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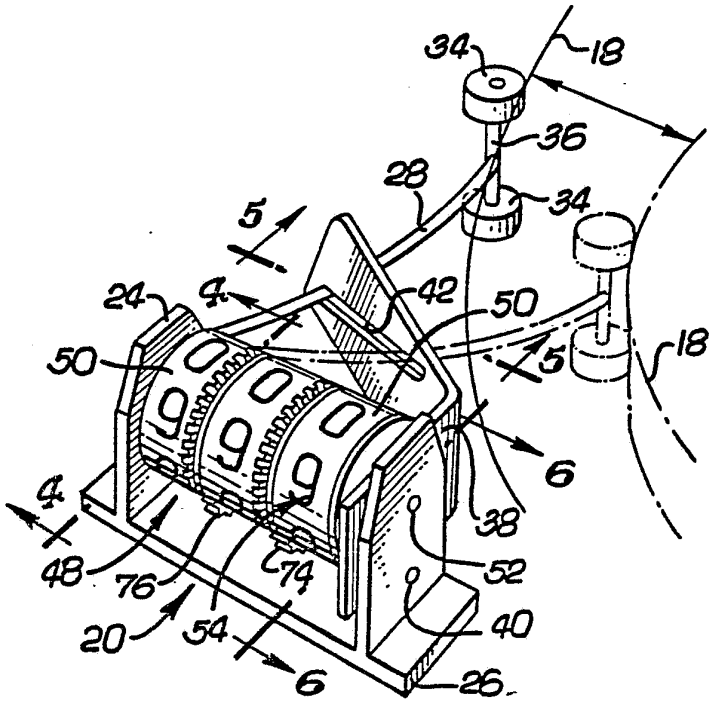
(54) Title: COUNTER ASSEMBLY FOR A VIDEO CASSETTE

(57) Abstract

A counter assembly (20) for a video cassette (10) for indicating the number of times the program recorded upon the video tape (18) within the cassette (10) has been played. The counter assembly (20) comprises a position indicator arm (28) mounted on the cassette housing (12) and biased by a spring (32) to ride against the cassette take-up reel (16) to follow the diameter of the reel (16) as the video tape (18) is wound and/or unwound therefrom. The position indicator arm (28) mechanically displaces an oscillatory crank arm (38) between a first position at the beginning of the program and a second position at the end of the program. The crank arm (38) drives a counter unit (48) through a relatively loosely engaged escapement mechanism such that the counter unit (48) indexes once each time the program is played substantially in its entirety, while permitting tape rewinding and replaying of relatively short portions of the program without additionally indexing the counter unit (48).



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COUNTER ASSEMBLY FOR A VIDEO CASSETTE

BACKGROUND OF THE INVENTION

This invention relates generally to information cassettes carrying a supply of magnetic tape upon which can be recorded a prescribed program of information. More specifically, this invention relates to a counter assembly particularly adapted for use with cassettes carrying video tape having a prescribed video program recorded thereon.

Information cassettes in general are well known in the art and typically comprises a length of magnetic tape having its opposite ends coupled respectively to a supply reel and take-up reel which are supported rotationally within a cassette housing. The magnetic tape is adapted for storing prescribed information, such as audio and/or video information, and the entire cassette is adapted to fit within a particular playback machine with the magnetic tape oriented for engaging a machine playback head to permit the recorded information to be repeatedly and selectively retrieved. In operation, the playback machine controls rotation of the supply and take-up reels in a manner to advance the magnetic tape from the supply reel past the playback head and to wind the tape about the take-up reel. After the recorded program information has been played by the playback head, the direction of reel rotation can be reversed to rewind the tape back onto the supply reel in readiness for subsequent plays of the recorded program.

Recently, video playback machines have been developed for the domestic market, whereby there exists a substantial demand for so-called video cassettes having prerecorded thereon a prescribed video program such as a movie, sporting event, or the like. These

so-called video cassettes, however, are relatively expensive to purchase, particularly when considering the fact that many consumers are interested in viewing the recorded program only a small number of times. For example, the tape cassette may carry a specific movie and the consumer is interested in viewing that movie only once or twice. In this regard, a substantial market has arisen for short-term rentals of prerecorded video cassettes wherein the consumer pays a relatively small fee for the right to play a particular recorded program on his home playback machine.

