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TRANSVERSAL-PHONOGRAPHIC MACHINES

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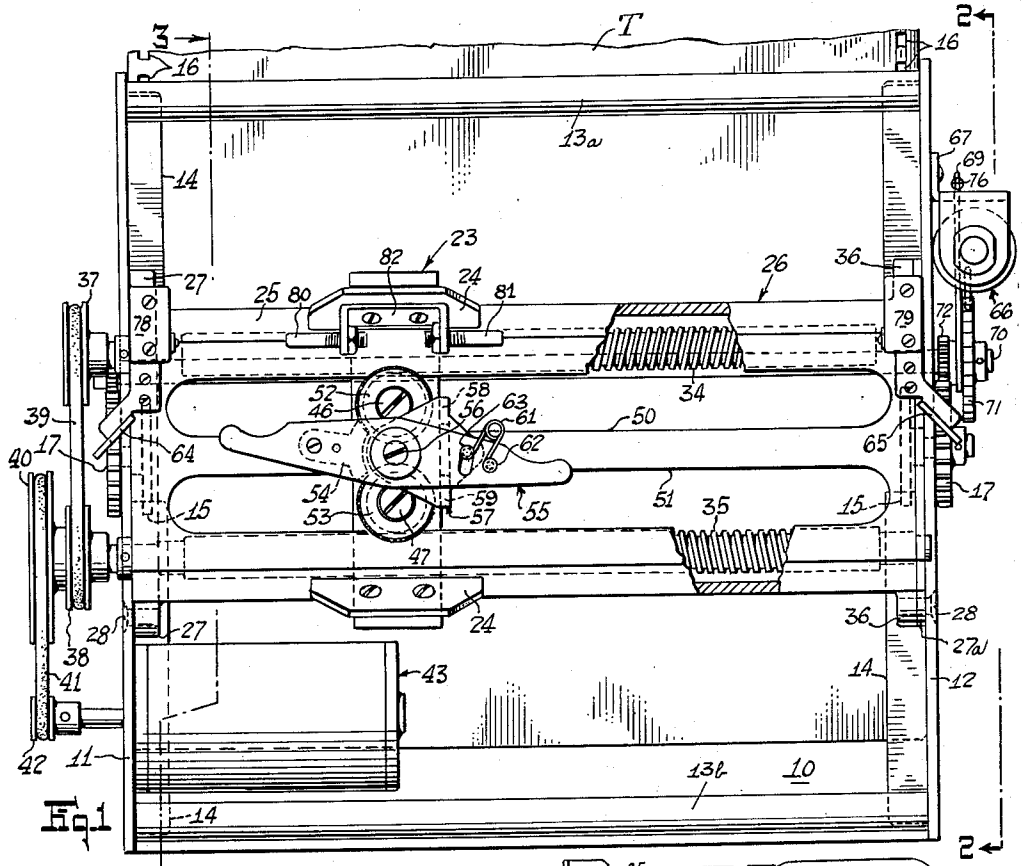


Fig. 1

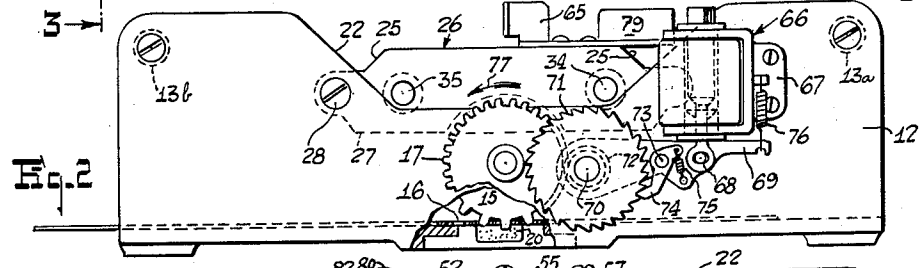


Fig. 2

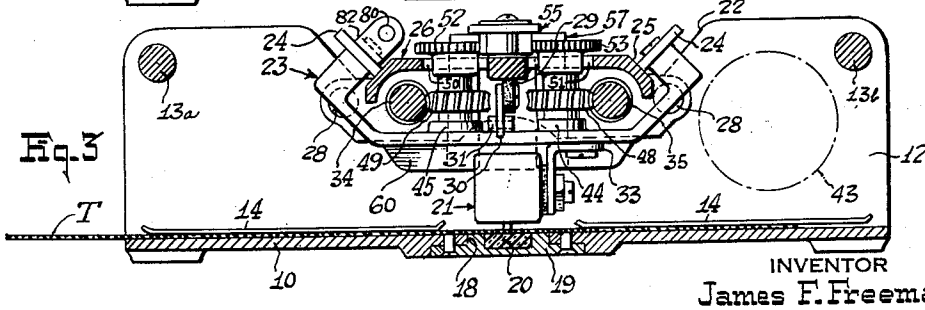


Fig. 3

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# TRANSVERSAL-PHONOGRAPHIC MACHINES

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9 Claims. (Cl. 274—11)

This invention relates to improvements in phonographic machines of the type which move the translating head in directions generally transverse to the direction of advance of the record medium.

