United States Patent

[11] 3,563,493

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[54] **END OF TAPE SENSING APPARATUS**
10 Claims, 4 Drawing Figs.

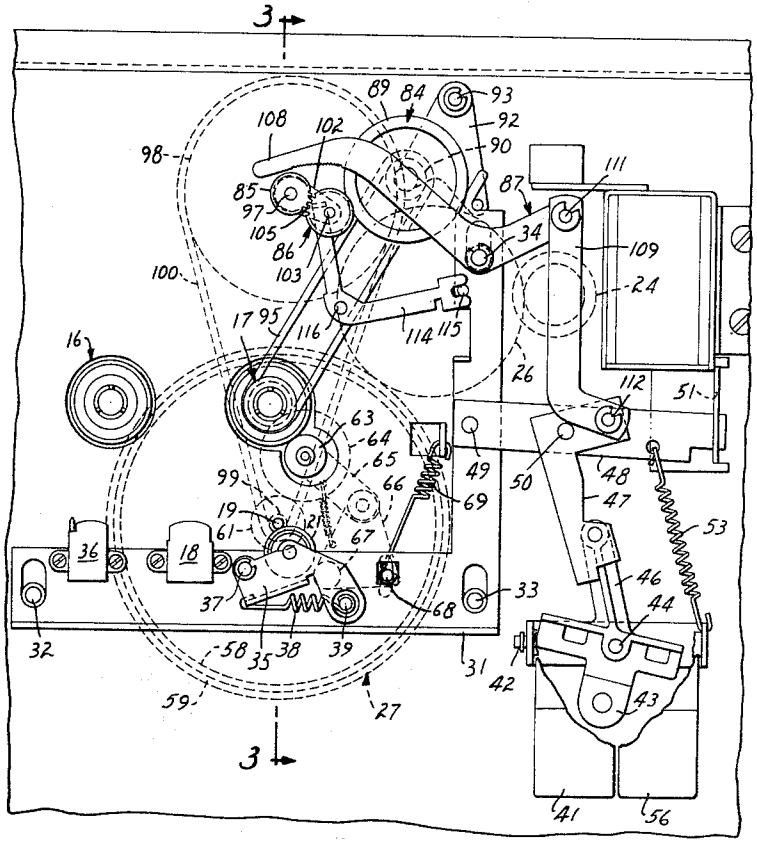
[52] **U.S. Cl.** **242/186,** 226/24
[51] **Int. Cl.** **B65h 59/38,** G03b 1/04, G11b 15/32
[50] **Field of Search** 242/186, 188, 189, 190, 75.5; 226/24, 43; 179/100.2

[56] **References Cited**
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ABSTRACT: Apparatus for deactivating a web transporting mechanism in response to retardation in the movement of a web. The retarded movement of the web is sensed by rotation of a spindle associated with a spool contacting the web and the rotation of the spindle relative to a continuously rotatable member drives a sensing member to maintain the sensing member in a first position when the web is normally transported and to drive the sensing member to a second sensing position when the web movement is retarded. Upon movement of the sensing member the web transporting mechanism is deactivated.