In the rental of video cassettes, it is highly desirable to base the rental fee in accordance with the number of times the consumer actually plays the recorded program. To this end, a variety of proposals have been made for incorporating a counter into the video cassette wherein the counter is intended to index once each time the consumer views the recorded program. For example, counters have been proposed which respond to reversals in the direction of tape transport for indexing each time the tape is rewound. However, this type of counting mechanism does not permit the consumer to play a short initial portion of the program for the purpose of adjusting the controls on his playback machine and then rewinding the tape to the beginning of the program for viewing. Moreover, this type of mechanism does not permit tape reversals of relatively short duration to permit the consumer to view a selected program scene a second time. Alternative counters have been proposed which are responsive to a recorded signal on the tape or to tape tension at the end of the program. However, these alternative devices are easily defeated by the consumer if the consumer discovers the location and/or operating mode of the counter. Moreover, counters responsive to recorded tape signals may index several times if the consumer

rewinds the tape and replays a selected short segment of the program which happens to include the indexing signal.

The present invention overcomes the problems and disadvantages of the prior art by providing a relatively simple and inexpensive counter assembly for a cassette wherein the counter assembly indexes only in response to a substantially complete playing of the recorded program, while permitting an unlimited number of tape reversals and replays of relatively short duration without indexing.

SUMMARY OF THE INVENTION

In accordance with the invention, a counter assembly is provided for accurately indicating the number of times the program recorded on magnetic tape of an information cassette, such as a video cassette, has been played substantially in its entirety. The counter assembly is incorporated directly into the housing of the cassette and includes a spring-biased position indicator arm for mechanically following the effective diameter of one of the cassette supply and take-up reels as the magnetic tape is wound and unwound therefrom during playing and rewinding of the magnetic tape. The position indicator arm controls the position of an oscillatory crank arm which is relatively loosely coupled to a counter unit for indexing the counter unit once as the crank arm is moved between a first position at the beginning of the program and a second position at the end of the program. Importantly, the mechanical connection between the crank arm and the counter unit has sufficient lost motion to permit an unlimited number of tape reversals and replays of relatively short duration without additionally indexing the counter unit.

In a preferred form of the invention, the position indicator arm comprises a relatively lightweight follower arm having one end pivotally supported by the cassette housing and a distal end urged by a spring into bearing engagement with the effective outer diameter of the cassette take-up reel. The distal end of the follower arm thus displaces generally radially outwardly with respect to the rotational axis of the take-up reel as the magnetic tape is wound about the take-up reel during playing of the program and returns generally radially inwardly as the magnetic tape is unwound from the take-up reel during rewinding of the tape. The follower arm passes through an angularly oriented slot in the crank arm which is mounted for pivoting movement with respect to the cassette housing. Accordingly, movement of the follower arm between the first and second positions corresponding with the beginning and end of the program causes the crank arm to oscillate back and forth about its pivot axis.

The crank arm is coupled by a escapement mechanism to the counter unit for indexing the counter unit once each time the program is played substantially in its entirety. More particularly, the crank arm includes a pair of generally opposed ratchet teeth for engaging a rotational spur gear at one end of the counter unit, wherein one of the ratchet teeth engages the spur gear to rotate the gear and index the counter when the crank arm is pivoted in one direction and the other ratchet tooth engages the spur gear to prevent further rotation thereof when the crank arm is pivoted in the opposite direction. Importantly, the mechanical coupling between the ratchet teeth and the spur gear is relatively loose such that the tape can be rewound for a relatively short period of time and then replayed without additionally indexing the counter unit.

From the foregoing, it will be seen that the

present invention provides a relatively simple and economical mechanical counter assembly which can be incorporated readily into the housing of an information cassette, such as a video cassette, for providing an indication of the number of times the recorded program has been played. The counter assembly is responsive to playing of the program substantially in its entirety, but the counter assembly does not index additionally in response to tape reversals and replays of relatively short duration. In this manner, a consumer renting the video cassette may play a short beginning portion of the recorded program to permit adjustment of the controls on his playback machine and then rewind the tape to the program beginning without indexing the counter unit. In addition, the consumer may at his option selectively replay certain scenes of the program an unlimited number of times without additionally indexing the counter unit. However, playing of the program substantially in its entirety indexes the counter unit in a manner which is not readily defeatable by the consumer.

