

PINCH ROLLER DRIVING DEVICE FOR A TAPE FEEDING DEVICE

BACKGROUND OF THE INVENTION

1) Field of the Invention

This invention relates to a pinch roller driving device for a tape feeding device which is incorporated in a magnetic recording and reproducing device or like apparatus such as a VTR (video tape recorder).

2) Description of the Prior Art

Conventionally, a pinch roller driving device for a tape feeding device is known wherein a pinch roller driving mechanism is pivoted to move and press a pinch roller thereon to and against a capstan.

In such a conventional device, the motion of the pinch roller is a single step motion. Accordingly, a time required for the pinch roller to be moved into or out of contact with the capstan is long, and it is difficult to press the pinch roller strongly against the capstan.

Besides, since the motion of the pinch roller when an operation, for example, to put the tape feeding device into a pause mode is effected is also a single step motion as described above, a mechanism for causing an operation to put the tape feeding device into the

pause mode is complicated.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a pinch roller driving device for a tape feeding device which allows reduction of a time required to move a pinch roller into or out of contact with a capstan and wherein the pinch roller can be pressed strongly against the capstan and a mechanism for causing an operation, for example, to put the tape feeding device into a pause mode can be simplified.

In order to attain the object, according to the present invention, a pinch roller driving device for a tape feeding device for pivoting a pinch roller supporting mechanism to move and press a pinch roller on the pinch roller supporting mechanism to and against a capstan comprises a link member connected to the pinch roller supporting mechanism and having a first point of application spaced by a predetermined distance away from a connecting point at which the link member is connected to the pinch roller supporting mechanism and a second point of application located intermediately between the first point of application and the connecting point, a first transmitting mechanism for displacing the second point of application relative to the first point of

application of the link member, a second transmitting mechanism for displacing the first point of application relative to the second point of application of the link member, and a selectively rotatable cam plate having thereon cam means for operating, when the cam plate is rotated from a first to a second position in one direction, the first transmitting mechanism to pivot the pinch roller supporting mechanism to rapidly move the pinch roller from a home position in which the pinch roller is spaced farthest away from the capstan toward the capstan to an intermediate position in which the pinch roller is spaced a little distance away from the capstan and for operating, when the cam plate is rotated from the second to a third position in the one direction, the second transmitting mechanism to pivot the pinch roller supporting mechanism to move the pinch roller from the intermediate position to an operative position in which the pinch roller is pressed strongly against the capstan.

As the first transmitting mechanism is operated by the cam plate, the pinch roller supporting mechanism is pivoted for a first step to rapidly move the pinch roller thereon from the home position toward the capstan to the intermediate position near the capstan, and then as the second transmitting mechanism is operated by the

cam plate, the pinch roller supporting mechanism is pivoted for a second step to move and press the pinch roller to and strongly against the capstan so as to feed a tape held between the pinch roller and the capstan.

Accordingly, the time required to move the pinch roller into or out of contact with the capstan can be reduced, and the pinch roller can be pressed strongly against the capstan. Besides, when an operation, for example, for a pause mode is to be effected, only it is required to return the capstan to the intermediate position which is a second step motion starting position and also a first step motion ending position.

Accordingly, a mechanism for causing the operation for a pause mode can be simplified.

A specific embodiment of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a magnetic recording and reproducing device in which a pinch roller driving mechanism for a tape feeding device of the present invention is incorporated;

FIG. 2 is a bottom plan view of the device of FIG. 1;

FIG. 3 is an enlarged bottom plan view of a cam plate of the device of FIG. 1;

FIG. 4 is an enlarged top plan view of the cam plate of FIG. 3; and

FIG. 5 is a schematic illustration showing operation of the pinch roller driving mechanism of the device of FIG. 1.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring first to FIGS. 1 and 2, a magnetic recording and reproducing device is shown in which a pinch roller driving mechanism for a tape feeding device of the present invention is incorporated. The magnetic recording and reproducing device is generally denoted at 1 and includes a cam motor 3, a capstan motor 4 and a guide cylinder motor 5 all mounted on a chassis 2 thereof.

The cam motor 3 is designed so as to rotate forwardly when the magnetic recording and reproducing device 1 is either in a reproducing mode or in a recording mode but rotate reversely when the magnetic recording and reproducing device 1 is in a fast feeding mode or in a rewinding mode. The turning force of the cam motor 3 is transmitted to a cam plate 7 by way of a first motion transmitting mechanism 6.

