

TAPE LOADING MECHANISM FOR A VIDEO
TAPE RECORDER

1) Field of the Invention:

This invention relates to a tape loading mechanism for a video tape recorder (VTR), which mechanism permits accurate positioning of tape loading arms.

5 2) Description of the Prior Art:

In a helical scanning VTR, a tape loading mechanism is actuated so that a video tape (hereinafter called "tape" for the sake of brevity) is pulled out of its cassette and then caused to wrap a video head carrier or "cylinder" to complete its loading. The carrier is usually equipped with a fixed lower cylinder and a rotatable upper cylinder on which the video head (hereinafter called "head" for the sake of brevity) is mounted. The "cylinder" is mounted aslant relative to the running plane of the tape, on a chassis.

The tape loading mechanism has a pair of drive rings provided turnably on the chassis. A pair of tape loading arms are arranged on their corresponding drive rings. A pair of guide posts are provided on each of the tape loading arms. Of the paired guide posts, one guide post extends vertically while the other is provided aslant. The former and latter guide

posts are called "the vertical post" and "the slant post" respectively. When the drive rings are each turned over a predetermined angle, the tape loading arms are caused to move along guide channels formed in the chassis, one for each arm, until they are brought
5 into contact each with a separate arm stopper. Here, the vertical posts of the tape loading arms pull out the tape from the cassette and the slant posts of the tape loading arms then cause the tape to wrap
10 the side wall of the video head carrier, whereby the loading of the tape is achieved.

After completion of recording or playback, the drive rings are turned in the opposite directions so as to move the tape loading arms in the opposite
15 directions into the cassette. The take-up reel of the cassette is then driven, and while following the movements of the tape loading arms, the tape is caused to return to its initial position within the cassette to complete the unloading of the tape.

20 Unless the tape loading arms are precisely replaced at their respective tape loading positions at this stage, at the next tape loading, the tape is caused to wrap the video head carrier at a position deviated in an upward or downward direction so that
25 it becomes difficult to load the tape precisely. It is hence essential to position the tape loading arms precisely.

The drive force of a motor is usually transmitted to the drive rings by way of an endless belt, gears, etc. Thus, the drive rings are driven so as to move the tape loading arms until they are brought into contact with their corresponding arm stoppers. In the above-mentioned construction, it is indispensable to control the rotation of the motor precisely and hence to regulate the motions of the drive rings, namely, the motions of the tape loading arms. It is however difficult to control the rotation of the motor precisely so that over-running or reverse rotation of the motor is avoided. It is hence difficult to achieve the precise positioning of the tape loading arms.

In the VTR tape loading mechanism disclosed in Japanese Patent Publication No. 25404/1979 for example, a worm gear and spring means are combined together to avoid the over-running or reverse rotation of the motor. More specifically, this tape loading mechanism is composed of a worm to which the drive force of the motor is transmitted, a worm gear maintained in meshing engagement with the worm, and an intermediate gear maintained in meshing engagement with a drive ring (rotatable disk) and arranged coaxially with the worm gear. The worm gear is fixedly secured on a common shaft while the intermediate ring is

loose-fit on the common shaft and is then allowed to rotate freely. Further, the rotatable disk is mounted fixedly on the common shaft at a point below the intermediate gear. In addition, a pair of engagement
5 pins are provided on the lower surface of the intermediate ring with an angular interval of 180° and two leaf springs are also provided on the rotatable disk at an angular interval of 180° in such a way that the leaf springs are engageable with
10 the engagement pins (engagement members).

In the construction just described, the drive force of the motor is transmitted to the worm and then rotates the common shaft owing to the meshing engagement of the worm and the worm gear. Since the
15 intermediate ring is free, it does not rotate together with the common shaft. However, the rotatable disk fixed on the common shaft is rotated. Upon rotation of the rotatable disk, the leaf springs on the rotatable disk are eventually brought into engagement
20 with their corresponding engagement pins on the intermediate ring. Thereafter, the rotatable disk is caused to rotate together with the free intermediate ring. Accordingly, a drive ring which is maintained in meshing engagement with the intermediate ring is
25 finally rotated.

