

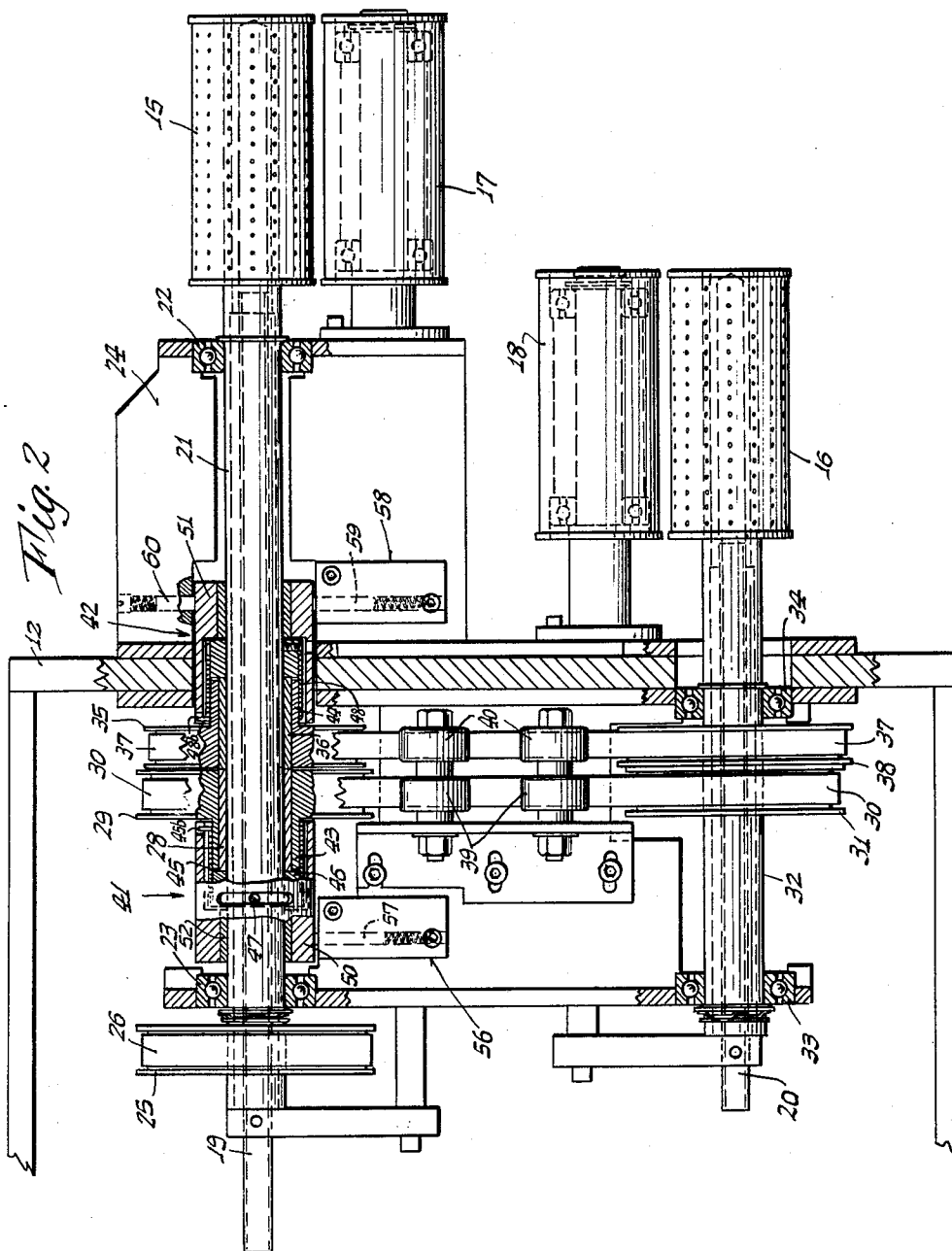
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J. P. FAY
APPARATUS FOR RECORDING AND/OR REPRODUCING
HIGH FREQUENCY SIGNALS

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2 Sheets-Sheet 2



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APPARATUS FOR RECORDING AND/OR REPRODUCING HIGH FREQUENCY SIGNALS

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This invention relates to a device for recording and/or reproducing signals, particularly high frequency electrical signals, on a recording tape. More specifically, it pertains to an improved driving means for feeding the recording tape to and from the drum that carries the recording head.

