UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SONY CORPORATION
Petitioner,

v.

FUJIFILM CORPORATION
Patent Owner.

_____

Case No. TBD
U.S. Patent No. 6,462,905
(Claims 1-4)

_____

DECLARATION OF THOMAS W. VON ALTEN

SONY Exhibit 1004
SONY v. FUJI

TABLE OF CONTENTS

I. PERSONAL AND PROFESSIONAL BACKGROUND 1

II. MATERIALS CONSIDERED 3

III. RELEVANT LEGAL STANDARDS 5

A. Anticipation 6

B. Obviousness 6

IV. THE LEVEL OF ORDINARY SKILL IN THE ART 9

V. OVERVIEW OF THE '905 PATENT 11

A. Technology Overview 11

1. Magnetic Tape Cartridges 11

2. The Purported Problems with Magnetic Tape Cartridges 16

B. The Three Disclosed Embodiments 18

1. The Common and Conventional Elements of the Three Embodiments 19

2. The "Improved" Design of Each Embodiment 23

C. Summary of the Claims 33

D. Summary of the Prosecution History 36

VI. CLAIM CONSTRUCTION 37

A. "reel stopper means" (Claims 1-4) 38

1. Claimed Function 38

2. Corresponding Structure 39

B. The "member" Limitations (Claims 1-4) 39

1. "braking member" 41

2. "urging member" 43

3. "releasing member" 43

4. "guide member" 45

C. "reel drive means" – claims 1-4 46

1. Claimed Function 46

2. Corresponding Structure 47

B. Japanese Patent Application Publication H10-90784 ("Mizutani," Ex-1006) 51
C. European Patent Application Publication 0926676 ("Morita-II," Ex-1011) 55
D. Japanese Patent Application Publication H11-288571 ("Tsuyuki," Ex-1012) 59
E. European Patent Application Publication 0284687 ("Laverriere," Ex-1007) 63
F. U.S. Patent No. 5,927,633 ("McAllister-II," Ex-1008) 66
G. Japanese Patent Application Publication S63-11776 ("Morita-I," Ex-1010) 68
H. International Publication WO 99/41513 ("Betzler," Ex. 1013) 70
VIII. SUMMARY OF MY OPINIONS 74
IX. VALIDITY ANALYSIS OF CLAIMS 1-4 76
A. Claims 1 and 2 Would Have Been Obvious Over McAllister-I in view of Laverriere 76
1. Reasons for Modifying McAllister-I In view of Laverriere 76
2. Limitation-by-Limitation Analysis 82
B. Claim 3 Is Anticipated by McAllister-I 106
1. The McAllister-I Embodiments 106
2. Limitation-by-Limitation Analysis 107
C. Claim 3 Would Have Been Obvious Over McAllister-I In View of Laverriere 117
1. Reasons for Modifying McAllister-I In View of Laverriere 117
2. Limitation-By-Limitation Analysis 120
D. Claim 4 Is Anticipated by McAllister-I 121
1. Patent Owner's Concessions Concerning McAllister-I 121
2. Limitation-by-Limitation Analysis 123
E. Claim 4 Would Have Been Obvious Over McAllister-I in View of McAllister-II 127
1. Reasoning for Modifying McAllister-I in view of McAllister-II 127
2. Limitation-By-Limitation Analysis 130

F. Claim 3 Is Anticipated by Mizutani 133
1. Limitation-By-Limitation Analysis 133
G. Claim 3 Would Have Been Obvious in view of Mizutani 158
H. Claim 1 Would Have Been Obvious Over Morita-I in view of Morita-II 160
1. Reasons for Modifying Morita-I In view of Morita-II 160
2. Limitation-by-Limitation Analysis 166
a. Claim 1, Preamble 166
i. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…" 166
ii. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used".....167
b. Claim 1, Limitation 1a.....170
i. "braking member": function.....170
ii. "braking member": structure.....171
c. Claim 1, Limitation 1b.....175
i. "urging member": function 175
ii. "urging member": structure.....176
d. Claim 1, Limitation 1c.....176
i. "releasing member": function 176
ii. "releasing member": structure.....178
iii. "rotated integrally with the reel".....181
e. Claim 1, Limitation 1d.....181
f. Claim 1, Limitation 1e.....182
i. "guide member": function.....185
ii. "guide member": structure 186

I. Claim 2 Would Have Been Obvious Over Morita-I in view of Morita-II and Laverriere....190
1. Reasons for Modifying Morita-I in view of Morita-II and Laverriere....190
2. Claim 2....191
a. "guide member": function....191
b. "guide member": structure....192
J. Claim 3 Is Anticipated by Tsuyuki....194
1. Limitation-By-Limitation Analysis....194
a. Claim 3, Preamble....194
i. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…"....194
ii. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"....195
b. Claim 3, Limitation 3a....198
i. "braking member": function....199
ii. "braking member": structure....200
c. Claim 3, Limitation 3b....204
i. "urging member": function....205
ii. "urging member": structure....205
d. Claim 3, Limitation 3c....206
i. "releasing member": function....206
ii. "releasing member": structure....208
iii. "rotated integrally with the reel"....211
e. Claim 3, Limitation 3d....211
f. Claim 3, Limitation 3e....212
K. Claim 3 Would Have Been Obvious in view of Tsuyuki....214

L. Claim 4 Is Anticipated by Morita-II....216
1. Patent Owner's Concessions Concerning Morita-II....216
2. Limitation-by-Limitation Analysis....218
a. Claim 4, preamble....218
iv. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…"....219
v. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"....220
b. Claim 4, Limitations 4a to 4d....220
c. Claim 4, Limitation 4e....221
M. Claim 4 Would Have Been Obvious Over Morita-II In View of Betzler....223
1. Reasons for Modifying Morita-II in View of Betzler....223
2. Claim 4, Limitation-by-Limitation Analysis....227
a. Claim 4, Preamble and Limitations 4a to 4d....227
b. Claim 4, Limitation 4e....227
X. SIGNATURE....230

I, Thomas von Alten, declare:

1. I have been retained by Wolf, Greenfield & Sacks, P.C., counsel for Petitioner Sony Corporation ("Petitioner" or "Sony"), to submit this declaration in connection with Sony's Petition for *Inter Partes* Review of Claims 1-4 of U.S. Patent No. 6,462,905 ("the '905 patent").

2. I am being compensated for my time at a rate of $250.00 per hour, plus actual expenses. My compensation is not dependent in any way upon the outcome of this proceeding.

I. PERSONAL AND PROFESSIONAL BACKGROUND

3. I received undergraduate degrees in General Studies and Mechanical Engineering from the University of Idaho in 1978 and 1982, respectively. I received a master's degree in Manufacturing Systems Engineering from Stanford University in 1990.

4. From 1986 to 1989, I worked as a manufacturing engineer for assembly and testing of magnetic disk drives at Hewlett Packard ("HP").

5. From 1990 to 1996, I worked as a product development engineer in the Disk Memory Division for HP. In that role, I worked on mechanical design and research development teams focused on disk drive systems.

6. From 1996 to 1999, I worked in HP's Computer Peripherals Division. In that role, I designed new magnetic tape cartridges and tape drive systems. I was

involved with the three-company team of HP, Seagate, and IBM, Linear-Tape Open (LTO) effort to design and introduce the "Ultrium" tape format. These are the tapes that became widely known as LTO magnetic tape cartridges.

7. From 1999-2003, I worked as part of the HP Labs "Atomic Resolution Storage" project, with responsibility for a nanopositioning, ultrahigh vacuum test platform for microelectromechanical systems (MEMS) product development. Since 2004, I have been self-employed as a web application developer.

8. I am a named inventor on a number of patents, including patents relating to magnetic tape cartridges, such as U.S. Patent No. 6,717,771 ("Magnetic Tape Cartridge Having Projections"); U.S. Patent No. 6,449,684 ("Tape Leader Pin Assembly and Method for Making the Same"); U.S. Patent No. 6,003,802 ("Tape Leader Pin Assembly and Method for Making the Same"); U.S. Patent No. 5,901,916 ("Tape Cartridge Reel Lock"); and U.S. Patent No. 5,813,622 ("Tape Cartridge Reel Lock").

9. My employment background, professional experience, and list of patents are contained in my CV, attached as Exhibit 1004.

II. MATERIALS CONSIDERED

10. In connection with my work on this matter, I have reviewed the '905 patent (Ex-1001), as well as the other documents listed on the following list:

Exhibit	Description
1001	U.S. Patent No. 6,462,905
1002	File History for U.S. Patent No. 6,462,905
1003	CV of Mr. Thomas W. von Alten
1004	Declaration of Mr. Thomas W. von Alten (this document)
1005	U.S. Patent No. 5,901,916 ("McAllister-I")
1006	Japanese Patent Publication No. H11-273307 ("Mizutani")
1007	European Patent Publication No. 0 284 687 A2 ("Laverriere")
1008	U.S. Patent No. 5,927,633 ("McAllister-II")
1009	File History for European Patent No. 1 098 320 B1
1010	Japanese Patent Publication No. S63-11776 ("Morita-I")
1011	European Patent Publication No. 0 926 676 A1 ("Morita-II")
1012	Japanese Patent Application H11-288571 ("Tsuyuki")
1013	International Patent Publication No. WO 99/41513 ("Betzler")
1014	Fujifilm Corp. and Fujifilm Recording Media U.S.A., Inc.'s Proposed Constructions in *Certain Magnetic Data Storage Tapes and Cartridges Containing the Same*, 337-TA-1076 (dated Jan. 18, 2018)
1015	Summary of Petitioner's Proposed Claim Constructions
1016	Redline Comparison of Issued Claim 4 of U.S. Patent No. 6,462,905 and Original Claim 4 of EP 1 098 320 B1
1017	U.S. Patent No. 2,778,636
1018	Excerpt from FUNK & WAGNALLS NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE (2000)
1019	Excerpt from THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (2011)

1020	Excerpt from THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (2011)
1021	Works, G., "CURVIC COUPLING DESIGN," *Gear Technology* (November/December 1986)
1022	Excerpt from WEBSTER'S ENCYCLOPEDIC UNABRIDGED DICTIONARY OF THE ENGLISH LANGUAGE (1989)
1023	Excerpt from RANDOM HOUSE UNABRIDGED DICTIONARY (1993)
1024	U.S. Patent No. 1,660,792
1025	Claim Comparison of Original Claim 4 of EP 1 098 320 B1and Amended Claim 1 of EP 1 098 320 B1
1026	Claim Element Comparison of Primary References
1027	Standard ECMA-120 (Dec. 1993)
1028	Standard ECMA-196 (Dec. 1993)
1029	European Patent No. 1 098 320 B1

III. RELEVANT LEGAL STANDARDS

11. I understand that there are a number of legal principles involved in assessing the validity of a patent in connection with an *inter partes* review (IPR) proceeding. In expressing my opinions and considering the subject matter of the challenged claims of the ’905 patent, I am relying on legal principles that Sony’s attorneys have provided and/or explained to me.

12. I understand that in this proceeding, Sony has the burden of proving that claims 1-4 of the ’905 patent are unpatentable by a preponderance of the evidence. I understand that under “a preponderance of the evidence” standard, Sony must show that a fact is more likely true than not true.

13. I understand that for an invention claimed in a patent to be patentable, it must be, among other things, new (novel) and not obvious from the prior art that preceded the invention.

14. I understand the information that is used to evaluate whether a claimed invention is patentable is generally referred to as “prior art” and includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

15. I understand that *inter partes* review is a proceeding before the United States Patent & Trademark Office (“Patent Office”) for evaluating the patentability of issued patent claims based on prior art patents and printed publications.

16. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, I understand that prior art may "anticipate" the claim. Second, I understand the prior art may have made the claim "obvious" to a person of ordinary skill in the art ("POSA") at the time the invention was made. My understanding of the two legal standards is set forth below.

A. Anticipation

17. I understand that the following standards govern the determination of whether a patent claim is "anticipated" by the prior art.

18. I understand that, for a patent claim to be "anticipated" by the prior art, each and every limitation of the claim must be found, expressly or inherently, in a single prior art reference.

19. I understand that a claim limitation is inherent in a prior art reference if that limitation is necessarily present when practicing the teachings of the reference, regardless of whether a POSA recognized the presence of that limitation in the prior art.

B. Obviousness

20. I understand that a patent claim may be unpatentable if it would have been obvious in view of a single prior art reference or a combination of prior art references.

21. I understand that a patent claim would have been obvious if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSA in the relevant field. Specifically, I understand that the obviousness question involves a consideration of:

- the scope and content of the prior art;
- the differences between the prior art and the claims at issue;
- the knowledge of a person of ordinary skill in the pertinent art; and
- if present, objective factors indicative of non-obviousness, sometimes referred to as "secondary considerations."

22. I understand that in order for a claimed invention to be considered obvious, a POSA must have had a reason for combining teachings from multiple prior art references (or for altering a single prior art reference, in the case of single-reference obviousness) in the fashion proposed.

23. I further understand that in determining whether a prior art reference would have been combined with other prior art or with other information within the knowledge of a POSA, the following are examples of approaches and rationales that may be considered:

- combining prior art elements according to known methods to yield predictable results;

- simple substitution of one known element for another to obtain predictable results;
- use of a known technique to improve similar devices in the same way;
- applying a known technique to a known device ready for improvement to yield predictable results;
- applying a technique or approach that would have been "obvious to try," i.e., choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or
- some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. I understand that this teaching, suggestion, or motivation may come from a prior art reference or from the knowledge or common sense of one of ordinary skill in the art.

24. I understand that for a single reference or a combination of references to render the claimed invention obvious, a POSA must have been able to arrive at the claims by altering or combining the applied references.

IV. THE LEVEL OF ORDINARY SKILL IN THE ART

25. I understand that prior art references should be understood from the perspective of a person of skill in the art of the applicable field as of the time the invention was made.

26. Here, the '905 patent addresses the "Field of the Invention" by explaining:

> This invention relates to a magnetic tape cartridge comprising a cartridge casing and a single reel which is housed in the cartridge casing for rotation and around which a magnetic tape is wound, and more particularly to a structure of a reel stopper means for preventing rotation of the reel when the magnetic tape cartridge is not being used.

'905 Patent at 1:6-11. In other words, the invention relates to the design of a "reel stopper means" that prevents the reel in a magnetic tape cartridge from rotating.

27. As for the time the invention was made, the '905 patent claims priority to two Japanese patent applications filed on November 8, 1999 and November 9, 1999, respectively. Therefore, I have been asked to consider the level of ordinary skill in the art as of November 1999.

28. In my opinion, a POSA in the November 1999 time frame would have had a bachelor's degree in mechanical engineering or related field with two years

of experience designing magnetic tape cartridges or similar advanced post-graduate education in this area. A person with less education but more design experience may also meet this standard as would a person with less design experience and more education.

29. I understand that a POSA is presumed to be aware of all pertinent prior art and is a person of ordinary creativity. I have applied this standard throughout my declaration.

30. As of November 1999, I exceeded the above-described qualifications of a POSA as I had been working specifically on magnetic tape cartridge design for more than three years and had worked on related precision machine design (i.e., hard disk drives) for nearly a decade at Hewlett Packard.

31. Though my credentials and experience exceeded those that would qualify a person as a POSA, I am (and was in 1999) familiar with the knowledge and skills of those who would have qualified as a POSA under the standard set forth above. For example, as of November 1999, I had been actively involved in the design of new magnetic tape cartridges at HP. In that role, I lead various task forces and teams which included junior engineers and technicians who satisfied the above-described qualifications for a POSA.

V. OVERVIEW OF THE '905 PATENT

A. Technology Overview

1. Magnetic Tape Cartridges

32. The '905 patent relates to the design of magnetic tape cartridges. The patent concedes that such cartridges were known by November 1999 (Ex. 1001 at 1:12-17), an unsurprising concession given that magnetic tape cartridges date back to at least the 1950s (*e.g.*, Ex-1017) and were ubiquitous by the 1990s (*e.g.*, Exs. 1005-1008, 1010-1012). An audio cassette used with the Sony Walkman from the 1980s is an example of a well-known magnetic tape cartridge.

33. Magnetic tape cartridges conventionally wrapped magnetic tape around either two reels, like the audio cassettes used with Sony's Walkman, or a single reel, a design common for cartridges designed for archival storage of computer data. McAllister-I at 1:11-20; Mizutani ¶2. The '905 patent relates to the latter form of cartridges.

34. As of November 1999, conventional single-reel magnetic tape cartridges included a box-like cartridge that housed a reel around which tape was wound. Below are four examples of a conventional cartridge with a casing (red) and a single reel (green):

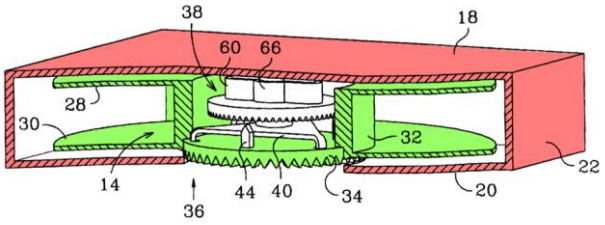
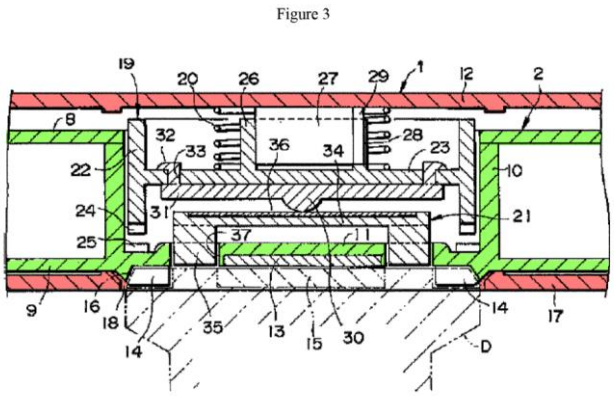


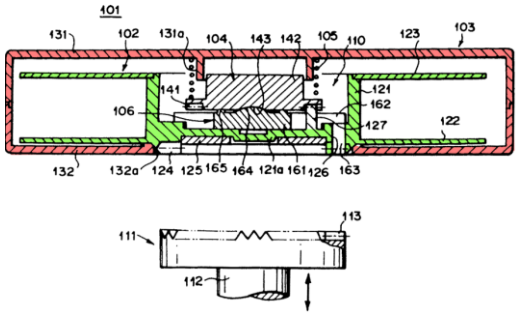
FIG. 2B

McAllister-I at FIG. 2B



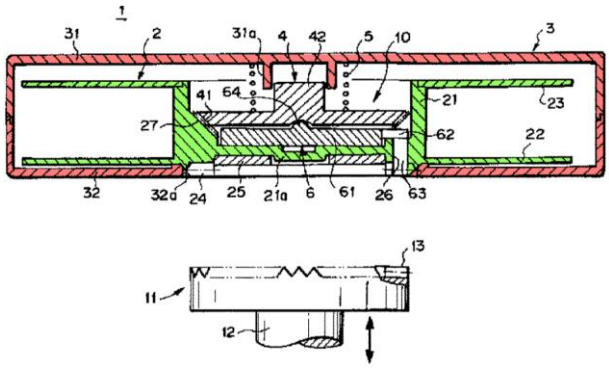
Mizutani at FIG. 3

F I G . 7



Morita-II at FIG. 7

Figure 1



Tsuyuki at FIG. 1

35. Using McAllister-I as an example, its reel includes top and bottom flanges 28 and 30 an annular hub 32. McAllister-I at 3:3-5. Within the annular reel hub 32 is a set of cooperating structures that lock and unlock the reel for rotation within the casing. Those structures, illustrated below, include a brake (yellow) that is rotationally fixed relative to the casing, a projection (blue) on the base of the reel, a spring (purple) and a plate (orange) with three legs that extend through the reel base:

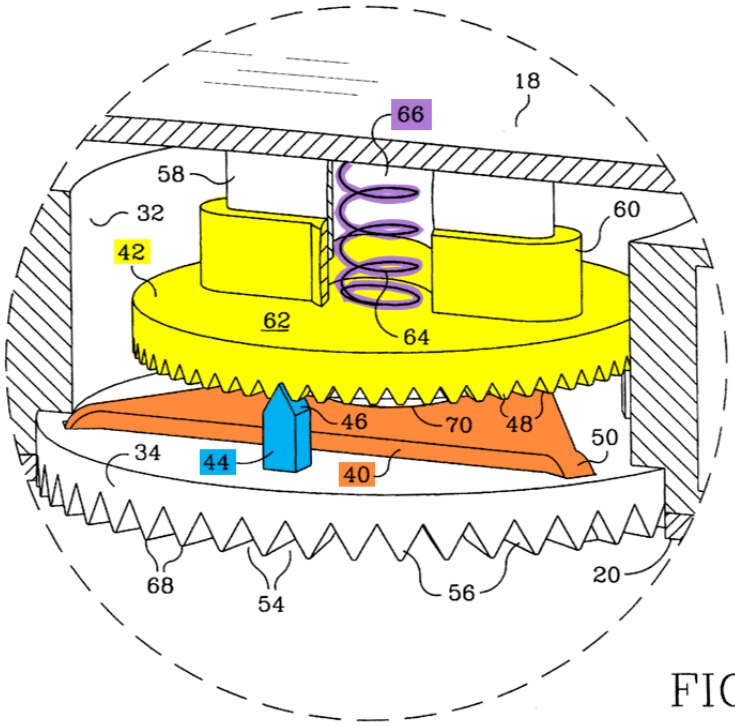
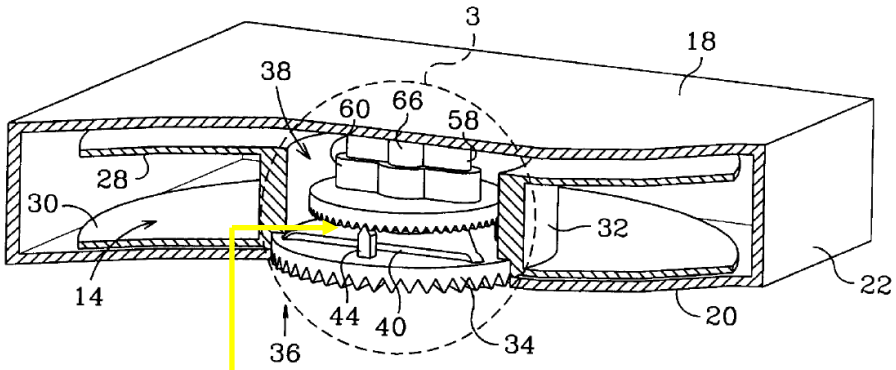


FIG. 3

McAllister-I at FIG. 3

36. When not in use, the spring forces the brake (downwardly in the Figure 3 of McAllister-I above) into engagement with the reel projection, thus locking the reel in place. When the cartridge is installed in a tape drive, drive teeth in the tape drive push against the plate's legs, overcoming the spring's force and causing the brake to move (upwardly in the figures) away from engagement with the projection. The locked and unlocked states are depicted in Figures 2A and 2B of McAllister-I:

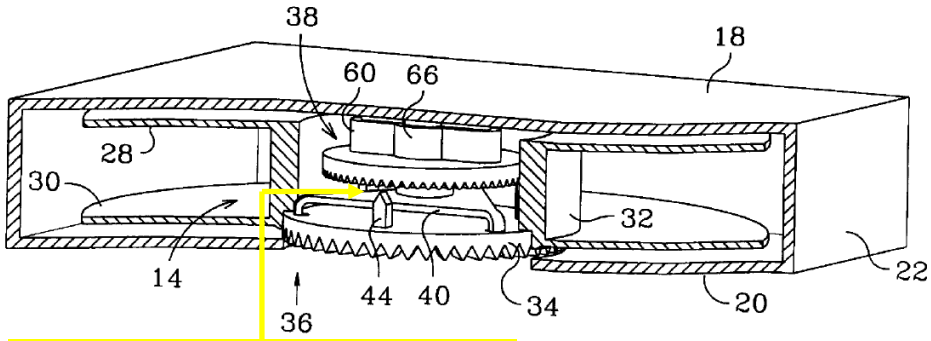
Locked



Brake engaged with reel projection

FIG. 2A

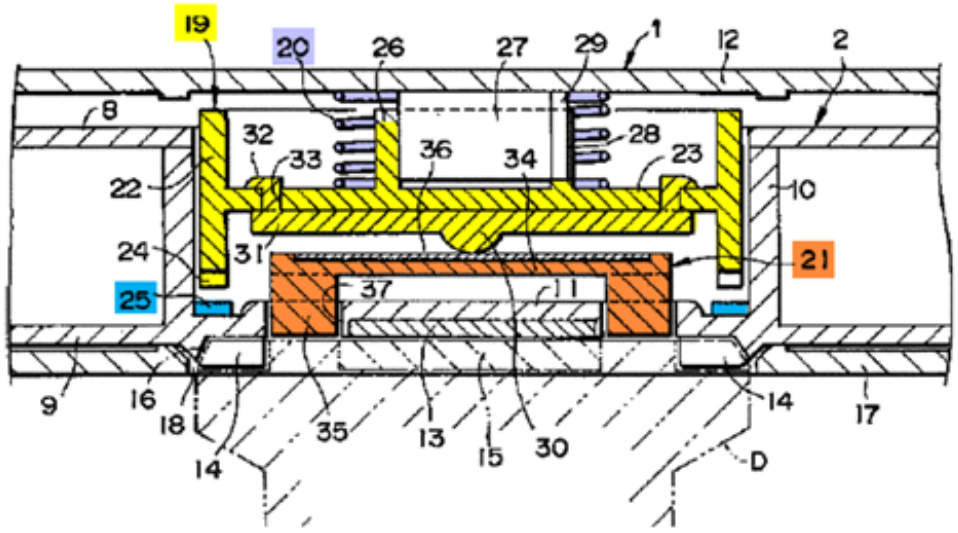
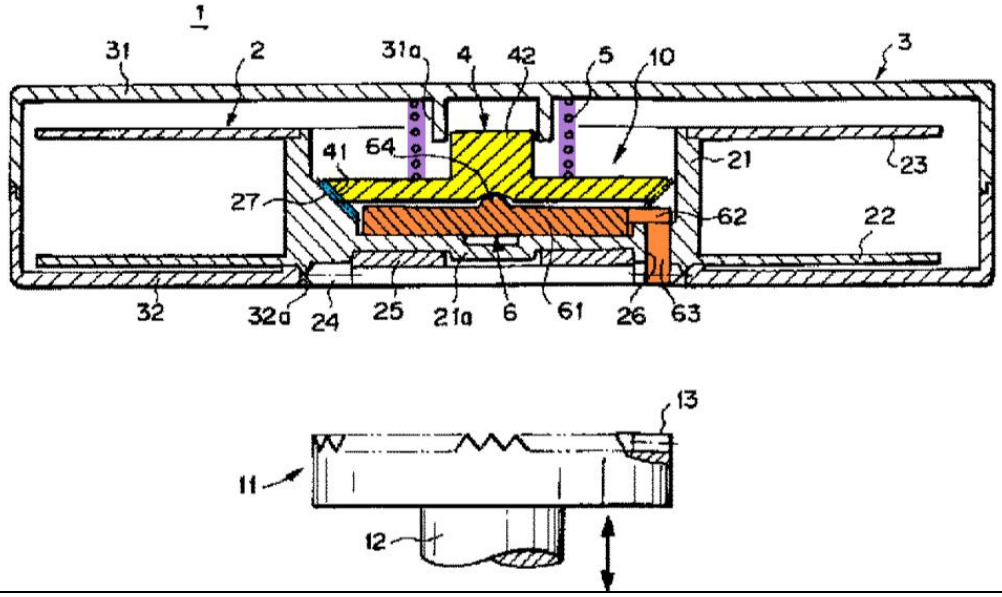
Unlocked

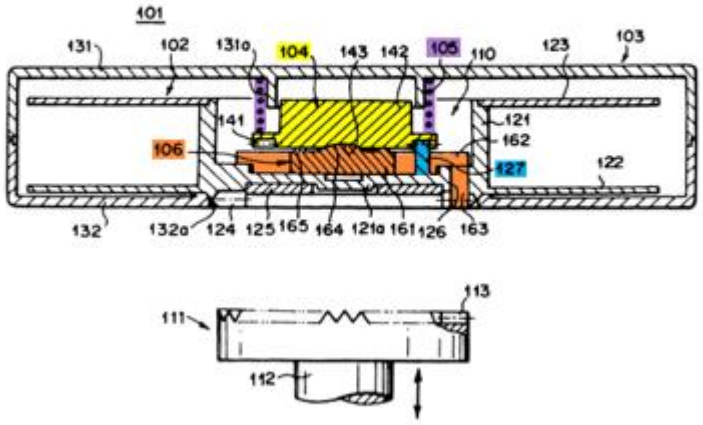


Brake disengaged from reel projection

FIG. 2B

37. As seen below, Mizutani, Tsuyuki and Morita-II all utilize the same basic components to lock a reel to the cartridge:

Mizutani	Figure 3 
Tsuyuki	Figure 1 

Morita-II	FIG. 7 

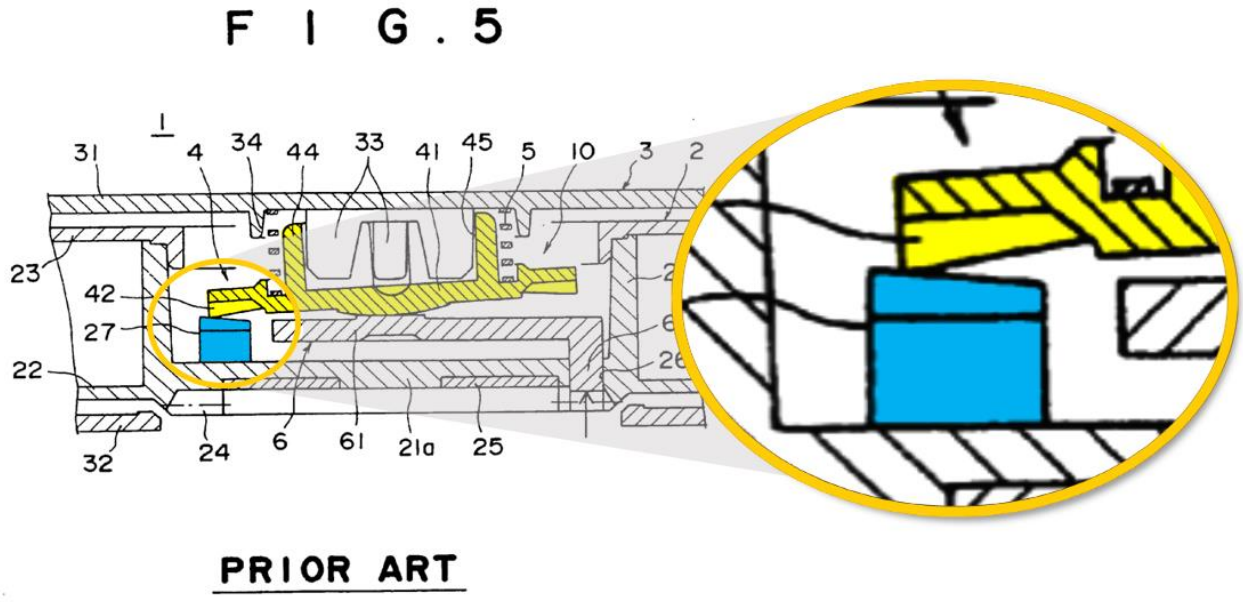
2. The Purported Problems with Magnetic Tape Cartridges

38. The ’905 patent identifies two purported problems with the type of cartridge design depicted in McAllister-I, Mizutani, Tsuyuki and Morita-II: (1) misalignment and (2) over-winding.

a. The Misalignment Problem

39. According to the ’905 patent, during the assembly process or when the cartridge is used, the brake can become “inclined” in the conventional design. ’905 Patent at 1:58-61, 2:5-9, Fig. 5. This is problematic because gear teeth on an inclined brake can contact gear teeth on the reel even after the brake has purportedly been disengaged, resulting in “noise, obstruction of rotation of the reel and unstable magnetic tape loading/unloading action.” ’905 Patent at 1:61-65. A misaligned brake is shown in Figure 5 of the ’905 patent reproduced below. Given

its tilt, the brake (yellow) can remain in contact with a gear tooth (blue) on the reel even though the brake has been lifted up and should have disengaged:



40. Although not explained in the ’905 patent, a reason for the purported misalignment problem is self-evident: the outer diameter of the brake is smaller than the inner diameter of the reel hub, and the open space between the outer edge of the brake and the inner surface of the reel hub permits the brake to tilt or become off-center.

41. This misalignment problem would have occurred even though a projection on the top of the brake (element 44) mates with an engagement projection (element 33) extending downward from the inner surface of the upper half of the cartridge case. The two projections work together to allow the brake to move up and down but not rotate. ’905 Patent at 7:6-14. Because projection 44

moves up and down within projection 33, there must be sufficient clearance between the two components to permit this movement. This clearance thus allows the brake to tilt. *See, e.g.*, Mizutani ¶5 (recognizing that "the amount of clearance maintained" between two projections like elements 33 and 44 of the '905 Patent "is also a factor" in a brake tilting").

42. As discussed in more detail in Section VII, the "misalignment" problem that the '905 Patent identified in November 1999 was identified (and solved) in prior art references dating back to the late 1980s.

b. The Over-Winding Problem

43. According to the '905 patent, brakes in conventional cartridges used sawteeth-shaped gears which "surely prevented" the reel from rotating in the tape-unwinding direction during non-use. '905 Patent at 2:9-29. If the cartridge was dropped, however, the impact could cause the reel to rotate in the tape-winding direction which could disadvantageously stretch or even break the magnetic tape, because the sawteeth design of the brake teeth prevented the tape from unwinding to release the tension on the tape. '905 Patent at 2:29-38.

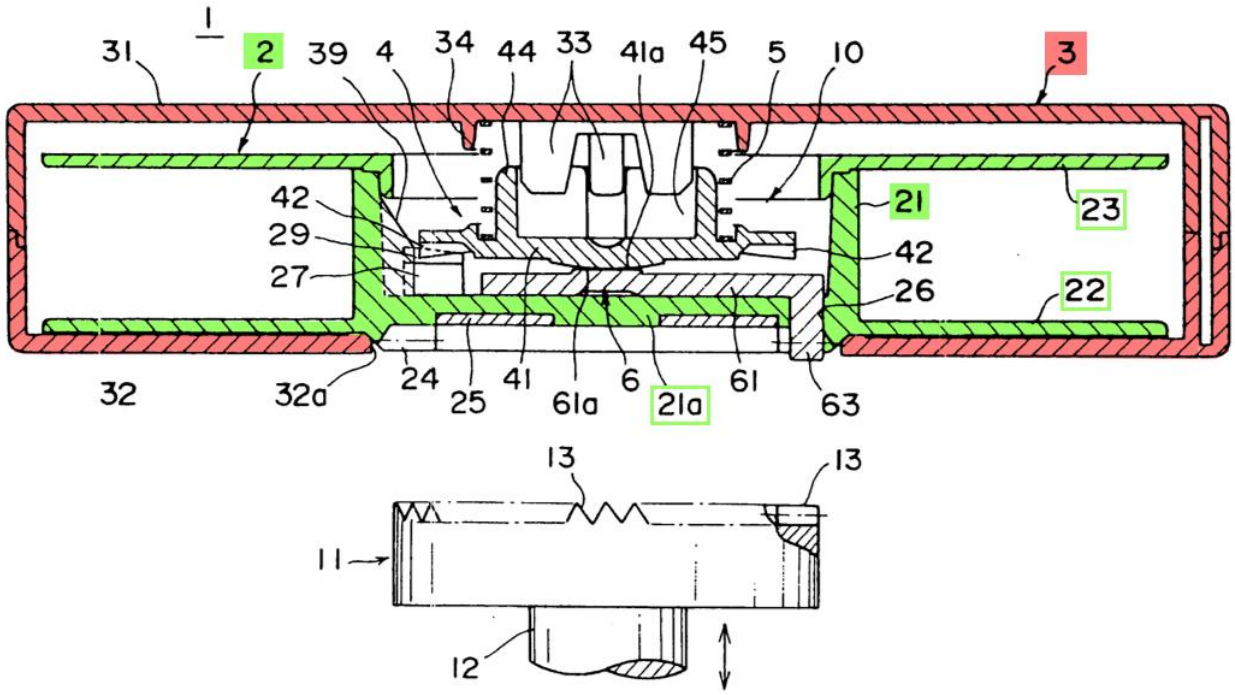
B. The Three Disclosed Embodiments

44. The '905 patent describes three alterations to the conventional cartridge design. '905 Patent at 2:40-58. Each of the "improved" designs starts

with the same above-discussed conventional cartridge components depicted in McAllister-I and Mizutani.

1. The Common and Conventional Elements of the Three Embodiments

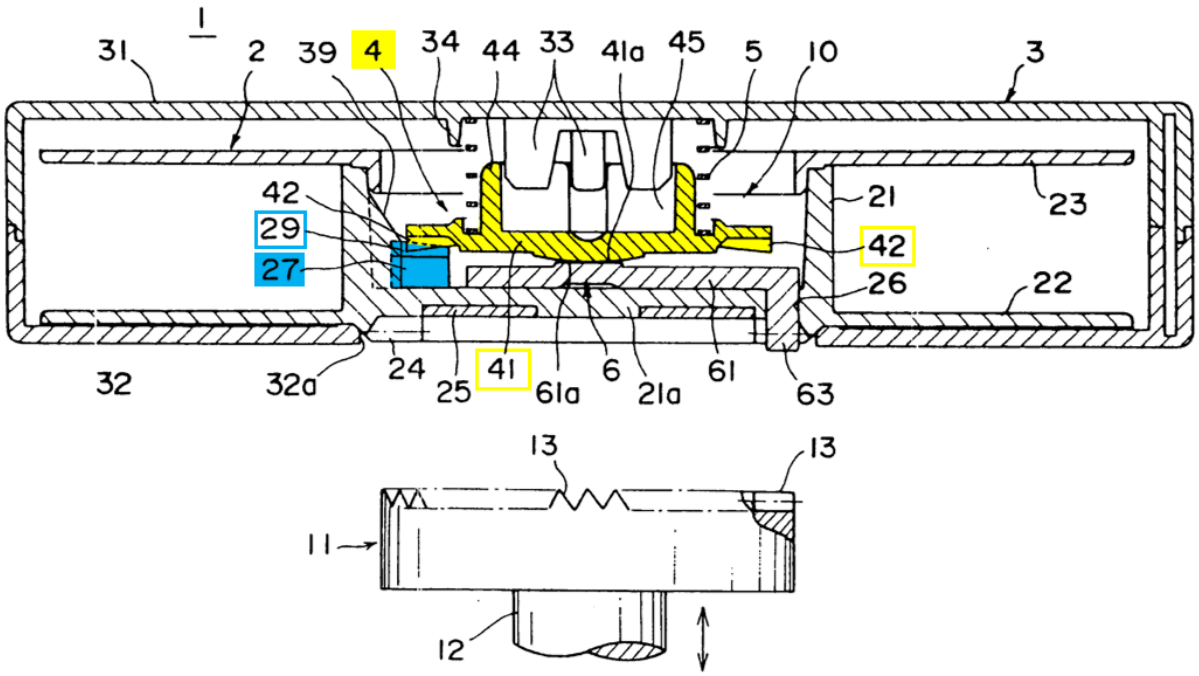
45. Each embodiment in the '905 patent, including the embodiment in Fig. 1 reproduced below, includes a casing 3 (red) and reel 2 (green) that includes a cylindrical reel hub 21 having a closed bottom wall 21a. '905 Patent at 5:26-33.



F I G . 1

46. The reel hub bottom wall includes "three pairs of (six) engagement projections 27" (blue below) on its upper surface that each has an engagement gear 29. '905 Patent at 5:63-6:1. A braking member 4 (yellow) inside the reel hub

includes a disc portion 41 and annular braking gear 42 adapted to engage with engagement gear 29 on engagement projections 27. '905 Patent at 6:6-16.



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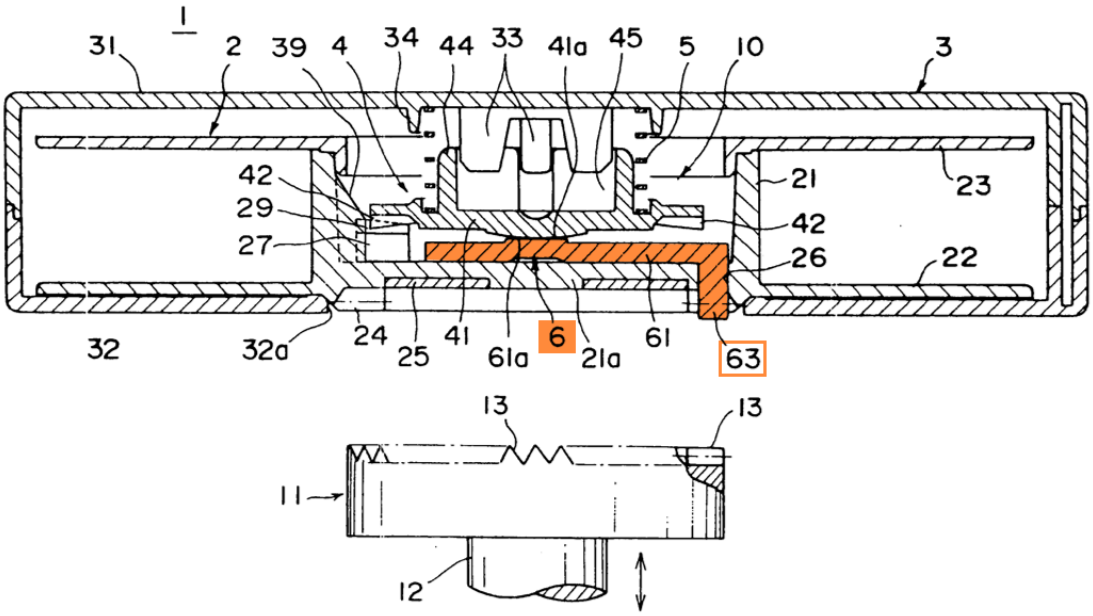
47. A "coiled spring (urging member) 5" is compressed between the top of the braking member and the top of the cartridge. '905 Patent at 7:16-18. The spring urges braking member 4 into engagement with engagement projections 27 of the reel hub. '905 Patent at 7:19-23.

48. A triangular releasing member 6 (orange below) disposed in the reel hub includes three leg portions 63 that extend through holes 26 in the reel hub bottom. '905 Patent at 7:23-35. When the releasing member is at its lowest point (Fig. 1), its leg portions extend through the reel hub base. '905 Patent at 7:36-39.

When a drive gear 13 is brought into engagement with the reel (Figure 2), drive gear 13 pushes leg portions 63 up, causing releasing member 6 to overcome the bias of spring 5 and lift the braking gear out of engagement with the reel's engagement gear 27, thus permitting the reel to rotate. '905 Patent at 7:39-46. The releasing member is rotationally fixed to, and rotates together with, the reel. '905 Patent at 7:46-49.



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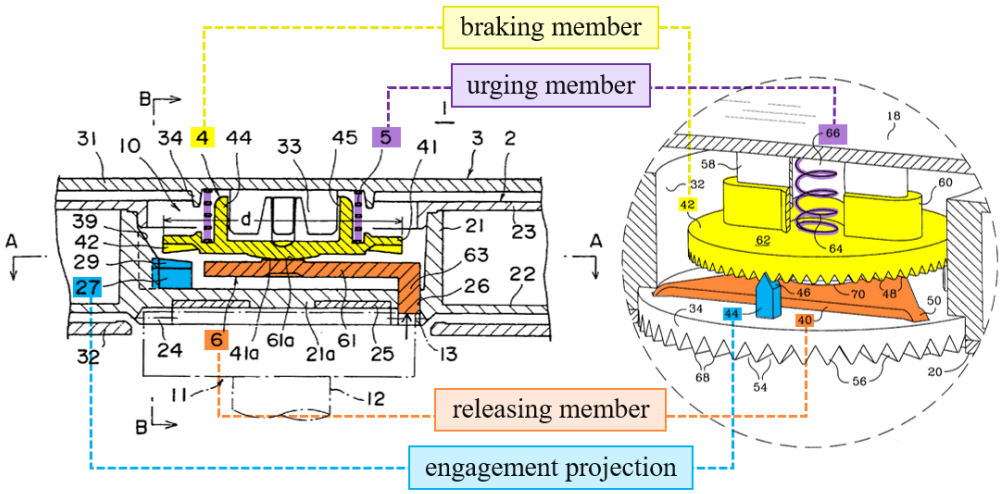
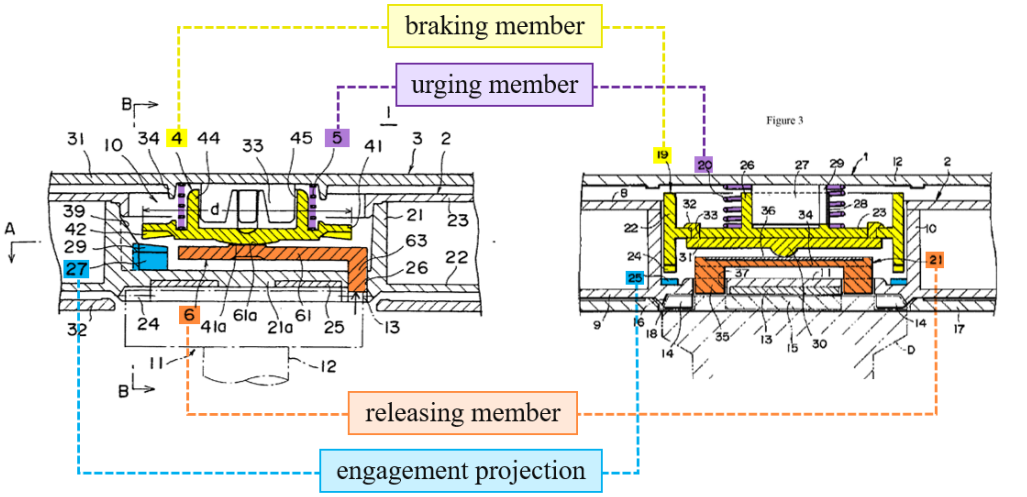
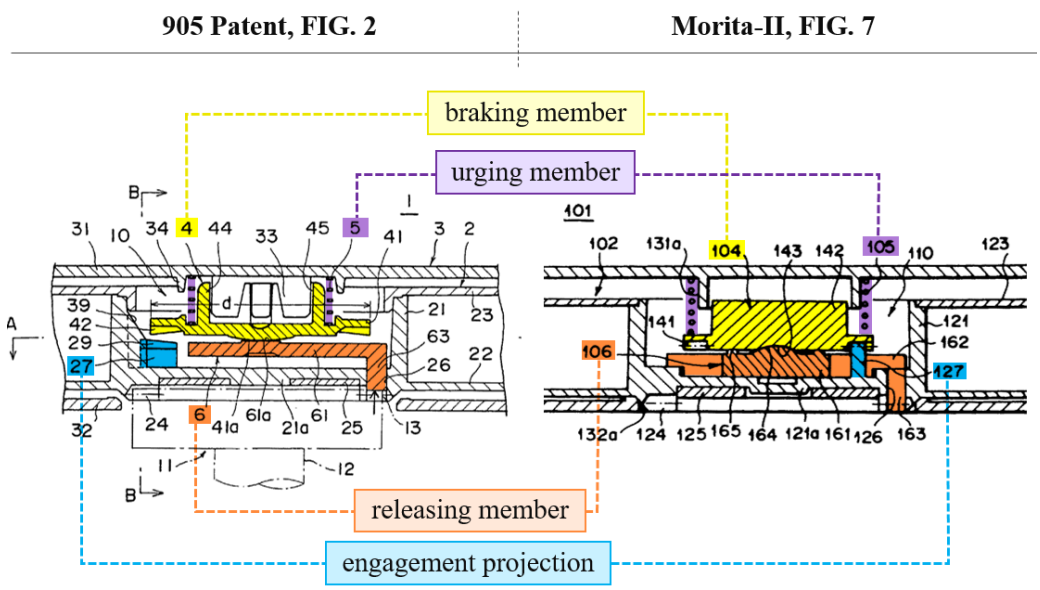
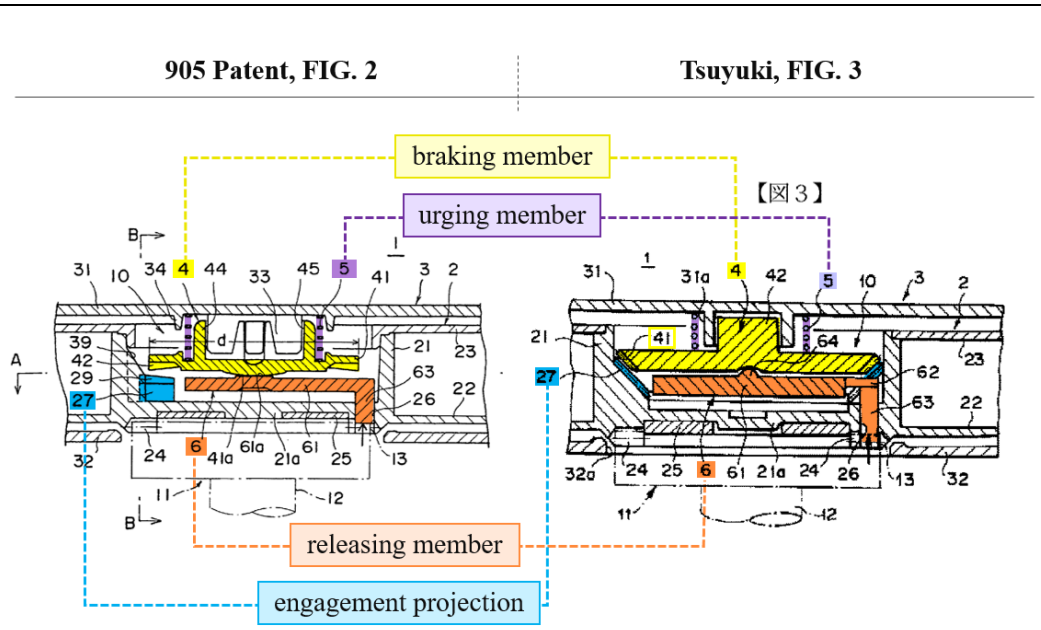
49. As seen below, the braking member, urging member, releasing member, and engagement projection in the '905 patent correspond to the conventional reel lock components in McAllister-I, Mizutani, Morita-II and Tsuyuki:

McAllister-I	**905 Patent, FIG. 2** | **McAllister I, FIG. 3** 
Mizutani	**905 Patent, FIG. 2** | **Mizutani, FIG. 3** 

Morita-II	
Tsuyuki	

2. The "Improved" Design of Each Embodiment

50. The '905 patent discloses three embodiments that purport to improve on the above-described conventional design.

a. The First Embodiment: Guide Members

51. In a **first embodiment**, the inner surface of the reel hub includes three "guide members 39," highlighted in purple in Figure 1 below. '905 Patent at 6:26-34. The guide members are formed by three ribs, each having "an inclined surface which gradually inclines downward," that together "center the braking gear 42 when the outer periphery of the breaking gear 42 is brought into contact with the inclined surfaces." '905 Patent at 6:34-40. The guide members thus allegedly solve the first problem the '905 patent identified—misalignment of the brake. '905 Patent at 3:14-34.

