

Description

The invention relates to a magnetic-tape apparatus for recording/reproducing signals on/ from a magnetic tape which is movable between two reels in a first transport direction and in an opposite second transport direction, comprising:

a chassis; a rotatable reel support for each of the two reels; and a tape-pull control device for controlling the tape pull in the part of the magnetic tape between the two reels, which device comprises:

a sensing lever which is mounted on the chassis so as to be pivotable about a pivot of axis in a first pivoting direction and in an opposite second pivoting direction and which has a first end and a second end;

resilient means which act on the sensing lever to urge it in the first pivoting direction; tape-contact means near the first end of the sensing lever, which means when a tape is present, are in contact with the part of the magnetic tape which extends between the reels; a brake disc on one of the two reel supports and an elongate flexible braking member which surrounds at least a part of circumference of the brake disc and which has a first end which is secured to a part of the apparatus other than the securing lever, and a second end, which braking member co-operates with the sensing lever to produce a tensile force in the braking member depending on the position of the sensing lever about its pivotal axis and thereby influence the braking torque between the brake disc and the braking member as a function of the tape pull in the magnetic tape.

German Patent Specification No. 1,549,107 describes such a magnetic-tape apparatus in which the braking member is a brake band. In this known apparatus the tape pull for each of the two tape reels is controlled by means of an associated tape-pull control device. Recording or reproducing of signals on the magnetic tape is effected only during transport of the magnetic tape in one of the two directions of transport. Each of the two tape-pull control devices comprises resilient means in the form of a tension spring which pulls on the free second end of the relevant brake band. The sensing levers also co-operate with these free second ends to vary the braking torque.

It is favourable for a tape-pull control device if a given displacement of the sensing lever results in a comparatively large variation of the braking torque. Moreover, it is desirable that the tape-contact means of the sensing lever exert only a small force on the magnetic tape. In other words, it is desirable that small variations in the position of the magnetic tape and small variations in the force exerted on the magnetic tape by the sensing lever result in large variations of the braking torque. It is known that in the case of a flexible braking member such as a brake wire, a brake cord or a brake band, which co-operates with a brake disc, the frictional force exerted on the brake disc by the braking member increases

exponentially in the direction of rotation of the brake disc. Therefore, it is favourable if the frictional force exerted on the braking member by the brake disc decreases towards the point where the sensing lever co-operates with the braking member. In the known magnetic-tape apparatus this is the case in the "playback" mode.

It is the object of the invention to increase the variations in braking force as a result of variations in the position of the sensing lever for given dimensions of the lever and the invention is characterized in that also the second end of the braking member is a part of the apparatus other than the sensing lever secured to and the sensing lever is co-operable with the braking member at a point which is situated between the brake disc and an end of the braking member so as to exert a force on the braking member transversely of the longitudinal direction thereof.

FR—A—2 389 194 and US—A—4 345 725 disclose a braking member whose both ends, are secured to the chassis. The braking member however engages a pair of brake discs, and the braking mechanisms are not therefore suitable for tape tension control but only for accurate stopping of a tape.

Particularly when the part of the braking member between the brake disc and the second end is nearly taut only a small transverse force is necessary to produce a comparatively large force in the longitudinal direction of the braking member. Indeed, the braking member is flexible and therefore it cannot take up compressive forces, so that the reactive force must be provided by only the tensile forces in the braking member. However, these forces act substantially perpendicularly to the applied transverse force and therefore they yield only a small component which counteracts the transverse force. In this way it is possible to produce tensile forces in the braking member which are several times, for example six times, as large as the transverse force exerted by the sensing lever. Another advantage is that the lever pivot is not loaded by the large tensile forces in the braking member but is subjected only to the small forces exerted on the sensing lever. The tensile forces in the braking member are taken up by the points of attachment to the chassis and the supporting means of the spindle. A small load on the pivot of the sensing lever is favourable for the sensitivity of the sensing lever to variations in pull in the magnetic tape. In other words, the mechanical hysteresis in the pivot of the sensing lever is minimal. Further advantages are obtained with respect to the mounting of the tape-pull control device. Indeed, the braking member need no longer be connected to a moving part of the apparatus.

It is advantageous to employ an embodiment of the invention which is characterized in that the pivotal axis of the sensing lever is situated between the first end and the second end of said lever and the sensing lever is provided with first pressure means at or near its second end for exerting direct measure on the braking member

in a first pressing direction when the sensing lever is pivoted in its first pivoting direction. This embodiment has the advantage that it requires a small number of parts and that the sensing lever can be mounted easily. Indeed, the sensing lever is separated entirely from the braking member and may be mounted or removed subsequently without affecting the mounting of the braking member.