The present invention constitutes another form of drive for the tape feeding means that is disclosed in my co-pending application for Apparatus for Recording High Frequency Signals, Serial No. 699,958, filed December 2, 1957, now Patent No. 2,968,702 to which reference may be hereinafter made in the explanation of the invention.

In my prior application a recording tape was fed to a driven drum, having at least one record-reproduce head therein, by a feed roller and cooperating cinch roller at a speed substantially less than the peripheral speed of the drum, and was disposed therearound in a helix and at a wrap-tension of predetermined value. According to that invention the feed roller and cinch roller were driven at predetermined different constant relative speeds so that the desired wrap-tension was maintained, with the cinch roller having a speed slightly greater than the feed roller and being adapted to permit the tape to slip relative thereto, as required, to maintain the wrap-tension. My prior invention also contemplated the reversal of direction of tape feed for reproducing the signals thereon or the like and, accordingly, the direction of drive of the feed roller and cinch roller were reversible with the feed roller, in effect, becoming a cinch roller and vice versa and the relative speed differential therebetween being reversed so that the feed roller fed the tape at a slightly greater speed than the cinch roller.

It is an object of the present invention to provide a simple positive reversible drive for the feed and cinch rollers which will maintain a predetermined speed differential therebetween and will automatically reverse the speed differential when the direction of feed is reversed.

It is also an object of the invention to provide a drive means for a feed roller and cinch roller which is reversible and is actuated in either direction by merely changing the direction of operation of the source of power to which it is connected.

Another object of the invention is to provide a drive means for a feed roller and cinch roller, which are operated at a predetermined relative speed differential, wherein the direction of operation and relative speed differential of the rollers is reversed without interrupting the input of power thereto or utilizing manually operated clutches or the like.

A further object of the invention is to provide a drive means for a feed roller and cinch roller, wherein one roller is adapted to be driven at a slightly greater speed than the other, which is reversible, not only as to direction but to relative speed, by merely changing the direction of power input to the drive means.

A still further object of the invention is to provide a drive means for a feed roller and cinch roller, having means for driving the cinch roller at a greater speed than the feed roller in a forward direction of operation and means for driving the cinch roller at a lesser speed than the feed roller in the reverse direction of operation, in which the forward and reverse drive means are selectively

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coupled to the source of power driving the feed roller to be driven thereby by resilient means actuated in response to the direction of operation of the feed roller.

Other objects and advantages will be apparent from the specification and claims when considered in connection with the attached sheets of drawings, illustrating one form of the invention, wherein like characters represent like parts, and in which:

FIGURE 1 is a fragmentary elevational view of an apparatus for recording and reproducing high frequency signals embodying the invention;

FIG. 2 is a top view, partially in section, of the apparatus taken in the direction of the arrows 2—2 in FIG. 1; and

FIG. 3 is an enlarged detail view, partially in section, of the drive means of the apparatus of FIG. 1.

Referring now to the drawings for a detailed description of the invention, an apparatus 10 for recording high frequency signals is shown embodying the concepts of the invention. The apparatus comprises a frame 11 having a front panel 12 on which is mounted a cylinder or drum 13 having one or a plurality of record-reproduce heads therein (not shown). The drum, which is rotatably mounted and driven in one direction at a predetermined speed by any means known to the art, projects obliquely from the front panel of the frame and is adapted to have a flat recording tape 14 passed therearound in a helix, the tape being passed between a pair of rollers 15 and 16 which project perpendicularly from the panel. The rollers, which are rotatable, are adapted to feed the tape to and from the drum and the record-reproduce head therein.

As shown in FIG. 1 of the drawings, the roller 15, which has a guide roller 17 cooperating therewith, is a feed roller positioned on one side of the drum 13 to positively move the tape to the drum in the direction of the arrows. Roller 16, positioned on the other side of the drum and having a cooperating guide roller 18, engages the tape to feed it away from the drum and functions as a cinch roller. The guide rollers are rotatably mounted on panel 12 in any manner known to the art. The cinch roller and feed roller are rotated in such a direction and at such a relative speed differential that a predetermined wrap-tension is produced around the drum, whereby the tape is maintained in a predetermined recording relation with the head carried by the drum. The feed roller and cinch roller are also located, with respect to the drum and each other, in such a manner that the tape is disposed in a helical wrap around the drum so that the tape overlies the path of movement of the recording head as it is rotated with the drum.

