

Description

This invention relates to a hub assembly and a method of assuring locking a tape supply reel to a computer tape drive according to the first part of claim 1 and claim 17, respectively (US-A 4 243 186).

In order to facilitate the securing of the supply reel onto the supply hub, there have been used supply hubs with reel engaging pawls, a centering knob and a single sensing mechanism for determining if the supply reel is centered and secured onto the supply hub. One such supply reel is disclosed in the above mentioned U.S. Patent 4, 243, 186. Such supply hubs have several problems. First, it often appears at first glance that the supply tape reel is properly positioned and aligned on the supply hub, when, in fact, it is not. One side of the supply reel may be properly positioned against the supply hub and has been sensed as being in position while the other side of the supply reel is not properly aligned. Secondly, the centering knob does not allow for the mounting of six-inch reels as the inner hub of the six-inch reels cannot be positioned over the centering knob. Furthermore, in the case where the supply reel is not properly positioned on the supply hub, there is no error message transmitted to one computer or computer tape drive, rotation of the tape is continued, often resulting in tape damage. It has also been encountered that when the supply reel has a write enable ring with a tab on it, upon loading of the supply reel onto the supply hub, the tab may become caught on the centering knob.

Consequently, it is the main problem of the invention to provide a hub assembly according to the first part of claim 1 and a method according to the first part of claim 17 which would assure locking of the supply reel onto the supply hub in proper alignment in order to prevent tape damage and for safety reasons.

This problem is solved by the invention as defined in claim 1 and 17, respectively.

The hub assembly according to the invention comprises a locking means, preferably in the form of three L-shaped feet that assure that the reel is locked down squarely as well as in place, a plurality of spaced apart sensing means and a plurality of signalling means which sense and signal to a controller whether each of the three L-shaped feet of the locking means are properly in position. According to preferred further developments of applicant's hub assembly a centering knob is provided which assures that a six-inch reel may be properly mounted on the supply hub. A groove has been positioned on the base of the supply hub to allow a write enable tab to slip over the supply hub and not hang up on the centering knob upon load-

ing of the supply reel. An additional sensing means has been provided for sensing whether there is a write enable ring on the supply reel. There has also been provided further assurance against tape edge damage by the manner in which the hub base is positioned over the shaft of the drive motor.

The multiple sensing means of the invention assures that the supply reel is properly positioned at multiple positions around the supply hub.

Other objects and advantages of the invention will become apparent from a review of the drawings showing the invention and from a reading of the description of the preferred embodiment, which has been given by way of illustration only.

Brief Description of the Drawings

Figure 1 is a perspective view of a conventional computer tape drive unit.

Figure 2 is an elevational view, taken through line 2-2 of Figure 1, showing applicant's novel supply reel hub attached to a supply reel.

Figure 3 is a cross-sectional view, taken through line 3-3 of Figure 1, showing a prior art type supply hub assembly and showing a misaligned supply reel attached thereto.

Figure 4 is an enlarged top plan view of applicant's supply reel hub similar to Figure 2, showing the hub assembly with the supply reel removed.

Figure 5 is a bottom plan view of the supply hub assembly shown in Figure 4 and showing the reverse side thereof.

Figure 6 is a cross-sectional view taken through line 6-6 of Figure 4, showing a typical sensing member.

Figure 7 is a cross-sectional view taken through line 7-7 of Figure 6.

Figure 8 is a side elevational view of applicant's supply reel hub, showing in dashed lines a supply reel as it is positioned on the hub assembly.

Figure 9 is an enlarged top plan view showing the center portion of the supply hub assembly, and in particular, showing greater detail on the hub attaching means.

Figure 10 is a cross-sectional view, taken through line 10-10 of Figure 9.

Figure 11 is a top plan view of the centering member used on applicant's supply reel hub.

Figure 12 is a side elevational view of the centering member of Figure 11.

Figure 13 is a schematic view of the locking hub system.

Figure 14 is a bottom plan view of the supply reel hub assembly similar to Figure 5, and showing the actuator arm used in the locking hub system.

Figure 15 is a bottom plan view of a supply tape reel with a write enable ring shown in posi-

tion.

Figure 16 is a front elevational view taken along line 16-16 of Figure 1, showing the computer tape drive.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in general, and in particular to Figure 1 of the drawings, there is shown a perspective view of a conventional computer tape drive unit, shown generally by the numeral 10. Shown on the tape drive 10 is a supply reel 12 and a take up reel 14. Positioned in the center of the supply reel 12 is a supply reel hub 16 according to the invention which secures the supply reel 12 to the tape drive 10.

Referring now to Figure 2, there is shown an elevational view taken through line 2-2 of Figure 1 showing the supply reel hub 16 according to the invention as it is attached to the supply reel. The supply reel 12 includes a plastic case 18 wherein the magnetic computer tape is wound. Positioned on the supply reel hub 16 are three generally L-shaped feet 20 which are positioned 120 degrees apart from one another. The generally L-shaped feet 20 are adapted to securely engage the inside circumference 22 of the plastic case 23. The bottom leg of the L-shaped foot 20 engages the rim of the inside circumference of the plastic case 23 such that the supply reel 12 is locked firmly onto the supply reel hub 16 by means of the feet 20 locking over the rim of the inside circumference of the plastic case 23. Positioned in the center of the supply reel hub is a hole 25 for receiving the drive motor shaft 24. Positioned in proximity to the hole in the supply reel hub 16 is a hub attaching means 26 in the form of a single hex key receiving member, having two extensions therefrom, which will be described in greater detail with reference to Figures 9 and 10. Also shown positioned on the supply reel hub 16 and formed integrally therewith is centering member 28 which is a generally frusto-conical shaped member having a generally flat upper surface that is substantially parallel to the surface of the supply reel hub 16. The centering member will be described more fully with reference to Figures 11 and 12. In Figure 2 also shown engaging the feet 20 are bar-bell shaped structural legs 30. The top ball of the structural leg 30 engages the feet 20 and the bottom ball of the structural leg 30 is positioned in a locking mechanism to open or retract the feet 20. A locking mechanism on the rear of the supply hub which causes the structural leg 30 to open or close the feet 20 may be similar to the type disclosed in U.S. Patent 4,243,186 to Cipher Data Products Inc., a portion of such a locking mechanism is also shown

in Figure 5 of the drawings.

Figure 3 is a partial cross-sectional view, taken through line 3-3 of Figure 1, showing a prior art type hub assembly and showing a misaligned supply reel attached thereto. The prior art type supply reel hub is shown generally by the number 32. The prior art type supply hub 32 comprises generally a circular hub member 34 having a plurality of feet 36 positioned on the circular hub member 34. Positioned on each of the plurality of feet 36 is a plastic cushion 38 for engaging the foot 36 against the supply reel 12. The prior art type foot 36 is generally linear and is not adapted to engage the rim of the inside circumference of the plastic case 23 as shown in Figure 2, but rather pushes against the inside circumference of the supply reel 22. Also shown in Figure 3 is a single sensing means 40 for sensing if one of the plurality of feet 36 is positioned properly. The supply reel hub 16 according to the invention comprises three sensing means, as will be described more fully in reference to Figures 4 and 5. In Figure 3, there is shown how in the prior art supply reel hub 32 the single sensing means 40 may sense that one foot 36 is in proper position. However, as shown at number 42 there is an angle of displacement which has been slightly exaggerated for the purposes of illustration showing that the supply reel hub may in fact be misaligned with no detection of an error condition in the prior art supply reel hub assembly. In Figure 3 there is shown only one actuation point of the sensor 44 at the bottom of the supply reel hub 32. The top of the supply reel hub 32 is displaced from the supply reel 12 as no sensing means has been provided to sense the position of the feet 36 at this portion of the supply reel hub 32.