The motion transmitting mechanism 6 is located on a lower (reverse) face of the chassis 2 as shown in FIG. 2 and includes a first pulley 8 of a smaller diameter securely mounted on a rotary shaft 3a of the cam motor 3, a second pulley 9 of a larger diameter mounted for rotation on the lower face of the chassis 2, an endless belt 10 made of a rubber material or the like and extending between and around the first and second pulleys 8, 9, a first gear 11 of a smaller diameter formed in an integral concentrical relationship at the center of an upper face of the second pulley 9, a second gear 12 of a larger diameter mounted for rotation on the lower face of the chassis 2 and held in meshing engagement with the first gear 11, and a third gear 13 of a smaller diameter formed in an integral concentrical relationship at the center of an upper face of the second gear 12.

The cam plate 7 is mounted for back and forth rotation on the lower face of the chassis 2. The cam plate 7 has an integral gear portion 14 having gear teeth formed on an outer peripheral edge thereof and has on a lower (reverse) face thereof a first cam 15 in the form of a cam groove as particularly shown in FIG. 3 and on an upper (front) face thereof a second cam 16 in the form of a peripheral cam as particularly shown in

FIG. 4. The gear portion 14 of the cam plate 7 is held in meshing engagement with the third gear 13 of the first motion transmitting mechanism 6.

The turning force of the cam motor 3 is transmitted via the first motion transmitting mechanism 6 and the cam plate 7 as a driving force to a pinch roller driving mechanism 18 particularly shown in FIG. 5.

Referring to FIGS. 1 and 5, the pinch roller driving mechanism 18 includes a pinch roller supporting mechanism 20 having a pinch roller 19 thereon, a link member 21, a first transmitting mechanism 23 for rapidly moving the pinch roller 19 toward a capstan 22, and a second transmitting mechanism 24 for pressing the pinch roller 19 strongly against the capstan 22. The pinch roller supporting mechanism 20 includes a pivotal member 25 supported for back and forth pivotal motion within a predetermined angular range on the upper face of the chassis 2, and a torsion coil spring (spring member) 26 incorporated in the pivotal member 25. The pinch roller 19 is supported for rotation at the other end of the pivotal member 25. The torsion coil spring 26 is anchored at an end 26a thereof in an anchoring hole 25b formed in the pivotal member 25, fitted at a central coiled portion thereof around a pivot shaft 25a of the

pivotal member 25, and received at the other end thereof in a recess 21a defined by a laterally bent bifurcated end portion of the link member 21. The link member 21 is connected substantially at a central portion thereof for pivotal motion within a predetermined angular range to an end of a first slide member 27 of the first transmitting mechanism 23 and is connected at the other end thereof for pivotal motion to an end of a connecting arm 28 of the second transmitting mechanism 24. A connecting point at which the link member 21 is connected to the connecting arm 28 serves as a first point O_1 of application while another connecting point at which the link member 21 is connected to the first slide member 27 serves as a second point O_2 of application. The first transmitting mechanism 23 is associated with the first cam 15 of the cam plate 7 by way of a gear mechanism 32 and a link mechanism 38 of a tape loading mechanism 31 (FIG. 2) which will be hereinafter described. Referring also to FIG. 2, the first transmitting mechanism 23 includes, in addition to the first slide member 27 which is mounted for longitudinal sliding movement within a predetermined range on the upper face of the chassis 2, a pivotal member 29 supported for pivotal motion within a predetermined angular range on the lower face of the

chassis 2, and a second slide member 30 mounted for longitudinal sliding movement within a predetermined range on the lower face of the chassis 2. An engaging projection or laterally bent lug 27a is formed at the other end of the first slide member 27 and extends through a hole 2a of the chassis 2 and downwardly below the chassis 2 so that it may be engaged by the pivotal member 29. The pivotal member 29 has an engaging projection or laterally bent lug 29a formed thereon. The engaging projection 29a of the pivotal member 29 is received in a recess 30a formed at a portion of the second slide member 30 adjacent the other end of the second slide member 30. The second slide member 30 has an engaging projection or laterally bent lug 30b formed at a portion adjacent the other end of the second slide member 30. The engaging projection 30b of the second slide member 30 is received in an engaging hole 33a formed in a sector gear 33 of the gear mechanism 32 of the tape loading mechanism 31. When the sector gear 33 is in its unloading position as shown in FIG. 2, the engaging projection 30b of the second slide member 30 engages with an end face of the engaging hole 33a of the sector gear 33. Thus, as the sector gear 33 is pivoted by a predetermined angle toward the loading side, the engaging projection 30b of the second slide member 30

