

PATENT SPECIFICATION (11)

1 505 539

1 505 539

- (21) Application No. 13916/75 (22) Filed 4 April 1975 (19)
 (31) Convention Application No. 50169 (32) Filed 5 April 1974 in
 (33) Italy (IT)
 (44) Complete Specification published 30 March 1978
 (51) INT. CL.⁸ G11B 15/44 15/29 15/32 23/08
 (52) Index at acceptance
 G5R B264 B37Y B383 B38Y B421 B443 B475 B476 B481
 B482 B483 B488 B58Y B591 B59Y B612 B614
 B61Y B623 B640 B65Y B682 B788 B83 B93



(72) Inventor RODOLFO CICALLELLI

(54) RECORDING TAPE TRANSPORT MECHANISM

(71) We, AUTOVOX S.P.A., an Italian Joint Stock Company of Via Salaria 981, 00199 Roma, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a tape transport mechanism for a cassette-type magnetic tape recording and/or reproducing apparatus.

There is an increasing tendency to install cassette recorders in motor cars. The main difficulty of such an installation in the instrument board, where space is already at premium, lies in the relative thickness of the tape transport mechanism of the known recorders.

One object of the present invention is therefore to provide a compact tape transport mechanism for cassette recorders, which allows installation within a very restricted space of the instrument panel of a complete tape recorder provided with such a mechanism and its controls.

It is a further object of the present invention to provide a tape transport mechanism which is simple and inexpensive to produce and which is suitable for mass production.

According to the invention there is provided a tape transport mechanism for a cassette-type magnetic tape recording and/or reproducing apparatus, comprising a motor which drives a flywheel and an idler wheel, a tape drive capstan being formed by a shaft of the flywheel; a tape wind member in which a first gear is releasably coupled to a second gear coaxial therewith, the second gear meshing with a pinion rigidly connected to the idler wheel; a freely rotatable tape rewind member; and a pivotal arm carrying a pair of intercoupled gears at one end, the pivotal arm being movable into a first position, in which an upper one of the pair of gears engages the first gear of the wind member and a lower one of the pair

of gears engages a gear which is rigid and coaxial with the flywheel, to transmit thereby the drive of the motor to the wind member, and a second position, in which the upper one of the pair of gears engages the rewind member while the lower one of the pair of gears engages a gear which is rigid and coaxial with the idler wheel, to transmit thereby a tape rewind motion from the motor to the rewind member, and an inoperative third position intermediate its first and second positions.

In the following description, the directions "right", "left", "clockwise", "counterclockwise", "top", "bottom", etc. are intended as they appear in the Figures being discussed.

In the accompanying drawings:

Figure 1 is a plan view showing one embodiment of the tape transport mechanism according to the invention, in a recording or reproducing position;

Figure 2 is a schematic sectional view taken along line II—II of Figure 1;

Figure 3 is a schematic partly sectional view taken along line III—III of Figure 1;

Figure 4 is a plan view showing the tape transport mechanism of Figure 1, in its fast rewind position; and

Figure 5 is a plan view showing the tape transport mechanism of Figure 1, in its fast forward position.

With reference to the drawings, in which the same parts are indicated by the same reference numerals, a motor 1 is equipped with a pulley 2, which drives, through an endless elastic cord 3, a flywheel 4 and an idler wheel 5.

A capstan 6 is formed by the shaft of flywheel 4, which the journaled on a frame 7 through a bearing 8.

The tape is fed to the receiving reel of a twin-reel magnetic tape cassette 9 by the capstan 6 and a cooperating spring-biased pressure roller 10.

The receiving reel is inserted upon a wind member 11 which is integral with a first gear 12, which is friction coupled to, by

50

55

60

65

70

75

80

85

90

means of a friction ring 13, and is coaxial with a second gear 14 meshing with a pinion 15 integral with the idler wheel 5 journaled on the frame 7.

5 Gear 14 is axially slidable on the shaft of gear 12 and is urged against the friction ring 13 by a flat spring 16 with a pressure which is adjustable by means of a screw 18. The flat spring 16 is fulcrumed at 17. 10 The assembly of the members 12, 13 and 14 will be referred to in the following as the "friction unit" for the sake of brevity.

This assembly permits the member 11 to rotate at an angular speed which is variable as a function of the length of tape wound around the tape receiving reel. The tape-feeding reel of the cassette is inserted upon a rewind member 19, whose gear 20 remains freely rotatable during the tape feed and 20 fast forward motion of the mechanism.

An arm 21, pivoted at 22 to the frame 7, carries a magnetic recording and playback head 23 and an erasing head 24. One end of a bracket 26 is pivotal around a pin 25 on the arm 21, while the pressure roller 10 is pivotally mounted on its other end. The bracket 26 is spring biased against the capstan 6. The pin 25 is hollow and tapped and into it is screwed the adjusting screw 18. 30 18.