Referring now to Figure 4, there is shown an enlarged top plan view of applicant's supply reel hub. The supply reel hub is shown generally by the numeral 16, the supply reel hub 16 has a generally circular hub base 45, the hub base 45 having a first sloped surface 48 and a second sloped surface 46. In between the first sloped surface 48 and the second sloped surface 46 is a circumferential ring 50. Positioned around the circumferential ring 50 at 120 degrees apart are three holes for the sensing means 52 and within each of the holes for the sensing means 52 is positioned a probe tip 56, 58, and 60. As the supply reel hub 16 is rotated at a set speed, the combination of the holes for the sensing means 52 and the corresponding probe tips 56, 58 and 60 contact an inner annular surface of the reel shown at 95 in Figure 8 directly under the circumferential ring 50 on the supply reel hub 16. Shown in proximity to each of the feet 20 are shown the bifurcated ends 64, 66 and 68 for locking each of the sensing members 72, 74 and 76 in Figure 5 in position, as will be described in greater

detail with reference to Figures 5, 6, and 7. Also shown in Figure 4, is a similar arrangement for a write enable sensor, wherein the hole for the write enable sensor is shown at number 54 with a corresponding probe tip 62 having a corresponding bifurcated end 70.

In Figure 5, there is shown a bottom plan view of applicant's hub assembly, shown in Figure 4, which shows the reverse side thereof. On the back surface 88 of applicant's supply reel hub, there are shown elongated sensing members 72, 74 and 76, one end of each of the sensing members 72, 74 and 76 is positioned through holes 52. At the end of the sensing members 72, 74 and 76, which are positioned through holes 52, there are positioned corresponding sensing protrusions 80, 82, and 84. The sensing protrusions 80, 82, and 84 are positioned on the opposite side of the holes 52 from their corresponding probe tips 56, 58, and 60 in Figure 4. In this manner, each of the sensing protrusions 80, 82 and 84 provide a signalling flag to indicate that the corresponding probe tips 56, 58 and 60 are each in proper position and in contact with the inner annular surface of the supply reel 95 in Figure 8. There is also a corresponding sensing protruding 86 positioned on sensing member 78 used in combination with probe tip 62 in Figure 4 for sensing if a write enable ring is positioned on the supply reel. Each of the sensing protrusions 80, 82, 84 and 86 interrupt an optical sensor, as will be described in greater detail with reference to Figure 13. It can be seen, therefore that each of the sensing protrusions 80, 82, 84, and 86 are checked to ensure that each of the probe tips 56, 58, 60 and 62 in Figure 4 are properly positioned so that the problem of a single sensing means falsely indicating that the supply hub is properly positioned on the supply reel has been overcome. Also shown in Figure 5 on the back surface 88 of the supply reel hub, is a split locking ring 90 and a standard locking mechanism 92 for engaging the feet 20 and locking the supply reel hub 16 in Figure 4 onto the supply reel.

In Figure 6, there is shown a cross-sectional view taken through line 6-6 of Figure 5, showing a typical sensing member. All of the sensing member 72, 74, 76; and 78 for sensing the write enable ring, all shown in Figure 5, operate in the same manner, so that Figure 6 is illustrative of a typical sensing member 72. Shown in Figure 6 is an elongated sensing member 72, having at one end its corresponding probe tip 56. Probe tip 56 is positioned through hole 52 and thus protrudes slightly above the sloped surface 48 on the top of the supply reel hub 16. Across from the probe tip 56 is sensing protrusion 80 which is on the other side of hole 52 and protrudes from the underside of the supply reel hub 16. At the other end of elongated sensing

member 72, opposite to the end where the probe tip 56 is attached, there is attached a bifurcated end 64 for locking the elongated sensing member 72 in place on the supply reel hub 16.

Referring now to Figure 7, there is shown a cross-sectional view taken through line 7-7 of Figure 6. Greater detail on the bifurcated end 64 is shown as it locks elongated sensing member 72 in position as bifurcated end 64 is locked against the edges of hole 65. Thus it can be seen, that bifurcated end 64 cannot slip out of the end of hole 65 and thus securely locks sensing member 72 into position.

Figure 8 is a side elevational view of applicant's supply reel hub, showing in dashed lines a supply reel positioned on the supply reel hub assembly. The motor shaft 24 is connected to drive motor 27 as shown diagrammatically in Figure 8. The drive motor 27 rotates the supply reel 12. In Figure 8, there is shown in dashed lines a plastic case 18 of a supply reel 12 having a circular indentation 94 wherein a write enable ring would be positioned on the supply reel 12 if it is desired. As can be seen then in Figure 8 there is an elongated sensing member 78 having attached at one end of the corresponding sensing protrusion 86, and across from sensing protrusion 86 on the top surface 87 of the supply reel hub is probe tip 62. Probe tip 62 then engages the circular indentation 94 in the supply reel to sense if there is a write enable ring on the supply reel 12. In a similar manner, on the right side of Figure 8 there is shown a supply reel 12 also in dashed lines. On the right side of Figure 8, there is shown the inner annular surface 95 of the supply reel 12 which functions in a manner similar to circular indentation 94 shown on the left side of Figure 8. Probe tip 58 seen on Figure 8, then, upon rotation, would contact the inner annular surface 95 of the supply reel 12. If the supply reel 12 is not properly positioned on the supply reel hub 16, the probe tip 58 would not come in contact with the inner annular surface 95 of the supply reel and, therefore, sensing protrusion 82 would not be activated. In applicant's new and novel supply reel hub, all three of the sensing protrusions must be activated, thereby ensuring a proper positioning of the supply reel 12 on the supply reel hub 16 in three different locations. It is also shown in Figure 8 how the feet 20 have a pad 96 for engaging the inside circumference 22 of the plastic case 18 of the supply reel and further that the leg 20 has a lip 98 which tightly secures the top edge 99 of the supply reel 12 at the rim of the inside circumference of the plastic case 23.

Referring now to Figure 9, there is shown an enlarged top plan view showing the center portion of the supply reel hub, and in particular, there is shown greater detail on the hub attaching means

26. The hub attaching means 26 comprises a drilled hole 102 and a tapped hole 104, shown in Figure 10. The drilled hole 102 has elongated slots 110 and 112 positioned around one side of the hole 25. Elongated slots 110 and 112 provide a weakened thin wall section 114 in proximity to one side of the hole 25 in the supply reel hub around the motor shaft 24. In Figure 10, there is shown a cross-sectional view taken through line 10-10 of Figure 9. In Figure 10, as bolt 106 is positioned into tapped hole 104 in the direction as shown by arrow 108, the tightening of the bolt 106 serves to push out the weakened thin wall section 114 in Figure 9 in the direction shown by arrow 116 in Figure 9 so that the hole 25 in the supply reel hub 16 tightens around the drive motor shaft 24. This manner of tightening the hole 25 in the supply hub around the drive motor shaft 24 at the weakened thin wall section 114 serves to improve perpendicularity and thereby ensures less edge damage to a supply reel tape.

Referring now to Figure 11, there is shown a top plan view showing greater details of the centering member used on applicant's supply reel hub assembly. The centering member, shown generally by the number 28 is generally frusto-conical in shape, having an upper surface 118. The distance across the upper surface 118, particularly the length and slope, as will be explained further with reference to Figure 12, are designed to allow a tape reel to pass over the top of the centering member 28, and also the write enable tap on a supply reel tape does not get hung up on the supply reel hub assembly as will be explained further with reference to Figure 16. Also shown in Figure 11 is short side surface 126, having at one end a nick 125. The short side surface 126 with its nick 125 has been adapted to accommodate a smaller six-inch reel, whereby the nick 125 fits into the inner diameter of a six-inch reel such that if a six-inch reel is positioned askew in the tape drive, the nick 125 will engage the inner diameter of the six-inch reel, sliding it into proper position upon rotation. Also, short side surface 126 is angled to grab the inner circumference of a supply reel. Experimentation has shown if the angle of the short side surface 126 were shallower, it would not grab the supply reel and pull it along during mounting of the supply reel tape. The centering member 28 also has a long side surface 124 across from the short side surface 126. The angle of the long side surface 124 is to provide a smooth continuation of the bottom surface 120 of the centering member 28 in Figure 12, and with the smooth continuation, forms an integral positioning of the centering member 28 on the supply reel hub.