Another embodiment of the invention has the advantage that the tape-pull control device may also be used for the transport of the magnetic tape in the second transport direction. This is important for magnetic-tape apparatus with which signals can be recorded on or reproduced from the magnetic tape in each of the two directions of tape transport. This embodiment is characterized in that at or near its end the sensing lever carries second pressure means for exerting pressure on the braking member in a second pressing direction opposite to the first pressing direction when the sensing lever is pivoted in the second pivoting direction. It is also possible to use an embodiment which is characterized in that the first pressure means and co-operable with the braking member at a point which is situated between the first end of this member and the brake disc, and the second pressure means and co-operable with the braking member at a point which is situated between the second end of this member and the brake disc. In the last-mentioned case another braking characteristic is obtained, which will be discussed in more detail hereinafter.

In many modern magnetic-tape apparatus, in each of the two directions of transport of the magnetic tape, for reasons of economy, only the "upstream" reel is driven. Only a single drive motor is provided which drives only the upstream reel via a transmission device which can be moved between a first position for transport of the magnetic tape in the first transport direction and a second position for transport of the magnetic tape in the second transport direction. Generally, the transmission device comprises a pivotal support or other member which is pivoted from one side to the other side when the direction of rotation of the motor is reversed. As a result of this, a drive wheel which is mounted on the pivotal member and which is driven by the motor is pivoted from one reel to the other.

In magnetic-tape apparatus of this kind problems may arise when the direction of transport of the magnetic tape is reversed. If at this instant the magnetic tape is not taut, the sensing lever will be in a position in which the braking member exerts the maximum braking torque. Preferably, this maximum braking torque is larger than the maximum driving torque that can be produced by the motor. This is important in order to ensure that the tape-pull control device will operate correctly in all cases in which magnetic-tape transport in the second direction is effected. However, if the brake is fully activated the motor will not be capable of moving the new "upstream" reel in the second transport direction.

In view of this problem a further embodiment of the invention is of interest which is characterized in that the said transmission device is coupled to the sensing lever and moves this lever in the second pivoting direction when the transmission device moves from the first position to the second position so as to disengage the braking member from the circumference of the brake disc. After driving of the new upstream reel in the second transport direction has commenced the magnetic tape will be pulled taut and the tape-pull control device can revert to normal operation.

Variations in length of the braking member arising during manufacture may give rise to variations in the position of the braking lever. This is undesirable, in particular if tape transport in the second transport direction is required, as is necessary to minimize the variations in the various parameters which affect the pulling force of the magnetic tape in the case of a reversal of the transport direction. An embodiment of the invention which is advantageous in this respect and which, in principle, may be combined with any one of the preceding embodiments is characterized in that at least one of the two ends of the braking member is adjustable in the longitudinal direction of this member.

Some embodiments of the invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic plan view of a video recorder deck which co-operates with a magnetic-tape cassette,

Fig. 2 shows a part of Fig. 1 to an enlarged scale and represents some forces resolved into their components.

Fig. 3 shows another version of a tape-pull control device, and

Figs. 4 and 5 show in detail in two different positions a tape-pull control device intended for use in a deck as shown in Fig. 1.

The deck shown in Fig. 1 constitutes practically the entire mechanical section of a magnetic-tape apparatus for recording/reproducing signals on/from a magnetic tape 4 which is movable between two reels 2 and 3 of a magnetic-tape cassette 1. Those parts of the magnetic-tape cassette which are important for the description of the operating principle of the invention are shown in dash-dot lines. The magnetic tape is shown in full lines. The tape deck is suitable for transport of the magnetic tape between the reels in two opposite transport directions 5A and 5B.

The deck comprises a chassis or deck plate 6 on which reel supports in the form of two reel discs 7 and 8 for the reels 2 and 3, respectively, are mounted for rotation.

The deck plate 6 carries a rotary scanning system 9 around which the magnetic tape 4 is wrapped along a helical path through an angle of approximately 220°. The scanning system comprises a rotary upper drum 10 carrying two magnetic heads, not shown, which can record or read oblique parallel tracks across the width of

the magnetic tape in known manner. Such rotary scanning systems are employed on a large scale in magnetic video tape recorders and for this reason the scanning system and other parts which are not relevant to the present invention will not be described in more detail. It is to be noted only that for threading the magnetic tape around the scanning system 9 there is provided a threading mechanism of a known type, which comprises an externally toothed threading ring 11 which is mounted for rotation on the deck plate. Further, some elements of the threading mechanism which can pivot separately are shown, such as the gear segment 12 and the levers 13, 14 and 15. For guiding the magnetic tape there is provided a number of guide elements bearing the reference numerals 16 to 23. For driving the magnetic tape there is provided a capstan 24 and a pressure roller 25 which presses the magnetic tape against the capstan. In the non-threaded situation these tape-guide elements and the pressure roller are situated behind the magnetic tape *via* an opening in the cassette. The positions of the tape-guide elements and the pressure roller in this starting condition are shown in broken lines.

