United States Patent

Hollingsworth

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[54] TAPE TRANSPORT APPARATUS AND CARTRIDGE THEREFOR

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[73] Assignee: **Newell Industries Inc.**

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[21] Appl. No.: **873,283**

[52] **U.S. Cl.**.....**242/192,** 242/200, 242/204

[51] **Int. Cl.**.....**G11b 15/32,** G11b 23/10

[58] **Field of Search**.....242/192, 191, 197, 198, 199, 242/200, 202, 203, 207, 208, 209, 210, 186, 187, 188, 189, 190, 191, 201, 75.5, 71.2, 71.1

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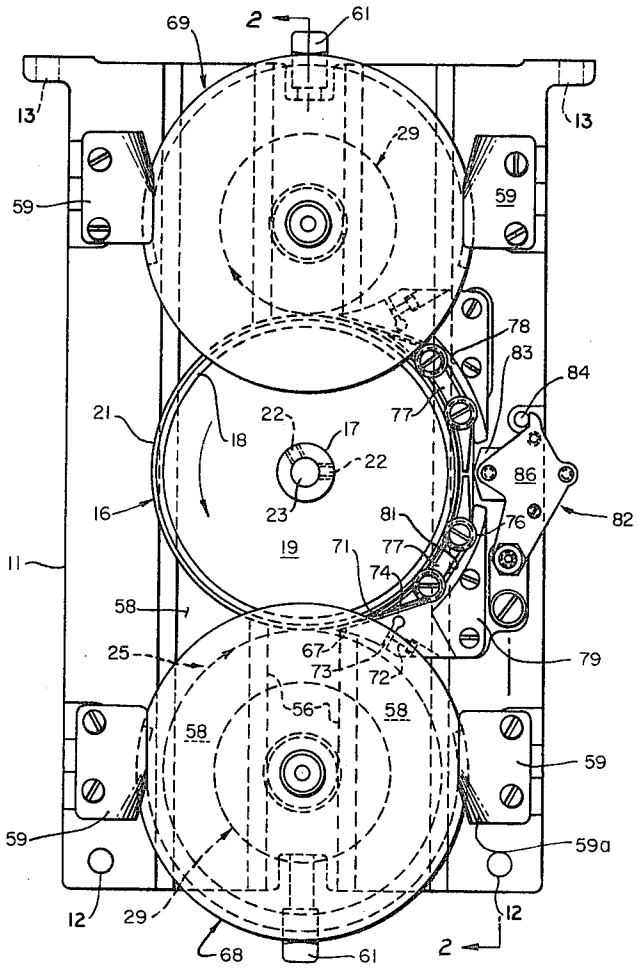
[57] **ABSTRACT**

A tape transport wherein supply and takeup rolls are engaged by a resilient drive body disposed between the rolls, and urged against the rolls by means independent of the tape. Unidirectional brake means restrain rotation of the supply roll so as to tension a span of tape disposed between the rolls during feeding thereof. In one embodiment, a motor drives the rotating body directly. The brakes, applied at the hub of the supply roll, are individual to that particular supply roll to be carried therewith for use on all machines. In another embodiment, the drive body serves as a transfer roller to transfer forces between the rolls whereby one of two motors respectively connected to supply and takeup rolls drives the takeup roll while the other motor applies a drag to the rotation of the supply roll. In reverse feeding of tape, the functions of the two motors are reversed.