Figure 12 is a cross-sectional view taken through line 12-12 of Figure 11 also showing the

centering member used on the supply reel hub. In Figure 12, it can be seen that the upper surface of the centering member 118 and the bottom surface of the centering member 120 are substantially parallel. However, the upper surface 118 and the bottom surface 120 are displaced by angle 122. The angle 122 is approximately 2 degrees, and, as explained with reference to Figure 11, the slope of the upper surface of the centering member 118 allows a supply tape to pass over the top of the centering member 28 and the write enable tab of the supply tape does not get hung up on the centering member 28.

In Figure 13, there is shown a schematic view of applicant's locking hub system. Figure 13 shows the back surface 88 of the supply reel hub with signalling flags 80, 82 and 84. Arrows 128, 130 and 132 indicate the rotation of signalling flags 82, 80 and 84. As seen at arrow 128, the signalling flag 82 is cutting through optical beam 136 of optical interrupter 134. In the preferred embodiment, the optical interrupter 134 is an emitter detector which is normally "on." A typical emitter detector which may be used is Honeywell HOA 1882. As the signalling flag 82 goes through optical beam 136 of the optical interrupter 134, the optical interrupter 134 goes "off." Thus, if each of the plurality of the signalling flags 80, 82 and 84 do not break through optical beam 136 an error condition is detected. The optical interrupter 134 is positioned on the frame 138 of the locking hub system. As optical beam 136 is broken by signalling flag 82 and optical interrupter 134 goes "off," a signal is transmitted through transmission line 140 from the optical interrupter 134 to the controlling means in the form of a master controller 142. A typical master controller which may be used is a Motorola MC6809. The master controller 142 may send a signal across transmission line 168 to the computer 170 indicating that the computer 170 may continue its loading operation, or alternatively, that an error exists and operations involving the tape drive must stop. The master controller 142 also sends a signal across transmission line 164 to a display and user interface 166. Thus, the master controller 142 sends a signal which causes the display of an error condition directly on the tape drive. This operation of sensing if a signalling flag 82 has broken the optical beam 136 and the optical interrupter 134 sending a signal to the master controller 142 and the master controller 142 signalling an error condition on the display 166 on the tape drive is done both upon loading and unloading of the supply reel tape. If the master controller 142 has received proper signals from the optical interrupter 134 that the signalling flags 80, 82 and 84 have passed through the optical beam 136, then the master controller 142 signals through transmission line 144

to a power supply 146. The power supply 146 then transmits voltage across transmission line 148 to a solenoid 150. The arm of the solenoid 151 then moves in the direction of arrow 152 and engages actuator arm 154. Actuator arm 154 is mounted by pin 156 and, upon being pushed by solenoid arm 151, the actuator arm 154 moves in the direction of arrow 158 causing the engaging surface 160 of the actuator arm 154 to engage the mating surface 162 of the locking mechanism 92. In preferred embodiment, therefore, the activating means which activates the locking mechanism 92 on the supply reel hub 16 is a combination of the power supply 146 which applies voltage to solenoid 150, thus extending the solenoid arm 151 to engage the actuator arm 154.

Also referring to Figure 13, upon unloading the supply reel from supply hub 16, the supply reel is rotated in reverse. By known means, the read/write path of the tape is sensed by sensor 11 in Figure 13, which is positioned between the supply reel 12 and the take up reel 14, sensor 11 determines if there is tape in the read/write path or if all the tape is on the supply reel 12. If all the tape is on the supply reel 12, a signal is sent through transmission line 15 to the master controller 142 indicating that the supply reel 12 is in an unload condition. The master controller 142 signals to the power supply 146. Voltage is applied to the solenoid 150 and the solenoid arm 151 engages contact with the actuator arm 154. The engaging surface 160 of the actuator arm 154 engages contact with the mating surface 162 of the locking mechanism 92 thereby locking the locking mechanism 92 in its reversed position, stopping rotation of the supply reel 12 and retracting feet 20 in Figure 8 back into the supply hub 16. In the case of unloading, one of the signalling flags 80, 82 or 84 does not break the optical beam 136 of the optical interrupter 134. Therefore a signal is sent to the master controller 142 that the feet 20 in Figure 8 are retracted into the supply hub 16 an operation of the tape drive assembly is terminated at which point the supply reel 12 can be removed from the supply hub 16.

Referring now to Figure 14, there is shown a bottom plan view of the supply reel hub assembly similar to Figure 5, and showing in greater detail the operation of the actuator arm. In Figure 14, it can be seen that actuator arm 154 is mounted by pin 156 and at one end of actuator arm 154 there is an engaging surface of the actuator arm 160 which engages its mating surface 162 on the locking mechanism 92. The actuator arm 154 has an arm 172 extending therefrom. As solenoid 150 activates and extends solenoid arm 151 in the direction shown by arrow 52, arm 172 causes the actuator arm 154 to be moved in direction 158 whereby the engaging surface of the actuator arm 160

then engages its mating surface 162 on the locking mechanism 92.

Figure 15 is a bottom plan view of the supply tape reel with a write enable ring shown in position. The underside of the tape 174 has positioned thereon a write enable ring 176 and the write enable ring 176 has formed thereon a tab 178. The write enable ring 176 is positioned in a groove in proximity to the inner circumference of the tape 180.

Referring now to Figure 16, there is shown how the tab 178 of the write enable ring 176 is allowed to pass through groove 182, thereby allowing the supply reel 12 to be easily mounted onto the supply reel hub 16. It has been seen through experimentation that often the tab 178 of the write enable ring 176 becomes bent after periods of use and when this occurs, as the supply reel 12 is being mounted onto the supply reel hub 16, the tab 178 of the write enable ring 176 can become hung up on the centering member 28. When this occurs, the supply reel 12 is rotated and the tab 178 of the write enable ring 176 is allowed to freely passed through groove 182 and thus the supply reel 12 is allowed to be easily loaded onto the supply reel hub 16 and through the opening in the tape drive unit 184.

Also disclosed is a method of assuring locking of a supply reel to a computer tape drive by means of a supply hub in which a supply hub having a hub base and a plurality of locking means are provided. A plurality of elongated spaced apart sensing means are positioned around the periphery of the hub base and the elongated sensing means have sensing protrusions which extend partially out of the supply hub and contact the supply reel whenever the supply reel is properly positioned in a predetermined position. Activating means are also provided which are in contact with the plurality of locking means for activating the locking means to lock the supply reel onto the supply hub. In the preferred embodiment, the activating means comprises a power supply which applies voltage to a solenoid and the solenoid arm engages an actuator arm which engages a portion of the locking mechanism. Also provided is a controlling means for controlling the operation of the computer tape drive. A plurality of signalling means are formed on one end of the elongated sensing means for signalling to the controlling means that each of the plurality of sensing protrusions are properly positioned in a predetermined position to indicate that the supply reel is properly aligned. The supply hub is positioned on the computer tape drive and the supply reel is then positioned and centered onto the supply hub. The plurality of spaced apart sensing means sense whether the locking means are properly positioned in a predetermined position on the

supply reel and the signalling means signal to the controlling means whether the locking means are properly positioned on the supply reel to indicate that the supply reel is properly aligned. If the supply reel is properly positioned and aligned, the activating means activate the locking means and the supply reel is locked onto the supply hub if the locking means are properly positioned in the predetermined position on the supply reel. In the event that the locking means are not properly positioned in the predetermined position on the supply hub, an error message is displayed on the computer tape drive. In addition to displaying an error message on the computer tape drive when the locking means are not properly positioned in the predetermined position of the supply hub, a signal may also be sent to a computer used with the computer tape drive and an error message may be displayed on the computer also.

The method of assuring locking of a supply reel to a computer tape drive by means of a supply hub with additional steps to assure unlocking of the supply reel from the supply hub is also provided, whereby, a second sensing means is provided to sense whether there is tape remaining on the tape path between the supply reel and the take up reel. When there is no tape in the tape path, all the tape is on the supply reel indicating an unlock condition. Transmission means are also provided for signalling to the controlling means that there is no tape on the tape path. To unlock the supply reel from the supply hub, the supply reel is rotated in reverse; the second sensing means senses whether there is tape in the tape path; when there is no tape in the tape path, the transmission means signals to the controlling means that there is no tape on the tape path. A signal is sent from the controlling means to the activating means to indicate that the supply reel is in unload condition and the locking means are activated to retract into the supply hub. One of the plurality of spaced apart sensing means senses whether the locking means are properly retracted into the supply hub and a signal is sent from one of the plurality of signalling means to the controlling means to indicate that the locking means are properly retracted into the supply hub. At this point, operation of the tape drive ceases and the supply tape can be removed from the supply hub.