For the purpose of threading there is provided a motor 26 which drives the ring 11 *via* a pinion 27 and the gear wheels 28 and 29. The outer teeth of the ring 11 co-operate with the teeth of the segment 12 and *via* an idler wheel 30 also with the teeth of a gear segment 3 which is connected to the lever 14. The lever 13 also is pivoted by the rotation of the threading ring 11, but the manner in which this is done is not shown for the sake of clarity.

The magnetic tape is threaded as follows: the motor 26 is energized and the threading ring 11 is rotated anti-clockwise *via* the gear train 27-28-29. The gear segment 12 pivots the tape-guide element 23 and at the same time the levers 13 and 14 are pivoted in a similar way, thereby causing the tape-guide elements 16 and 17 to be pivoted. The tape-guide elements on the threading ring 11 now thread the magnetic tape in a loop around the scanning system 9. The lever 15 then performs a swing-out movement relative to the threading ring through co-operation with a guide 32 on the deck plate 6, so that the tape-guide element 22 assumes an end position which is defined by a stop 33 on the deck plate. The pressure roller 25 is mounted in a double lever 34 which is pivotable about the centre of the tape-guide element 21 and is urged into the operating position by a pressure lever 36 which is loaded by a spring 35.

For driving the capstan 24 there is provided another electric motor 37 which drives a pulley 39 on the capstan 24 *via* a belt 38. The reels 2 and 3 are driven by an electric motor 40. This motor drives a wheel 41 *via* a belt 42. The wheel 41 carries a gear wheel 43 which drives a gear wheel 44 which co-operates either with a gear wheel 45 on the reel 2 or with a gear wheel 46 on the reel 3, depending on the direction of rotation of the

motor 40. The mechanism necessary for pivoting the gear wheel 44 from the gear wheel 45 to the gear wheel 46 or the other way round is not shown in Fig. 1 but in principle it may be of a type as will be described hereinafter with reference to Fig. 4.

A tape-pull control device is provided which controls the tape pull in the part of the magnetic tape between the two tape-guide elements 16 and 17. The tape-pull control device comprises a two-armed sensing lever 49 having a first end 50A and a second end 50B and which is pivotable about a spindle 48 on the deck plate 1 in a first pivoting direction 47A and an opposite second pivoting direction 47B. Spring means in the form of a helical tension spring 51 which is pre-tensioned between the sensing lever and a pin 52 on the deck plate 6 act on the sensing lever. The tension spring 51 urges the sensing lever in the first pivoting direction 47A. At or near the first end 50A of the sensing lever 49 there are arranged tape-contact means in the form of a tape-guide pin 53 which, when a tape is present, is in contact with the part of the magnetic tape between the tape-guide elements 16 and 17. The reel disc 7 carries a brake disc which in the embodiment shown in Fig. 1 is integral with a gear wheel, for which reason the combination of the brake disc and the gear wheel bears the reference numeral 45. In the present context the term "brake disc" also refers to similar brake members which are not truly disc-shaped. It is essential only that there is a cylindrical braking surface. This surface may be, for example, a surface of a brake drum or a shaft.

An elongate flexible braking member 54, which in the present embodiment comprises a brake band, is arranged around at least a part of the circumference of the brake disc 45. Instead of a brake band it is possible to use a brake cord, a brake wire or any other suitable flexible braking member. A first end 55A of the brake band is secured to the deck plate and the sensing lever 49 is co-operable with the brake band to produce a pulling force in the band which depends on the position of the sensing lever about the spindle, in order to obtain a braking torque between the brake disc 45 and the brake band as a function of the tape pull in the magnetic tape 4. The second end 55B of the brake band 54 is also secured to the deck plate 6. The sensing lever 49 co-operates with the brake band 54 at a point which is situated between the brake disc 45 and the second end 55B of the band and exerts a force F (Fig. 2) on the brake band which is directed transversely of this band.

The effect of the invention will be illustrated by means of Fig. 2. During transport of the magnetic tape in the first transport direction 5A, see Fig. 1, the reel 2 rotates in the direction 56A. The brake band 54 embraces the brake disc 45 over an angle ϕ which extends from a point P where, proceeding from the first end 55A of the brake band to the second end 55B, the contact between the brake band and the brake disc 45 begins to a point Q where the contact ends. If a tensile force is

exerted in the brake band 54 the frictional torque between the brake band and the brake disc 45 will be:

$$M = SR (e^{\mu\phi} - 1)$$

where M is the frictional torque in Newton meters at the circumference of the brake disc, S is the tensile force in Newton in the part of the brake band between point Q and the second end 55B of the band, R is the radius in meters of the brake disc, e is the base of the natural logarithm, μ is the coefficient of friction between the brake band and the brake disc, and ϕ is the wrapping angle in radians between points P and Q.