Other features and advantages of the present invention will become more apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 is a perspective view of an information cassette, such as a video cassette, including a counter assembly embodying the novel features of this invention;

FIGURE 2 is an enlarged fragmented horizontal

section of a portion of the video cassette illustrating construction details of the counter assembly;

FIGURE 3 is an enlarged perspective view illustrating the construction and operation of the counter assembly;

FIGURE 4 is an enlarged fragmented vertical section taken generally on the line 4-4 of FIG. 3;

FIGURE 5 is an enlarged vertical section taken generally on the line 5-5 of FIG. 3; and

FIGURE 6 is an enlarged vertical section taken generally on the line 6-6 of FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An information cassette is referred to generally in the exemplary drawings by the reference numeral 10. This information cassette 10 includes a cassette housing 12 of standardized size and shape which carried a rotatable supply reel 14 and a rotatable take-up reel 16. A supply of magnetic tape 18 has its opposite ends appropriately connected to the supply and take-up reels and is wound about these reels for transport back and forth from one reel to another, all in a well-known manner. A counter assembly 20 of this invention is incorporated into the cassette housing 12 for indexing once each time the magnetic tape 18 is advanced substantially in its entirety from the supply reel 14 to the take-up reel 16.

The information cassette 10 is adapted to fit into an appropriate information playback machine (not shown) for association of the magnetic tape 18 with an appropriate playback head (also not shown) to permit a program of information recorded upon the magnetic tape to be played back by the playback machine. In this regard, the cassette housing 12 conventionally is open at one side, as illustrated by arrow 22, to permit the

requisite electromechanical cooperation between the magnetic tape 18 and the machine playback head during playing of the recorded program.

The counter assembly 20 of this invention is provided for indicating the number of times the program recorded on the magnetic tape 18 has been played substantially in its entirety. The counter assembly 20 is particularly adapted for incorporation into a so-called video cassette wherein the magnetic tape 18 constitutes a video tape having composite audio and video information recorded thereon for playback by use of modern video playback machines. The invention is thus particularly designed for use in the video cassette rental industry wherein the counter assembly provides an accurate indication of the number of times the program has been played by the renting consumer, thereby permitting a rental fee to be calculated as a function of the number of program plays. Accordingly, while the counter assembly 20 may be used with any type of information cassette including a supply of magnetic tape 18, the invention is primarily directed toward the video tape rental industry, whereby the description herein will describe the invention in conjunction with a video cassette.

As shown in detail in FIGS. 2 and 3, the counter assembly 20 is installed directly into the cassette housing 12 such as by use of a pair of mounting brackets 24 upstanding from a mounting plate 26 which can be secured to a lower half of the housing 12 in any suitable manner. Alternately, if desired, the brackets 24 can be molded integrally with the housing during injection molding of the housing. In any event, the brackets 24 are positioned in slightly spaced relation to each other, as viewed in FIGS. 2 and 3, and in a position generally between and slightly to one side of the supply and take-up reels 14 and 16. For

example, as illustrated, the brackets 24 fit conveniently in a position generally between the two reels 14 and 16 at a central location generally opposite the open side 22 of the cassette housing.

A relatively lightweight position indicator arm 28 projects from a pivotal mounting adjacent the mounting bracket 24 near the supply reel 14 in a direction generally toward the take-up reel 16 for bearing engagement with the outer diameter of the take-up reel. More specifically, the position indicator arm 28 has one end secured to an upstanding pivot post 30 which extends between the mounting plate 26 and a retainer 31 mounted on the one mounting bracket 24. This pivot post 30 is mounted for rotation about its own axis, and a torsion spring 32 (FIG. 4) reacts between the mounting plate 26 and the pivot post 30 to rotate the post in a direction biasing the distal end of the position indicator arm 28 into bearing engagement with the outer diameter of the take-up reel 16.

The position indicator arm 28 is thus biased for pivoting motion in the horizontal plane, as viewed in the drawings for engaging the outer diameter of the take-up reel 16. This outer diameter changes, of course, as the program on the tape 18 is played and the tape winds about the take-up reel to increase the effective diameter of the take-up reel. The position indicator arm 28 thus comprises a cam follower which moves generally in a radial direction with respect to the rotational axis of the take-up reel to follow this change in effective diameter and thereby provide a mechanical indication of playing of the recorded program. For example, the position indicator arm 28 moves from a first position represented by the dotted lines in FIGS. 2 and 3 at the beginning of the program to a second position represented by solid lines at the conclusion of the program. Conveniently, to avoid

adverse wear of the tape, the position indicator arm is provided with means for smoothly bearing against the tape, such as the pair of small rollers 34 carried at the upper and lower ends of a short support rod 36 mounted at the distal end of the position indicator arm 28.