During the fast forward and fast rewind operations, the arm 21 is swung counterclockwise to move the heads 23 and 24 and the pressure roller 10 away from the tape. 35 Consequently, the screw 18 releases the spring 16 and therefore the gear 14 is uncoupled from gear 12.

Thus the friction unit is released or set free.

40 As shown in Figure 3, two gears 27 and 28 are rigidly secured to a common shaft 29, which is supported in a bushing 30 at one end of a flip-over arm 31. A first slot 33 is provided approximately at the centre of the flip-over arm 31, while a second slot 34 is provided at its other end. Arm 31 is pivotally and slidably secured to frame 7 by a pin 32 passing through the slot 33 and is 45 pressed against the frame 7 by a collar 35.

50 A coil spring 36 biases the pin 32 towards the left hand end of the slot 33, as shown in Figure 3.

A control lever 37, pivoted at 38 under the frame 7 is linked to the flip-over arm 31 by its pin 39, which engages in the slot 34 of the arm. 55

In order to accomplish the fast rewind operation, the arm 21 is swung counterclockwise. This movement disengages the gear 14 from gear 12, and thus disengages gear 12 from the drive. This movement also withdraws the pressure roller 10 from the capstan 6 and thus also from the tape. Simultaneously it also moves the heads 23 and 24 65 away from the tape.

When the control lever 37 is now rotated counterclockwise (as shown in Figure 4), the upper gear 27 will mesh with the rewind member 19, while its twin 28 will mesh with a gear 40, which is coaxial and rigid with the idler wheel 5. In this manner the drive will be transmitted from the motor 1, through the cord 3, to the rewind member 19. 70

To obtain the fast forward motion of the tape, the arm 21 is again rotated counterclockwise, but the control lever 37 is rotated clockwise (as shown in Figure 5). 75

Consequently, the upper twin gear 27 will be carried into engagement with gear 12, while the lower twin gear 28 will engage a gear 41, which is coaxial and rigid with the flywheel 4. In this manner the drive from the motor 1 will be transmitted to the wind member 11. 80

During the recording and playback operations, the twin gears 27 and 28 remain in their inoperative position, intermediate the wind member 11 and the rewind member 19, with the former receiving its drive from motor 1 through the idler wheel 5 and the pinion 15. In this operation the tape is fed by the capstan 6 against which it is pressed by the pressure roller 10, when the arm 21 is in the position shown in Figure 1. 85 90

The arm 21 and the control lever 37 can be coupled together in such a manner that, by pivoting the control lever 37 around pivot 38 in either sense from its central position shown in Figure 1, the arm 21 is swung counterclockwise. 95 100

Obviously, various changes may be applied to the above described embodiment of the invention, such as, for instance, some or all of the gears may be replaced by friction wheels. The terms "gear" and "pinion" 105 as used in the claims is intended to include friction wheels.

WHAT WE CLAIM IS:—

1. A tape transport mechanism for a 110 cassette-type magnetic tape recording and/or reproducing apparatus, comprising a motor which drives a flywheel and an idler wheel, a tape drive capstan being formed by a shaft of the flywheel; a tape wind member in which a first gear is releasably coupled to a second gear coaxial therewith, the second gear meshing with a pinion rigidly connected to the idler wheel; a freely rotatable tape rewind member; and a pivotal arm 115 carrying a pair of intercoupled gears at one end, the pivotal arm being movable into a first position, in which an upper one of the pair of gears engages the first gear of the wind member and a lower one of the pair of gears engages a gear which is rigid and coaxial with the flywheel, to transmit thereby the drive of the motor to the wind member, and a second position, in which the upper one of the pair of gears engages the 120 125 130

means of a friction ring 13, and is coaxial with, a second gear 14 meshing with a pinion 15 integral with the idler wheel 5 journaled on the frame 7.

5 Gear 14 is axially slidable on the shaft of gear 12 and is urged against the friction ring 13 by a flat spring 16 with a pressure which is adjustable by means of a screw 18. The flat spring 16 is fulcrumed at 17.
10 The assembly of the members 12, 13 and 14 will be referred to in the following as the "friction unit" for the sake of brevity.

This assembly permits the member 11 to rotate at an angular speed which is variable as a function of the length of tape wound around the tape receiving reel. The tape-feeding reel of the cassette is inserted upon a rewind member 19, whose gear 20 remains freely rotatable during the tape feed and fast forward motion of the mechanism.

20 An arm 21, pivoted at 22 to the frame 7, carries a magnetic recording and playback head 23 and an erasing head 24. One end of a bracket 26 is pivotal around a pin 25 on the arm 21, while the pressure roller 10 is pivotally mounted on its other end. The bracket 26 is spring biased against the capstan 6. The pin 25 is hollow and tapped and into it is screwed the adjusting screw 18.
25

30 During the fast forward and fast rewind operations, the arm 21 is swung counterclockwise to move the heads 23 and 24 and the pressure roller 10 away from the tape. Consequently, the screw 18 releases the spring 16 and therefore the gear 14 is uncoupled from gear 12.
35

Thus the friction unit is released or set free.