For a large braking torque on the brake disc 45 it is therefore necessary to aim at a large diameter of the brake disc, a large angle ϕ , a large coefficient of friction μ between the brake band and the brake disc, and a large tensile force S. The dimensions of the brake disc are dictated by aspects of constructional engineering in combination with the dimensions of the cassette and the other parts of the tape deck. The angle ϕ can be enlarged by wrapping the braking member several times around the brake disc, which gives rise to constructional problems in the case of a brake band but which is possible in the case of a brake cord. In the present example the brake band is wrapped around the brake disc in such a way that the part of the band between the brake disc and the second end 55B of the brake band almost contacts the first end 55A, the brake band being situated entirely in the plane of rotation of the brake disc 45. The magnitude of the coefficient of friction between the brake band and the brake disc depends on the materials used and is therefore dictated by the choice of these materials.

The invention in particular aims at increasing the ratio between the tensile force S in the brake band and the transverse force F exerted on the brake band 54 by the sensing lever 49. The pivotal spindle 48 of the lever 49 is situated between the first end 50A and the second end 50B of this lever. At or near the latter end there are arranged first pressure means 57 in the form of a pressure nose which is integral with the sensing lever. Via this pressure nose direct pressure can be exerted on the brake band 54 in a first pressing direction 58 when the sensing lever is pivoted in its first pivoting direction 47A. Thus, the pressure nose 57 exerts a transverse force F on the part of the brake band between the brake disc 45 and the second end 55B of the band. As is shown in Fig. 2 the reactive force R is the resultant of the two opposed tensile forces S which occur in this section of the brake band. The forces S increase as the angle α between the two parts of the brake band on each side of the pressure nose 57 decreases, enabling a substantial value of the quotient S:F to be obtained by a suitable choice of the angle α .

In Fig. 3 the reel discs bear the reference numerals 62 and 63 and the magnetic tape is referenced 60. The first transport direction of the

magnetic tape is 61A and the second transport direction is 61B. Instead of the levers 13 and 14 in Fig. 1 there are provided levers 64 and 65 whose ends carry tape-guide elements 66 and 67. The sensing lever 68 is again a two-armed lever with a first end 69A and a second end 69B and between these ends it is pivotally mounted by means of a pivot 70. A tension spring 71 urges the sensing lever in its first pivoting direction 72A. The first end 69A of the sensing lever 68 carries tape-contact means in the form of a contact roller 73, which is in contact with that part of the magnetic tape which is situated between the two tape-guide elements 66 and 67. In the present case the braking member is again a brake band 74 having a first end 75A and a second end 75B. During transport of the magnetic tape 60 in the first transport direction 61A the reel 62 rotates in a direction 76A. The sensing lever 68 is in the position shown in full lines in the case of transport of the magnetic tape in the first transport direction. Again the sensing lever comprises first pressure means in the form of a pressure nose 77A at or near its second end 69B for a directly exerting pressure on the brake band 74 when the sensing lever is pivoted in its first pivoting direction 72A. In contradistinction to the sensing lever shown in Fig. 1 the sensing lever shown in Fig. 3 also comprises second pressure means in the form of a second pressure nose 77B at or near its second end 69B to exert pressure on the braking member in a second pressing direction 78B opposite to the direction 78A when the sensing lever is pivoted in the second pivoting direction 72B. The second pressure nose 77B co-operates with the brake band 74 in the case of transport of the magnetic tape in the second transport direction 61B during recording or reproduction of signals on/from the magnetic tape. The sensing lever 68 is then in the position shown in dash-dot lines, in which it has been pivoted slightly in the second pivoting direction. The position of the brake band between the reel disc 62 and the second end 75B of the brake band in this situation is indicated by a broken line. The reel disc 62 rotates in its second direction of rotation 76B. It will be evident that in this situation an entirely different braking characteristic is obtained. Owing to the pivotal movement of the sensing lever 68 in the second pivoting direction 72B the tension spring 71 has been extended to a certain extent, so that the pull in the magnetic tape 60 will be slightly larger, although in practice this may be minimal depending on the dimensioning of the tension spring 71. A more important difference is that the pressure nose 77B now co-operates with that part of the brake band 74 which, in relation to the direction of rotation of the reel disc and in comparison with the preceding situation, is situated at the other side of the brake disc 79. Variations in tensile force in the part of the brake band between the second end 75B hereof and the braking drum 79 therefore now have less effect on the resulting braking torque. Generally this is regarded as an advantage because in the second transport direc-

tion the part of the magnetic tape with which the sensing lever co-operates is situated "down-stream" of the scanning unit. The rotary drum of the scanning unit in fact also brakes the tape to some extent. In the second transport direction variations in tape pull therefore have a greater influence on the variation of the friction between the magnetic tape and the scanning system than in the first direction of transport of the magnetic tape.