The back-and-forth motion of the position indicator arm 28 is converted into vertical oscillatory movement of a crank arm 38. More specifically, the crank arm 38 is carried by a longitudinally extending shaft 40 extending between the two mounting brackets 24 such that the crank arm 38 is pivotally movable up and down with respect to the horizontal axis of the shaft 40. The crank arm 38 is carried by the shaft at a position generally adjacent the mounting bracket 24 closer to the take-up reel 16 and projects from the shaft generally toward the take-up reel before turning in a direction extending generally toward the supply reel 14 and the position indicator arm 28. Importantly, the position indicator arm 28 is received through an elongated and angularly oriented slot 42 in the crank arm 38 such that the vertical position of the crank arm with respect to the pivot shaft 40 is altered by movement of the position indicator arm 28 within the slot 42.

As shown best in FIGS. 3 and 5, the slot 42 in the crank arm 38 comprises, in the preferred embodiment, an elongated linear slot which angles downwardly in a direction toward the distal end of the crank arm. With this configuration, the position indicator arm 28 causes the crank arm 38 to pivot upwardly about the shaft 40 in a gradual manner as the position indicator arm 28 moves from the dotted line to the solid line position as the program on the tape 18 is played. Conversely, the position indicator arm 28 causes the crank arm to pivot downwardly, or in a reverse

direction, as the tape is rewound from the take-up reel 18 to the supply reel 14. Importantly, the length of the crank arm slot 42 is chosen to accommodate the requisite swinging movement of the position indicator arm 28 to permit complete playing of the program, and a biasing spring 44 (FIG. 6) conveniently reacts between a pin 46 on the mounting bracket 24 and the crank arm 38 to bias the crank arm 38 in one rotational direction for positive engagement with the position indicator arm 28.

The crank arm 38 is in turn coupled to a mechanical counter unit 48 supported between the two mounting brackets 24 for indexing the counter unit 48 one time when the recorded program on the tape is played substantially in its entirety. However, this coupling with the counter unit is intentionally chosen to have a sufficient degree of lost motion to prevent indexing of the counter unit when only a small portion of the program is played. Thus, relatively short portions of the program may be played and replayed as desired without indexing the counter unit, but any substantially complete winding of the tape onto the take-up reel 16 will index the counter unit.

More specifically, the counter unit comprises a plurality of rotary counter dials 50, three of which are depicted in the accompanying drawings. These counter dials 50 are mounted for rotation about a common shaft 52 which is supported between the two mounting brackets. All of the dials 52 include circumferentially positioned numerical indicia, as illustrated by arrow 54, wherein this indicia is viewable through an open window 56 in the cassette housing 12 to permit viewing of the number of times the recorded program has been played.

One of the counter dials 50 is positioned adjacent the crank arm 38 and is mechanically coupled thereto by

an escapement mechanism to control indexing of the dials. More specifically, as shown in FIG. 6, the crank arm 38 includes a relatively enlarged opening 58 for receiving a relatively small spur gear 60 having ten teeth and being formed integrally at one side of the adjacent counter dial 50. This opening 58 in the crank arm 38 is substantially larger than the outer diameter of the spur gear 60, whereby substantial clearance exists between the crank arm and the spur gear 64. However, the opening 58 in the crank arm 38 is bounded by a pair of generally opposed and radially inwardly projecting ratchet teeth 62 and 64 positioned for movement upwardly toward the horizontal plane of the shaft 30 into engagement with the teeth of the spur gear 60 as the crank arm 38 is oscillated back and forth.