Claims

1. A reel hub assembly with a locking mechanism for locking a tape supply reel (12) used on a computer tape drive having a frame, the supply reel (12) having an inner circumference (22) with a rim, the hub assembly being used to assure proper alignment of the supply reel

(12) on the hub (16), comprising:

- (a) a drive motor (27) having a shaft (24) for rotating the supply reel (12);
- (b) a hub base (45) having a periphery with a central opening (25) and having means for releasably attaching the hub base (45) to the shaft (24) of the drive motor (27);
- (c) locking means (20, 92) positioned on the hub base (45) for locking the supply reel (12) to the hub base (45);
- (d) activating means (150, 160) fixedly attached to the frame and in contact with the locking means (20, 92) for activating the locking means (20, 92) to lock the supply reel (12) onto the hub (16);

characterized by further comprising

- (e) a plurality of elongated spaced apart sensing means (72, 74, 76) positioned around the periphery of the hub base (45) in a predetermined position, the elongated sensing means (72, 74, 76) having sensing protrusions (56, 58, 60) extending partially out of the hub (16) to contact the supply reel (12) whenever the supply reel (12) is properly positioned; and
- (f) a plurality of signalling means (80, 82, 84), formed on one end of the elongated sensing means (72, 74, 76) for signalling to the computer tape drive (110) that each of the plurality of sensing protrusions (56, 58, 60) is positioned properly in a predetermined position to indicate that the supply reel (12) is properly aligned.

2. A reel hub assembly as defined in claim 1 wherein the locking means (20, 92) comprise three generally L-shaped feet (20), the L-shaped feet (20) being adapted to engage the rim edge of the inner circumference (22) of the supply reel (12).
3. A reel hub assembly as defined in claim 1 wherein the means (26) for releasably attaching the shaft (24) of the drive motor (27) to the hub base (45) comprises:
 - (a) a screw receiving hole (104) having two elongated slots (110, 112) positioned partially around one side of the central opening (25) in the hub base (45), and having a weakened section (114); and
 - (b) whereby when a bolt (106) is tightened in the screw receiving hole (104), the central opening (25) of the hub base (45) is deformed at the weakened section (114).
4. A reel hub assembly as defined in claim 1 further comprising:
 - (g) centering means (28) positioned on the



supply reel and the signalling means signal to the controlling means whether the locking means are properly positioned on the supply reel to indicate that the supply reel is properly aligned. If the supply reel is properly positioned and aligned, the activating means activate the locking means and the supply reel is locked onto the supply hub if the locking means are properly positioned in the predetermined position on the supply reel. In the event that the locking means are not properly positioned in the predetermined position on the supply hub, an error message is displayed on the computer tape drive. In addition to displaying an error message on the computer tape drive when the locking means are not properly positioned in the predetermined position of the supply hub, a signal may also be sent to a computer used with the computer tape drive and an error message may be displayed on the computer also.

The method of assuring locking of a supply reel to a computer tape drive by means of a supply hub with additional steps to assure unlocking of the supply reel from the supply hub is also provided, whereby, a second sensing means is provided to sense whether there is tape remaining on the tape path between the supply reel and the take up reel. When there is no tape in the tape path, all the tape is on the supply reel indicating an unlock condition. Transmission means are also provided for signalling to the controlling means that there is no tape on the tape path. To unlock the supply reel from the supply hub, the supply reel is rotated in reverse; the second sensing means senses whether there is tape in the tape path; when there is no tape in the tape path, the transmission means signals to the controlling means that there is no tape on the tape path. A signal is sent from the controlling means to the activating means to indicate that the supply reel is in unload condition and the locking means are activated to retract into the supply hub. One of the plurality of spaced apart sensing means senses whether the locking means are properly retracted into the supply hub and a signal is sent from one of the plurality of signalling means to the controlling means to indicate that the locking means are properly retracted into the supply hub. At this point, operation of the tape drive ceases and the supply tape can be removed from the supply hub.

Claims

1. A reel hub assembly with a locking mechanism for locking a tape supply reel (12) used on a computer tape drive having a frame, the supply reel (12) having an inner circumference (22) with a rim, the hub assembly being used to assure proper alignment of the supply reel

(12) on the hub (16), comprising:

- (a) a drive motor (27) having a shaft (24) for rotating the supply reel (12);
- (b) a hub base (45) having a periphery with a central opening (25) and having means for releasably attaching the hub base (45) to the shaft (24) of the drive motor (27);
- (c) locking means (20, 92) positioned on the hub base (45) for locking the supply reel (12) to the hub base (45);
- (d) activating means (150, 160) fixedly attached to the frame and in contact with the locking means (20, 92) for activating the locking means (20, 92) to lock the supply reel (12) onto the hub (16);

characterized by further comprising

- (e) a plurality of elongated spaced apart sensing means (72, 74, 76) positioned around the periphery of the hub base (45) in a predetermined position, the elongated sensing means (72, 74, 76) having sensing protrusions (56, 58, 60) extending partially out of the hub (16) to contact the supply reel (12) whenever the supply reel (12) is properly positioned; and
- (f) a plurality of signalling means (80, 82, 84), formed on one end of the elongated sensing means (72, 74, 76) for signalling to the computer tape drive (110) that each of the plurality of sensing protrusions (56, 58, 60) is positioned properly in a predetermined position to indicate that the supply reel (12) is properly aligned.

2. A reel hub assembly as defined in claim 1 wherein the locking means (20, 92) comprise three generally L-shaped feet (20), the L-shaped feet (20) being adapted to engage the rim edge of the inner circumference (22) of the supply reel (12).
3. A reel hub assembly as defined in claim 1 wherein the means (26) for releasably attaching the shaft (24) of the drive motor (27) to the hub base (45) comprises:
 - (a) a screw receiving hole (104) having two elongated slots (110, 112) positioned partially around one side of the central opening (25) in the hub base (45), and having a weakened section (114); and
 - (b) whereby when a bolt (106) is tightened in the screw receiving hole (104), the central opening (25) of the hub base (45) is deformed at the weakened section (114).
4. A reel hub assembly as defined in claim 1 further comprising:
 - (g) centering means (28) positioned on the



periphery of the hub base (45) for centering the supply reel (12) on the hub (16).

5. A reel hub assembly as defined in claim 4 wherein the centering means (28) is a generally frusto-conical shaped member having a generally flat upper surface (118) substantially parallel to the surface of the hub base (45) and further having a portion removed at one corner (125), the centering means (28) being fixedly attached to the hub base (45).

6. A reel hub assembly as defined in claim 5 wherein the supply reel (12) has a write enable ring (176) having a tab (178) attached thereto and further comprising:

(a) a groove (182) formed in the hub base (45) in proximity to the centering means (28) running radially outward; and
(b) whereby as the tab (178) of the write enable ring (176) becomes caught on the centering means, as the supply reel is rotated the tab of the write enable ring will pass across the groove (182) on the hub base (45).

7. A reel hub assembly as defined in claim 1 further comprising:

(g) an additional elongated sensing means (76) positioned on the hub base (45), the additional elongated sensing means (76) having a sensing protrusion (62) extending partially out of the hub (16) to contact the supply reel (12) in proximity to its inside circumference (22) to sense the presence or absence of a write enable ring (176).

8. A reel hub assembly as defined in claim 1 wherein the plurality of signalling means are signalling flags (80, 82, 84) positioned at the rear of the hub (16).

9. A reel hub assembly as defined in the preceding claims and further comprising:

(a) controlling means (142) associated with the frame (138) for controlling the operation of the computer tape drive;
(b) receiving means (134) associated with the frame (138) for receiving the signal from each of the signalling means (80, 82, 84);
(c) a first transmission means (140) associated with the receiving means (134) for transmitting the plurality of signals from the receiving means (134) to the controlling means (142); and
(d) a second transmission means (144) associated with the controlling means (142) and the activating means (150) for transmit-

ting the plurality of signals from the controlling means (142) to the activating means (150), whereby the controlling means (142) activates the activating means (150), whenever the plurality of signals have been received indicating that each of the sensing means (72, 74, 76) are in a proper predetermined position.