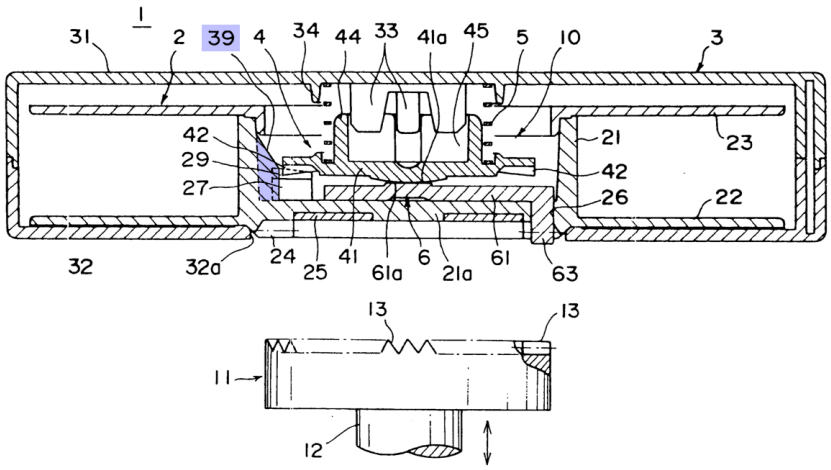


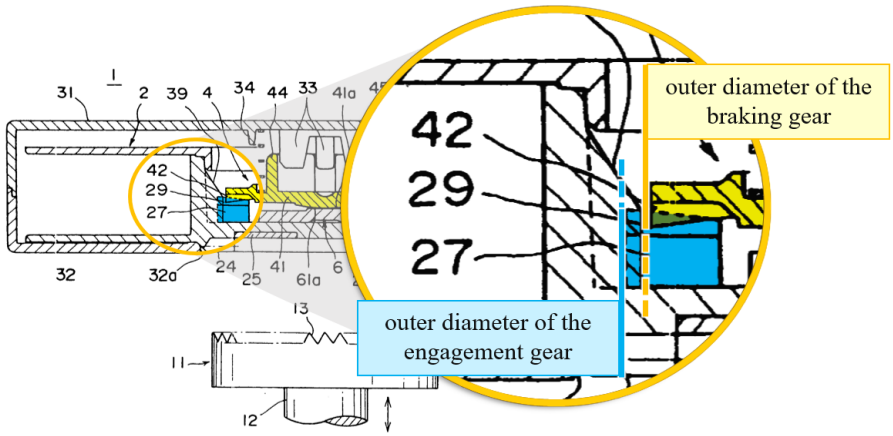
FIG. 1

b. The Second Embodiment: Gear Diameter Differential

52. In a **second embodiment**, rather than (or in addition to) utilizing guide members, the reel's engagement gear (blue) has an outer diameter (measured across the outer periphery of the engagement projections) larger than the diameter

of the gear on the braking member (yellow), as shown in Figure 1 reproduced and highlighted below. '905 Patent at 8:44-48. The '905 patent states that the difference in gear diameters centers the braking member with respect to the reel hub, thereby preventing the braking member "from being inclined in the locking position" or "contacting the engagement gear teeth to generate noise or to obstruct rotation of the reel." '905 Patent at 3:57-4:5. The difference in gear diameters, like the guide members, thus allegedly[1] solves the misalignment problem. '905 Patent at 3:57-4:5.

[1] While the '905 Patent takes it as a given that the difference in diameters would result in a self-centering relationship between the braking gear and the engagement gear, there is little mechanical reason why this is so. With two face gears—which the braking gear and engagement gear are—self-centering is obtained by the meshing of the gear teeth together. For misalignment within the tolerance of proper meshing, the meshing of the two sets of gear teeth will align the parts as they mesh. The tooth geometry (spacing, depth, face angles), rather than the relative diameters of the gears, determines the limit of misalignment for proper mesh.



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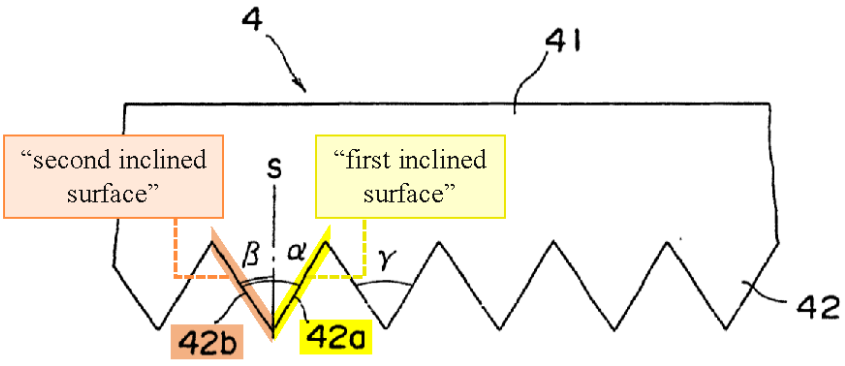
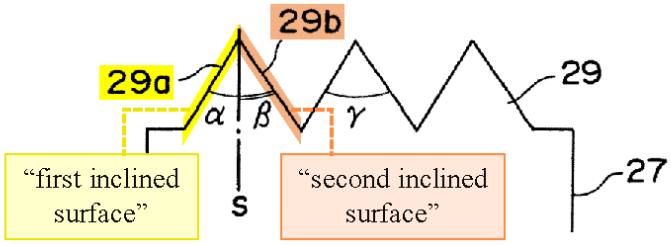
c. The Third Embodiment: Gear Tooth Configuration

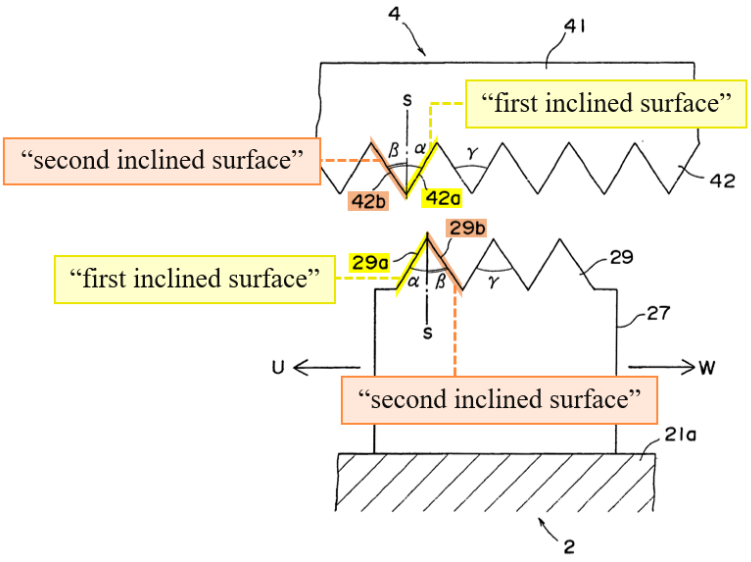
53. The **third embodiment** addresses the over-winding of the tape when the cartridge is dropped problem through a particular gear tooth configuration. ’905 Patent at 4:6-58. As shown below (a portion of Figure 4), each gear tooth on the braking gear 42 is triangular in cross-section, with a “first inclined surface 42a” and a “second inclined surface 42b.” ’905 Patent at 6:41-64, Fig. 4.



54. The braking gear teeth mesh with the teeth of the reel's engagement gear 29, each of which is also triangular in cross-section, with a "first inclined surface 29a" and a "second inclined surface 29b":



55. As depicted in Figure 4 (reproduced in full below), when the braking gear and engagement gear teeth mesh and the reel is rotated in the tape-unwinding direction ("U"), the "first inclined surface 42a" of each braking gear tooth abuts the "first inclined surface 29a" of each engagement gear tooth. If the reel is rotated in the tape-winding direction ("W"), the "second inclined surface 42b" of each braking gear tooth abuts the "second inclined surface 29b" of each engagement gear tooth. '905 Patent at 6:44-64.



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56. The '905 patent sets forth four requirements for the various angles that the first and second inclined surfaces create:

(1) The apical angle between the two surfaces (γ) must be 90° or less;

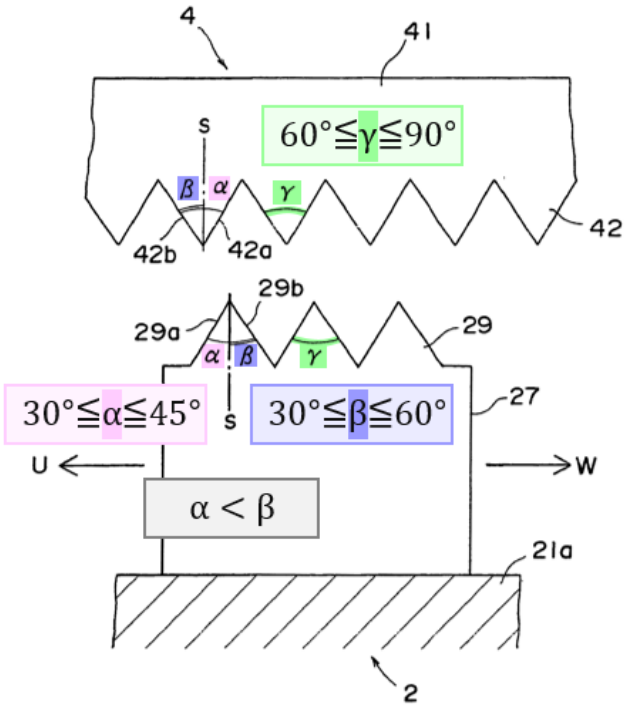
(2) Interior angles α and β between the first and second inclined surfaces and the vertical S, respectively, are each less than 30°; and

(3) Interior angle α is less than interior angle β.

'905 Patent at 6:41-7:5, 8:56-9:23.[2]

[2] Although the patent states that α can equal β (6:64-7:4), it clarifies that α must be less than β to overcome the tape-unwinding problem while also ensuring that "sufficient locking force" is maintained (9:10-23).

57. In other words, and as shown below, the '905 patent's third embodiment requires that 60°≦γ≦90°, 30°≦α≦45°, 30°≦β≦60, and α< β. '905 Patent at 7:5, 9:10-23.



F I G . 4

58. According to the '905 specification, this specific gear configuration ensures that if the reel is inadvertently rotated in the winding direction due to a sudden force (i.e., dropping of the tape), the reel can rotate back in the unwinding direction to reduce the tension on the magnetic tape and thereby prevent the tape from being stretched or cut. '905 Patent at 8:56-67, 9:1-25. This is accomplished because α, while less than β, is still greater than 30° which more easily permits

rotation in the unwinding direction than the sawtooth configurations in prior art devices.

59. The sizes of α and β correspond to the steepness of the first or second inclined surfaces. The smaller α or β, the steeper the first or second inclined surface; the bigger α or β, the less steep the first or second inclined surface. The steepness of a gear tooth surface dictates how much torque can be applied against the surface before the tooth (and thus the gear) "slips," i.e., gives way. In a sawtooth or ramp-shaped configuration, either α or β is close to 0°, though for manufacturing purposes, a molded part would typically have a small draft angle of 1° to 5°. McAllister-II (Ex-1008) depicts an exemplary sawtooth / ramp-shaped configuration, I have reproduced and annotated that depiction below:

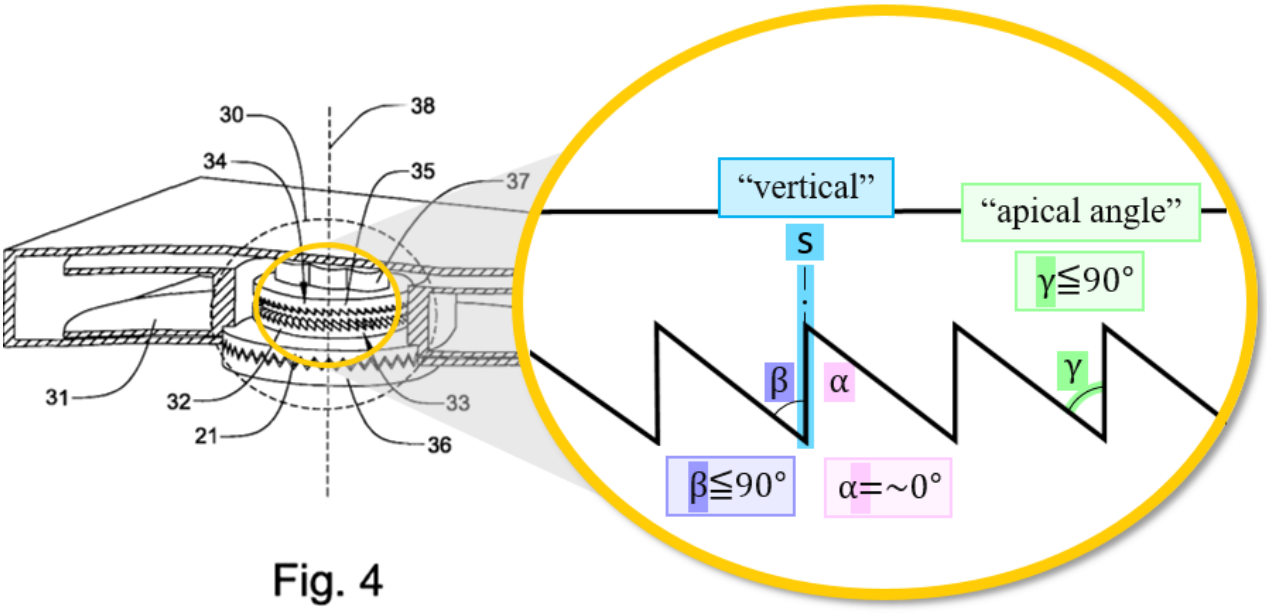
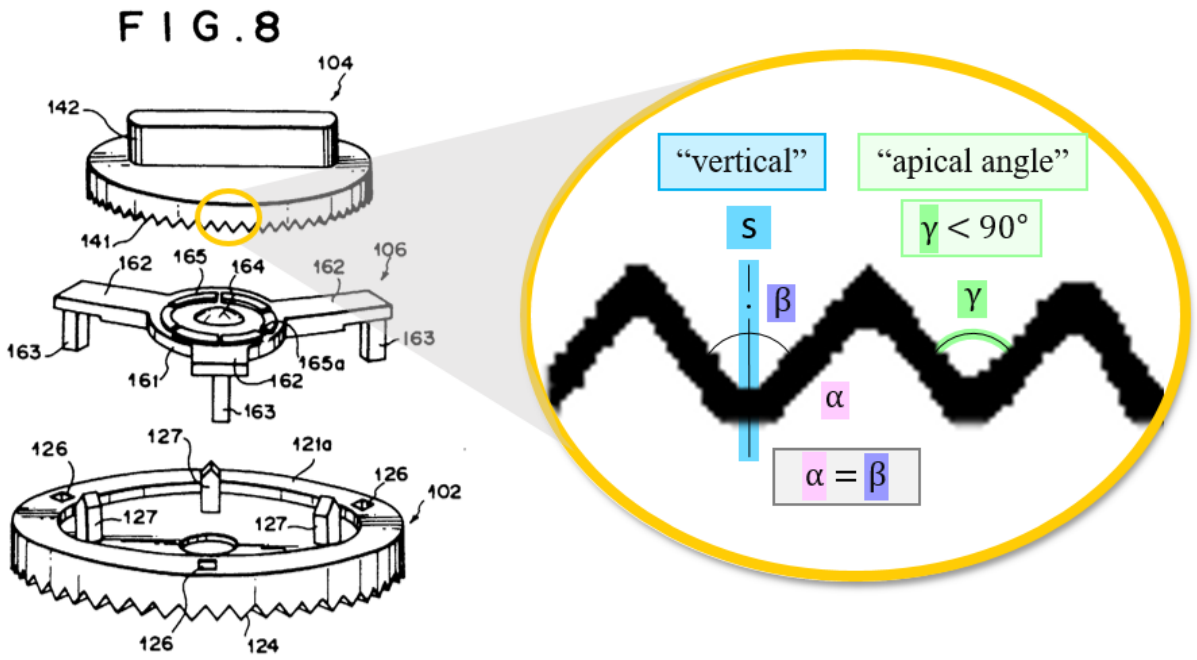


Fig. 4

60. When α is close to 0° (as shown above), then the first inclined surface is nearly vertical and the amount of resistance the brake applies to rotation of the reel in the un-wind direction is maximized. As the ’905 patent notes (’905 Patent at 2:9-16), the sawtooth brake gear design was common in conventional cartridges because that design provided the greatest assurance that the tape would not accidentally un-wind during non-use.

61. Another known brake gear design was a symmetrical configuration in which α and β were the same angle. This design resulted in the first and second inclined surfaces being equally steep. As a consequence, the brake applied the same resistance to rotation of the reel in either the winding or un-winding direction. A symmetrical gear does not resist unwinding as strongly as sawtooth or other asymmetrical designs. During European prosecution of a related patent (EP1098320), the European Patent Office found, and the Patent Owner conceded, that McAllister-I and Morita-II depicted brakes with symmetrical gear tooth configurations. Ex-1009 at 52-55 (European Patent Office’s findings), 56-60 (Patent Owner’s concessions), 90-91 (same). Morita-II (Ex-1011) depicts a symmetrical gear tooth configuration, and I have reproduced and annotated that depiction below:



62. By describing a gear tooth configuration in which (1) neither α nor β is less than 30° and (2) α is less than β, the '905 patent ensures that the resistance the brake applies to rotation of the reel in the un-wind direction is not maximized yet that resistance is still greater than the resistance applied to rotation of the reel in the wind direction. In other words, the gear tooth configuration described in the '905 patent allows the tape to un-wind more easily than a sawtooth configuration would allow yet it still ensures that more resistance is applied to the un-wind direction than the wind direction, unlike a symmetrical gear configuration in which the applied resistance is equal in both directions. Thus, the patent explains, the specific disclosed gear configuration both "reduc[es] the tension on the magnetic tape" when it is accidentally dropped while still ensuring "sufficient locking force." '905 Patent at 9:14-24.

C. Summary of the Claims

63. The ’905 patent has three independent claims (claims 1 and 3-4) and a single dependent claim (claim 2). The preambles and first four limitations of the independent claims are identical, reproduced below and labelled [a]-[d] herein for ease of reference.

Claim 1	Claim 3	Claim 4
[preamble] A magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used, wherein the improvement comprises that		
[a] the reel stopper means comprises **a braking member** which is movable between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same		
[b] **an urging member** which urges the braking member toward the locking position, and		
[c] **a releasing member** which is rotated integrally with the reel and moves the braking member toward the releasing position in response to a reel chucking action		

of the reel drive means of a tape drive, and
[d] the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear tooth[3] on an **engagement projection** formed on the reel.

64. In their final limitations (each labelled [e] herein), the independent claims differ in the followings ways:

65. Limitation [e] of **claim 1** requires that "the reel is provided with a guide member which centers the braking member with respect to the reel." Thus, claim 1 and dependent **claim 2** are directed to the guide member ("first") embodiment described above.

66. Limitation [e] of **claim 3** requires that "the outer diameter of the engagement gear being larger than that of the braking gear." Claim 3 is directed to the different diameter ("second") embodiment described above.

67. Limitation [e] of **claim 4** (hereinafter: "the Braking Gear Angle Limitation") requires:

> that each of the gear teeth of the braking gear has a first inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-unwinding direction with the

[3] Claim 3 recites "engagement gear," rather than "engagement gear tooth." '905 Patent at 10:25. It is otherwise the same as claims 1 and 4.

> braking gear and the engagement gear tooth in mesh with each other and a second inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-winding direction with the braking gear and the engagement gear tooth in mesh with each other, the first and second inclined surfaces forming there between an apical angle not larger than 90°, and the interior angle between the first inclined surface and the vertical [i.e., α] being not larger than the interior angle between the second inclined surface and the vertical [[i.e., β].

68. Claim 4 is not limited to the gear angle ("third") embodiment disclosed in the '905 patent specification. As discussed above, the specification explains that in the disclosed "third" embodiment: (1) α and β must each not be less than 30° and (2) α must be less than β ('905 Patent at 6:54-7:5, 8:55-9:23), but claim 4 imposes no such limits on α or β. Instead, claim 4 only requires that (1) α be equal to or less than β and (2) the apical angle α and β form is less than 90°.

69. Claim 4 is not limited to the third embodiment disclosed in the specification, and covers a wide variety of tooth configurations, including conventional sawtooth and symmetrical gear tooth designs. Claim 4 covers conventional sawtooth or ramp-shaped gear tooth designs because the claim does not set a minimum requirement on the angle of α. In other words, α can be as small as 0°, and thus the claim covers the conventional sawtooth or ramp-shaped gear discussed above that utilizes an α of roughly 0°.

70. Claim 4 also covers conventional symmetrical gear tooth designs because the claim allows α to be equal to β so long as the apical angle the two

angles form together remains less than 90°. Maintaining an apical angle less than 90°, however, would have been the typical design for a reel brake gear because the larger the apical angle the less resistance the gear can provide, i.e., the worse it performs its intended function. Gear teeth with an apical angle larger than 90° are conventionally found in devices in which the gear is intended not to act as a brake, such as the noisemakers that are used during a New Year's Eve celebration. If the gear is intended to brake, its teeth will form apical angles substantially less than 90°.

D. Summary of the Prosecution History

71. The '905 patent did not receive a rejection during prosecution. Ex. 1002.

72. Certain of the prior art identified in my declaration—McAllister-I, Morita-II, Laverriere—were submitted to the Patent Office during prosecution of the '905 patent but there is no indication that the Patent Office gave the references any substantive considerations, *e.g.*, they did not form the basis of any rejection and were not mentioned other than in an Information Disclosure Statement that the Patent Owner submitted.

73. Other prior art identified in my declaration—McAllister-II, Morita-I, Mizutani, Tsuyuki, and Betzler—were not identified during prosecution of the '905 patent.

VI. CLAIM CONSTRUCTION

74. As discussed above, I understand that determining whether an invention is or was patentable requires comparing the prior art to the claims at issue. I further understand that to make this comparison, at times, terms in the claims at issue must be interpreted.

75. I am informed and understand that in an *inter partes* review, claim terms are given their broadest reasonable interpretation (BRI) consistent with the specification and that, under this BRI standard, absent any special definitions, claim terms or phrases are given their ordinary and customary meaning, as would be understood by a POSA, consistent with the specification.

76. I am also informed and understand that in an *inter partes* review construing means-plus-function terms involves two steps: (1) identifying the claimed function(s) for the term and (2) identifying the structure that the specification associates with performing the claimed function(s). On the second step, I understand that the identified structure is the structure necessary to perform the claimed function and those structural features unnecessary to performing the claimed function need not be identified.

77. I further understand (A) that the use of the term "means" creates a rebuttable presumption that a term is a means-plus-function term, a presumption that is rebutted only where sufficient structure for performing a claimed function is

recited in the claim, and (B) that if a term does not use the word "means," there is a rebuttable presumption that the term is not a means-plus-function limitation, but this presumption is rebutted where the limitation at issue recites a function and does not recite sufficiently definite structure for the performance of that function.

78. I have applied these standards throughout my declaration.

79. Because the interpretation of certain terms in the '905 patent will facilitate a comparison of the prior art to the claims at issue, below, I propose constructions for six terms: "reel stopper means"; "braking member"; "urging member"; "releasing member"; "guide member"; and "reel drive means." Attached as Ex-1015 is a chart summarizing my proposed interpretation of these six terms.

A. "reel stopper means" (Claims 1-4)

80. Because the term "reel stopper means," which appears in the preambles and first limitations of claims 1, 3, and 4 in the '905 patent, uses the word "means," I understand that it is presumptively a means-plus-function term.

1. Claimed Function

81. The function for this term is recited in the preamble of each independent claim: "locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." '905 Patent at 9:43-45, 10:7-11, 10:30-34.

2. Corresponding Structure

82. The structure disclosed in the specification of the ’905 Patent that performs the claimed function of the reel stopper means are (1) a “braking member”; (2) “an urging member”; and (3) a “releasing member.” *E.g.*, ’905 Patent at 9:48-63.

83. These three “member” components, however, are themselves means-plus-function elements for reasons discussed below—namely, they do not recite sufficient structure for the performance of their own functions (braking, urging, and releasing). Thus, claims 1, 3, and 4 do not recite structure sufficient to rebut the presumption that “reel stopper means” is a means-plus-function term. It follows that the structure for the “reel stopper means” term consists of the structures corresponding to the “braking member,” “urging member,” and “releasing member” terms, which I identify below.

B. The “member” Limitations (Claims 1-4)

84. The terms “braking member,” “urging member,” and “releasing member” are recited in claims 1, 3, and 4 of the ’905 patent. The term “guide member” is recited in claims 1 and 2. I refer to these terms collectively as the “member limitations.”

85. In the ’905 patent, the term “member” on its own does not connote any specific structure. This is clear from at least the ’905 patent’s use of the word

"member," in the claims and the specification, in disparate contexts and for the performance of varied functions—"braking," "urging," "releasing," and "guid[ing]."

86. A POSA would not understand the word "member" as setting out some specific structure that brakes, urges, releases, and guides. The ordinary meaning of "member" is "a part of a whole." Ex-1020 (defining "member" as "[a] distinct part of a whole"). The word has no technical meaning in the art of tape drive design, and would not convey to a POSA to have a sufficiently definite meaning as the name for structure. To a POSA, the meaning of "braking member," "urging member," "releasing member," and "guiding member" would remain the same if "member" was replaced with "means"—both words convey no definite structure and is a generic reference to "something" that brakes, urges, releases or guides. A POSA might understand that the tape cartridges of claims 1, 3, and 4 include something that brakes, something that urges, something that releases, and something that guides, but the claims' recitations do not provide enough guidance for a POSA to determine what types of structures the inventors intended to accomplish those functions.

87. The use of the words "braking," "urging," "releasing," and "guide" as modifiers to the word "member" does not change my assessment. Those modifiers merely identify the functions performed by the otherwise undefined "members."

88. For these reasons, the member limitations should be construed as means-plus-function terms, as set forth below.

1. "braking member"

a. Claimed Function

89. Each independent claim states that the braking member "is movable between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same." '905 Patent at 9:48-52, 10:13-17 (same), 10:35-39 (same). The function for the "braking member" term is thus: "moves between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same."

b. Corresponding Structure

90. The structure disclosed in the specification of the '905 Patent that performs the claimed function of the braking member includes a disc with an annular braking gear formed on its lower surface. '905 Patent at 6:6-16, 6:41-44, 8:3-8, 8:16-24, Figs. 1, 2, 4, & 5 (element 4). The claims further require that the annular braking gear on the disc be adapted to be engaged with an engagement gear tooth or gear on an engagement projection formed on the reel. '905 Patent at 9:57-61, 10:22-26, 10:46-49. In other words, the disc's gear teeth need to be able to engage with a gear tooth or teeth formed on the reel.

91. In order for the disc to perform the claimed function of "restricting … rotation of the reel," it also includes on its top surface a projection that extends upward and which mates with a projection extending downward from the inner surface of the upper half of the cartridge casing. '905 Patent at 7:6-14. As the projection extending downward from the inner surface of the upper half of the cartridge casing is fixed to the cartridge, mating it with the projection on the disc ensures that the disc "is held in the cartridge casing 3 to be movable up and down but not to be rotatable." '905 Patent at 7:12-14.

92. The combination of these three components—(1) a disc, (2) an annular gear on the bottom of the disc, and (3) an upward-extending projection that mates with a projection on the cartridge casing—is the structure disclosed in the specification for the claimed "braking member" and all three structures are needed to perform the claimed function of the "braking member."

93. Thus, the structure for the "braking member" is:

> **(1)** a disc with an annular braking gear formed on its lower surface,
>
> **(2)** the braking gear adapted to be engaged with an engagement gear tooth [teeth] on an engagement projection formed on the reel, and
>
> **(3)** a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing.

2. "urging member"

a. Claimed Function

94. Each independent claim states that the urging member "urges the braking member to the locking position." '905 Patent at 9:52-53, 10:17-18, 10:39-40. The function of the "urging member" is thus: "urges the braking member toward the locking position."

b. Corresponding Structure

95. The structure disclosed in the specification of the '905 Patent that performs the claimed function of the urging member is a "coiled spring." *Id.* at 7:15-22, Figs. 1, 2, & 5 (element 5). This is the only structure disclosed in the specification for the claimed "urging member," and the structure necessary for performing its claimed function.

3. "releasing member"

a. Claimed Function

96. Each independent claim states that the releasing member "moves the braking member toward the releasing position in response to a reel chucking action of the reel drive means of a tape drive." *Id.* at 9:54-57, 10:19-21, 10:41-44.

97. As described in the patent and consistent with its ordinary meaning, a "chucking action" occurs when a cartridge is inserted into a tape drive and the drive gear of the tape drive engages with the cartridge's reel gear to hold it in place. '905 Patent at 5:41-49, 7:36-46; Ex-1018 (defining "chucking" as "**[t]o**

place or fix in or by means of a chuck," and defining "chuck" as "[a] clamp, chock, or wedge to **hold a tool**, as a drill"); Ex-1019 (similar).

98. The function of the "releasing member" is thus: "moves the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive." This interpretation includes my proposed interpretation for "drive means," which I discuss below.

b. Corresponding Structure

99. The structure disclosed in the specification of the '905 Patent that performs the claimed function of the releasing member is a plate-like body with leg portions extending downward from its lower surface. *Id.* at 7:23-28, Figs. 1, 2, 3 & 5 (element 6). This is the only structure disclosed in the specification for the claimed "releasing member," and the structure necessary for performing its claimed function.

100. Although the particular plate-like body disclosed in the specification of the '905 Patent is "substantially triangular" ('905 Patent at 7:26), the geometric shape of the plate-like body is not necessary to the body performing the claimed function.

101. In order to "mov[e] the braking member toward the releasing position in response to the drive gear on a reel drive of a tape drive being brought into engagement with the reel gear," the plate-like body must have (a) sufficient surface

area to abut and raise the brake member and (b) legs that a drive gear can push upon in order to move the plate-like body up and into abut with the brake member.

102. The precise shape of the plate-like body is not necessary to perform the claimed function. For example, a plate-like body can be substantially circular but still have (a) sufficient surface area to abut and raise the brake member and (b) legs that a drive gear can push upon in order to move the plate-like body up and into abut with the brake member. For example, as discussed in Section IX.J, Tsuyuki discloses a plate-like body that performs the claimed function of the "releasing member" yet the body is substantially-circular, not substantially triangular. That the Tsuyuki plate-like body performs the claimed function using a non-triangular shape underscores that the geometric shape of the plate-like body is not necessary to perform the claimed function.

4. "guide member"

a. Claimed Function

103. Claim 1 states that the guide member "centers the braking member with respect to the reel." '905 Patent at 9:62-63. The claimed function of the "guide member" is thus "centers the braking member with respect to the reel."

b. Corresponding Structure

104. The structure disclosed in the specification of the '905 patent that performs the claimed functioned is at least three ribs formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the

upper portion of the inner surface of the reel hub toward the center of the reel. *Id.* at 3:9-13, 6:26-40, 8:39-43, Figs. 1-3 (element 39). This is the only structure disclosed in the specification for the claimed "guide member," and the structure necessary for performing its claimed function.

105. The structure that performs the claimed function necessarily requires "at least three" ribs because any number of ribs fewer than three (i.e., one or two) would not "center" the brake. Rather, if a single or two ribs is used, then the disc of the braking member would not necessarily "center," and instead could tilt because its outer diameter was not properly supported. At least three ribs equidistant around the inner surface of the reel hub would properly balance and thus center the disc. Three ribs are thus the minimum number of ribs necessary to accomplish the claimed function.

C. "reel drive means" – claims 1-4

106. Similar to "reel stopper means," the term "reel drive means" includes the word "means" and thus I understand that it is presumptively a means-plus-function term.

1. Claimed Function

107. The function for this term is recited in the term itself—drives the reel.

2. Corresponding Structure

108. The structure identified in the specification of the ’905 patent that performs the claimed function is a drive gear. Specifically, the patent explains that:

> When the magnetic tape cartridge 1 loaded in a bucket of the tape drive is moved downward toward the rotary shaft 12, **the drive gear 13 is brought into mesh with the reel gear 24** and the reel plate 25 is magnetically attracted against the magnet to hold the drive gear 13 and the reel gear 24 in mesh with each other. In this manner, the reel drive means 11 **chucks** the reel 2.

’905 Patent at 5:43-49.

> When the releasing member 6 is in its lowermost position shown in FIG. 1, the lower ends of the leg portions 63 project downward form the lower surface of the reel 2 through the portion at which the reel gear 24 is formed, and when **the drive gear 13 is brought into engagement with the reel gear 24 in response to a chucking action of the reel drive means 11**, the leg portions 63 are pushed upward by a predetermined stroke as shown in FIG. 2, whereby the braking gear 42 of the braking member 4 is disengaged from the engagement gear teeth 29 of the engagement projections 27 and rotation of the reel 2 is permitted.

’905 Patent at 7:35-45.

VII. SCOPE AND CONTENT OF THE PRIOR ART

109. As discussed above, I understand that determining whether an invention is or was patentable requires assessing the scope and content of the prior art. I conducted such a review and describe it below.

A. U.S. Patent No. 5,901,916 ("McAllister-I," Ex-1005)

110. McAllister-I describes a conventional magnetic tape cartridge that includes a cartridge housing and a tape reel 14 that includes "disc shaped top and bottom flanges 28 and 30 and an annular hub 32." McAllister-I at 2:58-3:5, FIGS. 1, 2A, 2B. The bottom of the annular reel hub includes a reel gear 34 that forms "the operative interface between the tape drive and the tape reel." McAllister-I at 3:5-7. These elements are shown in Figure 2B below, where the cartridge housing is highlighted in red and the reel is highlighted in green.

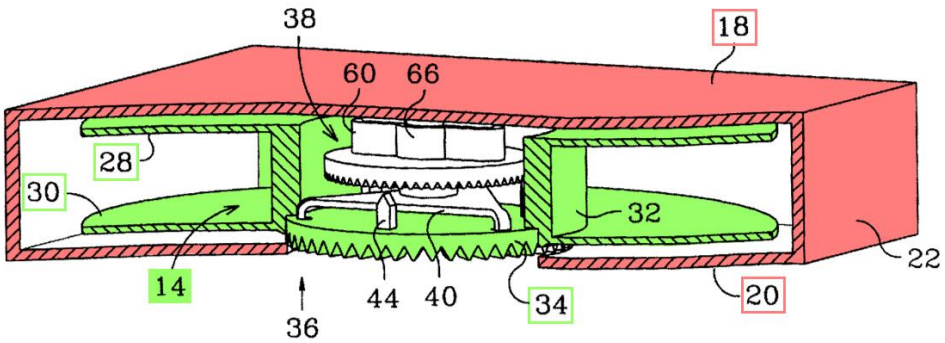


FIG. 2B

111. Positioned inside the annular reel hub is a reel lock 38 that comprises several components: (a) a spider washer 40, (b) a locking gear 42 with a upwardly

extending protrusion 60, (c) locking posts 44 formed on the bottom surface of the reel hub, and (d) a biasing spring 64. McAllister-I at 3:14-16, 3:54-58, FIGS. 2-9. These reel lock components are highlighted below in Figure 3—spider washer (orange), locking gear and protrusion (yellow), locking posts (blue), and biasing spring (purple):

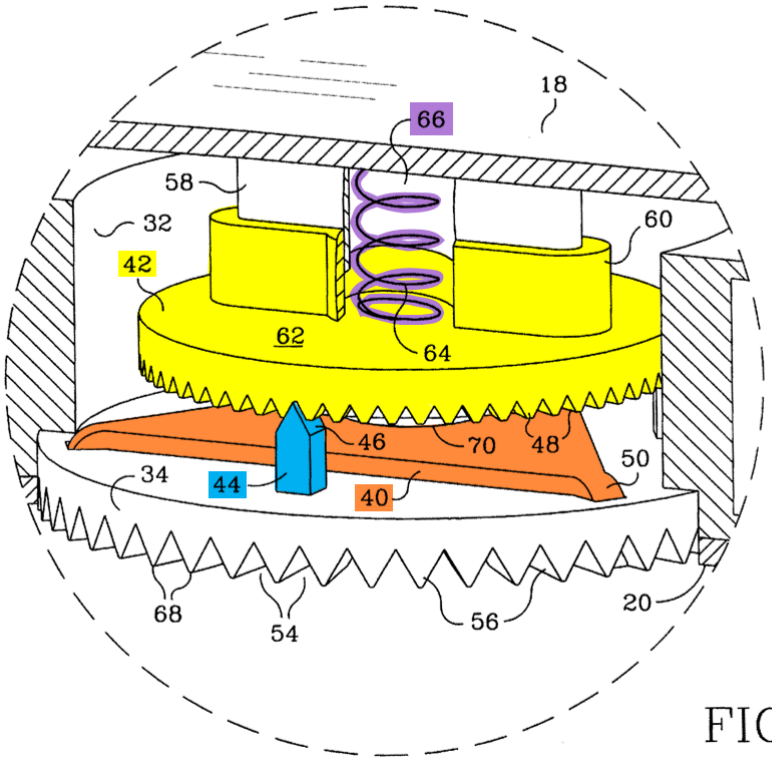
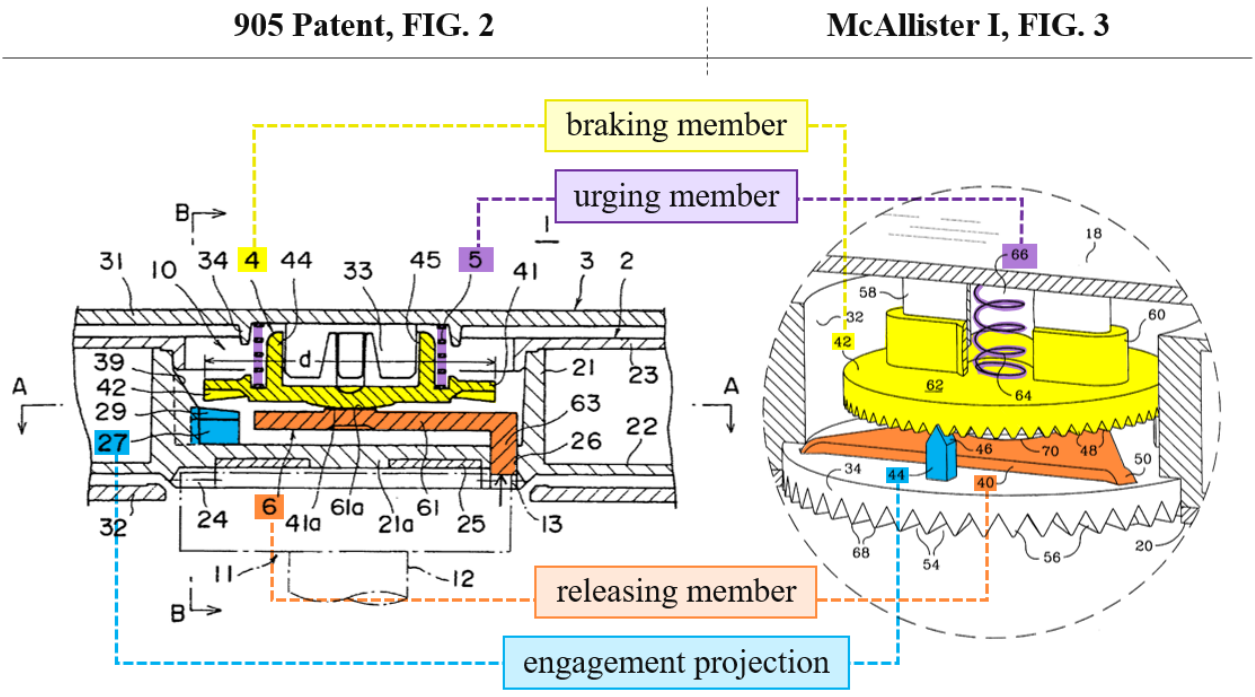


FIG. 3

112. McAllister-I explains that locking gear is moveable in only direction (up and down) and cannot rotate because its protrusion 60 interlocks with structure 58 on the top of the cartridge casing. McAllister-I at 3:44-54. When the cartridge is not in use (i.e., not installed in a tape drive), the biasing spring urges the locking gear into engagement with the locking posts on the reel thereby preventing the reel from rotating. McAllister-I at 3:54-65, 4:79.

113. When the cartridge is inserted into a tape drive, "the drive motor gear in a tape drive engages reel gear 34, the tips of the drive motor gear push on spider legs 50 to drive spider washer 40 up into reel gear 34. This action moves lock gear 42 up and off locking posts 44 to unlock reel lock 38." McAllister-I at 3:66-4:3.

114. The below figures compare the "reel stopper means" components depicted in Figure 2 of the '905 patent with the "reel lock" components depicted in Figure 3 of McAllister-I. As can be seen, the components of McAllister-I's reel lock (on right) correspond directly to the braking member, urging member, releasing member, and engagement projections of the '905 patent's "reel stopper means" (on left).

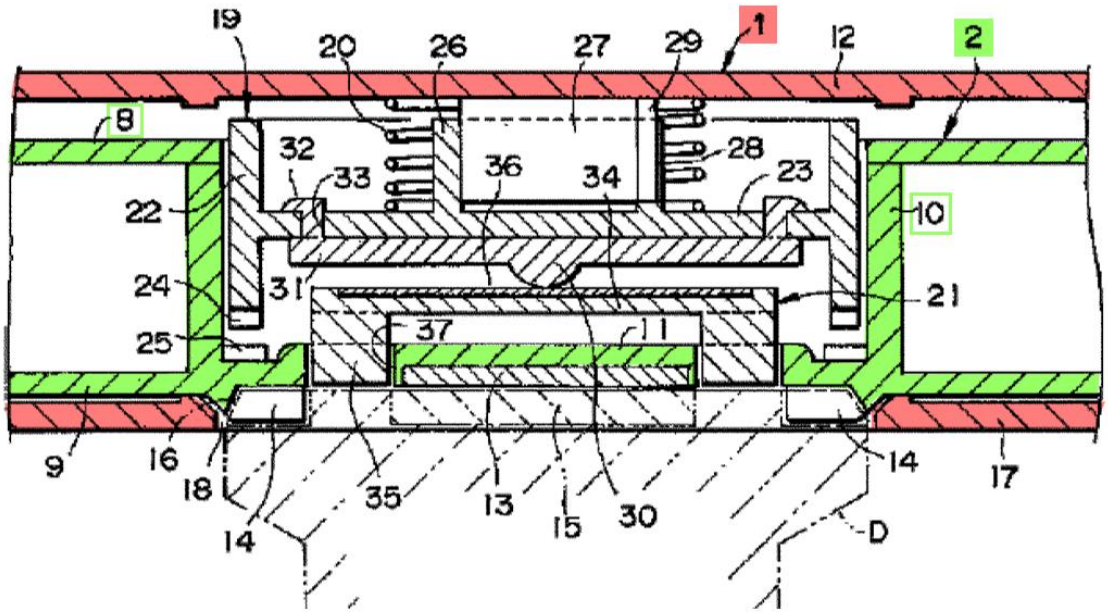


Ex-1026 at 1.

B. Japanese Patent Application Publication H10-90784 ("Mizutani," Ex-1006)

115. Mizutani describes a conventional magnetic tape cartridge that includes a "tape reel 2 rotatably housed in a main body case 1." Mizutani ¶7, FIGS. 1, 3, 5. The reel comprises an upper flange 8, a lower flange 9, and a bottomed cylindrical hub 10." Mizutani ¶16, FIGS. 1, 3, 5. In Figure 3 below, the cartridge casing is highlighted in red and the reel is highlighted in green.

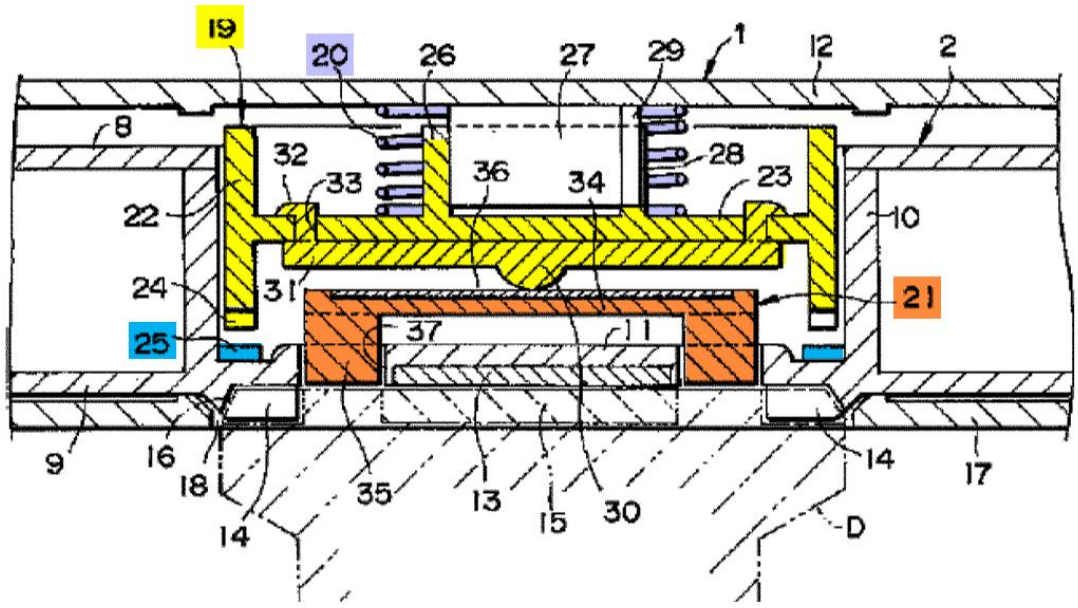
Figure 3



116. Positioned inside the cylindrical reel hub is a "reel lock mechanism for preventing free rotation of the tape reel 2 during non-use." Mizutani ¶ 16, FIGS. 1, 3, 5. The reel lock mechanism comprises several components: (a) a lock release member 21, (b) a lock member 19 with an upwardly extending cylindrical slide boss 26, (c) lock teeth 25 formed on the top surface of the hub bottom wall

11, and (d) a spring 20. Mizutani ¶7, ¶¶17-19, FIGS. 1, 3, 5. These reel lock mechanism components are highlighted in Figure 3—lock release member (orange), lock member and slide boss (yellow), spring (purple), and lock teeth (blue).

Figure 3

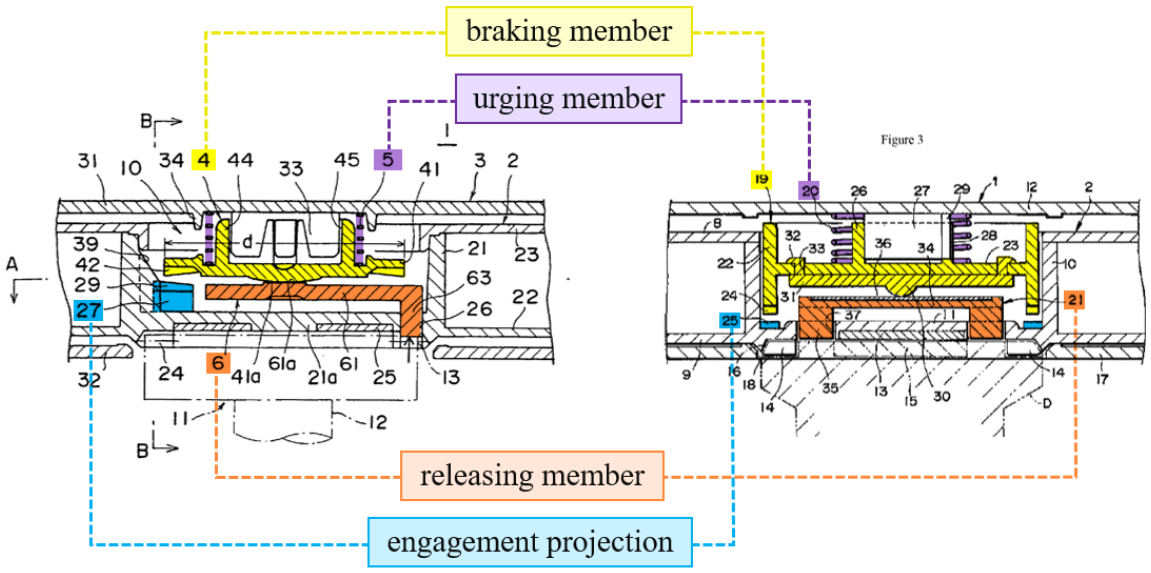


117. Mizutani explains that the lock member is moveable in only direction (up and down) and cannot rotate because its slide boss 26 is "externally fitted to a guide protrusion 27" on the top of the cartridge casing. Mizutani ¶19. When the cartridge is not in use (i.e., not installed in a tape drive), the spring exerts downward pressure on the lock member causing its lock teeth 24 to engage with lock teeth 25 on the bottom surface of the reel hub. This locks the reel. Mizutani ¶7, ¶11, ¶20, ¶25, FIG. 1 (depicting locked state).

118. When the cartridge is inserted into a tape drive, "drive teeth 16" on the tape drive shaft engage with the reel drive teeth 14 such that "the lock release member 21 leg pieces 25 are thrust upward" and "the lock release member 21 pushes the lock member 19 upward in opposition to the spring 20, mutually separating the lock teeth 24 and 25 that were thus far engaged, releasing the reel lock status." Mizutani ¶26; *see also* ¶11, FIG. 3 (depicting un-locked state).