More particularly, vertically upward pivoting movement of the crank arm 38 corresponding with playing of the recorded program moves the ratchet tooth 62 upwardly into engagement with a tooth at one side of the spur gear 60. This initiates a slow rotation or indexing of the spur gear which correspondingly indexes the rotary dial 50 to the next numerical position as the tape program is played substantially in its entirety. During this upward motion of the ratchet tooth 62, the other ratchet tooth 64 moves downwardly in clearance with one tooth on the spur gear. When the program on the tape is concluded and the tape is rewound, the ratchet tooth 62 moves downwardly to clear one spur gear tooth when the other ratchet tooth 64 engages between a pair of spur gear teeth to complete the single tooth index and to lock the spur gear against further indexing until the program is substantially completely played again. Importantly, with this escapement mechanism, the mechanical coupling between the crank arm 38 and the spur gear 60 is

relatively loose such that brief reversals in crank arm motion corresponding with reversals in the direction of tape transport during any portion of the program will not index the spur gear. However, the spur gear will index when the program is played substantially at least over half way.

The above-described counter dial 50 is mechanically coupled in a conventional manner to the two adjacent counter dials to provide the counter unit 48 with a "ones" digit and a "tens" digit and a "hundreds" digit. This conventional coupling is achieved by means such as tabs (not shown) on the various dials for cooperating with indexing gears 74 and 76 carried on the lower pivot shaft 40. Conveniently, the general construction and design of counter units of this type is conventional in the art, such as a counter unit of the type sold by Veeder-Root, Inc. of West Hartford, Connecticut, under the designation number 1779, whereby the construction and operation of the counter unit 48 is not described herein in further detail. Of course, any number of rotary dials can be provided in accordance with available space to allow any number of program plays to be counted.

The counter assembly of this invention thus provides a relatively compact and inexpensive mechanical counter arrangement for incorporation directly into the housing 12 of a video cassette 10. The counter assembly advantageously indexes once each time the tape program is played substantially in its entirety, while at the same time permitting virtually an unlimited number of tape reversals of relatively short duration and replays without additional indexing of the counter. The counter assembly is therefore ideally suited for use with video cassettes which are rented to consumers wherein it is desired to charge a rental fee based upon the number of times the consumer has viewed the record-

ed program. However, the invention gives the consumer substantial latitude in replaying selected scenes and in initially adjusting his video playback machine without additionally indexing to indicate plural plays.

A variety of modifications and improvements to the invention described herein are believed to be apparent to one skilled in the art. For example, the specific counter assembly described can be made responsive to unwinding of the tape 18 from the supply reel 14 instead of responding to winding onto the take-up reel 16. Accordingly, no limitation of the invention described herein is intended, except by way of the appended claims.

What is claimed is:

1. In an information cassette having a length of magnetic tape connected between a supply reel and a take-up reel, a counter assembly, comprising:

a counter unit including indexable counting means; and

means responsive to the change in effective diameter of one of the supply and take-up reels when the tape is substantially completely unwound from one of the reels and wound onto the other of the reels for indexing said counter unit.

2. The counter assembly of claim 1 wherein said diameter responsive means includes a lost motion mechanism having sufficient lost motion to permit reversals in the direction of tape winding of relatively short duration without indexing said counter unit.

3. The counter assembly of claim 2 wherein said lost motion mechanism comprises an escapement mechanism.

4. The counter assembly of claim 1 wherein said diameter responsive means comprises a follower arm, means for biasing said follower arm for engagement of one end of said follower arm with the outer diameter of one of the supply and take-up reels whereby said follower arm moves between a first position when the tape is substantially completely wound onto the supply reel and a second position when the tape is substantially completely wound onto the take-up reel, an escapement mechanism for indexing the counter unit, and means coupled between said follower arm and said escapement mechanism for oscillating said escapement mechanism in response to movement of said follower arm

between said first and second positions.

5. The counter assembly of claim 4 wherein said means coupled between said follower arm and said escapement mechanism comprises a crank arm mounted for pivoting movement for oscillating said escapement mechanism, said crank arm having an angularly oriented slot therein receiving said follower arm whereby movement of said follower arm between said first and second positions pivotally moves said crank arm.

6. In an information cassette having a length of magnetic tape connected and wound between a supply reel and a take-up reel, a counter assembly, comprising:

a counter unit having at least one rotary dial with numerical indicia about the circumference thereof;

follower means for bearing engagement with the outer diameter of one of the supply and take-up reels for movement between a first position when the tape is substantially completely wound onto the supply reel and a second position when the tape is substantially completely wound onto the take-up reel; and

motion conversion means for coupling movement of said follower means to said rotary dial for indexing said rotary dial once in response to movement of said follower means from said first position to said second position, said motion conversion means including a lost motion mechanism for permitting reversals of relatively short duration in the direction of tape winding without indexing said rotary dial.