6 Claims, 8 Drawing Figures



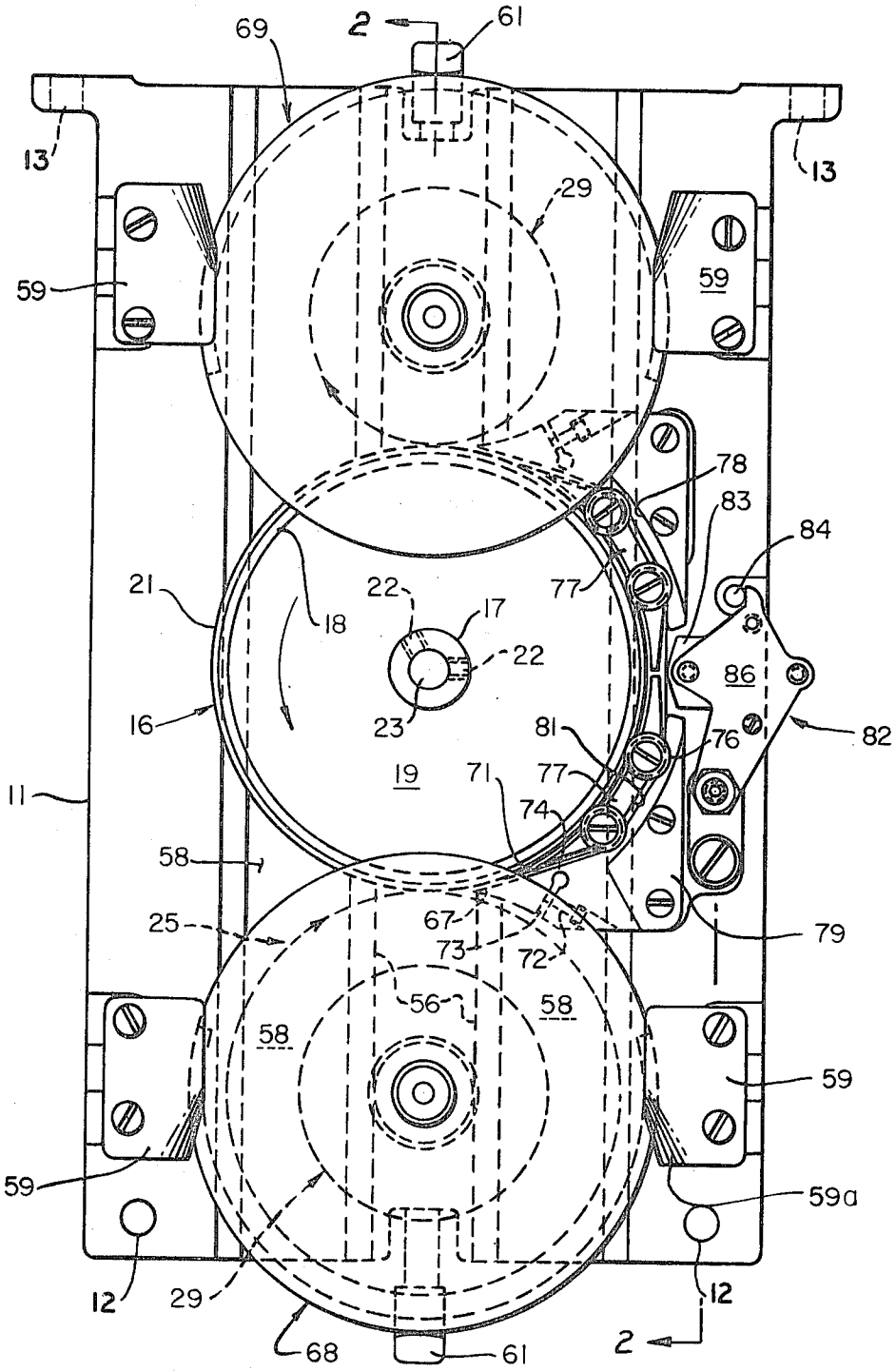


FIG. 1

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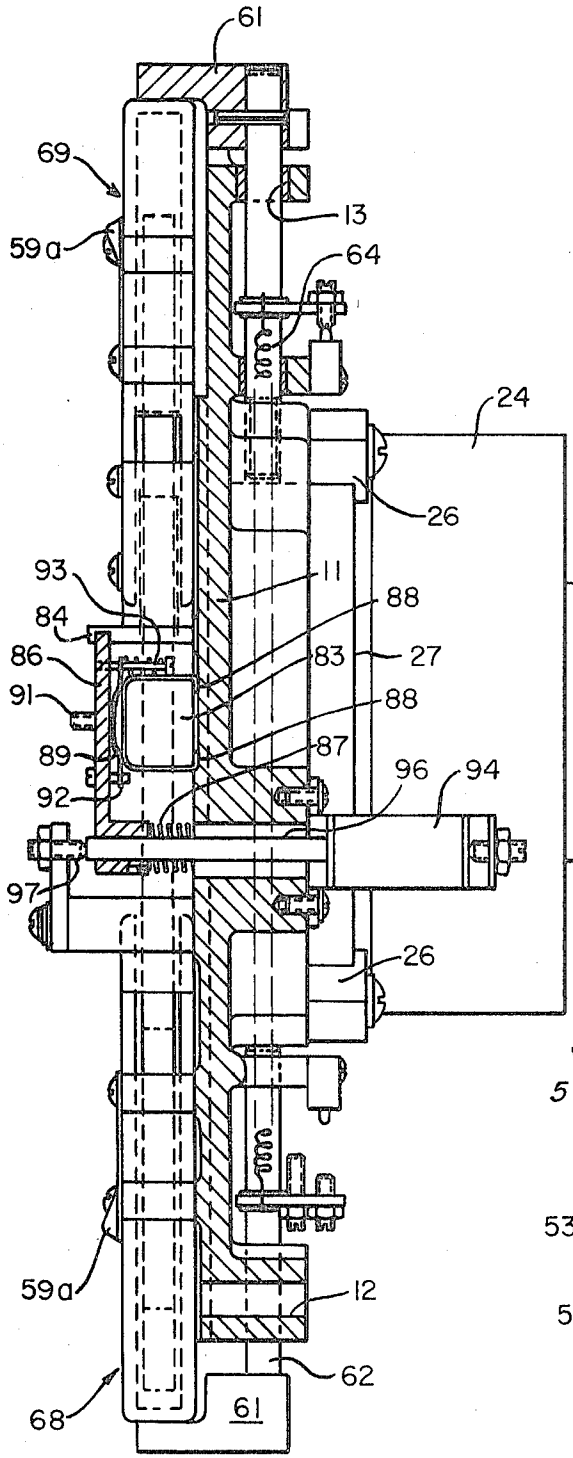

