provide for clearance between the pulley on the motor and said roller. The continued pivotal movement of the cam-plate 60 will cause tooth 85 to ride on the edge of the cam-plate until it snaps into the succeeding notch in the cam-plate. While tooth 85 is riding on the edge portion between the notches, roller 34 will be held away from pulley 49 and one of the cam portions of slot 66 between the steps therein will shift roller 64 to rock arm 62 and lever 54 to raise or lower the motor and pulley 49 one step, according to the direction in which the cam-plate is rotated. When the tooth 85 snaps into the succeeding notch in the cam-plate 60 detent 84 will release the link 81 on which roller 34 is mounted and permit spring 94 to become effective to press roller 34 into frictional engagement with the pulley 49 on the motor and the friction surface on the turntable. This operation occurs during each selective step-by-step shift of the control button or handle 72. During the step-by-step movements of button 72 in one direction, the motor will be lowered and during like movements in the opposite direction the motor will be raised for speed changes. During each step the roller 34 will be shifted for clearance between the pulley and the motor-shaft and said roller and then released for driving engagement with the pulley on the motor.

The operation of the mechanism for driving the turntable will be as follows: Assuming the cam-plate 60 to be set in the position illustrated in Figs. 6 and 11, roller 64 on arm 62 of lever 54 will be confined in step 67 of the slot 66 in the cam-plate 60. Lever 54 acting through stud 58 on the frame of the motor will hold the motor depressed against the force of springs 48' with element 52 of the pulley on the motor engaged by the periphery of roller 34 for driving the turntable at high speed. While the motor is driven, spring 94 will urge the roller 34 into frictional driving relation with said member and the depending flange on the turntable to cause the turntable to be driven at high speed. When a speed change is to be made from high speed to the predetermined intermediate speed, control button 72 is rotated one step to shift cam-plate 60 so that the tooth 85 on detent 84 will be shifted

out of notch 86 and ride on the edge of the cam-plate until said tooth snaps into notch 87 in the cam-plate 60. As tooth 85 passes out of notch 86 detent 84 will be shifted and move roller 34 away from the pulley 49. While tooth 85 rides on the arcuate edge between the notches 86 and 87 the cam portion of slot 66 between steps 67 and 68 will shift the roller 64 and lever 54 to raise the motor one step to bring the element 51 of the pulley 49 into position to be engaged by roller 34. As the tooth 85 of detent 84 snaps into notch 87, detent 84 will release the link 81 on which roller 34 is mounted and spring 94 will become effective to maintain driving relation between element 51 of the pulley on the motor and roller 34 and between said roller and the flange 32 on the turntable for driving the turntable at the predetermined intermediate speed. When a speed change is desired from intermediate to low, control button 72 will be rotated to swing cam-plate 60 so that tooth 85 on detent 84 will be forced out of notch 87 and ride on the edge of said cam-plate until said tooth snaps into the notch 88. As tooth 85 is forced out of notch 87, detent 84 will be shifted to engage the link 81 and move roller 34 away from the pulley on the motor. While tooth 84 rides on the edge of the cam-plate 60 between notches 87 and 88, the cam portion between steps 68 and 69 of slot 66 in the cam-plate 60 will shift roller 64 and lever 54 to lower the motor and the pulley 49 thereon into position for the engagement of roller 34 with the element 50 of the pulley on the motor, as indicated by dotted lines in Fig. 10. When tooth 85 of detent 84 snaps into notch 88 in the cam plate 60, detent 84 will release link 81 and permit spring 94 to become effective to move roller 34 into driving relation with element 50 on the pulley 49 and with the turntable. The turntable will then be driven at low speed. Reverse step-by-step operation of the control button 72 will lower the motor step-by-step for driving the turntable at intermediate and high speeds.

The vertically movable electric motor, the laterally movable roller 34 and the cam-plate 60 for shifting the motor and pulley 49 for speed changes are all mounted on the removable plate 36 for convenient replacement and installation. The control button 72 is mounted on the base and by uncoupling link 75 from arm 73 or arm 74 the entire driving mechanism may be unitarily and conveniently removed or installed on the base. The opening 38 in the base permits the parts positioned over the base to be inserted and removed with the mounting plate 36.