Since the drive force of the motor is trans-

mitted via the worm as mentioned above, the motor is prevented from undergoing reverse rotation owing to the provision of the worm. Furthermore, the leaf springs provided on the rotatable disk which is coaxial with the worm gear are maintained in resilient engagement with their corresponding engagement pins on the intermediate ring. Owing to this feature, any over-run of the motor can be absorbed by deflection of the leaf springs even if such an over-run takes place at the motor. In other words, the rotation of the common shaft due to the over-run of the motor is absorbed by deflection of the leaf springs. The rotation of the common shaft due to the over-run of the motor is therefore not transmitted to the intermediate ring and drive ring.

According to the VTR tape loading mechanism of Japanese Patent Publication No. 25404/1979, the motor is prevented from reverse rotation or over-running and the precise positioning of the tape loading arms is ensured.

However, the VTR tape loading mechanism disclosed in Japanese Patent Publication No. 25404/1979 involves a potential problem in that the tape loading arm may not be retained at its tape loading position if vibrations, impacts or the like are applied to the mechanism. In this tape loading mechanism, the tape loading arm is

positioned at its tape loading position in such a state that the leaf springs of the rotatable disk are kept in engagement with their corresponding engagement pins and are hence pre-stressed in deflection. In this state, the spring forces of the leaf springs are applied to the corresponding engagement pins and their reaction forces act to reverse the common shaft. Such reverse rotation of the common shaft is usually prevented because the lead angle of the worm is small.

10 There is however a potential problem that the worm may be gradually rotated in the reverse direction by a radial component of an axial force received from the worm gear if vibrations, shocks or the like are applied to the VTR tape loading mechanism. If the worm is

15 rotated in the reverse direction, the spring forces of the leaf springs, which forces are being applied to the corresponding engagement pins, are reduced to render the intermediate ring susceptible to reverse rotation. In such a state that the intermediate ring is susceptible

20 to reverse rotation, the drive ring, namely, the tape loading arm cannot be held firmly at its tape loading position. Therefore, the tape loading arm tends to be moved out easily from its tape loading position by vibrations, impacts or the like, thereby failing to

25 fully ensure the precise positioning of the tape loading arm.

SUMMARY OF THE INVENTION

An object of this invention is to provide a tape loading mechanism for a VTR, which ensures the precise positioning of tape loading arms at their respective
5 tape loading positions.

According to this invention, there is thus provided a tape loading mechanism for a video tape recorder, which comprises:

a drive source;

10 a pair of tape loading arms for pulling out a tape from a loaded cassette and then loading the tape on a video head carrier; and

drive force transmission means for transmitting the drive force from the drive source to each of the
15 tape loading arms so as to shift the tape loading arms to tape loading positions respectively, said drive force transmission means comprising:

a first transmission mechanism located on the side of the drive source;

20 a second transmission mechanism located on the side of the tape loading arm; and

an intermediate transmission mechanism including rotatable cam means, which has a circular arc cam surface concentric with the center of rotation of the
25 cam means and a curvilinear cam surface continuous with the circular arc cam surface and eccentric with the

center of rotation of the cam means, the intermediate transmission means being interlocked with the first transmission mechanism, and cam follower means interlocked with the second transmission mechanism, the cam
5 follower means being capable of following the cam means, said cam follower means being allowed to follow the curvilinear cam surface of the cam means so as to cause the tape loading arms to reach their respective tape
10 loading positions, and when the tape loading arms have reached their respective tape loading positions, said cam follower means being caused to move to the circular arc arm surface so that the cam follower means does not move with the cam means.

Using a tape loading mechanism of the present
15 invention, the drive force of the drive source is transmitted from the cam means to the cam follower means so as to position the tape loading arms at their respective tape loading positions. While the tape loading arms assume their respective tape loading
20 positions, the cam follower means has reached the circular arc cam surface of the cam means and confronts the circular arc cam surface. Even if the tape loading arms or the transmission mechanism on the side of the tape loading arms begin to move due to vibrations,
25 shocks or the like, the cam follower means is merely pressed at a right angle against the circular arc cam

surface. The cam means is not turned accordingly,
whereby there is absolutely no possibility for the
cam follower means to move following the cam means.
Even if the cam means should be turned due to vibrations,
5 impacts or the like, the cam means undergoes mere idling
to absorb effects of the vibrations, shocks or the
like so that the cam follower means does not move with
the cam means.