FIG. 2

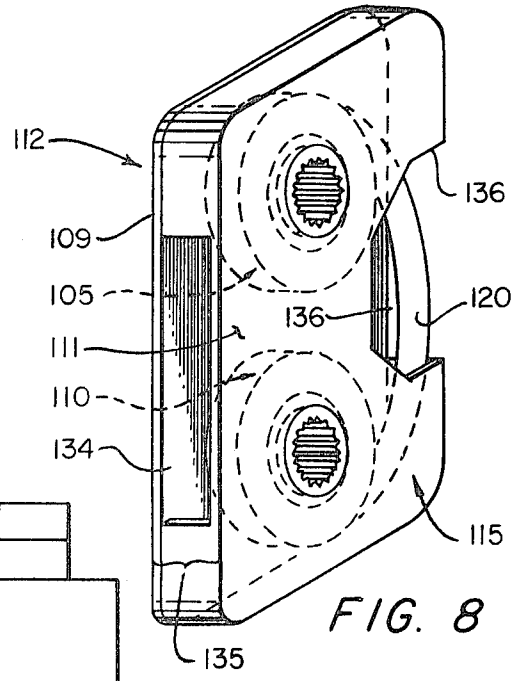

FIG. 8

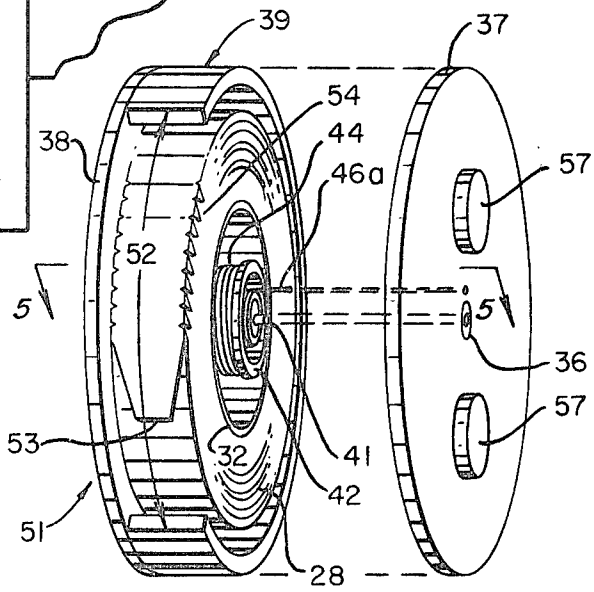

FIG. 4

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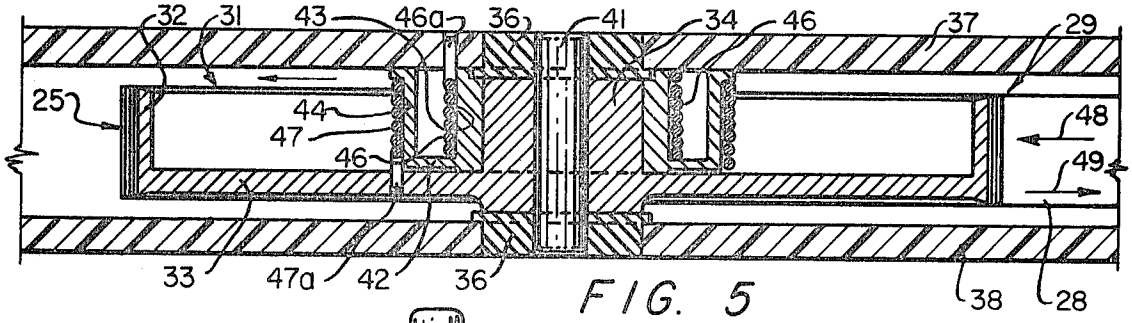