will soon be engaged by the other end face of the engaging hole 33a of the sector gear 33 and then pushed by the latter to slidably move in the rightward direction in FIG. 2 until an intended tape loading operation of the tape loading mechanism 31 is completed. Thus, the engaging projection 30b of the second slide member 30 and the engaging hole 33a of the sector gear 33 establishes a lost motion connection between the second slide member 30 and the sector gear 33. As the second slide member 30 is slidably moved in this manner, the pivotal member 29 is pivoted in the counterclockwise direction in FIG. 2, that is, in the clockwise direction in FIG. 5 so that the first slide member 27 is pushed and slidably moved in the rightward direction in FIGS. 1 and 5 by the pivotal member 29 as shown in two-dot chain lines in FIG. 5. As the first slide member 27 is slidably moved, the link member 21 is pivoted in the clockwise direction in FIGS. 1 and 5 displacing the second point O₂ of application rightwardly in the same figures while the first point O₁ of application remains at its position so that the pinch roller supporting mechanism 20 is pivoted rapidly in the counterclockwise direction in the same figures to move the pinch roller 19 rapidly toward the capstan 22 from a home position in which the pinch roller 19 is spaced farthest away from

the capstan 22 as shown by a two-dot chain line in FIG. 5 to an intermediate position at which a slight gap is left between the pinch roller 19 and the capstan 22 as shown by a long and short dash line in FIG. 5.

The second transmitting mechanism 24 includes, in addition to the connecting arm 28, a first pivotal arm 34 and a second pivotal arm 35. The connecting arm 28 is connected at one end thereof for pivotal motion to the other end of the link member 21 and at the other end thereof for pivotal motion to one end of the first pivotal arm 34. The first pivotal arm 34 is supported at a substantially central portion thereof for pivotal motion on the upper face of the chassis 2. An engaging projection 35a is formed at an end portion of the second pivotal arm 35 and extends through a hole 2b formed in the chassis 2 and upwardly above the upper face of the chassis 2 until it is received in a recess 34a formed at the other end of the first pivotal arm 34. The second pivotal arm 35 has a substantially L-shape in plan and is supported substantially at a central portion thereof for pivotal motion within a predetermined range on the lower face of the chassis 2. An engaging pin 35b is formed at the other end of the second pivotal arm 35 and normally engages with the second cam 16 of the cam plate 7. Thus, as the cam plate 7 is rotated by a

predetermined angle in the clockwise direction in FIG. 2, the link member 21 is pivoted in the clockwise direction in FIG. 5 via the second pivotal arm 35, first pivotal arm 34 and connecting arm 28 displacing the first point O_1 of application leftwardly in FIG. 5 while the second point O_2 of application remains at its position. Consequently, the pinch roller supporting mechanism 20 is pivoted in the counterclockwise direction in FIGS. 1 and 5 to move the pinch roller 19 thereon from the intermediate position as shown in long and short dash lines in FIG. 5 to an operative position in which the pinch roller 19 is contacted with and strongly pressed against the capstan 22 as shown in solid lines in FIG. 5. In the operative position of the pinch roller 19, it is resiliently pressed against the capstan by the biasing force of the torsion coil spring 26 of the pinch roller supporting mechanism 20. The link member 21 is normally biased in the counterclockwise direction in FIG. 1 by a coil spring 36 so as to move the pinch roller 19 out of contact with the capstan 22 and hold the engaging pin 35b of the second pivotal arm 35 of the second transmitting mechanism 24 in contact with the second cam 16 of the cam plate 7.

The tape loading mechanism 31 is designed so as

to draw out a magnetic tape not shown from within a tape cassette not shown which has been set to a loaded position by a cassette loading mechanism not shown of the tape magnetic recording and reproducing device 1 and cause the magnetic tape to extend over a predetermined angular range on an outer circumferential face of a guide cylinder 37 which has a head not shown thereon and is connected to be rotated by the cylinder motor 5. Referring to FIG. 2, the tape loading mechanism 31 includes, as described above, the gear mechanism 32 and the link mechanism 38. The gear mechanism 32 is provided for moving a pair of loading arms not shown in a synchronized relationship with each other while the link mechanism 38 is provided for associating the gear mechanism 31 with the first cam 15 of the cam plate 7. Referring to FIG. 1, each of the loading arms has a leading guide block 39 securely mounted at one end thereof. The leading guide blocks 39 are engaged for sliding movement in a pair of guide holes 41 of a predetermined shape formed at opposite locations of a sub-chassis 40 with respect to the guide cylinder 37. The sub-chassis 40 is mounted on and extends in a plane above the chassis 2. Each of the leading guide blocks 39 has an inclined pole 42 and a vertical pole 43 mounted on an upper face thereof for guiding a tape.