As was more fully described in my prior application, with the tape fed about the drum at a wrap-tension of predetermined value and the drum rotating at high speed with respect to the tape an air bearing or film will be formed and disposed between the drum and the tape so as to permit the tape to float over the drum as it is fed longitudinally therearound by the rollers.

While various types of positive feed means may be provided for the tape, it is preferred to utilize the type of feed disclosed in my prior application wherein the feed roller and cinch roller are perforated throughout and are connected through suction manifolds 19 and 20, respectively and appropriate conduit means to a source of vacuum (not shown). As described in my prior application the vacuum system for the cinch roller is provided with pressure reducing means so that the suction applied to the tape at the cinch roller is less than that applied at the feed roller so that the cinch roller slip feeds the tape away from the rotating drum.

As shown in FIG. 1 the drum is rotated at high speeds

and in such a direction that the traction of the drum on the tape tends to move the tape away from the cinch roller and the slip feed operation of the cinch roller facilitates the maintenance of a predetermined wrap-tension of the tape around the drum. While it will be understood the cinch roller can be driven by any number of known slip drives, it is preferred to drive the roller at a constant speed and permit the slippage to occur between the tape and the roller thus preventing inertia of the drive means from affecting the movement of the tape. The relatively light suction at the surface of cinch roller 16 facilitates the tape slipping over the surface thereof when an excess of driving torque is applied to the tape by the roller. It will be understood that by varying the suction on the cinch roller the driving torque value can be varied to provide a predetermined slip between the tape and the roller whereby a wrap-tension of predetermined value is maintained around the drum.

While the feed roller 15 and cinch roller 16 may be driven independently, such as by separately controlled motors, or as described in my prior application by a synchronous motor and suitable reduction gearing, in the present invention the motors are driven from a single, preferably reversible, motor, with the cinch roller being operated by separate one-way drive means in either direction of operation.

According to the invention, the feed roller 15 is carried by a quill shaft 21 which is rotatably carried in bearings 22 and 23 in the frame 11, the frame being provided with a projecting front portion 24 to accommodate and support the extra length of quill shaft 21. The quill shaft is provided, at the end thereof directed away from roller 15, with a pulley 25 which in turn is connected through a belt 26 to a pulley 27 carried by the output shaft of a motor (not shown) for driving the quill shaft and feed roller in either direction of operation. The quill shaft carries a cylindrical type bearing member 28 which is rotatable relative to the shaft. The bearing 28, in turn, rotatably carries a pulley 29 connected through a belt 30 to a pulley 31, the latter pulley being connected to a quill shaft 32 which carries the cinch roller 16. The quill shaft 32 is rotatably mounted in the frame 11 in bearings 33 and 34 and is driven in one direction of operation by pulley 29, belt 30 and pulley 31. A second pulley 35, carried by a cylindrical bearing 36 on feed roller quill shaft 21, is connected through a belt 37 to a pulley 38, also connected to quill shaft 32 for driving the quill shaft and cinch roller 16 in a reverse direction. It will be seen according to the present invention, that each of the one-way cinch roller drives, namely 29—30—31 and 35—37—38 are adapted to impart a predetermined different speed to the cinch roller relative to the feed roller. As shown, the forward drive 29—30—31 imparts greater peripheral speed to cinch roller 16 than is imparted to feed roller 15 and conversely when the reverse one-way drive 35—37—38 is operated the peripheral speed imparted to the cinch roller is less than that of the feed roller. This feature of the invention is important since the wrap-tension of the tape passing over the drum is maintained by the different relative speeds of operation of the rollers. According to conventional practice, the one-way drives for the cinch roller 16 are adjustably tensioned by means of rollers 39 and 40 engaging the belts 30 and 37.