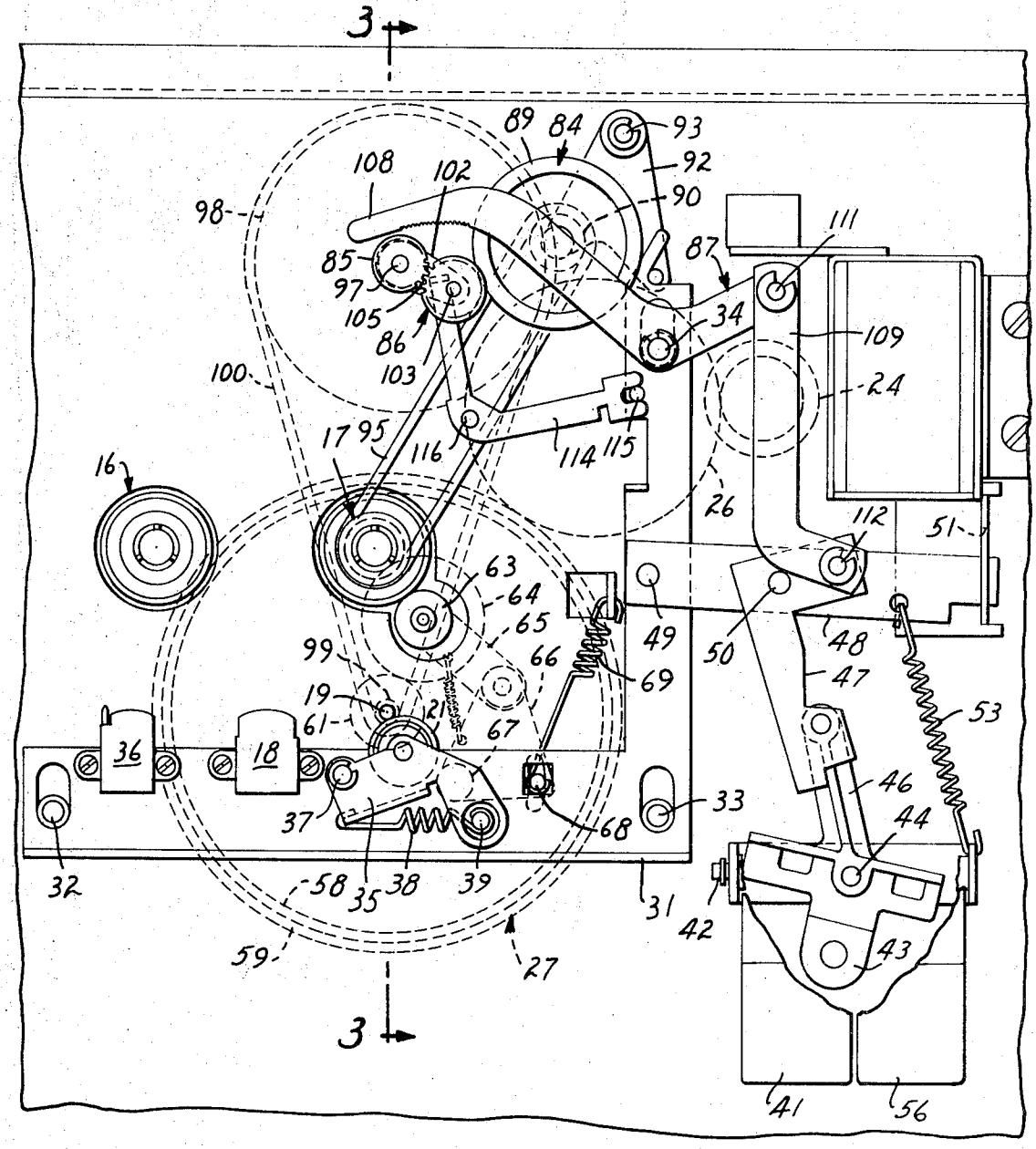


FIG. 1

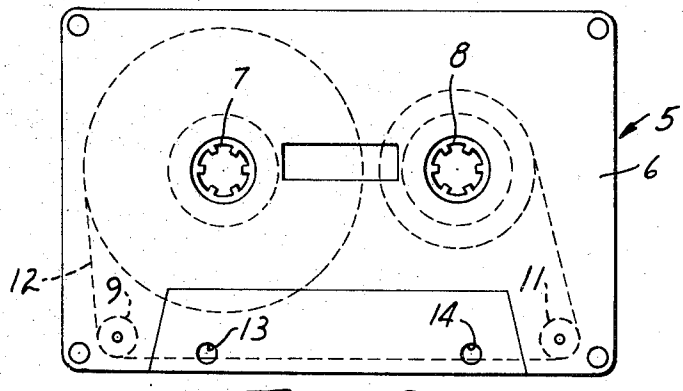


FIG. 2

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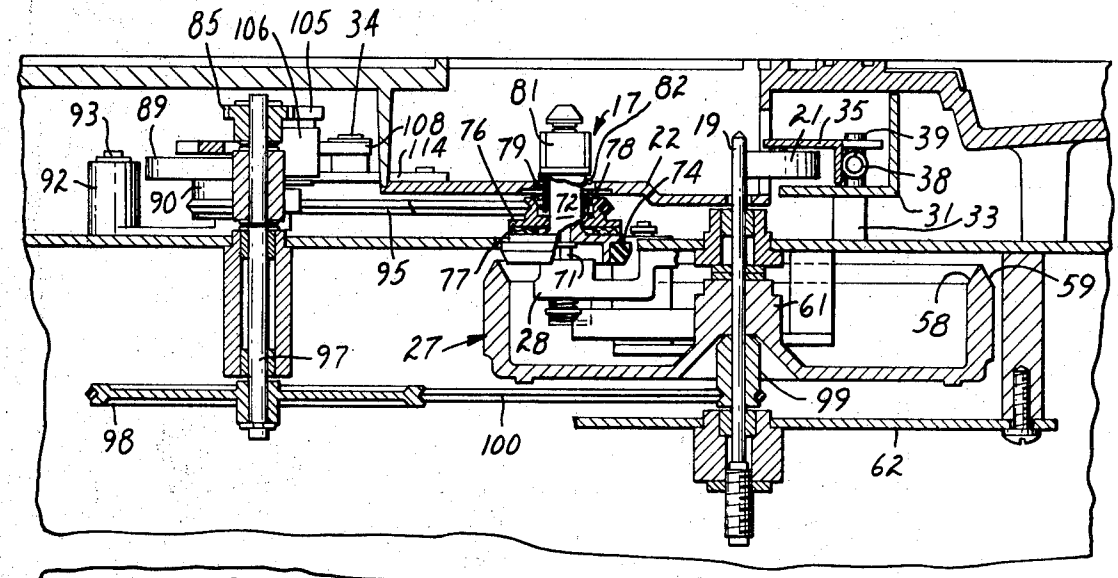