7. The counter assembly of claim 6 wherein said lost motion mechanism comprises an escapement mechanism.

8. The counter assembly of claim 6 wherein said

follower means includes spring means for maintaining said follower means in bearing engagement with said one of the supply and take-up reels.

9. The counter assembly of claim 6 wherein the information cassette includes a cassette housing having a window formed therein to permit viewing of said rotary dial, the counter assembly being mounted within the cassette housing.

10. The counter assembly of claim 6 wherein said motion conversion means comprises a crank arm coupled to said follower means for oscillatory movement in response to movement of said follower means between said first and second positions, and an escapement mechanism coupled between said crank arm and said rotary dial for indexing said dial in response to oscillatory movement of said crank arm.

11. In an information cassette having a length of information storage tape connected and wound between a supply reel and a take-up reel, a counter assembly carried by the cassette for indicating the number of times the tape is wound substantially in its entirety from the supply reel to the take-up reel, comprising:

a counter unit having at least one rotary dial with numerical indicia about the circumference thereof;

a position indicator arm having one end for bearing engagement with the outer diameter of one of the supply and take-up reels;

means for urging said one end of said position indicator arm into bearing engagement with said one reel whereby said arm moves between a first position when the tape is wound substantially completely about the supply reel and a second position when the tape is wound substantially completely about the take-up reel;

a crank arm mounted for oscillatory movement and having a surface oriented angularly with respect to the plane of movement of said position indicator arm;

means for maintaining said angularly oriented surface of said crank arm in bearing engagement with said position indicator arm whereby said crank arm moves in an oscillatory fashion in response to movement of said position indicator arm between said first and second positions; and

an escapement mechanism coupled between said crank arm and said rotary dial and responsive to oscillatory movement of said crank arm for indexing said rotary dial once in response to movement of said position indicator arm from said first position to said second position, said escapement mechanism having sufficient lost motion for permitting reversals in the direction of tape winding of relatively short duration without indexing said rotary dial.

12. The counter assembly of claim 11 wherein the information cassette includes a cassette housing having a window formed therein to permit viewing of said rotary dial, the counter assembly being mounted within the cassette housing.

13. In an information cassette having a length of information storage tape connected and wound between a supply reel and a take-up reel, a counter assembly carried by the cassette for indicating the number of times the tape is wound substantially in its entirety from the supply reel to the take-up reel, comprising:

a counter unit having at least one rotary dial with numerical indicia about the circumference thereof;

a position indicator arm having one end for bearing engagement with the outer diameter of one of the supply and take-up reels;

means for urging said one end of said position indicator arm into bearing engagement with said one reel whereby said arm moves between a first position when the tape is wound substantially completely about the supply reel and a second position when the tape is wound substantially completely about the take-up reel;

a crank arm mounted for oscillatory movement and having a slot formed therein for receiving said position indicator arm therethrough, said slot extending angularly with respect to the plane of movement of said position indicator arm whereby said crank arm moves in an oscillatory fashion in response to movement of said position indicator arm between said first and second positions; and

an escapement mechanism coupled between said crank arm and said rotary dial and responsive to oscillatory movement of said crank arm for indexing said rotary dial once in response to movement of said position indicator arm from said first position to said second position, said escapement mechanism having sufficient lost motion for permitting reversals in the direction of tape winding of relatively short duration without indexing said rotary dial.

14. A combination information cassette and counter assembly, comprising:

a cassette housing;

a supply reel and a take-up reel rotatably carried by said housing;

a length of information storage tape connected and wound between said supply and take-up reels;

a counter unit mounted on said housing and including indexable counting means;

follower means for following the outer diameter of one of said supply and take-up reels for movement between a first position when said tape is wound

substantially completely about said supply reel and a second position when said tape is wound substantially completely about said take-up reel; and

motion conversion means for coupling movement of said follower means to said counter unit to index said counter unit once in response to movement of said follower means from said first position to said second position, said motion conversion means including a lost motion mechanism for permitting reversals of relatively short duration in the direction of tape winding without indexing said counter unit.