The inclined poles 42 and vertical poles 43 extend upwardly through the guide holes 41 and above the sub-chassis 40. A stopper 44 is located adjacent an end of each of the guide holes 41. Referring to FIG. 2, the gear mechanism 32 includes a pair of mutually meshing gears 46 mounted for cooperative rotation via springs not shown at the other ends of the loading arms, and the sector gear 33 is held in meshing engagement with one of the gears 46. The sector gear 33 is supported for back and forth rotation within a predetermined angular range on the lower face of the chassis 2.

Referring to FIGS. 2 and 5, the link mechanism 38 includes a first pivotal lever 47, a slide lever 48, and a second pivotal lever 49. The first pivotal lever 47 is supported substantially at a central portion thereof for pivotal motion within a predetermined angular range on the lower face of the chassis 2 and is engaged at an end thereof in a recess 33b formed at an end portion of the sector gear 33. The first pivotal lever 47 has formed at a substantially central portion thereof an engaging projection or laterally bent lug 47a which extends into an arcuate guide hole 2c perforated in the chassis 2 and having a predetermined angular extent so that the first pivotal lever 47 may be pivoted back and forth only within a limited range of the angular extent

of the guide hole 2c. The other end of the first pivotal lever 47 is connected to one end of the slide lever 48 by a coil spring 50 and is located such that it may normally be engaged with the one end of the slide lever 48 under the biasing force of the coil spring 50. The slide lever 48 is mounted for sliding movement within a predetermined range on the lower face of the chassis 2. A pin 48a is mounted at a portion adjacent the other end of the slide lever 48 and is received in a recess 49a formed at an end of the second pivotal lever 49. The second pivotal lever 49 is supported at the other end thereof for back and forth pivotal motion within a predetermined angular range on the lower face of the chassis 2. An engaging pin 49b is mounted at an end portion of a lateral extension of the second pivotal lever 49 and is held in sliding engagement with the first cam 15 of the cam plate 7. When the cam plate 7 is rotated by a predetermined angle in the counterclockwise direction in FIG. 2, the sector gear 33 is pivoted toward the unloading side, that is, in the counterclockwise direction in FIG. 2 via the second pivotal lever 49, coil spring 50, slide lever 48 and first pivotal lever 47 so that both the loading arms are brought into a compressed condition in which the leading guide blocks 39 thereof are located adjacent base ends

of the guide holes 41 remote from the stoppers 44. However, if the cam plate 7 is rotated by a predetermined angle in the other direction, that is, in the clockwise direction in FIG. 2 from the thus rotated position, then the sector gear 33 is pivoted toward the loading side, that is, in the clockwise direction in FIG. 2 so that both the loading arms are brought into an extended condition in which the leading guide blocks 39 thereof are abutted with the stoppers 44.

Referring to FIGS. 1 and 2, the turning force of the capstan motor 4 is transmitted to the capstan 22 by way of a second motion transmitting mechanism 51 and to a supply side reel base 54 and a take-up side reel base 55 by way of a third motion transmitting mechanism 52 and a rotational speed change-over mechanism 53. Both the reel bases 54, 55 are mounted for rotation in a spaced relationship on the upper face of the chassis 2.

The second motion transmitting mechanism 51 is located on the lower face of the chassis 2 and includes a first pulley 56 of a smaller diameter securely mounted on a rotary shaft 4a of the capstan motor 4, a second pulley or fly-wheel 57 of a larger diameter securely mounted at a lower end of the capstan 22 for integral rotation with the capstan 22, and an endless belt 58 made of a rubber material or the like and extending

between and around the pulleys 56, 57. The capstan 22 is mounted for rotation on the upper face of the chassis 2.

Referring to FIG. 1, an impedance roller 59 is supported for rotation at a predetermined location on the upper face of the chassis 2, and a pivotal member 60 is mounted at an end thereof for pivotal motion in a coaxial relationship with the impedance roller 59 and has an erasing head 61 mounted on an upper face of the other end thereof. The pivotal member 60 is normally biased in the clockwise direction in FIG. 1 by a torsion coil spring 62. A reproducing head 63 is also provided.