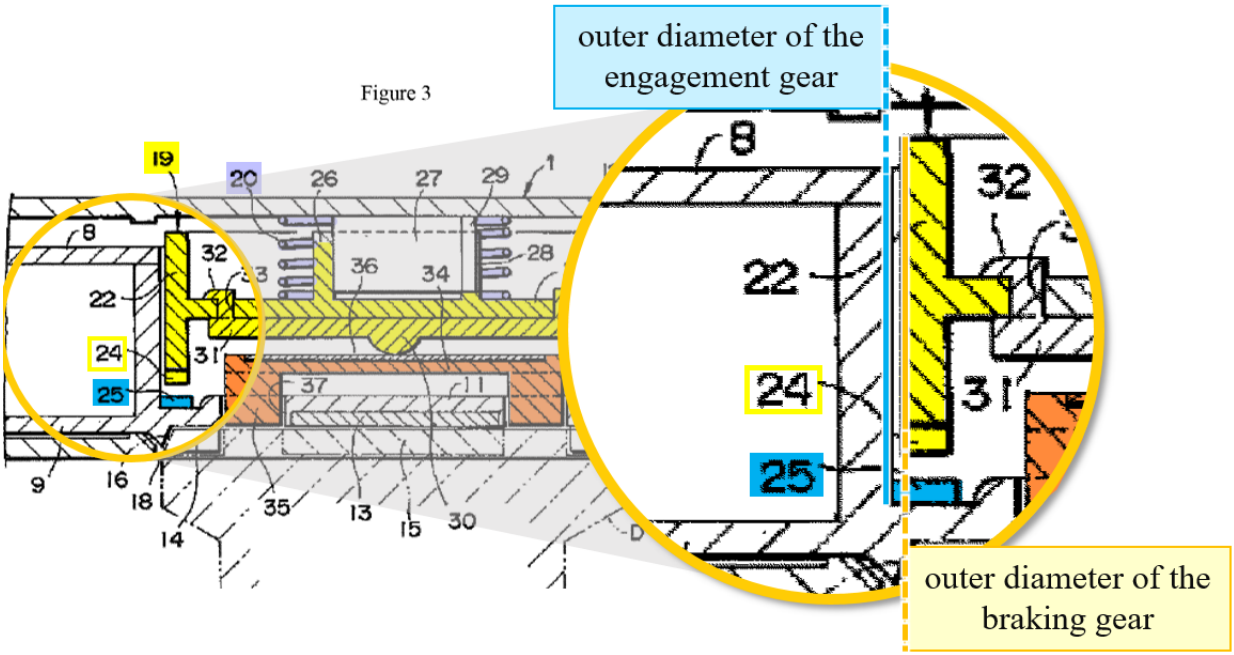
119. In the below figures, the "reel stopper means" components depicted in Figure 2 of the '905 patent are compared with the "reel lock mechanism" components depicted in Figure 3 from Mizutani. As can be seen, the components of Mizutani's lock member (on right) correspond directly to the braking member, urging member, releasing member, and engagement projections of the '905 patent's "reel stopper means" (on left).

905 Patent, FIG. 2	Mizutani, FIG. 3



Ex-1026 at 2.

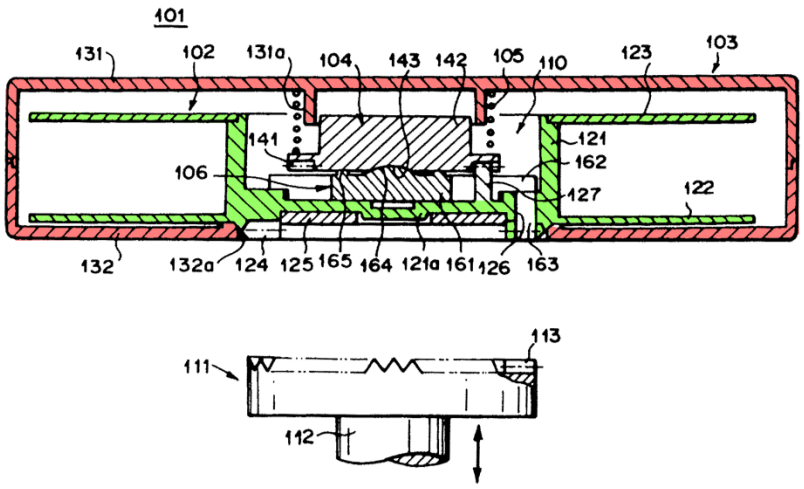
120. As depicted and described in Mizutani, lock teeth 25 are "provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11." Mizutani ¶18, FIG. 3. In view of this disclosure, a POSA would have interpreted Mizutani to disclose that the outer diameter of the lock teeth 25 is necessarily larger than the outer diameter of lock teeth 24 on the lock member. The outer diameter of lock teeth 24 must be smaller to permit the lock member to fit within the reel hub and to allow the lock member to move up and down between unlocked and locked positions. Below, I have reproduced and annotated Figure 3 from Mizutani. Figure 3 shows that the outer diameter of lock teeth 25 exceeds the outer diameter of lock teeth 24.



C. European Patent Application Publication 0926676 ("Morita-II," Ex-1011)

121. Morita-II describes a conventional magnetic tape cartridges that includes "a single reel 102 around which a magnetic tape (not shown) is wound and is contained for rotation in a cartridge casing 103." Morita-II ¶24. The reel includes a cylindrical reel hub 121 having a bottom wall 121a and "doughnut-shaped lower and upper flanges 122 and 123 extending outward from the lower and upper ends of the reel hub 121." Morita-II ¶25. These elements are shown in Figure 7 below, where the cartridge casing is highlighted in red and the reel is highlighted in green.

FIG. 7



122. Positioned inside the cylindrical reel hub 121 is a "reel stopper means 110" that comprises several components: (a) a brake release member 106, (b) a brake member 104 with gear teeth 141 on its lower surface and a straight protrusion 142 extending on its upper surface, (c) engagement projections 127 formed on the upper surface of the bottom hub wall 121a, and (d) an urging member 105 in the form of a coiled spring. Morita-II ¶¶27-30. These reel stopper means components are highlighted below in Figures 7 and 8—brake release member (orange), brake member and protrusion (yellow), engagement posts (blue), and spring (purple):

FIG. 7

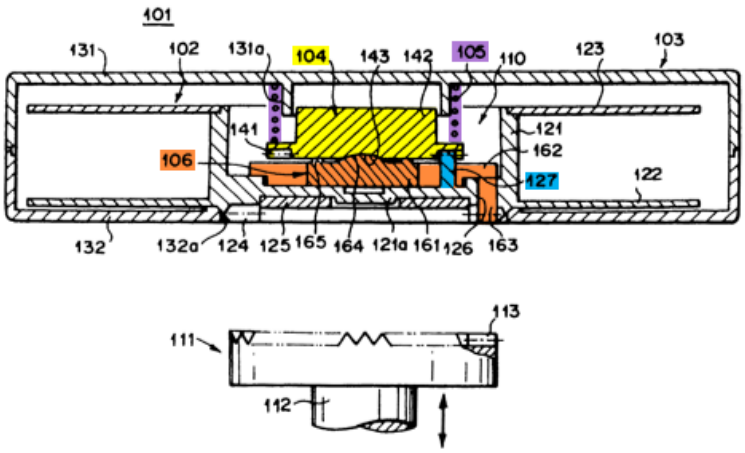
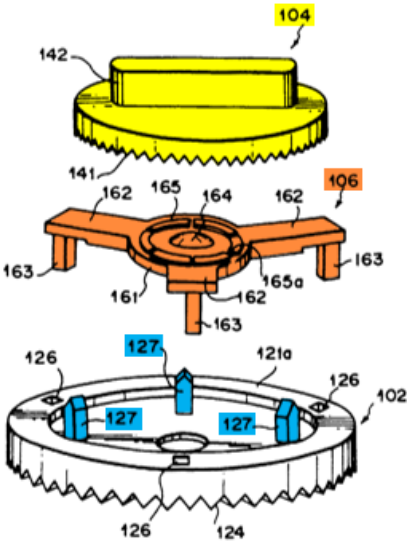


FIG. 8



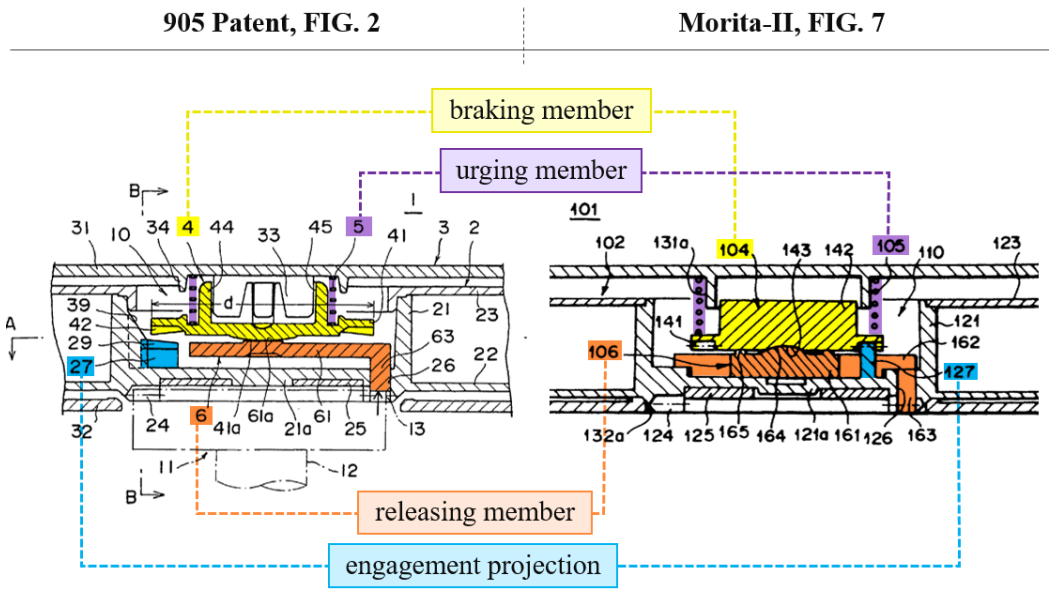
123. The reel stopper means of Morita-II is designed to prevent "dust and dirt … from entering the inside of the cartridge casing when the brake member is moved upward to permit rotation of the reel." Morita-II ¶5.

124. Morita-II explains that brake member 104 is moveable in only direction (up and down) and cannot rotate because its protrusion 142 fits inside a guide portion 131a projecting downward from the inner surface of the upper casing half 131." Morita-II ¶ 29. When the cartridge is not in use (i.e., not installed in a tape drive), the spring urges the brake member into engagement with the engagement projections on the reel thereby preventing the reel from rotating. Mizutani ¶30, ¶33, ¶¶39-43, FIG. 7 (depicting locked state).

125. When the cartridge is installed in a tape drive, drive gear 113 of the tape drive meshes with reel gear 124 causing push rods 163 on the brake release

member move it upward a "predetermined amount, thereby disengaging the engagement projection 127 from the stopper gear 141 [on the lock member] to permit rotation of the reel as shown in Figure 9." Morita-II ¶32; *see also* ¶31, ¶¶39-43, FIG. 9 (depicting unlocked state)

126. The below figures compare the "reel stopper means" components depicted in Figure 2 of the '905 patent with the "reel stopper means" components depicted in Figure 7 of Morita-II. As can be seen, the components of Morita-II's reel stopper means (on right) correspond directly to the braking member, urging member, releasing member, and engagement projections of the '905 patent's "reel stopper means" (on left).

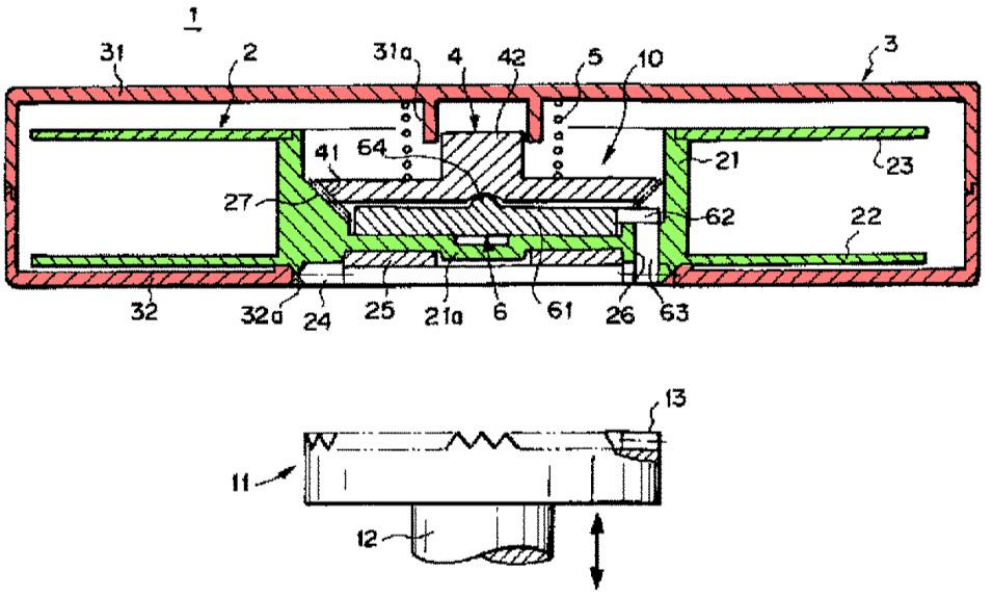


Ex-1026 at 3.

D. Japanese Patent Application Publication H11-288571 ("Tsuyuki," Ex-1012)

127. Tsuyuki describes a conventional magnetic tape cartridge. The Tsuyuki cartridge includes a "cartridge case 3" and a "single reel 2 with magnetic tape (not pictured) wound thereon." Tsuyuki ¶¶11-12, FIGS. 1, 2. The reel includes a cylindrical reel hub 21 and lower flange portion 22 and an upper flange portion 23 extending in a disc shape in the diameter direction from the top and bottom edge perimeters of this reel hub 21." Tsuyuki ¶12. These elements are shown in Figure 1 below, where the cartridge case is highlighted in red and the reel is highlighted in green.

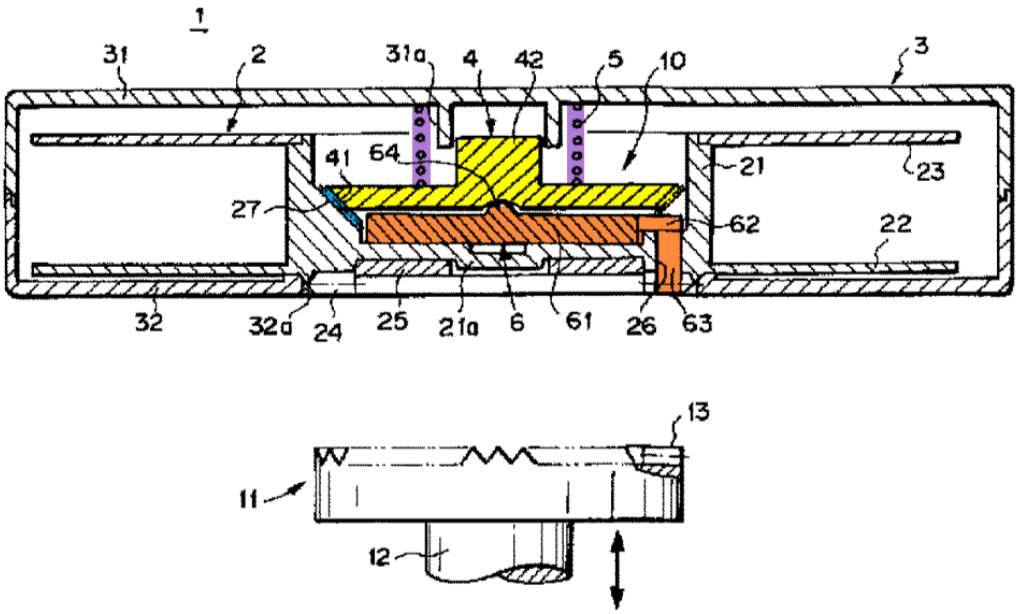
Figure 1



128. Positioned inside the cylindrical reel hub is a "reel rotation inhibiting means 10" that comprises several components: (a) a release member 6, (b) an

inhibiting member 4 with an inhibiting gear 41 on its lower surface and a upwardly-extending protrusion 42 on its upper surface, (c) an inhibiting gear 27 formed "on the outer perimeter of the bottom wall 21a" of the reel hub, and (d) a pressing member 5 in the form of a coiled spring. Tsuyuki ¶¶14-17, FIGS. 1-3. These reel rotation inhibiting means components are highlighted below in Figure 1—release member (orange), inhibiting member and protrusion (yellow), inhibiting gear on the bottom hub wall (blue), and spring (purple):

Figure 1



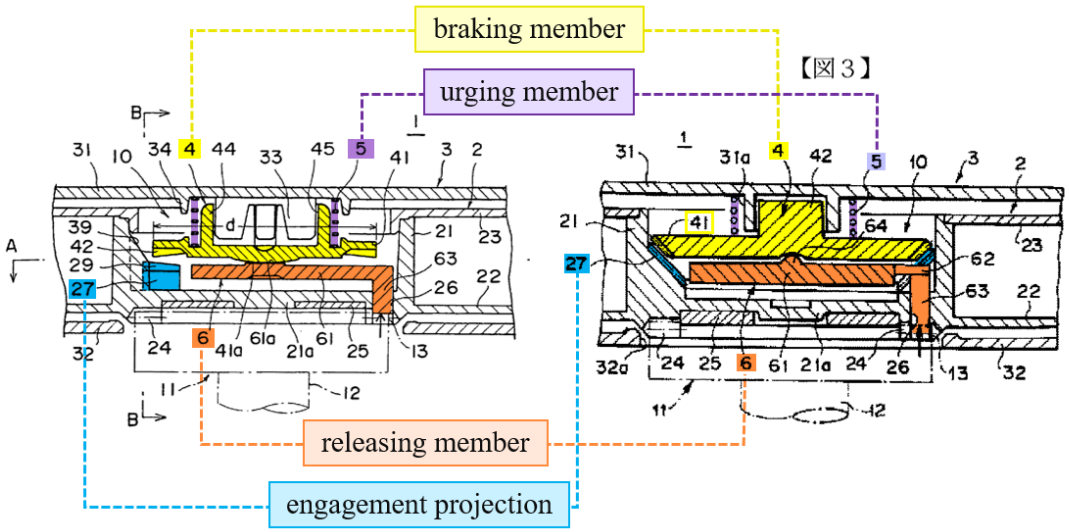
129. Tsuyuki explains that the inhibiting member 4 is moveable in only direction (up and down) and cannot rotate because its protrusion 42 interlocks with a guide portion 31a formed on the upper surface of an upper case 31 of a cartridge case 3. Tsuyuki ¶16. When the cartridge is not in use (i.e., not installed in a tape drive), the spring urges the inhibiting gear on the inhibiting member into

engagement with the inhibiting gear formed on the outer perimeter of the bottom wall of the reel hub. Tsuyuki ¶¶15-17, ¶¶22-23, FIG. 1 (depicting locked state).

130. When the cartridge is inserted into a tape drive, the drive gear 13 of the tape drive meshes with reel gear 24 and comes into contact with portions 63 on the release member causing the release member to move "upward against the pressing force" of the spring thereby "releas[ing] the engagement of the inhibiting gear 41 on the inhibiting member 4 and the inhibiting gear 27 on the reel 2." Tsuyuki ¶24, FIG. 3 (depicting unlocked state).

131. The below figures compare the "reel stopper means" components depicted in Figure 2 of the '905 patent with the "reel rotation inhibiting means 10" components depicted in Figure 3 of Tsuyuki. As can be seen, the components of Tsuyuki's reel rotation inhibiting means (on right) correspond directly to the braking member, urging member, releasing member, and engagement projections of the '905 patent's "reel stopper means" (on left).

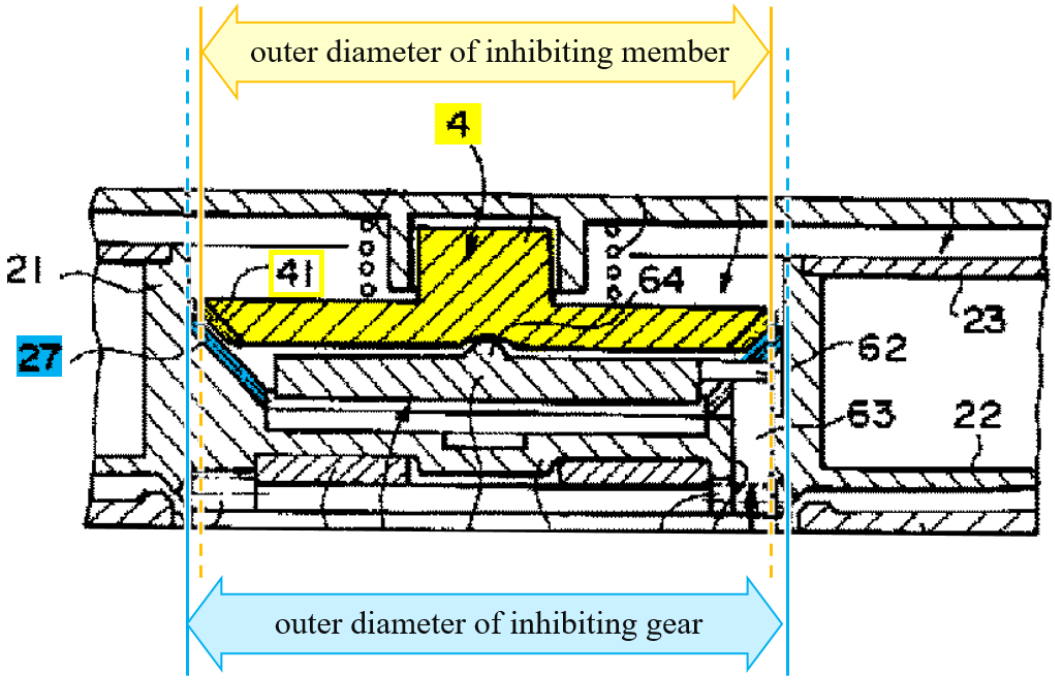
905 Patent, FIG. 2	Tsuyuki, FIG. 3



Ex-1027 at 4.

132. As depicted and described in Tsuyuki, inhibiting gear 41 on the inhibiting member and inhibiting gear 27 on the bottom of the reel hub are bevel gears. Tsuyuki ¶16, FIG. 2. As bevel gears, the outer diameter of the inhibiting gear 27 must be larger than the outer diameter of the inhibiting gear 41 in order to ensure that inhibiting gear 41 to slide into inhibiting gear 27. Were the outer diameter of the inhibiting gear 41 larger than the outer diameter of the inhibiting gear 27, the two gears would not engage "in an evenly meshed state around the entire perimeter, securing inhibiting rotation" (Tsuyuki ¶23), instead the two gears would be unevenly meshed.

133. Below, I have reproduced and annotated Figure 3 from Tsuyuki. Figure 3 shows that the outer diameter of inhibiting gear 27 exceeds the outer diameter of inhibiting gear 41.



E. European Patent Application Publication 0284687 ("Laverriere," Ex-1007)

134. Laverriere relates to magnetic tape cartridges. Laverriere at 1:1-2. Laverriere explains that single-spool (a.k.a. singe-reel) ribbon tape cartridges were known in 1988. Laverriere at 1:6-15 ("Ribbon cartridges … include a single, circular spool which is rotatable within a substantially square cartridge.").

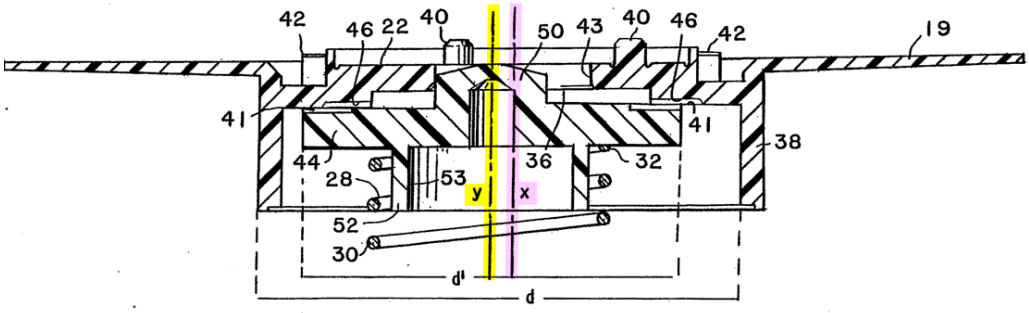
135. The spool (or reel) in such a cartridge includes "a hub with an annular wall … surround[ing] a circular brake button." Laverriere at 1:16-17. When the

cartridge is not in use, a spring biases the brake button against the hub to "'brake' or prevent rotation of the spool," using gear teeth on the brake button that engage with gear teeth on the hub. Laverriere at 1:16-24. "Only when the brake button is pushed back into the cartridge against the force of the spring via, e.g., the external drive means can the hub be rotated and the ribbon be dispensed." Laverriere at 1:24-28.

136. Laverriere recognized a problem with then-conventional cartridges: because the diameter of the spool (or reel) hub was larger than the diameter of the brake button, there was a risk that the brake button would become "misaligned, i.e., lie off centre of the hub during assembly and/or use." Laverriere at 1:31-35. If this occurs, "the brake button cannot function properly to prevent undesirable dispensing of the ribbon and the external drive means cannot properly align with the brake button." Laverriere at 1:35-39; *see also* 3:42-46. This is the same misalignment problem that the '905 patent claimed it was solving more than a decade later, in November 1999. '905 Patent at 1:60-65 ("[T]he brake member can be inclined as shown in FIG. 5 … which results in generation of noise, obstruction of rotation of the reel and unstable magnetic tape loading/unloading action.").

137. Laverriere depicts problematic misalignment in its Figure 2[4], which is reproduced below. Laverriere at 2:29-33, 3:42-46. As shown, the "center line x of the hub 17" and "the center line y of the brake button 24" are misaligned. *Id.* at 3:46-48.

FIG. 2

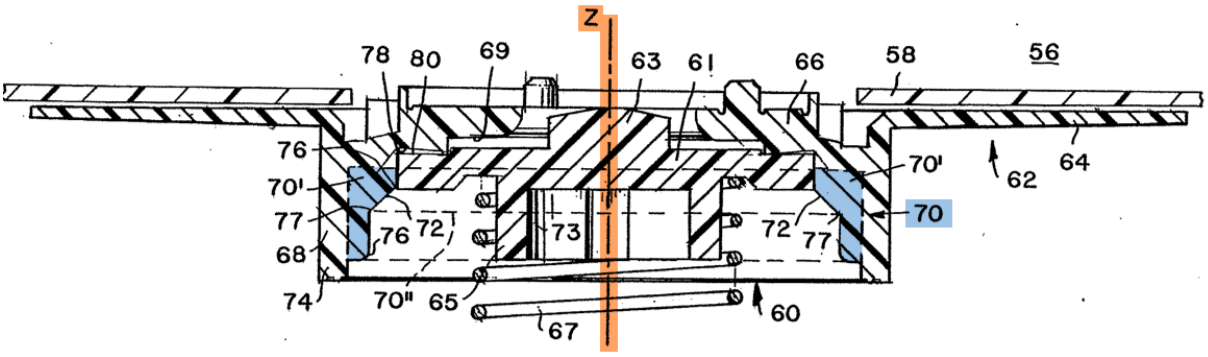


138. Laverriere proposes that this "misalignment" problem be solved via the use of "projecting means 70," which can take the form of "centering ribs" integrally molded into the wall of the hub or "a single, continuous annular ring." Laverriere at 4:38-43.

[4] The cartridge depicted in Figure 2 of Laverriere is upside-down in comparison to the cartridges depicted in the '905 Patent and other prior art such as McAllister-I or Morita-II. In other words, whereas the figures in the '905 Patent, McAllister-I or Morita-II depict a brake being urged downward by a spring, the Laverriere figures depicts the brake being urged upward.

139. The projecting means are angled to "gradually and positively receive and position the circular brake button 60 concentrically relative to the [reel] hub." Laverriere at 4:49-54. During assembly, the projecting means "maintain[] the brake button in the desired position, i.e., on center with the hub." Laverriere at 5:1-3. Laverriere's Figure 3 depicts centering ribs and illustrates "the coincident center lines 'z' of the brake button 60 and the hub 66." Laverriere at 5:3-5. That figure is reproduced below, with the centering ribs highlighted in blue.

FIG. 3



140. Laverriere explains that adding centering ribs to a single-reel tape cartridge reel hub would "require[] only minimal modifications to the structure of the hub 66" and would "not otherwise interfere with assembly or operation of the cartridge 56." Laverriere at 5:23-27. Of course, a POSA would have understood this to be the case over a decade later, in the 1999 time frame.

F. U.S. Patent No. 5,927,633 ("McAllister-II," Ex-1008)

141. McAllister-II discloses a magnetic tape cartridge that includes a "reel locking mechanism." McAllister-II at 2:56-57, FIGS. 3-4 (element 30). The

locking mechanism includes a rotating locking gear 32 with "a first set of teeth 33" that engages with a non-rotating second locking gear 35 with "a second set of teeth 34" when the cartridge is not in use. *Id.* at 2:58-3:3. "Each tooth of the first and second sets of teeth (33 and 34, respectively) are preferably ramp shaped so that when the teeth of both locking gears are engaged, rotation of the reel 31 in an unwind direction is blocked." *Id.* at 3:11-16.

142. As seen in McAllister-II's Figure 4, reproduced below with a call-out image that I asked to be created, each tooth in the second set of teeth 34 has a first and second inclined surface, and these surfaces are brought into abutment with first and second inclined surfaces on the locking gear's first set of teeth 33:

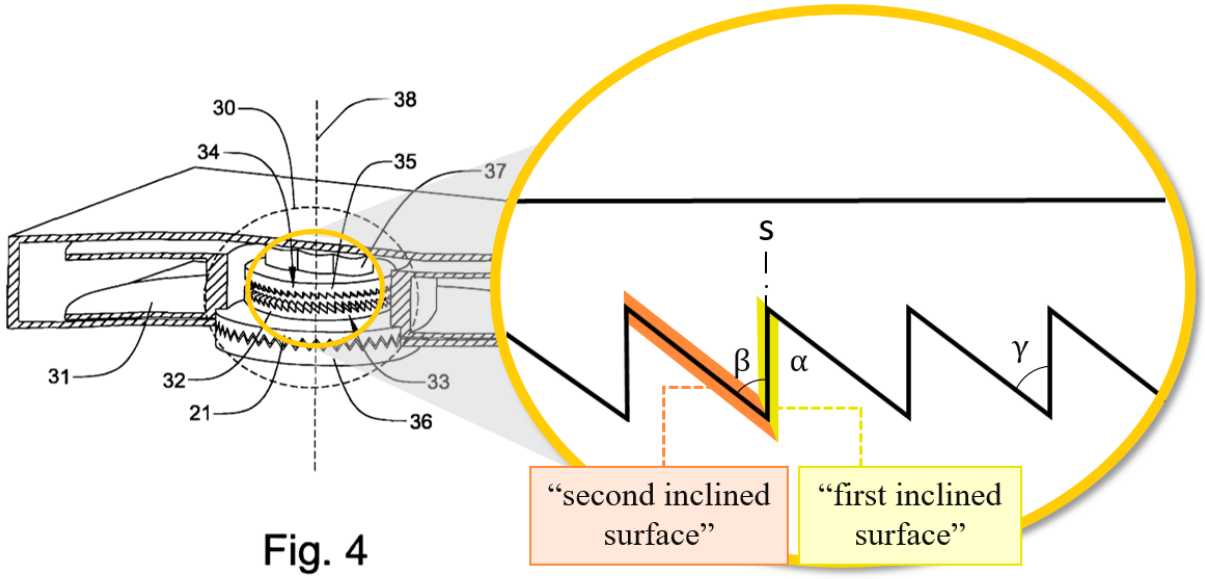


Fig. 4

143. The interior angle between the first surface and the vertical S (i.e., ~0°) is less than the interior angle between the second surface and the vertical.

And together, these angles total less than 90°, i.e., the "apical angle" is less than 90°.

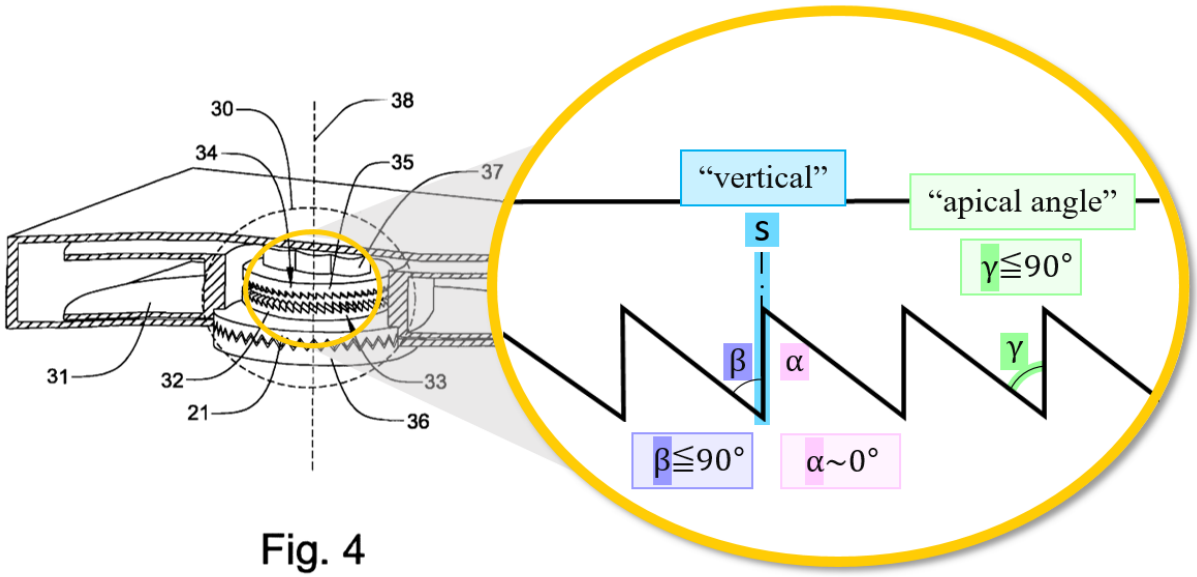


Fig. 4

144. McAllister-II explains that its Figures 1-4 "depict a single reel tape cartridge which was developed by Hewlett-Packard Company, and which is the subject of the pending patent applications referenced at the beginning of this document." McAllister-II at 5:3-7. The utility patent application referenced at the beginning of McAllister-II is the application that matured into McAllister-I. *Compare* McAllister-I at 1:5-8 *with* McAllister-II at [21].

G. Japanese Patent Application Publication S63-11776 ("Morita-I," Ex-1010)

145. Morita-I discloses a conventional magnetic tape cartridge. The cartridge includes a reel hub within which is a "brake button" that is biased by a coil spring to engage a brake gear of the reel in order to "prevent unexpected

rotation of the reel at the time of cartridge non-use." Morita-I at 3. When the cartridge is used, "a rotation shaft (rotation shaft of a motor) of [a] device such as [a] computer enters the [cartridge] case, abuts the brake button, and moves the button against the biasing force of the coil spring." Morita-I at 3-4 "As a result, the lock of the reel is released." Morita-I at 4.

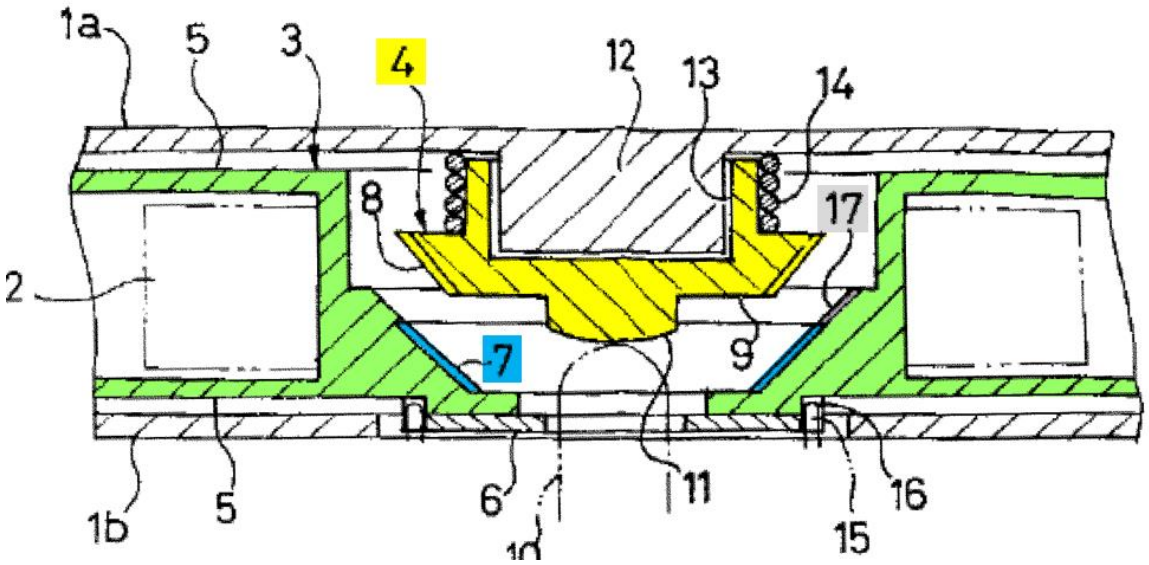
146. Morita-I recognized a problem with then-conventional cartridges. When the cartridges were not in use, the gears on the brake button and reel might not "occlude," i.e., come into contact with each other, and thus "the reel can rotate even at the time of non-use." Morita-I at 4. While rotating the gears slightly could cause them to occlude, such manual adjustment was not possible when the two gears "are not centered." Morita-I at 4. Centering the gears, in turn, was "extremely difficult" from outside the cartridge. Morita-I at 4. This is the same misalignment problem that the '905 patent claimed it was solving more than a decade later, in November 1999. '905 Patent at 1:60-65 ("[T]he brake member can be inclined as shown in FIG. 5 … which results in generation of noise, obstruction of rotation of the reel and unstable magnetic tape loading/unloading action.").

147. Morita-I proposes a solution to this "misalignment" problem—the use of a "guide surface that guides the brake-button occluding portion," i.e., the brake button gear, "to the reel occluding portion," i.e., the reel gear. Morita-I at 5. With this "guide surface," "the brake button and the reel are centered" in the non-use

state "and occlusion is readily performed"—i.e., the guide surface centers the brake button and reel so that gears on those components mesh and can lock the reel. Morita-I at 6; *see id.* at 8.

148. Guide surface 17, and its relationship to the brake button 4 (yellow) and reel gear 7 (blue), is seen below in Figure 1 of Morita-I:

Fig. 1

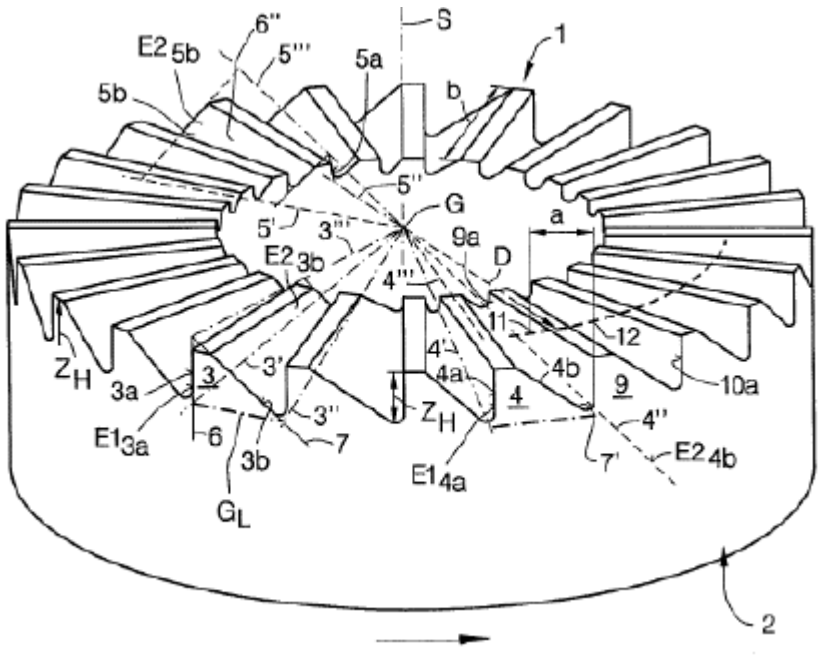


H. International Publication WO 99/41513 ("Betzler," Ex. 1013)

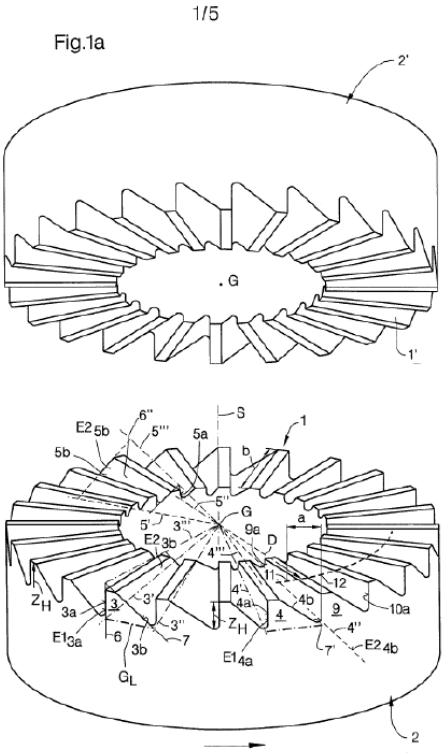
149. Betzler relates to face gears such as a Hirth coupling. Betzler at 1:7-8. Face gears are the type of gears the '905 patent discloses for its complementary braking and engagement gears. *Compare* Betzler, Fig. 1a *with* '905 Patent, Fig. 4.

150. A face gear, as in Betzler, is a disc-like gear having gear teeth on its face rather than its side. Ex-1022 (defining "face gear" as "a disklike gear having

teeth cut on the face…"); Ex-1023 (same). Figure 1A (below) of Betzler provides an example of a face gear:

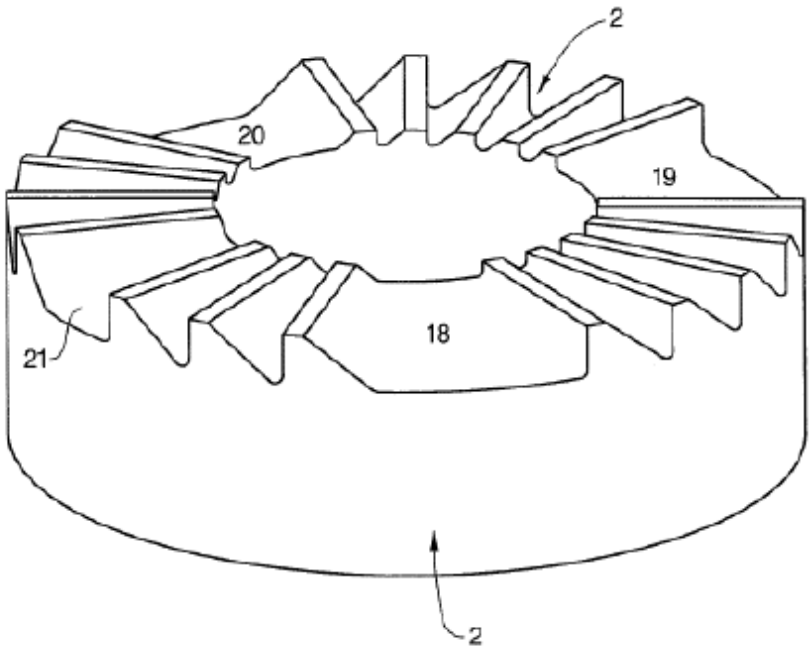


151. In both Betzler and the '905 patent, two face gears are designed to be complementary such that when pushed together into engagement the teeth mesh as seen below in Figure 1A of Betzler:



152. The gear depicted in Figure 4 of the ’905 patent is also a face gear despite the fact that the bottom gear (i.e., the one on engagement projection 27) does not extend continuously around the entire perimeter of the reel. For example, as shown below, Figure 3 of Betzler discloses a face gear with a non-continuous set of gear teeth:

Fig.3



153. As Betzler explains, face gears "have been known for a long time as construction elements for a wide variety of different purposes." Betzler at 1:10-11; *see also* 1:20-21 ("The possible uses of such connection elements are quite varied"). Face gears allow "two machine elements to be coupled together" with a "form-fitting, self-centering connection," and are used as "space-saving" elements with "high precision." Betzler at 1:16-20.

154. Betzler discloses face gears with asymmetrical gear teeth profiles. Betzler at 2:23-28. For example, in one embodiment, in each gear tooth, a first flank angle is "between 0° and < 29°," and preferably 0°, and the second flank angle is "29° < 80°, preferably <80°." Betzler at 4:10-18; *id.* at 5:10; *see also id.*,

13:6-7 (“The steeper flank … is preferably designed with the flank angle between 0° and 29°, and the angle of the shallower flank is … between 30° and 80°.”). Betzler explains that, with face gears, “[t]he specific choice of the geometry of the individual gearing elements … depends on the specific application … and is therefore up to the judgment of the responsible person skilled in the art.” Betzler at 8:16-20. With the asymmetrical tooth design described in Betzler, the first flank, which has a smaller angle and is thus steeper, can withstand more torque than the second flank, which has a larger angle and is less steep.

VIII. SUMMARY OF MY OPINIONS

155. In the subsequent section (Section IX), I provide my opinions as to whether claim 1-4 of the ’905 Patent are novel or non-obvious. I summarize those opinions here.

156. In my opinion, each of claims 1-4 of the ’905 Patent either are not novel (i.e., anticipated) and/or would have been obvious. The chart below summarizes my opinions:

Section of My Declaration	Prior Art	Applicable Claims	Basis for My Opinion
Section IX.A	McAllister-I in view of Laverriere	1-2	Obvious
Section IX.B	McAllister-I	3	Anticipated
Section IX.C	McAllister-I in view of Laverriere	3	Obvious
Section IX.D	McAllister-I	4	Anticipated
Section IX.E	McAllister-I in view of McAllister-II	4	Obvious
Section IX.F	Mizutani	3	Anticipated
Section IX.G	Mizutani	3	Obvious
Section IX.H	Morita-I in view of Morita-II	1	Obvious
Section IX.I	Morita-I in view of Morita-II and Laverriere	2	Obvious
Section IX.J	Tsuyuki	3	Anticipated
Section IX.K	Tsuyuki	3	Obvious
Section IX.L	Morita-II	4	Anticipated
Section IX.M	Morita-II in view of Betzler	4	Obvious

IX. VALIDITY ANALYSIS OF CLAIMS 1-4

A. Claims 1 and 2 Would Have Been Obvious Over McAllister-I in view of Laverriere

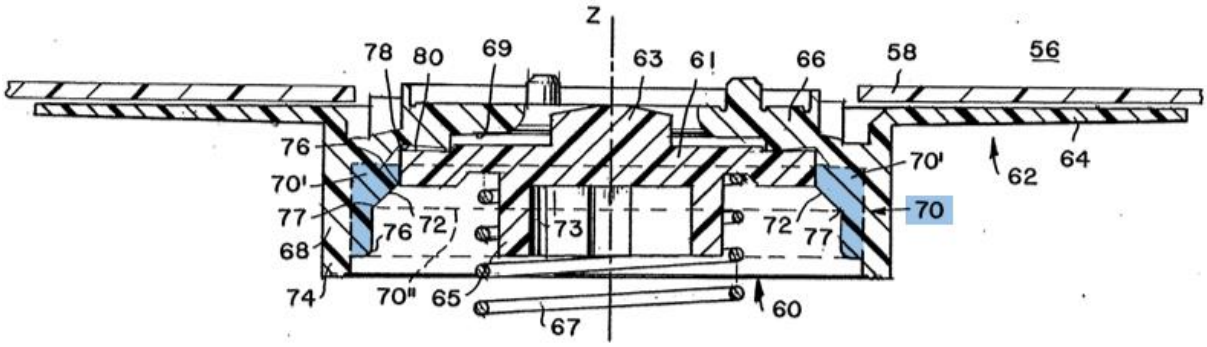
157. As I explain below, McAllister-I discloses all limitations of claim 1 except its reel lacks "a guide member which centers the braking member with respect to the reel." In view of Laverriere, however, a POSA would have had several reasons to add such a guide member to McAllister-I's reel. Claim 1, and its dependent claim, thus would have been obvious to a POSA.

1. Reasons for Modifying McAllister-I In view of Laverriere

158. Laverriere explains that because the diameter of a reel brake is smaller than the diameter of the reel hub into which it is inserted during assembly (Laverriere, 1:1:28-31), the difference in diameters creates a potential for the brake to become "misaligned, i.e., lie off centre of the hub during assembly and/or use" and thus the brake "cannot function properly to prevent undesirable dispensing of the ribbon" (*id.*, 1:31-39). *See also* 3:40-46 ("This intentional difference in diameters creates a relatively loose fit between the brake button 24 and the annular wall 38 [of the reel hub] to facilitate assembly. However, … it is possible, due to this relatively loose fit, that the brake button 24 can become oriented off-center of the hub 17 during assembly or mishandling during use."). Laverriere teaches a solution to this "misalignment" problem—the use of "centering ribs" integrally molded into the wall of the hub which "gradually and positively receive and

position the circulate brake button 60 concentrically relative to the hub." *Id.*, 4:38-41, 4:49-53. The Laverriere centering ribs (element 70) are highlighted below in purple:

FIG. 3



159. As Laverriere explains, the centering ribs overcome the misalignment problem and "maintain[] the brake button in the desired position, i.e., **on center** with the hub." *Id.*, 5:1-3; *see also* 4:15-17 ("The present invention provides a means for ensuring positive, concentric alignment between the brake button and hub…"), claims 1 ("the projecting means … maintains a substantially concentric relationship between the circular brake button and the circular annular wall of the hub"), claim 7.

160. The brake misalignment problem that Laverriere identifies is present in the McAllister-I cartridge. As with Laverriere's brake button 24[5], the diameter of McAllister-I's locking gear 42 is smaller than the diameter of reel hub 32 in which it resides. This difference in diameter between the locking gear and the reel hub is visible, for example, in Figure 2A (below):

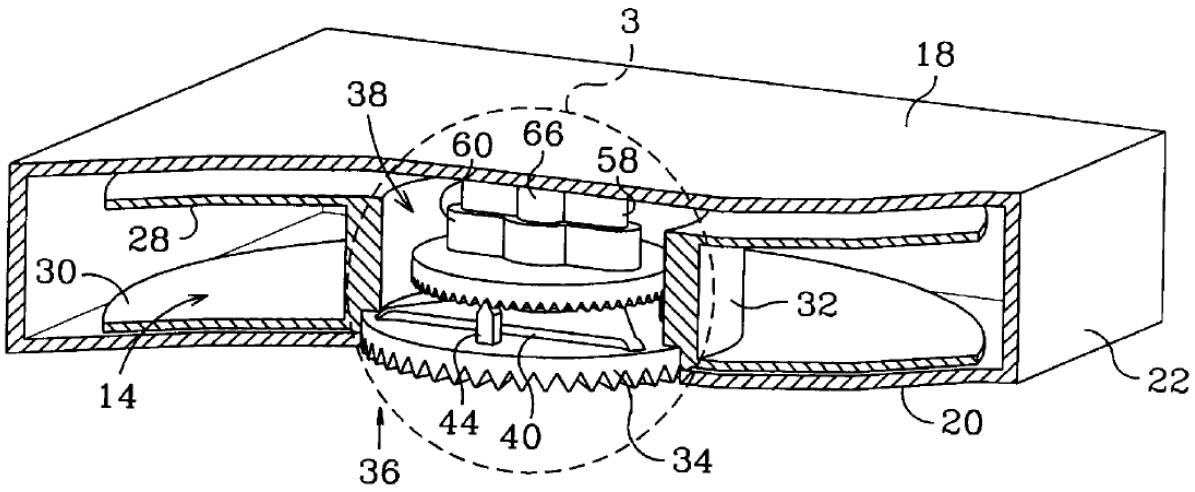


FIG. 2A

161. The difference in diameter, as Laverriere explains (3:40-42) aids in assembly of the cartridge—because it is smaller in diameter than the reel hub, the locking gear can easily be inserted into the reel hub during assembly of the device. Were the locking gear the same diameter as the inner surface of the reel hub, then friction would make it more difficult to insert the locking gear into the hub. The difference in diameter also allows the locking gear to move up and down within

[5] While "brake button 24" is directly engaged by a tape drive mechanism in order for it to disengage from the reel, it is otherwise the same as "locking gear 42" of McAllister-I.

the reel hub, which it must in order to lock and unlock the reel. Additionally, in operation, there must be clearance between the (stationary) locking gear and (moving) reel to ensure undisturbed rotation of the reel, as tape is wound or unwound.