Machines of the character described, which may be referred to as transversal type phonographic machines, are generally of a magnetic form which record on and/or reproduce from a magnetic record medium. Although I herein show and describe my invention in connection with such magnetic machine by way of preferred example, no unnecessary limitation thereto is intended.

In a transversal recording machine the problem is one of driving the head carriage at uniform speed and of effecting almost instantaneous reversal of the carriage when it reaches each end of the recordable area on the record. In prior reciprocating carriage drive mechanisms two parallel feed screws have been provided with the threads progressing in opposite directions and a pawl has been shifted from one screw to the other to reverse the drive of the carriage. With such prior arrangements it is firstly necessary that both feed screws be maintained in exact synchronism. Even when this is done, however, some slack is well nigh unavoidable at each reversal because it is not mechanically feasible to effect a precise engagement of the pawl with the rotating screws on first contact at each reversal. The result has been that a very noticeable gap is provided in the recording at each end of travel of the carriage. In accordance with my invention this problem is solved in a simple and economical manner by providing two worm wheels on the carriage in continuous engagement with the respective feed screws, and then alternately braking the worm wheels so that they will act alternately as feed pawls or nuts while allowing always the unbraked worm wheel to be rotated freely along its respective feed screw. This form of carriage drive permits each trip-over to be reduced to an extremely small time interval limited only by the mechanical difficulties of releasing one worm wheel and braking the other, without regard to whether the feed screws are in synchronism or not. This improved carriage drive enables therefore an almost continuous recordation and reproduction of voice or other signals notwithstanding the repeated reversals in the drive of the head carriage across the record.

Objects of my invention are to provide an improved reciprocating drive for a phonograph carriage of a transversal type phonographic machine, and especially to provide such improved drive which will have a uniform movement with almost instantaneous reversal when the carriage reaches each end in its path of travel. Furthermore, it is an object to provide such improved drive mechanism which does not require synchronism between the two feed screws nor precise timing adjustments at the trip-over points where the carriage is reversed. A still further object is to provide such improved carriage drive mechanism which is simple and economical to produce.

These and other objects and features of my invention



will be apparent from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawings, of which:

Figure 1 is a fractional top plan view of a phonographic machine incorporating my invention;

Figure 2 is a right hand end view of this machine; and

Figure 3 is a fractional sectional view through the machine taken substantially on the line 3—3 of Figure 1.

The transversal type phonographic machine shown in the accompanying figures may have a frame comprising, for example, a base **10** with upright side walls or standards **11** and **12**. These side walls may be interconnected at the front and back of the machine by respective rigidifying bars or rods **13A** and **13B**. The base may have a flat upper surface forming a channel with the side standards through which a magnetic web or wide tape T is fed, such tape comprising typically a non-magnetic base as of paper or plastic coated on its upper side with magnetic particles as of iron oxide. The magnetic tape is guided flat across the base **10** by guide bars **14** overlying the side borders of the tape, and is propelled by two sprocket wheels **15** which mesh with sprocket holes **16** in the border portions of the tape. These sprocket wheels have shafts journaled in the side standards midway the length of the frame (Figure 2), and secured to the outer ends of the shafts are gears **17** for driving the sprocket wheels to advance the tape as later described. The base has a narrow opening **18** extending crosswise thereof in line with the sprocket wheels into which the teeth of the wheels extend to engage the tape. However, this opening is filled throughout its length between the sprocket wheels by an insert **19** having a slot lengthwise thereof in its upper surface filled by a yieldable pad **20** as of soft rubber. This pad provides a yieldable backing for the magnetic tape where it is engaged by a magnetic recording and reproducing head **21**.

The side standards **11** and **12** have central cutaways **22** from the top to provide clearance space for passage therethrough of parts of the carriage drive mechanism for the head **21**. The head carriage, referred to as **23**, may be of the form of a yoke having upwardly inclined end portions provided with shoes **24** inset therefrom and inwardly inclined. These shoes rest slidably on oblique tracks **25** at opposite sides of a horizontal transversely-extending bed plate **26** which may be a casting having depending mounting flanges **27** at its ends secured by screws **28** to the side standards. As shown in Figure 3, the carriage is suspended slidably from the bed plate across the underside thereof. In order to maintain the shoes **24** firmly in engagement with the tracks **25**, a pressure roller **29** is journaled to one end of a rocker arm **30** the other end of which is pivoted to a forked lug **31** upstanding from the central part of the carriage. This arm is urged upwardly as by a suitable spring (not shown) to cause the pressure roller to bear against the under side of the bed plate and exert a downward pressure on the carriage. The head **21** is secured rigidly to the under side of the carriage by a bracket **33**.