10. A reel hub assembly as defined in claim 9 wherein the activating means (150) comprises in part:

(a) a power supply (146) for applying voltage;
(b) a solenoid (150) having a solenoid arm (151) associated with the power supply (146), the solenoid (150) receiving voltage from the power supply (146);
(c) an actuator arm (160) associated with the solenoid arm (151); and
(d) whereby as voltage is applied to the solenoid (150), the solenoid arm (151) pushes the actuator arm (160) into engagement with the locking means (20, 92) thereby locking the supply reel to the hub base (45) as the hub rotates.

11. A reel hub assembly as defined in claim 9 further comprising:

(k) a display (166) positioned on the frame;
(l) a third transmission means (164) associated with the controlling means (142) and the display (166) for transmitting the plurality of signals from the controlling means (142) to the display (166).

12. A reel hub assembly as defined in claim 11 further comprising:

(m) a fourth transmission means (168) associated with the controlling means (142) for transmitting the plurality of signals from the controlling means (142) to the computer (170).

13. A reel hub assembly as defined in claim 9 wherein the controlling means (142) is a master controller which functions to receive and interpret the plurality of signals from the receiving means (134) and to signal the activating means (150) whenever the plurality of signals have been received indicating that each of the sensing means (72, 74, 76) are in a proper position.

14. A reel hub assembly as defined in claim 9 wherein the receiving means (134) is an optical interrupter which functions to receive a plurality of signals from the signalling means (80,



82, 84) and to transmit the plurality of signals to the controlling means (142).

15. A reel hub assembly as defined in claim 9 wherein the receiving means (134) is an emitter detector which functions to receive a plurality of signals from the signalling means (80, 82, 84) and to transmit the plurality of signals to the controlling means (142).

16. A reel hub assembly as defined in claim 9 wherein:

- (a) the locking means (20, 92) are used for unlocking the supply reel (12) from the hub base (45);
- (b) the elongated spaced apart sensing means (72, 74, 76) are retracted into the hub (16) to release contact from the supply reel (12) whenever the reel (12) is being removed from the supply reel hub (16);
- (c) the activating means (150) are used for activating the locking means (20, 92) to unlock the supply reel (12) from the hub (16);
- (d) one of the plurality of signalling means (80, 82, 84) signals to the controlling means (142) that each of the plurality of sensing protrusions (56, 58, 60) are properly retracted into the hub (16); and
- (e) whereby the controlling means (142) activates the activating means (150) whenever the plurality of signals have been received indicating that each of the sensing means (72, 74, 76) are properly retracted into the hub (16).

17. A method of assuring locking of a supply reel (12) to a computer tape drive (10) having a frame, wherein the supply reel (12) having an inner circumference (22) with a rim is locked on a supply hub having a central opening (25) and means for releasably attaching the hub (16) to a shaft (24) of a drive motor (27) for rotating the hub (16), comprising the steps of

- (a) positioning the supply hub (16) on the computer tape drive (10);
 - (b) positioning the supply reel (12) onto the hub (16);
 - (c) centering the supply reel (12) over the supply hub (16);
- characterized by the further steps of:
- (d) sensing with a plurality of spaced apart sensing means (72, 74, 76), whether the supply reel (12) is properly positioned in a predetermined position on the supply hub (16);
 - (e) signalling to controlling means (142) whether the supply reel (12) is properly

positioned in a predetermined position on the hub (16);

- (f) activating the locking means (20, 92) if the supply reel (12) is properly positioned in the supply hub (16);
- (g) locking the supply reel (12) onto the supply hub (16); and
- (h) displaying an error message on the computer tape drive (10) if the supply reel (12) is not properly positioned in a predetermined position on the supply hub (16).

18. The method of assuring locking of a supply reel (12) to a computer tape drive (10) as defined in claim 17 wherein there is a tape path between the supply reel (12) and a take up reel (14) further comprising the steps of:

- (a) rotating the supply reel (12) on the supply hub (16) in a reverse direction;
- (b) sensing with second sensing means (11) that there is no tape in the tape path;
- (c) transmitting a signal from the second sensing means (11) to the controlling means (142) when there is no tape in the tape path;
- (d) signalling from the controlling means (142) to the activating means (150) to indicate that the supply reel (12) is in unload condition;
- (e) activating the locking means (20, 92) to retract the locking means (20, 92) into the supply hub (16);
- (f) sensing with one of the plurality of spaced apart sensing means (72, 74, 76) whether the supply reel (12) is properly unlocked from the supply hub (16);
- (g) signalling from one of the plurality of signalling means (72, 74, 76) to the controlling means (142) that the supply reel (12) is properly unlocked from the supply hub (16);
- (h) ceasing operation of the tape drive (10); and
- (i) removing the supply reel (12) from the supply hub (16).

19. The method of assuring locking of a supply reel (12) to a computer tape drive (10) as defined in claim 18 wherein the supply reel (12) has a write enable ring (176) having a tab (178) further comprising the step of:
- rotating the supply reel (12) until the tab (178) of the write enable ring (176) on the supply reel (12) passes across the groove (182) on a hub base (45).

Patentansprüche

1. Spulennaben-Anordnung mit einem Verriegelungsmechanismus zum Verriegeln einer



Bandspeisespule (12), wie sie bei einem Computer-Bandantrieb mit einem Rahmen eingesetzt wird, wobei die Speisespule (12) einen inneren Umfang (22) mit einem Kragen aufweist und die Nabenanordnung zum Gewährleisten korrekter Ausrichtung der Speisespule (12) auf der Nabe (16) eingesetzt ist, umfassend:

- (a) einen Antriebsmotor (27) mit einer Welle (24) zum Drehen der Speisespule (12);
- (b) eine Nabenbasis (45) die ein Umfangsgebiet mit einer zentralen Öffnung (25) sowie Mittel zum lösbaren Befestigen der Nabenbasis (45) auf der Welle (24) des Antriebsmotors (27) aufweist;
- (c) eine Verriegelungsvorrichtung (20,92) auf der Nabenbasis (45) zum Verriegeln der Speisespule (12) mit der Nabenbasis (45);
- (d) eine Aktivierungsvorrichtung (150,160), die fest auf dem Rahmen in Kontakt mit der Verriegelungsvorrichtung (20,92) angebracht ist, um die Speisespule (12) auf der Nabe (16) zu verriegeln;

gekennzeichnet durch

- (e) mehrere langgestreckte, im Abstand angeordnete Fühlmittel (72,74,76), die um den Umfang der Nabenbasis (45) in vorbestimmter Lage positioniert sind und Fühlvorsprünge (56,58,60) aufweisen, die teilweise von der Nabe (16) zum Kontaktieren der Speisespule (12) vorkragen, wenn die Speisespule (12) korrekt positioniert ist; und
- (f) mehrere Signalvorrichtungen (80,82,84) je an einem Ende der langgestreckten Fühlmittel (72,74,76), um dem Computer-Bandantrieb (110) zu melden, daß jeder Fühlvorsprung (56,58,60) korrekt in vorbestimmter Lage positioniert ist, um so anzuzeigen, daß die Speisespule (12) korrekt ausgerichtet ist.

2. Spulennaben-Anordnung nach Anspruch 1, bei der die Verriegelungsvorrichtung (20,92) drei im wesentlichen L-förmige Füße (20) aufweist, die dazu ausgelegt sind, am Kragenrand des inneren Umfangs (22) der Speisespule (12) anzugreifen.
3. Spulennaben-Anordnung nach Anspruch 1, bei der die Mittel zum lösbaren Befestigen der Nabenbasis (45) auf der Welle (24) des Antriebsmotors (27) umfassen:
 - (a) ein Schraubenaufnahmeloch (104) mit zwei langgestreckten Schlitz (110, 112), die teilweise eine Seite der zentralen Öffnung (25) in der Nabenbasis (45) umgeben und einen geschwächten Abschnitt (114) haben;

(b) so daß dann, wenn ein Bolzen (106) in dem Schraubenaufnahmeloch (104) festgezogen wird, die zentrale Öffnung (25) der Nabenbasis (45) im geschwächten Abschnitt (114) verformt wird.