However, if desired, another embodiment of the invention as shown in Figs. 4 and 5 may be used. In these Figures the magnetic tape 80 is shown in dash-dot lines. The sensing lever 81 again comprises two arms and is pivotable about a pin 82 between the first and second ends 83A and 83B of the lever. The first end 83B carries a guide roller 84 which co-operates with the magnetic tape at a point between two guide rollers 85 and 86 which correspond to the tape-guide elements 16 and 17 in Fig. 1. A tension spring 88 urges the sensing lever 81 in the first pivoting direction 87A. The reel disc 89 carries a brake disc 90 around which a braking member in the form of a brake cord or a brake band 91 is arranged. The braking member is secured at its first end 92A and its second end 92B. At or near its second end 83B the sensing lever comprises first pressure means 93A for co-operation with the braking member 91 at a point which is located between the first end 92A of the braking member and the brake disc 90 (Fig. 4), and second pressure means 93B for co-operation with the braking member at a point which is situated between the second end 92B of the braking member and the brake disc 90 (Fig. 5). Fig. 4 shows the situation in which recording or reproducing is effected during transport of the magnetic tape 80 in the first transport direction 94A. This corresponds to a first direction of rotation 95A of the braking drum. Fig. 5 shows the situation in which during recording or reproduction the magnetic tape is moved in the second transport direction 94B, which corresponds to a direction of rotation 96B of the brake disc.

Fig. 3 shows a part of a transmission device 59 by means of which only the upstream reel is driven in each of the two transport directions 61A and 61B. Driving is effected by means of a single winding motor, such as the motor 40 in Fig. 1. The winding motor drives a gear wheel 96. This gear wheel is rotatable about a stationary spindle 97 about which a member 98 is pivotable. This member comprises three limbs 99 to 101. The limb 100 carries a pin 102 about which a gear wheel 103 which is in constant mesh with the gear wheel 96, is rotatable. In a first position shown in full lines the gear wheel 103 meshes with a gear wheel 104 on the reel disc 63 and drives this gear wheel in a direction of rotation 105 corresponding to the first transport direction 61A of the magnetic tape 60. In a second position shown in broken lines the gear wheel 103 meshes with a gear wheel 106 on the spindle 62 and drives this wheel in the second direction of rotation 76B which corresponds to the second transport direction 61B of the magnetic tape.

The gear wheel 103 is set from its first position to its second position by reversing the direction of rotation of the winding motor. The reactive forces between teeth of the gear wheels 103 and 104 will produce an initial pivotal movement of the member 98. For a rapid and reliable pivotal movement there are further provided two coaxial auxiliary gear wheels 107 and 108 which are mounted for rotation about a pin 109 on the limb 101 of the member 98. The gear wheel 107 is constantly in mesh with the gear wheel 96 and rotates freely and consequently has no function in the first and in the second position of the member 98. However, a small initial pivotal movement of the member 98 results in the gear wheel 108 meshing with the gear segment 110 which is rigidly mounted on the deck plate. As a result of this, the member 98 is pivoted further by the motor torque which is transmitted to the gear segment 110 via the gear wheels 96, 107 and 108. This ensures a rapid and reliable change-over. At the end of the pivotal movement the gear wheel 108 and the gear segment 110 are again disengaged, so that the drive of the magnetic tape 60 in the second transport direction 61B is not obstructed.

By means of the limb 99 the transmission device is coupled to the sensing lever 68. Coupling is effected by means of a coupling lever 111, a two-armed lever 112 and pivots 113, 114 which connect the levers pivotally to each other. The lever 112 is pivotable about a stationary pin 115. The end 116 of the lever 112 can transmit pressure to a protection 117 on the sensing lever 68. When the transmission device 59 is set from the first position to the second position the end 116 is urged against the pressure nose 117, thereby moving the sensing lever in the second pivoting direction 72B. As a result of this, this lever can assume a position between the first and the second position. In this intermediate position neither the pressure nose 77A nor the pressure nose 77B co-operate with the braking member 74, so that this member is clear of the circumference of the brake disc. Thus, when the tape 61 is somewhat slack during reversal of the transport direction the tension spring 71 will not prevent the winding motor from driving the spindle 62 in its second transport direction 76B. Once driving takes place the magnetic tape is pulled taut between the tape guide elements 66 and 67 and the sensing lever is moved further into its second position shown in broken lines.