In addition, the possible over-run or reverse
10 rotation of the motor is also absorbed through the
idling of the cam means. Here again, the cam follower
is prevented from moving with the cam means.

Thus, with a tape loading mechanism of the
present invention, it is always possible to completely
15 prevent the tape loading arms from moving out from
their respective tape loading positions and hence to
hold the tape loading arms at their respective tape
loading positions without failure.

While the motor is stopped, it is sufficient
20 for the cam follower means merely to confront the
circular arc cam surface. It is therefore not required
to position the cam follower means precisely.
Accordingly, it is unnecessary to precisely control
the drive source, for example, the operation of the
25 motor.

Further, the following speed of the cam follower
means can be controlled by forming the shape of the

cam curve as desired. It is hence possible to move the tape loading arms promptly and to shorten the positioning time of the tape loading arms, provided that the moving speed of each tape loading arm at an
5 intermediate position between its initial position and its tape loading position is set at a high speed.

If the moving speed of each tape loading arm is set at a lower speed at a position adjacent to its tape loading position, it is possible to achieve still
10 more precise positioning of the tape loading arm at the tape loading position.

Specific embodiments of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIGURES 1 and 2 are schematic plan views of a VTR tape loading mechanism according to one embodiment of this invention at the initial position and tape loading position respectively;

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FIGURE 3 is an enlarged plan view of a gear with cam means formed thereon;

FIGURE 4 is a cam diagram of the cam means; and

FIGURE 5 shows one modification of the VTR
25 tape loading mechanism depicted in Figures 1 and 2.

DETAILED DESCRIPTION OF THE
SPECIFIC EMBODIMENTS

As illustrated in FIGURE 1, a VTR tape loading mechanism 10 is equipped with a motor 12 which constitutes a drive source, a pair of tape loading arms 14,15, and drive force transmission means 16 for transmitting the drive force of the motor 12 to the respective tape loading arms 14,15.

The respective tape loading arms 14,15 are each provided with two links 18,19 and have symmetrical structures. These links 18,19 are connected turnably by a pin 20. A support plate 22 is turnably attached to each link 19 by a pin 24. Each support plate 22 is provided with a guide pin 26 which extends downwardly. Owing to sliding movements of the pins 24 and guide pins 26 along their respective guide channels 28 formed in a chassis, the tape loading arms 14,15 are moved from their initial positions shown in FIGURE 1 to predetermined tape loading positions depicted in FIGURE 2. Although not shown in the drawings, a slant post and a vertical post are provided on each support plate 22. The vertical posts pull out a tape from a cassette 30 and guide same to both sides of a cylinder 32 when the support plates 22 move toward their respective tape loading positions. Thereafter, the slant posts wrap the tape in the form of an inverted Ω pattern on the

cylinder 32 to achieve the loading of the tape. By the way, it is preferable to provide over-run preventing means to absorb any over-run of the respective support plates 22. The over-run preventing means may be
5 constructed, for example, by disposing each of the pins 20 in a slot in is associated link 19 and then spring biasing the pin 20 towards that end of its slot remote from the pin 26 associated with the link 19. Needless to say, the structure of each of the tape loading arms
10 14, 15 is not limited to the illustrated embodiment.

The drive force transmission means 16 is constructed on three transmission mechanisms, namely, a first transmission mechanism 34 located on the side of the drive source, a second transmission mechanism
15 35 located on the side of the tape loading arms, and an intermediate transmission mechanism 36 located between the first and second transmission mechanism 34,35.

The first transmission mechanism 34 has a motor pulley 38 fixed on a motor shaft 13, a pulley 40
20 connected to the motor pulley 38 via an endless belt 39, and a small-diameter gear 42 fixed on the pulley shaft 41.