4. Spulennaben-Anordnung nach Anspruch 1, die ferner umfaßt:

- (g) Eine Zentriervorrichtung (28), die auf dem Umfang der Nabenbasis (45) zum Zentrieren der Speisespule (12) auf der Nabe (16) angeordnet ist.

5. Spulennaben-Anordnung nach Anspruch 4, bei der die Zentriervorrichtung (28) ein im wesentlichen kegelförmiges Bauteil mit einer allgemein ebenen Oberseite (118) ist, die im wesentlichen parallel zur Oberfläche der Nabenbasis (45) ist und ferner eine Ecke (125) eine Abflachung aufweist, wobei die Zentriervorrichtung (128) fest an der Nabenbasis (45) angebracht ist.

6. Spulennaben-Anordnung nach Anspruch 5, bei der die Speisespule (12) einen Schreib-Freigaber (176) mit einer daran befestigten Zunge (178) hat und ferner aufweist:

- (a) eine in der Nabenbasis (45) nächst der Zentriervorrichtung (28) radial außerhalb verlaufende Nut (182),
- (b) so daß beim Auflaufen der Zunge (128) des Schreib-Freigabers (176) an der Zentriervorrichtung bei Drehung der Speisespule die Zunge über die Nut (182) der Nabenbasis (45) läuft.

7. Spulennaben-Anordnung nach Anspruch 1, ferner umfassend:

- (g) ein zusätzliches langgestrecktes Fühlmittel (76), welches an der Nabenbasis (45) positioniert ist und einen Fühlvorsprung (62) hat, der teilweise von der Nabe (16) vorkragt, so daß er die Speisespule (12) nächst ihres innenseitigen Umfangs (22) kontaktiert, um das Vorhandensein oder das Fehlen eines Schreib-Freigabers (176) zu fühlen.

8. Spulennaben-Anordnung nach Anspruch 1, bei der die mehreren Signalvorrichtungen Signalflaggen oder -marken (80, 82, 84) sind, die auf der Rückseite der Nabe (16) angeordnet sind.

9. Eine Spulennaben-Anordnung nach einem der vorangehenden Ansprüche, weiterhin umfassend:

- (a) eine Kontrollvorrichtung (142), welche dem Rahmen (138) zum Steuern des Betriebes des Computer-Bandantriebes zugeordnet



net ist;

(b) eine Aufnahmeverrichtung (134), welche dem Rahmen (138) zum Aufnehmen der Signale von jeder Signalvorrichtung (80, 82, 84) zugeordnet ist;

(c) eine erste Übertragungsverrichtung (140), welche der Aufnahmeverrichtung (134) zum Übertragen mehrerer Signale von der Aufnahmeverrichtung (134) zu der Kontrollvorrichtung (142) zugeordnet ist und

(d) eine zweite Übertragungsverrichtung (144), welche der Kontrollvorrichtung (142) und der Aktivierungsvorrichtung (150) zum Übertragen mehrerer Signale von der Kontrollvorrichtung (142) zu der Aktivierungsvorrichtung (150) zugeordnet ist, wodurch die Kontrollvorrichtung (142) die Aktivierungsvorrichtung (150) immer dann aktiviert, wenn die mehreren Signale empfangen worden sind, um anzuzeigen, daß jedes der Füllmittel (72, 74, 76) in korrekter, vorbestimmter Position sind.

10. Spulennaben-Anordnung nach Anspruch 9, bei der die Aktivierungsvorrichtung (150) umfaßt:

(a) eine Energieversorgung (146) zum Anlegen einer Spannung;

(b) einen Solenoid (150) mit einem Solenoidarm (151), welcher der Energieversorgung (146) zugeordnet ist, wobei der Solenoid (150) eine Spannung von der Energieversorgung (146) aufnimmt;

(c) einen Betätigungsarm (160), welcher dem Solenoidarm (151) zugeordnet ist,

(d) derart, daß beim Anlegen einer Spannung an den Solenoid (150) der Solenoidarm (151) den Betätigungsarm (160) in Eingriff mit der Verriegelungsvorrichtung (20, 92) bringt, um so die Speisespule mit der Nabenbasis (45) zu verriegeln, wenn die Nabe rotiert.

11. Spulennaben-Anordnung nach Anspruch 9, ferner umfassend:

(k) ein auf dem Rahmen angeordnetes Display (166);

(l) eine dritte Übertragungsverrichtung (164) welche der Kontrollvorrichtung (142) und dem Display (166) zum Übertragen der mehreren Signale von der Kontrollvorrichtung (142) zu dem Display (166) zugeordnet ist.

12. Spulennaben-Anordnung nach Anspruch 11, ferner umfassend:

(m) eine vierte Übertragungsverrichtung (168), welche der Kontrollvorrichtung (142) zum Übertragen der mehreren Signale von

der Kontrollvorrichtung (142) zu dem Computer (170) zugeordnet ist.

13. Spulennaben-Anordnung nach Anspruch 9, bei der die Kontrollvorrichtung (142) ein Meister-Computer ist, der zum Aufnehmen und Interpretieren mehrerer, aus der Empfangsvorrichtung (134) übertragener Signale und zum Signalisieren zur Aktivierungsvorrichtung (150) immer dann fungiert, wenn die mehreren Signale empfangen worden sind und anzuzeigen, daß sämtliche Füllmittel (72, 74, 76) in korrekter Position sind.

14. Spulennaben-Anordnung nach Anspruch 9, bei der die Empfangsvorrichtung (134) ein optischer Unterbrecher ist, der zum Empfangen der mehreren Signale aus der Signalvorrichtung (80, 82, 84) dient und die mehreren Signale zu der Kontrollvorrichtung (142) überträgt.

15. Spulennaben-Anordnung nach Anspruch 9, bei der die Empfangsvorrichtung (134) ein Emitter-Detektor ist, der zum Empfangen mehrerer Signale von den Signalvorrichtungen (80, 82, 84) und die mehreren Signale zu der Kontrollvorrichtung (142) überträgt.

16. Spulennaben-Anordnung nach Anspruch 9, bei der

(a) die Verriegelungsvorrichtung (20, 92) zum Entriegeln der Speisespule (12) und der Nabenbasis (45) eingesetzt wird;

(b) die langgestreckten, im Abstand angeordneten Füllmittel (72, 74, 76) in die Nabe (16) zurückgezogen werden, um den Kontakt mit der Speisespule (12) immer dann aufzuheben, wenn die Spule (12) von der Speisespulennabe (16) weggenommen wird;

(c) die Aktivierungsvorrichtung (150) zum Aktivieren der Verriegelungsvorrichtung (20, 92) zum Entriegeln der Speisespule (12) von der Nabe (16) eingesetzt wird,

(d) eine der mehreren Signalvorrichtungen (80, 82, 84) der Kontrollvorrichtung (142) signalisiert, daß sämtliche Füllvorsprünge (56, 58, 60) korrekt in die Nabe (16) zurückgezogen sind; und

(e) die Kontrollvorrichtung (142) die Aktivierungsvorrichtung (150) immer dann aktiviert, wenn die mehreren Signale empfangen worden sind, um anzuzeigen, daß sämtliche Füllmittel (72, 74, 76) korrekt in die Nabe (16) zurückgezogen sind.