The first end 75A of the braking member is secured eccentrically to a rotatable adjusting element 118 which is formed with an eccentric screwdriver slit 119. By rotating the adjusting element 118 the desired position of the sensing lever 68 can be adjusted simply, regardless of dimensional and manufacturing tolerances of the various parts of the tape-pull control device.

Claims

1. A magnetic-tape apparatus for recording/reproducing signals on/from a magnetic tape (4) which is movable between two reels (2, 3) in a first

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The first end 75A of the braking member is secured eccentrically to a rotatable adjusting element 118 which is formed with an eccentric screwdriver slit 119. By rotating the adjusting element 118 the desired position of the sensing lever 68 can be adjusted simply, regardless of dimensional and manufacturing tolerances of the various parts of the tape-pull control device.

Claims

1. A magnetic-tape apparatus for recording/reproducing signals on/from a magnetic tape (4) which is movable between two reels (2, 3) in a first



transport direction (5A) and in an opposite second transport direction (5B), comprising:

—a chassis (6),
—a rotatable reel support (7, 8) for each of the two reels (2, 3), and

—a tape-pull control device for controlling the tape pull in the part of the magnetic tape between the two reels (7, 8), which device comprises:

—a sensing lever (49) which is pivotable about a pivotal axis (48) in a first pivoting direction (47A) and in an opposite second pivoting direction (47B) and which has a first end (50A) and a second end (50B),

—resilient means (51) which act on the sensing lever to urge it in the first pivoting direction (47A),

—tape-contact means near the first end (50A) of the sensing lever (49), which means, when a tape is present, are in contact with the part of the magnetic tape which extends between the reels,

—a brake disc (45) on a reel support, and

—an elongate flexible braking member (54) which surrounds at least a part of the circumference of the brake disc (45) and which has a first end (55A) which is secured to a part of the apparatus other than the sensing lever, and a second end, which braking member (49) cooperates with the sensing lever to produce a tensile force in the braking member depending on the position of the sensing lever about its pivotal axis and thereby influence the braking torque between the brake disc (45) and the braking member as a function of the tape pull in the magnetic tape, characterized in that

—also the second end (55B) of the braking member (54) is secured to a part of the apparatus other than the sensing lever (49) and

—the sensing lever (49) is cooperable with the braking member (54) at a point which is situated between the brake disc (45) and an end of the braking member, so as to exert a force (7) on the braking member, transversely of the longitudinal direction thereof.

2. A magnetic-tape apparatus as claimed in Claim 1, characterized in that

—the pivotal axis of the sensing lever (49) is situated between the first end (50A) and the second end (50B) of said lever, and

—the sensing lever (49) is provided with first pressure means (57) at or near its second end (50B) for exerting direct pressure on the braking member in its first pressing direction (58) when the sensing lever is pivoted in its first pivoting direction (47A).

3. A magnetic-tape apparatus as claimed in Claim 2, characterized in that at or near its second end (69B) the sensing lever (68) carries second pressure means (77B) for exerting pressure on the braking member (74) in a second pressing direction (78B) opposite to the first pressing direction when the sensing lever is pivoted in the second pivoting direction (72B). (Fig. 3).

4. A magnetic-tape apparatus as claimed in Claim 3, characterized in that the first pressure means (93A) are cooperable with the braking

member (91) at a point which is situated between the first end (92A) of this member and the brake disc (90), and the second pressure means (93B) and cooperable with the braking member at a point which is situated between the second end (92B) of this member and the brake disc (90). Figs. 4, 5).

5. A magnetic-tape apparatus as claimed in any of the preceding claims, in which in each of the two transport directions (61A, B) only the upstream reel is driven and which comprises only a simple motor which drives the relevant upstream reel *via* a transmission device (59) which can be moved between a first position for transport of the magnetic tape in the first transport direction and a second position for transport of the magnetic tape in the second transport direction, characterized in that the transmission device (59) is coupled to the sensing lever (68) and moves this lever in the second pivoting direction when the transmission device moves from the first position to the second position so as to disengage the braking member (74) from the circumference of the brake disc (Fig. 3).

6. A magnetic-tape apparatus as claimed in any of the preceding Claims, characterized in that at least one of the two ends of the braking member (74) is adjustable in the longitudinal direction of this member. (Fig. 3).