FIG. 3

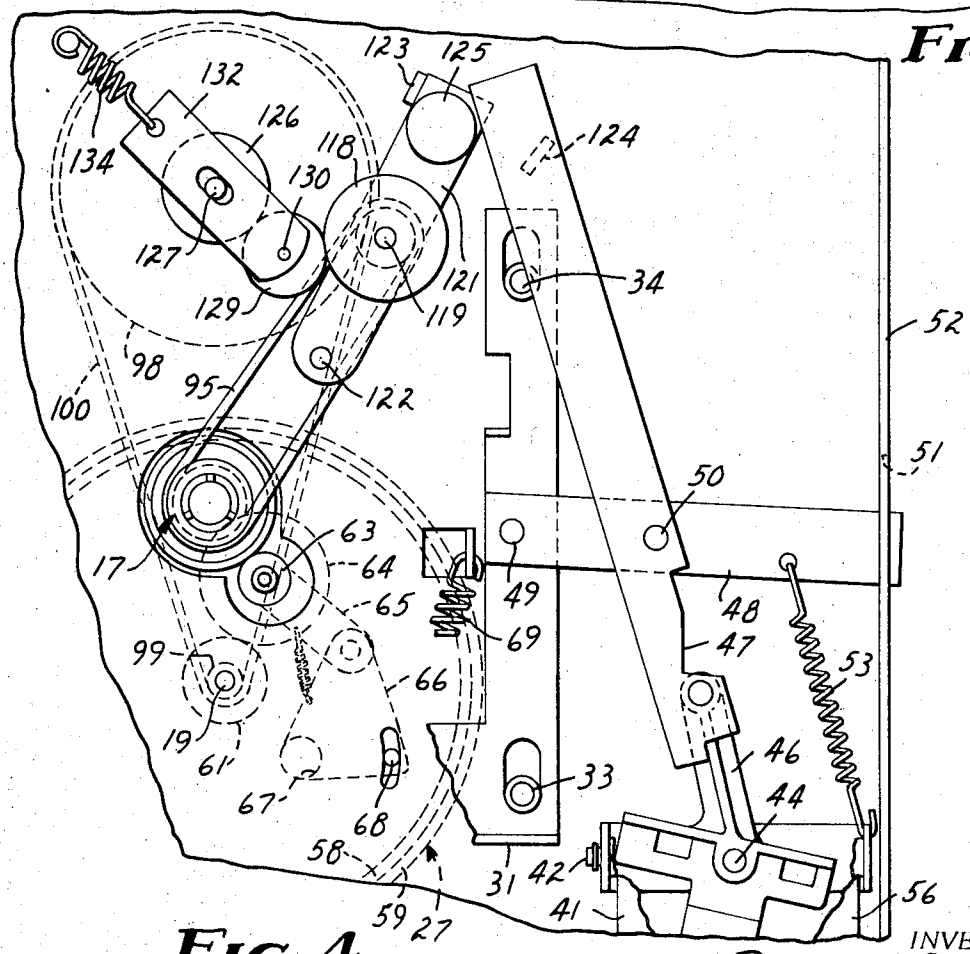


FIG. 4

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END OF TAPE SENSING APPARATUS

This invention relates to an improved apparatus for deactivating a web transporting mechanism in response to retardation in the movement of a web and in one aspect to apparatus for sensing the end or completion of the transporting of a length of a web and for deactivating a web transporting mechanism in response thereto.

Prior art inventions for deactivating a web transporting mechanism in response to movement of a web include a variety of electrically operated devices such as switches or photo cells. However, these devices generally sense the presence or absence of the web rather than the movement of the web so that the web transporting mechanism may remain activated even when the web is moving irregularly or not at all. Furthermore, these devices generally generate very little motive force in operation and they, therefore, cannot be used where it is desired to deactivate a web transporting mechanism by moving a pressure roller away from a capstan. One known electrically operated device that senses the completion of web movement utilizes a cam on the web supply spindle to open and close switches to charge and discharge capacitors until the supply spindle stops. When the supply spindle stops the capacitors leak their charge through a transistor circuit to activate a solenoid and thereby provide motive force to deactivate the web transport. However, this device is not only unduly expensive but it may also be undesirable to use a solenoid with the attendant magnetic field if the web carries magnetic signals.

It is, therefore, an object of the present invention to provide a simple and inexpensive mechanical apparatus for sensing the movement of a web and for deactivating a web transporting mechanism in response to retardation in the movement of a web. A further object is to provide an apparatus which upon sensing retardation of the movement of a web provides sufficient motive power to move a pressure roller away from a capstan and deactivate the other drives in the machine.

The present invention has the advantages desired of apparatus for deactivating a web transport mechanism in response to retardation in the movement of a web and comprises a first member rotatable in response to movement of a web, a second member spaced from the first member and continuously rotatable, a movable sensing member adapted to be driven by the first and second members to maintain it in a first position when the web is normally transported and to be driven to a second position by the second member when the web movement and rotation of the first member is retarded, and means responsive to movement of the sensing member from its first position to its second position to deactivate the web transporting mechanism.

The novel features and advantages of the present invention will become apparent after reading the following description which refers to the accompanying drawing wherein:

FIG. 1 is a plan view of one embodiment of a web movement sensing device made in accordance with the present invention and illustrating a fragmentary view of a tape recording machine

FIG. 2 is a plan view of one tape cassette adapted for use on the machine of FIG. 1, indicating the path of the tape therein in broken lines;

FIG. 3 is a transverse cross-sectional view taken along line 3–3 of FIG. 1; and

FIG. 4 is a plan view of a second embodiment of the present invention illustrating a fragmentary view of a tape recording machine.

Referring now to the drawings, wherein like numbers in the several FIGS. refer to like parts, a portion of a magnetic tape recording and/or playback device, commonly referred to as merely a tape recorder is illustrated including an end of tape sensing device designed in accordance with the present invention. The illustrated tape recorder is designed for use with a cassette 5, such as illustrated in FIG. 2, comprising a container 6 in which is journaled in spaced relation a pair of tape spools 7 and 8 to which the ends of a length of tape 12 are secured

and which is formed with guide members 9 and 11 directing the tape 12 from one spool to the other spool across one generally open side on one edge of the container. The container 6 is formed with a a pair of openings 13 and 14 adjacent the open side across which the tape is directed to receive a capstan of the recording machine against the inner face of the tape to afford movement of the tape 12. When a cassette is positioned within the tape recorder, each spool 7 and 8, is supported by one of the spindles designated 16 and 17, to be driven thereby to wind the tape in either direction of movement of the tape and to take up the tape after the same has been driven past the magnetic transducer or head 18 by means of the capstan 19 and a resiliently mounted pressure roller 21 as is conventional in tape recorders.