The invention exemplifies a phonograph with three-speed driving mechanism including a drive roller engaging the inner periphery of the down-turned flange of the turntable, and by which speed changes are effected through vertical shift of the motor, with control means for conjointly controlling the movement of the motor for speed changes and the disengagement of the roller from the motor for permitting vertical shift of the motor. By utilizing a vertically movable motor with a pulley having stepped driving faces and a roller having an extended friction face, the speed change can be compactly located under and without increasing the depth of the turntable.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a phonograph including a base, and a record-supporting turntable provided with a peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a laterally movable roller engaging the friction face on the turntable, pulley elements of different diameters driven by the motor, engageable by the roller for driving the turntable at different speeds, and movable vertically to positions for engagement of the roller with said elements respectively, mechanism including a cam-plate for selectively shifting the elements vertically into said positions for speed changes, and means operable by the cam-plate for shifting the roller to clear said elements during the vertical shift of the elements and engaging the roller with said elements when they are shifted into said positions.

2. The combination with a phonograph including a base, and a record-supporting turntable provided with a peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a laterally movable roller engaging the friction face on the turntable, pulley elements of different diameters driven by the motor, engageable by the roller for driving the turntable at different speeds, and movable vertically to positions for engagement of the roller with said elements respectively, mechanism including a cam-plate for selectively shifting the elements vertically into said positions for speed changes, and means operable by said cam-plate for shifting the roller to clear said elements during the vertical shift of the elements and engaging the roller with said elements when they are shifted into said positions.

3. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the turntable, comprising; a vertically movable electric motor, pulley elements of different diameters carried by and movable vertically with the motor, a laterally movable roller engaging the friction face on the turntable and engageable with said pulley elements respectively, mechanism including a cam-plate for selectively shifting the motor vertically into positions for engagement of the roller with said elements respectively, and means operable by said cam-plate for shifting the roller to clear said elements during the vertical shift of the motor and said elements for speed changes and engaging said elements when the motor has been shifted into said positions.

4. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the turntable, comprising; a vertically movable electric motor, pulley elements of different diameters carried by and movable vertically with the motor, a laterally movable roller engaging the friction face on the turntable and engageable with said pulley elements respectively, mechanism including a cam-plate for selectively shifting the motor vertically into positions for engagement of the roller with said elements, respectively, means operable by said cam-plate for shifting the roller to clear said elements during

the vertical shift of the motor and said elements for speed changes and engaging said elements when the motor has been shifted into said positions.

5. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the turntable, comprising; an electric motor, means on which said motor is mounted for vertical sliding movement below the base; springs for urging the motor upwardly, pulley elements of different diameters carried by and movable with the motor, a laterally movable roller engaging the friction face on the turntable and engageable with said pulley elements, a lever for depressing the motor against the force of the springs, a cam-plate for selectively shifting said lever to position the roller for engaging elements respectively, means shiftable by the cam-plate for shifting the roller to clear said elements during the vertical shift of the motor and said elements for speed changes, and means for holding the roller engaged with said elements when the motor has been shifted into said positions.

6. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the turntable, comprising; an electric motor, means on which said motor is mounted for vertical sliding movement below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor, a laterally movable roller engaging the friction face on the turntable and engageable with said pulley elements, a lever for depressing the motor against the force of the springs, a cam-plate provided with a cam slot for shifting the lever to position and hold the motor vertically for engagement of the roller with said elements respectively, means shiftable by the cam-plate for shifting the roller to clear said elements during the shift of the motor and said elements for speed changes, and means for holding the roller engaged with said elements when the motor has been shifted into said positions.

7. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the turntable, comprising; an electric motor, means on which said motor is mounted for vertical sliding movement below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor, a laterally movable roller engaging the friction face on the turntable and engageable with said pulley elements, a cam-plate provided with a slot and a lever provided with an arm extending into said slot for depressing the motor against the force of the springs, for positioning and holding the motor for engagement of the roller with said elements respectively, means shiftable by the cam-plate for shifting the roller to clear said elements during the shift of the motor and said elements for speed changes, and means for holding the roller engaged with said elements when the motor has been shifted into said positions.

8. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with an internal friction face; of variable speed driving mechanism for the



turntable, comprising; an electric motor, means on which said motor is mounted for vertical sliding movement below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor, a laterally movable spring-pressed roller engaging the friction face on the turntable and engageable with said pulley elements, a cam plate provided with notches, a lever operable by the cam plate for depressing the motor against the force of the springs, for selectively shifting the motor vertically into positions for engagement of the roller with said elements respectively, and a spring-pressed detent engaging the notches in the cam-plate for shifting the roller to clear said elements during the shift of the motor and said elements for speed changes, and releasing the roller for engaging said elements when the motor has been shifted into said positions.

9. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with a depending flange having an internal friction face; of variable speed driving mechanism for the turntable comprising; an electric motor, means for slidably supporting the motor below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor; a laterally movable spring-pressed roller provided with a friction periphery engaging the friction face on the turntable, a cam-plate provided with a stepped cam slot and peripheral notches, a lever provided with an arm extending into the cam slot for depressing the motor against the force of the springs for selectively shifting the motor into positions for engagement of the roller with said elements respectively, and a spring-pressed detent provided with a tooth engaging the edge of the cam-plate and the notches therein for shifting the roller to clear said elements for speed changes and releasing the roller for engaging said elements when the motor is in said positions.

10. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with a depending flange having an internal friction face; of variable speed driving mechanism for the turntable comprising; an electric motor, means for slidably supporting the motor below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor; a laterally movable spring-pressed roller provided with a friction periphery engaging the friction face on the turntable, a pair of serially connected links for movably supporting the roller, a cam-plate provided with a stepped cam slot and peripheral notches, a lever provided with an arm extending into the cam slot for depressing the motor against the force of the springs for selectively shifting the motor into positions for engagement of the roller with said elements respectively, and a spring-pressed detent provided with a tooth engaging the edge of the cam-plate and the notches therein for shifting the roller to clear said elements for speed changes and releasing the roller for engaging said elements when the motor is in said positions.

11. The combination with a phonograph including a base and a record-supporting turntable on the base, provided with a depending flange having an internal friction face; of variable speed driving mechanism for the turntable com-

prising; an electric motor, means for slidably supporting the motor below the base; springs for urging the motor upwardly, pulley elements of three different diameters carried by and movable with the motor; a laterally movable spring-pressed roller provided with a friction periphery engaging the friction face on the turntable, a cam-plate provided with a stepped cam slot and peripheral notches, a lever provided with an arm extending into the cam slot for depressing the motor against the force of the springs for selectively shifting the motor into positions for engagement of the roller with said elements respectively, a spring-pressed detent provided with a tooth engaging the edge of the cam-plate and the notches therein for shifting the roller to clear said elements for speed changes and releasing the roller for engaging said elements when the motor has been shifted into said positions, and a mounting plate detachably secured on the base, said motor, roller, cam-plate and detent being mounted on said detachable plate.

12. The combination with a phonograph including a base and a record-supporting turntable provided with a peripheral friction face; of variable speed driving mechanism for the turntable comprising: an electric motor, a laterally movable idler roller engaging the friction face on the turntable, three-step pulley-elements driven by the motor for driving the turntable at three predetermined speeds and movable vertically to three positions for engagement of the elements respectively with the roller, and mechanism for selectively and vertically shifting the elements and locking them in said three predetermined driving positions and for shifting the roller to clear said elements during said vertical shift between said three predetermined positions.

13. The combination with a phonograph including a base and a record-supporting turntable provided with a depending flange having an internal peripheral friction face; of variable speed driving mechanism for the turntable comprising: an electric motor, a laterally movable idler roller engaging the friction face on and under the turntable, three-step pulley-elements driven by the motor for driving the turntable at three predetermined speeds and movable vertically to three positions for engagement of the elements respectively with the roller, and mechanism for selectively and vertically shifting the elements into and locking them in said three predetermined driving positions and for shifting the roller to clear said elements during said vertical shift between said three predetermined positions.