15. The apparatus of claim 14 wherein said counting means comprises at least one indexable rotary dial having numerical indicia about the circumference thereof, said counter unit being mounted with said housing and said housing having a window formed therein to permit viewing of said rotary dial.

16. The apparatus of claim 14 wherein said lost motion mechanism comprises an escapement mechanism.

17. The apparatus of claim 14 wherein said follower means includes spring means for maintaining said follower means in bearing engagement with said one of the supply and take-up reels.

18. A combination information cassette and counter assembly, comprising:

a cassette housing;

a supply reel and a take-up reel rotatably carried by said housing;

a length of information storage tape connected and wound between said supply and take-up reels;

a counter unit including a pair of mounting brackets mounted within said housing and supporting at

least one rotary dial having numerical indicia about the circumference thereof;

a position indicator arm having one end mounted for pivoting movement about a pivot axis adjacent one of said mounting brackets for movement of its opposite end into bearing engagement with the outer diameter of one of said supply and take-up reels;

a spring for urging the opposite end of said position indicator arm into bearing engagement with the outer diameter of said one reel whereby said position indicator arm is movable between a first position when said tape is wound substantially completely about said supply reel and a second position when said tape is wound substantially completely about said take-up reel;

a crank arm mounted with respect to the other of said mounting brackets for oscillatory movement and having a slot formed therein for receiving said position indicator arm therethrough, said slot extending angularly with respect to the plane of movement of said position indicator arm whereby said crank arm moves in an oscillatory fashion in response to movement of said position indicator arm between said first and second positions; and

an escapement mechanism coupled between said crank arm and said rotary dial and responsive to oscillatory movement of said crank arm for indexing said rotary dial once in response to movement of said position indicator arm from said first position to said second position, said escapement mechanism having sufficient lost motion for permitting reversals in the direction of tape winding of relatively short duration without indexing said rotary dial.

19. The apparatus of claim 18 wherein said housing has a window formed therein to permit viewing of said rotary dial.

20. The apparatus of claim 18 including roller means at the opposite end of said position indicator arm for smoothly engaging the outer diameter of said one reel.