The spindles 16 and 17, the capstan 19, pressure roller 21 and magnetic head 18 are supported from a frame including a plate 22. This plate 22 is the primary support member supporting in a depending manner an electric motor (not shown) having a drive shaft 24 engaged by an idler roller 26 to transfer a rotational torque to the peripheral surface of a flywheel 27 rotatably supported on an axis generally normal to the plane of the plate 22, as more clearly illustrated in FIG. 3. This flywheel 27 drives the capstan 19 which advances the tape 12 by having the tape 12 pressed against the capstan by the spring-biased pressure roller 21.

The spindles 16 and 17 are similarly freely rotatably supported from the underside of the plate 22 by support brackets 28. These spindles are adapted to be received within the hubs of the spools 7 and 8 of the cassette and the capstan 19 is received in one of the openings 13 or 14 in the cassette, thus positioning the tape 12 between the capstan 19 and the pressure roller 21. The pressure roller 21 is movably mounted relative to the capstan by its support on a bar 31, which bar is slidably mounted on the plate 22. The bar 31 is generally L-shaped and is mounted on guide pins 32, 33, and 34 for movement toward and away from the spindles 16 and 17 and capstan 19. This bar 31 supports the head 18 and an erase head 36 adjacent one edge, together with the pressure roller 21 which is rotatably mounted in a frame 35 which in turn is supported by a pivot pin 37 and biased by a spring 38 toward engagement with the capstan 19. The freedom of movement of the pressure roller and frame is limited by another pin 39 projecting from the bar 31 through an enlarged opening in the frame for the pressure roller. The bar 31 is moved from a retracted out-of-the-way position to the play position (as illustrated in FIG. 1) under the control of a play key 41 pivoted about a key support shaft 42 mounted parallel to the plane of the plate 22. Key 41 imparts a clockwise pivoting action (as seen in FIG. 1) to standard 43 pivoted on the plate 22 by a pin 44. The standard has a radially extending toggle arm 46 carrying a pin connected to an L-shaped link 47 forming a toggle connection therewith, which when in the position shown in FIG. 1, advances the bar 31, from a retracted position to the play position shown. The movement is carried through a floating link 48, connected at one end by a pin 49 to the bar 31, and pivotally supporting the L-shaped link 47 by a pin 50, and extending through an enlarged slot 51 formed in an upturned flange 52 of an actuating plate 22. The link 48 has a tension spring 53 connected thereto and to the plate 22 which spring, in conjunction with the toggle link formed by arm 46 and link 47, positively advances or retracts bar 31 and holds it in each position. In the play position, the erase head 36 and recording head 18 are positioned in the edge wall of the cassette 5 and the pressure roller 21 is positioned against the tape 12, pressing it against the capstan 19.

A stop key 56, supported on the shaft 42, operates the standard 42 to retract the bar 31 and stop the movement of the tape 12 by the capstan 19 and pressure roller 21.

The takeup drive to the spindle 17 is also operated by movement of bar 31 to the play position. The flywheel 27, as seen in FIGS. 1 and 3 has an axial dimension greater than in most flywheels providing a cylindrical peripheral flange formed with beveled edges or driving surfaces 58 and 59 and with a

central axially extending hub 61 supported on the capstan shaft, which is suitably journaled in the plate 22 and by a bracket 62 extending beneath the flywheel and depending from the plate 22. An idler member for the takeup drive is operatively positioned between the hub 61 and the takeup spindle 17 and includes a cylindrical member 63 frictionally engageable with the takeup spindle 17, and a flange 64 frictionally engageable with the hub 61. The idler member is rotatably supported on a pivoted link 65, which is supported from a guide member 66 pivoted to the under side of plate 22 on a pin 67 and formed with a pin 68 extending upward through a slot in plate 22 and into a hole in bar 31. The extended end of pin 68 is connected to a spring 69 urging the guide member 66, link 64 and idler member into operative position upon movement of bar 31 to play position. The idler member is retracted against the bias of spring 69 from takeup spindle 17 upon retraction of the bar 31, by engagement between bar 31 and pin 68.

The supply and takeup spindles 16 and 17 are similar and only spindle 17, illustrated partially in section in FIG. 3 will be described. The spindle 17 is rotatably mounted on a shaft 81, which shaft is axially movable (by a linkage not shown) in its support bracket 29. The axial movement permits spindle 16 to engage the outer edge 59 of the driving member and rotation thereof in a clockwise direction and spindle 17 to engage the inner edge 58 affording counterclockwise rotation, as illustrated in FIG. 1, affording fast forward or reverse searching.

The spindle comprises a body member 72 rotatably supported on the shaft 71 and having a hub and radial flange which supports a ring 74 of high friction material with a beveled outer periphery complimentary to the beveled edge of the flywheel to permit driving engagement therewith. The spindles have a built-in slip clutch, which is defined by a sleeve assembly rotatably supported on the body member and frictionally driven by said clutch therefrom. The assembly comprises a pulley 76 disposed about the hub of the body member 72, which pulley 76 has a face engaging a pad 77 of friction material on the surface of the flange opposite the ring 74 and a spool-supporting sleeve 81. The face of the pulley 76 opposite the pad 77 is recessed and has spaced fingers 78 defining, with complimentary fingers 79 on the reel-supporting sleeve 91, a bayonet joint to join the pulley 76 and the sleeve 81 for coincident rotation. A compression spring 82 is disposed between the sleeve 81 and pulley 76, around the bayonet joint, to urge the pulley 76 against the friction pad 77 to transfer the driving force from the body member to the sleeve 81 and to the spool or reel supported thereon.