Patentansprüche

1. Magnetbandgerät zum Aufzeichnen/Wiedergeben von Signalen auf/von einem zwischen zwei Wickelspulen (2, 3) in einer ersten Transportrichtung (5A) und in einer entgegengesetzten zweiten Transportrichtung (5B) beweglichen Magnetband (4), mit:

—einem Chassis (6),

—einem drehbaren Wickelspulenträger (7, 8) für jede der zwei Wickelspulen (2, 3) und

—einer Bandzugkraftregelvorrichtung zur Regelung der Bandzugkraft in dem Teil des Magnetbandes zwischen den zwei Wickelspulen (7, 8), wobei diese Vorrichtung die folgenden Elemente aufweist:

—einen in einer ersten Schwenkrichtung (47A) und in einer entgegengesetzten zweiten Schwenkrichtung (47B) um eine Schwenkachse (48) schwenkbaren Fühlerhebel (49) mit einem ersten Ende (50A) und einem zweiten Ende (50B),
—Federmittel (51), die auf den Fühlerhebel einwirken um diesen in der ersten Schwenkrichtung (47A) zu belasten,

Bandkontaktmittel in der Nähe des ersten Endes (50A) des Fühlerhebels (49), wobei diese Mittel beim Vorhandensein eines Bandes mit demjenigen Teil des Magnetbandes in Berührung sind, der sich zwischen den Wickelspulen erstreckt,

—eine Bremsscheibe (45) auf einem Wickelspulenträger und

—ein wenigstens einen Teil des Umfangs der Bremsscheibe (45) umgebendes längliches biegsames Bremsselement (54) mit einem an einem



anderen Teil des Gerätes als dem Fühlerhebel befestigten ersten Ende (55A) und einem zweiten Ende, wobei das Bremsselement (54) zum Erzeugen einer Zugkraft in dem Bremsselement, und zwar abhängig von der Lage des Fühlerhebels um die Schwenkachse mit dem Fühlerhebel zusammenarbeitet und das Bremsmoment zwischen der Bremsscheibe (45) und dem Bremsselement als Funktion des Bandzuges in dem Magnetband beeinflusst, dadurch gekennzeichnet, dass

—auch das zweite Ende (55B) des Bremsselementes (54) an einem anderen Teil des Gerätes als an dem Fühlerhebel (49) befestigt ist und

—der Fühlerhebel (49) mit dem Bremsselement (54) an einer Stelle zwischen der Bremsscheibe (45) und einem Ende des Bremsselementes zusammenarbeitet, damit quer zu der Längsrichtung des Bremsselementes eine Kraft (7) auf dasselbe ausgeübt wird.

2. Magnetbandgerät nach Anspruch 1, dadurch gekennzeichnet, dass

—die Schwenkachse des Fühlerhebels (49) zwischen dem ersten Ende (50A) und dem zweiten Ende (50B) des genannten Hebels liegt und

—der Fühlerhebel (49) mit ersten Anpressmitteln (57) an oder bei dem zweiten Ende (50B) versehen ist, und zwar zum Ausüben eines direkten Druckes auf das Bremsselement in der ersten Anpressrichtung (58), wenn der Fühlerhebel in der ersten Schwenkrichtung (47A) geschwenkt wird.

3. Magnetbandgerät nach Anspruch 2, dadurch gekennzeichnet, dass an oder bei dem zweiten Ende (69B) der Fühlerhebel (68) zweite Anpressmittel (77B) aufweist, und zwar zum Ausüben eines Druckes auf das Bremsselement (74) in einer der ersten Anpressrichtung entgegengesetzten zweiten Anpressrichtung (78B) wenn der Fühlerhebel in der zweiten Schwenkrichtung (72B) geschwenkt wird (Fig. 3).

4. Magnetbandgerät nach Anspruch 3, dadurch gekennzeichnet, dass die ersten Anpressmittel (93A) mit dem Bremsselement (91) zusammenarbeiten, und zwar an einer Stelle, die zwischen dem ersten Ende (92A) des ersten Elementes und der Bremsscheibe (90) liegt, und die zweiten Anpressmittel (93B) mit dem Bremsselement zusammenarbeiten, und zwar an einer Stelle, die zwischen dem zweiten Ende (92B) dieses Elementes und der Bremsscheibe (90) liegt (Fig. 4, 5).

5. Magnetbandgerät nach einem der vorstehenden Ansprüche, wobei in jeder der beiden Transportrichtungen (61A, B) nur die stromaufwärts liegende Wickelspule angetrieben wird, und wobei dieses Gerät nur einen einzigen Motor aufweist, der die betreffende stromaufwärts liegende Wickelspule über eine zwischen einer ersten Lage zum Transportieren des Magnetbandes in der ersten Transportrichtung und einer zweiten Lage zum Transportieren des Magnetbandes in der zweiten Transportrichtung bewegliche Übertragungsvorrichtung (59) antreibt, dadurch gekennzeichnet, dass die Übertragungs-

vorrichtung (59) mit dem Fühlerhebel (68) gekuppelt ist und diesen Hebel in der zweiten Schwenkrichtung bewegt, wenn die Übertragungsvorrichtung aus der ersten Lage in die zweite Lage bewegt wird um das Bremsselement (74) von dem Umfang der Bremsscheibe zu lokalisieren (Fig. 3).