FIG. 5

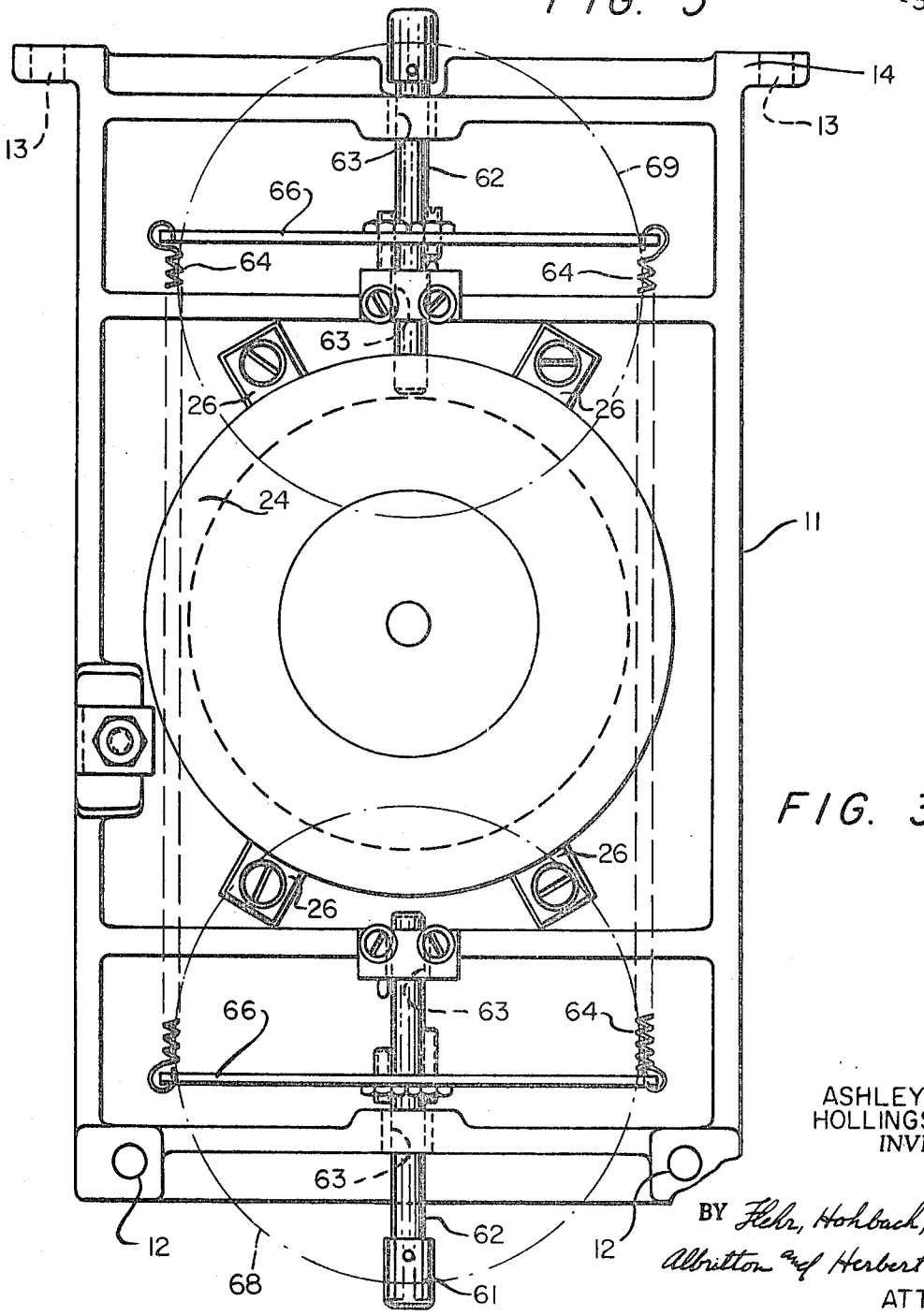

FIG. 3

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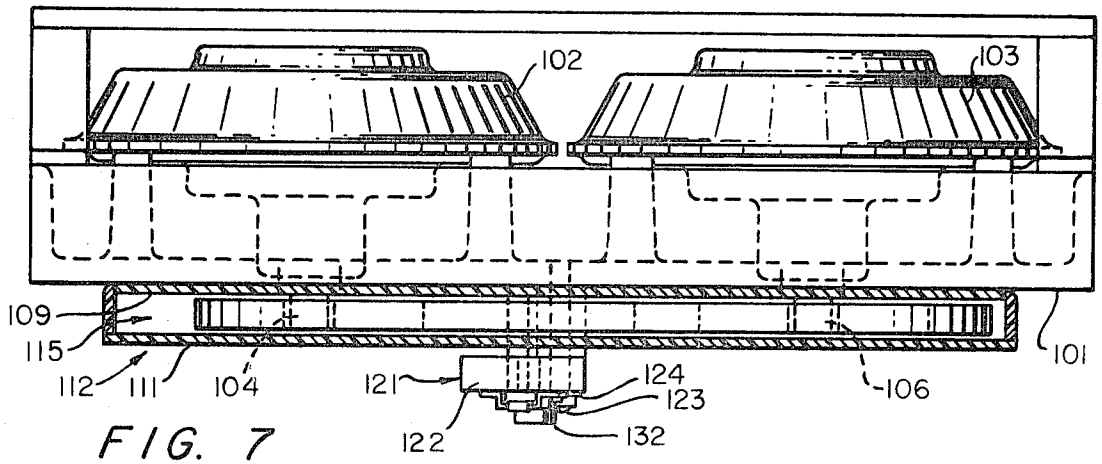

FIG. 7

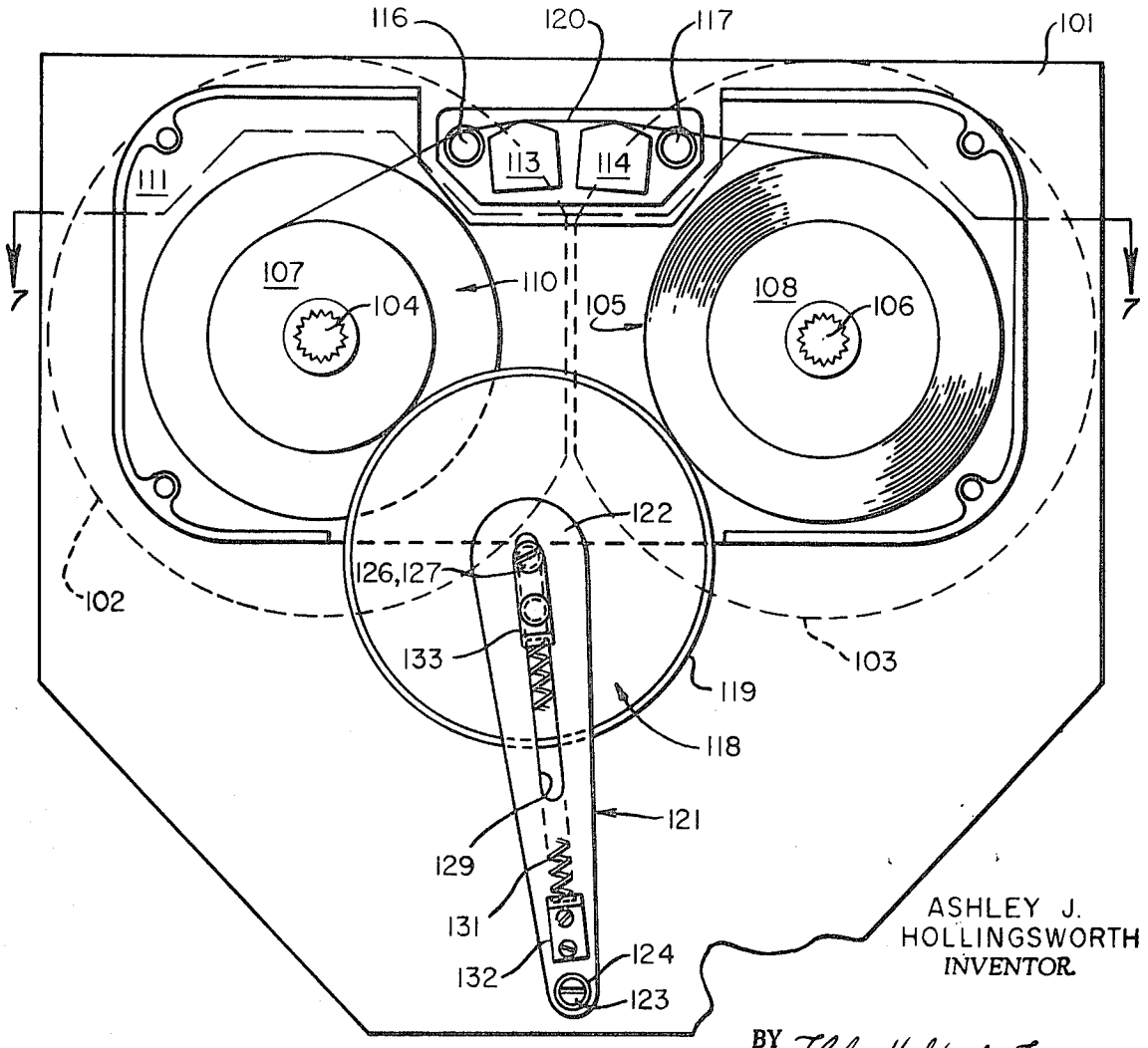

FIG. 6

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TAPE TRANSPORT APPARATUS AND CARTRIDGE THEREFOR

BACKGROUND OF THE INVENTION

This invention pertains to tape transport apparatus and to cartridges containing one or two rolls of tape, the cartridge being particularly useful with the tape transport.

Heretofore, as shown in U.S. Pat. No. 3,370,803, rolls of tape have been made which are extremely hard to the point where they can function much in the nature of solid discs, thereby permitting high-acceleration, deceleration and quick start/stop rotation of these rolls of tape. However, where a roll of tape has not been formed as a hard pack, or has become loosely wrapped, the use of the soft roll renders difficult the achievement of high-performance characteristics associated with hard-packed rolls.