162. Because there is a difference in diameter between locking 24 and the inner surface of reel hub 32, a POSA would have recognized that the misalignment problem identified in Laverriere was also present in McAllister-I. A POSA would have recognized this problem existed in McAllister-I even though McAllister-I includes mating structures 58 and 60 that "fix locking gear 42 into position over spider washer 40 and locking posts 44." McAllister-I at 3:52-53. A POSA would have recognized that there would have been clearance between the two mating structures such that there remained a risk that locking gear 42 would tilt and become misaligned during assembly or use of the cartridge. Such clearance is needed to ensure that locking gear 42 can move up and down. Indeed, FIG. 5 of the '905 Patent depicts a misaligned braking member, and that braking member has a structure that mates with a structure on the cartridge. *See, e.g.*, 5:5-7, 7:6-14, FIG. 5 (elements 33 and 44).

163. Indeed, Laverriere depicts a conventional cartridge that experiences brake misalignment in Figure 2. Laverriere at 2:29-33, FIG. 2. That conventional cartridge, like McAllister-I, includes mating structures that fix the position of

brake. Laverriere at 3:25-29 ("The second, lower projection 52 includes a rectangular recess 53 which is mounted on the second half 13 of the cartridge 10."). The Mizutani reference further confirms that brake misalignment can occur even where the brake and cartridge use mating structures to fix the position of the brake. *E.g.*, Mizutani ¶5 ("However, to vertically slide the lock member, there must be a certain amount of clearance maintained between the slide boss 59 and the guide protrusion 63 sliding surfaces, and lock member 54 tilt motion for this clearance amount cannot be avoided.").

164. In view of the misalignment problem Laverriere identifies and its teaching of centering ribs as a solution to that problem, a POSA would have had a reason to modify the McAllister-I reel to include Laverriere's ribs to reduce the likelihood that reel lock 38 of McAllister-I became misaligned during assembly or use. While Mizutani suggests that a release member, like spider washer 40, can also decrease the likelihood that a brake tilts during use (Mizutani ¶12), a POSA would have appreciated that centering ribs would provide even greater assurances that locking gear will not tilt and thus a POSA would have had a reason to add the centering ribs even though the McAllister-I cartridge used spider washer 40. Moreover, Mizutani does not suggest that a release member like spider washer 40 centers a brake during assembly—it does not. Centering ribs, however, would

have centered the brake during assembly, thus providing a POSA with another reason to use the Laverriere centering ribs with the McAllister-I cartridge.

165. Adding the Laverriere centering ribs to the inner surface of the McAllister-I reel hub would have been within the skills of a POSA. Indeed, Laverriere teaches that adding its centering ribs "requires only minimal modifications" and "does not otherwise interfere with assembly or operation of the cartridge." Laverriere at 5:23-27.

166. Adding Laverriere's centering ribs to the inner surface of the McAllister-I reel hub would have involved no more than applying a known technique (centering ribs) to a known device (a conventional cartridge) ready for improvement to yield a predictable result (a cartridge in which the reel brake remains centered).

167. Likewise, adding Laverriere's centering ribs to the inner surface of the McAllister-I reel hub would have required only using a known technique (centering ribs) that had improved one device (Laverriere's cartridge) to improve a similar device (McAllister-I's cartridge) in the same way (ensuring the reel brake remains centered).

2. Limitation-by-Limitation Analysis

a. Claim 1, Preamble

168. The preamble to claim 1 recites: "[a] magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." McAllister-I discloses each element of the preamble.

i. "a magnetic tape cartridge comprising…"

169. McAllister-I discloses, as recited in the preamble, a "magnetic tape cartridge." Specifically, McAllister-I discloses a "tape cartridge 10." McAllister-I, 2:58-60; *see also* 1:4 ("this invention relates generally to tape cartridges"), 1:11-48 (describing magnetic tape cartridges as the "background of the invention"). McAllister-I explains that "[a] widely used medium for storing data is magnetic tape," and that "tape cartridges are one of the most popular formats for storing data on tape." McAllister-I at 1:10-12. Thus, tape cartridge 10 is, as recited in the preamble, a "magnetic tape cartridge."

170. Cartridge 10 is depicted below in Figure 1 of McAllister-I:

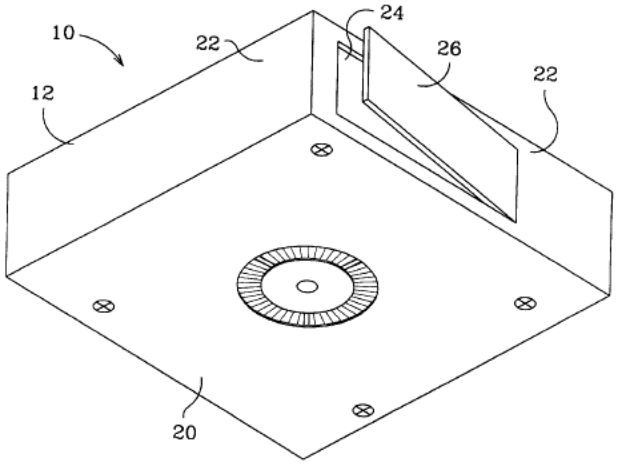


FIG. 1 of McAllister-I

ii. "magnetic tape wound around a single reel"

171. Cartridge 10 comprises, as recited in the preamble, a "magnetic tape wound around a single reel." Specifically, as seen below in Figure 2B, within cartridge 10 is a "tape supply reel 14." *Id.*, 2:58-60; *see also* Abstract ("The tape cartridge includes a housing, a tape reel …"), 1:57 ("the tape cartridge includes … a tape reel"), 3:3 ("tape reel 14"), claim 1 ("A tape cartridge, comprising … a tape reel…"), claim 6 ("A tape cartridge, comprising … a reel…"),

172. Although "not shown" (McAllister-I at 2:67), a POSA would have known that magnetic tape was wound around reel 14. As the Background of the Invention makes clear, the McAllister-I cartridge is an improved type of **magnetic tape** cartridge and thus a POSA would understand that magnetic tape is wrapped around reel 14 as was standard practice with magnetic tape cartridges for decades.

See McAllister-I at 1:10-12 ("A widely used medium for storing data is magnetic tape. Tape cartridges are one of the most popular formats for storing data on tape."); 2:60-61 (describing the cartridge as "configured to enclose a single reel of tape"); *see also* Ex-1017 at FIG. 1 (depicting magnetic tape wrapped around a reel), 1:72-2:6. The reason tape is "not shown" in the McAllister-I figures (McAllister-I at 2:67) is because the presence of tape around the reel would have been so well-known to a POSA that depicting this feature of the cartridge was wholly unnecessary for a POSA to understand how the cartridge worked.

173. Below I have highlighted in green "tape reel 14" to demonstrate that the McAllister-I cartridge includes, as recited in the preamble, a "magnetic tape wound around a single reel":

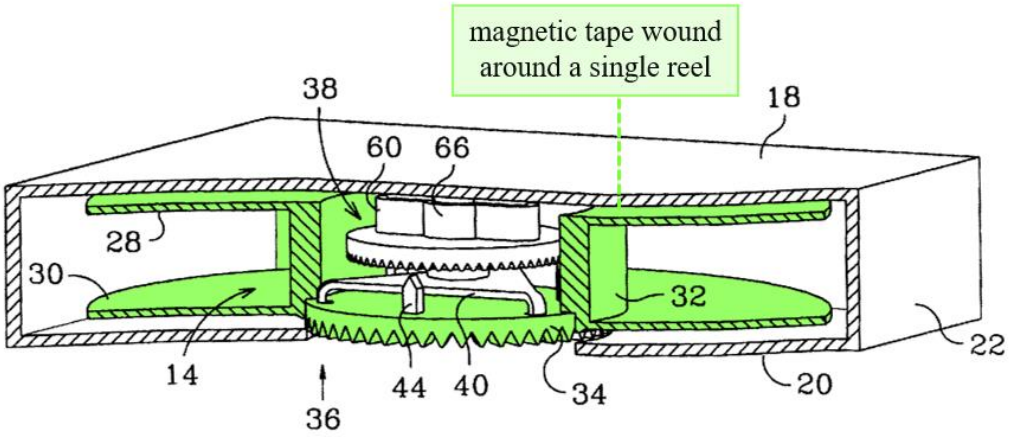


FIG. 2B

iii. "a cartridge casing in which the reel is housed for rotation"

174. The McAllister-I cartridge comprises, as recited in the preamble, "a cartridge casing in which the reel is housed for rotation." Specifically, the cartridge includes a housing 12 in which the reel rotates. *Id.*, Abstract ("The tape cartridge include a housing, a tape reel rotatably disposed in the housing…."), 1:57-58 (same), 2:58-63 ("a single reel tape cartridge 10 includes a housing 12"), claim 1 ("A tape cartridge, comprising: a housing; a tape reel **rotatably disposed in the housing**"), claim 6 ("A tape cartridge, comprising: a housing; a reel **rotatably disposed in the housing**"), claim 13 ("A tape cartridge, comprising: a housing; a reel **rotatably disposed in the housing**").

175. Below I have highlighted in red "housing 12" to demonstrate that the McAllister-I cartridge includes, as recited in the preamble, "a cartridge casing in which the reel is housed for rotation":

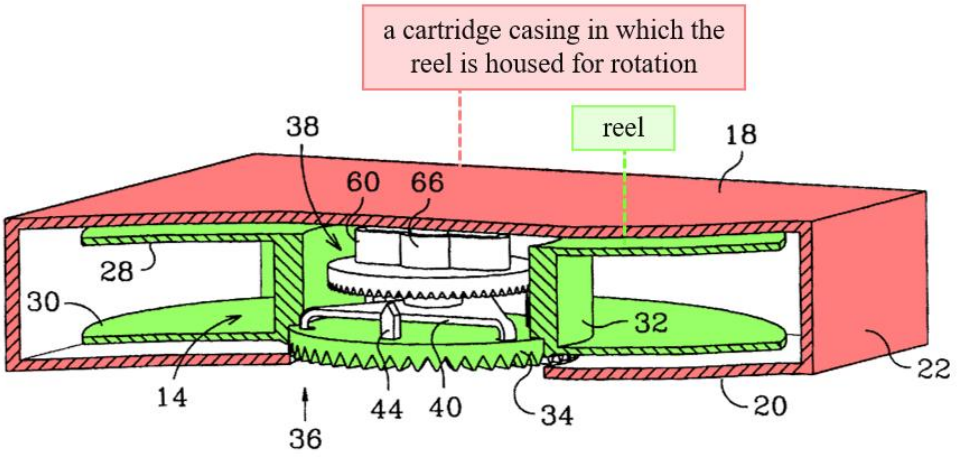


FIG. 2B

iv. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"

176. The McAllister-I cartridge comprises, as recited in the preamble, "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." As seen in Figure 2B (below), the cartridge has a "reel lock 38" that meets the claimed "reel stopper means."

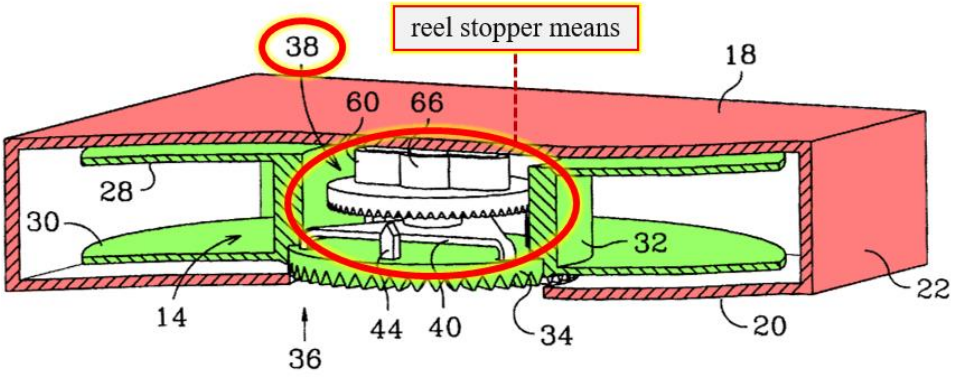


FIG. 2B

177. Reel lock 38 comprises several components that lock the reel in place when the tape is not in use and permit rotation of the reel when it is used. These components include "a spider washer 40, a locking gear 42 and locking posts 44 positioned at spaced apart locations around the top of reel gear 34" as well as a "biasing spring 64." McAllister-I at 3:14-16, 3:54-56. McAllister-I explains that locking gear 42 is moveable in only direction (up and down) and cannot rotate because its protrusion 60 interlocks with structure 58 on the top of the cartridge casing. McAllister-I at 3:44-54.

178. These reel lock components are highlighted below in Figure 3—spider washer (orange), locking gear and protrusion (yellow), locking posts (blue), and biasing spring (purple):

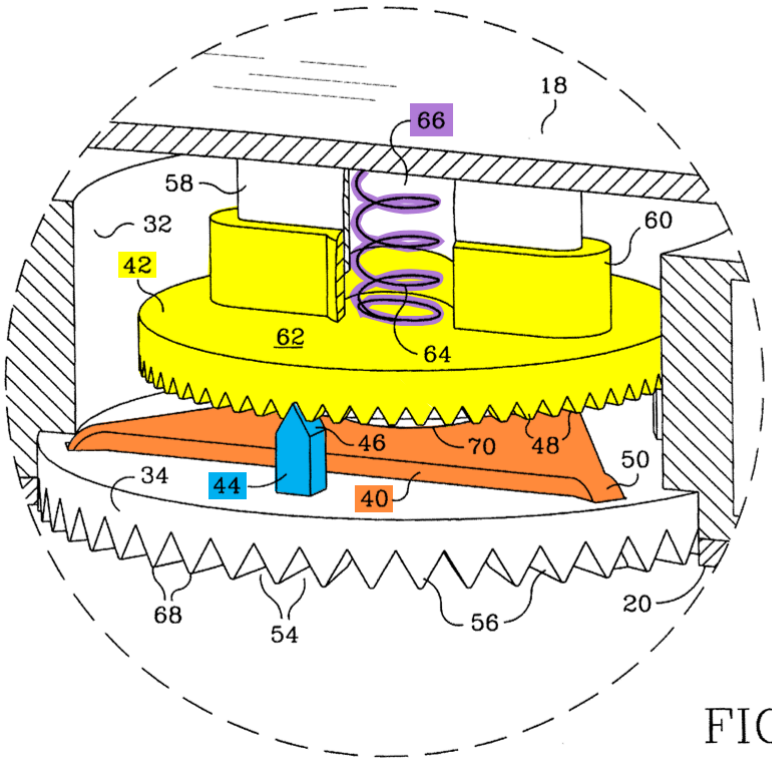


FIG. 3

179. With respect to the operation of reel lock 38, McAllister-I explains that "[s]pring 64 urges locking gear 42 against spider washer 40 and locking posts 44" thereby keeping "reel lock 38 **locked** when tape cartridge 10 is not installed in a tape drive." *Id.*, 3:54-61. When the cartridge is installed in a tape drive, "tips of the drive motor gear push on spider legs 50 to drive spider washer 40 up," which "moves lock gear 42 up and off locking posts 44 to **unlock** reel lock 38." *Id.* at 3:66-4:3; *see also* 4:4-9. Reel lock 38 therefore performs the claimed function of the "reel stopper means," i.e., locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used.

180. As discussed in Section VI.A.2, the structure corresponding to the "reel stopper means" are the structures corresponding to the "braking member," "urging member," and "releasing member" recited in claim 1. As I explain below with respect to limitations [a]-[d], reel lock 38 uses the same structures disclosed in the '905 patent for performing the claimed functions of the "braking member," "urging member," and "releasing member," and thus it uses the same structures disclosed in the '905 patent to perform the claimed function of the "reel stopper means."

181. As it performs the claimed function of the "reel stopper means," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, reel lock 38 of McAllister-I meets the "reel stopper means" of claim 1 under the BRI of that term.

b. Claim 1, Limitation 1a

182. Limitation 1a requires that "the reel stopper means comprises a braking member which is movable between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same."

183. McAllister-I's "reel stopper means," i.e., reel lock 38, includes "**locking gear 42**" that satisfies the "braking member" element of limitation 1a.

i. "braking member": function

184. As explained in Section VI.B.1, the function of the "braking member" is: "moves between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same." Locking gear 42 performs this function.

185. First, the locking gear restricts rotation of the reel by moving to a locking position in contact with the reel. When the McAllister-I cartridge is not installed in a tape drive, a biasing spring 64 "urges locking gear 42 against … locking posts 44" to "lock" the reel from rotating. *Id.*, 3:54-61; *see also* 2:14-17 ("[T]he locking gear is biased against the engagement mechanism on the reel gear to **lock the reel**."), claim 1 ("locking member movable between **a locked position** in which the locking member **engages the reel to prevent rotation**"), claim 14 ("the second gear is movable between **a locked position in which the second gear engages the projections to prevent rotation of the reel**").

186. Second, the locking gear permits rotation of the reel by moving to a releasing position away from the reel. When the cartridge is installed into a tape drive, spider washer 40 moves "locking gear 42 up and off locking posts 44 to **unlock** reel lock 38." *Id.*, 4:2-3; *see also* 2:17-21 ("[T]he teeth of the drive motor gear push the washer legs up to drive the washer into the locking gear. This action moves the locking gear up and off the engagement mechanism to **unlock the**

reel."), claim 1 ("**an unlocked position** in which the locking member does not engage the reel and the reel is free to rotate"), claim 14 ("**an unlocked position** in which the second gear does not engage the projections and the reel is free to rotate").

187. Locking gear 42 therefore performs the claimed function of the "braking member."

ii. "braking member": structure

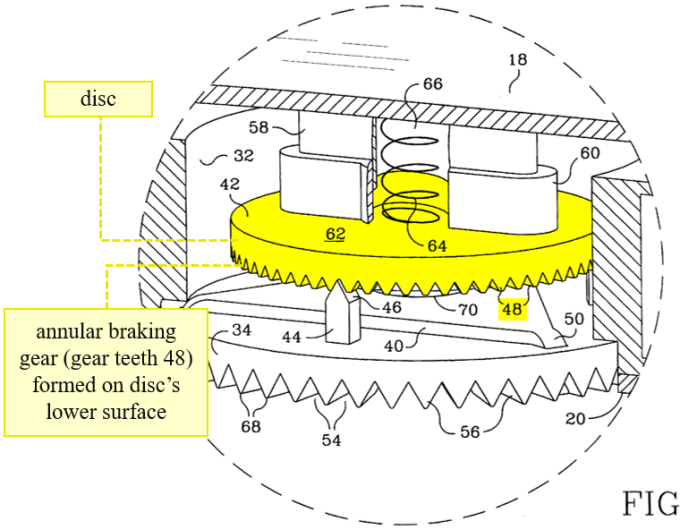
188. As explained in Section VI.B.1, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "braking member" is:

> **(1)** a disc with an annular braking gear formed on its lower surface,
>
> **(2)** the braking gear adapted to be engaged with an engagement gear tooth [teeth] on an engagement projection formed on the reel, and
>
> **(3)** a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing.

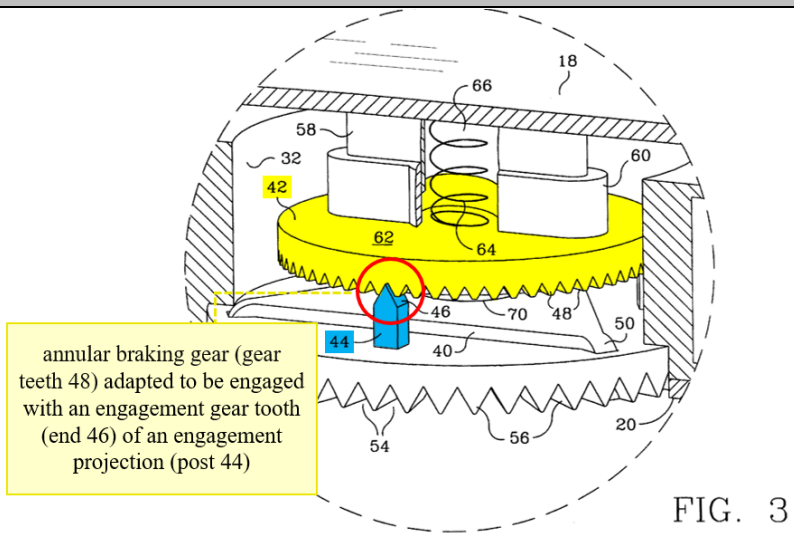
189. Locking gear 42 uses these same structures to perform the claimed function as the "braking member" of the '905 patent.

190. First, locking gear 42 comprises "a disc with an annular braking gear formed on its lower surface." As seen, for example, in Figure 3 below, locking gear 42 is a disc. McAllister-I at FIGS. 2-9. Formed on that disc's lower surface are "locking gear teeth 48" that form an annular, i.e., ring-shaped, braking gear around the disc's lower surface. McAllister-I at 3:18; *see also* 4:13 ("locking gear

teeth 48"), claim 6 ("a second gear rotationally fixed to the housing, the second gear having gear teeth"), claim 13 ("a second gear rotational fixed to the housing, the second gear having second gear teeth engageable with the projections on the first gear").

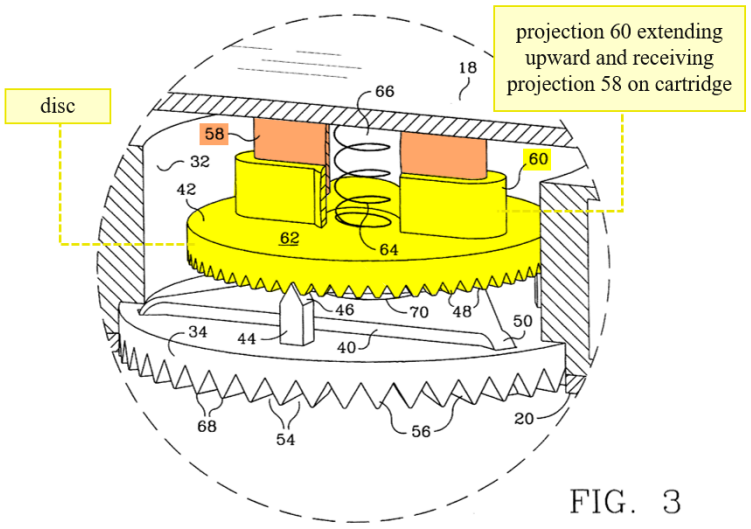
"Braking Member" Structure	**Disclosure in McAllister-I**
(1) a disc with an annular braking gear formed on its lower surface	 FIG. 3

191. Second, the braking gear of locking gear 42, i.e., locking gear teeth 48, is "adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel." McAllister-I explains "ends 46 of locking posts 44 are sized and shaped to fit into locking gear teeth 48." McAllister-I, 3:17-18. As I explain in Section IX.A.2.e, locking posts 44 are engagement projections and each of their ends is a gear tooth. That locking gear teeth 48 is adapted to engage with the ends of locking posts 44 is also depicted in Figure 3 below:

"Braking Member" Structure	Disclosure in McAllister-I
(2) the braking gear adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel	

192. Third, the disc of locking gear 42 has "a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing." McAllister-I explains that a "male key shaped structure 58 is formed on or integral with top portion 18 of housing 12. A mating female key shaped structure 60 is formed on or integral with the top 62 of locking gear 42. Female structure 60 on locking gear 42 receives male structure 58 on cartridge housing 12 to fix locking gear 42 into position over spider washer 40 and locking posts 44." McAllister-I at 3:48-54. As McAllister-I further explains, the mating of structures 58 and 60 ensures the locking gear "is movable in only one dimension, parallel to the axis of rotation of

reel 14" and "fixed in the other dimensions by its attachment to the cartridge housing 12." McAllister-I at 3:44-47.

"Braking Member" Structure	Disclosure in McAllister-I
(3) a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing	 FIG. 3

193. As it performs the claimed function of the "braking member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, locking gear 42 of McAllister-I meets the "braking member" of claim 1 under the BRI of that term.

c. Claim 1, Limitation 1b

194. Limitation 1b requires "an urging member which urges the braking member toward the locking position." McAllister-I's cartridge includes a "**spring 64**" that satisfies the "urging member" element of limitation 3b.

i. "urging member": function

195. As explained in Section VI.B.2, the claimed function of the "urging member" is "urges the braking member toward the locking position." Spring 64 performs this function.

196. As explained in Section IX.A.2.b, locking gear 42 meets the claimed "braking member." Spring 64 "**urges** locking gear 42 … against locking posts 44" to prevent the reel from rotating. McAllister-I, 3:54-61; *see also* 4:7-9 ("Spring 64 serves as a biasing mechanism **to urge the locking member, lock gear 42, towards the locked position**."), claim 4 ("a biasing mechanism **urging** the locking member towards the locked position"), claim 5 (same).

197. Spring 64 therefore performs the claimed function of the "urging member."

ii. "urging member": structure

198. As explained in Section VI.B.2, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "urging member" is: a coiled spring.

199. Spring 64 uses the same structure to perform the claimed function as the "urging member" of the '905 patent. Specifically, as seen below, Figure 3 of McAllister-I depicts spring 64 as a "coiled" spring.

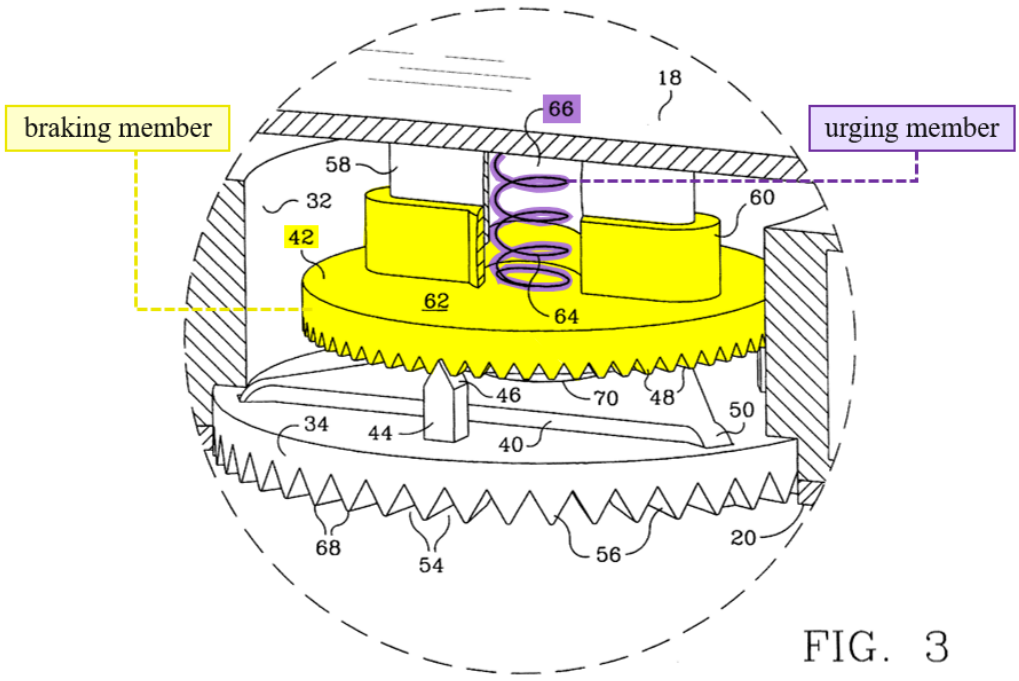


FIG. 3

200. As it performs the claimed function of the "urging member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, spring 64 of McAllister-I meets the "urging member" of claim 1 under the BRI of that term.

d. Claim 1, Limitation 1c

201. Limitation 1c requires "a releasing member which is rotated integrally with the reel and moves the braking member toward the releasing position in response to a reel chucking action of the reel drive means of a tape drive." McAllister-I's cartridge includes a "**spider washer 40**" that satisfies the "releasing member" element of limitation 1c.

i. "releasing member": function

202. As explained in Section VI.B.3, the claimed function of the "releasing member" is "moves the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive." Spider washer 40 performs this function.

203. As explained in Section IX.A.2.b, locking gear 42 meets the claimed "braking member." When the McAllister-I cartridge is installed into a tape drive, a spider washer 40 moves "locking gear 42 up and off locking posts 44 to unlock reel lock 38." McAllister-I, 4:2-3. Spider washer 40 thus "acts as **a release mechanism** to disengage the locking member…from reel 14 and unlock reel 38 when the tape drive engages the reel 14." *Id.*, 4:4-7; *see also* claim 1 ("the release mechanism movable between a first position … and a second position in which … the locking member is unlocked"). Spider washer 40 therefore performs the first-half of the claimed "releasing member" function: "moves the braking member toward the releasing position."

204. Spider washer 40 also performs the second-half of the claimed function—"…in response to a reel chucking action of the drive gear of a tape drive." Spider washer 40 moves the locking gear 42 into its release position when a drive motor gear in a tape drive engages the reel, i.e., chucks it, and "tips of the drive motor gear" push up on the washer's legs. McAllister-I, 3:66-4:3; *see also*

2:1-5 ("The release mechanism is movable between a first position in which the release mechanism is not engaged by the tape drive and the locking member is locked and a second position in which the **tape drive engages the release mechanism** and the locking member is unlocked."), 2:17-20 ("As the drive motor gear in a tape drive engages the reel gear, the **teeth of the drive motor gear push the washer legs up** to drive the washer into the locking gear. This action moves the locking gear up and off the engagement mechanism to unlock the reel."), claim 1 ("the release mechanism movable between a first position in which the release mechanism is not engaged by the tape drive and the locking member is locked and a second position in which the **tape drive engages the release mechanism** and the locking member is unlocked").

205. The second-half of the claimed function incorporates my proposed interpretation for the phrase "reel drive means." As explained in Section VI.C, the claimed function of the "reel drive means" is driving the reel, and the corresponding structure disclosed in the specification of the '905 patent is a "drive gear." The McAllister-I drive motor gear performs this claimed function and does so using the same structure.

206. As McAllister-I explains, the "drive motor gear in a tape drive engages the reel gear." McAllister-I at 2:17-18. The reason it does so is to drive the reel, i.e., turn it, when the tape cartridge is used. The drive motor gear thus

performs the claimed function of the "reel drive means." The "**drive** motor **gear**" is also a drive gear, and thus it is the same structure as that disclosed in the specification of the '905 patent as corresponding to the "reel drive means."

ii. "releasing member": structure

207. As explained in Section VI.B.3, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "releasing member" is "a plate-like body with leg portions extending downward from its lower surface."

208. As seen below in Figures 3 and 6, spider washer 40 has a plate-like body with leg portions ("legs 50") extending downward from its lower surface. McAllister-I at 2:11-13 ("[A] washer interposed between the reel gear and the locking gear. One or more holes are formed through the teeth in the reel gear. Legs on the washer project into the holes in the reel gear."), 3:33-34 ("legs 50 of spider washer 40 project through holes 52 in reel gear 34"), claim 6 ("a washer operatively coupled to the first gear, the washer interposed between the first gear and the second gear and the washer having at least one leg projecting into the one or more holes in the first gear"), claim 13 ("a spider washer interposed between the first gear and the second gear, the spider washer having a plurality of legs projecting into the holes in the first gear"), FIGS. 2-7 (element 40).

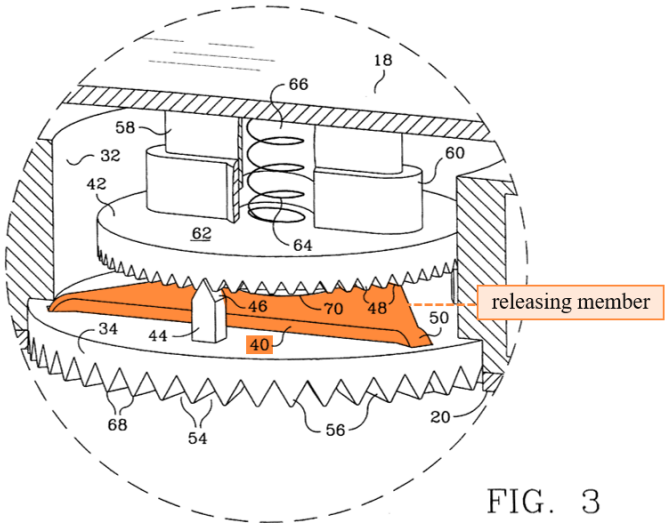


FIG. 3

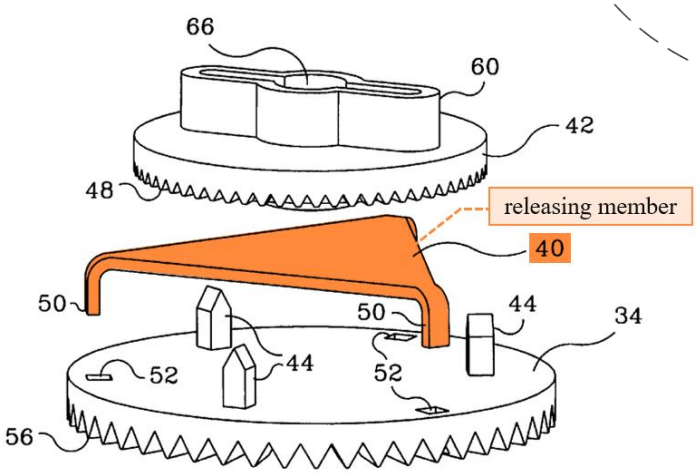


FIG. 6

iii. "rotated integrally with the reel"

209. McAllister-I discloses that spider 40 washer "rotates with tape reel 14." *Id.*, 4:20-23. Thus, the spider washer is, as recited in limitation 1c, "rotated integrally with the reel."

e. Claim 1, Limitation 1d

210. Limitation 1d requires that "the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear tooth on an engagement projection formed on the reel."

211. As explained in Section IX.A.2.b, locking gear 42 meets the claimed "braking member." It meets the remainder of limitation 1d as well.

212. Locking gear 42 includes "locking gear teeth 48" on its bottom surface that fit into "[t]he ends 46 of locking posts 44" for "robust locking" of the reel. *Id.*, 3:14-21; *see also* 2:9-11 ("an engagement mechanism, such as a post or a set of gear teeth, on the reel gear for engaging the teeth on the locking gear"), 3:66-4:3 ("In operation, as the drive motor gear in a tape drive engages reel gear 34, the tips of the drive motor gear push on spider legs 50 to drive spider washer 40 up into reel gear 34. This action **moves lock gear 42 up and off locking posts 44 to unlock reel lock 38**."), claim 6 ("an engagement means on the first gear for engaging the teeth on the second gear"), claim 7 ("A cartridge according to claim 6, wherein the engagement means comprises at least one post projecting from the first gear."), claim 13 ("the second gear having second gear teeth engageable with the projections on the first gear").

213. As seen below in Figure 3, locking posts 44 are projections projecting from and formed on the reel and each of their ends 46 is depicted as a gear tooth. McAllister-I at 2:9-11 ("an engagement mechanism, such as a post or a set of gear teeth, on the reel gear for engaging the teeth on the locking gear"), claim 6 ("an engagement means on the first gear for engaging the teeth on the second gear"), claim 7 ("A cartridge according to claim 6, wherein the engagement means

comprises at least one post projecting from the first gear."), claim 13 ("a first gear fixedly connected to the bottom of the reel hub, the first gear having gear teeth on a bottom side, a plurality of locking projections projecting from a top side").

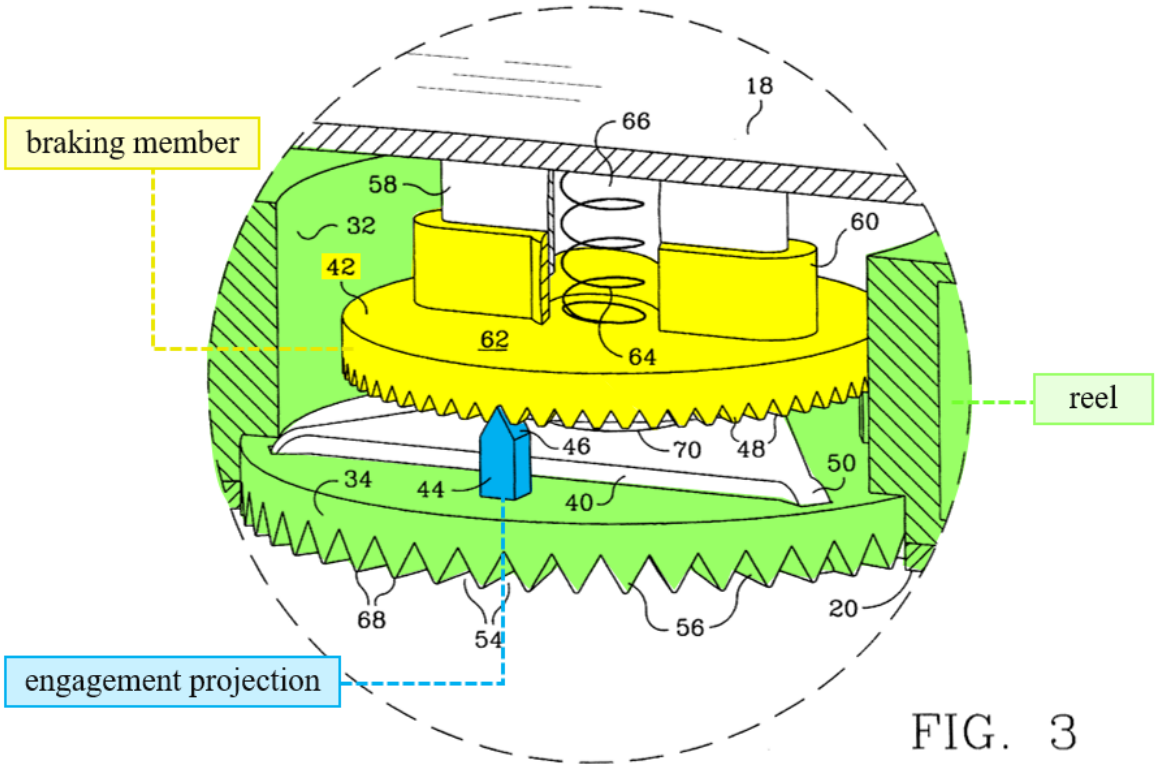


FIG. 3

214. Although depicted above as separate from the reel hub, "reel gear 34," upon which the locking posts are formed, "is usually formed as an integral part of reel hub 32." McAllister-I, 3:10-11. Thus, locking posts 44 are "formed on the reel."

215. Locking gear 42 is therefore provided, as recited in limitation 1d, "with a braking gear," i.e., gear teeth 48, "which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear tooth on an engagement projection formed on the reel," i.e., ends 46 of locking posts 44.

f. Claim 1, Limitation 1e

216. Limitation 1e requires that "the reel is provided with a guide member which centers the braking member with respect to the reel." As above discussed in Section IX.A.1, a POSA would have had reasons to add Laverriere's centering ribs to the McAllister-I reel.

217. In the McAllister-I/Laverriere cartridge, the centering ribs meet the claimed "guide members" of limitation 1e.

i. "guide member": function

218. As explained in VI.B.4, the function of the "guide member" is: "centers the braking member with respect to the reel." The centering ribs of Laverriere, when added to the reel hub of the McAllister-I cartridge, perform this function.

219. Laverriere explains that the centering ribs "gradually and positively receive and position" a brake "concentrically relative" to the reel hub and maintain the brake "in the desired position, i.e., **on center** with the hub." Laverriere, 4:50-55, 5:1-3; *see also* 4:15-17 ("The present invention provides a means for ensuring positive, concentric alignment between the brake button and hub…"), Abstract (57) ("a set of centering ribs or projections … direct, **center**, and maintain a brake button (61) concentrical relative to the hub (86) to prevent the brake button (61) from becoming misaligned in the cartridge during assembly or use."),

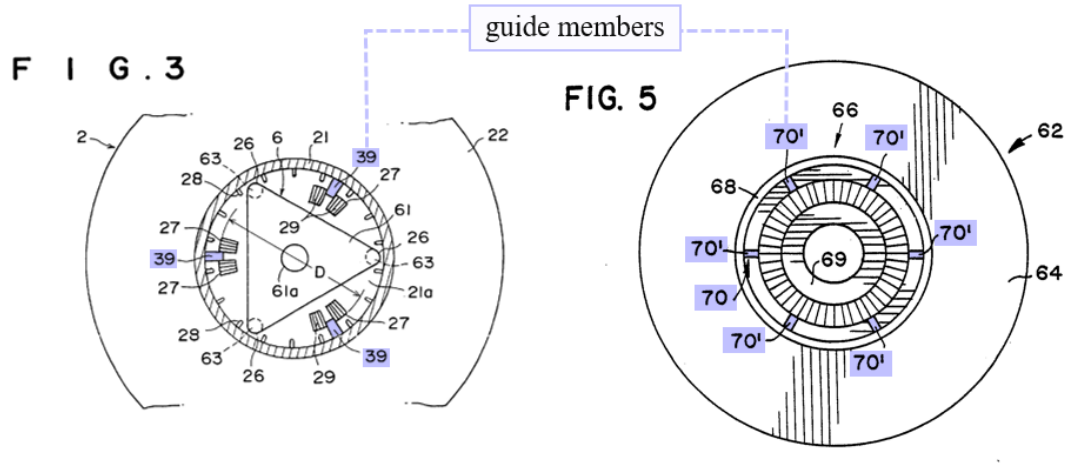
220. The centering ribs of Laverriere therefore performs the claimed function of the "guide member," and would do so in the McAllister-I/Laverriere cartridge as well. In modified McAllister-I/Laverriere cartridge, the centering ribs would have centered locking gear 42 with respect to the McAllister-I reel.

ii. "guide member": structure

221. As explained in Section VI.B.4, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "guide member" is "at least three ribs formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." The Laverriere centering ribs use these same structures to perform the claimed function as the "guide member" of the '905 patent.

222. Laverriere's centering ribs include "curves" that form "angled, contoured steps" and there are "preferably" six such ribs "molded to be equally, radially spaced" around the inner wall of the reel hub. Laverriere, 4:37-41. As shown below, the guide members (element 39) of the '905 patent are depicted in a manner similar to the "centering ribs 70" of Laverriere.

905 Patent, FIG .3	Laverriere, FIG. 5



223. As it performs the claimed function of the "guide member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, the centering ribs of Laverriere incorporated onto the reel of McAllister-I meets the "guide member" of claim 1 under the BRI of that term.

g. Claim 2

224. Claim 2 limits the guide member of claim 1 to "ribs which are formed on the inner surface of the reel hub at at least three places, each having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel."

225. As explained in VI.B.4, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "guide member" is "at

least three ribs formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." Thus, for purpose of my validity assessment, there is no difference between claim 2 and limitation [e] of claim 1.

B. Claim 3 Is Anticipated by McAllister-I

1. The McAllister-I Embodiments

226. McAllister-I discloses three embodiments. The first is depicted in Figures 2-7. McAllister-I at 2:28-46. The second and third are depicted in Figures 8 and 9, respectively. McAllister-I at 2:47-54.

227. Each embodiment uses locking gear 42, spring 64, and spider washer 40. *Compare* FIGS. 2 & 4 *with* FIGS. 7 & 8. The only difference between the embodiments is the structure on the reel with which the locking gear engages. McAllister-I explains that locking gear 42 engages with a gear tooth on the top of locking posts 44 in the first embodiment, with a full set of gear teeth 45 in the second embodiment, and with partial sets of gear teeth 45 in the third embodiment. McAllister-I at 3:21-27, FIGS. 2, 7, 8.

228. My analysis below relies on the second McAllister-I embodiment, depicted in Figure 9, in which locking gear 42 engages with a full set of gear teeth with openings for spider washer 40.

2. Limitation-by-Limitation Analysis

a. Claim 3, Preamble and Limitations 3a to 3c

229. As the chart I created above in Section V.C. shows, the preamble and limitations [a]-[c] of claim 3 are identical to the preamble and limitations [a]-[c] of claim 1.

230. The second embodiment of McAllister-I is identical to the first embodiment in terms of the components (*e.g.*, reel lock 38, spider washer 40, spring 64, and locking gear 42) that meet the preamble and limitations [a]-[c] of claim 1. Thus, the second embodiment discloses the preamble and limitations [a]-[c] of claim 3 for the same reasons and in the same manner that the first embodiment meets those same limitations in claim 1. *Supra* Section IX.A.2.a-d.

b. Claim 3, Limitation 3d

231. Limitation 3d requires that "the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear on an engagement projection formed on the reel."

232. As explained in Section IX.A.2.b, McAllister-I's locking gear 42 meets the claimed "braking member." It meets the remainder of limitation 3d as well.

233. In the second embodiment, "locking gear teeth 48" on the bottom surface of locking gear 42 engage a "full set of teeth [45] with openings for spider washer 50 as shown in FIG. 8." McAllister-I, 3:20-27. The gear teeth 45 (shown

below) include a projecting lower base on which gear teeth are formed and are therefore an "engagement gear on an engagement projection" as claimed in limitation 3[d].

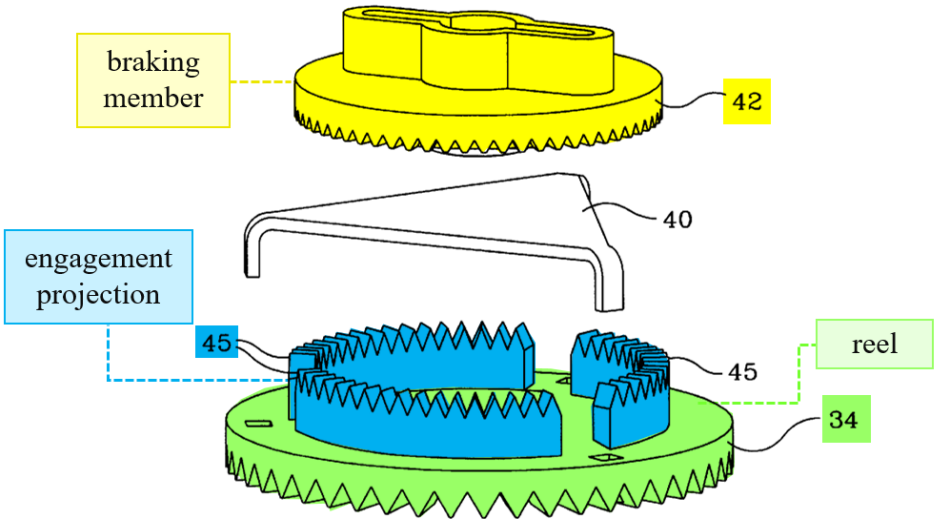


FIG. 8

234. Locking gear 42 is therefore provided, as recited in limitation 3d, "with a braking gear," i.e., gear teeth 48, "which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear on an engagement projection formed on the reel," i.e., gear teeth 45.

c. Claim 3, Limitation 3e

235. Limitation 3[e] requires "the outer diameter of the engagement gear being larger than that of the braking gear." As depicted below in Figure 4A, in McAllister-I's first embodiment the outer diameter of locking posts 44 (i.e., the claimed engagement gear) is larger than the outer diameter of the locking gear

teeth 48 (i.e., the claimed braking gear). As seen in the figures, the OD of locking gear 42 and its locking gear teeth 48 are the same because the gear teeth extend to the outer edge of the gear.