Now, operation of the pinch roller driving device of the present invention having such a construction as described above will be described.

If a cassette is inserted to a predetermined set position into a cassette housing not shown, the insertion of the cassette is detected by a detecting switch not shown, and in response to such detection signal, the capstan motor 4 is driven to rotate in one direction, that is, in the clockwise direction in FIG. 2 so that the cassette loading mechanism is operated toward its loading side to load the cassette to its loaded position.

Upon completion of such loading of the cassette,

this is detected by a detecting switch not shown, and in response to such detection signal, driving rotation of the capstan motor 4 is stopped, thereby stopping driving of the cassette loading mechanism.

Upon stopping of driving rotation of the capstan motor 4, this is detected by a detecting switch not shown, and in response to such detection signal, the cam motor 3 is driven to rotate in the forward direction, that is, in the clockwise direction in FIG. 2. The turning force of the cam motor 3 is transmitted via the first motion transmitting mechanism 6 to the cam plate 7 so that the cam plate 7 is rotated in the forward direction, that is, in the clockwise direction in FIG. 2. As the cam plate 7 is rotated, the rotational speed change-over mechanism 53 and some other mechanisms associated with the cam plate 7 are changed over to their respective predetermined conditions, and after then, a stand-by state of the magnetic recording and reproducing device is entered.

If a reproducing mode setting operating member at a mode setting section of the magnetic recording and reproducing device 1 is manually operated when the magnetic recording and reproducing device 1 is in such a stand-by state, then in response to such operation signal, the cam motor 3 is driven to rotate in the

forward direction, the capstan motor 4 is driven to rotate in the reverse direction, that is, in the counterclockwise direction in FIG. 2, and the cylinder motor 5 is driven to rotate in one direction, thereby to rotate the cam plate 7, capstan 22 and guide cylinder 37, respectively.

As the cam plate 7 is rotated in the forward direction by forward rotation of the cam motor 3, the second pivotal lever 49 of the link mechanism 38 of the tape loading mechanism 31 is pivoted in the counterclockwise direction in FIG. 2 to move the slide lever 48 rightwardly in FIG. 2. As the slide lever 48 is moved, it pushes the adjacent end of the first pivotal lever 47 to pivot the first pivotal lever 47 in the counterclockwise direction in FIG. 2 so that the sector gear 33 is pivoted in the clockwise direction in FIG. 2 by the first pivotal lever 47. Consequently, both the loading arms are operated toward the loading side via the gears 46 associated with the sector gear 33 thereby to draw out the magnetic tape from within the cassette and extend it along an outer periphery of the guide cylinder 37.

Meanwhile, as the sector gear 33 is pivoted in the clockwise direction in FIG. 2, the engaging projection 30b of the second slide member 30 of the

first transmitting mechanism 23 of the pinch roller driving mechanism 18 is first engaged with the other end face of the engaging hole 33a of the sector gear 33 and then moves the slide member 30 rightwardly in FIG. 2, that is, leftwardly in FIG. 5. Consequently, the pivotal member 29 is pivoted in the clockwise direction in FIG. 5 to move the first slide member 27 rightwardly in FIG. 5 to pivot the link member 21 around the first point O of application so that the pivotal member 25 is pivoted for a first step from its initial position shown in two-chain lines in FIG. 5 to its intermediate position as shown in long and short chain lines in FIG. 5 by the link member 21 of the first transmitting mechanism 23 to rapidly move the pinch roller 19 from the home position toward the capstan 22 to the intermediate position as described hereinabove.

Then, when the leading guide blocks 39 of the tape loading mechanism 31 are stopped by the stoppers 44 thereby to end the tape loading operation, the engaging pin 35b of the second pivotal member 35 of the second transmitting mechanism 24 of the pinch roller driving mechanism 18 rides over from a smaller diameter portion to a larger diameter portion of the second cam 16 of the cam plate 7 to operate the second transmitting mechanism 24 so that the pivotal member 25 is pivoted for a second

step to a position as shown in solid lines in FIG. 5 in which the pinch roller 19 is pressed strongly against the capstan 22 with the magnetic tape held therebetween. Consequently, the magnetic tape is fed in a predetermined direction, thereby establishing the reproducing mode.

As the reproducing mode is executed, driving rotation of the cam motor 3 is stopped.