Thus, where the rolls are contained within envelopes, such as hollow cases, an operator of a tape transport of the type for use with the hard-packed rolls may not be aware that the roll of tape being loaded onto his machine does not have the hard pack characteristics. Thus, operation of the machine may then be subject to difficulties.

SUMMARY OF THE INVENTION AND OBJECTS

In general, there is disclosed herein a tape transport of a type for feeding a length of pliable recording tape to form hard-packed supply and takeup rolls whereby high-acceleration and deceleration, and stop/start performance, is achieved by interlocking the supply and takeup rolls through a resilient-rotating drive body disposed between the rolls for engaging and rotating them during feeding of tape. During feeding of the tape the axes of rotation of the rolls advance and retreat relative to the axis of rotation of the drive body respectively in a direction defined substantially along a radius of the roll and passing substantially through the axis of rotation of the drive body to maintain continuous engagement between the drive body and the rolls during quick changes in speed. Means independent of the tape have been provided for yieldingly urging the two rolls against the resilient drive body. The tape is formed tightly upon the two rolls. Finally, drag brake means have been provided which restrain the rotation of the supply roll so as to tension a portion of the tape spanning between the rolls during feeding thereof. In one embodiment, the breaks are individual to the roll cartridges employed with the machine so as to provide its own tension characteristic to the roll notwithstanding use of the roll on various transports. In another embodiment, first and second motive means are associated directly with each of the rolls so as to be alternately activated for driving one of the rolls while the other is inactivated. When inactive each of the drive means serves to restrain the tape being withdrawn from its associated roll.

Thus, motors are connected directly to the stationary roll shafts and the rotating resilient drive body is pivotally mounted to move relative to the axes of rotation of the two rolls the drive body is continuously urged against the two rolls so as to engage both to transfer forces from one to the other.

In general, it is an object of the present invention to provide improved tape transport apparatus and cartridges therefor.

It is another object of the invention to provide an improved tape transport apparatus having high-acceleration/deceleration characteristics and wherein loosely packed tape can be employed initially without need to preprocess the tape to form it into a relatively rigidly packed roll.

Still another object of the invention is to provide improved tape roll cartridge constructions.

The foregoing and other objects of the invention will become more readily apparent from the following detailed description of preferred OF THE when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a front elevation view of tape transport apparatus, according to the invention, disposed in a vertical orientation;

FIG. 2 shows a side elevation section view of the construction shown in FIG. 1 taken along the line 2—2 thereof;

FIG. 3 shows a rear elevation view of a tape transport deck construction shown in FIGS. 1 and 2;

FIG. 4 is an exploded perspective view of a tape cartridge construction for use in the tape transport apparatus as shown in FIG. 1, according to the invention;

FIG. 5 is an elevation section view taken along the line 5—5 of figure 4;

FIG. 6 is a plan view of another embodiment, according to the invention, employing a dual roll cartridge shown with front cover removed;

FIG. 7 is an elevation section view of FIG. 6 taken along the line 7—7 thereof;

FIG. 8 is a perspective view showing a dual roll cartridge construction for use with the embodiment shown in FIGS. 6 and 7.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The tape transport shown in FIGS. 1, 2 and 3 is built upon a baseplate 11 formed at its lower end with a pair of drilled mounting holes 12 extending normal to the plane of baseplate 11. At its upper end plate 11 includes another pair of drilled mounting holes 13 which extend in substantially coplanar relation to the plane of plate 11 through a flange portion 14 of plate 11 whereby suitable bolts can be employed to attach baseplate 11 and its supported components into a suitable housing for operating the machine.

A rotatable resilient body forming a drive capstan 16 is journaled in plate 11 for rotation and consists of a central hub portion 17, an outer rim portion 18 having a smooth cylindrical surface on its outer periphery, and a relatively thin web portion 19 extending between hub 17 and rim 18. Portions 17, 18, 19 are preferably of a material, such as aluminum, or plastic, selected for its rigidity and lightweight.

A resilient tire 21 of rubber or suitable elastomeric plastic is secured about the periphery of rim 18 and is attached thereto, as by bonding, molding, or other suitable means. Hub portion 17 is fastened by means of setscrews 22, to rotate with drive shaft 23 of a bidirectional drive motor 24.

Motor mountings 26 serve to extend across a flange 27 at the base of motor 24 so as to hold motor 24 securely to plate 11.

Supply and takeup rolls of tape are arranged to advance and retreat relative to capstan 16 during feeding of the tape from one roll to the other so as to maintain engagement between the tire 21 of capstan 16 and the two rolls of tape during changes in the diameter of the rolls while feeding tape. Thus, it will be readily apparent that as the tape is unwound from one roll, the diameter of the roll will become smaller and the diameter of the receiving roll will become larger. At such times, the supply and takeup rolls move relative to the capstan so as to maintain constant contact with tire 21.

In feeding tape at high speed while requiring great acceleration/deceleration and reversals in the tape movement, it is essential that the tape should remain totally under control during such critical times. Otherwise, the tape can become loose from the capstan 16, form an untensioned loop, and become unthreaded in the machine.

Therefore, as herein disclosed, the supply and takeup rolls are mounted to move relative to the capstan 16 respectively in a direction defined substantially along a radius of the roll and passing substantially through the axis of rotation of capstan 16 so as to maintain continuous engagement between loose from the capstan 16, so as to maintain continuous engagement between capstan 16 and both rolls during rapid speed changes.

In short, the rolls mover virtually "straight at" the axis of capstan 16 in order to keep the tape from throwing a loop at such times.

As shown in FIGS. 4 and 5, a rotatable roll 25 is carried with its own unidirectional break structure within a case to be urged against capstan 16. Thus, a length of pliable magnetic

recording tape 28 has been wrapped about a hub assembly 29 comprised of a rigid, lightweight hub member 31 formed with a cylindrical rim 32, a radially extending web portion 33 formed with a hollow central bearing body 34, the end surfaces of which ride flush in self-lubricated relation to mounting bushings 36. Mounting bushings 36 are respectively supported in the sidewalls 37, 38 of a tape roll case or container 39. Bushings 36 further carry an axle 41 upon which bearing body 34 rotates during rotation of hub assembly 29.