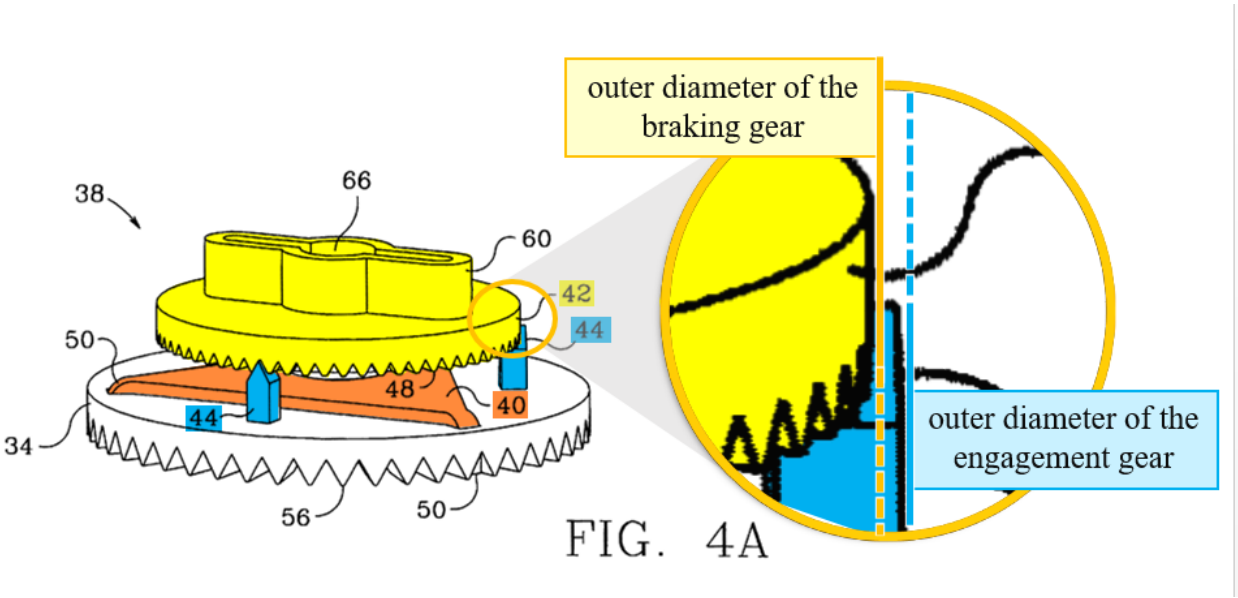


FIG. 4A

236. This difference in diameters is also depicted in Figure 3:

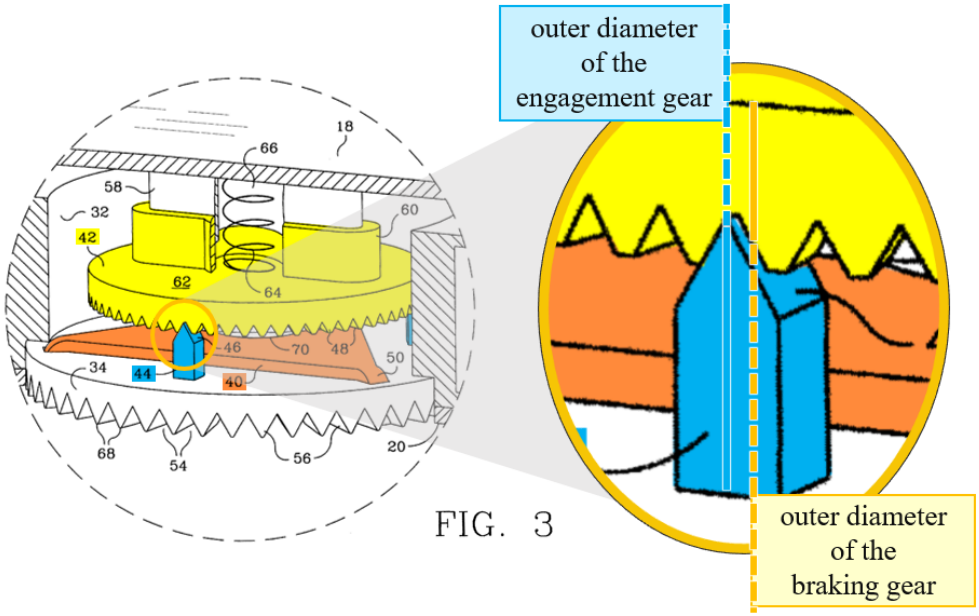


FIG. 3

237. And in Figure 4B:

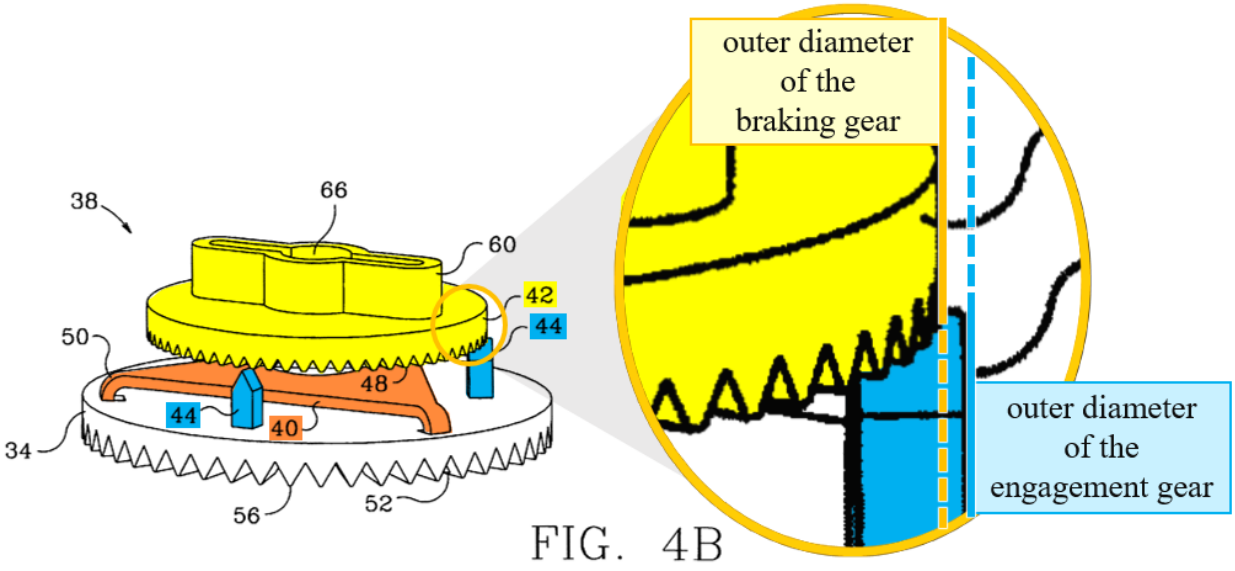


FIG. 4B

238. The difference is also seen below in Figure 6 when a straight line is drawn down from the outer edge of locking gear 42:

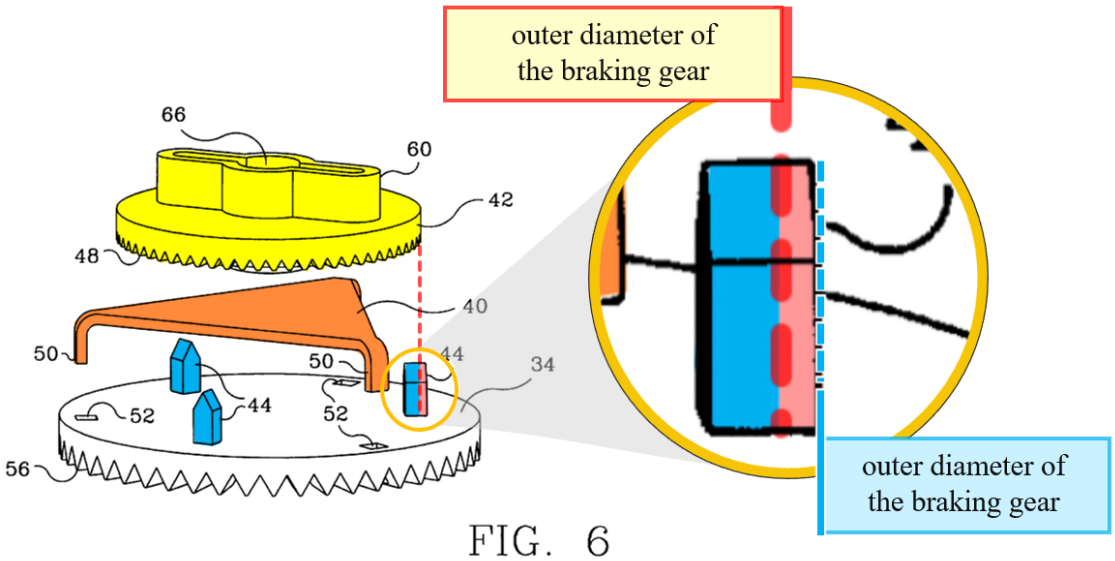


FIG. 6

239. The same diameter difference is also shown in Figures 8 and 9, which depict the second and third McAllister-I embodiments.

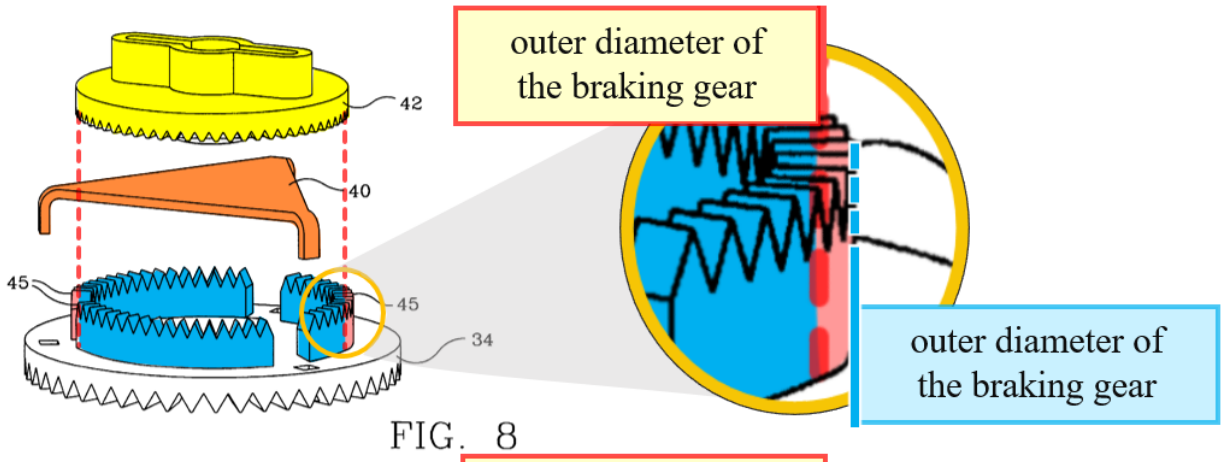


FIG. 8

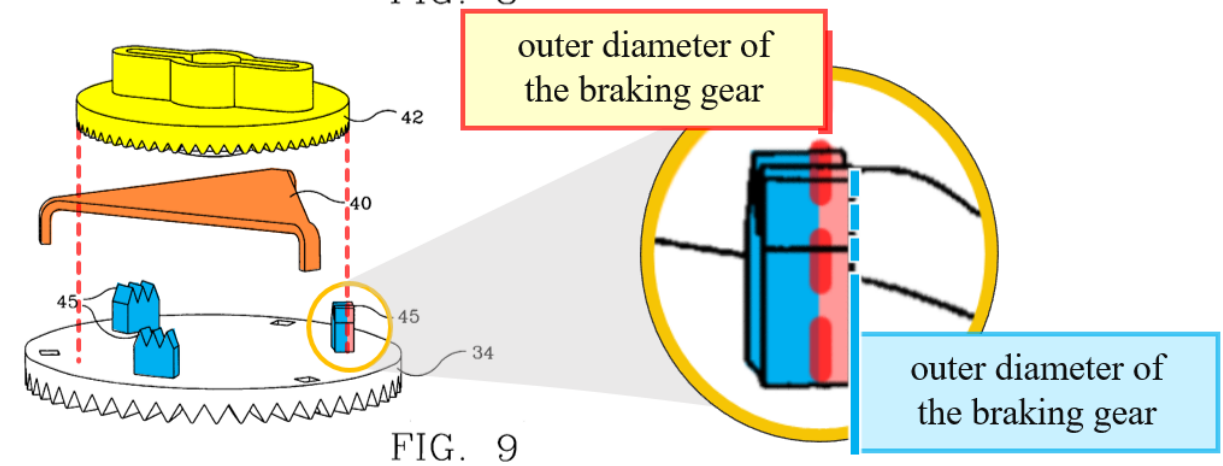


FIG. 9

240. The McAllister-I figures are thus consistent in their depiction of the outer diameter of locking posts 44 (i.e., the claimed engagement gear) as larger than the outer diameter of the braking gear teeth 48 (i.e., the claimed braking gear), and a POSA would have interpreted the figures in this manner. The figures consistency in depiction would have reinforced a POSA's interpretation of McAllister-I.

241. A POSA would have also understood that there were only three possible relationships between the outer diameters of locking gear 42 / braking gear teeth 48 and engagement posts 44. The outer diameter of locking gear 42 /

braking gear teeth 48 could either be less than, equal to, or greater than the outer diameter of the engagement posts. This limited number of designs available for manufacturing the McAllister-I cartridge would have further reinforced a POSA's interpretation of the figures as disclosing one of the three available designs—i.e., a locking gear with an OD less than the OD of the engagement posts.

242. The limited number of options available for designing locking gear 42 / braking gear teeth 48 and engagement posts 44 / gear teeth 45 also would have made implementing McAllister-I such that its locking gear 42 / braking gear teeth 48 had an OD less than the OD of the engagement posts 44 / gear teeth 45 a routine design choice. A POSA would have known that the most effective locking engagement will have the greatest possible diameter because a rotational force, or torque, comprises a force applied at some distance from a center of rotation, or an opposing pair of forces separated by a distance. In the case of the McAllister-I reel lock, the distance from the axis, or the distance between said forces is constrained by the inner diameter of the hub. For engaging features that are to resist rotation, with some inherent force capacity "per feature" (per gear tooth, the context of McAllister-I), the maximum torque resistance will be provided by placing those features at the greatest distance from the axis of rotation.[6] In McAllister-I, the

[6] A simple way to think of this is that the longer the handle on a winch, the more torque you can apply or resist.

engagement posts (or gear teeth) are limited by the inside diameter of the hub. The locking gear is limited by that same diameter, and by the need for clearance when the reel rotates in operation. Hence a POSA would have considered the design with a locking gear smaller in outer diameter than the reel engagement teeth or gear as the optimal arrangement of the parts.

243. Indeed, this arrangement—in which the OD of locking gear 42 / braking gear teeth 48 was less than the OD of the engagement gear—was a standardized arrangement in magnetic tape cartridges at least since the early 1990s as reflected in European Computer Manufacturers Association (ECMA) Standards 120 and 196. *See* Ex-1026, Ex-1027. For example, as shown below, FIGS. 12 and 13 of the ECMA-120 Standard depict a cartridge in which the OD of the gear on the brake button is smaller than the OD of the gear on the reel.

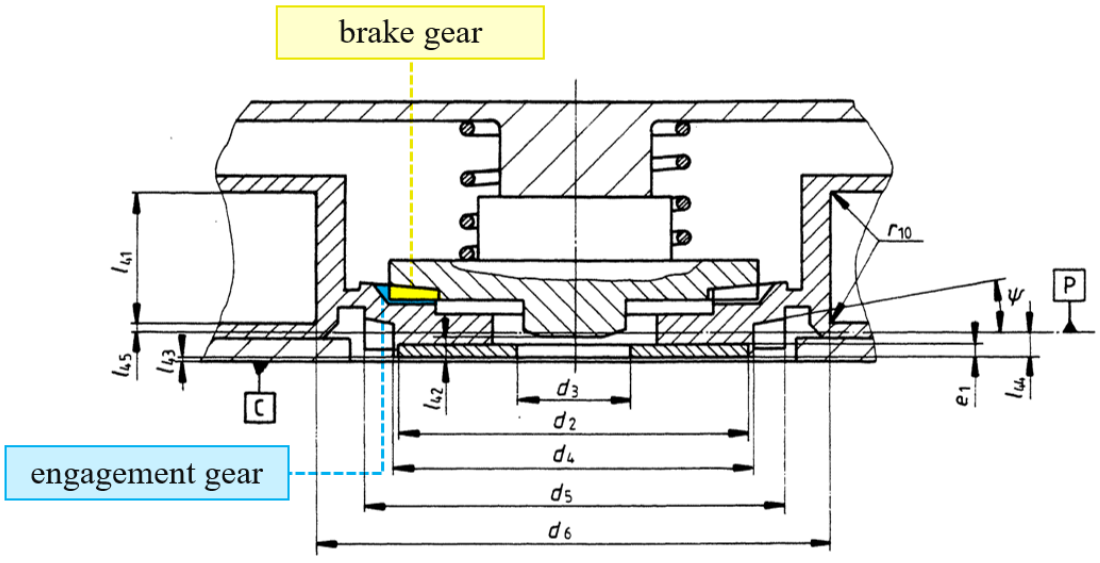


Figure 12 - Cross-section of the cartridge in hand

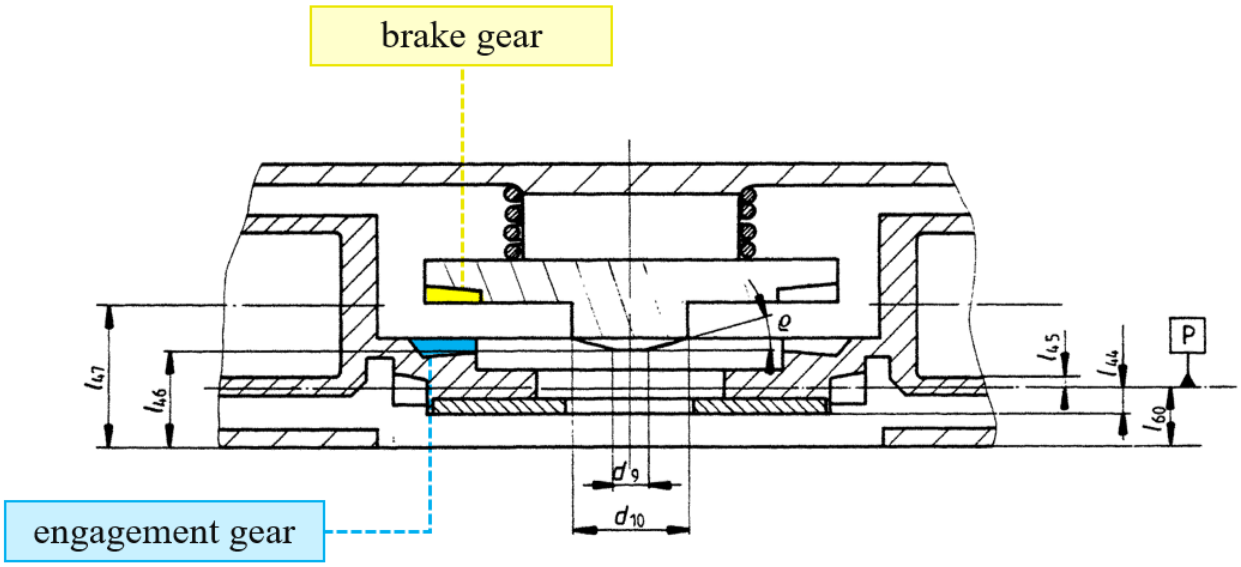


Figure 13 - Cross-section of the cartridge in the drive

244. FIGS. 15 and 16 of the EMCA-196 Standard depict the same OD relationship:

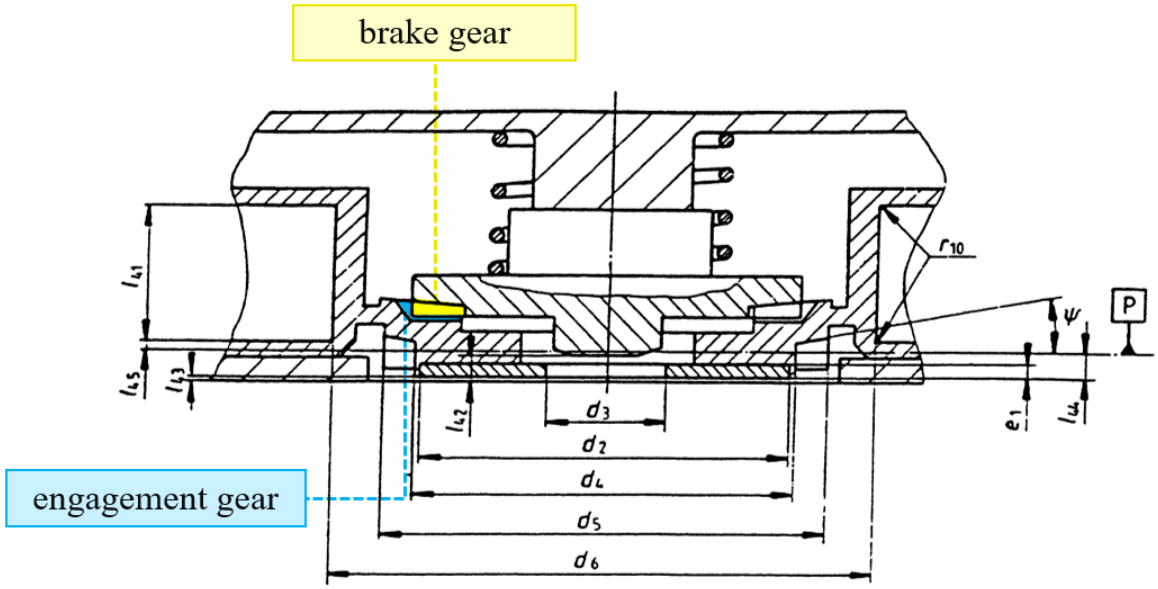


Figure 15 - Cross-section of the cartridge in hand

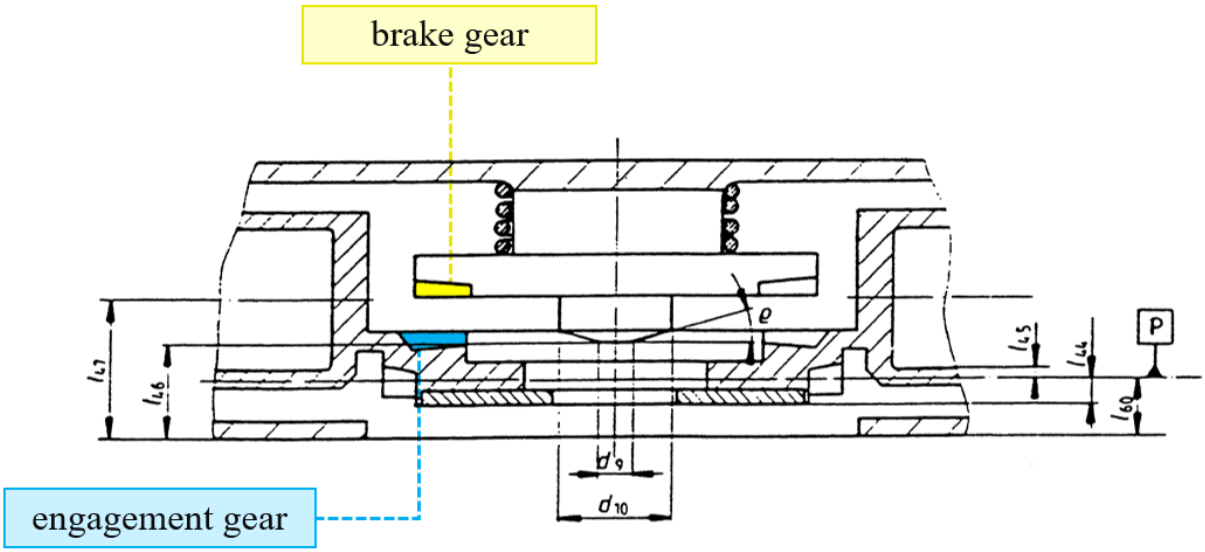


Figure 16 - Cross-section of the cartridge in the drive

245. While the two ECMA standards relate to the older "brake button" type of magnetic cartridge depicted in Laverriere and Morita-I, the standards nonetheless would have influenced the design choices a POSA would have made in designing a more modern cartridge like McAllister-I. The standards thus reinforce my opinion that a POSA would have interpreted the figures of McAllister-I as depicting a braking gear with an OD less than the OD of the locking posts 44 or gear teeth 44.

246. In the second embodiment, where locking posts 44 are replaced with gear teeth 45, McAllister-I does not use a figure to show explicitly how the gear teeth engaged with the locking gear 42. However, a POSA would have understood that substituting the locking post of Figure 4A with gear teeth 45 of Figure 8 did not require any alterations to the design of the reel lock, including alterations to the

diameter relationship between locking gear 42 / braking gear teeth 48 and the reel engagement mechanism (i.e., a gear tooth or gear teeth). When discussing the differences between its three embodiments, McAllister-I identifies the type of engagement mechanism (i.e., locking post vs. partial gear teeth vs. complete gear teeth) as the only difference between the embodiments. Thus, a POSA would have interpreted the diameter relationship between the outer diameter of locking gear 42 / braking gear teeth 48 and locking posts in Figures 3, 4A and 4B to apply equally when the locking posts 44 were substituted with a gear 45 as in Figure 8.

247. That Figure 8 depicts such a diameter relationship (shown below) would have further reinforced POSA's interpretation of McAllister-I:

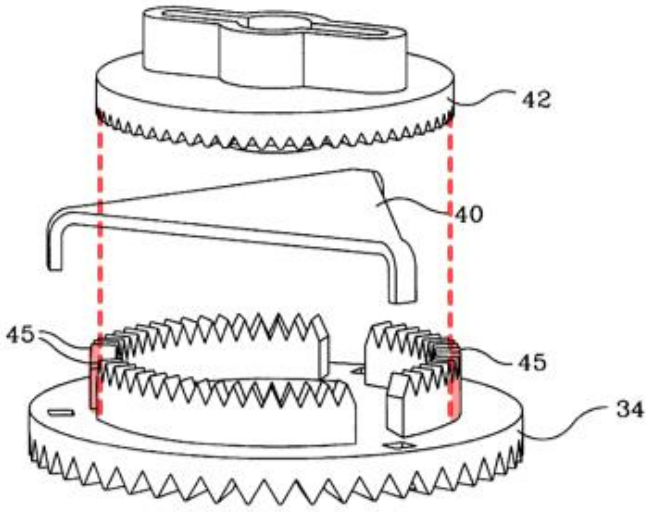


FIG. 8

C. Claim 3 Would Have Been Obvious Over McAllister-I In View of Laverriere

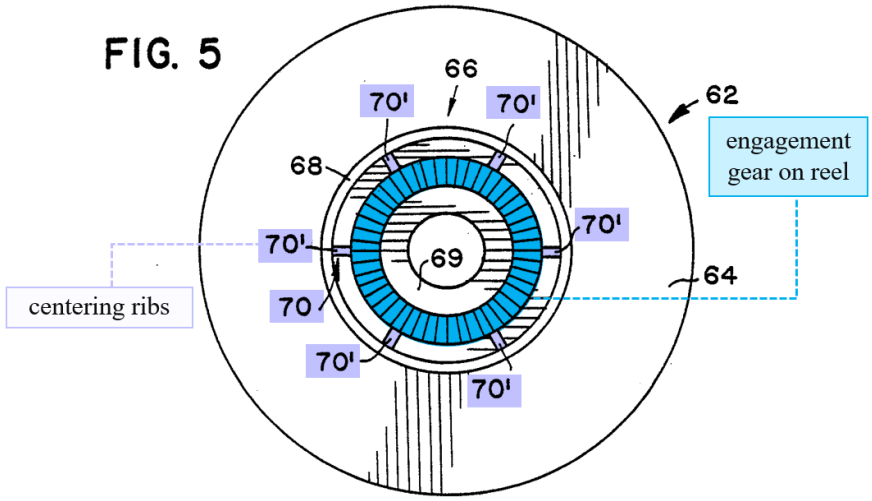
1. Reasons for Modifying McAllister-I In View of Laverriere

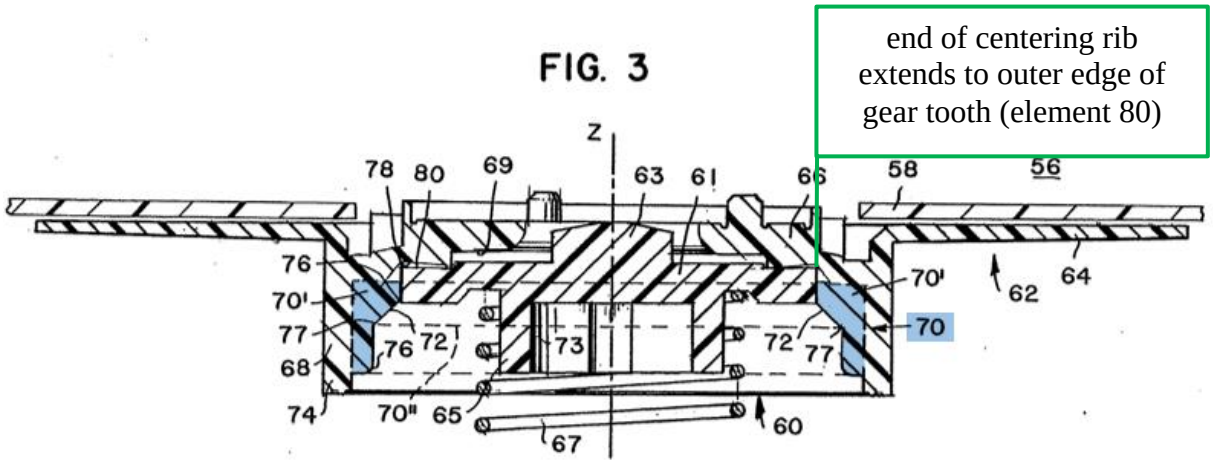
248. As discussed in Section IX.A.1, a POSA would have had reasons to modify the McAllister-I reel hub to include Laverriere's centering ribs on its inner surface. While Section IX.A.1 focused on the first McAllister-I embodiment which uses locking posts 44 as the engagement mechanism on the reel, my reasoning applies equally to the third McAllister-I embodiment which replaces the three locking posts 44 with three partial gear teeth 45. As I explained in Section IX.B.1, the only difference between the first and third McAllister-I embodiments is the engagement mechanism on the reel, thus a POSA would have had the same reasons to modify the McAllister-I reel hub to include Laverriere's centering ribs regardless of which McAllister-I embodiment the POSA was designing.

249. In modifying the McAllister-I reel hub to include Laverriere's centering ribs on its inner surface, a POSA would have designed the ribs to end where the locking posts 44 (first embodiment) or gear teeth 45 (second and third embodiments) begin as this was the design disclosed in Laverriere.

250. As seen below, Laverriere's centering ribs (element 70) extend to the outer diameter of a gear (blue below) on the bottom of the reel hub. Laverriere at 1:22-23 (describing the hub as having "teeth" that "interlock" with the gear on the bottom of the brake button); FIGS. 1, 4 (depicting gear on bottom of brake button),

FIG. 3 (depicting centering rib 70 extending to the outer diameter of element 80 which is depicted as a gear tooth on the bottom of the reel hub):





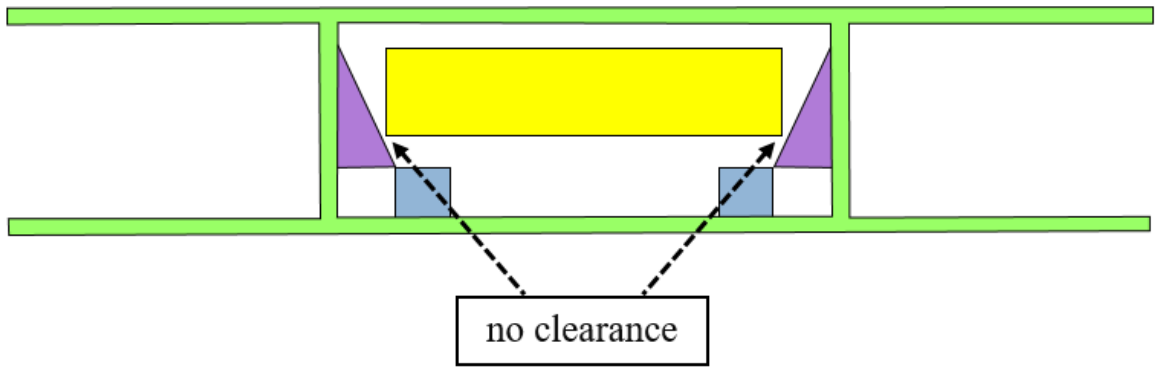
251. Given that it is the design depicted in Laverriere, a POSA would have had a reason to design the McAllister-I/Laverriere reel such that the centering ribs ended where the outer diameter of the locking posts or gear teeth 45 begin.

252. Having formed the Laverriere centering ribs to end at the outer diameter of the locking posts 44 or gear teeth 45, a POSA would have known that

the outer diameter of locking gear 42 (and thus locking gear teeth 48) must be less than the outer diameter of locking posts 44 or gear teeth 45 to ensure that the locking gear could engage the posts/gear.

253. A POSA would have known that when the ends of the centering ribs extend to the outer diameter of the locking posts 44 / gear teeth 45 then the outer diameter of the locking gear 42 (and thus locking gear teeth 48) cannot be larger than the outer diameter of the locking posts 44 / gear teeth 45 because the locking gear would be too wide to enter into the space between the ribs. This is visually depicted below:

Outer Diameter of Locking Gear (Yellow) Is Larger Than Outer Diameter of Locking Posts or Gear Teeth (Blue)



254. Moreover, given manufacturing tolerances, a POSA would know that the locking gear's outer diameter could not be equal to the outer diameter of the locking posts. Even if the outer diameters were designed to be equal, typical manufacturing tolerances would create the potential for the locking gear's outer

diameter to be inadvertently manufactured larger than the outer diameter of the locking posts / gear teeth thus causing the same clearance problem identified in the image above.

255. Therefore, having modified McAllister-I to include Laverriere's ribs, a POSA would have dimensioned locking gear 42 (and thus necessarily its lock gear teeth 48 as well) such that its outer diameter was less than the outer diameter of the locking posts, thereby ensuring that they consistently engaged. That McAllister-I depicts such a dimensional relationship between the two components (*supra* Section IX.B), would have given a POSA further reason to dimension the braking member in this manner.

2. Limitation-By-Limitation Analysis

a. Claim 3, Preamble and Limitations 3a to 3d

256. McAllister-I discloses the preamble and limitations [a]-[d] of claim 3 for the same reasons discussed in Section IX.B.2 which also addressed claim 3.

b. Claim 3, Limitation 3e

257. Limitation 3e requires "the outer diameter of the engagement gear being larger than that of the braking gear." As discussed in Section IX.C.1, once a POSA modified the McAllister-I cartridge to include Laverriere's centering ribs, a POSA would have appreciated the need to ensure that the diameter of the locking gear 42 (and thus its locking gear teeth 48 as well) was less than the outer diameter of the gear teeth 45. Indeed, as I explained in IX.B.2.c, McAllister-I already

depicts this diameter relationship between the two components. Once modified such that the outer diameter of locking gear 42 and locking gear teeth 48 was less than the outer diameter of gear teeth 45, the modified McAllister-I reel discloses element 3[e].

D. Claim 4 Is Anticipated by McAllister-I

1. Patent Owner's Concessions Concerning McAllister-I

258. I understand from counsel for Sony that the Patent Owner (Fujifilm) filed a patent application in Europe—EP20000124448. I have reviewed the prosecution history from that application. Ex-1009.

259. The application describes the same "invention" described in the '905 patent and it originally included a claim 4 that is identical to claim 4 of the '905 patent. Ex-1009 at 35-37. A comparison of the two claims is provided in Ex-1016. As is apparent from that comparison, the original European claim and claim 4 of the '905 patent both include the Braking Gear Angle Limitation that I discussed above in Section V.C.

260. European claim 4 was rejected over Morita-II. Ex-1009 at 52, (identifying Morita-II as D1), 53 (rejecting claim 4 over D1). McAllister-I was also cited and identified as a basis for rejecting then-pending European claim 1. Ex-1009 at 52, (identifying McAllister-I as D4), 53 (rejecting claim 1 over D4).

261. In response to the rejections, the applicants amended European claim 4 by narrowing the Braking Gear Angle Limitation such that it no longer allowed α to equal β, and instead required that α be less than β. Ex-1009 at 61 (new claim 1 reciting "wherein an interior angle (α) between the first inclined surface (42a) and a vertical (S) is smaller than an interior angle (β) between the second inclined surface (42b) and the vertical (s)"); Ex-1009 at 64 ("The applicant has replaced a first feature 'the interior angle between the first inclined surface and the vertical being not larger than the interior angle between the second inclined surface and the vertical' by '… is smaller …'"); Ex-1025 (redline comparison of original European claim 4 and amended European claim).

262. In making their revision to the Braking Gear Angle Limitation, the applicants argued that requiring α to be less than β distinguished the claim not only from Morita-II but also from McAllister-I which the applicants explained "clearly show[s]" a braking gear with "equally inclined abutment surfaces," i.e., α is equal to β. Ex-1009 at 59; *see also* Ex-1009 at 70, 91. The amended claims were subsequently allowed. Ex-1009 at 131.

263. In my view, the Patent Owner's statements during prosecution of the related European application that McAllister-I "clearly show[s]" a braking gear with "equally inclined abutment surfaces" is a concession that McAllister-I discloses gear teeth in which first and second inclined surfaces create angles with

the vertical (i.e., α and β) that are equal to each other. This concession is unsurprising given the figures of McAllister-I disclose such a gear tooth profile.

2. Limitation-by-Limitation Analysis

a. Claim 4, Preamble and Limitations 4a to 4d

264. As the chart I created above in Section V.C. shows, the preamble and limitations [a]-[d] of claim 4 are identical to the preamble and limitations [a]-[d] of claim 1. Therefore, McAllister-I discloses the preamble and limitations [a]-[d] of claim 4 for the same reasons discussed in Section IX.A.2 which addressed claim 1.

b. Claim 4, Limitation 4e

265. As I explained in Section V.C, limitation 4e is the Braking Gear Angle Limitation. As Patent Owner conceded during European prosecution, McAllister-I depicts the gear teeth on its locking gear 42 as having equal inclined surfaces, such that α is equal to β. In McAllister-I, the equal angles α and β together form an apical angle 90° or less as shown below:

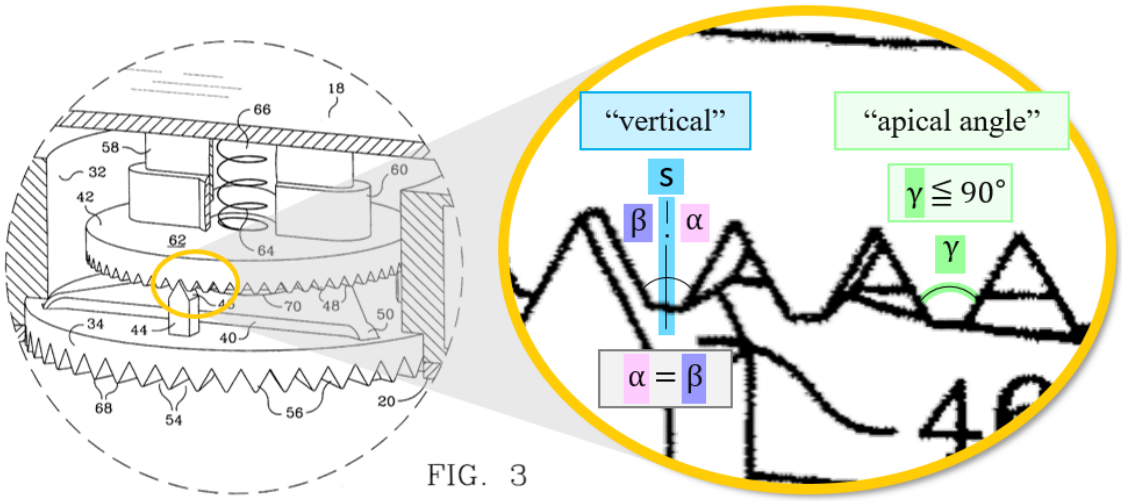


FIG. 3

266. That the apical angle α and β form is 90° or less is apparent from the figure—it's not an obtuse angle. Moreover, McAllister-I explains that its gear teeth can be "sharp angled." McAllister-I at 4:27-28. A "sharp" angle is another term for an acute angle, i.e., an angle that is less than 90°.

267. Patent Owner also did not contest whether McAllister-I disclosed an apical angle 90° or less during European prosecution. This is unsurprising not only because of the McAllister-I figures and its disclosure of "sharp" angled teeth, but also because a POSA would have known that gear teeth designed to withstand torque—like the gear teeth on a **locking** gear—would typically have an apical angle well less than 90°.

268. For example, Ex-1021 is an article that discusses a fixed "Curvic"[7] coupling which is a "precision face spline for joining two members … to form a single operating unit." Ex-1021 at 1. As the article explains, fixed Curvic couplings are used in a wide-variety of applications from aircraft engines to "precision indexing mechanisms." Ex-1021 at 1-2. Although locking gear 42 and locking posts 44 do not form a conventional fix Curvic coupling (because the locking posts each has a single gear tooth rather than a continuous set of gear teeth) and they are much smaller components than those described in Ex-1021, they are both face gears and the same physics that apply to a fixed Curvic coupling also apply to locking gear 42 and locking posts 44. As with a fixed Curvic coupling, the locking gear 42 and locking posts 44 are designed to "couple" together to form a "single operating unit," one that prevents the reel from rotating in the context of McAllister-I.

269. The article notes that the "most practical" pressure angle for the tooth of a fixed Curvic coupling is 30° though if "special design conditions require it," the angle can be as low as 10° or as high as 40°. Ex-1021 at 7. A pressure angles, also referred to as a flank angle, determines the line of the resultant force acting

[7] The "curvic" name refers to the fabrication milling process making the ridges of the gear teeth curved rather than straight.

between the mating gears. The pressure angle referenced in Ex-1021 corresponds to the α and β angles recited in claim 4.

270. Thus, the article shows that a "most practical" symmetrical gear tooth design would have α and β angles that both equal 30°, thus forming an apical angle between them less than 90°. Even in the most extreme scenario identified in the article, α and β would equal 40° and thus still form an apical angle between them less than 90°.

271. As Ex-1021 demonstrates, gear teeth with apical angles greater than 90° were not common, while teeth with apical angles less than 90° were considered "most practical" and "the standard" for coupling applications. Ex-1021 at 7. A POSA would have known this and thus would understood that the teeth on locking gear 42—as depicted and described in McAllister-I—form a "sharp" apical angle less than 90°.

272. Moreover, a POSA would have understood that the smaller the apical angle the more robust a locking mechanism the brake gear would have provided. This knowledge would have reinforced a POSA's interpretation of Figure 3 as disclosing an apical angle less than 90° since the purpose of the locking gear 42 is to brake the reel. McAllister-I at 3:57-61.

273. A gear tooth with an apical angle **greater** than 90° is less likely to "prevent rotation of the reel" than a gear tooth with an apical angle **less** than 90°.

The steeper the tooth surfaces (i.e., the smaller the apical angle), the more torque the gear can resist and the better brake it creates. Gears with apical angles greater than 90° are designed to slip, i.e., not brake. For example, the noise makers used during New Years' Eve include gears with large apical angles because the gears are designed to slip in order to make noise.

274. Given the well understood benefit to designing brake gears with small apical angles, a POSA would have understood that the gear teeth on the McAllister-I locking gear 42 had apical angles 90° or less. As shown above, the figures themselves confirm this understanding.

E. Claim 4 Would Have Been Obvious Over McAllister-I in View of McAllister-II

1. Reasoning for Modifying McAllister-I in view of McAllister-II

275. McAllister-II teaches that using "ramp shaped" teeth on a braking gear and engagement gear, like locking gear 42 and locking posts 44 of McAllister-I, is "preferabl[e]" because it ensures that "rotation of the reel [] in an unwind direction is blocked." McAllister-II, 3:11-16. As the primary purpose of locking gear 42 is to avoid the problem in the prior art where "it is possible for the reel[] to rotate idly and cause the tape to lose tension and become partially unwound from the reel" (McAllister-I at 1:21-24), a POSA would have had a

reason to select the "ramp shaped" teeth design of McAllister-II to ensure that the McAllister-I reel did not "rotate idly."

276. The ramp shaped tooth design described McAllister-II was well-known as of 1999. As shown below, a ramp shaped tooth, also known as a sawtooth, allows for a gear to withstand significantly greater torque in the direction facing the steeper of the two teeth surfaces.

277. The inclined surface that can withstand more torque typically has an angle between it and the vertical that is near 0°, but a POSA would have known that it would preferably not be exactly 0° to provide for a draft angle to ensure that the gear could be removed from a mold during manufacturing. As McAllister-II suggests (3:41), the teeth on locking gear like those shown in McAllister-II or McAllister-I are typically plastic and thus would have been mass manufactured using injection molding techniques in which a draft angle would be needed to aide in removal of the gear from the mold. Based on my past experience in the manufacture of molded parts, a draft angle of 0.5 to 2° is typical.

278. As seen in my exemplary ramp shaped tooth above, the apical angle that the first and second inclined surfaces form between themselves is well below

90°. If the apical angle between the two surfaces was greater than 90°, the tooth would no longer be a ramp, it would resemble a step and would no longer "brake" the reel.

279. In addition to the explicit reason McAllister-II provides using its ramp shaped tooth design with the locking gear 42 of McAllister-I, adding McAllister-II's tooth design to the teeth of the McAllister-I locking gear 42 would also have involved no more than applying a known technique (ramp shaped teeth) to a known device (a conventional cartridge like McAllister-I) ready for improvement to yield a predictable result (a conventional cartridge in rotation of the reel in an unwind direction is blocked).

280. Likewise, using McAllister-II's configuration required only using a known technique (ramp shaped teeth) that had improved one device (the McAllister-II conventional cartridge) to improve a similar device (the McAllister-I conventional cartridge) in the same way (ensuring rotation of the reel [] in an unwind direction is blocked).

281. Incorporating the McAllister-II teeth would have been within the skills of a POSA. McAllister-II suggests that POSAs at Hewlett-Packard had already incorporated such teeth into the cartridge disclosed in McAllister-I. Specifically, McAllister-II states:

> FIGS. 1 through 4 depict a single reel tape cartridge which was developed by the Hewlett-Packard Company, and which is the subject

> of the pending patent applications referenced at the beginning of this document.

McAllister-II at 5:3-7.

282. The "pending patent applications referenced at the beginning" of McAllister-II include "U.S. utility patent application Ser. No. 09/033,352, filed on Mar. 2, 1998," which is McAllister-I. McAllister-II therefore indicates that POSAs at Hewlett-Packard had already used the ramp shaped gear tooth design disclosed in McAllister-II on locking gear 42 of McAllister-I.

283. Finally, while McAllister-II cautions that "at least one of" either the locking gear or engagement gear "must have a full complement of equally-spaced teeth" (McAllister-II at 3:15-16), all three embodiments in McAllister-I depict locking gear 42 as having a full complement of equally-spaced teeth. McAllister-I, FIGS. 1-9 (element 42). A POSA would have recognized that McAllister-I's locking gear 42 was a suitable gear upon which to implement the teachings of McAllister-II.

2. Limitation-By-Limitation Analysis

a. Claim 4, Preamble and Limitations 4a to 4d

284. As the chart I created above in Section V.C. shows, the preamble and limitations [a]-[d] of claim 4 are identical to the preamble and limitations [a]-[d] of claim 1. Therefore, McAllister-I discloses the preamble and limitations [a]-[d] of claim 4 for the same reasons discussed in Section IX.A.2 which addressed claim 1.

b. Claim 4, Limitation 4e

285. As I explained in Section V.C, limitation 4e is the Braking Gear Angle Limitation. McAllister-II depicts gear teeth on a locking gear that are ramp shaped such that α is close to 0° while β is greater than α yet substantially below 90°. The image below shows the ramp shaped tooth design described in McAllister-II with α, β and the vertical (S) identified:

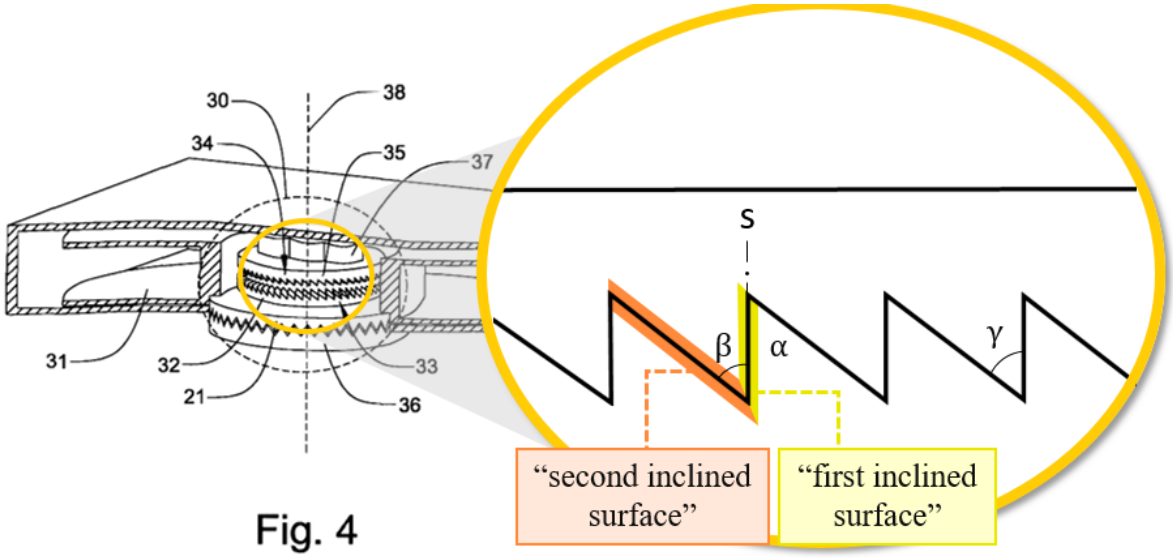


Fig. 4

286. As seen in Figure 4 of McAllister-II (above), teeth 34 on locking gear 35 have a first and second inclined surface which are brought into abutment against inclined surfaces of teeth 33 on gear 32 when the reel is rotated in a winding or unwinding direction.

287. As seen above, the interior α angle between the first surface and the vertical S (i.e., close to 0°) is less than the interior β angle between the second surface and the vertical. While close to 0°, a POSA would have known that α was

at least a degree or two greater than 0° because a draft angle would have been needed to ensure that the gear could be removed from a mold after an injection molding process—a common way to mass manufacture gears like those shown in McAllister-II and McAllister-I.

288. Moreover, the total apical angle between the two surfaces is not greater than 90° because a ramp-shape tooth is designed like a ramp with one inclined surface having a degree of incline close to zero while the other surface has a degree greater than zero but well less than 90°. If the included angle of the second surface approached 90°, the height of the tooth would be diminished, and the reduced tooth would no longer be able to effectively "brake" the reel.

289. Once modified to incorporate a ramp-shaped design, locking gear 42 in McAllister-I would have satisfied the Braking Gear Angle Limitation. The "first inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-unwinding direction with the braking gear and the engagement gear tooth in mesh with each other," is the steep surface of the ramp shaped tooth as depicted above. A POSA would have placed the steeper surface facing the un-winding direction in order to ensure that "rotation of the reel [] in an unwind direction is blocked." McAllister-II, 3:11-16. The "second inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-winding direction with the braking gear and the

engagement gear tooth in mesh with each other," is the less steep surface of the ramp shaped tooth as depicted above.

290. "The interior angle between the first inclined surface and the vertical," i.e., α, is, as recited in the claim, "not larger than the interior angle between the second inclined surface and the vertical," i.e., β. This is also depicted above. Finally, "the first and second inclined surfaces forming there between an apical angle not larger than 90°," as also depicted above.

F. Claim 3 Is Anticipated by Mizutani

1. Limitation-By-Limitation Analysis

a. Claim 3, Preamble

291. The preamble to claim 3 recites: "[a] magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." Mizutani discloses each element of the preamble.

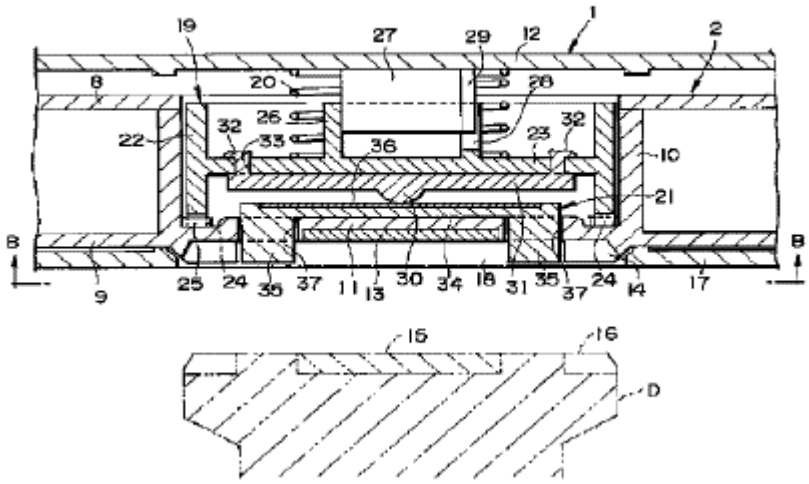
i. "a magnetic tape cartridge comprising…"

292. Mizutani discloses, as recited in the preamble, a "magnetic tape cartridge." Indeed, this is the title of Mizutani: "Single Reel Type Magnetic Tape Cartridge." *See also* Mizutani ¶7 ("The magnetic tape cartridge in the present invention…"), ¶15 ("Fig. 1 to Fig. 4 show one embodiment of a single reel type

magnetic tape cartridge…"), claim 1 ("In a magnetic tape cartridge with one tape reel 2 rotatably houses in the interior of a main body case 1….").