As will be most clearly seen in FIGS. 2 and 3, the one-way drives for cinch roller 16 are each separately and independently operated by the feed roller quill shaft 21, which, as aforementioned, is directly driven from the motor. While various forms of clutches or manually operated means may be resorted to for selectively operably connecting the one-way drives to the quill shaft 21, in the illustrated form of the invention this is accomplished by automatic means 41 and 42 which are actuated in response to the direction of operation of the quill shaft. That is, when the quill shaft 21 is operating to drive the

feed roller 15 in the forward direction the means 41 for coupling the one-way drive 29—30—31 to the quill shaft is automatically actuated to drive the cinch roller in the forward direction and the drive 35—37—38 is actuated to release position and, similarly, when the direction of operation of the quill shaft 21 is reversed the reverse one-way drive 35—37—38 is automatically actuated by means 42 to drive the cinch roller in the reverse direction and the drive 29—30—31 is actuated to release position.

As shown in the drawings, the main forward and reverse drive pulleys 29 and 35 for cinch roller 16 are each formed with an integral axially extending flange 43 and 44, respectively, which form collars adapted to rotatably embrace the respective cylindrical bearings 28 and 36. The collars 43 and 44, which are formed on the outer sides of their respective pulleys are each enclosed by a loosely wound resilient helical member. As will be best seen in FIG. 3, the helical member 45 embracing collar 43 of pulley 29 has an end 45a thereof anchored to quill shaft 21 by means of a collar or ring 46 secured to the quill shaft by a set screw 47 or the like. Similarly, the resilient member 48 embracing collar 44 of pulley 35 has its end 48a secured against movement with respect to the quill shaft by a ring or collar 49 connected thereto in the same manner as was ring 46. Positioned adjacent each of the resilient members 45 and 48, and rotatably carried by quill shaft 21 are sleeve members 50 and 51, respectively. The sleeve members 50 and 51, which may be carried by cylindrical bearings 52 and 53 or the like, are formed with integral skirt portions 54 and 55, respectively, the skirt portions being adapted to extend over their respective resilient members. Each of the skirt members 54 and 55 are formed with openings 54a and 55a, respectively, adjacent the ends thereof for receiving end portions 45b and 48b of their respective resilient members. Brake means are provided for cooperating with the rotatable sleeves 50 and 51 for retarding their movement to initially prevent their rotation with quill shaft 21, for a purpose to be hereinafter explained. As best seen in FIG. 2, a brake 56 having a spring pressed friction rod 57 cooperates with the sleeve 50 and a brake 58 having a friction rod 59 cooperates with the sleeve 51. Additionally, rotation of the sleeve 51 is retarded by a second brake 60 in the form of a spring pressed rod disposed in the frame of the apparatus.

In the operation of the apparatus 10 for recording high frequency signals, as heretofore described and embodying the concepts of the present invention, the feed roller 15 is driven in the forward direction by the motor (not shown) through the belt 26 and pulley 25 and quill shaft 21. As the feed roller and quill shaft are driven in the forward direction, as shown by the arrows in FIG. 3, the brake 56 retards sleeve 50 and prevents its rotation with the quill shaft just long enough for the resilient member 45 to be wound tightly around the collar 43 of pulley 29, thereby locking the pulley to the quill shaft so that it is rotated thereby and forward one-way drive 29—30—31 is operated to drive quill shaft 32 and cinch roller 16. It should here be noted that the rotation of feed roller quill shaft 21 in the forward direction causes sleeve 51 to cooperate with resilient member 48 in such a manner that a loose helical wind is maintained and the pulley 35 is not locked to the quill shaft to be rotated thereby. It will be seen, as heretofore described, that the operation of the cinch roller and the actuation of the forward cinch roller drive is automatic and results from the operation of the feed roller and feed roller quill shaft in the forward direction.

When it is desired to drive the tape in the reverse direction for playing back a recorded signal or the like, it is merely necessary to reverse the direction of drive of the feed roller, which may be achieved by merely reversing the direction of operation of the motor. Re-

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versal of the direction of operation of the feed roller 15 and quill shaft 21 results in sleeve 51 cooperating with resilient member 48 to tighten the resilient member around collar 44 to lock pulley 35 to the quill shaft and thereby operate one-way reverse drive 35—37—38 to drive quill shaft 32 and cinch roller 16 in the reverse direction. As the reverse one-way drive for the cinch roller is being actuated by the cooperation of sleeve 51 and resilient member 48 the pulley 29 is being disengaged from the quill shaft 21 by the sleeve 50 being retarded by the brake 56 and cooperating with the resilient member 45 to unwind the member from its grip on collar 43.