Referring now to FIGS. 1 and 3 there is illustrated one embodiment of an "end of tape" sensing mechanism made in accordance with the present invention comprising a first rotatable member illustrated as a roller 84, a second rotatable member illustrated as a roller 85, and a movable sensing member or roller 86. A sensing lever 87 responsive to movement of the roller 86 will pivot to deactivate the web transport. The sensing lever 87 is engageable by the sensing roller upon retardation of tape movement and rotation of the first roller 84 to move the support bar 31 to deactivate the tape transport in the same manner as is provided by depression of the stop key 56 as will be more fully described hereinafter.

The first roller is formed with a disc-shaped driving segment 89 and a lesser diameter cylindrical segment 90 having a V-belt groove. The roller 84 is rotatably supported at one corner of a generally triangular plate 92 with the V-belt groove in vertical alignment with the spindle pulley 86. The triangular plate 92 is supported at a second corner on frame plate 22 by a pin 93. An elastic belt 95 extends around the takeup spindle pulley 76 and the segment 90 of the first roller 84 and normally maintains the first roller axis in line with and between the plate support pin 93 and the axis of the takeup spindle 17. The first roller is then rotated (in a counterclockwise direction as viewed in FIG. 1) in response to winding of tape on the takeup spindle 17.

The second roller 85 is formed with gear teeth. It is horizontally spaced from the first roller 84 and it is secured to a shaft 97 vertically above the first roller 84. The second roller shaft 97 is journaled in and extends through frame plate 22 with its axis parallel to the axis of the first roller 84. A second pulley 98 is secured to the shaft 97 below the frame plate 22 in vertical alignment with a third pulley 99 that is secured to the capstan shaft 19 below the flywheel 27. A second belt 100 extends around the second pulley 98 and the third pulley 99 to provide continuous, constant velocity counterclockwise (as viewed in FIG. 1) rotation of the second roller 85 by the capstan 19 when the machine is in use. .The first and second rollers 84 and 85 are, therefore, rotated in the same circular direction when the tape 12 is moving from spindle 16 toward spindle 17 and the diameters of the first and second rollers 84 and 85, the spindle pulley 76, and the second and third pulleys 98 and 99 are chosen so that when the tape 12 is normally driven by the capstan 19 and wound on the spool driven by the takeup spindle 17 the tangential velocity at the periphery of the second roller 85 is at all times less than the tangential velocity at the periphery of the first roller driving disc 89 engaging the roller 86.

A sensing roller support arm 102 is supported on the second roller shaft 97 between the second roller 85 and the frame plate 22 for free rotation about the shaft 97. It extends perpendicular to the axis of the shaft 97 and carries the sensing roller on a shaft 103 to permit free rotation of the sensing roller about an axis parallel to the axes of the first and second rollers 84 and 85. The sensing roller 86 has a diameter greater than the horizontal spacing between the peripheries of the first and second rollers 84 and 85 and it is formed with a spur gear 105 vertically aligned with the second roller 85 for positive engagement therewith and a cylindrical portion 106 of a frictional material extending vertically across the thickness of the first roller driving disc 89 for frictional engagement of the first roller 84.

The sensing linkage 87 consists of an S-shaped pivotal link 108 and an L-shaped connecting link 109. The pivotal link 108 is supported on the support bar guide pin 34 and it extends horizontally therefrom in one direction above the first roller 84 and below the sensing roller spur gear 105 to extend across a path swept out by the cylindrical portion 101 of the sensing roller 86 as the sensing roller 86 and its support arm 102 are rotated in a counterclockwise direction (as viewed in FIG. 1) about the second roller shaft 97 and the sensing roller 86 passes between the first and second rollers 84 and 85. A portion of the pivotal link that is in the path of the sensing roller 86 is knurled to enhance engagement with the frictional material of the sensing roller 86. The pivotal link also extends from the guide pin 34 in the opposed direction and is connected to the connecting link by a pin 111. The opposite end of the connecting link 109 is connected to the free end of the toggle link 47 by a pin 112 so that clockwise (as viewed in FIG. 1) rotation of the pivotal link 108 about the guide pin 34 will cause the toggle link 47, through the connecting link 109, to rotate clockwise (as viewed in FIG. 1) about its support pin 50 and thereby to rotate the standard 43 and to move the pressure roller support bar 31 through floating link 48 away from the cartridge support.

An L-shaped sensing roller stop link 114 having one end forked to engage a pin 115 on the support bar 31 and its opposite end upturned is supported for rotation about a pin 116. The pin 116 is located to position the upturned end of the stop link 114 below the sensing support arm 102 and out of the path of the sensing roller shaft 103 when the tape transport is activated and to provide rotation of the stop link 114 to move the upturned end into the path of the sensing roller shaft 103 upon movement of the support bar 31.