The intermediate transmission mechanism 36 includes a large-diameter gear 44, which is maintained
25 in meshing engagement with the gear 42 of the

transmission mechanism 34, and a sectorial rocking member 46. Cam means 48 is provided with the gear 44. In the illustrated embodiment, the cam means is incorporated as a cam slot 50. As shown in detail in

5 FIGURE 3, the cam slot 50 includes curvilinear cam surfaces 52 and circular arc cam surfaces 54, which extend continuously with one another. The curvilinear cam surfaces 52 are eccentric with the shaft center 01 of the gear 44 and their radius R_i of curvature increases

10 gradually. On the other hand, the circular arc cam surfaces 54 are concentric with the shaft center 01 of the gear 44 and their radius R_c of curvature is constant. Namely, the curvilinear cam surfaces 52 act as cam surfaces over an angular displacement angle θ_1

15 whereas the circular arc cam surfaces 54 act as cam surfaces over an angular displacement angle θ_2 . Therefore, as shown in FIGURE 4, the cam curve of the cam means 48 takes the form of a gentle slope over the angular displacement angle θ_1 but becomes flat over

20 the angular displacement angle θ_2 . The displacement ΔL does not increase over the latter displacement angle.

The sectorial rocking member 46 of the intermediate transmission mechanism 36 is mounted rockingly

25 on the chassis by a sector shaft 56. Cam follower means 57 and a sector gear 60 are provided respectively

on one side and the other side of the sectorial rocking member 46, both, relative to the sector shaft 56 as the center of rocking motion. The cam follower means 57 is incorporated as a turnable guide pin 58 received
5 slidably within the cam slot 50. Namely, when the gear 44 is turned by the transmission mechanism 34, the cam follower means 57 follows the cam surface of the cam means. As a result, the sectorial rocking member 46 is caused to rock about the sector shaft
10 56 in a manner interlocked with the gear 44.

It is possible to suitably choose the inclination of the cam curve of the cam means 48 to correspond to the lead angle of a worm. It is hence feasible to form the shape of the cam curve as desired. Depending
15 on the shape of the cam curve, it is possible to cause the cam follower means 57 to move with the rotation of the cam means 48 or not to move with the rotation of the cam means 48. In the illustrated embodiment, the cam means 48 is equipped continuously with the
20 eccentric curvilinear cam surfaces 52 having the gradually-increasing radius R_i of curvature and the concentric circular arc cam surfaces 54 having the constant radius R_c of curvature. Over the angular displacement angle θ_1 corresponding to the curvilinear
25 cam surfaces 52, the displacement

varies little by little as readily envisaged from
FIGURE 4 and the cam follower means 57 hence follows
the rotation of the cam means 48 to rock the sectorial
rocking member 46. However, over the angular
5 displacement angle θ_2 corresponding to the circular
arc cam surfaces 54, the displacement remains constant
and the cam means 48 is caused to idle. As a result
the cam follower means 57 does not move with the cam means
48. Therefore, the sectorial rocking member 46 does
10 not undergo any rocking motion. It is also possible to
control the moving speed of the cam follower means
57 by forming the cam curve into a desired shape.

More specifically, the cam follower means 57 is
located at the ends of the curvilinear cam surfaces 52
15 on the side opposite to the circular arc cam surfaces
54 as shown in FIGURE 1 when the tape loading arms
14,15 are at their respective initial positions. When
the gear 44 rotates counterclockwise in FIGURE 1, the
cam follower means 57 follows the curvilinear cam
20 surfaces 52 of the cam means, thereby causing the
sectorial rocking member 46 to undergo a rocking motion
interlocked with the gear 44. When the tape loading
arms 14,15 reach their respective tape loading
positions, the cam follower means 57 reaches the
25 circular arc cam surfaces 54. At the circular arc cam
surfaces 54, no increment takes place as to the

displacement of the cam means 48 as mentioned above. The cam means 48 is therefore allowed to idle together with the gear 44 and does not allow the cam follower means 57 to move with the cam means 48, even if the gear 44 turns clockwise after the cam follower means 57 has reached the circular arc cam surfaces 54. Accordingly, the sectorial rocking member 46 is not interlocked for movement with the gear 44 and hence does not undergo any rocking motion.