14. The combination with a phonograph including a base and a record-supporting turntable provided with a depending flange having an internal peripheral friction face; of variable speed driving mechanism for the turntable comprising: an electric motor, a laterally movable idler roller engaging the friction face on and under the turntable, three-step pulley-elements driven by the motor, engageable by the roller for driving the turntable at three predetermined speeds and movable vertically to three positions for engagement of the elements respectively with the roller, and mechanism, including a cam-plate, for selectively and vertically shifting the elements into and locking them in said three predetermined driving positions and for shifting the roller to clear said elements during said vertical shift between said three predetermined positions.

15. The combination with a phonograph including a base and a record-supporting turntable provided with a peripheral friction face; of variable speed driving mechanism for the turntable comprising: a vertically movable electric motor, a laterally movable idler roller engaging the friction face on the turntable, three-step pulley-elements driven by and movable vertically with the motor, for driving the turntable at three predetermined speeds and movable vertically to three positions for engagement of the elements respectively with the roller, and mechanism for selectively and vertically shifting the pulley elements into and locking them in said three predetermined driving positions and for shifting the roller to clear said elements during said vertical shift between said three predetermined positions.

16. The combination with a phonograph including a base and a record-supporting turntable rotatably mounted on the base and provided with an internal peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a vertical motor-driven shaft, vertically movable three-step pulley-elements, on and driven by the shaft, a laterally movable idler roller supported in a substantially fixed horizontal plane, provided with a friction periphery having an upper zone engaging the friction face on the turntable and a lower zone engaged by the pulley-elements respectively for driving the turntable at three predetermined speeds, means for shifting the roller laterally into and out of engagement with the pulley-elements, and mechanism for selectively and vertically adjusting the pulley-elements into three predetermined positions to respectively engage the lower zone of the roller.

17. The combination with a phonograph including a base and a record-supporting turntable rotatably mounted on the base and provided with a flange having a peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a vertical motor-driven shaft, vertically movable three-step pulley-elements, on and driven by the shaft, a laterally movable idler roller supported in a substantially fixed horizontal plane, provided with a substantially straight friction periphery having an upper zone engaging the friction face on the turntable and a lower zone extending below the lower end of the flange on the turntable and engaged by the pulley-elements respectively, for driving the turntable at three predetermined speeds, means for shifting the roller laterally into and out of engagement with the pulley-elements, and mechanism for selectively and vertically adjusting the pulley-elements into three positions to respectively engage the lower zone of the roller.

18. The combination with a phonograph including a base and a record-supporting turntable rotatably mounted on the base and provided with a peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a vertical motor-driven shaft, vertically movable three-step pulley-elements of diameters decreasing in upward progression on the shaft, a laterally movable idler roller supported in a substantially fixed horizontal plane, provided with a friction periphery having an upper zone engaging the friction face on the turntable and a lower zone extending below the lower end of the friction face on the turntable, and engaged by the pulley-elements respectively, for driving the turntable at three predetermined speeds, means for shifting the roller laterally into and out of engagement with the pulley-elements, and mechanism for selectively and ver-

tically adjusting the pulley-elements when they are disengaged from the roller into three positions to respectively engage the lower zone on the roller.

19. The combination with a phonograph including a base and a record-supporting turntable rotatably mounted on the base and provided with an internal peripheral friction face; of variable speed driving mechanism for the turntable, comprising: an electric motor, a vertical motor-driven shaft, vertically movable three-step pulley-elements of diameters decreasing in upward progression, on the shaft, a laterally movable idler roller supported in a substantially fixed horizontal plane, provided with a substantially straight friction periphery with an upper zone engaging the friction face on the turntable and a lower zone extending below the lower end of the friction periphery on the turntable and engaged by the pulley-elements respectively for



driving the turntable at three predetermined speeds, spring-means for urging the roller into engagement with the friction face on the turntable and said pulley-elements, and mechanism for selectively and vertically adjusting the pulley-elements into three positions to respectively engage the lower zone of the roller, and disengaging the roller from the pulley-elements when the roller is shifted between said positions.

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