In use the cartridge of FIG. 2 is placed on the machine of FIG. 1 and the play key 41 is depressed to position the elements as shown in FIG. 1 to drive the tape 12 past the head and to wind it onto the takeup spindle 17. When the tape 12 is moving normally the first and second rollers 84 and 85 are

rotated counterclockwise (as viewed in FIG. 1) as aforedescribed and they drive the sensing roller **86** in a clockwise direction. The second roller **85** tends to rotate the sensing roller **86** and the sensing roller arm **102** about the second roller shaft **97** (in a counterclockwise direction as viewed in FIG. 1) but the greater peripheral velocity of the first roller **84** will prevent the sensing roller **86** from moving between the first and second rollers **84** and **85**, thereby maintaining the sensing roller **86** in the position illustrated in FIG. 1.

When all of the tape **12** has been pulled from the supply spool except the end of the tape secured thereto the tape **12** becomes taut and prevents further rotation of the takeup spindle **17**. The drive to the takeup spindle **17** continues but the spool supporting sleeve **81** and spindle pulley **76** are stopped by the tape tension and ride on the friction pad **77**. When the spindle pulley **76** stops the first roller **84** also stops since they are linked by belt **95** but the second roller **85** which is being driven by the capstan **19** through belt **100** continues its rotation. The second roller then drives the sensing roller **86** along the periphery of the first roller **84** forcing the first roller support plate **92** to rotate about its support pin **93** to increase the spacing between the first and second rollers **84** and **85**. As the sensing roller **86** passes between the first and second rollers **84** and **85** it engages the pivotal link **108** and its rolls along the knurled portion of the pivotal link **108** rotating that link about guide pin **34**. As pivotal link **108** rotates it moves connecting link **109** which in turn rotates toggle link **47** about its connecting pin **50** on the floating link **50**. Rotation of toggle link **47** causes the standard **43** to rotate and to pull the floating link **50** toward itself. Movement of the floating link **50** in turn moves the support bar **31** along its guide pins **32**, **33** and **34** to move the pressure roller **21** away from the capstan **19** and to move the idler wheel **63** away from the takeup spindle thereby deactivating or separating the tape transport drive members.

At the same time the sensing roller **86** and its support arm **102** progress around the second roller shaft **97**, the L-shaped stop link **114** is rotated by the support bar **31** to position the upturned end of the stop link in the path of the sensing roller shaft **103**. As the sensing roller returns to its original position the upturned end of the stop link **114** engages the sensing roller shaft **103** and prevents the sensing roller **86** from contacting the periphery of the first roller and its support arm **102** from continuing their progression around the second roller shaft **97**.

Referring now to FIG. **4** there is illustrated a second embodiment of the present invention. Since this embodiment is similar to the first, only the differences will be discussed. In this embodiment the first roller **118** is similar to the first roller **84** of the first embodiment but it is supported by a shaft **119** on a link **121** that is in turn supported on a pin **122** located between the first roller **118** and the spindle **17**. A toggle link actuating cylinder **125** is supported on the free end of the link **121**. A pair of stops **123** and **124** limit the rotation of the link **121** to small arcs on either side of a position where the first roller shaft **119**, the link pin **122** and the spindle are aligned. The second roller **126** is a smooth surface cylinder and it is spaced from the first roller **118** and supported on a shaft **127** in vertical alignment with the first roller **118**.

The sensing roller **129** is cylindrical and it is formed of a frictional material. It is supported for free rotation in vertical alignment with the first and second rollers **118** and **126** by a shaft **130** on an arm **132** with its axis parallel to the axes of the first and second rollers. The arm has an elongated central aperture fitting over the second roller shaft **127** and it is biased by a spring **134** linking its end opposite the sensing roller **129** to the frame plate **22** so as to normally maintain the sensing roller **129** in contact with the first and second rollers **118** and **126** and to assure frictional drive between the second roller **126** and the sensing roller **129**.

In this embodiment the toggle link **47** is extended to lie adjacent the actuating cylinder **125**. Thus, when the rotation of the takeup spindle **17** stops the first roller **118** stops and the second roller **126** continues to rotate and drives the sensing roller **129** along the periphery of the first roller as in the first embodiment. As the sensing roller moves along the periphery of the first roller **118** it forces the first roller link **121** to rotate about its support pin **122** to increase the spacing between the first and second rollers **118** and **126**. As the first roller link **121** rotates the actuating cylinder **125** carried thereon engages the toggle link **47** causing it to rotate about its support pin **50** on the floating link **48**. Rotation of the toggle link causes movement of the standard **43**, the floating link **48** and the support bar **31** as aforedescribed with reference to the first embodiment to deactivate the tape transport.

We claim:

1. In a recording and/or reproducing machine having means for transporting a web between two spindles, the improvement which comprises:

a first member rotatable in response to movement of a web between the spindles;

a second member spaced from said first member and continuously rotatable;

movable means engageable to be driven by said first member and said second member to maintain it in a first position and to be driven to a second position by said second member when the angular velocity of said first member falls below a predetermined level;

means responsive to movement of said movable means from said first position to said second position to deactivate the web transporting means; and

whereby when a web is moved between the spindles by the transporting means said first and second members are rotated and said movable means remains in said first position and when the web movement slows so that the angular velocity of said first member falls below said predetermined level, said second member drives said movable means to said second position and the web transporting means is deactivated.

2. The machine of claim **1** wherein said movable means is frictionally driven by said first member and adapted to be positively driven by said second member to maintain it in said first position when the web is moved between the spindles by said transporting means.

3. The machine of claim **1** wherein said first and second members are generally cylindrical in shape, supported with parallel body axes and rotatable about their body axes in the same circular direction when the web is moved.