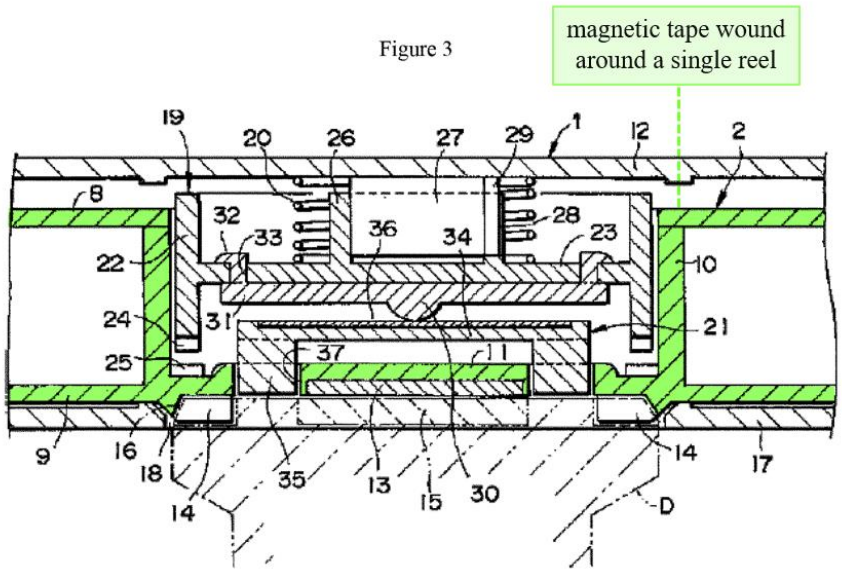
293. The cartridge is depicted below in Figure 1 of Mizutani:

Figure 1



ii. "magnetic tape wound around a single reel"

294. The Mizutani cartridge includes, as recited in the preamble, a "magnetic tape wound around a single reel." As seen in Figure 3 (below), within the cartridge is a "tape reel 2" (highlighted in green) and "magnetic tape3 … is wrapped around" that reel. Mizutani ¶15.

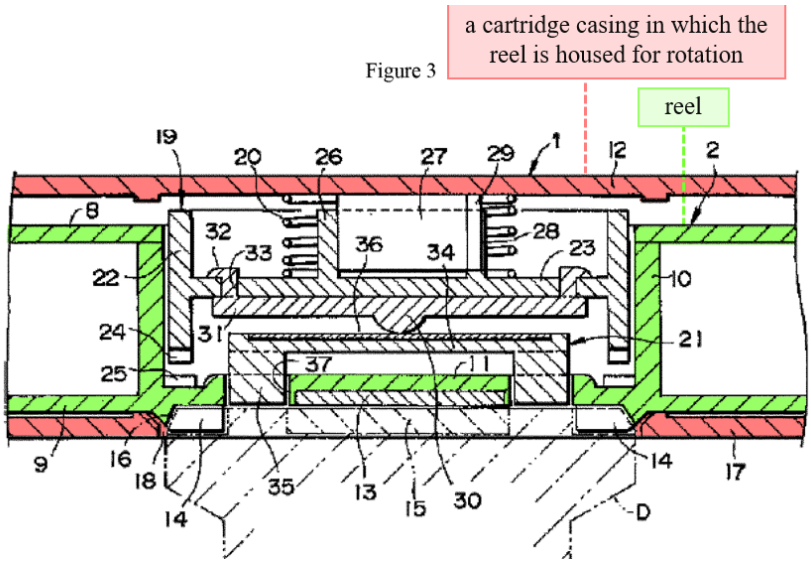


iii. "a cartridge casing in which the reel is housed for rotation"

295. The Mizutani cartridge comprises, as recited in the preamble, "a cartridge casing in which the reel is housed for rotation." Specifically, the magnetic tape cartridge includes a "tape reel 2 rotatably housed in a main body case 1." *Id.* ¶7; *see also* ¶15 ("In Fig. 2, the magnetic tape cartridge houses one tape reel 2 in the interior of a rectangular box shaped main body case 1…"), claim 1 ("In a magnetic tape cartridge with one tape reel 2 rotatably houses in the interior of a main body case 1…."),

296. Below I have highlighted in red "body case 1" to demonstrate that the Mizutani cartridge includes, as recited in the preamble, "a cartridge casing in which the reel is housed for rotation":

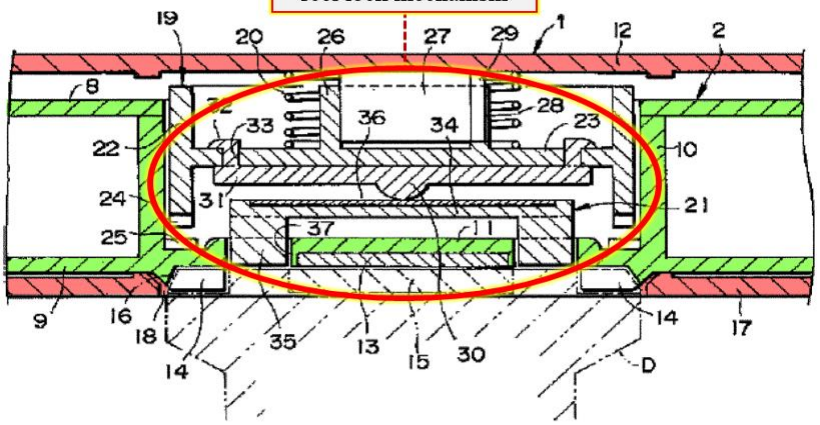
Figure 3



iv. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"

297. The Mizutani cartridge comprises, as recited in the preamble, "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." As seen in Figure 3 (below), the cartridge has a "reel lock mechanism" that meets the claimed "reel stopper means."

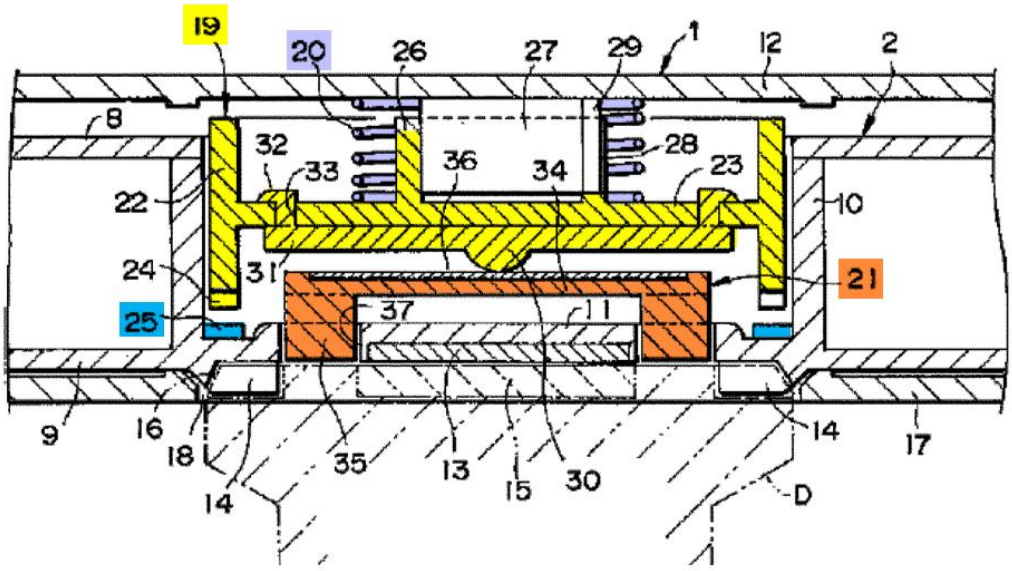
Figure 3



298. The Mizutani reel lock mechanism comprises several components that lock the reel in place when the tape is not in use and permit rotation of the reel when it is used. These components include "a lock member 19," "a spring 20," and "a lock release member 21 disposed between the lock member 19 and the hub bottom wall 11 inner top surface." Mizutani ¶7, ¶17, FIGS. 1, 3. The lock member includes "lock teeth 24" around its entire bottom circumference that engage with "lock teeth 25 provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11." Mizutani ¶7, ¶18, FIGS. 1, 3. Mizutani explains that lock member 19 is moveable in only direction (up and down) and cannot rotate because its "cylindrical slide boss 26" interlocks with a "guide protrusion 27" on the top of the cartridge casing. Mizutani ¶19.

299. These reel lock mechanism components are highlighted below in Figure 3—lock release member 21 (orange), lock member 19 and its cylindrical slide boss 26 (yellow), lock teeth 25 on the reel (blue), and spring 20 (purple):

Figure 3



300. With respect to the operation of the reel lock mechanism, Mizutani explains that when the cartridge is not in use, the spring exerts downward pressure on the lock member, which forces its lock teeth 24 into engagement with the reel lock teeth 25, thereby locking the reel in place. Mizutani ¶7, ¶11, ¶20, ¶25, FIG. 1. When the cartridge is inserted into a tape drive, the drive pushes the lock release member up, causing it to push the lock member up, which disengages lock teeth 24 from lock teeth 25, permitting the reel to rotate. Mizutani ¶11, ¶26, FIG. 3.

301. The reel lock mechanism therefore locks the reel in place when the tape is not in use and permits rotation of the reel when it is inserted into a tape drive. Mizutani, ¶7 ("[A] reel lock mechanism for preventing free rotation of the tape reel 2 during non-use."), ¶16 ("A reel lock mechanism for preventing free

rotation of the tape reel during non-use…"), ¶17 (discussing components of reel lock mechanism), ¶25 (describing how components function together such that "tape reel 2 in non-use status can be locked with rotation disabled"), ¶26 (describing how components "releas[e] the reel lock status" and permit the reel to be "rotatable"), claim 1 ("a reel lock mechanism which prevents free rotation of the tape reel 2 during non-use"). The Mizutani reel lock mechanism therefore performs the claimed function of the "reel stopper means," i.e., locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used.

302. As discussed in Section VI.A.2, the structure corresponding to the "reel stopper means" are the structures corresponding to the "braking member," "urging member," and "releasing member" recited in claim 3. As I explain below with respect to limitations [a]-[d], the Mizutani reel lock mechanism uses the same structures disclosed in the '905 patent for performing the claimed functions of the "braking member," "urging member," and "releasing member," and thus it uses the same structures disclosed in the '905 patent to perform the claimed function of the "reel stopper means."

303. As it performs the claimed function of the "reel stopper means," and does so using the same structures as those disclosed in the specification of the '905

patent for performing the claimed function, the reel lock mechanism of Mizutani meets the "reel stopper means" of claim 3 under the BRI of that term.

b. Claim 3, Limitation 3a

304. Limitation 3a requires that "the reel stopper means comprises a braking member which is movable between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same."

305. Mizutani's "reel stopper means," i.e., reel lock mechanism, includes "**lock member 19**" that satisfies the "braking member" element of limitation 1a.

i. "braking member": function

306. As explained in Section VI.B.1, the function of the "braking member" is: "moves between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same." Lock member 19 performs this function.

307. First, lock member 19 restricts rotation of the reel by moving to a locking position in contact with the reel. When the Mizutani cartridge is not installed in a tape drive, a spring applies pressure on the lock member causing it to prevent "rotation of the tape reel" by having its "lock teeth 24 engaging with the lock teeth 25 in the hub 10." Mizutani ¶20; *see also* ¶8 ("[L]ock teeth 24 and 25 … mutually engage protrusions and recesses to prevent rotation of the tape reel."),

¶11 ("During non-use, as shown in Fig. 1, the tape reel 2 is engaged via the lock teeth 24 and 25 with the lock member 19 which energized downward by the spring 20, and is thus held with rotation disabled."), ¶25 ("[T]he lock teeth 24 and 25, provided to the lock member 19 and the hub bottom wall 11, are mutually engaged. Therefore, the tape reel 2 in non-use status can be held locked with rotation disabled."), claim 1 ("on the bottom end surface of the cylindrical body 22 [of lock member 19] and the inner top surface of the hub bottom wall 11, lock teeth 24 and 25, which mutually engage protrusions and recesses to prevent rotation of the tape reel 2").

308. Second, lock member 19 permits rotation of the reel by moving to a releasing position away from the reel. When the cartridge is installed in a tape drive, a lock release member "pushes the lock member 19 upward in opposition to the spring, mutually separating the lock teeth 24 and 25 that were thus far engaged, releasing the reel lock status." *Id.*, ¶26; *see also id.* ¶11 ("[When] the lock member 19 is pressed upward in opposition to the spring 20, the lock teeth 24 and 25 mutually separate, and the reel lock status is released.").

309. Lock member 19 therefore performs the claimed function of the "braking member."

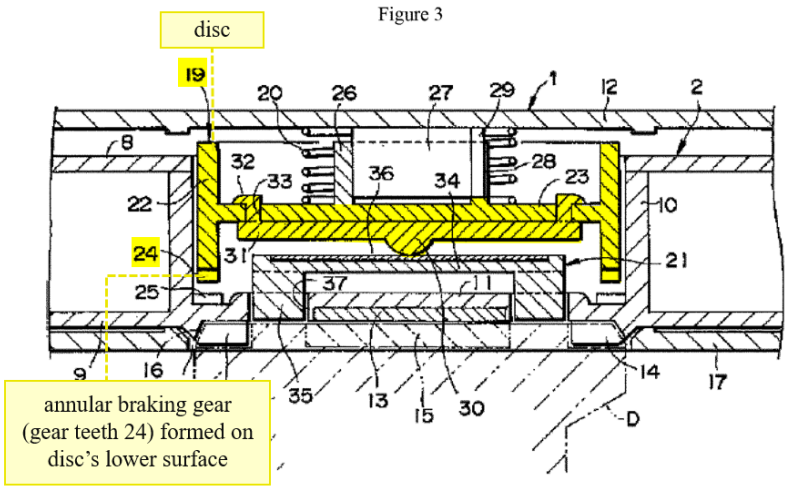
ii. "braking member": structure

310. As explained in Section VI.B.1, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "braking member" is:

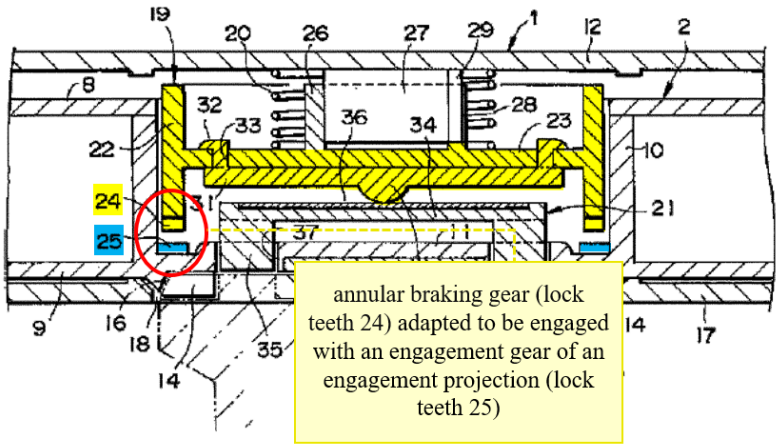
> **(1)** a disc with an annular braking gear formed on its lower surface,
>
> **(2)** the braking gear adapted to be engaged with an engagement gear tooth [teeth] on an engagement projection formed on the reel, and
>
> **(3)** a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing.

311. Lock member 19 uses these same structures to perform the claimed function as the "braking member" of the '905 patent.

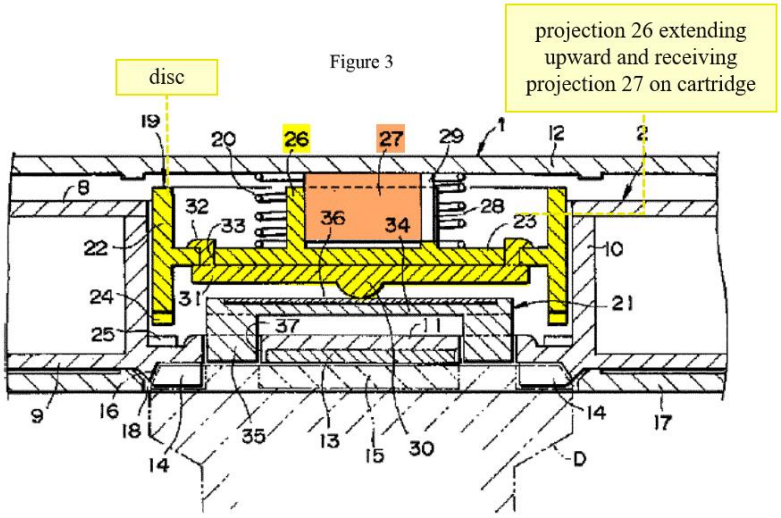
312. First, lock member 19 comprises "a disc with an annular braking gear formed on its lower surface." As described in Mizutani, lock member "has a cylindrical body 22 … in concentric circle form." Mizutani ¶18; *see also* claim 1 ("the lock member 19 having a cylindrical body 18 … in concentric circle form"). A cylindrical body is a disc. Moreover, "lock teeth 24" are provided "around the entire circumference of the bottom end of the cylindrical body 22." Mizutani ¶18; *see also* claim 1 ("providing on the bottom end surface of the cylindrical body 22 .. lock teeth 24…"). Therefore, the cylindrical body has an annular braking gear formed on its lower surface.

"Braking Member" Structure	Disclosure in Mizutani
(1) a disc with an annular braking gear formed on its lower surface	

313. Second, the braking gear of lock member 19, i.e., lock teeth 24, is "adapted to be engaged with an engagement gear on an engagement projection formed on the reel." Mizutani explains that "lock teeth 24 engage with lock teeth 25 provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11." Mizutani ¶18; *see also* claim 1 ("lock teeth 24 and 25 which mutually engage"). As I explain below in Section IX.F.1.d, lock teeth 25 are an engagement gear on an engagement projection formed on the reel. That lock teeth 24 and 25 engage with each other is depicted in Figure 3 below:

"Braking Member" Structure	Disclosure in Mizutani
(2) the braking gear adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel	Figure 3 

314. Third, lock member 19 has "a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing." Mizutani explains that lock member 19 has a "slide boss 26" that is "externally fitted to a guide protrusion 27" on the upper half of the cartridge and "is linked and guided by the guide protrusion 27 such that vertical sliding is enabled, but relative rotation is disabled." Mizutani ¶19. Below I have highlighted guide protrusion 27 in orange:

"Braking Member" Structure	Disclosure in Mizutani
(3) a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing	

315. As it performs the claimed function of the "braking member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, lock member 19 of Mizutani meets the "braking member" of claim 3 under the BRI of that term.

c. Claim 3, Limitation 3b

316. Limitation 3b requires "an urging member which urges the braking member toward the locking position." Mizutani's cartridge includes a "**spring 20**" that satisfies the "urging member" element of limitation 3b.

i. "urging member": function

317. As explained in Section VI.B.2, the claimed function of the "urging member" is "urges the braking member toward the locking position." Spring 20 performs this function.

318. As explained in Section IX.F.1.b, lock member 19 meets the claimed "braking member." As shown in Figure 3 below, spring 20 applies "downward pushing force" onto lock member 19 to place it into a position that locks the reel. Mizutani, ¶20; *see also* Abstract, claim 1 ("a spring 20 applying downward pushing force on the lock member 19"), ¶7, ¶11 ("the lock member 19 which is energized downward by the spring 20, and is thus held with rotation disabled"), ¶17, ¶25 ("the lock member 19 … is always pushed down by the spring 20").

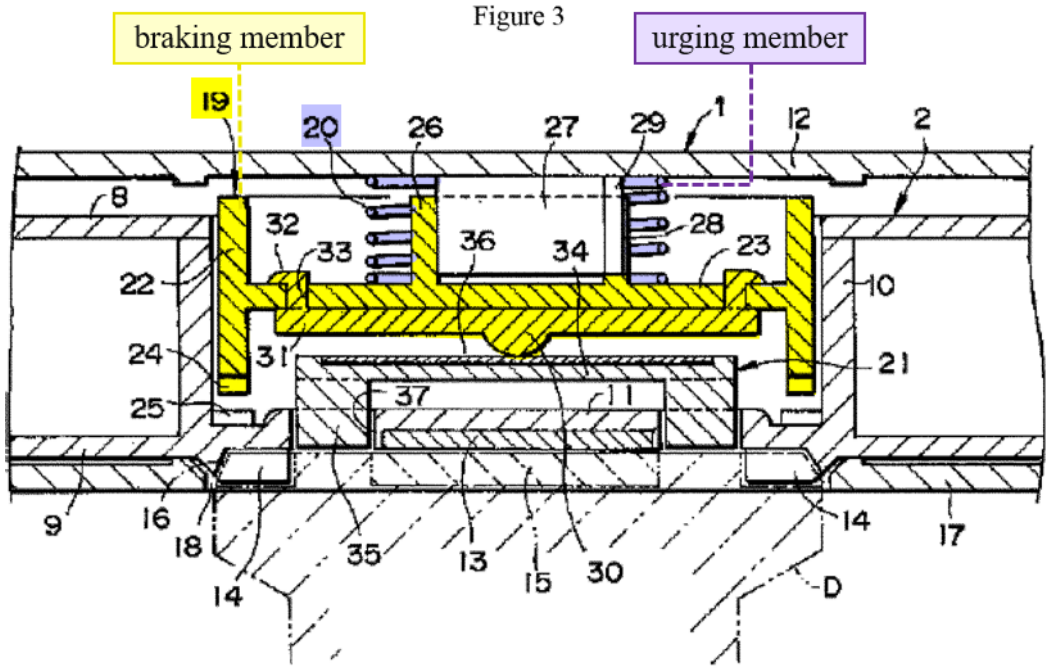
319. Spring 20 therefore performs the claimed function of the "urging member."

ii. "urging member": structure

320. As explained in Section VI.B.2, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "urging member" is: a coiled spring.

321. Spring 20 uses these same structure to perform the claimed function as the "urging member" of the '905 patent. Specifically, Mizutani describes spring

20 as a "compression coil shaped spring." Mizutani ¶17. The Mizutani figures also depict it as a coil as seen below:



322. As it performs the claimed function of the "urging member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, spring 20 of Mizutani meets the "urging member" of claim 3 under the BRI of that term.

d. Claim 3, Limitation 3c

323. Limitation 3c requires "a releasing member which is rotated integrally with the reel and moves the braking member toward the releasing position in response to a reel chucking action of the reel drive means of a tape drive." Mizutani's cartridge includes a "**lock release member 21**" that satisfies the "releasing member" element of limitation 3c.

i. "releasing member": function

324. As explained in Section VI.B.3, the claimed function of the "releasing member" is "moves the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive." Lock release member 21 performs this function.

325. As explained in Section IX.F.1.b, lock member 19 meets the claimed "braking member." When the Mizutani cartridge is installed into a tape drive, "lock release member 21" pushes the lock member 19 "upward in opposition to the spring 20" causing "lock teeth 24 and 25 [to] mutually separate, and the reel lock status is released." Mizutani, ¶11; *see also* ¶26 ("Thus, the lock release member 21 pushes the lock member 19 upward in opposition to the spring 20, mutually separating the lock teeth 24 and 25 that were thus far engaged, releasing the reel lock status."). The lock release member 21 thus performs the first-half of the claimed function: "moves the braking member toward the releasing position."

326. Lock release member 21 also performs the second-half of the claimed function—"…in response to a reel chucking action of the drive gear of a tape drive." Lock release member 21 is pushed upward to release the lock member when its leg pieces 35 are "subjected to an upward push operation of the tape drive shaft D." *Id*., ¶11. Mizutani describes the "upward push operation" in more detail in paragraph 26:

> "During use, loading this into a tape drive will open then shutter 7 and the loading pin 4 is captured by the loading mechanism. Simultaneously, as shown in Figure 3, the tape reel 2 is attracted downward against a magnet 15 on the driveshaft D via the magnetic body 13, and simultaneously **the drive shaft D drive teeth 16 and the tape reel 2 drive teeth 14 are engaged**. When performing this engagement operation, the lock release member 21 leg pieces 35 are thrust upward by the drive shaft D, and are pushed inside the leg piece protrusion holes 37. Thus, the lock release member 21 pushes the lock member 19 upward in opposition to the spring 20, mutually separating the lock teeth 24 and 25 that were thus far engaged, releasing the reel lock status. As a result, the tape reel 2 becomes rotatable and tape extraction or rewind drive can be performed. Thereafter when the drive shaft separates from the tape reel 2, the tape reel 2 stays locked."

Mizutani ¶26. The described "upward push" or "engagement" operation is a chucking action as it brings the gear teeth (i.e., drive teeth 16) of a tape drive into engagement with gear teeth on the reel (i.e., drive teeth 14).

327. The second-half of the claimed function incorporates my proposed interpretation for the phrase "reel drive means." As explained in Section VI.C, the claimed function of the "reel drive means" is driving the reel, and the corresponding structure disclosed in the specification of the '905 patent is a "drive gear."

328. As Mizutani explains, "[d]uring use," when the cartridge is loaded into a tape drive, "the drive shaft D drive teeth 16" engage "the tape reel 2 drive teeth 14." Mizutani ¶26. The reason the drive teeth 16 engage with the reel drive teeth 14 is to drive the reel, i.e., turn it, when the tape cartridge is used. Mizutani ¶16 (describing "rotation force of the drive shaft"), ¶26. The drive shaft D thus

performs the claimed function of the "reel drive means." The "drive shaft D drive teeth 16" also form a drive gear, and thus it is the same structure as that disclosed in the specification of the '905 patent as corresponding to the "reel drive means."

ii. "releasing member": structure

329. As explained in Section VI.B.3, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "releasing member" is "a plate-like body with leg portions extending downward from its lower surface."

330. As seen in Figures 3 and 4 below, lock release member 21 has a circular base 34 and three legs 35 that extend downward from the base. *Id.*, claim 1 ("the lock release member 21 … is provided with a base 34 … and a plurality of same length leg pieces 35 provided protruding downward from the base 34"), ¶9 (same), ¶22 ("The lock release member is molded with a circular base 35 … integrated with a plurality (three shown in the figure) of same length leg pieces 35 which are provided downward from the base 34 bottom surface …. Each leg piece 35 is at an equidistant position from the base 34 bottom surface center, and is provided protruding at mutually equal intervals"), ¶24.

Figure 3

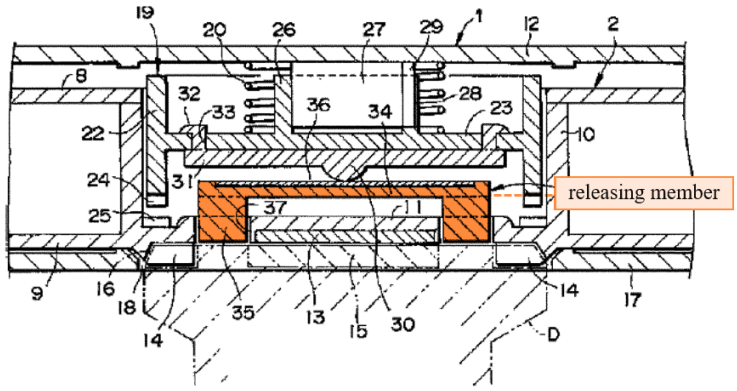
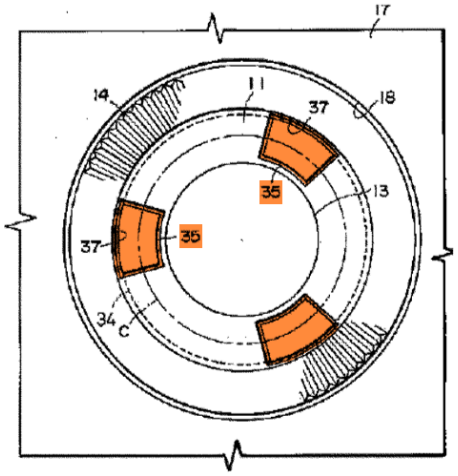


Figure 4



331. As explained in Section VI.B.3, the "releasing member" disclosed in the '905 patent is "substantially triangular," but the BRI of the term is not limited to substantially triangular plate-like bodies. Were the Board to limit "releasing member" to substantially triangular bodies, however, then Mizutani's lock release member 21 is a structure equivalent to the "releasing member."

332. I understand from counsel that structures are equivalent under §112, ¶6 if they are insubstantially different with respect to structure. I further understand that insubstantially different structures perform the identical function, in substantially the same way, with substantially the same result. *Id.* Lock release member 21 and the "releasing member" structure of the '905 patent are equivalents under this test.

333. First, as I explained immediately above in Section IX.F.1.d, the two structures perform the identical function—"moving the braking member toward the

releasing position in response to a reel chucking action of the drive gear of a tape drive."

334. Second, the two structures perform this identical function in substantially the same way. Both structures, in response to the cartridge entering a tape drive, press up on a braking member to overcome downward pressure from a spring. *Compare* Mizutani ¶11, ¶26 *with* '905 Patent at 7:36-48. Both structures generate the upward pressure using legs which a tape drive pushes up when the cartridge is used. *Compare* Mizutani ¶11, ¶26; '905 Patent at 7:36-48. In both structures, the base, whether it be circular or triangular, is the surface that directly applies pressure to the "braking member." *Compare* Mizutani ¶11, ¶26, FIG. 3; *with* '905 Patent, 7:36-48, FIG. 2.

335. Third, the structures achieve substantially the same result: the downward pressure from a spring is overcome and the "braking member" is disengaged from engagement projections on the reel. *Compare* Mizutani ¶11, ¶26 *with* '905 Patent at 7:36-48. The two structures thus perform the identical claimed function in substantially the same way, with substantially the same result.

iii. "rotated integrally with the reel"

336. Mizutani discloses that lock release member 21 "simultaneously rotat[es]" with the reel. Mizutani ¶13. Thus, the lock release member 21 is, as recited in limitation 1c, "rotated integrally with the reel."

e. Claim 3, Limitation 3d

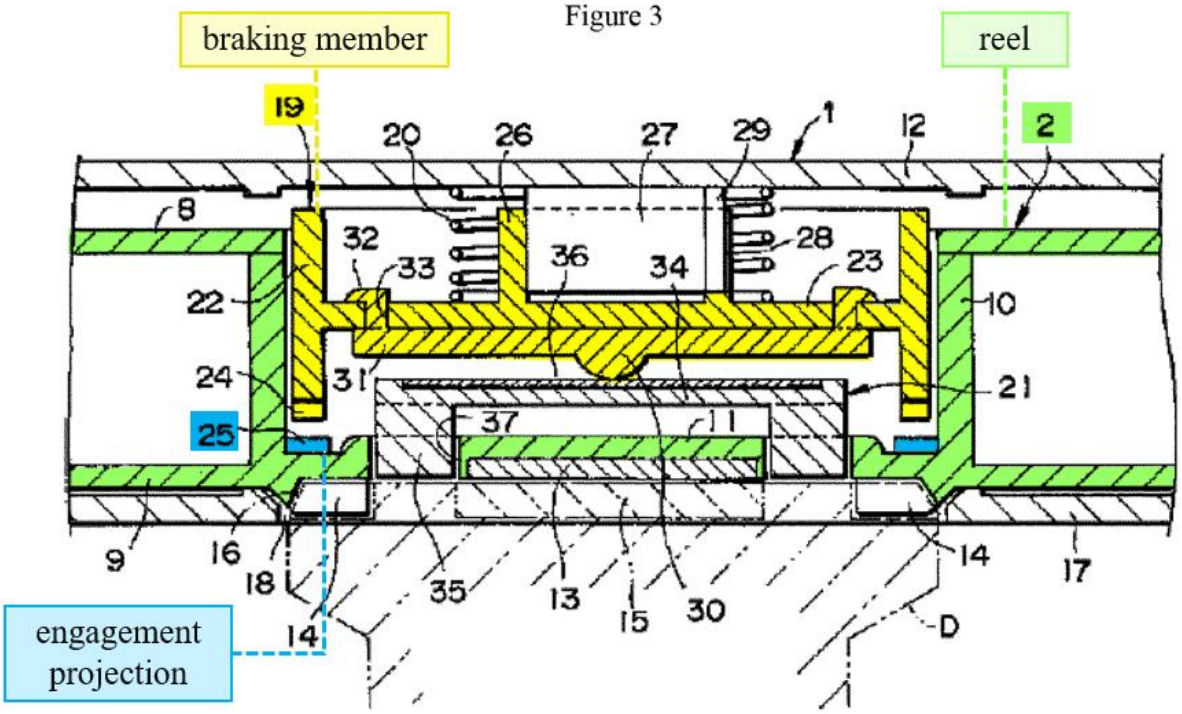
337. Limitation 3d requires that "the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear on an engagement projection formed on the reel."

338. As explained in Section IX.F.1.b, lock member 19 meets the claimed "braking member." It meets the remainder of limitation 3d as well.

339. Lock member 19 includes "lock teeth 24" on its lower surface that "engage with lock teeth 25 provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11." Mizutani ¶18. The engagement between lock teeth 24 and lock teeth 25 restrict rotation of the reel. Mizutani ¶11 ("During non-use … the tape reel 2 is engaged via lock teeth 24 and 25 with the lock member 19 which is energized downward by the spring 20, and is thus held with rotation disabled."), ¶20 ("The lock member 19 prevents rotation of the tape reel by the lock teeth 24 engaging with the lock teeth 25 in the hub 10."), ¶25 ("Further, the lock teeth 24 and 25, provided by the lock member 19 and the hub bottom wall 11, are mutually engaged. Therefore, the tape reel 2 in non-use status can be held locked with rotation disabled."), claim 1 ("providing on the bottom end surface of the cylindrical body 22 [of the lock member 19] and the inner top surface of the hub bottom wall 11, lock teeth 24 and 25, which mutually engage protrusions and recesses to prevent rotation of the tape reel 2.").

340. As seen below in Figure 3, lock teeth 25 project from both the lower surface of the reel hub and its inner wall surface. *Id.*, ¶18 ("[L]ock teeth 25 provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11."), ¶28 ("lock teeth 25 on the hub bottom wall 11"), claim 1. As they project from the reel hub surface, the lock teeth 25 are "engagement projections" as recited in limitation 3d. Moreover, as "teeth [] provided in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11," the teeth form an engagement gear at their ends. Mizutani ¶18. Thus, teeth 25 constitute an engagement gear on an engagement projection formed on the reel.

Figure 3

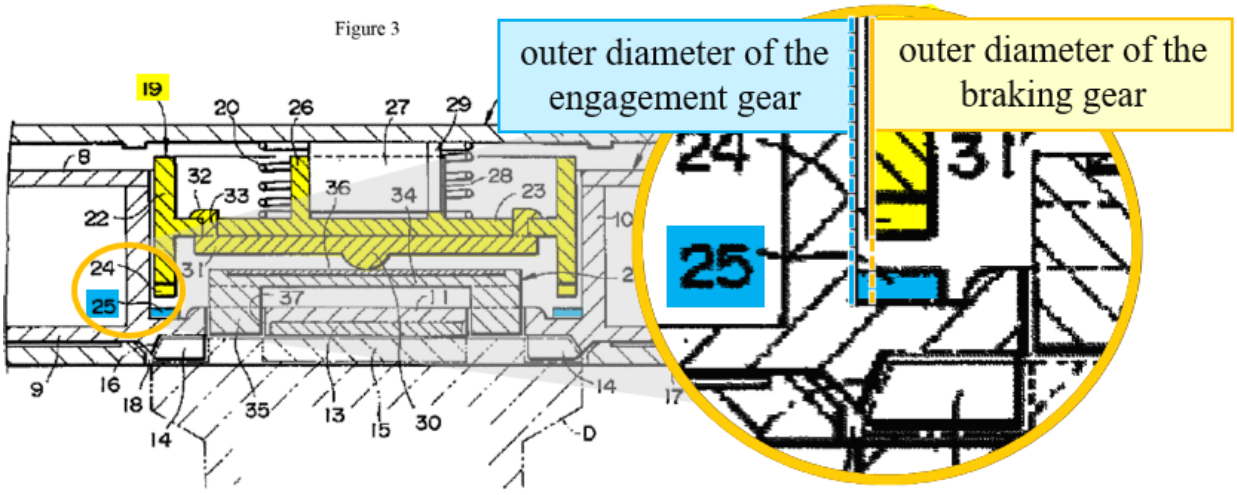


341. Lock member 19 is therefore provided, as recited in limitation 3d, "with a braking gear," i.e., lock teeth 24, "which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear on an engagement projection formed on the reel," i.e., lock teeth 25.

f. Claim 3, Limitation 3e

342. Limitation 3e requires "the outer diameter of the engagement gear being larger than that of the braking gear."

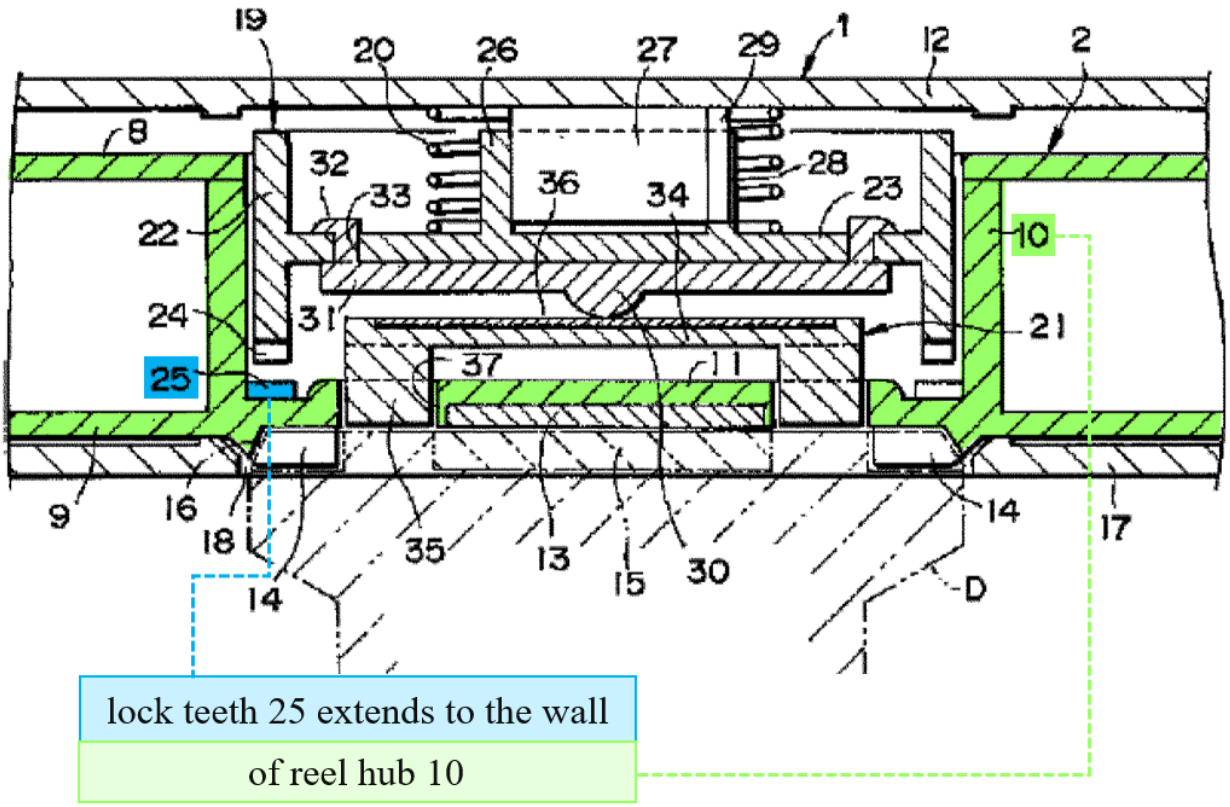
343. As explained above in Section IX.F.1e, the "engagement gear" in Mizutani is the gear teeth on lock teeth 25, while the "braking gear" is lock teeth 24. As shown in, for example, Figure 3 (below) the outer diameter of lock teeth 25 is larger than that of lock teeth 24.



344. A POSA would have understood Figure 3 to disclose that the OD of lock teeth 25 is larger than the OD of lock teeth 24. Mizutani explains that lock

teeth 25 are "provided in a radiating manner in the **outer perimeter area** of the top surface of the hub bottom wall 11." Mizutani ¶18. As seen in the Mizutani figures (one of which, FIG. 3, I annotate below), the "outer perimeter area of the top surface of the hub bottom wall 11" is the outer-most area within the hub such that lock teeth 25 extend both from the bottom wall and the inner surface of the hub. Mizutani at FIG. 1, 3 & 5.

Figure 3



345. A POSA would thus have understood the text and figures of Mizutani to disclose that lock teeth 25 extend from the inner surface of the reel hub such that they necessarily extend to the outer-most perimeter of the reel hub.

346. Given the location of lock teeth 25 at the reel hub's outer-most perimeter, a POSA would have interpreted Mizutani to disclose that lock teeth 24 are smaller in diameter than lock teeth 25 because that is the only design that would allow the Mizutani cartridge to function properly. Lock teeth 24 are provided around the bottom end surface of the lock member 19 which moves up and down inside the reel hub. Mizutani ¶8, ¶¶11-12, ¶¶25-27. If lock teeth 24 were equal to or larger in diameter than lock teeth 25, then the lock member 19 would be unable to move inside the reel hub due to friction between the inner surface of the reel hub and the cylindrical body of lock member 19. A POSA would know that in for a cylindrical body (i.e., lock member 19) to move up and down within a stationary cylindrical body (i.e., reel hub 10), the moving body must be smaller in diameter than the stationary body. In engineering terms, a POSA would have known that there need to be a "clearance fit" between the two components. Similarly, such a clearance fit would be needed to ensure that the reel freely rotates about the lock member 19.

347. The use of a clearance fit was a well-known engineering concept in the field of magnetic tape cartridge design. Indeed, Mizutani discusses the need for clearance between two mating components within a tape cartridge. Mizutani ¶5.

G. Claim 3 Would Have Been Obvious in view of Mizutani

348. As explained in Section IX.F, Mizutani discloses a braking gear (lock teeth 24 on lock member 19) with an OD smaller than the OD of its engagement gear (lock teeth 25 on the reel). However, even if it did not explicitly disclose such a dimensional relationship between the two components (it does), designing the Mizutani cartridge such that it had the claimed dimensional relationship would have been obvious to a POSA.

349. Mizutani explains that lock teeth 25 are provided "in a radiating manner in the outer perimeter area of the inner top surface of the hub bottom wall 11." Mizutani ¶18. As seen in Figures 1, 3 and 5, the outer-most diameter of lock teeth 25 extends to the inner wall surface of the reel hub 10. Thus, the inner diameter of the reel hub is also the outer diameter of lock teeth 25.

350. Because the inner diameter of the reel hub is also the outer diameter of lock teeth 25, a POSA would have known that the outer diameter of lock teeth 24 on lock member 19 needed to be less than the outer diameter of lock teeth 25 on the reel in order for the Mizutani cartridge to function properly. Specifically, a POSA would have recognized the need for some amount of clearance between the outer diameter of lock teeth 24 on lock member 19 and the inner surface of the reel hub. Without such clearance, lock member 19 would be restricted from moving up and down within the reel hub and the reel would be restricted from rotating around

the lock member. To create clearance needed to ensure the Mizutani cartridge functioned properly, a POSA would have designed lock teeth 24 on lock member 19 (as shown in Mizutani) to have an outer diameter smaller than the inner surface of the reel hub which necessarily means it would have had a diameter smaller than the outer diameter of lock teeth 25 on the reel.

351. Once lock teeth 24 on lock member 19 was designed to ensure there was clearance between it and the inner surface of the reel hub, the Tsuyuki cartridge would have disclosed all limitations of claim 3 and rendered the claim obvious. Implementing Mizutani's cartridge such that it employed a conventional clearance fit between the two sets of lock teeth to ensure that lock teeth 24 moved freely within the reel hub would have been the obvious use of a known technique (clearance fits) to a known device (Mizutani's cartridge) to yield a predictable result (a cartridge with proper clearance fit).

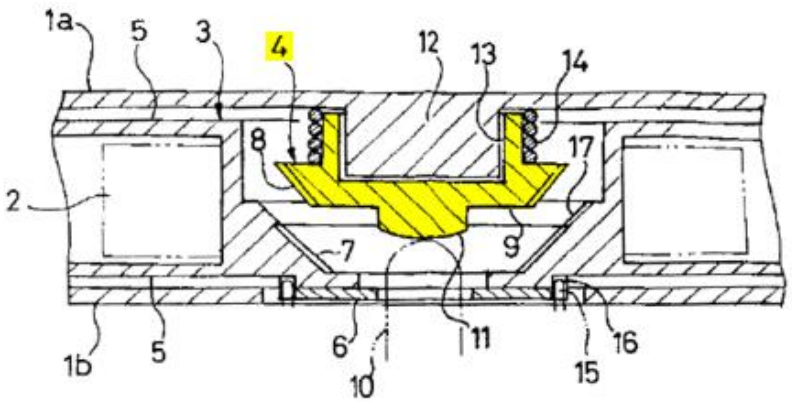
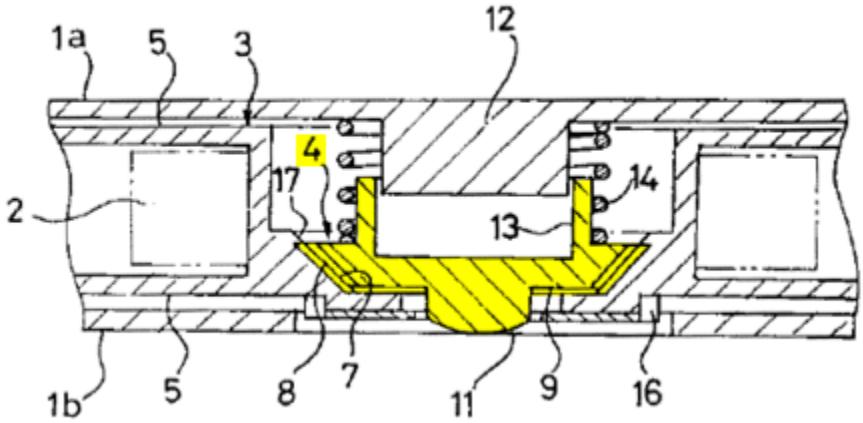
H. Claim 1 Would Have Been Obvious Over Morita-I in view of Morita-II

352. Claim 1 of the ’905 patent would have been obvious over Morita-I, which discloses a tape cartridge that uses a “guide member” to center a reel brake, in view of Morita-II, which discloses a reel lock mechanism that a POSA would have had reason to incorporate into the Morita-I cartridge to prevent dust from entering and adversely affecting the cartridge.

1. Reasons for Modifying Morita-I In view of Morita-II

353. Morita-I published in 1988, more than a decade before the ’905 patent was filed. At that time, conventional tape cartridges were designed with a “brake button” that would move up and down to lock the reel. Laverriere, which also published in 1988, also depicts a cartridge with a brake button. Laverriere at FIG. 3 (element 61).

354. The Morita-I brake button (yellow) is seen below in Figures 1 and 2 of Morita-I:

FIG. 1	Fig. 1 
FIG. 2	Fig. 2 

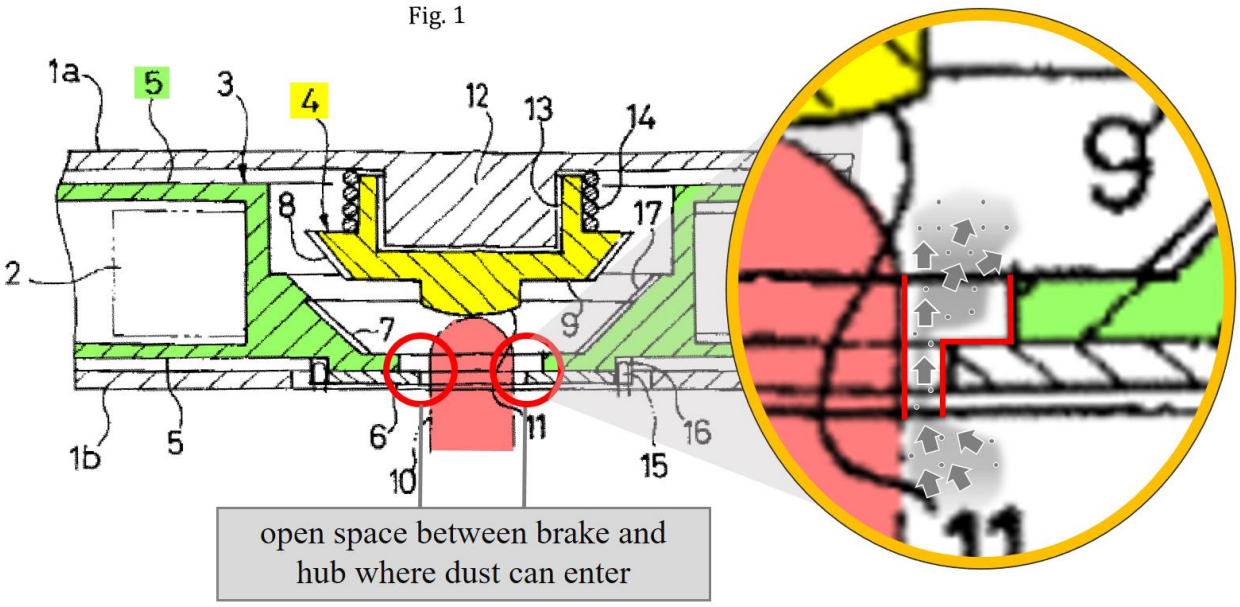
355. When the Morita-I cartridge is not being used (FIG. 2), a spring 14 urges the brake button 4 (including its brake gear 8) into engagement with a brake gear 7 formed on the reel. Morita-I at 7. When the cartridge is inserted into a tape drive (FIG. 1), a shaft 10 of the tape drive pushes the brake button up, overcoming

the force of the spring and disengaging brake gear 8 on the brake button from brake gear 7 on the reel. Morita-I at 3-4, 7.

356. The Morita-I brake button thus operates similar to the "braking member" described and claimed in the '905 patent—they both restrict rotation of a reel by engaging with an engagement mechanism on the reel. The primary difference between the two components is that the Morita-I brake button is moved into a position that releases the reel in response to a shaft of the tape drive directly contacting the button, while the "braking member" of the '905 patent moves into a position that releases the reel in response to a "releasing member" separate from the tape drive.

357. By June 1999, when Morita-II published, cartridges that utilized the Morita-I design were known to be problematic because, as Morita-II explains, they had the potential to form a space "between the brake member and the reel hub when the brake member is moved upward," and thus "dust and dirt can enter the inside of the cartridge casing through the space." Morita-II ¶4; *see also* ¶3 (describing prior art cartridges that, like Morita-I, used a "brake release spindle," i.e., shaft, to disengage a brake member).

358. The space between the brake and the reel hub that Morita-II refers to is seen in Figure 1 of Morita-I on either side of brake release member 10:



359. To solve the problem of cartridges like the one depicted in Morita-I's Figure 1, Morita-II discloses several reel locking mechanisms that prevent "dust and dirt … from entering the inside of the cartridge casing when the brake member is moved upward." Morita-II ¶5.

360. One such mechanism, referred to as a "reel stopper means 110," is shown in Figures 7 and 8. Morita-II ¶27. As seen below, reel stopper means 110 includes a brake member 104 (yellow), three engagement projections 127 (blue) each of which has a gear tooth on its upper end, a coiled spring 105 (purple), and a brake release member 106 (orange). Morita-II ¶¶28-31.