10 The second transmission mechanism 35 is equipped with a first drive gear 62 maintained in meshing engagement with the sector gear 60 of the sectorial rocking member 46 and a second drive gear 64 maintained in meshing engagement with the gear 62 and having the same diameter as the gear 62. On gear shafts 63, the links 18 of the corresponding tape loading arms 14,15 are mounted turnably. A pair of push pins 66,67 are provided on the upper surface of each of the first and second drive gears 62,64 in such a way that the push
15 pins 66,67 sandwich their corresponding link 18 and can be brought into contact with the corresponding link 18. In the above construction, when the drive gears 62,64 are turned in association with the sector gear 60, either the push pins 66 or 67 are brought into contact
20 with their associated edges of the links 18 so as to move the links 18 in association with the gears 62,64
25

respectively. Therefore, the support plates 22 are guided along their corresponding guide channels 28 in the chassis and the tape loading arms 14,15 are reciprocated between their respective initial positions and their tape loading positions.

The operation of the tape loading mechanism 10 of the above-described construction will hereinafter be described in detail.

In FIGURE 1 in which the tape loading arms 14,15 are located at their respective initial positions, the gear 44 is rotated counterclockwise by a drive force transmitted by the transmission mechanism 33 when the motor 12 is started and the motor shaft 13 is hence rotated clockwise. Since the cam means 48 turns counterclockwise together with the gear 44, the cam follower means 57 follows the curvilinear cam surfaces 52 of the cam means. As a consequence, the sectorial rocking member 46 is caused to rock clockwise about the sector shaft 56. Then, the first drive gear 62 is turned counterclockwise owing to the meshing engagement between the sector gear 60 and the first drive gear 62 while the second drive gear 64 is turned clockwise owing to its meshing engagement with the first drive gear 62. When the first and second drive gears 62,64 are turned as mentioned above, the push pins 66 are brought into contact with the associated edges of their

corresponding links 18 so that the support plates 22 are caused to move along their corresponding guide channels 28. As shown in FIGURE 2, upon rotation of the cam means 48 over 61, the guide pins 26 of the
5 respective support plates 22 are brought into their corresponding arm stopper 70 provided on the chassis and the tape loading arms 14,15 reach their respective tape loading positions. Incidentally, the cam follower means 57 reaches the ends of the circular arc cam
10 surfaces 54 of the cam means 48 as indicated by a broken line in FIGURE 2 when the tape loading arms 14,15 have reached their respective tape loading positions. However, the operation of the motor 12 is controlled beforehand in such a way that even after the
15 cam follower means 57 has reached the ends of the circular arc cam surfaces 54, the gear 44 is turned and the cam follower means 57 is caused to move in to a point between the circular arc cam surfaces 54 and hence to confront the circular arc cam surfaces 54.

20 After positioning the tape loading arms 14,15 at their respective tape loading positions, the VTR performs recording or playback. Let's now assume that a drive force, which causes the tape loading arms
25 14,15, gears 62,64 and sectorial rocking member 46 to move, is applied to the tape loading arms or the like by vibrations, shocks or the like during the recording

or playback. This drive force acts to rock the sectorial rocking member 46 in either one of the rocking directions. Hence, the cam follower means 57 facing the circular arc cam surfaces 54 is pressed against the circular arc cam surfaces 54. However, the guide pin 58 is pressed at a right angle against the circular arc cam surfaces 54. The line of action of the pressing force extends obviously through the shaft center 01 of the gear 44. As a result, no torque is applied to the gear 44. The gear 44, namely, the cam means 48 does not turn in any direction consequently. Owing to the prevention of the rotation of the cam means 48 in the above-described manner, there is no possibility for the cam follower means 57 to follow the cam means 48. The sectorial rocking member 46 is therefore prevented from rocking. Accordingly, the tape loading arms 14,15 are held precisely at their respective tape loading positions.