Hub assembly 29 includes unidirectional brake means serving to apply a modest restraint to the unwinding of tape from hub assembly 29 while permitting winding of tape thereon without any substantial resistance.

Accordingly, a brakedrum member 42 is carried for rotation upon bearing body 34 and formed to include inner and outer races 43, 44 respectively. Thus, the races 43, 44 form concentrically arranged cylindrical brakedrum surfaces for respectively carrying encircling coil springs 46, 47. One end 46*a* of spring 46 is retained in a small hole drilled through sidewall 37 of container 39 while the other end (not shown) of the spring remains free, other than as simply coiled about race 43. One end 47*a* of spring 47 is similarly retained in a small hole drilled through the web 33 of hub member 31. The other end of spring 47 also remains free, to the extent that it is coiled about outer race 44.

Operation of the unidirectional drag brake means formed in hub assembly 29 proceeds as follows. Assume that the tape roll 25 is being wrapped with tape moving in the direction of arrow 48 (FIG. 5). The coils of spring 47 will tend to enlarge their diameter due to the fact that the retained end 47*a* of this spring is connected to move with the web 33 of the roll. This rotation tends to "unwrap" the coils of spring 47 by virtue of friction contact about the outer race 44 of brakedrum 42.

However, some rotation of brakedrum 42 could be expected by virtue of frictional engagement experienced on its outer race 44 and, accordingly, the coils of spring 46, wrapped about the inner race 43 in an opposite direction, tighten in response to this rotational tendency due to the fact that the retained end 46*a* is anchored to the sidewall 37 of the tape roll container 39.

Thus, as tape is wrapped upon tape support rim 32 of the hub assembly 29, the inner spring 46 locks drum 42 to the stationary sidewall 37. At the same time, the outer spring 47 permits slippage between the roll 25 and the stationary drum 42.

When it is desired to unwind or payout tape from rim 32 in the direction of arrow 49, rotation of web 33 carries the retained end 46*a* of the inner spring 46 in a direction tightening the coil of inner spring 46 so as to bind the drum 42 so as not to rotate with web 33. This holds the outer drum surface against the direction of coiling of spring 47 and thereby serves to somewhat release the grip of spring 47 about race 44.

However, the frictional interference is sufficiently great between spring 46 and race 44 that unwinding of roll 25 is somewhat restrained whereby the tape is subjected to tension as it is pulled from the roll.

From the foregoing, it will be readily evident that there has been provided, as shown best in FIG. 4, a tape cartridge 51 characterized by its own individual unidirectional brake means. Thus, no matter where cartridge 51 is played, the braking forces applied to the unwinding of the tape 28 will provide the same characteristics.

Cartridge 51 further includes an opening 52 forming a window whereby the leading end 53 of tape 28 can be withdrawn from within the cartridge. This leading end 53 is retained to the roll of tape 28 by means of two series of confronting gripping teeth 54 disposed to engage the opposite edges of the outer few convolutions of tape on the roll. The leading end of the roll of tape is free to extend naturally slightly away from the circumference of the roll whereby it can be engaged by automatic threading means described further below. Window 52 also is dimensioned and adapted to receive capstan 16 therethrough for driving supply and takeup rolls.

Means on opposite sides of drive capstan 16 receive each a pair of tape cartridges of the type described above, with the exception that on the takeup side of the tape transport, the cartridge will, of course, be initially empty, i.e., contain no tape but otherwise include the component parts described above.

Thus, the face of baseplate 11 is formed with an elongated rectilinear guide channel 56 dimensioned to receive therein the diameter of the two-circular guide bosses 57 formed on the outer surface of sidewall 37. Sidewall 37 is otherwise flush and resets upon the flats 58 formed on the face of baseplate 11. The other surface of each cartridge is engaged by overhanging retainer clips 59 formed at its leading edge with an upwardly turned edge 59*a* so as to aid in guiding a cartridge into position to be moved toward capstan 16.

It is readily apparent that each cartridge is to be disposed with its open window 52 in position whereby tire 21 can engage the roll of tape within each of the two cartridges.

Means independent of the tape itself have been provided for urging the two cartridges, and hence their contained rolls, into engagement with tire 21. In this way, the tape is subjected only to the small tension supplied by the brake of its supply roll. Accordingly, a retaining tab or catch 61 is disposed at each end of the tape transport. Each catch 61 is carried on an associated elongated shaft 62 which is suitably guided for lengthwise movement (and also rotation) through a pair of aligned openings 63 (FIG. 3).

The two shafts 62 are yieldingly drawn together by means of a pair of springs 64 extending between the ends of a pair of spacer bars 66 fixed to shafts 62. In this way, the springs can be coupled to draw the two shafts 62 together and at the same time, bypass the general obstruction provided by the presence of drive motor 24.

It is assumed for the present description that the roll of tape within cartridge 68 may be considered the supply roll and the roll of tape being formed within cartridge 69 may be considered the takeup roll.

Means for automatically threading the leader portion 53 of tape 28 from its supply roll to takeup roll includes a rigid, plastic-peeling blade 67 riding very closely spaced from the surface of the tape supply roll in a position to enter between the naturally extending tip end of leader 53 and the close penultimate outermost convolution of tape. Thus, by further rotation of the supply roll the grip of the leading end 53 of tape 28 will be released and the leading end 53 guided through a channel 71 as further defined below. In the event that adjustment of blade 67 is to be made, an adjustment screw 72 extends across the keyhole slot 73 to urge the plastic blade or tooth 67 forwardly or, upon relaxation of the screw 72, to permit the resilience in the plastic at the hinge portion 74 to cause the blade or tooth 67 to move closer to the periphery of the roll.