40 As shown in Figure 3, two gears 27 and 28 are rigidly secured to a common shaft 29, which is supported in a bushing 30 at one end of a flip-over arm 31. A first slot 33 is provided approximately at the centre of the flip-over arm 31, while a second slot 34 is provided at its other end. Arm 31 is pivotally and slidably secured to frame 7 by a pin 32 passing through the slot 33 and is pressed against the frame 7 by a collar 35.
45

50 A coil spring 36 biases the pin 32 towards the left hand end of the slot 33, as shown in Figure 3.

55 A control lever 37, pivoted at 38 under the frame 7 is linked to the flip-over arm 31 by its pin 39, which engages in the slot 34 of the arm.

60 In order to accomplish the fast rewind operation, the arm 21 is swung counterclockwise. This movement disengages the gear 14 from gear 12, and thus disengages gear 12 from the drive. This movement also withdraws the pressure roller 10 from the capstan 6 and thus also from the tape. Simultaneously it also moves the heads 23 and 24 away from the tape.
65

When the control lever 37 is now rotated counterclockwise (as shown in Figure 4), the upper gear 27 will mesh with the rewind member 19, while its twin 28 will mesh with a gear 40, which is coaxial and rigid with the idler wheel 5. In this manner the drive will be transmitted from the motor 1, through the cord 3, to the rewind member 19.

To obtain the fast forward motion of the tape, the arm 21 is again rotated counterclockwise, but the control lever 37 is rotated clockwise (as shown in Figure 5).

Consequently, the upper twin gear 27 will be carried into engagement with gear 12, while the lower twin gear 28 will engage a gear 41, which is coaxial and rigid with the flywheel 4. In this manner the drive from the motor 1 will be transmitted to the wind member 11.

During the recording and playback operations, the twin gears 27 and 28 remain in their inoperative position, intermediate the wind member 11 and the rewind member 19, with the former receiving its drive from motor 1 through the idler wheel 5 and the pinion 15. In this operation the tape is fed by the capstan 6 against which it is pressed by the pressure roller 10, when the arm 21 is in the position shown in Figure 1.

The arm 21 and the control lever 37 can be coupled together in such a manner that, by pivoting the control lever 37 around pivot 38 in either sense from its central position shown in Figure 1, the arm 21 is swung counterclockwise.

Obviously, various changes may be applied to the above described embodiment of the invention, such as, for instance, some or all of the gears may be replaced by friction wheels. The terms "gear" and "pinion" as used in the claims is intended to include friction wheels.

WHAT WE CLAIM IS:—

1. A tape transport mechanism for a cassette-type magnetic tape recording and/or reproducing apparatus, comprising a motor which drives a flywheel and an idler wheel, a tape drive capstan being formed by a shaft of the flywheel; a tape wind member in which a first gear is releasably coupled to a second gear coaxial therewith, the second gear meshing with a pinion rigidly connected to the idler wheel; a freely rotatable tape rewind member; and a pivotal arm carrying a pair of intercoupled gears at one end, the pivotal arm being movable into a first position, in which an upper one of the pair of gears engages the first gear of the wind member and a lower one of the pair of gears engages a gear which is rigid and coaxial with the flywheel, to transmit thereby the drive of the motor to the wind member, and a second position, in which the upper one of the pair of gears engages the





(12)

rewind member while the lower one of the pair of gears engages a gear which is rigid and coaxial with the idler wheel, to transmit thereby a tape rewind motion from the motor to the rewind member, and an inoperative third position intermediate its first and second positions.

2. A mechanism as claimed in claim 1, wherein the first gear of the wind member is rigidly mounted on a shaft, the second gear is axially slidable on said first gear shaft; and a friction ring is interposed between the first and second gears.

3. A mechanism as claimed in claim 1 or 2, wherein the pivotal arm has a first slot intermediate its ends and a second slot at the end opposite the said pair of gears, a stationary pin engaging the first slot and the pivotal arm being linked to a control lever by a pin on the control lever engaging the second slot.

4. A mechanism as claimed in any preceding claim further comprising: a further pivotal arm carrying a magnetic recording head and an erasing head; and a pressure roller for pressing the tape of the cassette

against the capstan, the pressure roller being rotatable at one end of a bracket, whose other end is pivotally mounted on the last-mentioned arm, the bracket being spring biased against the capstan.

5. A mechanism as claimed in claim 4, wherein pivoting in one direction of the last-mentioned arm releases the second gear from the first gear of the wind member and pivoting of said last-mentioned arm in a direction opposite to said one direction frictionally engages the second gear with the first gear of the wind member.

6. A magnetic recording tape transport mechanism, substantially as herein described, with reference to the accompanying drawings.

7. A cassette-type magnetic tape recorder comprising a tape transport mechanism as claimed in any preceding claim.

ELKINGTON & FIFE,
Chartered Patent Agents,
High Holborn House,
52/54 High Holborn,
London, WC1V 6SH.
Agents for the Applicants.