6. Magnetbandgerät nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass wenigstens eines der beiden Enden des Bremsselementes (74) in der Längsrichtung dieses Elementes einstellbar ist.

Revendications

1. Appareil à bande magnétique pour enregistrer/reproduire des signaux sur/à partir d'une bande magnétique (4) mobile entre deux bobines (2, 3) dans un premier sens de transport (5A) et dans un second sens de transport (5B) opposé au premier, comprenant:

—un châssis (6),

—un support de bobine (7, 8) rotatif pour chacune des deux bobines (2, 3), et

—un dispositif régulateur de tension de bande pour régler la tension de bande dans la partie de la bande magnétique comprise entre les deux bobines (7, 8), le dispositif comprenant:

—un levier palpeur (49) qui est monté sur le châssis de manière à pouvoir pivoter autour d'un axe de pivotement (48) dans un premier sens (47A) et dans un second sens (47B) opposé au premier et qui comporte une première extrémité (50A) et une seconde extrémité (50B),

—un moyen élastique (51) qui agit sur le levier palpeur pour le ramener dans le premier sens de pivotement (47A),

—des moyens de contact avec la bande près de la première extrémité (50A) du levier palpeur (49) qui lorsqu'une bande est présente, sont en contact avec la partie de la bande magnétique qui s'étend entre les bobines,

—un disque de frein (45) sur un support de bobine, et

—un long organe de freinage (54) flexible qui entoure au moins une partie de la circonférence du disque de frein (45) et comporte une première extrémité (55A) attachée à une partie de l'appareil autre que le levier palpeur et une seconde extrémité, cet organe de freinage (49) coopérant avec le levier palpeur pour produire une force de traction dans l'organe de freinage en fonction de la position du levier palpeur autour de son axe de pivotement et pour ainsi influencer le couple de freinage entre le disque de frein (45) et l'organe de freinage en fonction de la traction sur la bande magnétique,

caractérisé en ce que

—la seconde extrémité (55B) de l'organe de freinage (54) est également fixée à une partie de l'appareil autre que le levier palpeur (49), et

—le levier palpeur (49) peut coopérer avec l'organe de freinage (54) en un point qui est située entre le disque de frein (45) et une extrémité de l'organe de freinage, de manière à exer-



cer sur cet organe de freinage une force (7) transversale à son sens longitudinal.

2. Appareil à bande magnétique suivant la revendication 1, caractérisé en ce que

—l'axe de pivotement du levier palpeur (49) est situé entre la première extrémité (50A) et la seconde extrémité (50B) du levier, et

—le levier palpeur (49) est pourvu d'un premier moyen de pression (57) à sa seconde extrémité (50B) ou près de celle-ci pour exercer une pression directe sur l'organe de freinage dans un premier sens de pression (58) lorsque le levier palpeur pivote dans son premier sens de pivotement (47A).

3. Appareil à bande magnétique suivant la revendication 2, caractérisé en ce qu'à sa seconde extrémité (69B) ou près de celle-ci, le levier palpeur (68) porte un second moyen de pression (77B) pour exercer une pression sur l'organe de freinage (74) dans un second sens de pression (78B) opposé au premier lorsque le levier palpeur pivote dans le second sens de pivotement (72B) (Fig. 3).

4. Appareil à bande magnétique suivant la revendication 3, caractérisé en ce que le premier moyen de pression (93A) peut coopérer avec l'organe de freinage (91) en un point qui est situé entre la première extrémité (92A) de cet organe et le disque de frein (90), et le second moyen de

pression (93B) peut coopérer avec l'organe de freinage en un point qui est situé entre la seconde extrémité (92B) de cet organe et le disque de frein (90) (Fig. 4, 5).

5. Appareil à bande magnétique suivant l'une quelconque des revendications précédentes, dans lequel dans chacun des deux sens de transport (61A, B), seule la bobine d'amont est entraînée et un seul moteur est prévu, entraînant la bobine d'amont en question par l'intermédiaire d'un dispositif de transmission (59) qui peut être déplacé entre une première position destinée au transport de la bande magnétique dans le premier sens de transport et une seconde position destinée au transport de la bande magnétique dans le second sens de transport, caractérisé en ce que le dispositif de transmission (59) est couplé au levier palpeur (68) et déplace ce levier dans le second sens de pivotement lorsque le dispositif de transmission passe de la première position à la seconde de manière à dégager l'organe de freinage (74) de la circonférence du disque de frein (Fig. 3).

6. Appareil à bande magnétique suivant l'une quelconque des revendications précédentes, caractérisé en ce qu'au moins une des deux extrémités de l'organe de freinage (74) peut être ajustée dans le sens longitudinal de cet organe (Fig. 3).