If a pause mode setting operating member at the mode setting section is operated when the magnetic recording and reproducing device is in the reproducing mode, then the cam motor 3 is driven to rotate in the reverse direction, that is, in the counterclockwise direction in FIG. 2 in response to such operation signal so that the cam plate 7 is rotated in the reverse direction, that is, in the counterclockwise direction in FIG. 2 from its reproducing mode position to its pause mode position.

As the cam plate 7 is rotated reversely, the second transmitting mechanism 24 of the pinch roller driving mechanism 18 is operated reversely so that the pivotal member 25 is returned to its intermediate second step pivotal motion starting position or first step pivotal motion ending position, moving the pinch roller 19 a little distance away from the capstan 22.

Further, while the cam plate 7 is rotated reversely to its pause position, the other various mechanisms are set to their respective pause mode conditions in order to effect the pause mode.

CLAIMS:

1. A pinch roller driving device for a tape feeding device for pivoting a pinch roller supporting mechanism to move and press a pinch roller on said pinch roller supporting mechanism to and against a capstan, comprising a link member connected to said pinch roller supporting mechanism and having a first point of application spaced by a predetermined distance away from a connecting point at which said link member is connected to said pinch roller supporting mechanism and a second point of application located intermediately between said first point of application and said connecting point, a first transmitting mechanism for displacing said second point of application relative to said first point of application of said link member, a second transmitting mechanism for displacing said first point of application relative to said second point of application of said link member, and a selectively rotatable cam plate having thereon cam means for operating, when said cam plate is rotated from a first to a second position in one direction, said first transmitting mechanism to pivot said pinch roller supporting mechanism to rapidly move said pinch roller from a home position in which said pinch roller is



spaced farthest away from said capstan toward said capstan to an intermediate position in which said pinch roller is spaced a little distance away from said capstan and for operating, when said cam plate is rotated from the second to a third position in the one direction, said second transmitting mechanism to pivot said pinch roller supporting mechanism to move said pinch roller from the intermediate position to an operative position in which said pinch roller is pressed strongly against said capstan.

2. A pinch roller driving device for a tape feeding device as set forth in claim 1, wherein said cam means of said cam plate includes a first cam for operating said first transmitting mechanism and a second cam for operating said second transmitting mechanism.

3. A pinch roller driving device for a tape feeding device as set forth in claim 2, wherein said first and second cams are formed separately on front and rear faces of said cam plate.

4. A pinch roller driving device for a tape feeding device as set forth in claim 2 or 3, wherein said second cam of said cam plate is a peripheral cam, and said first transmitting mechanism includes a cam follower and spring means for resiliently contacting said cam follower with said second cam.



5. A pinch roller driving device for a tape feeding device as set forth in any one of claims 2 to 4, wherein said first cam of said cam plate is a groove cam, and said first transmitting mechanism includes a cam follower slidably received in said groove cam and resilient means for resiliently transmitting a motion of said cam follower when said cam plate is rotated from the second to the first position to said second point of application of said link member.

6. A pinch roller driving device for a tape feeding device as set forth in any one of claims 2 to 5, wherein said first transmitting mechanism is also associated with a tape loading mechanism of said tape feeding device and includes therein a lost motion connection by means of which said first transmitting mechanism displaces said second point of application of said link member in one or the other direction at a latter part of a tape loading or unloading operation, respectively, of said tape loading mechanism.

7. A pinch roller driving device for a tape feeding device as set forth in any one of the preceding claims, wherein said pinch roller supporting mechanism includes a pivotal member on which said pinch roller is supported for rotation, and a spring member incorporated in said pivotal member, said link member being connected



at one end of said spring member such that said pinch roller in the operative position may be resiliently pressed against said capstan.

8. A pinch roller driving device for a tape feeding device as set forth in claim 7, wherein said spring member is a torsion coil spring having an intermediate coiled portion fitted round a shaft of said pivotal member, the other end of said torsion coil spring being secured to said pivotal member.

9. A pinch roller driving device for a tape feeding device as set forth in any one of the preceding claims, wherein when a pause operating member for putting said tape feeding device into a pause mode is manually operated during feeding of a tape for recording on or reproduction from the tape, said cam plate is rotated from the third to the second position in the opposite direction thereby to pivot said pinch roller supporting mechanism to move said pinch roller from the operative to the intermediate position.

10. A pinch roller driving device for a tape feeding device for pivoting a pinch roller supporting mechanism to move and press a pinch roller on said pinch roller supporting mechanism to and against a capstan substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