Fig. 1

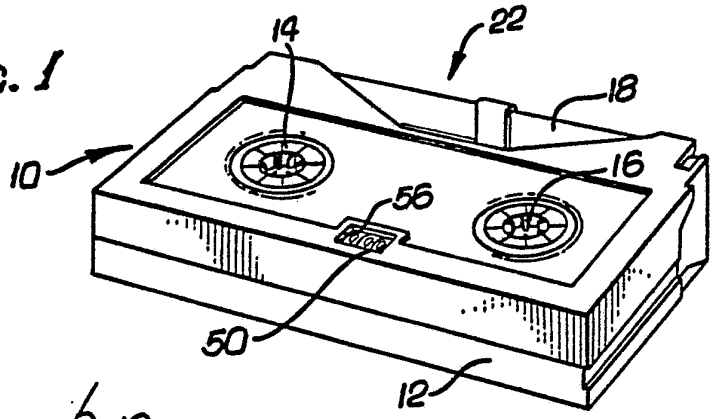


Fig. 3

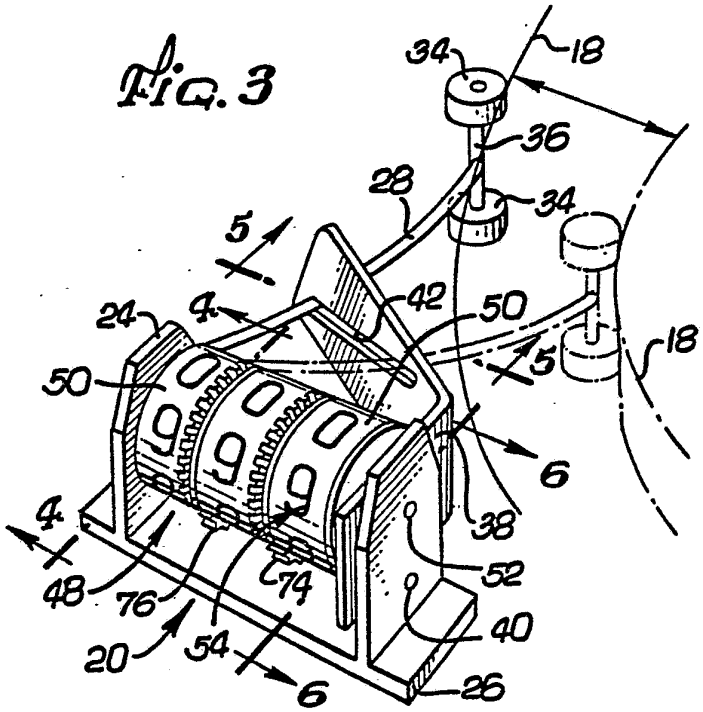


Fig. 4

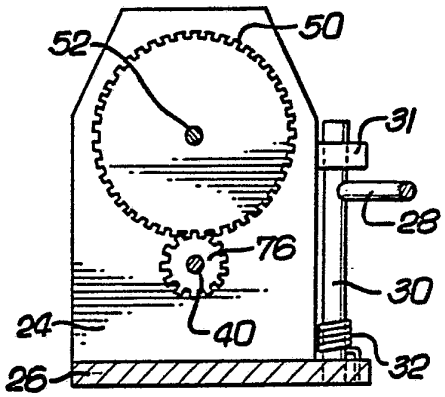


Fig. 5

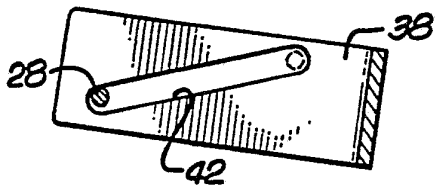


Fig. 2

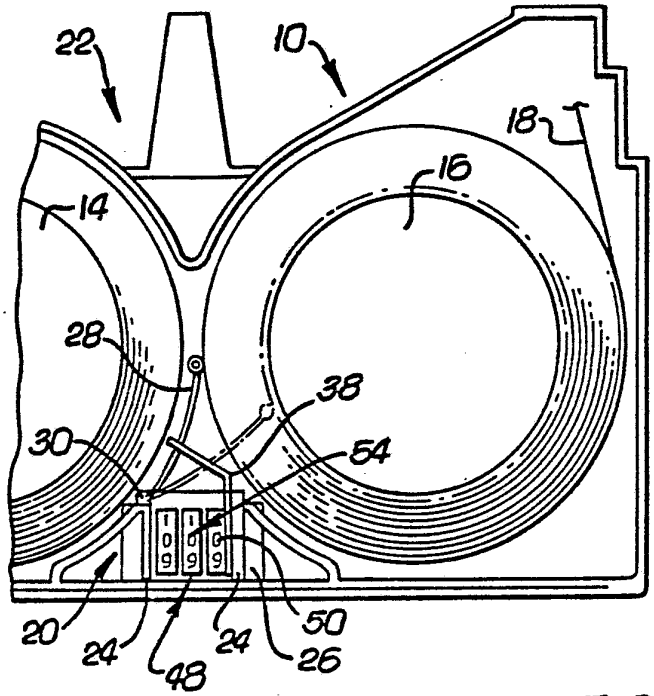
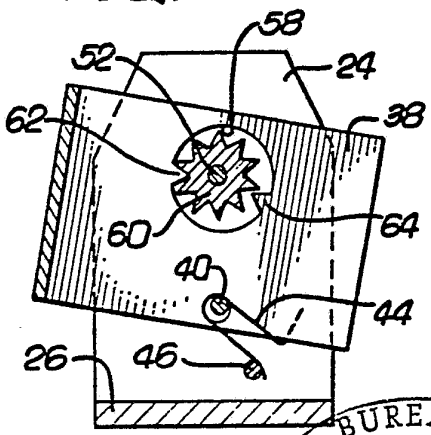


Fig. 6



SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/US82/01735

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT CL[3] B65H 75/00

U.S. CL. 235/103; 242/55.19A

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	235/103 242/55, 55.19A, 57, 191, 200

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US, A, 4274605, Published 23 June 1981, GRUBER, JR.	1-20
Y	US, A, 3604624, Published 14 September 1971, MIURA ET AL	1-17
A	US, A, 2944750, Published 12 July 1960, HALL, JR	1-20
A	US, A, 2756279, Published 24 July 1956, LANG	1-20

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
17 March 1983	22 MAR 1983
International Searching Authority [1]	Signature of Authorized Officer [20]
ISA/US	B.R. FULLER