FIG. 7

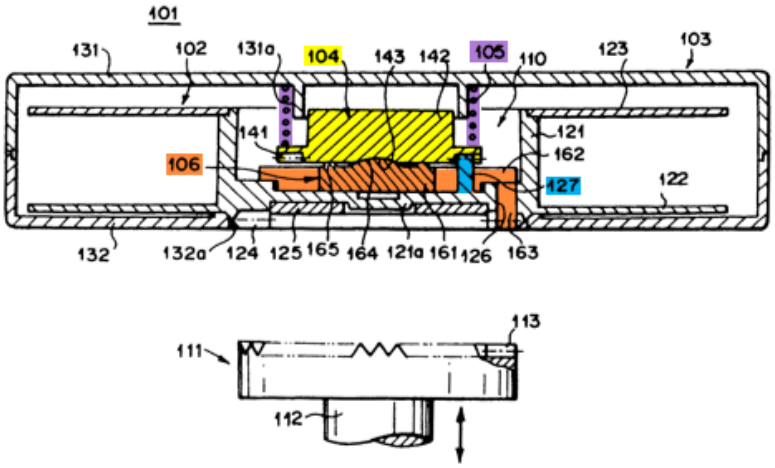
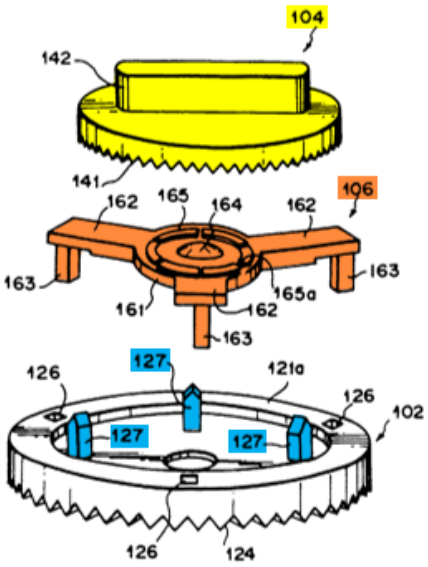


FIG. 8



361. Similar to the operation of the Morita-I brake, the Morita-II reel stopper means locks the reel by having spring 105 urge brake member 104 into engagement with engagement projections 127 formed on the reel. *Id.* ¶¶30-32.

362. Unlike the Morita-I cartridge which relies on a shaft of the tape drive to directly contact and move the brake into an unlocking position (Morita-I at 3-4), the Morita-II reel stopper means use a separate "release member" (orange above) to move its brake member into the unlocking position. When the cartridge is installed in a tape drive, push rods 163 on the release member are "pushed upward" thereby "disengaging" gear 141 of the brake member from the engagement projections 127. Morita-II ¶32, FIG. 7.

363. With the use of a separate release member, the "entrance of dust and dirt … can be prevented," as the spaces through which dust and dirt might have

otherwise entered are minimized with push rods of the release member occupying those spaces throughout operation of the cartridge. Morita-II ¶10; FIGS. 9-10. This is seen, for example, in Figure 7 (locked state) and Figure 9 (unlocked state) of Morita-II.

364. In view of the problem Morita-II identifies with the Morita-I cartridge design—i.e., dirt can enter the cartridge—and Morita-II's teaching of a reel stopper means that solves the problem, a POSA would have had a reason to modify the Morita-I cartridge to incorporate the Morita-II reel stopper means. Incorporating such structures would have been within the skills of a POSA and would have yielded predictable results.

365. Apart from the reason Morita-II provides, using Morita-II's reel stopper means in the Morita-I cartridge would have involved no more than applying a known technique (means for locking a reel) to a known device (a conventional cartridge) ready for improvement to yield a predictable result (a cartridge in which the entrance of dust is prevented).

366. Likewise, using Morita-II's reel stopper means with the Morita-I cartridge would have required no more than using a known technique (means for locking a reel) that had improved one device (Morita-II's cartridge) to improve a similar device (Morita-I's cartridge) in the same way (preventing dirt from entering the cartridge).

2. Limitation-by-Limitation Analysis

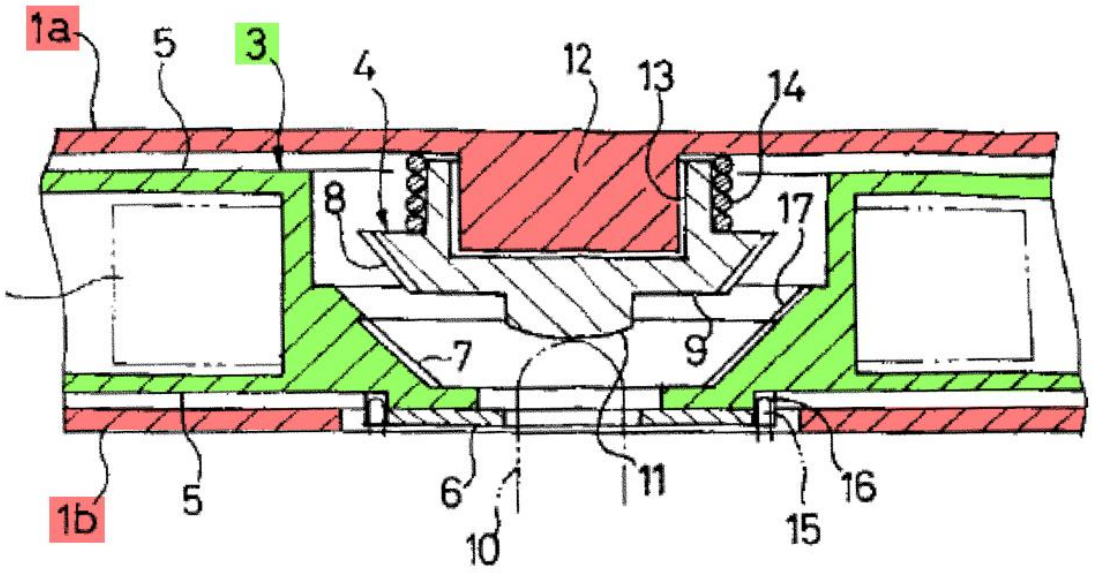
a. Claim 1, Preamble

367. The preamble to claim 1 recites: "[a] magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." Morita-I, modified to include the reel lock mechanism of Morita-II, discloses each element of the preamble.

i. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…"

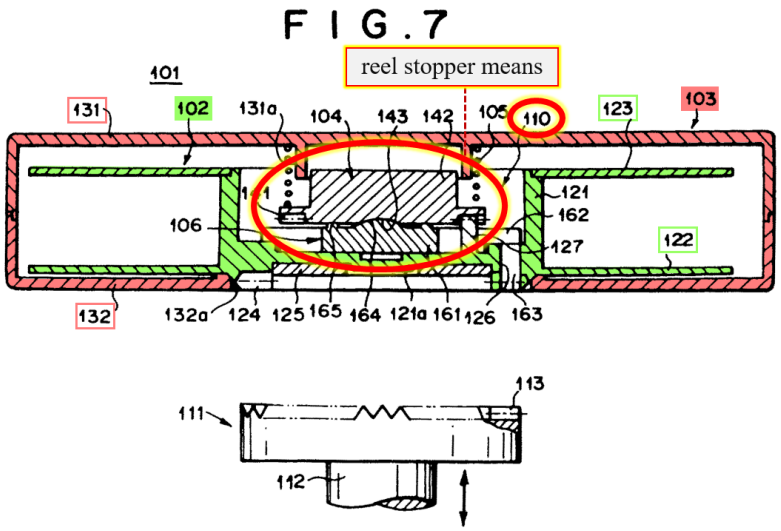
368. Morita-I discloses, as recited in the preamble, a "magnetic tape cartridge comprising a magnetic tape wound around a single reel" and "a cartridge casing in which the reel is housed for rotation." Specifically, Morita-I discloses "a magnetic-tape cartridge rotatably housing a single reel wound with a magnetic tape." Morita-I at 2; *see also id*. at 6 ("As illustrated in fig. 1, the magnetic-tape cartridge houses a reel 3 wound with a magnetic tape 2… in a hollow interior of a case consisting of upper and lower shells 1a and 1b."). Morita-I's cartridge (red), reel (green), and magnetic tape (element 2) are shown below:

Fig. 1



ii. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"

369. As I explained in Section IX.H.1, a POSA would have had reasons to modify the Morita-I magnetic tape cartridge to include the reel stopper means 110 disclosed in Morita-II. Once so modified, the Morita-I/Morita-II cartridge includes, as recited in the preamble, "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." Specifically, the cartridge would have included the Morita-II reel stopper means 110 shown in Figure 7 of Morita-II (below):



370. Reel stopper means 110 comprises several components that lock the reel in place when the tape is not in use and permit rotation of the reel when it is used. These components include (a) brake member 104 with a protrusion 142 on its upper surface, (b) an urging member 105 in the form of a coiled spring, (c) a brake release member 106, and (d) engagement projections 127. Morita-II ¶¶27-28, ¶30. Morita-II explains that brake member 104 is moveable in only direction (up and down) and cannot rotate because its protrusion 142 interlocks with structure 131a on the top of the cartridge casing. Morita-II ¶29.

371. The four components of the reel stopper means—brake release member (orange), brake member (yellow), engagement projections (blue), and urging member (purple)—are highlighted in Figures 7 and 8 below:

FIG. 7

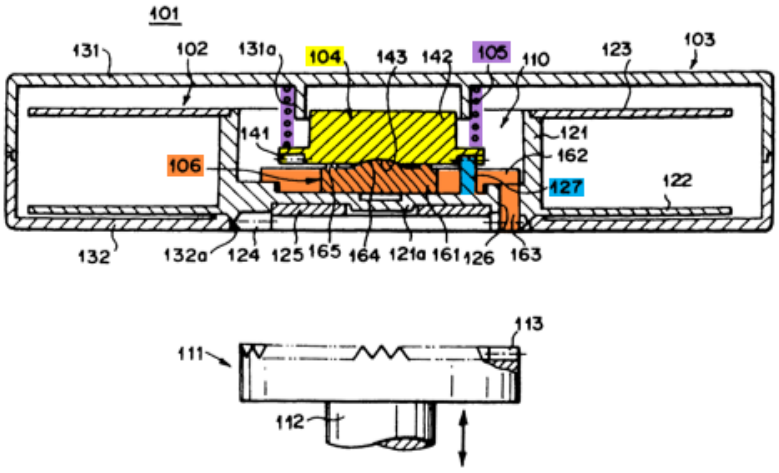
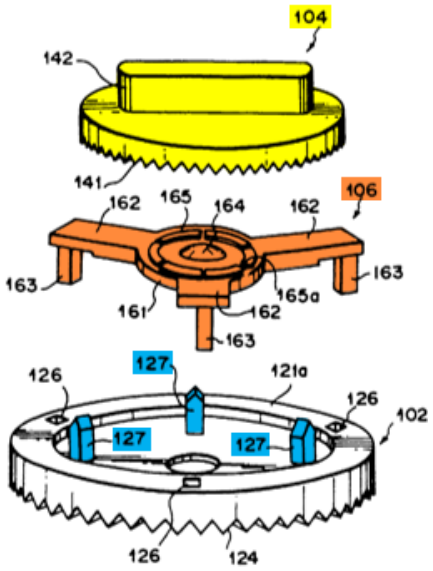


FIG. 8



372. With respect to the operation of reel stopper means 110, Morita-II explains that it "prevents rotation of the reel 102 when the magnetic tape cartridge 101 is not used and permits rotation of the reel 102 when the magnetic tape cartridge 101 is used." Morita-II ¶24. The reel stopper means 110 thus performs the claimed function of the "reel stopper means," i.e., locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used.

373. As discussed in Section VI.A.2, the structure corresponding to the "reel stopper means" are the structures corresponding to the "braking member," "urging member," and "releasing member" recited in claim 1. As I explain below with respect to limitations [a]-[d], reel stopper means 110 uses the same structures disclosed in the '905 patent for performing the claimed functions of the "braking

member," "urging member," and "releasing member," and thus it uses the same structures disclosed in the '905 patent to perform the claimed function of the "reel stopper means."

374. As it performs the claimed function of the "reel stopper means," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, reel stopper means 110 of Morita-II meets the "reel stopper means" of claim 1 under the BRI of that term.

b. Claim 1, Limitation 1a

375. Limitation 1a requires that "the reel stopper means comprises a braking member which is movable between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same."

376. Morita-II's "reel stopper means," i.e., reel stopper means 110, includes "**brake member 104**" that satisfies the "braking member" element of limitation 1a.

i. "braking member": function

377. As explained in Section VI.B.1, the function of the "braking member" is: "moves between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same." Brake member 104 performs this function.

378. First, brake member 104 restricts rotation of the reel by moving to a locking position in contact with the reel. When the tape cartridge is not installed in a tape drive, a coiled spring 105 "urges the brake member 104 toward the operative position" where its stopper gear 141 engages with engagement projections 127 to "prevent rotation of the reel." Morita-II, ¶30; *see also* claim 10 ("a brake member … is movable between an operative position where it engages with the reel to prevent rotation of the reel").

379. Second, brake member 104 permits rotation of the reel by moving to a releasing position away from the reel. When the tape cartridge is inserted into a tape drive, a release member 106 moves the brake member 104 upward "thereby disengaging the engagement projection 127 from the stopper gear 141" on the brake member 104. Id. ¶32; see also claim 10 ("a brake member … is movable between an operative position … and a retracted position where it is disengaged from the reel to permit rotation of the reel"), claim 19, claim 23.

380. Brake member 104 therefore performs the claimed function of the "braking member."

ii. "braking member": structure

381. As explained in Section VI.B.1, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "braking member" is:

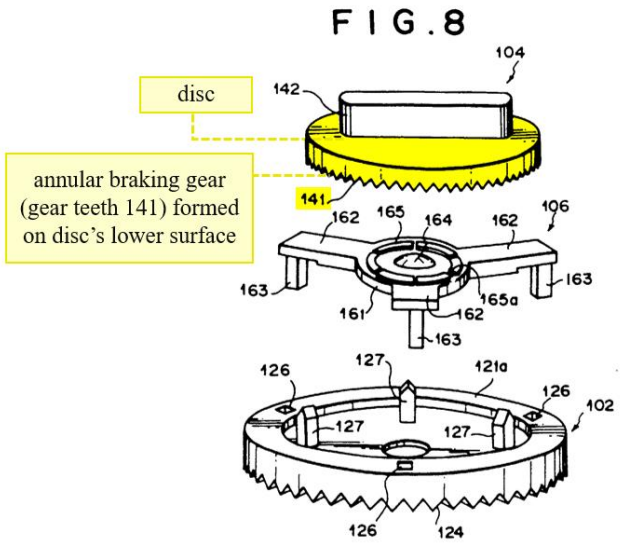
(1) a disc with an annular braking gear formed on its lower surface,

(2) the braking gear adapted to be engaged with an engagement gear tooth [teeth] on an engagement projection formed on the reel, and

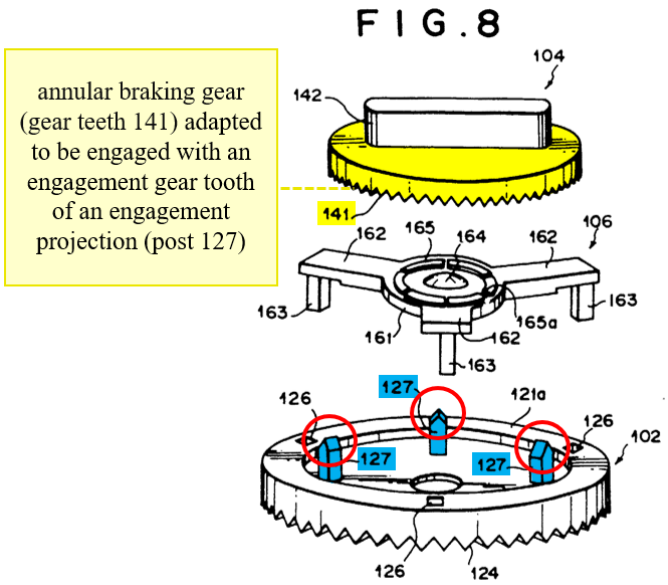
(3) a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing.

382. Brake member 104 uses these same structures to perform the claimed function as the "braking member" of the '905 patent.

383. First, brake member 104 comprises "a disc with an annular braking gear formed on its lower surface." As seen, for example, in Figure 8 below, and as described in Morita-II, brake member 104 "is a substantially **disc**-like member." Morita-II ¶29; FIGS. 7-9. "A plurality of gear teeth 141 (stopper gear) are **annularly** formed on the lower surface of the brake member." Morita-II ¶29.

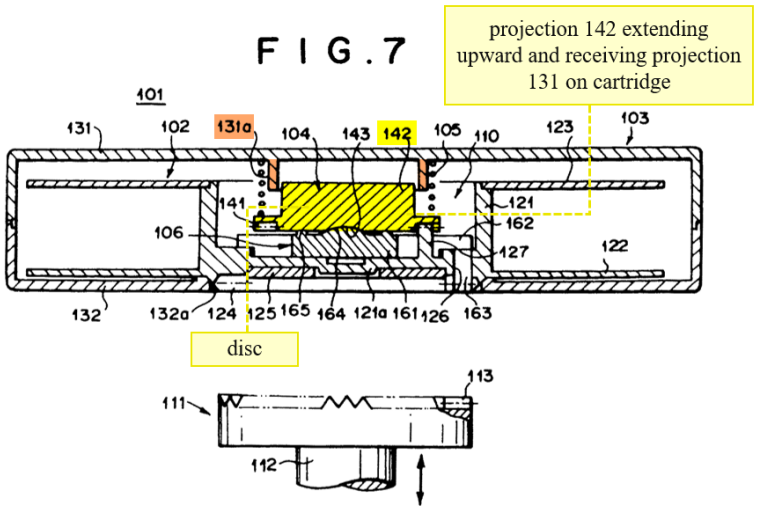
"Braking Member" Structure	**Disclosure in Morita-II**
(1) a disc with an annular braking gear formed on its lower surface	

384. Second, the annular braking gear of brake member 104, i.e., gear teeth 141, is "adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel." Morita-I explains that gear teeth 11 "are adapted to be brought into **engagement** with the engagement projections 127." Morita-II ¶29. As I explain below in Section IX.H.2.e, locking engagement projections 127 are engagement projections and each of their ends is a gear tooth. That gear teeth 141 are adapted to engage with the ends of engagement projections 127 is also depicted in Figure 8 below:

"Braking Member" Structure	**Disclosure in McAllister-I**
(2) the braking gear adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel	

385. Third, the disc of brake member 104 has "a projection extending upward from the disc's upper surface, which engages a projection extending

downward from the inner surface of the upper half of the cartridge casing." Morita-II explains that a "straight protrusion 142 extends upward from the upper surface of the brake member 104 and is fitted in a guide grove formed in a guide portion 131a projecting downward from the inner surface of the upper casing half 131." Morita-II ¶29. As Morita-II further explains, the mating of structures 142 and 131a ensures that the brake member "is able to be moved toward and away from the bottom wall 121a of the reel hub 121," i.e., up and down, "without rotating relative to the reel hub 121." Morita-II ¶29. Below I have highlighted guide portion 131a in orange:

"Braking Member" Structure	**Disclosure in McAllister-I**
(3) a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing	

386. As it performs the claimed function of the "braking member," and does so using the same structures as those disclosed in the specification of the '905

patent for performing the claimed function, brake member 104 of Morita-II meets the "braking member" of claim 1 under the BRI of that term.

c. Claim 1, Limitation 1b

387. Limitation 1b requires "an urging member which urges the braking member toward the locking position." The Morita-I/Morita-II cartridge includes an "**urging member 105**" that satisfies the "urging member" element of limitation 3b.

i. "urging member": function

388. As explained in Section VI.B.2, the claimed function of the "urging member" is "urges the braking member toward the locking position." Urging member 105 performs this function.

389. As explained in Section IX.H.2.b, lock member 104 meets the claimed "braking member." Morita-II explains that "urging member 105 … **urges** the brake member 104 toward the operative position" wherein it engages with engagement projections 127 "to prevent rotation of the reel." Morita-II ¶30; *see also* ¶38 ("the coiled spring 105 acts on the brake member 104").

390. Urging member 105 therefore performs the claimed function of the "urging member."

ii. "urging member": structure

391. As explained in Section VI.B.2, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "urging member" is: a coiled spring.

392. "Urging member 105" takes the "form of a coiled spring" (Morita-II ¶30) and thus uses these same structure to perform the claimed function as the "urging member" of the '905 patent, i.e., a coiled spring.

393. As it performs the claimed function of the "urging member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, urging member 105 of Morita-II meets the "urging member" of claim 1 under the BRI of that term.

d. Claim 1, Limitation 1c

394. Limitation 1c requires "a releasing member which is rotated integrally with the reel and moves the braking member toward the releasing position in response to a reel chucking action of the reel drive means of a tape drive." The Morita-I/Morita-II cartridge includes a "**release member 106**" that satisfies the "releasing member" element of limitation 1c.

i. "releasing member": function

395. As explained in Section VI.B.3, the claimed function of the "releasing member" is "moves the braking member toward the releasing position in response

to a reel chucking action of the drive gear of a tape drive." Release member 106 performs this function.

396. As explained in Section IX.H.2.b, brake member 104 meets the claimed "braking member." When the Morita-II cartridge is inserted into a tape drive, release member 106 moves upward to disengage gear teeth 141 on the lower surface of brake member 104 from engagement projections 127 "to permit rotation of the reel 102 as shown in Figure 9." Morita-II ¶32; FIG. 9; claim 10 ("brake release member…moves the brake member to the retracted position"). Release member 106 thus performs the first-half of the claimed "releasing member" function: "moves the braking member toward the releasing position."

397. It also performs the second-half of the claimed function—"…in response to a reel chucking action of the drive gear of a tape drive." Release member 106 moves the brake member 104 into its release position when, "in response to **chucking action**," drive gear 113 of a tape drive "mesh with the reel gear 124" on the lower surface of the reel hub. Morita-II ¶32. This "chucking action" causes push rods 163 of the release member 106 "to move upward the brake release member 106 by a predetermined amount, thereby disengaging the engagement projection 127 from the stopper gear 141." Morita-II ¶32; FIG. 9; claim 10 ("brake release member…moves the brake member to the retracted position in response to **chucking operation** of a tape drive").

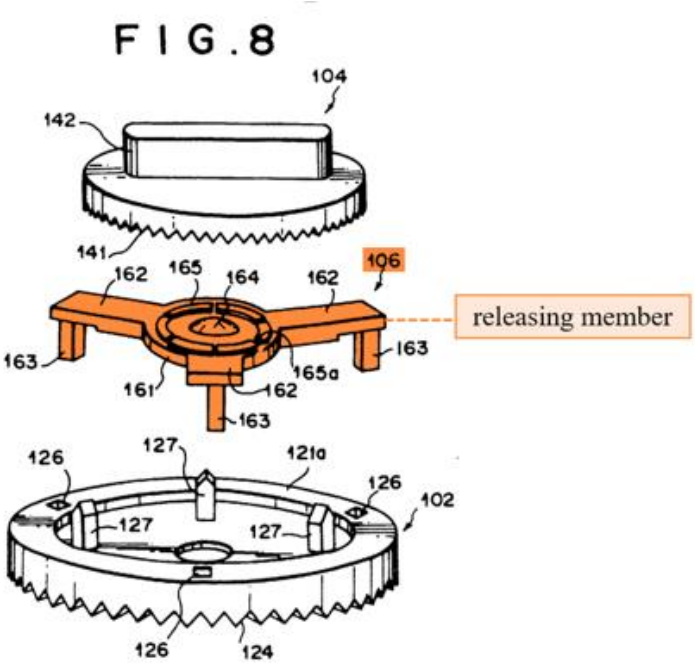
398. The second-half of the claimed function incorporates my proposed interpretation for the phrase "reel drive means." As explained in Section VI.C, the claimed function of the "reel drive means" is driving the reel, and the corresponding structure disclosed in the specification of the '905 patent is a "drive gear." The Morita-II drive gear 113 performs this claimed function and does so using the same structure.

399. As Morita-II explains, a "chucking action of the rotary spindle 111 of the tape drive system" brings "the drive gear 113 into mesh with the reel gear 124." Morita-II ¶32. The reason it does so is to drive the reel, i.e., turn it, when the tape cartridge is used. Morita-II ¶25 ("Gear teeth (reel gear) 124 for driving the reel 102."). The drive gear 113 thus performs the claimed function of the "reel drive means." The "**drive gear**" is also a drive gear, and thus it is the same structure as that disclosed in the specification of the '905 patent as corresponding to the "reel drive means."

ii. "releasing member": structure

400. As explained in Section VI.B.3, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "releasing member" is "a plate-like body with leg portions extending downward from its lower surface."

401. As seen below in Figure 8, release member 106 has a plate-like body with leg portions extending downward from its lower surface. Specifically, the release member includes "a central disc portion 161," "three arms 162 extending radially outward from the central disc portion 161," and "rectangular push rod[s] 163 [that] extend[] downward" from the arms. Morita-II ¶31. Release member 106 is the same structure disclosed in the '905 patent for the claimed "releasing member."



402. As explained in Section VI.B.3, the "releasing member" disclosed in the '905 patent is "substantially triangular," but the BRI of the term is not limited to substantially triangular bodies. Were the Board to limit "releasing member" to substantially triangular bodies, however, then release member 106 of Morita-II is at least structure equivalent to the "releasing member."

403. As I noted previously, I understand from counsel that structures are equivalent under §112, ¶6 if they are insubstantially different with respect to structure. I further understand that insubstantially different structures perform the identical function, in substantially the same way, with substantially the same result. Release member 106 and the "releasing member" structure of the '905 patent are equivalents under this test.

404. First, as I explained immediately above in Section VIII.H.2.d(1), the two structures perform the identical function—i.e., move[s] the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive.

405. Second, the two structures perform this identical function in substantially the same way. Release member 106 and the "releasing member" structure both, in response to the cartridge entering a tape drive, press up on a braking member to overcome downward pressure from a spring. *Compare* Morita-II ¶32 *with* '905 Patent at 7:36-48. Both structures generate the upward pressure using legs which a tape drive pushes up when the cartridge is used. *Compare* Morita-II ¶32 *with* '905 Patent at 7:36-48. In both structures, the base, whether it be a circle with arms spaced in a triangular pattern or triangular plate, is the surface that directly applies pressure to the "braking member." *Compare* Morita-II ¶32, FIG. 8 *with* '905 Patent at 7:36-48, FIG. 2.

406. Third, the structures achieve substantially the same result: the downward pressure from a spring is overcome and the "braking member" is disengaged from engagement projections on the reel. *Compare* Morita-II ¶32 *with* '905 Patent at 7:36-48. The two structures thus perform the identical claimed function in substantially the same way, with substantially the same result.

iii. "rotated integrally with the reel"

407. Morita-II discloses that its release member 106 is "rotated integrally with the reel." Morita-II ¶32; *see also* claim 10 ("brake release member…rotated together with the reel").

e. Claim 1, Limitation 1d

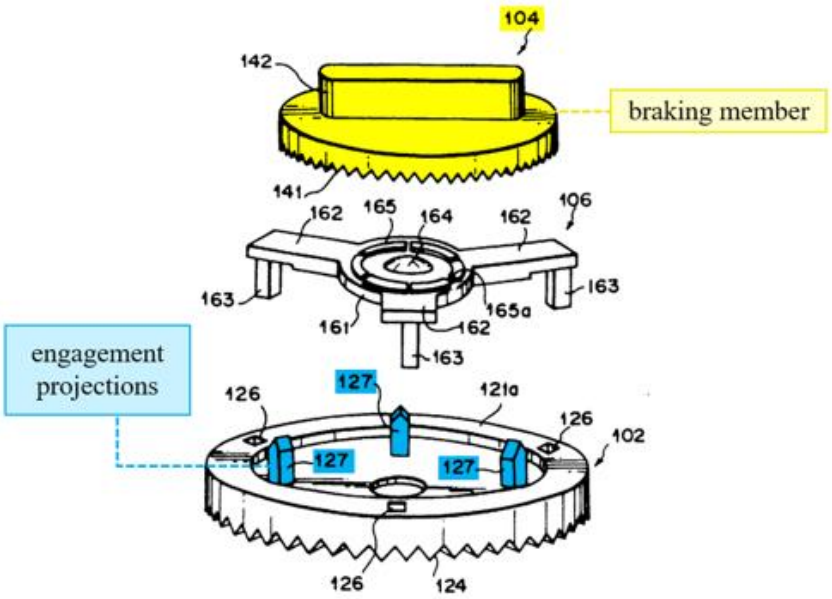
408. Limitation 1d requires that "the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear tooth on an engagement projection formed on the reel."

409. As explained in Section IX.H.2.b, brake member 104 meets the claimed "braking member." It meets the remainder of limitation 1d as well.

410. Brake member 104 includes "a plurality of gear teeth 141 (stopper gear) [that] are annularly formed on the lower surface of the brake member 104 and [which] are adapted to be brought into engagement with the engagement projections 127." Morita-II ¶29. By bringing the engagement projections 127 into engagement with gear teeth 141, rotation of the reel is prevented. Morita-II ¶30.

411. As seen below in Figure 8, engagement projections 127 are "engagement projections" formed on the reel and each of their ends is an "engagement gear tooth." Morita-II ¶28 ("The upper end portion of each engagement projection 127 is **shaped like a gear tooth** and may be shaped like a plurality of gear teeth.").

FIG. 8



412. Brake member 104 is therefore provided, as recited in limitation 1d, "with a braking gear," i.e., gear teeth 141, "which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear tooth on an engagement projection formed on the reel," i.e., gear tooth ends of engagement projections 127.

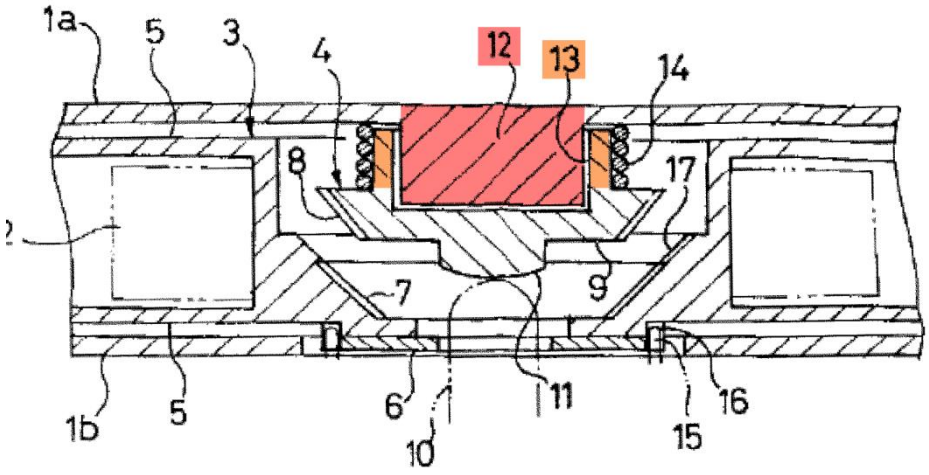
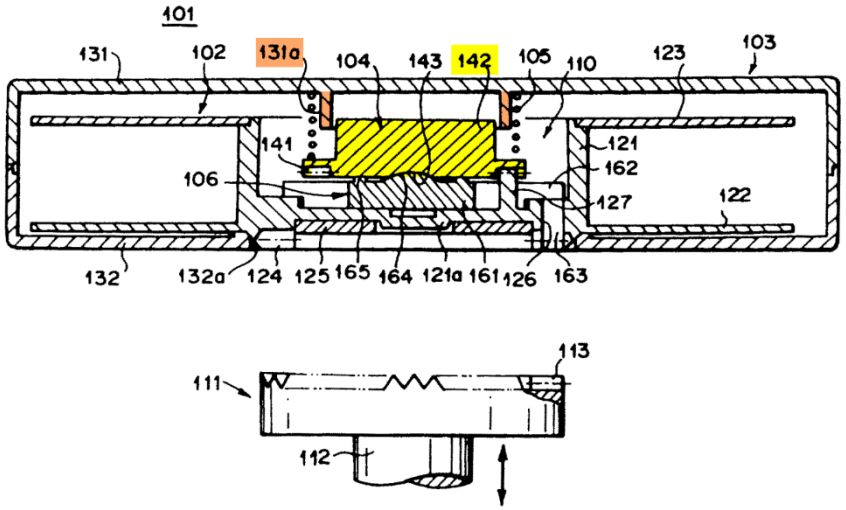
f. Claim 1, Limitation 1e

413. Limitation 1e requires that "the reel is provided with a guide member which centers the braking member with respect to the reel." This limitation is

satisfied by Morita-I's "inclined guide surface," which a POSA would have retained in the Morita-I/II cartridge.

414. When modifying the cartridge of Morita-I to include the reel stopper means of Morita-II, a POSA would have had no reason to remove the Morita-I inclined guide surface because the surface would have still usefully served to center brake member 104 in the Morita-I/II cartridge. Morita-I explains that a reason why cartridge brakes, like brake member 104 in Morita-II's reel stopper means 110, become misaligned is the "loose[] fit[]" between a projection on the top of the brake and a corresponding projection on the inner surface of the cartridge. Morita-I at 7-8.[8] Such projections are seen in Figure 1 of Morita-I and Figure 7 of Morita-II (both below), and mate together to rotationally fix the brake to the cartridge while allowing the brake to move up and down (*e.g.*, Morita-II ¶29).

[8] Mizutani also identified the clearance between a projections on the brake and the inner surface of the cartridge as creating a potential for misalignment. Mizutani ¶5.

Morita-I	Fig. 1 
Morita-II	FIG. 7 

415. As seen above, the Morita-II brake member 104 includes a projection on its top surface (Morita-II, ¶29, Fig. 7 (element 142)), and a POSA would have understood from Morita-I that retaining the inclined guide surface would reduce the likelihood that brake member 104 became off-centered due to a "loose fit" between its projection and a corresponding projection on the inner surface of the

Morita-I/II cartridge. Such a "loose fit" is needed to ensure that there is clearance between the two projections sufficient to allow brake member 104 to move up and down.

i. "guide member": function

416. As explained in VI.B.4, the function of the "guide member" is: "centers the braking member with respect to the reel." The inclined guide surface of Morita-I, when maintained in the reel hub of the Morita-I/Morita-II cartridge, performs this function.

417. Morita-I explains that its inclined guide surface guides the brake "to the center of the reel." Morita-I at 8; *see also id.* at claim 1 ("the reel has an inclined guide surface that guides the brake-button occluding portion to the reel occluding portion"), 5 ("[A]n object to the present invention is to … **readily center a reel** and brake button… The object of the present invention is achieved by [a] reel [that] has an inclined guide surface that guides the brake-button occluding portion to the reel occluding portion."), 6 ("the brake button and reel are centered"), 8 ("an inner-circumference surface of the reel 3 continuous with the brake gear 7 is formed with a guide surface 17 that guides the bevel-gear portion 9 of the brake button 4 **to the center of the reel** … the bevel-gear portion 9 **is centered** by moving along the guide surface"), 9 ("an inclined guide surface …

can center… the brake"), 11 ("the brake button is centered by being guided by … the guide surface").

418. As explained above, the inclined guide surface would continue to serve this function in the Morita-I/Morita-II cartridge due to a potential "loose fit" between the projection on the top of the brake member 104 and a corresponding projection on the inner surface of the Morita-I/II cartridge. Thus, the guide surface in the Morita-I/Morita-II cartridge accomplishes the claimed function of the '905 patent's "guide member." i.e., centers the braking member with respect to the reel.

ii. "guide member": structure

419. As explained in Section VI.B.4, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "guide member" is "at least three ribs formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." The Morita-I inclined guide surface is structure equivalent to the structure identified in the '905 patent as performing the claimed function of the "guide member."

420. The Morita-I inclined guide surface is a single continuous inclined surface formed on the inner surface of the reel hub. Morita-I at 9, FIGS. 1-2 (element 17), FIGS. 3-4 (element 21). Because it is a **single** surface, the guide surface is not the exact same structure that performs the claimed function of the

"guide member" in the '905 patent—"**at least three ribs** formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel."

421. Morita-I's single continuous inclined surface, however, is equivalent to the three or more inclined ribs disclosed in the '905 patent.

422. As I noted above, I understand from counsel that structures are equivalent under §112, ¶6 if they are insubstantially different with respect to structure. I further understand that insubstantially different structures perform the identical function, in substantially the same way, with substantially the same result. Release member 106 and the "releasing member" structure of the '905 patent are equivalents under this test.

423. First, as I explained immediately above in Section VIII.H.2.f(1), the two structures perform the identical function—" centers the braking member with respect to the reel."

424. Second, the two structures perform this identical function in substantially the same way. The inclined guide surface and the "guide member" structure both center a "braking member" by using gradually inclining surfaces formed on the inner surface of the reel that contact the outer-periphery of the braking member and gradually guide the braking member toward the center of a

reel somewhat like a funnel. *Compare* Morita-I at 5 ("The object of the present invention is achieved by [a] reel [that] has **an inclined guide surface** that guides the brake-button occluding portion to the reel occluding portion."), 8 ("an inner-circumference surface of the reel 3 continuous with the brake gear 7 is formed with a **guide surface 17 that guides** the bevel-gear portion 9 of the brake button 4 **to the center of the reel** … the bevel-gear portion 9 **is centered by moving along the guide surface**") *with* 6:37-40 ("the guide members 39 center the braking gear 42 when the outer periphery of the braking gear 42 is brought into contact with the inclined surfaces.").

425. Third, the structures achieve substantially the same result: the inclined surfaces move the "braking" member toward the center of the reel. *Compare* Morita-I at 8 ("an inner-circumference surface of the reel 3 continuous with the brake gear 7 is formed with a **guide surface 17 that guides** the bevel-gear portion 9 of the brake button 4 **to the center of the reel** … the bevel-gear portion 9 **is centered by moving along the guide surface**") *with* 6:37-40 ("the guide members 39 center the braking gear 42 when the outer periphery of the braking gear 42 is brought into contact with the inclined surfaces.").

426. The two structures thus perform the identical claimed function in substantially the same way, with substantially the same result.

427. I also understand from counsel that evidence a POSA would have recognized two structures to be interchangeable for performing the claimed function underscores that the two structures are equivalents. Here, Laverriere demonstrates that it was known at least as of 1988—a decade before the '905 patent was filed—that structures formed on the inner surface of reel to center a reel brake could take one of two alternate forms: multiple separate ribs or a single annular ring.

428. As discussed in Section VII.E, Laverriere teaches the use of a "projecting means 70" for centering a reel brake in a single-reel magnetic tape cartridge. *E.g.*, Laverriere at 4:28-44. Laverriere explains that the projecting means can come into two forms:

> "As best seen in FIGS. 3 and 5, **preferably**, the projecting means 70 is **six** projections or **centering ribs** integrally molded to be equally, radially, spaced about the inner circumference of the annular wall 68. **Alternatively**, the projecting means 70 can constitute **a single, continuous annular ring** 70' as indicated by the phantom lines in FIG. 3."

Laverriere at 4:37-43.

429. As Laverriere confirms, a POSA would have known that the use of multiple separate ribs or a single annular ring was a matter of design choice and each was interchangeable with the other. This evidence further underscores that Morita-I's single guide surface is equivalent to the structure that performs the claimed function of the "guide member" in the '905 patent.

I. Claim 2 Would Have Been Obvious Over Morita-I in view of Morita-II and Laverriere

1. Reasons for Modifying Morita-I in view of Morita-II and Laverriere

430. As I explained in Section IX.H, a POSA would have been motivated to use the "reel stopper means 110" of Morita-II in a Morita-I cartridge, and the Morita-I/Morita-II cartridge discloses every limitation of claim 1, including the "guide member" element of limitation 1e.

431. As I also explained in Section IX.H.2.f, a POSA would have known, in view of Laverriere, that brake misalignment problems can be solved via projections formed on the inner surface of a reel hub which can take the form of multiple "centering ribs" integrally molded into the wall of the reel hub, or, alternatively, "a single, continuous annular ring." Accordingly, it would have been a simple design choice for a POSA to use Laverriere's multiple centering ribs in the Morita-I/Morita-II cartridge, in lieu of Morita-I's single, continuous "guide surface." Making this design choice would have been within the skill of a POSA because, as Laverriere notes, the incorporation of centering ribs "requires only minimal modifications" and "does not otherwise interfere with assembly or operation" of a cartridge. Laverriere at 5:23-27. A POSA would have had a reason to choose the centering ribs design because Laverriere taught that ribs were the "preferabl[e]" design. Laverriere at 4:37.

2. Claim 2

432. Claim 2 limits the guide member of claim 1 to "ribs which are formed on the inner surface of the reel hub at at least three places, each having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." When the Morita-I/Morita-II cartridge is designed to use Laverriere's multiple centering ribs, the ribs are the "guide members" required by claim 2—"guide ribs which are formed on the inner surface of the reel hub at at least three places, each having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." I explained this previously in Section IX.A when discussing the combination of McAllister-I and Laverriere. *See, e.g.*, Section IX.A.2.f-g.

a. "guide member": function

433. As explained in VI.B.4, the function of the "guide member" is: "centers the braking member with respect to the reel." The centering ribs of Laverriere, when added to the reel hub of the Morita-I/Morita-II cartridge, perform this function.

434. Laverriere explains that the centering ribs "gradually and positively receive and position" a brake "concentrically relative" to the reel hub and maintain the brake "in the desired position, i.e., **on center** with the hub." Laverriere, 4:50-

55, 5:1-3; *see also* 4:15-17 ("The present invention provides a means for ensuring positive, concentric alignment between the brake button and hub…"), Abstract (57) ("a set of centering ribs or projections … direct, **center**, and maintain a brake button (61) concentrical relative to the hub (86) to prevent the brake button (61) from becoming misaligned in the cartridge during assembly or use.").

435. The centering ribs of Laverriere therefore performs the claimed function of the "guide member," and would do so in the Morita-I/Morita-II/Laverriere cartridge as well. In the Morita-I/Morita-II/Laverriere cartridge, the centering ribs would have centered brake member 104 with respect to the Morita-I reel.

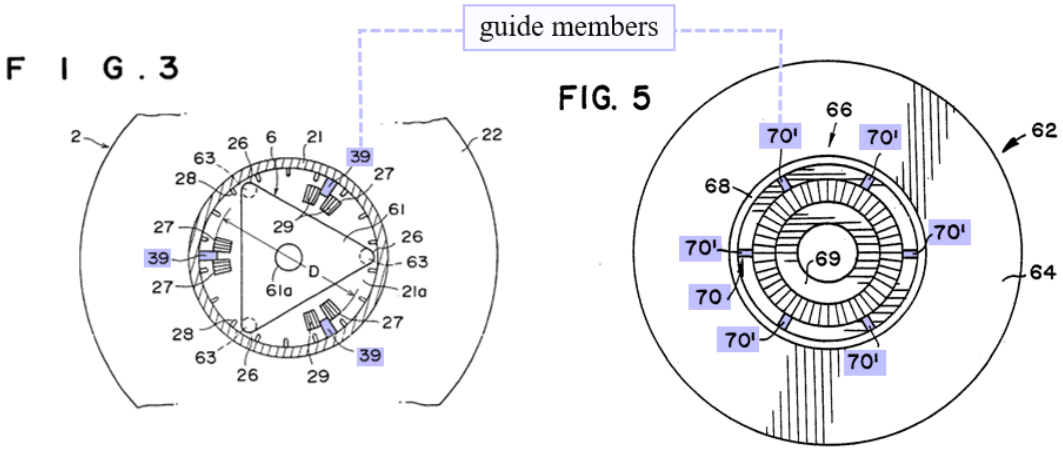
b. "guide member": structure

436. As explained in Section VI.B.4, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "guide member" is "at least three ribs formed on the inner surface of the reel hub, each rib having an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel." The Laverriere centering ribs use these same structures to perform the claimed function as the "guide member" of the '905 patent.

437. Laverriere's centering ribs include "curves" that form "angled, contoured steps" and there are "preferably" six such ribs "molded to be equally,

radially spaced" around the inner wall of the reel hub. Laverriere, 4:37-41. As depicted in, for example FIG. 3 of Laverriere, the ribs each have an inclined surface which inclines downward from the upper portion of the inner surface of the reel hub toward the center of the reel. *See, e.g.*, FIG. 3 (element 70). Indeed, as shown below using FIG. 3 of the '905 Patent and FIG. 5 of Laverriere, the guide members (element 39) of the '905 patent are depicted in a manner similar to the "centering ribs 70" of Laverriere.

905 Patent, FIG .3	Laverriere, FIG. 5



438. As it performs the claimed function of the "guide member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, the centering ribs of Laverriere incorporated onto the reel of McAllister-I meets the "guide member" of claim 2 under the BRI of that term.

439. Thus, the Morita-I/Morita-II cartridge, modified to substitute Morita-I's single inclined guide surface with Laverriere's six centering ribs (i.e., at least three) would have rendered claim 2 obvious.

J. Claim 3 Is Anticipated by Tsuyuki

1. Limitation-By-Limitation Analysis

a. Claim 3, Preamble

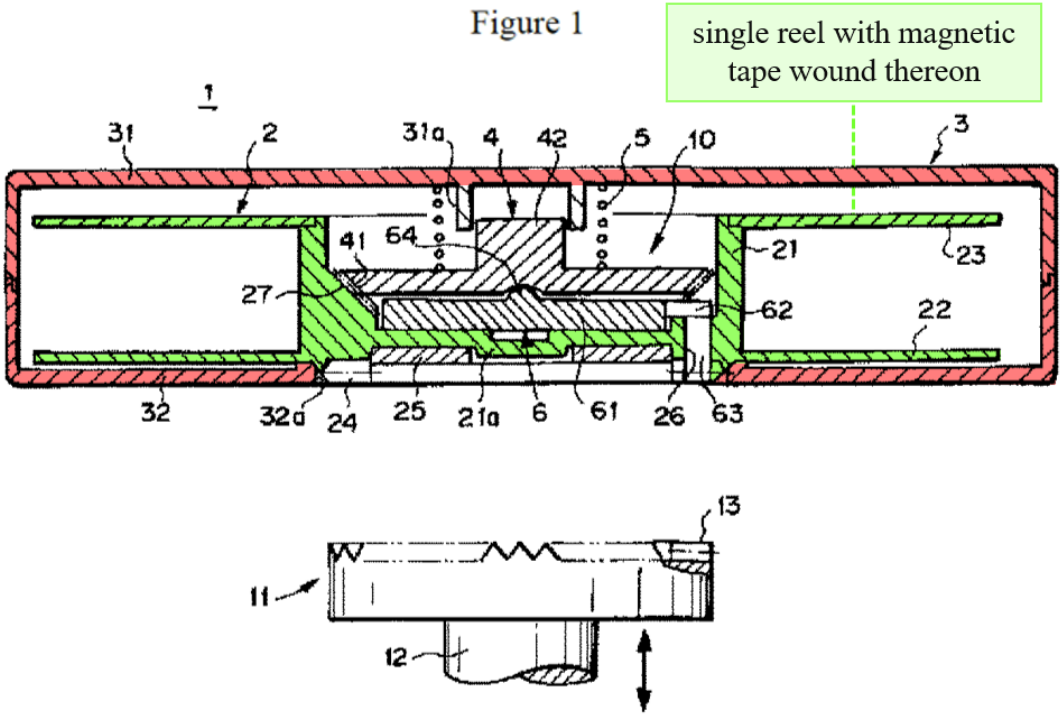
440. The preamble to claim 3 recites: "[a] magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." Tsuyuki discloses each element of the preamble.

i. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…"

441. Tsuyuki discloses, as recited in the preamble, a "magnetic tape cartridge comprising a magnetic tape wound around a single reel" and "a cartridge casing in which the reel is housed for rotation." Specifically, Tsuyuki discloses "a magnetic-tape cartridge rotatably housing a single reel with magnetic tape wound thereon." Tsuyuki at claim 1; *see also* (54) ("Magnetic Tape Cartridge"), ¶1 ("This invention relates to … a magnetic tape cartridge rotatably housing a single reel with magnetic tape wound thereon."), ¶8, ¶11 ("A magnetic tape cartridge 1

comprises a single reel 2 with magnetic tape (not pictured) wound thereon, and rotatably housing said reel 2 in a cartridge case 3…"), Figures 1, 3

442. The Tsuyuki magnetic tape cartridge, including its "cartridge case 3" and "reel 2," is depicted below in Figure 1 of Tsuyuki with my annotations added:

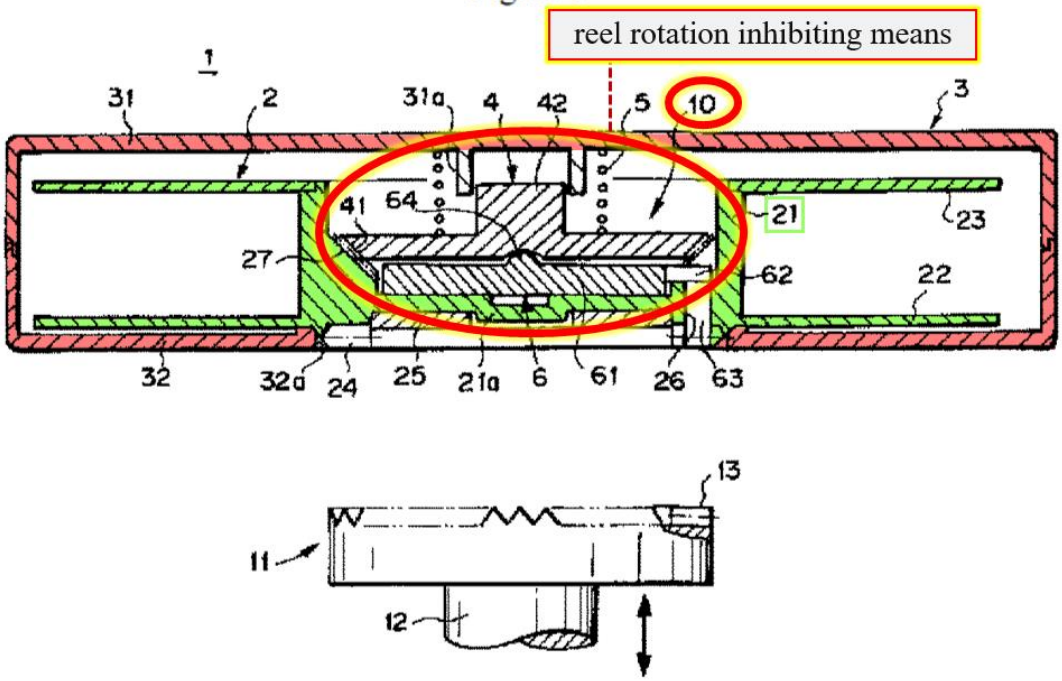


ii. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"

443. The Tsuyuki cartridge includes, as recited in the preamble, "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic

tape cartridge is to be used." As seen in Figure 1 (below), the cartridge has a "reel rotation inhibiting means 10" that meets the claimed "reel stopper means."