17. Verfahren zum Sicherstellen der Verriegelung einer Speisespule (12) mit einem Computer-



Bandantrieb (10) mit einem Rahmen, wobei die mit einem inneren Umfang (22) mit einem Kragen versehene Speisespule (12) auf einer Speisenabe mit einer zentralen Öffnung (25) verriegelt ist und Mittel zum lösbaren Befestigen der Nabe (16) mit einer Welle (24) eines Antriebsmotors (27) zum Drehantreiben der Nabe (16) vorgesehen sind, umfassend die Schritte

- (a) Positionieren der Speisenabe (16) auf dem Computer-Bandantrieb (10);
- (b) Positionieren der Speisespule (12) auf der Speisenabe (16);
- (c) Zentrieren der Speisespule (12) auf der Speisenabe (16);

gekennzeichnet durch die Schritte:

- (d) Fühlen mit mehreren im Abstand angeordneten Fühlvorrichtungen (72, 74, 76), ob die Speisespule (12) korrekt in vorbestimmter Position auf der Speisenabe (16) positioniert ist;
- (e) Signalisieren an die Kontrollvorrichtung (142), ob die Speisespule (12) korrekt in der vorbestimmten Position auf der Nabe (16) sitzt;
- (f) Aktivieren der Verriegelungsvorrichtung (20, 92), wenn die Speisespule (12) korrekt auf der Speisenabe (16) positioniert ist;
- (g) Verriegeln der Speisespule (12) auf der Speisenabe (16) und
- (h) Anzeigen einer Fehlerbotschaft an dem Computer-Bandantrieb (10), wenn die Speisespule (12) nicht korrekt in vorbestimmter Position auf der Speisenabe (16) positioniert ist.

18. Verfahren zum Gewährleisten der Verriegelung einer Speisespule (12) mit einem Computer-Bandantrieb (10) nach Anspruch 17, wobei eine Band-Laufbahn zwischen der Speisespule (12) und einer Aufnahmespule (14) vorhanden ist, mit den folgenden weiteren Schritten:

- (a) Drehen der Speisespule (12) auf der Speisenabe (16) in Rückwärtsrichtung;
- (b) Fühlen mit einer zweiten Fühlvorrichtung (11), ob kein Band in der Band-Laufbahn vorhanden ist;
- (c) Übertragen eines Signals von der zweiten Fühlvorrichtung (11) zu der Kontrollvorrichtung (142), wenn kein Band in der Band-Laufbahn vorhanden ist;
- (d) Signalisieren von der Kontrollvorrichtung (142) zu der Aktivierungsvorrichtung (150), um anzuzeigen, daß die Speisespule (12) in ungeladenem Zustand ist;
- (e) Aktivieren der Verriegelungsvorrichtung (20, 92) um die Verriegelungsvorrichtung (20, 92) in die Speisenabe (16) zurückzuzie-

hen;

- (f) Fühlen mit einer der mehreren im Abstand angeordneten Fühlvorrichtungen (72, 74, 76), ob die Speisespule (12) korrekt von der Speisenabe entriegelt ist;
- (g) Signalisieren von einer der mehreren Signalvorrichtungen (72, 74, 76) an die Kontrollvorrichtung (152), daß die Speisespule (12) korrekt von der Speisenabe (16) entriegelt ist;
- (h) Beenden des Betriebs des Bandantriebes (10) und
- (i) Entfernen der Speisespule (12) von der Speisenabe (16).

19. Verfahren zum Sicherstellen der Verriegelung einer Speisespule (12) mit einem Computer-Bandantrieb (10) nach Anspruch (18), wobei die Speisespule (12) einen Schreib-Freigaberling (176) mit einer Zunge (178) aufweist, mit folgendem weiteren Schritt:
Drehen der Speisespule (12), bis die Zunge (178) des Schreib-Freigaberlinges (176) auf der Speisespule (12) die Nut (182) an einer Nabebasis (45) überfährt.

Revendications

1. Un ensemble de mandrin de bobine comportant un mécanisme de blocage pour bloquer une bobine débitrice de bande (12) utilisée dans un système d'entraînement de bande pour ordinateur comportant un châssis, la bobine débitrice (12) comportant une circonférence intérieure (22) avec une bordure, l'ensemble de mandrin étant utilisé pour assurer un alignement correct de la bobine débitrice (12) sur le mandrin (16), ledit ensemble comprenant :

- (a) un moteur d'entraînement (27) comportant un arbre (24) pour entraîner en rotation la bobine débitrice (12) ;
- (b) une base de mandrin (45) comportant une périphérie pourvue d'une ouverture centrale (25) et comportant des moyens pour la fixation séparable de la base de mandrin (45) sur l'arbre (24) du moteur d'entraînement (27) ;
- (c) des moyens de blocage (20, 92) positionnés sur la base de mandrin (45) pour bloquer la bobine débitrice (12) sur la base de mandrin (45) ;
- (d) des moyens d'actionnement (150, 160) fixés sur le châssis et en contact avec les moyens de blocage (20, 92) pour actionner les moyens de blocage (20, 92) afin de bloquer la bobine débitrice (12) sur le mandrin (16) ;



- caractérisé par :
- (e) plusieurs moyens de détection (72, 74, 76), allongés, espacés l'un de l'autre et positionnés autour de la périphérie de la base de mandrin (45) dans des positions prédéterminées, les moyens allongés de détection (72, 74, 76) comportant des saillies de détection (56, 58, 60) s'étendant en partie hors du mandrin (16) pour entrer en contact avec la bobine débitrice (12) à chaque fois que la bobine débitrice (12) est correctement positionnée ;
- (f) plusieurs moyens de signalisation (80, 82, 84), formés à une extrémité des moyens allongés de détection (72, 74, 76) pour signaler au moyen d'entraînement de bande (110) de l'ordinateur que chacune des différentes saillies de détection (56, 58, 60) est placée correctement dans une position prédéterminée pour indiquer que la bobine débitrice (12) est correctement alignée.
2. Un ensemble de mandrin de bobine tel que défini dans la revendication 1, dans lequel les moyens de blocage (20, 92) comprennent trois pieds (20) ayant dans l'ensemble une forme de L, les pieds (20) en forme de L étant adaptés pour entrer en contact avec le bord de bordure de la circonférence intérieure (22) de la bobine débitrice (12).
 3. Un ensemble de mandrin de bobine tel que défini dans la revendication 1, dans lequel les moyens (26) de fixation séparables de l'arbre (24) du moteur d'entraînement (27) sur la base de mandrin (45) comprennent :
 - (a) un trou (104) de réception de vis comportant deux fentes allongées (110, 112) disposées en partie autour d'un côté de l'ouverture centrale (25) de la base de mandrin (45) et comportant une section affaiblie (114) ; et
 - (b) dans lequel, quand un boulon (106) est serré dans le trou (104) de réception de boulon, l'ouverture centrale (25) de la base de mandrin (45) est déformée dans sa section affaiblie (114).
 4. Un ensemble de mandrin de bobine tel que défini dans la revendication 1, comprenant en outre :
 - (g) un moyen de centrage (28) positionné sur la périphérie de la base de mandrin (45) pour centrer la bobine débitrice (12) sur le mandrin (16).
 5. Un ensemble de mandrin de bobine tel que défini dans la revendication 4, dans lequel le moyen de centrage (28) est un élément ayant dans l'ensemble une forme tronconique et comportant une surface supérieure généralement plane (118) sensiblement parallèle à la surface de la base de mandrin (45), et dont en outre une partie a été enlevée dans un coin (125), le moyen de centrage (28) étant fixé sur la base de mandrin (45).
 6. Un ensemble de mandrin de bobine tel que défini dans la revendication 5, dans lequel la bobine débitrice (12) comporte un anneau (176) de validation d'écriture qui est pourvu d'une languette (178), et comprenant en outre :
 - (a) une rainure (182) formée dans la base de mandrin (45) à proximité du moyen de centrage (28) et s'étendant radialement vers l'extérieur ; et
 - (b) dans lequel, lorsque la languette (178) de l'anneau (176) de validation d'écriture est accrochée sur le moyen de centrage, quand la bobine débitrice est entraînée en rotation, la languette de l'anneau de validation d'écriture passe à travers la rainure (182) prévue dans la base de mandrin (45).
 7. Un ensemble de mandrin de bobine tel que défini dans la revendication 1, comprenant en outre :
 - (g) un moyen de détection allongé additionnel (76) positionné sur la base de mandrin (45), ce moyen de détection allongé additionnel (76) comportant une saillie de détection (62) s'étendant partiellement hors du mandrin (16) pour entrer en contact avec la bobine débitrice (12) à proximité de sa circonférence intérieure (22) pour détecter la présence ou l'absence d'un anneau (176) de validation d'écriture.
 8. Un ensemble de mandrin de bobine tel que défini dans la revendication 1, dans lequel les différents moyens de signalisation sont des indicateurs de signalisation (80, 82, 84) positionnés sur l'arrière du mandrin (16).
 9. Un ensemble de mandrin de bobine tel que défini dans les revendications précédentes et comprenant en outre :
 - (a) un moyen de commande (142) associé au châssis (138) pour commander le fonctionnement du système d'entraînement de bande pour ordinateur ;
 - (b) un moyen récepteur (134) associé au châssis (138) pour recevoir le signal provenant de chacun des moyens de signalisation (80, 82, 84) ;
 - (c) un premier moyen de transmission (140)



associé au moyen récepteur (134) pour transmettre les différents signaux du moyen récepteur (134) au moyen de commande (142) ; et

(d) un second moyen de transmission (144) associé au moyen de commande (142) et au moyen d'actionnement (150) pour transmettre les différents signaux du moyen de commande (142) au moyen d'actionnement (150), de sorte que le moyen de commande (142) assure l'activation du moyen d'actionnement (150) à chaque fois que les différents signaux ont été reçus en indiquant que chacun des moyens de détection (72, 74, 76) se trouve dans une position correcte prédéterminée.

10. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, dans lequel le moyen d'actionnement (150) comprend en partie :

(a) une source de courant (146) pour appliquer une tension ;
 (b) un solénoïde (150) comportant un bras de solénoïde (151) associé à la source de courant (146), le solénoïde (150) recevant une tension provenant de la source de courant (146) ;
 (c) un bras d'actionnement (160) associé au bras de solénoïde (151) ; et
 (d) dans lequel, lorsqu'une tension est appliquée au solénoïde (150), le bras de solénoïde (151) pousse le bras d'actionnement (160) au contact des moyens de blocage (20, 92) afin de bloquer ainsi la bobine débitrice sur la base de mandrin (45) lorsque le mandrin tourne.

11. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, comprenant en outre :

(k) un dispositif d'affichage (166) positionné sur le châssis ;
 (l) un troisième moyen de transmission (164) associé au moyen de commande (142) et au dispositif d'affichage (166) pour transmettre les différents signaux du moyen de commande (142) au dispositif d'affichage (166).

12. Un ensemble de mandrin de bobine tel que défini dans la revendication 11, comprenant en outre :

(m) un quatrième moyen de transmission (168) associé au moyen de commande (142) pour transmettre les différents signaux du moyen de commande (142) à l'ordinateur (170).

13. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, dans lequel le moyen de commande (142) est un contrôleur principal qui fonctionne de façon à recevoir et interpréter les différents signaux provenant du moyen de réception (134) et pour avertir le moyen d'actionnement (150) à chaque fois que les différents signaux qui ont été reçus indiquent que chacun des moyens de détection (72, 74, 76) se trouve dans une position correcte.

14. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, dans lequel le moyen de réception (134) est un interrupteur optique qui fonctionne de façon à recevoir une pluralité de signaux provenant des moyens de signalisation (80, 82, 84) et à transmettre les différents signaux au moyen de commande (142).

15. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, dans lequel le moyen de réception (134) est un émetteur-détecteur qui fonctionne de façon à recevoir une pluralité de signaux provenant des moyens de signalisation (80, 82, 84) et pour transmettre les différents signaux au moyen de commande (142).

16. Un ensemble de mandrin de bobine tel que défini dans la revendication 9, dans lequel :

(a) les moyens de blocage (20, 92) sont utilisés pour débloquer la bobine débitrice (12) par rapport à la base de mandrin (45) ;
 (b) les moyens de détection (72, 74, 76), allongés et espacés l'un de l'autre, sont rétractés dans le mandrin (16) pour supprimer le contact avec la bobine débitrice (12) à chaque fois que la bobine (12) est en train d'être enlevée du mandrin (16) ;
 (c) des moyens d'actionnement (150) sont utilisés pour actionner les moyens de blocage (20, 92) afin de débloquer la bobine débitrice (12) du mandrin (16) ;
 (d) un des différents moyens de signalisation (80, 82, 84) signale au moyen de commande (142) que chacune des différentes saillies de détection (56, 58, 60) est correctement rétractée dans le mandrin (16) ; et
 (e) le moyen de commande (142) assure l'activation du moyen d'actionnement (150) à chaque fois que les signaux ont été reçus en indiquant que chacun des moyens de détection (72, 74, 76) a été correctement rétracté dans le mandrin (16).



17. Un procédé pour assurer un blocage d'une bobine débitrice (12) sur un système d'entraînement de bande (10) pour ordinateur comportant un châssis, la bobine débitrice (12), comportant une circonférence intérieure (22) pourvue d'une bordure, étant bloquée sur un mandrin d'entraînement comportant une ouverture centrale (25) et des moyens pour fixer de façon séparable le mandrin (16) sur un arbre (24) d'un moteur d'entraînement (27) servant à faire tourner le mandrin (16), procédé comprenant les étapes consistant à :

(a) positionner le mandrin d'entraînement (16) sur le système d'entraînement de bande (10) pour ordinateur ;

(b) positionner la bobine débitrice (12) sur le mandrin (16) ;

(c) centrer la bobine débitrice (12) sur le mandrin (16) ;

- procédé caractérisé par les autres étapes consistant à :

(d) détecter à l'aide de plusieurs moyens de détection (72, 74, 76) espacés l'un de l'autre si la bobine débitrice (12) est correctement placée dans une position prédéterminée sur le mandrin d'entraînement (16) ;

(e) signaler au moyen de commande (142) si la bobine débitrice (12) est correctement placée dans une position prédéterminée sur le mandrin (16) ;

(f) actionner les moyens de blocage (20, 92) si la bobine débitrice (12) est correctement positionnée dans le mandrin d'entraînement (16) ;

(g) bloquer la bobine débitrice (12) sur le mandrin (16) ; et

(h) afficher un message d'erreur sur le système d'entraînement de bande d'ordinateur (10) si la bobine débitrice (12) n'est pas placée dans une position prédéterminée correcte sur le mandrin d'entraînement (16).

18. Le procédé pour assurer un blocage d'une bobine débitrice (12) sur un système d'entraînement de bande pour ordinateur (10) tel que défini dans la revendication 17, où il existe un trajet de passage de bande entre la bobine débitrice (12) et une bobine réceptrice (14), procédé comprenant en outre les étapes consistant à :

(a) faire tourner dans une direction inverse la bobine débitrice (12) sur le mandrin (16) ;

(b) détecter à l'aide d'un second moyen de détection (11) s'il n'y a pas de bande dans le trajet de bande ;

(c) transmettre un signal du second moyen de détection (11) au moyen de commande (142) lorsqu'il n'y a pas de bande dans le

trajet de bande ;

(d) transmettre un signal du moyen de commande (142) au moyen d'actionnement (150) pour indiquer que la bobine débitrice (12) se trouve dans la condition de déchargement ;

(e) actionner les moyens de blocage (20, 92) pour rétracter les moyens de blocage (20, 92) dans le mandrin d'entraînement (16) ;

(f) détecter à l'aide d'un des différents moyens de détection (72, 74, 76) espacés l'un de l'autre si la bobine débitrice (12) est correctement débloquée du mandrin d'entraînement (16) ;

(g) transmettre un signal de l'un des différents moyens de signalisation (72, 74, 76) au moyen de commande (142) pour signaler que la bobine débitrice (12) est correctement débloquée du mandrin (16) ;

(h) arrêter le fonctionnement du système d'entraînement de bande (10) ; et

(i) enlever la bobine débitrice (12) du mandrin (16).

19. Le procédé pour assurer un blocage d'une bobine débitrice (12) sur un système d'entraînement de bande pour ordinateur (10) tel que défini dans la revendication 18, dans lequel la bobine débitrice (12) comporte un anneau (176) de validation d'écriture pourvu d'une languette (178), le procédé comprenant en outre l'étape consistant à :

- entraîner en rotation la bobine débitrice (12) jusqu'à ce que la languette (178) de l'anneau (176) de validation d'écriture prévue sur la bobine débitrice (12) passe à travers la rainure (182) prévue sur une base de mandrin (45).