4. In a recording and/or reproducing machine having a supply spindle, a driven takeup spindle and means for transporting a web between the spindles, the improvement which comprises:

a first roller rotatable about its axis in response to movement of a web between said spindles;

a second roller spaced from said first roller with its axis parallel to the axis of said first roller rotatable about its axis in the same circular direction as said first roller is rotatable in response to web movement at a generally constant peripheral velocity less than the peripheral velocity of said first roller when a web is moved between the spindles by the transporting means;

a sensing roller having a diameter greater than said spacing between said first and second rollers supported for rotation about its axis with its axis parallel to said first and second roller axes and its periphery normally in contact with the peripheries of said first and second rollers and supported for movement between said first and second rollers;

means for increasing said spacing between said first and second rollers to permit said sensing roller to move between them upon exertion of a force between their axes;

means for deactivating the web transporting means upon movement of said sensing roller between said first and second rollers; and

whereby when a web is moved by the web transporting means the peripheral velocity of said first roller is greater than that of said second roller and said sensing roller is prevented from moving between them and when the web stops the first roller discontinues its rotation and said sensing roller, driven by said second roller, rolls along the periphery of said first roller exerting a force between the axes of said first and second rollers to increase said spacing between them and to deactivate the means for transporting the web.

5. The machine of claim 4 wherein said first roller is rotated in response to winding of a web on the takeup spindle.

6. The machine of claim 4 wherein said sensing roller is supported on an arm that is mounted for rotation about said second roller axis and including means for maintaining continuous peripheral contact between said sensing roller and said second roller.

7. In a recording and/or reproducing machine having a supply spindle, a driven takeup spindle and means for transporting between the spindles a web having one end securely linked to the supply spindle, the improvement which comprises:

a first roller rotatable about its axis in response to winding of a web on the takeup spindle;

a second roller spaced from said first roller with its axis parallel to the axis of said first roller rotatable about its axis in the same circular direction as said first roller is rotatable in response to web movement at a generally constant peripheral velocity less than the peripheral velocity of said first roller when a web is moved between the spindles by the transporting means;

a sensing roller having a diameter greater than said spacing between said first and second rollers supported for rotation about its axis with its axis parallel to said first and second roller axes and its periphery normally in contact with the peripheries of said first and second rollers and supported for movement between said first and second rollers;

means for increasing said spacing between said first and second rollers to permit said sensing roller to move between them upon exertion of a force between their axes;

means for deactivating the web transporting means upon movement of said sensing roller between said first and second rollers; and

whereby a web is transported from the supply spindle to the takeup spindle by the transporting means until the end of the web securely linked to the supply spindle prevents further winding of the web on the takeup spindle at which time said first roller discontinues its rotation and said sensing roller, driven by said second roller, rolls along the periphery of said first roller exerting a force between the axes of said first and second rollers to increase said spacing between them and to deactivate the means for transporting the web.

8. The machine of claim 7 wherein said sensing roller is adapted to be frictionally driven by said first roller and positively driven by said second roller to maintain its normal peripheral contact with said first roller and said second roller.

9. The machine of claim 8 wherein said sensing roller is supported on an arm that is mounted for rotation about said second roller axis.

10. The machine of claim 9 wherein said means for deactivating the web transporting means includes a sensing lever engageable and movable by said sensing roller when said sensing roller moves between said first roller and said second roller.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,563,493 Dated February 16,1971

Inventor(s) Richard C. Bielke and Leif O. Erickson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the drawings, Sheet 1, Figure 1, the lead line on reference numeral 16 should be extended to the third inner concentric circle, reference numeral 22 should be added with a lead line to indicate the large deck outlining the figure, and reference numeral 52 should be added to indicate the flange formed with a slot 51 through which link 48 extends. On Sheet 2, Figure 3, the present reference numeral 22 and lead line should be deleted and added to designate the plate below that now designated, reference numeral 108 and a lead line should be added to the left end of the member projecting past gear 85, and reference numeral 102 and lead line should be added to the member below the roller surface 106, in Figure 4 reference numeral 22 and an appropriate lead line should be added to designate the plate outlining the figure and reference numeral 43 should be added to the same member in this figure as indicated in Figure 1.

In the specification, column 2, line 44, after "frame" insert -- 35 --; line 45, after "roller" insert -- 21 --; line 46, cancel "as"; line 50, after "to" insert -- a --; line 60, "an actuating" should read -- the frame --; and, line 69, "42" should read -- 43 --. Column 3, line 14, "64" should read -- 65 --; line 22, "81" should read -- 71 --; line 24, "29" should read -- 28 --; line 29, "spindle comprises" should read -- spindles comprise --; line 54, cancel "movable"; line 67, "86" should read -- 76 --; and line 70, "segment 90" should read -- V-belt segment 90 --. Column 4, line 66, "sensing support arm" should read -- sensing roller support arm --. Column 5, line 17, after "stops" (first occurrence) insert -- , --;

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line 35, after "spindle" insert -- 17 --; and, line 57, after "spindle" insert -- 17 --. Column 6, line 15, cancel beginning with "1. In a recording" to and including "porting the web."'in column 7, line 10, and insert the following claims:

1. In a recording and/or reproducing machine having means for transporting a web between two spindles, the improvement which comprises:

a first roller rotated about its axis in response to movement of a web between the spindles,

a second roller spaced from said first roller with its axis parallel to the axis of said first roller, said second roller being rotated about its axis in the same circular direction as said first roller is rotated at a generally constant peripheral velocity less than the peripheral velocity of said first roller when a web is moved between the spindles by the transporting means,

a sensing roller supported for rotation about its axis with its axis parallel to said first and second roller axes and its periphery normally in contact with the peripheries of said first and second roller and supported for movement between said first and second rollers and for progression abou said second roller axis away from peripheral contact with said first roller when the peripheral velocity of said first roller falls