During rotation of the supply roll, after blade 67 picks up the leading end 53 of the tape roll, and guides it into channel 71, it will be readily apparent that by a general stiffness to the leader, the tape will continue to be guided through the remainder of channel 71 bounded at its side edges by washers 76 carried on the side of guide blocks 77 and bounded at its outer wall by the shoulder 78 of a plastic guide 79. Channel 71 is further bounded at its inner wall by a relieved surface 81. The tape 28 passing across guide member 77 accordingly rides on two-spaced rounded portions of the guide member 77 in the region of the spaced washers 76.

Channel 71 continues to the region of a transducer assembly 82 where a magnetic recording or pickup head 83 engages the recording surface of tape 28 for cooperation therewith in an unsupported zone or span of the tape.

Thus, the inner wall of each guide member 77 tapers abruptly toward tire 21 to meet beneath head 83 so that tape 28 span from two adjacent support points defined on the guide members 77.

The remainder of channel 71 on the takeup side of capstan 16 constitutes a mirror image of that shown for the supply side described above and will not be further described in detail.

As the leader portion of the tape roll arrives at the cylindrical rim 32 of hub member 31 in the takeup cartridge 69, the gripping teeth 54 of the leader engage the reversely taped side edges of rim 32 and thereby attach the tape to the takeup hub.

Thus, it will be readily apparent that the spring-loading of both rolls into engagement with the resilient tire 21 by means of the catches 61, when disposed to engage the outer edge of each cartridge, severs to cause the leader to be pressed into engagement with the takeup hub and thereby attach itself to the takeup hub for further feeding of the remainder of the tape.

Transducer assembly 82 is spring-loaded toward tape 28 to a point defined by the fixed stop 84. Stop 84 consists simply of a dowel pin mounted in the baseplate 11 and against which the sideplate 86 is rotated by spring 87. Sideplate 86 further carries the head 83 disposed in conventional clips 88 extending outwardly from a mounting bracket 89 or plate which, in turn, is attached by screw 91 to sideplate 86.

It is to be understood that the recording gap of head 83 extends transversely of the path of tape movement and that it may be necessary to adjust the skew or angle of this gap so that it is precisely normal to the movement of the tape. Accordingly, one end of bracket 89 is anchored by a screw 92 and the other end anchored by a screw 93. Screw 93, however, carries a helical coil spring therearound adapted to extend between the head of the screw and the bracket. In this manner, by somewhat tightening the screw 93, the angle of the recording gap of head 83 can be adjusted for skew correction.

Means for shifting head 83 from one position to another is achieved by means of the two-position solenoid 94 which, when energized, serves to compress spring 87 and, when deenergized, serves to permit spring 87 to move the armature 96 outwardly until the outer end of the armature contacts the adjustment limit stop 97.

As thus arranged, the head assembly is arranged to be pivoted outwardly for cleaning and is further arranged to be moved laterally of the recording tape so as to cause the transducing gap therein to cooperate with another channel of the tape.

From the foregoing, it will be readily apparent that there has been provided a magnetic tape transport apparatus of a type whereby rolls of tape carried within their own individual containers and provide with their own individual break means may be automatically threaded onto a takeup hub and played merely by driving motor 24 in one or the other of two directions.

Further, it shall be readily apparent that even though the tape roll of the cartridge supplied to the transport may have been wound upon another style of machine where the pack is somewhat loose, the tape will be properly tensioned and available for transducing on the first pass through the machine, due to the fact that tension is provided in this instance by means of the unidirectional restraining drag brake means carried by the supply cartridge itself.

As tape is fed from the supply to the takeup roll, it will also be apparent that the springs 64 serve to continuously urge the two rolls into contact with the resilient tire 21 thereby creating the solidly packed rolls of tape, as characterized above.

Inasmuch as the rolls become relatively solidly packed by the first passage through the machine, it will be readily evident that thereafter high-acceleration and deceleration of the tape can be readily accomplished by virtue of the fact that the supply and takeup rolls are virtually locked to rotate with and be accelerated or decelerated by the operation of a single drive motor 24 coupled to operate capstan 16. Further, the positioning of the rolls to move substantially "straight toward" the capstan axis keeps the tape under control during quick reversals or acceleration/deceleration.

According to another embodiment as shown in FIGS. 6, 7 and 8, supply and takeup rolls are also relatively solidly locked together to be driven as a unit for high-acceleration and deceleration resulting from the generation of relatively solidly packed rolls of tape while unidirectional brake means are provided at each of the two hubs for supply and takeup rolls. In addition, however, individual motors are associated with each of the two rolls and the rotating drive body coupling the supply and takeup rolls serves as a drive roller in the sense that it transfers the forces (rather than requiring the tape) from the rotation of one roll to rotate the other.

Referring to FIGS. 6 and 7, a baseplate 101 carries a pair of DC motors 102, 103, respectively. Each DC motor 102, 103, includes an output drive shaft 104, 106 respectively. Shafts 104, 106 protrude above the surface of baseplate 101 to form spindles which include lands and grooves adapted to cooperate with the grooves and lands of the hubs 107, 108 of two rolls of tape journaled between the sidewalls 109, 111 of a tape cartridge 112 (FIG. 8).

An annular rotatable resilient drive body 118, lying in a plane normal to spindles 104, 106, carries a tire 119 of a suitable resilient material attached thereto and forms a force transfer roller 118. Transfer roller 118 is carried by a pivot arm assembly 121 whereby an elongated pivot arm 122 pivots about a pivot pin 132 secured to baseplate 101 through a bushing 124.

Preferably, transfer roller 118 is formed of a light weight, rigid material, such as aluminum, formed with a flanged rim upon which the tire 119 can be carried substantially in the plane of the supply and takeup rolls.

Tape cartridge 112 is employed with the above-described transport assembly for mounting on the pair of spaced spindles 104, 106 protruding in a common direction from a common side of the transport base 101. The cartridge comprises a hollow generally planar envelope or case 115, a pair of hubs supported to rotate in the case 115, to engage the spindles 104, 106 and rotate in their own planes at spaced positions within the case.