Let's also assume that during recording or playback, vibrations, impacts or the like are applied and a drive force, which causes the gear to rotate, is hence applied from the transmission mechanism 34 to the gear 44. Since the cam follower means 57 confronts the circular arc cam surfaces 54, the gear 44 is however allowed to idle together with the cam means 48 in both clockwise and counterclockwise directions so that the

cam follower means 57 is not caused to move with the cam means 48. As a consequence, the sectorial rocking member 46 does not rock and the tape loading arms 14,15 are hence held precisely at their respective tape loading positions.

As described above, the cam follower 57 is prevented from following or moving with the cam means 48 according to the present invention, because the cam means 48 is caused to idle or prevented completely from turning even if vibrations, impacts or the like are applied subsequent to the positioning of the tape loading arms 14,15. Accordingly, the tape loading arms 14,15 which are interlocked with the cam follower means 57 are not caused to move out from their respective tape loading positions and the tape loading arms 14,15 are held at their respective precise loading positions without failure. It is also possible to avoid any adverse effects due to over-run or reverse rotation of the motor 12 as will be described later.

Let's now suppose that the gear 44 is turned excessively in the clockwise direction due to over-run of the motor 12 after the tape loading arms 14,15 have reached their respective tape loading positions. Even if the gear 44 is turned excessively in the clockwise direction together with the cam means 48, the cam means 48 is caused to idle because the cam follower means 57

confronts the circular arc cam surfaces 54. Hence, the cam follower 57 does not move with the cam means 48.

Similarly, the gear 44 and cam means 48 are merely caused to idle counterclockwise even if the motor 12 turns slightly in the reverse direction. Thus, the cam follower 57 does not move with the cam means 48.

As has been described above, any over-run or reverse rotation of the motor 12 can be absorbed by the idling of the cam means 48 and the cam follower 57 is not caused to move with the cam means 48. Even if the motor 12 undergoes over-run or reverse rotation, the tape loading arms 14,15 are not cause to move and hence held precisely at their respective tape loading positions.

By the way, the unloading of the tape is effected by causing the motor 12 to turn in the counterclockwise direction after recording or playback, in contrast with the turning direction upon loading the tape. Namely, when the motor 12 is caused to turn counterclockwise, the gear 44 turns clockwise as viewed in FIGURE 2 and as a result of this turning, the cam follower means 57 follows the curvilinear cam surfaces 52 of the cam means 48. Therefore, the sectorial rocking member 46 is turned counterclockwise about the sector shaft 56, thereby causing the gears 62 and 64 to

turn clockwise and counterclockwise respectively. As a consequence, the push pins 67 of the gears 62,64 are brought into contact with their corresponding links 18 so that the links 18 are turned. Hence, the support
5 plates 22 are caused to move along their corresponding guide channels 28 so that the tape loading arms 14,15 are caused to return their respective initial positions shown in FIGURE 1 to unload the tape.

In the described arrangement, it is only necessary
10 for the cam follower means 57 to confront the circular arc cam surfaces 54 of the cam means 48 when the tape loading arms 14,15 are located at their respective tape loading positions. In other words, the cam follower means 57 is required merely to remain within a range
15 confronting the circular arc cam surfaces 54. It is hence not required to position the cam follower means 57 precisely when the motor 12 is stopped. Accordingly, it is not necessary to control the operation of the motor 12 precisely.

20 In addition, the following speed of the cam follower means 57 can be controlled by forming the cam curve into a desired shape as mentioned above. By controlling the following speed of the cam follower means 57, the moving speed of the tape loading arms
25 14,15 can be controlled. Namely, if the moving speed of the tape loading arms 14,15 is set at a high speed

at the intermediate positions between their respective initial positions and tape loading positions, it is possible to allow the tape loading arms 14,15 to move at a fast speed and hence to shorten the positioning time of the tape loading arms 14,15. If the moving speed of the tape loading arms 14,15 is set at a low speed at positions adjacent to their respective tape loading positions, still more precise positioning is feasible. Needless to say, it is also possible to set the moving speed of the tape loading arms 14,15 at a lower speed at positions adjacent to their respective initial positions so as to allow the tape loading arms 14,15 to assume their initial positions precisely. Such control of the moving speed of the tape loading arms 14,15 can be easily achieved by setting the inclination of the curvilinear cam surfaces 52 at a gentle angle at both sides thereof as illustrated by an alternate long and short dash line in FIGURE 4.