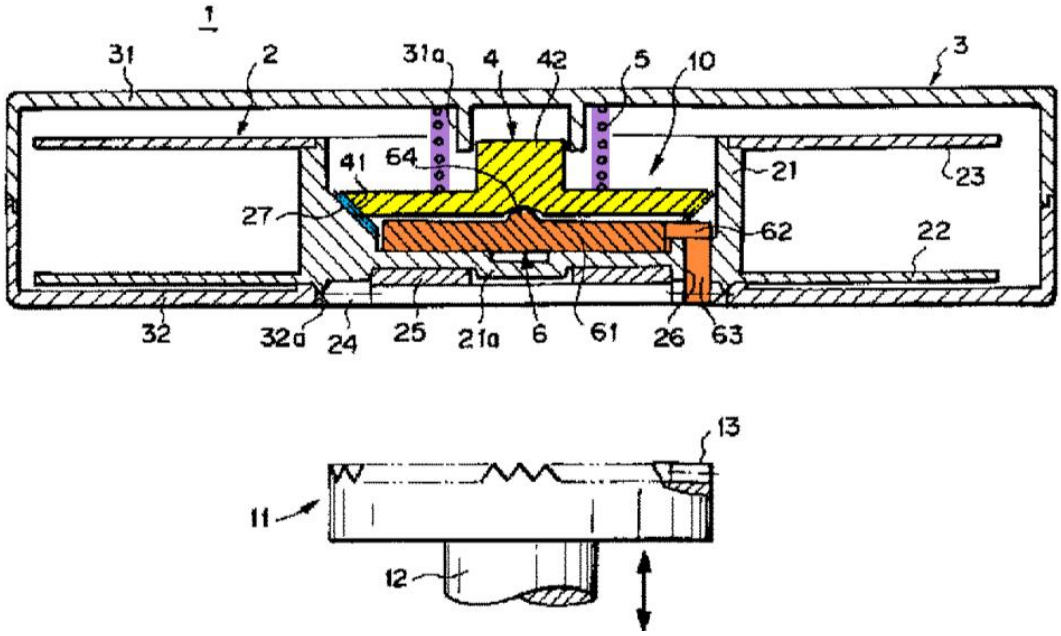
Figure 1



444. The Tsuyuki reel rotation inhibiting means comprises several components that lock the reel in place when the cartridge is not in use and permit rotation of the reel when it is used. These components include: "an inhibiting member 4," "a pressing member 5" in the form a "coil spring," and a "release member 6." Tsuyuki ¶14, ¶17. On the lower surface of the inhibiting member is an "inhibiting gear 41" with "external bevel teeth," which meshes with "inhibiting gear 27" on the reel. Id. ¶16, FIGS. 1-3.

445. The four components of the reel rotation inhibiting means—inhibiting member (yellow), spring (purple), inhibiting gear on the reel (blue), and release member (orange)—are highlighted below in Figure 1:

Figure 1



446. With respect to the operation of the reel rotation inhibiting means, Tsuyuki explains that when the cartridge is not in use, the spring forces the inhibiting member into engagement with inhibiting gear 27 formed on the reel "to restrain reel 2 rotation during non-use, preventing extraction of the magnetic tape." Tsuyuki ¶22. When the cartridge is inserted into a tape drive, release member 6 presses up on the inhibiting member, lifting it out of engagement with the inhibiting gear on the reel "and the reel 2 becomes free to rotate." Tsuyuki ¶24.

447. As the reel rotation inhibiting means 10 "allows" the reel to rotate "during use, and restrains said reel 2 rotation during non-use" (Tsuyuki ¶11), it performs the claimed function of the "reel stopper means," i.e., locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used.

448. As discussed in Section VI.A.2, the structure corresponding to the "reel stopper means" are the structures corresponding to the "braking member," "urging member," and "releasing member" recited in claim 3. As I explain below with respect to limitations [a]-[d], the Mizutani reel lock mechanism uses the same structures disclosed in the '905 patent for performing the claimed functions of the "braking member," "urging member," and "releasing member," and thus it uses the same structures disclosed in the '905 patent to perform the claimed function of the "reel stopper means."

449. As it performs the claimed function of the "reel stopper means," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, the reel inhibiting means of Tsuyuki meets the "reel stopper means" of claim 3 under the BRI of that term.

b. Claim 3, Limitation 3a

450. Limitation 3a requires that "the reel stopper means comprises a braking member which is movable between a locking position where it is in

contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same."

451. Tsuyuki's "reel stopper means," i.e., reel rotation inhibiting means 10, includes "**inhibiting member 4**" that satisfies the "braking member" element of limitation 1a.

i. "braking member": function

452. As explained in Section VI.B.1, the function of the "braking member" is: "moves between a locking position where it is in contact with the reel to restrict rotation of the reel and a releasing position where it is away from the reel to permit rotation of the same." Inhibiting member 4 performs this function.

453. First, the inhibiting member restricts rotation of the reel by moving to a locking position in contact with the reel. When the Tsuyuki cartridge is not used, inhibiting gear 41 on the bottom surface of inhibiting member 4 engage inhibiting gear 27 on the reel "to restrain reel [] rotation." Tsuyuki ¶¶16, 22. The inhibiting member 4 is urged into this restraining position by a pressing member in the form of a coiled spring. Tsuyuki ¶14 ("**[I]nhibiting member 4 [] moves** in the vertical direction movable **toward** and away from **said reel** 2, a pressing member 5 pressing said inhibiting member 4 **in an inhibiting direction**…"), ¶17 ("a pressing member 5 by a coil spring … press[es] the inhibiting member 4 downward in the inhibiting direction in which its inhibiting gear 41 and the inhibiting gear 27 on the

reel 2 engage"), claim 1 ("an inhibiting member movable toward and away from said reel and restraining the reel rotation").

454. Second, the inhibiting member permits rotation of the reel by moving to a releasing position away from the reel. When Tsuyuki cartridge is installed in a tape drive, a release member moves the inhibiting member in an "upward **releasing direction**" thus releasing the engagement between the inhibiting member and the inhibiting gear on the reel such that the reel "becomes free to rotate." Tsuyuki ¶24; ¶14 ("[I]nhibiting member 4 [] moves in the vertical direction movable toward and away from said reel 2, … a release member 6 moving said inhibiting member 4 in **a releasing direction**."), claim 1 ("releasing member … causes said inhibiting member to move in a releasing direction").

455. Inhibiting member 4 therefore performs the claimed function of the "braking member."

ii. "braking member": structure

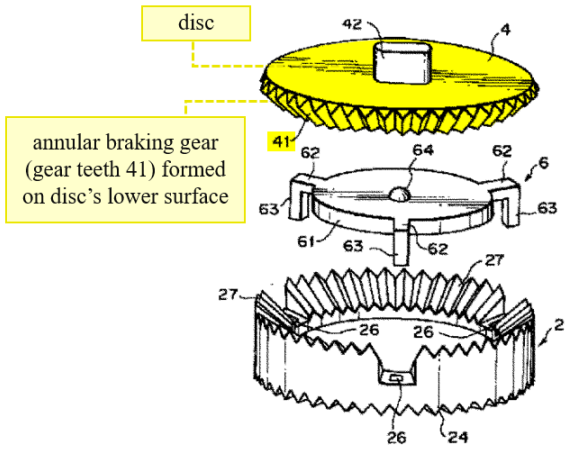
456. As explained in Section VI.B.1, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "braking member" is:

> **(1)** a disc with an annular braking gear formed on its lower surface,
>
> **(2)** the braking gear adapted to be engaged with an engagement gear on an engagement projection formed on the reel, and
>
> **(3)** a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the

upper half of the cartridge casing.

457. Inhibiting member 4 uses these same structures to perform the claimed function as the "braking member" of the '905 patent.

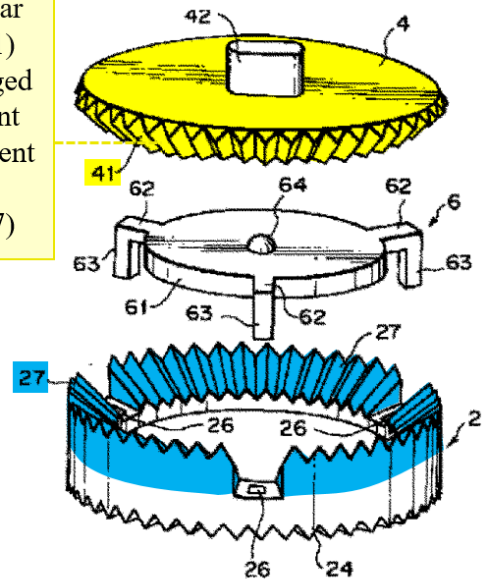
458. First, inhibiting member 4 comprises "a disc with an annular braking gear formed on its lower surface." As described in Tsuyuki, inhibiting member 4 "is roughly disc-shaped" and has on its "bottom surface outer perimeter an inhibiting gear 41 is engraved with external bevel teeth." Tsuyuki ¶16.

"Braking Member" Structure	**Disclosure in Mizutani**
(1) a disc with an annular braking gear formed on its lower surface	Figure 2 

459. Second, the braking gear of inhibiting member 4, i.e., inhibiting gear 41, is "adapted to be engaged with an engagement gear on an engagement projection formed on the reel." Tsuyuki explains that "inhibiting gear 41" on the bottom of inhibiting member 4 "can mesh with the inhibiting gear 27 on said reel

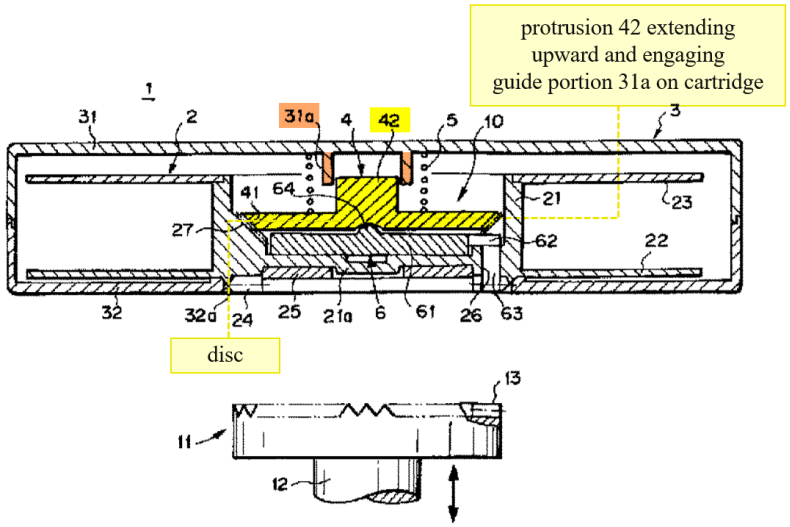
2." Tsuyuki ¶16; *see also* ¶15 ("meshing surface (engaging surface) of this inhibiting gear 27"), ¶23 ("In the inhibited state above, the inhibiting member 4 is centered by the conical shaped inhibiting gear 41 on the inhibiting member 4 being meshed with the inhibiting gear 27 on the reel 2 in a state pressed by the pressing member 5…").

460. As I explain below in Section IX.J.1.e, inhibiting gear 27 are an engagement gear on an engagement projection formed on the reel. That inhibiting gear 41 and inhibiting gear 27 engage with each other is depicted in Figure 2 below:

"Braking Member" Structure	Disclosure in Tsuyuki
(2) the braking gear adapted to be engaged with an engagement gear tooth on an engagement projection formed on the reel	Figure 2 annular braking gear (inhibiting gear 41) adapted to be engaged with an engagement gear of an engagement projection (inhibiting gear 27) 

461. Third, inhibiting member 4 has "a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing." Tsuyuki explains that inhibiting member 4 has "a straight line vertical wall shaped protrusion 42," which "is formed extending upward on the top surface of the inhibiting member 4" and mates with a "guide portion 31a formed standing in the inner surface of an upper

case 31 such that it is restricted to a non-rotatable state." Tsuyuki ¶16. Below I have highlighted guide portion 31a in orange:

"Braking Member" Structure	Disclosure in Mizutani
(3) a projection extending upward from the disc's upper surface, which engages a projection extending downward from the inner surface of the upper half of the cartridge casing	

462. As it performs the claimed function of the "braking member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, inhibiting member 4 of Tsuyuki meets the "braking member" of claim 3 under the BRI of that term.

c. Claim 3, Limitation 3b

463. Limitation 3b requires "an urging member which urges the braking member toward the locking position." Tsuyuki's cartridge includes a "**coil spring 5**" that satisfies the "urging member" element of limitation 3b.

i. "urging member": function

464. As explained in Section VI.B.2, the claimed function of the "urging member" is "urges the braking member toward the locking position." Coil spring 5 performs this function.

465. As explained in Section IX.J.1.b, inhibiting member 4 meets the claimed "braking member." Tsuyuki discloses that a "pressing member 5," in the form of a "coil spring" (Tsuyuki ¶17), exerts downward pressing force onto the inhibiting member, bringing the inhibiting member's gear into engagement with the inhibiting gear on the reel (Tsuyuki ¶22).

466. Coil spring 5 therefore performs the claimed function of the "urging member."

ii. "urging member": structure

467. As explained in Section VI.B.2, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "urging member" is: a coiled spring. Pressing member 5 is a coiled spring. Tsuyuki ¶17.

468. As it performs the claimed function of the "urging member," and does so using the same structures as those disclosed in the specification of the '905 patent for performing the claimed function, pressing member 5 of Mizutani meets the "urging member" of claim 3 under the BRI of that term.

d. Claim 3, Limitation 3c

469. Limitation 3c requires "a releasing member which is rotated integrally with the reel and moves the braking member toward the releasing position in response to a reel chucking action of the reel drive means of a tape drive." Tsuyuki's cartridge includes a "**release member 6**" that satisfies the "releasing member" element of limitation 3c.

i. "releasing member": function

470. As explained in Section VI.B.3, the claimed function of the "releasing member" is "moves the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive." Release member 6 performs this function.

471. As explained in Section IX.J.1.b, inhibiting member 4 meets the claimed "braking member." Tsuyuki discloses that when the cartridge is inserted into a tape drive, "release member 6" exerts upward pressing force on inhibiting member 4, thereby moving it out of engagement with the reel's inhibiting gear 127 and permitting rotation of the reel. Tsuyuki ¶24; ¶14 ("a release member 6 moving said inhibiting member 4 **in a releasing direction**"), claim 1 ("releasing member which … causes said inhibiting member to move in a releasing direction"), Figs. 1-3. Release member 6 thus performs the first-half of the claimed function, i.e., "moves the braking member toward the releasing position."

472. It also performs the second-half of the claimed function, i.e., "…in response to a reel chucking action of the drive gear of a tape drive." Specifically, the legs of the release member (i.e., pushing portions 63) are "pressed" upward when teeth of "**drive gear 13** mesh[] with [the] reel gear" as part of a "**chucking operation**." Tsuyuki ¶19; ¶24 ("**chucking operation** meshes the drive gear 13 with the real gear 24…. This brings **the tooth tip of said drive gear 13 in contact with the** center of the ends of the upward **pushing portions 63 on the release member 6**, applying pressure and pushing them upward"), claim 1 ("releasing member which moves in accordance with a **chucking operation** of a drive side rotation driving means"), Abstract ("releasing member 6 moves in accordance with a **chucking operation**").

473. The second-half of the claimed function incorporates my proposed interpretation for the phrase "reel drive means." As explained in Section VI.C, the claimed function of the "reel drive means" is driving the reel, and the corresponding structure disclosed in the specification of the '905 patent is a "drive gear."

474. As Tsuyuki explains, "release member 6 is pressed according to the drive gear 13 meshing with [] real gear [24]." Tsuyuki ¶19. The reason the drive gear 13 meshes with the reel gear 24 is to drive the reel, i.e., turn it, when the tape cartridge is used. Tsuyuki ¶24 ("… the reel 2 becomes free to rotate. And the

recording and playback device drive extracts or winds the magnetic tape."). The drive gear 13 thus performs the claimed function of the "reel drive means." The "drive gear 13" also form a drive gear, and thus it is the same structure as that disclosed in the specification of the '905 patent as corresponding to the "reel drive means."

ii. "releasing member": structure

475. As explained in Section VI.B.3, the structure disclosed in the specification of the '905 patent that performs the claimed function of the "releasing member" is "a plate-like body with leg portions extending downward from its lower surface."

476. As seen below in Figures 2 and 3, release member 6 has a plate-like body with leg portions extending downward from its lower surface. Specifically, release member 6 comprises a disc 61 with three arms 62 each of which has a leg 63 extending downward. Tsuyuki, ¶18. Release member 6 is thus the same structure disclosed in the '905 patent for the claimed "releasing member."

Figure 3

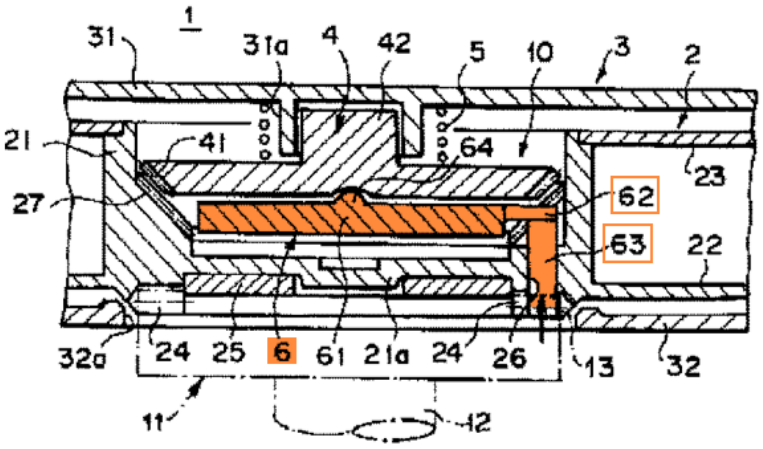
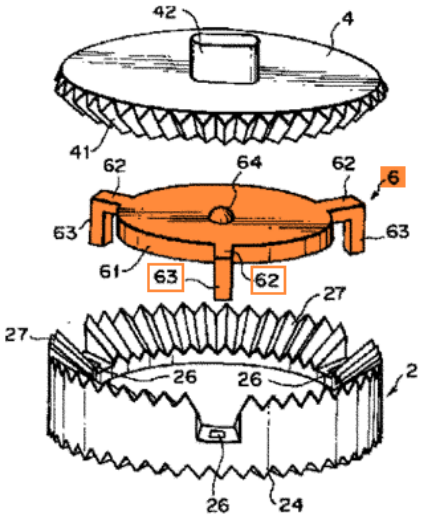


Figure 2



477. As explained in Section VI.B.3, the "releasing member" disclosed in the '905 patent is "substantially triangular," but the BRI of the term is not limited to substantially triangular plate-like bodies. Were the Board to limit "releasing member" to substantially triangular bodies, however, then Tsuyuki's release member 6 is structure equivalent to the "releasing member."

478. I understand from counsel that structures are equivalent under §112, ¶6 if they are insubstantially different with respect to structure. I further understand that insubstantially different structures perform the identical function, in substantially the same way, with substantially the same result. *Id.* Lock release member 21 and the "releasing member" structure of the '905 patent are equivalents under this test.

479. First, as I explained immediately above in Section IX.J.1.d, the two structures perform the identical function—i.e., move[s] the braking member toward the releasing position in response to a reel chucking action of the drive gear of a tape drive.

480. Second, the two structures perform this identical function in substantially the same way. Specifically, in response to the cartridge being loaded in a tape drive, the structures both press up on braking members to counteract the downward pressure of a spring. *Compare* Tsuyuki ¶19 *with* '905 Patent at 7:36-46, 8:8-21. The structures both generate upward pressure via three legs in a triangle arrangement, which the tape drive pushes up, and then base plates, whether circular or triangular, directly apply pressure to the "braking member." *Compare* Tsuyuki ¶19 *with* '905 Patent at 7:36-46, 8:8-21.

481. Third, the structures achieve substantially the same result: the downward pressure from a spring is overcome and the "braking member" is disengaged from engagement projections on the reel. *Compare* Tsuyuki ¶19 *with* '905 Patent at 7:36-45.

482. The two structures thus perform the identical claimed function in substantially the same way, with substantially the same result.

iii. "rotated integrally with the reel"

483. Tsuyuki discloses that its "release member 6 rotates as one body with the reel 2." Tsuyuki ¶19. Thus, the release member is, as recited in limitation 1c, "rotated integrally with the reel."

e. Claim 3, Limitation 3d

484. Limitation 3d requires that "the braking member is provided with a braking gear which is adapted to be engaged, to restrict rotation of the reel, with an engagement gear on an engagement projection formed on the reel."

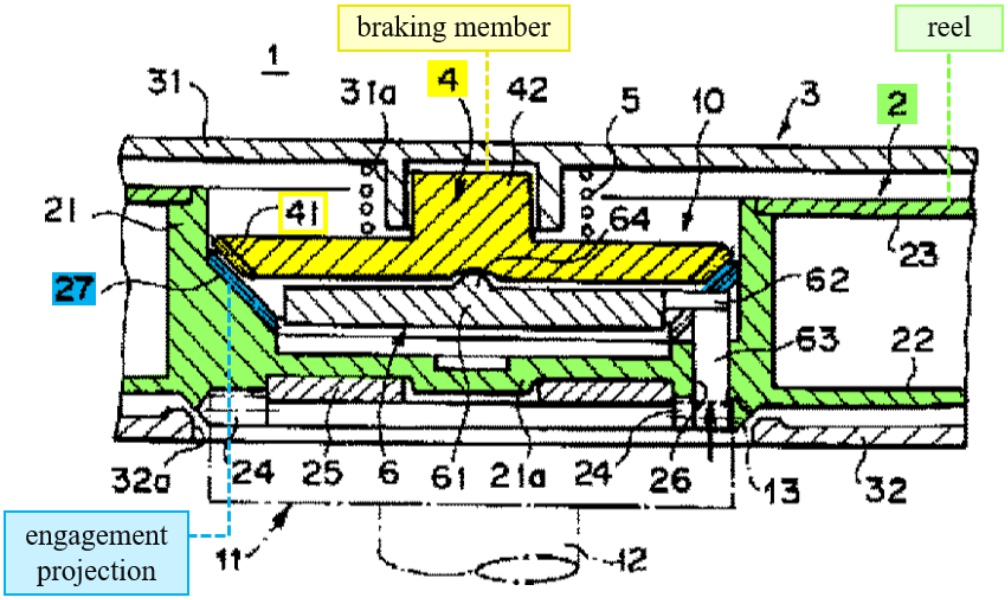
485. As explained in Section IX.J.1.b, inhibiting member 4 meets the claimed "braking member." It meets the remainder of limitation 3d as well.

486. Inhibiting member 4 is provided with an inhibiting gear 41 that meshes with an inhibiting gear 27 formed "on the outer perimeter of the bottom wall 21a" of the reel. Tsuyuki ¶¶15-16. The engagement between inhibiting gear 27 and inhibiting gear 41 "restrain[s] reel 2 rotation during non-use, preventing extraction of the magnetic tape." Tsuyuki ¶22.

487. As described in Tsuyuki and shown in Figure 3 (below), inhibiting gear 27 projects from the inner surface of the reel hub. Tsuyuki ¶15 ("[O]n the outer perimeter of the bottom wall 21a is an inhibiting gear 27 with internal teeth…"). As the gear projects from the bottom wall of the reel, inhibiting gear 27 comprises "engagement projections" as recited in limitation 3d. Moreover, the

teeth of inhibiting gear 27 create an engagement gear. Tsuyuki ¶16 ("inhibiting gear 41 is engraved with external bevel teeth, and this inhibiting gear can mesh with the inhibiting gear 27 on said reel 2"). Thus, inhibiting gear 27 constitutes an engagement gear on an engagement projection formed on the reel.

Figure 3



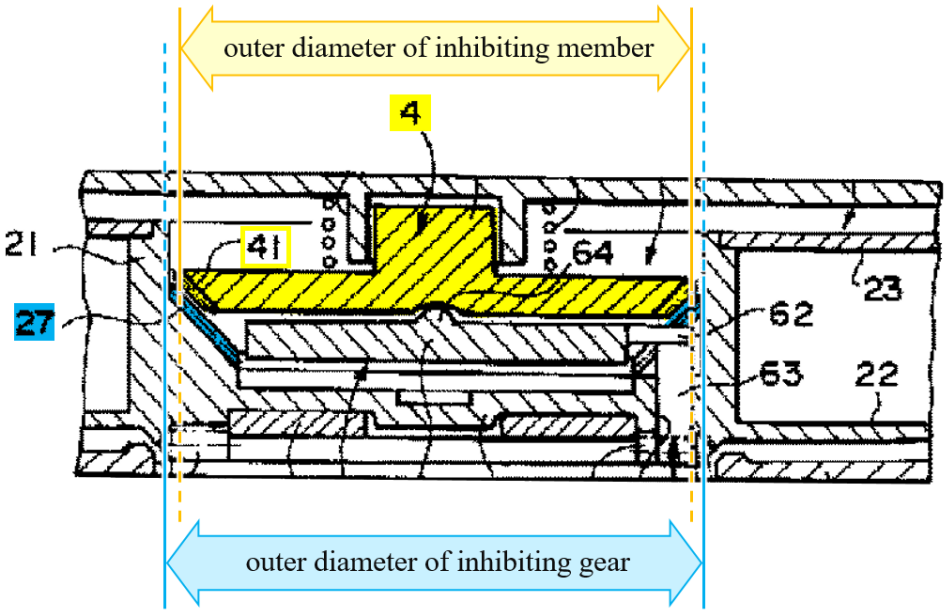
488. Inhibiting member 4 is therefore provided with "a braking gear," i.e., inhibiting gear 41, "which is adapted to be engaged with an engagement gear on an engagement projection formed on the reel," i.e., inhibiting gear 27

f. Claim 3, Limitation 3e

489. Limitation 3e requires "the outer diameter of the engagement gear being larger than that of the braking gear."

490. As explained above in Section IX.J.e, the "engagement gear" in Tsuyuki is the inhibiting gear 47, while the "braking gear" is inhibiting gear 21.

As shown in, for example, Figure 1 (below) the outer diameter of inhibiting gear 47 is larger than that of inhibiting gear 21.



491. A POSA would have understood Figure 1 to disclose that the outer diameter of inhibiting gear 27 is larger than the outer diameter of inhibiting gear 41. Tsuyuki explains that the two gears are mating bevel gears. Tsuyuki ¶15 ("an inhibiting gear 27 with **internal teeth** engraved at an angle relative to the reel hub 21 cylinder surface"), ¶16 ("inhibiting gear 41 is engraved with **external bevel teeth**, and this inhibiting gear 41 can mesh with the inhibiting gear 27 on said reel 2"), FIG. 2 (depicting bevel gears). A POSA would have known that with a bevel gear, one gear is intended to fit inside the other gear such that one gear has a smaller diameter than the other. In Tsuyuki, a POSA would have known that because inhibiting gear 41 fits within inhibiting gear 27, the outer diameter of

inhibiting gear 41 is smaller than the outer diameter of inhibiting gear 41. This knowledge would have reinforced a POSA's interpretation that Tsuyuki discloses a design in which the outer diameter of inhibiting gear 27 is larger than the outer diameter of inhibiting gear 41. Therefore, Tsuyuki discloses, as recited in claim 3[e], a cartridge in which "the outer diameter of the engagement gear being larger than that of the braking gear."

K. Claim 3 Would Have Been Obvious in view of Tsuyuki

492. As explained in Section IX.J, Tsuyuki discloses a braking gear (inhibiting member 41) with an OD smaller than the OD of its engagement gear (inhibiting gear 27). However, even if it did not explicitly disclose such a dimensional relationship between the two components (it does), designing the Tsuyuki cartridge such that it had the claimed dimensional relationship would have been obvious to a POSA.

493. Tsuyuki explains that inhibiting gear 27 is formed "on the outer perimeter of the bottom wall 21a" which is part of reel hub 21. Tsuyuki ¶15. As seen in Figures 1 and 3 of Tsuyuki, the outer-most diameter of inhibiting gear 27 extends to the inner wall surface of reel hub 21. Thus, the inner diameter of the reel hub is the outer diameter of inhibiting gear 27.

494. Because the inner diameter of the reel hub is also the outer diameter of inhibiting gear 27, a POSA would have known that the outer diameter of the

inhibiting member 41 needed to be less than the outer diameter of the inhibiting gear 27 in order for the Tsuyuki cartridge to function properly. Specifically, a POSA would have recognized the need for some amount of clearance between the outer diameter of the inhibiting member 41 and the inner surface of the reel hub. Without such clearance, inhibiting member 41 would be restricted from moving up and down within the reel hub and the reel would be restricted from rotating around the inhibiting member. To create clearance needed to ensure the Tsuyuki cartridge functioned properly, a POSA would have designed the inhibiting member 41 (as shown in Tsuyuki) to have an outer diameter smaller than the inner surface of the reel hub which necessarily means it would have had a diameter smaller than the outer diameter of the inhibiting gear 27.

495. Once inhibiting member 41 was designed to ensure there was clearance between it and the inner surface of the reel hub, the Tsuyuki cartridge would have disclosed all limitations of claim 3 and rendered the claim obvious. Designing the Tsuyuki cartridge in this manner would have been the obvious use of a known technique (clearance fits) to a known device (Tsuyuki's cartridge) to yield a predictable result (a cartridge with proper clearance between its components).

L. Claim 4 Is Anticipated by Morita-II

1. Patent Owner's Concessions Concerning Morita-II

496. I understand from counsel for Sony that the Patent Owner (Fujifilm) filed a patent application in Europe—EP20000124448. I have reviewed the prosecution history from that application. Ex-1009.

497. The application describes the same "invention" described in the '905 patent and it originally included a claim 4 that is identical to claim 4 of the '905 patent. Ex-1009 at 35-37. A comparison of the two claims is provided in Ex-1016. As is apparent from that comparison, the original European claim and claim 4 of the '905 patent both include the Braking Gear Angle Limitation that I discussed above in Section V.C.

498. European claim 4 was rejected over Morita-II. Ex-1009 at 52, (identifying Morita-II as D1), Ex-1009 at 53 (rejecting claim 4 over D1). In response to the rejection, the applicants amended European claim 4 by narrowing its Braking Gear Angle Limitation such that it no longer allowed α to equal β, and instead required that α be less than β. Ex-1009 at 61 (new claim 1 reciting "wherein an interior angle (α) between the first inclined surface (42a) and a vertical (S) **is smaller** than an interior angle (β) between the second inclined surface (42b) and the vertical (s)"); Ex-1009 at 64 ("The applicant has replaced a first feature 'the interior angle between the first inclined surface and the vertical being **not**

larger than the interior angle between the second inclined surface and the vertical' by '… **is smaller** …'"); Ex-1025 (redline comparison of original European claim 4 and amended European claim).

499. In making their revision to the Braking Gear Angle Limitation, the applicants argued that requiring α to be less than β distinguished the claim from Morita-II which the applicants explained "clearly show[s] in figures 8, 11 and 13" teeth on the brake member with "two abutment surfaces with an **equal inclination**, so that the teeth of the brake member (104) could provide the same force on a single reel (102) in both directions thereof, namely, winding and unwinding." Ex-1009 at 58; *see also* Ex-1009 at 59 ("[Morita-II] does not mention nor render obvious that the abutment surfaces of the teeth should be differently inclined…"), Ex-1009 at 64 ("The applicant has replaced a first feature 'the interior angle between the first inclined surface and the vertical being **not larger than** the interior angle between the second inclined surface and the vertical' by '… **is smaller** …' to distinguish the subject-matter of present independent claim from [Morita-II]."); Ex-1009 at 70 (describing Morita-II as disclosing "two abutment surfaces of an equal inclination, so that the teeth of the brake member could provide the same force on a single reel in both directions thereof, namely, winding and unwinding direction"); Ex-1009 at 90 (same), Ex-1009 at 110 (same). The amended claims were subsequently allowed. Ex-1009 at 131.

500. In my view, the Patent Owner's statements during prosecution of the related European application that Morita-II "clearly show[s]" a braking gear teeth having "two abutment surfaces with an **equal inclination**" is a concession that Morita-II discloses gear teeth in which first and second inclined surfaces create angles with the vertical (i.e., α and β) that are equal to each other. Indeed, but for the applicants altering the language of the Braking Gear Angle Limitation to require that α be "smaller" than β, it appears the claim would have remained rejected as anticipated by Morita-II. The applicants' concession regarding Morita-II is unsurprising given the figures of Morita-II disclose braking gear teeth with equal inclinations.

2. Limitation-by-Limitation Analysis

a. Claim 4, preamble

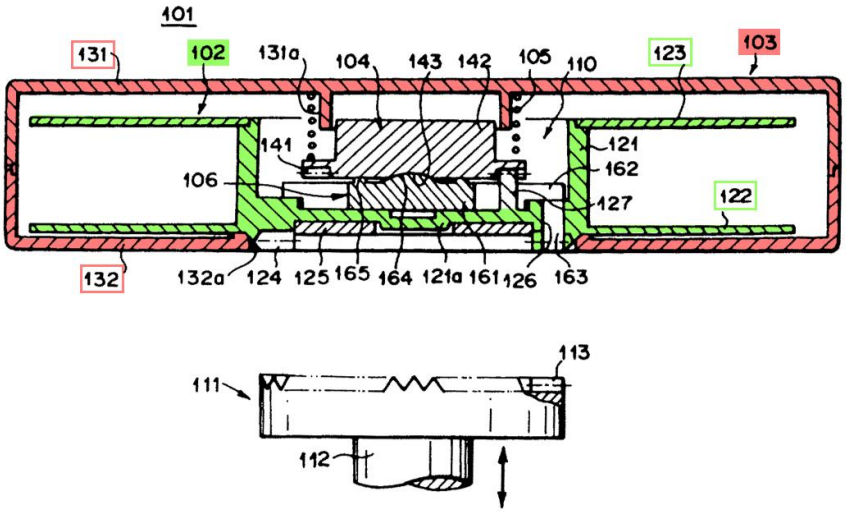
501. The preamble to claim 1 recites: "[a] magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation and a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used." Morita-II discloses each element of the preamble.

iv. "a magnetic tape cartridge comprising a magnetic tape wound around a single reel, a cartridge casing in which the reel is housed for rotation,…"

502. Morita-II discloses, as recited in the preamble, a "magnetic tape cartridge comprising a magnetic tape wound around a single reel" and "a cartridge casing in which the reel is housed for rotation." Specifically, Morita-II discloses "a magnetic tape cartridge comprising a cartridge casing and a single reel around which a magnetic tape is wound and which is contained in the cartridge casing for rotation." Morita-II ¶1; *see also id*. ¶¶2-4, ¶6 ("[A] magnetic tape cartridge comprising a cartridge casing, a single reel around which a magnetic tape is wound and which is contained in the cartridge casing for rotation…"), ¶24 ("In Figure 7, the magnetic tape cartridge 101 … comprises a single reel 102 around which a magnetic tape (not shown) is wound and is contained for rotation in a cartridge casing 103.").

503. Morita-II's cartridge (red) and reel (green) are shown below:

FIG. 7



v. "a reel stopper means which locks the reel not to rotate when the magnetic tape cartridge is not being used and releases the reel to permit rotation thereof when the magnetic tape cartridge is to be used"

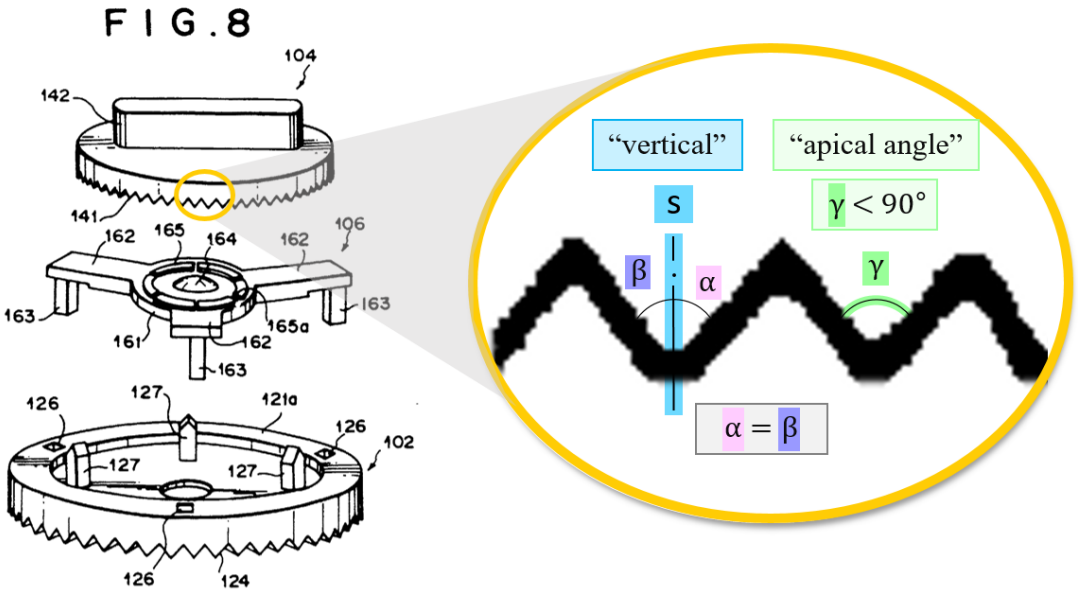
504. As I explained in Section IX.H.2.a.ii, the reel stopper means 110 disclosed in Morita-II meets the "reel stopper means" recited in the preamble of claim 1. As the chart I created above in Section V.C. shows, the "reel stopper means" element is identical in the preambles of claim 1 and 4. Thus, for the reasons I provided in Section IX.G.2.a.ii, the reel stopper means 110 of Morita-II meets the "reel stopper means" of claim 4 under the BRI of that term.

b. Claim 4, Limitations 4a to 4d

505. As the chart I created above in Section V.C. shows, limitations [a]-[d] of claim 4 are identical to limitations [a]-[d] of claim 1. Therefore, Morita-II discloses limitations [a]-[d] of claim 4 for the same reasons discussed in Section IX.H.2.b-e which addressed claim 1.

c. Claim 4, Limitation 4e

506. As I explained in Section V.C, limitation 4e is the Braking Gear Angle Limitation. As Patent Owner repeatedly conceded during European prosecution, Morita-II depicts the gear teeth on its brake member 104 as having equal inclined surfaces, such that α is equal to β. In Morita-II, the equal angles α and β together form an apical angle 90° or less as shown below:



507. That the apical angle α and β form together is 90° or less is apparent from the figure—it's not an obtuse angle. It's also not an issue that the applicants disputed during European prosecution. As I mentioned previously, Exhibit 1021 shows that a "most practical" symmetrical gear tooth design would have α and β angles that both equal 30°, thus forming an apical angle between them less than

90°. Even in the most extreme scenario identified in the article, α and β would equal 40° and thus still form an apical angle between them less than 90°.

508. Moreover, a POSA would have understood that the smaller the apical angle the more robust a locking mechanism the brake gear would have provided. This knowledge would have reinforced a POSA's interpretation of Figure 8 as disclosing an apical angle less than 90° since the purpose of the brake member 104 is to brake the reel. Morita-II ¶30 ("[A spring] urges the brake member 104 toward the operative position where the stopper gear 141 and the engagement projections 127 are engaged with each other to prevent rotation of the reel 104.").

509. A gear tooth with an apical angle **greater** than 90° is less likely to "prevent rotation of the reel" than a gear tooth with an apical angle **less** than 90°. The steeper the tooth surfaces (i.e., the smaller the apical angle), the more torque the gear can resist and the better brake it creates. Gears with apical angles greater than 90° are designed to slip, i.e., not brake. For example, the noise makers used during New Years' Eve include gears with large apical angles because the gears are designed to slip in order to make noise.

510. Given the well understood benefit to designing brake gears with small apical angles, a POSA would have understood that the gear teeth on the Morita-II brake member 106 had apical angles less than 90°. As shown above, the figures themselves confirm this understanding.

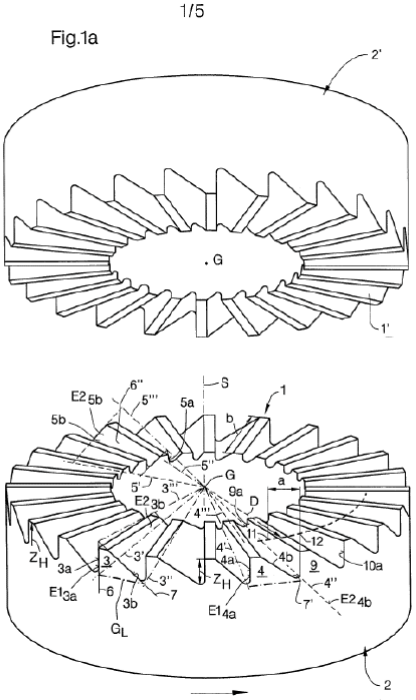
511. Alternatively, the knowledge that gear teeth with smaller apical angles serve as better brakes would have given a POSA a reason to adopt such a design in Morita-II rendering the claim obvious.

M. Claim 4 Would Have Been Obvious Over Morita-II In View of Betzler

1. Reasons for Modifying Morita-II in View of Betzler

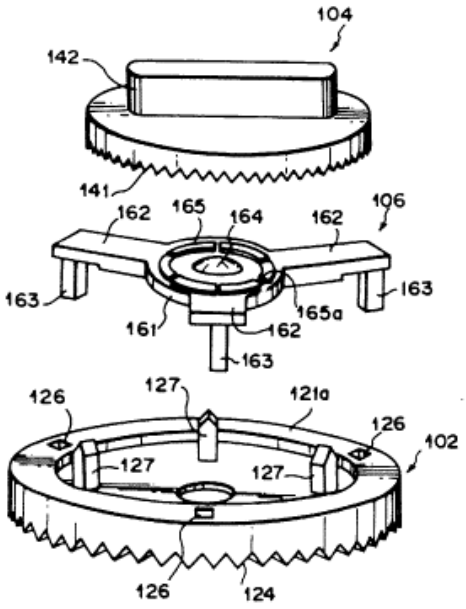
512. Betzler relates to a machine element known as a Hirth coupling. Betzler at 1:7-8. A Hirth coupling is a type of face gear. As its name implies, a face gear is a disklike gear with teeth on its face, rather than its side. Ex-1022 (defining "face gear" as "a disklike gear having teeth cut on the face"); Ex-1023 (same). Hirth couplings have existed since the 1920s. Ex-1024.

513. Figure 1a of Betzler depicts two complementary face gears:



514. Figure 8 of Morita-II also discloses complementary face gears, i.e., brake member 104 and engagement projections 127:

FIG. 8



515. Although the bottom face gear in Morita-II, i.e., projections 127, comprises only three gear teeth, a POSA would have still considered it to be a face gear because the gear teeth are on the face of the disc. In fact, Betzler discloses several face gears in which there is not a full complement of teeth like the Morita-II face gear. Betzler at FIGS. 2 and 3.

516. Betzler explains that Hirth tooth designed face gears are beneficial because they "create a form-fitting, self-centering connection" and are useful as "a fixation element with a high repeat precision." Betzler at 1:16-20; *see also id.* at

14:10-14. According to Betzler, "[t]he possible uses of such connecting elements are quite varied and are not limited to specific examples of use." Betzler at 1:20-21.

517. The disclosed invention in Betzler is the use of gear teeth that "are configured asymmetrically." Betzler at Abstract; *see also* 2:26-28 ("at least individual ones of the toothing elements are designed to be asymmetrical, i.e., to have an asymmetrical geometry with regard to the tooth profile"). The benefits to an "asymmetrical" tooth design, Betzler explains, include the creation of a "safety coupling in the form of an overrunning clutch, in which the flanks of the [gear teeth] … slide over one another when a predefined axial force is exceeded in accordance with the geometry." Betzler at 3:18-4:8.

518. Betzler teaches that its "asymmetrical structure is achieved by the fact that a first flank of an individual gearing elements is designed to be steeper than the other, the second flank." Betzler at 4:10-11. Betzler discloses an embodiment in which each gear tooth has a first flank angle "between 0° and $\leq$ 29°," preferably 0°, and the second flank angle is "29° < 80°, preferably $\leq$ 80°." Betzler at 4:10-18, 5:8-10; *see also* 13:6-7. Betzler teaches that with this embodiment, the gear forms an "overrunning clutch" which allows the gear to be designed so that more torque is required before the gear slips in one direction versus the other direction. Betzler

at 5:14-20. With the Betzler design, more torque is needed in the direction of the steeper flank before the gear teeth slip than in the direction of the less steep flank.

519. As the purpose of brake member 104 is to lock the Morita-II reel during non-use, and Betzler teaches that gears with its asymmetrical gear tooth designs are useful "as a fixation element with a high repeat precision," a POSA would have recognized that brake member 104 was a suitable gear upon which to implement the asymmetrical teachings of Betzler.

520. A POSA, in view of Betzler, would have designed the gear teeth on brake member 104 to have steep flanks (e.g., 0° to $\leq$ 29°) abutting the tape-unwinding direction and less steep flanks (e.g., 29° to < 80°) abutting the tape-winding direction. With this design, the likelihood that the reel of Morita-II would unwind during non-use and thereby cause the magnetic tape to become loose is minimized.

521. A POSA would have had a reason to modify brake member 104 such that it had an asymmetrical tooth profile in view of Morita-II's teaching that a purpose of a reel brake is to ensure that "magnetic tape is not accidentally drawn out." Morita-II ¶2. A POSA would have recognized that the Betzler asymmetrical tooth design was more likely to ensure "magnetic tape is not accidentally drawn out" than the symmetrical gear tooth design disclosed in the figures of Morita-II. The symmetrical design disclosed in Morita-II would have allowed brake member

104 to slip just as easily in either the un-winding direction as the winding direction. Therefore, modifying the Morita-II design to include an asymmetrical tooth profile would have improved brake member 104 by making it more likely to accomplish its intended purpose, i.e., not allow the reel to unwind, and thus a POSA would have had a reason to make the modification.

522. Additionally, using Betzler's gear design in Morita-II would have been the simple substitution of one known element (symmetrical gear teeth) for another (asymmetrical gear teeth) to obtain a predictable result (a brake that withstands more torque in the unwinding direction than the winding direction). Likewise, using Betzler's gear design in Morita-II would have been the use of a known technique (asymmetrical gear teeth) to improve similar devices (a gear) in the same way (a gear that withstands more torque in one direction than another).

2. Claim 4, Limitation-by-Limitation Analysis

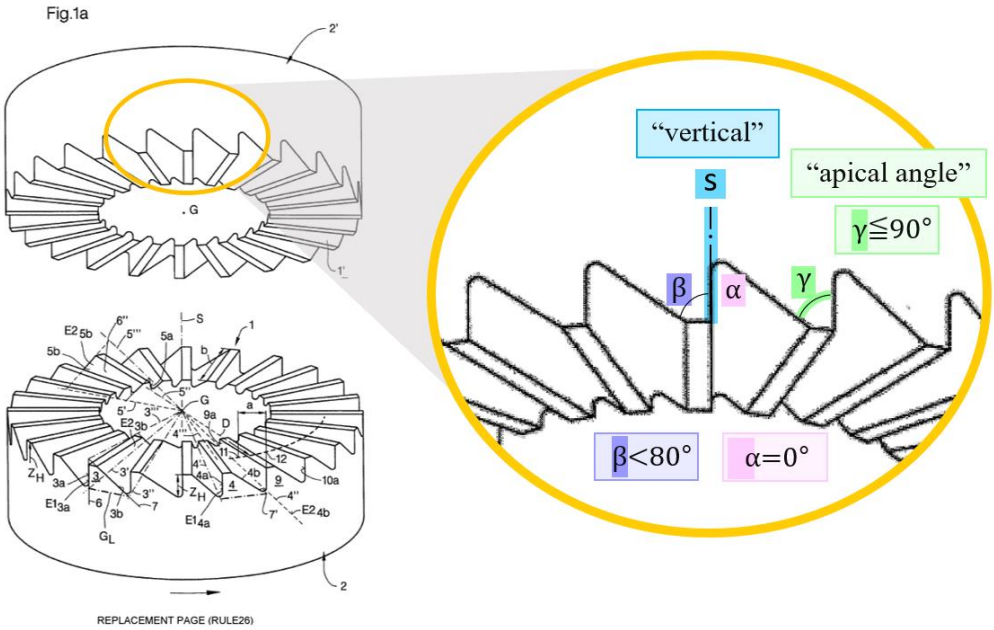
a. Claim 4, Preamble and Limitations 4a to 4d

523. I explained in Section IX.L.2.a-b, how Morita-II meets the preamble and limitations [a] to [d] of claim 4. That same explanation applies here as well.

b. Claim 4, Limitation 4e

524. Once modified to the incorporate the asymmetrical gear tooth design disclosed in Betzler, the gear teeth on brake member 104 of Morita-II would have satisfied the Braking Gear Angle Limitation.

525. As illustrated in the portion of Betzler's Figure 1a reproduced below, the teeth on Betzler's gears preferably have a first flank angle of roughly 0° (i.e., α) and have a second flank angle that is "preferably <80°," (i.e. β). Betzler at 4:10-18, 5:10.



526. When designing brake member 104 in view of Betzler, a POSA would have designed it such that the steeper first flank of its braking gear abuts the engagement projections 127 in the tape-unwinding direction, while its less-steep second flank abuts the gear in the tape winding direction. As mentioned above, this design would have ensured that the reel was less likely to rotate in the un-winding direction than the winding direction.

527. Moreover, while Betzler teaches that a first flank angle of 0° is preferable, the reference is express that "the geometry of the individual gearing

elements…depends on the specific application case and…is therefore up to the judgment of the responsible person skilled in the art." Betzler at 8:16-20. A POSA designing the Morita-II brake member 104 would have known that its components are typically molded. Morita-II ¶13 (discussing molding the reel out of synthetic resin). As I explained previously, when parts are to be molded, a POSA would have designed the parts to include a draft angle to ensure that the molded parts can be easily removed from the mold. Thus, a POSA designing brake member 104, in view of Betzler, would have designed its first flank angle (i.e., α) to be near, but not exactly, 0°. Therefore, the first flank angle is between a first inclined surface and a vertical, and the second flank angle is between a second inclined surface and the vertical.

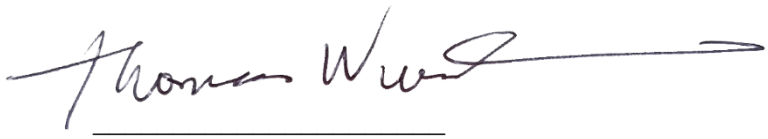
528. In the modified Morita-II cartridge, the "first inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-unwinding direction with the braking gear and the engagement gear tooth in mesh with each other," is the steep surface of the ramp shaped tooth depicted in Figure 1A above. The "second inclined surface which is brought into abutment against the engagement gear teeth when the reel is rotated in the tape-winding direction with the braking gear and the engagement gear tooth in mesh with each other," is the less steep surface of the ramp shaped tooth as depicted in Figure 1A above. "The interior angle between the first inclined surface and the vertical," i.e.,

α, is, as recited in the claim, "not larger than the interior angle between the second inclined surface and the vertical," i.e., β. This is also depicted in Figure 1A. Finally, "the first and second inclined surfaces forming there between an apical angle not larger than 90°," as also depicted in Figure 1A.

X. SIGNATURE

I hereby declare that all statements made in this declaration of my own personal knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the U.S. Code.

Dated: March 30, 2018



Thomas W. von Alten