A length of pliable tape is wrapped partially about each of the two hubs 107, 108 to form a pair of tape rolls 105, 110 with the rolls interconnected by an unsupported span 120 of the tape adapted to be disposed in transducing relation with respect to the transducers 113, 114.

An opening 134 is formed in the peripheral edge 135 of case 115 remote from and opposite the span 120 of tape. Opening 134 is dimensioned and adapted to accommodate entry of the rotatable resilient body 118 lying in the plane of the rolls 105, 110 for transferring forces therebetween.

Another opening 136 has been formed in case 115 to accommodate entry of the two transducers 113, 114 to dispose span 120 to lie across their respective recording gaps.

The recording and playback transducers 113, 114 are flanked by guide spindles 116, 117 whereby notwithstanding changes in the diameter of the rolls of tape, the angle at which the tape arrives across the transducing gap of the two heads 113, 114 will remain constant throughout a complete transfer of an entire length of tape.

Means for continuously urging the resilient tire 119 into positive engagement with both supply and takeup rolls during transfer of the tape in order to develop relatively hard-packed rolls comprises the mounting arrangement at the hub of transfer roller 118 wherein a screw and washer 126, 127 extend downwardly through the outer end of pivot arm 122 and the lower end of screw 126 carries a locknut 128. An elongated slot 129 permits the transfer roller 118 to move longitudinally therealong at its hub during changes in the diameter of the two rolls.

An elongated bias spring 131 extends in compression between a fixed anchor bracket 132 on arm 122 and a spacer sleeve 133 carried by screw 126.

As best shown in FIG. 8, the tape cartridge 112 includes the access window 134 to accommodate entry of roller 118. One wall 111 includes the relieved head-receiving cutout 136, through which the heads 113, 114 seat when cartridge 112 is disposed upon shafts 104, 106.

DC motors 102, 103 are of conventional type wherein an attempt to rotate their shafts in a reverse direction will encounter limited resistance as by closing the armature circuit of the motor. Also, a light hold back effect can be provided

merely by applying a low voltage to the drive motor on the supply side.

Thus, it will be readily apparent that by using the motor on the takeup hub to wind tape, the supply hub will be subjected to a limited unidirectional braking effect. The same will occur when the roles of the two motors are reversed.

Further, throughout the above activity, hard-packed rolls are being formed whereby supply and takeup rolls are virtually locked together (via roller **118**) to achieve higher acceleration/deceleration and start/stop performance.

I claim:

1. In a tape transport of a type for feeding a length of pliable recording tape wrapped to form supply and takeup rolls, the combination comprising a rotatable resilient body disposed between said rolls and substantially continuously engaging and rotating said rolls during feeding of tape, means for rotatably supporting the supply and takeup rolls to advance and retreat relative to said body respectively in a direction defined substantially along a radius of the roll and passing substantially through the axis of rotation of said body to maintain continuous engagement between said body and said rolls during rapid changes in the speed of the rolls while feeding tape, means independent of the tape for yieldingly urging said rolls in said direction against said body during rotation thereof for forming said tape tightly upon their respective said rolls, means forming a guide channel leading around the periphery of the body and adjacent thereto to lead the tape free of the surface of said body to form an unsupported span disposed and adapted to cooperate with a transducer adjacent the body, and drag brake means serving to restrain rotation of the supply roll to tension a portion of the tape between the rolls during the feeding thereof.

2. In a tape transport according to claim **1** further comprising means supporting said brake means to be carried with said rolls readily detachable from and independently of the transport to provide each roll with its own tension characteristic notwithstanding use of the roll on various transports.

3. In a tape transport of a type for feeding a length of pliable recording tape wrapped to form supply and takeup rolls, the combination comprising means for rotatably supporting a supply and takeup roll, a rotatable resilient body disposed between said rolls to engage and rotate with the rolls, the axis of said body being movable relative to the rolls and means urging the body against the rolls to maintain continuous engagement between said body and said rolls during changes in the diameter of the rolls while feeding tape, and first and second motive means associated with each of said rolls respectively to be alternately activated for driving one of the rolls for winding tape thereon while the inactive one of said motive means serves to restrain the tape being withdrawn from the other roll.

4. In a tape transport according to claim **1** wherein said supply roll comprises a hub, a length of pliable tape wrapped therearound to form a roll, and means forming an envelope around the roll, an opening in the envelope for withdrawing tape from the roll, means supporting said hub for rotation within said envelope, and said drag brake means comprising unidirectional brake means carried by said envelope and serving to apply greater restraint to the unwinding of the tape than to the winding thereof.

5. A tape transport apparatus of a type having a base comprising a pair of spaced drive spindles and first and second motive means for driving one or the other in opposite directions, transducer means carried by the base, a resilient rotatable body carried by the base, a tape cartridge comprising a hollow case, a pair of hubs journaled in the case, an elongated pliable recording tape wrapped partially about both of said hubs to form rolls of tape, said hubs being formed to engage said spindles for feeding tape from one hub to the other via said transducer means, said motive means serving to provide means for applying a braking restraint to rotation of the hubs respectively in opposite directions, an opening in said case to receive said body in the plane of said rolls to engage both rolls simultaneously, means for urging said body against both rolls during feeding of tape to form the tape tightly upon one of the hubs, and another opening in said case to receive said transducer means at a position disposed in the path of that tape extending between the two rolls.

6. A tape transport assembly comprising a tape transport having a pair of spaced drive spindles protruding in a common direction from a transport base, and having a rotatable resilient annular body disposed in a plane substantially normal to said spindles, a cartridge comprising a hollow generally planar case, a pair of hubs journaled in said case to engage and be driven by said spindles and to rotate in their own planes at spaced positions within the case, a length of pliable tape wrapped about both of said hubs to form a pair of tape rolls with the rolls interconnected by a span of said tape, an opening formed in the peripheral edge of said case opposite said span and dimensioned and adapted to accommodate entry of said body in the plane of the rolls for transferring forces therebetween via said body, and another opening in said case adapted to accommodate entry of transducer means to cooperate with said span of tape.

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