Although the cam means 48 and gear 44 are formed as an integral part in the above-described embodiment, it is sufficient for the cam means 48 if the cam means 48 is allowed to turn in a fashion interlocked with the gear 44. They are hence not necessarily limited to the illustrated structure. For example, it is possible to form the cam means 48 as a cam disk discrete from the gear 44 and to mount the cam disk fixedly on the shaft

of the gear 44. The cam means 48 and cam follower means 57 are incorporated as the cam slot 50 and guide pin 58 respectively in the above embodiment. Needless to say, they are not necessarily limited to the
5 illustrated structures.

One modification of the VTR tape loading mechanism depicted in FIGURES 1 and 2 is shown in FIGURE 5. Torsion springs 71,71 are provided on the gear shafts 63,63 respectively. The torsion springs
10 71,71 are energized as the guide pin 58 approaches the ends of the curvilinear cam surfaces 52,52 upon loading a tape. These ends are positioned where the curvilinear surfaces 52,52 are continuous with the corresponding circular arc cam surfaces 54,54. Within
15 the range facing the circular arc cam surfaces 54,54, the quantities of energy accumulated respectively in the torsion springs 71,71 remain unchanged and the reaction forces of the torsion springs 71,71 are borne by the upper circular arc cam surface 54 as viewed in
20 FIGURE 5. Accordingly, the guide pins 26,26 are held at the positions where they are maintained in contact with their corresponding stoppers 70,70 (see, FIGURE 2). Owing to the provision of the torsion springs 71,71, it is not required to achieve especially-high
25 accuracy as to the turning angle of the sectorial rocking member 46 so that the manufacture of the VTR

tape loading mechanism is rendered easier. Numeral 72 indicates a tension spring for ensuring the maintenance of the guide pins 26,26 at their fully-turned positions when the guide pin 58 assumes its initial position. The provision of the tension spring 72 is not essential. However, there are usually some gaps between the guide pin 58 and the circular arc cam surfaces 54,54. The tension spring 72 exhibits such an advantage that the guide pins 26,26 can be held at their respective fully-turned positions without play. It is therefore preferable to provide the tension spring 72.



CLAIMS:

1. A tape loading mechanism for a video tape recorder comprising:

a drive source;

5 a pair of tape loading arms for pulling out a tape from a loaded cassette and then loading the tape on a video head carrier; and

drive force transmission means for transmitting the drive force from the drive source to each of the
10 tape loading arms so as to shift the tape loading arms to tape loading positions respectively, said drive force transmission means comprising:

a first transmission mechanism located on the side of the drive source;

15 a second transmission mechanism located on the side of the tape loading arm; and

an intermediate transmission mechanism including rotatable cam means, which has a circular arc cam surface concentric with the center of rotation of the
20 cam means and a curvilinear cam surface continuous with the circular arc cam surface and eccentric with the center of rotation of the cam means, the intermediate transmission means being interlocked with the first transmission mechanism, and cam follower means inter-
25 locked with the second transmission mechanism, the cam follower means being capable of following the cam



means, said cam follower means being allowed to follow the curvilinear cam surface of the cam means so as to cause the tape loading arms to reach their respective tape loading positions, and when the tape loading arms
5 have reached their respective tape loading positions, said cam follower means being caused to move to the circular arc arm surface so that the cam follower means does not move with the cam means.

2. A tape loading mechanism as claimed in
10 claim 1, wherein when the cam follower means has come close to one end of the curvilinear cam surface of the cam means, said end being opposite to the other end of the curvilinear cam surface of the cam means, where the curvilinear cam surface is continuous with the
15 circular arc cam surface, the tape loading arms are respectively biased by springs so that the tape loading arms are maintained at their respective tape loading positions by the spring bias.

3. A tape loading mechanism for a video tape
20 recorder substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.