Thus, it will be seen that a feed and cinch roller drive means has been provided wherein the reversal of tape feed, with a consequent reversal in the relative speed differential between the feed roller and the cinch roller, is achieved by merely reversing the direction of operation of the motor driving the feed roller and without having to resort to manually operated clutches or the like.

Thus, among others, the several objects and advantages of the invention as aforementioned are achieved. Obviously numerous changes in the structure may be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed relative to the peripheral speed of the drum with the tape overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, means driving said feed roller and cinch roller at predetermined different speeds relative to each other for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means automatically reversing the direction of drive of said feed roller and cinch roller and the relative speed differential therebetween, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

2. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for slip feeding the latter away from said drum, means driving said feed roller and cinch roller at predetermined different speeds relative to each other for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained, said cinch roller being driven at a greater speed than said feed roller and means for reversing the direction of tape feed, said reversing means automatically reversing the direction of drive of said feed

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roller and cinch roller and the relative speed differential therebetween, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

3. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum, means cooperating with said cinch roller for slip feeding the tape away from said drum, means driving said feed roller and cinch roller at predetermined different speeds relative to each other for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained, said cinch roller being driven at a greater speed than said feed roller and means for reversing the direction of tape feed, said reversing means automatically reversing the direction of drive of said feed roller and cinch roller and the relative speed differential therebetween, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

4. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for slip feeding the latter away from said drum, means driving said feed roller, means cooperating with said feed roller drive for driving said cinch roller at a greater predetermined speed relative thereto, said feed roller and cinch roller cooperating for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means reversing the direction of drive of said feed roller and cinch roller and automatically reversing the relative speed differential therebetween, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

5. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for slip feeding the latter away from said drum, means driving said feed roller, means operably connected to said

feed roller drive for driving said cinch roller at a greater predetermined speed relative thereto, resilient means actuating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including resilient means for automatically reversing the direction of drive of said cinch roller when the direction of drive of said feed roller is reversed and automatically reversing the relative speed differential between said rollers, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

6. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for slip feeding the latter away from said drum, reversible means for driving said feed roller, means operably connected to said feed roller drive for driving said cinch roller at a greater predetermined speed relative said feed roller in one direction of operation thereof, resilient means for actuating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including means operably connected to said feed roller drive for driving said cinch roller in a reverse direction at a lesser predetermined speed than said feed roller in the reverse direction of operation thereof, and resilient means for actuating said reverse cinch roller drive when the direction of operation of said feed roller drive is reversed, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

7. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, a reversible source of power, means connecting said feed roller to said source of power for driving the latter directly therefrom, means for driving said cinch roller at a greater predetermined speed than said feed roller, resilient means for connecting said cinch roller drive means to said feed roller connecting means for actuating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including means for driving said cinch roller in a reverse direction at a lesser predetermined speed than said feed roller, and resilient means for auto-

matically connecting said reverse cinch roller drive means to said feed roller connecting means when the direction of operation of said feed roller is reversed for actuating said reverse cinch roller drive means, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

8. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, a reversible source of power, a drive shaft connecting said feed roller to said source of power for driving the feed roller directly therefrom, means for driving said cinch roller at a greater predetermined speed than said feed roller, resilient means for clamping said cinch roller drive means to said shaft in one direction of operation of the latter for operating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including means for driving said cinch roller in a reverse direction at a lesser speed than said feed roller, and resilient means for clamping said reverse cinch roller drive means to said shaft in the reverse direction of operation of the latter for operating said reverse drive means, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

9. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, means for driving said feed roller in one direction, means for driving said cinch roller at a different predetermined speed relative to said feed roller in the same direction, means for driving said feed roller in the opposite direction, means for driving said cinch roller in the opposite direction, said relative speed differential between said rollers being reversed, said feed roller and cinch roller cooperating in both directions of operation to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained, and resilient means for automatically selectively actuating one or the other of said cinch roller drive means depending upon the direction of operation of said feed roller.

10. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a

helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, means for driving said feed roller in one direction, means for driving said cinch roller at a greater predetermined speed relative to said feed roller in the same direction, means for driving said feed roller in the opposite direction, means for driving said cinch roller at a lesser predetermined speed relative to said feed roller in said opposite direction, said feed roller and cinch roller cooperating in both directions of operation to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained, and resilient means for automatically selectively actuating one or the other of said cinch roller drive means depending upon the direction of operation of said feed roller.

11. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position at one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for slip feeding the latter away from said drum, reversible means for driving said feed roller, means operably connected to said feed roller drive for driving said cinch roller at a greater predetermined speed relative to said feed roller in one direction of operation thereof, resilient means for actuating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including a brake means cooperating with said resilient means for stopping the operation of said cinch roller drive means, means operably connected to said feed roller drive for driving said cinch roller in a reverse direction at a lesser predetermined speed than said feed roller in the reverse direction of operation thereof, and resilient means for actuating said reverse cinch roller drive when the direction of operation of said feed roller drive is reversed, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

12. The invention as defined in claim 6, and brake means cooperating with said second resilient means for stopping the operation of said reverse cinch roller drive when said cinch roller drive means is actuated for feeding the tape in said first direction.

13. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, a reversible

source of power, a drive shaft connecting said feed roller to said source of power for driving the feed roller directly therefrom, means for driving said cinch roller at a greater predetermined speed than said feed roller, resilient means for clamping said cinch roller drive means to said shaft in one direction of operation of the latter for operating said cinch roller drive means so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including brake means cooperating with said resilient means for unclamping said cinch roller drive means from said shaft and preventing the operation of said cinch roller drive means during the operation of said shaft in the reverse direction, means for driving said cinch roller in a reverse direction at a lesser speed than said feed roller, resilient means for clamping said reverse cinch roller drive means to said shaft in the reverse direction of operation of the latter for operating said reverse drive means, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the reverse direction, and brake means cooperating with said second resilient means for unclamping said reverse cinch roller drive means from said shaft when the direction of operation of the latter is again changed to feed the tape in the first direction.

14. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position on one side of said drum to feed the tape thereto, a cinch roller in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, means for driving said feed roller in one direction, means for driving said cinch roller at a greater predetermined speed relative to said feed roller in the same direction, means for driving said feed roller in the opposite direction, means for driving said cinch roller at a lesser predetermined speed relative to said feed roller in said opposite direction, said feed roller and cinch roller cooperating in both directions of operation to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained, resilient means for automatically selectively actuating one or the other of said cinch roller drive means depending upon the direction of operation of said feed roller and brake means for automatically selectively preventing the operation of the one of said cinch roller drive means that is not being actuated by said resilient means.

15. An apparatus for recording and/or reproducing signals on a record tape comprising in combination a drum having at least one record-reproducing head disposed in the surface thereof, means for rotating the drum at a predetermined speed and means for feeding a tape longitudinally to, around and away from said drum at a predetermined speed substantially less than the peripheral speed of the drum with the tape disposed in a helix overlying the path of movement of the head and a predetermined wrap-tension between the drum and tape, said means comprising a feed roller engaging the tape and located in fixed position at one side of said drum to feed the tape thereto, a cinch roller having a drive shaft in fixed position on the other side of said drum and cooperating with said tape for feeding the latter away from said drum, a reversible source of power,

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a drive shaft connecting said fixed roller to said source of power for driving the feed roller directly therefrom, a one-way pulley drive connected to said cinch roller drive shaft for driving said cinch roller at a greater predetermined speed than said feed roller, resilient means for automatically operably connecting said one-way pulley drive to said feed roller drive shaft in one direction of operation of said latter drive shaft for operating said one-way pulley drive so that said rollers cooperate for feeding the tape at a speed and direction to maintain the wrap-tension at said predetermined value whereby a good head-tape relation is maintained and means for reversing the direction of tape feed, said reversing means including a second one-way pulley drive connected to said cinch roller drive shaft for driving said cinch roller in a reverse

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direction at a lesser speed than said feed roller, and resilient means for automatically operably connecting said reverse one-way pulley drive to said feed roller drive shaft in the reverse direction of operation of said latter shaft for operating said reverse pulley drive, whereby said predetermined wrap-tension is maintained between said head and said tape as the latter is fed in the opposite direction.

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