The carriage is driven back and forth transversely of the record by two parallel feed screws **34** and **35** which are positioned below the tracks **25** between the bed plate and the carriage. These screws are journaled at their end portions in the end flanges **27** of the bed plate, but for assembling purposes the right end flange, referred to as **27A** in Figure 1, is removable, it being secured as by the screws **28** to ears **36** extending off from the sides of the bed plate. The left end portions of the feed screws extend beyond their bearings, and mounted thereon are respective pulleys **37** and **38** which are interconnected by a belt **39**. Concentric with the pulley **38** is a relatively large pulley **40** coupled by a belt **41** to the drive pulley **42** of a

motor 43 mounted on the inner side of the left standard 11. The feed screws are driven preferably in the same direction, as shown, but the screws have left-hand and right-hand threads respectively so that one will be effective to drive the carriage in a direction opposite to that of the other.

On the carriage between the feed screws are two upstanding bosses 44 and 45 carrying respective studs 46 and 47 on which are journaled respective worm wheels 48 and 49. These worm wheels are in continuous engagement with the respective feed screws 34 and 35. The worm wheels have hubs extending upwardly through respective clearance slots 50 and 51 in the bed plate and have concentric ratchet wheels 52 and 53 thereon overlying the bed plate. These ratchet wheels are engageable alternately by a pawl including a brake shoe 54 mounted fixedly on a trip-lever 55 itself pivoted at its center 56 to a bracket 57 above the bed plate. This bracket is of a U form having its crossarm bent over in parallel relation to the top surface of the bed plate and having two depending legs 58 and 59 which extend respectively through the clearance slots 50 and 51. These legs are riveted at their lower ends to a flange 60 on the carriage. The trip-lever 55 is relatively long and extended generally in the direction of carriage movement, to the right and left of the carriage. This lever is biased over center by a compression type torsion spring 61 interposed between studs 62 and 63 on the lever 55 and bracket 57 respectively of which the latter stud extends upwardly through a suitable clearance slot in the lever. By making the ratchet wheels 48 and 49 large relative to the respective worm wheels and providing each with relatively fine teeth an almost instant engagement is made between the pawl 54 and respective ratchet wheels when the trip-lever is shifted over center. As a result the carriage feed is shifted from one feed screw to the other in only the time required to throw the trip-lever 55 over center. Moreover, this reversing of the carriage is independent of whether or not the feed screws are in synchronism to permit the feed screws to be interconnected by a simple belt arrangement.

In the positioning of the drive mechanism shown in Figure 1, the rearward worm wheel 52 is braked to cause the carriage to be driven to the left by the feed screw 34. As the carriage nears the left end of its travel the leftward end of the trip-lever 55 is moved against an inclined cam wall 64 bracketed to the bed plate 26. By this engagement of the trip-lever with the cam wall the lever is shifted over center. Such over-center movement releases the brake on the rearward worm wheel and applies it to the front worm wheel 53 to cause the carriage next to be driven to the right by the feed screw 35. As the carriage nears the right end of its travel the rightward end of the trip-lever 55 is moved against another inclined cam wall 65 bracketed to the top of the bed plate 26. By the resulting camming action the lever 55 is again moved over center to cause the drive to be again reversed and the carriage to be next fed to the left by the feed screw 34. Thus, the carriage is reciprocated back and forth across the record by the respective feed screws 34 and 35.

A means for intermittently advancing the record by successive intervals in synchronism with the reversing of the carriage comprises a solenoid 66 bracketed at 67 to the outer side of the right standard 12. The armature of this solenoid has a pin-slot type of connection 68 to a rocker arm 69 pivoted on a stud 70 on the standard 12. Also, on this stud is a ratchet wheel 71 having a pinion gear 72 meshing with the gear 17 aforementioned. Pivoted at 73 on the rocker arm is a pawl 74 which is biased by a spring 75 into engagement with the ratchet wheel. The rocker arm is biased into a raised or unoperated position by a tension spring 76 connected between the outer end portion thereof and a lug on the bracket 67, and the solenoid 66 is of the pusher type for rocking the arm 69 downwardly against the action of this spring each time the solenoid is energized. Upon each energization of the solenoid the gear 17 is turned by an increment in the direction of the arrow 77 (Figure 2) to step the record T ahead, in the direction which is from front to back relative to the machine, by the distance desired between successive tracks. In the path of the carriage are left and right end switches 78 and 79 of the push button type operable by respective adjustable abutments 80 and 81 bracketed at 82 to the back shoe 24 of the carriage, to cause the solenoid to be actuated to step the record ahead each time the carriage reaches the end of its travel. The record is loaded from the front of the machine by inserting the record leading edge first through the side slots between the base 10 and guide bars 14 until the leading end portion of the record is brought into engagement with the sprocket wheels 15. Thereupon the record is stepped rearwardly in synchronism with the reversing of the carriage as the machine is operated. The record may be provided in roll form, not herein necessary to show, and may be of any desired length.

The particular embodiment of my invention herein shown and described is intended to be illustrative and not limitative of my invention since the same is subject to changes and modifications without departure from the scope of my invention which I endeavor to express according to the following claims.

I claim:

1. In a phonographic machine: the combination of means for supporting and advancing a record medium; a record cooperable translating head; a carriage for said head mounted for movement in a path transverse to the direction of advance of said medium; a pair of feed screw extending along said path of the carriage; respective circular feed worms engaging said feed screws and rotatably mounted on said carriage; means for rotating said feed screws to render the same effective respectively for driving said carriage in reverse directions; and shiftable means for alternately braking said feed worms against rotation.

2. In a phonographic machine having a head for recording on and/or reproducing from a movable record: The combination of a carriage for said head mounted for back and forth movement transversely with respect to the direction of movement of the record; a pair of spaced parallel feed screws extending along the path of movement of said carriage; means for rotating said feed screws so that the thread of one progresses in the opposite direction to that of the other; a pair of worm wheels respectively engaging said feed screws and mounted rotatably on said carriage; and shiftable means on said carriage for alternately braking said worm wheels to cause said carriage to be driven back and forth across the record.

3. The combination set forth in claim 2 including means operable by the driving power transmitted to the carriage for shifting said braking means to reverse the movement of the carriage.

4. The combination set forth in claim 2 including stationary cam members at opposite sides of the carriage in the path of said shiftable means and against which said shiftable means is impinged by the driven movement of the carriage for actuating the shiftable means to reverse the direction of movement of the carriage at regular intervals.

5. In a phonographic machine having means for supporting and moving a record, and a record-cooperable translating head; the combination of a carriage for said head mounted for back and forth movement across the record in directions transversely of the movement of the record; a pair of spaced parallel feed screws extending along the path of said carriage; means for rotating said feed screws with the thread of one progressing in the direction opposite to that of the other; a pair of worm

wheels between said feed screws and freely rotatably mounted on said carriage on axes transverse to the feed screws, one of said worm wheel continuously engaging one feed screw and the other worm wheel continuously engaging the other feed screw; and a braking pawl on said carriage shiftable back and forth for alternately locking said worm wheels whereby to intermittently reverse the movement of said carriage.

6. The combination set forth in claim 5 including a ratchet wheel on each worm wheel; means pivoting said braking pawl to said carriage for alternate engagement with said ratchet wheels whereby to alternately brake said worm wheels to cause said carriage to be driven back and forth in reversed directions; means biasing said braking pawl over center for retaining the same releasably into whichever position it is shifted; and means for shifting said braking pawl over center when said carriage reaches predetermined positions in its path of travel.

7. The combination set forth in claim 6 wherein each of said ratchet wheels have a substantially larger diameter than the respective worm wheel and is provided with relatively fine teeth to effect a substantially instantaneous reversal of movement of the carriage when the braking pawl is thrown over center.

8. The combination set forth in claim 6 including a lever pivoted midway of its length on said carriage at a point midway between said worm wheels and extending generally in the directions of movement of the carriage;



means mounting said braking pawl on said lever for alternate engagement with said ratchet wheels as the lever is rocked back and forth; and means for shifting said lever to reverse the carriage at predetermined end points of travel.

9. A carriage drive for a phonograph comprising a feed screw parallel to the path of the carriage; a worm wheel freely rotatably mounted on said carriage and in continuous engagement with said feed screw; a ratchet wheel secured to said worm wheel in concentric relation therewith, said ratchet wheel having a substantially larger diameter and peripheral teeth of substantially smaller pitch than are the diameter and the pitch of the threads of said worm wheel; and a pawl shiftable into and out of engagement with said ratchet wheel for selectively locking said worm wheel against rotation whereby to cause the carriage to be driven by the feed screw when the pawl is engaged.

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