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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

below that of said second roller, and

means for deactivating the web transporting means upon progression of said sensing roller about the axis of said second roller, said deactivating means comprising a movable member formed for driving engagement with said sensing roller and positioned in the path of progression of said sensing roller about said second roller axis for driving engagement with said sensing roller as said sensing roller progresses about the axis of said second roller and mechanical linking means for deactivating said web transporting means in response to driving of said movable member by said sensing roller,

whereby when a web is moved between the spindles by the web transporting means the peripheral velocity of said first roller is greater than that of said second roller and said sensing roller is prevented from moving between them and progressing about said second roller axis and when the web movement slows so that the peripheral velocity of said first roller falls below said constant peripheral velocity, said sensing roller is driven by said second roller along the periphery of said first roller between said first and second rollers and it progresses about the axis of said second roller and engages and drives said movable member to deactivate the means for transporting the web.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,563,493 Dated February 16, 1971

Inventor(s) Richard C. Bielke and Leif O. Erickson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

2. The machine of claim 1 wherein said sensing roller is frictionally driven by said first roller and is adapted to be positively driven by said second roller to maintain rotation of said sensing roller.

3. The machine of claim 1 wherein said sensing roller is supported on an arm that is mounted for rotation about said second roller axis, means are provided for positively driving said sensing roller upon rotation of said second roller, and said movable member includes a pivotal link engageable and movable by said sensing roller when said sensing roller progresses about the axis of said second roller.

4. In a recording and/or reproducing machine having a supply spindle, a driven take-up spindle and means for transporting a web between the spindles, the improvement which comprises:

a first roller rotated about its axis in response to movement of a web between said spindles,

a second roller spaced from said first roller with its axis parallel to the axis of said first roller, said second roller being rotated about its axis in the same circular direction as said first roller is rotated at a generally constant peripheral velocity less than the peripheral velocity of said first roller when a web is

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moved between the spindles by the transporting means,

a sensing roller supported for rotation about its axis with its axis parallel to said first and second roller axes and its periphery normally in contact with the peripheries of said first and second rollers, adapted to be frictionally driven by said first roller and positively driven by said second roller and supported for movement between said first and second rollers and for progression about said second roller axis away from peripheral contact with said first roller when the peripheral velocity of said first roller falls below that of said second roller,

means affording an increase in said spacing between said first and second rollers to permit said sensing roller to move between them upon exertion a force between their axes, and

means for deactivating the web transporting means upon progression of said sensing roller about the axis of said second roller, said web transport deactivating means comprising a movable member formed for driving engagement with said sensing roller and positioned in the path of progression of said sensing roller about said second roller axis for driving engagement with said sensing

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roller as said sensing roller progresses about the axis of said second roller and mechanical linking means for deactivating said web transporting means in response to driving of said movable member by said sensing roller,

whereby when a web is moved by the web transporting means the peripheral velocity of said first roller is greater than that of said second roller and said sensing roller is prevented from moving between them and progressing about said second roller axis and when the web stops the first roller discontinues its rotation and said sensing roller is driven by said second roller along the periphery of said first roller between said first and second rollers and it progresses about the axis of said second roller and engages and drives said movable member to deactivate the means for transporting the web.

Column 7, line 13, cancel beginning with "6. The machine of" to and including "porting the web" in column 8, line 21 and insert the following claims:

6. The machine of claim 4 wherein said sensing roller is supported on an arm that is mounted for rotation about said second roller axis.

7. In a recording and/or reproducing machine having a supply spindle, a driven take-up spindle and means

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for transporting between the spindles a web having one end securely linked to the supply spindle, the improvement which comprises:

a first roller rotated about its axis in response to winding of a web on the take-up spindle,

a second roller spaced from said first roller with its axis parallel to the axis of said first roller, said second roller being rotated about its axis in the same circular direction as said first roller is rotated at a generally constant peripheral velocity less than the peripheral velocity of said first roller when a web is moved between the spindles by the transporting means,

a sensing roller supported for rotation about its axis with its axis parallel to said first and second roller axes and its periphery normally in contact with the peripheries of said first and second rollers and supported for movement between said first and second rollers and for progression about said second roller axis away from peripheral contact with said first roller when the peripheral velocity of said first roller falls below that of said second roller, and

means for deactivating the web transporting means upon progression of said sensing roller about the axis

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of said second roller, said web transport deactivating means comprising a movable member formed for driving engagement with said sensing roller and positioned in the path of progression of said sensing roller about said second roller axis for driving engagement with said sensing roller as said sensing roller progresses about the axis of said second roller and mechanical linking means for deactivating said web transporting means in response to driving of said movable member by said sensing roller,

whereby when a web is moved by the web transporting means the peripheral velocity of said first roller is greater than that of said second roller and said sensing roller is prevented from moving between them and progressing about said second roller axis and when the web stops the first roller discontinues its rotation and said sensing roller is driven by said second roller along the periphery of said first roller between said first and second rollers and it progresses about the axis of said second roller and engages and drives said movable member to deactivate the means for transporting the web.

Column 8, line 29, cancel beginning with "10. The machine of" to and including "roller." in column 8, line 34, and insert the following claim:

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10. The machine of claim 9 wherein said movable member comprises a sensing lever engageable and movable by said sensing roller when said sensing roller moves between said first roller and said second roller.

Signed and sealed this 14th day of December 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents