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(54) **ARTICLE VENDING MACHINE AND METHOD FOR AUTHENTICATING RECEIVED ARTICLES**

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(56)

References Cited

U.S. PATENT DOCUMENTS

1,901,243 A 3/1933 Horwitt
2,098,697 A 11/1937 Vanderput
(Continued)

FOREIGN PATENT DOCUMENTS

CA 1236546 A1 5/1988
CA 2302753 A1 5/1999
(Continued)

OTHER PUBLICATIONS

A complete version of U.S. Appl. No. 61/501,026 dated Jun. 24, 2011 is presented as a part of this office action. Publication No. 2012/0330458 A1 takes a priority to this provisional application.

(Continued)

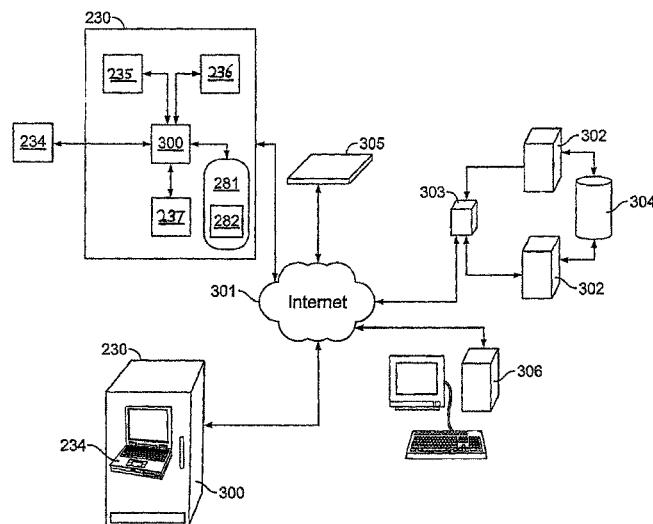
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(57) **ABSTRACT**

An article dispensing machine, system and method for authenticating an article returned to the article dispensing machine and an article for use in such a machine and system are disclosed herein. The returned article comprises an authentication code disposed on the surface of the returned article and a layer that is substantially opaque in visible light and at least partially overlays the authentication code. The article dispensing machine comprises a light source for illuminating the surface of the returned article so that the authentication code is visible through the layer, an image capture device for capturing an image of the authentication code when the surface is illuminated, and a processor for comparing the captured image to a master authentication code.

35 Claims, 8 Drawing Sheets



(58) **Field of Classification Search**

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4,903,815 A 2/1990 Hirschfeld et al.
 4,915,205 A 4/1990 Reid et al.
 D308,052 S 5/1990 Darden et al.
 4,921,128 A 5/1990 Guigan et al.
 4,941,841 A 7/1990 Darden et al.

4,945,428 A 7/1990 Waldo
 4,947,028 A 8/1990 Gorog
 4,959,686 A 9/1990 Spallone et al.
 4,967,403 A 10/1990 Ogawa et al.
 4,967,906 A 11/1990 Morello et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,549,624 A	4/1951	Moore	4,982,346 A	1/1991	Girouard et al.
2,559,599 A	7/1951	Crump et al.	4,991,739 A	2/1991	Levasseur
2,562,293 A	7/1951	Bourquin	4,995,498 A	2/1991	Menke
3,267,436 A	8/1966	Alpert et al.	5,007,518 A	4/1991	Crooks et al.
3,379,295 A	4/1968	Varley	5,012,077 A	4/1991	Takano
3,404,764 A	10/1968	Lipp et al.	5,013,897 A	5/1991	Harman et al.
3,529,155 A	9/1970	Hansen	5,019,699 A	5/1991	Koenck
3,622,995 A	11/1971	Dilks et al.	5,020,958 A	6/1991	Tuttobene
3,648,241 A	3/1972	Naito et al.	5,028,766 A	7/1991	Shah
3,824,544 A	7/1974	Simjian	5,042,686 A	8/1991	Stucki
3,826,344 A	7/1974	Wahlberg	5,077,462 A	12/1991	Newell et al.
3,831,807 A	8/1974	Deaton et al.	5,077,607 A	12/1991	Johnson et al.
3,946,220 A	3/1976	Brobeck et al.	5,085,308 A	2/1992	Wilhelm
3,964,577 A	6/1976	Bengtsson	5,088,586 A	2/1992	Isobe et al.
4,043,483 A	8/1977	Gore et al.	5,091,713 A	2/1992	Horne et al.
4,073,368 A	2/1978	Mustapick	5,095,195 A	3/1992	Harman et al.
4,300,040 A	11/1981	Gould et al.	5,105,069 A	4/1992	Hakenewerth et al.
4,306,219 A	12/1981	Main et al.	5,128,862 A	7/1992	Mueller
4,348,551 A	9/1982	Nakatani et al.	5,133,441 A	7/1992	Brown
4,369,422 A	1/1983	Rasmussen et al.	5,139,384 A	8/1992	Tuttobene
4,369,442 A	1/1983	Werth et al.	5,143,193 A	9/1992	Geraci
4,385,366 A	5/1983	Housey, Jr.	5,159,560 A	10/1992	Newell et al.
4,388,689 A	6/1983	Hayman et al.	5,205,436 A	4/1993	Savage
4,396,985 A	8/1983	Ohara	5,206,814 A	4/1993	Cahlander et al.
4,414,467 A	11/1983	Gould et al.	5,207,784 A	5/1993	Schwartzendruber
4,415,065 A	11/1983	Sandstedt	5,212,649 A	5/1993	Pelletier et al.
4,449,186 A	5/1984	Kelly et al.	5,226,519 A	7/1993	DeWoolfson
4,458,802 A	7/1984	Maciver et al.	5,235,509 A	8/1993	Mueller et al.
4,519,522 A	5/1985	McElwee	RE34,369 E	9/1993	Darden et al.
4,530,067 A	7/1985	Dorr	5,273,183 A	* 12/1993	Tuttobene G07F 7/069 221/121
4,547,851 A	10/1985	Kurland			
4,553,222 A	11/1985	Kurland et al.	5,313,392 A	5/1994	Temma et al.
4,567,359 A	1/1986	Lockwood	5,313,393 A	5/1994	Varley et al.
4,569,421 A	2/1986	Sandstedt	5,319,705 A	6/1994	Halter et al.
RE32,115 E	4/1986	Lockwood et al.	5,323,327 A	6/1994	Carmichael et al.
4,598,810 A	7/1986	Shore et al.	5,353,219 A	10/1994	Mueller et al.
4,649,481 A	3/1987	Takahashi	5,383,111 A	1/1995	Homma et al.
4,650,977 A	3/1987	Couch	5,385,265 A	1/1995	Schlamp
4,668,150 A	5/1987	Blumberg	5,402,911 A	4/1995	Noelle
4,669,596 A	6/1987	Capers et al.	5,408,417 A	4/1995	Wilder
4,675,515 A	6/1987	Lucero	5,409,092 A	4/1995	Itako et al.
4,706,794 A	11/1987	Awane et al.	5,418,713 A	5/1995	Allen
4,722,053 A	1/1988	Dubno et al.	5,442,568 A	8/1995	Ostendorf et al.
4,723,212 A	2/1988	Mindrum et al.	5,445,295 A	8/1995	Brown
4,734,005 A	3/1988	Blumberg	5,450,584 A	9/1995	Sekiguchi et al.
4,766,548 A	8/1988	Cedrone et al.	5,450,938 A	9/1995	Rademacher
4,767,917 A	8/1988	Ushikubo	5,467,892 A	11/1995	Schlamp
4,775,935 A	10/1988	Yourick	5,482,139 A	1/1996	Rivalto
4,778,983 A	10/1988	Ushikubo	5,484,988 A	1/1996	Hills et al.
4,789,045 A	12/1988	Pugh	5,499,707 A	3/1996	Steury
4,789,054 A	12/1988	Shore et al.	5,504,675 A	4/1996	Cragun et al.
4,797,818 A	1/1989	Cotter	5,510,979 A	4/1996	Moderi et al.
4,812,629 A	3/1989	O'Niel et al.	5,513,116 A	4/1996	Buckley et al.
4,812,985 A	3/1989	Hambrick et al.	5,546,316 A	8/1996	Buckley et al.
4,814,592 A	3/1989	Bradt et al.	5,550,746 A	8/1996	Jacobs
4,814,985 A	3/1989	Swistak	5,555,143 A	9/1996	Hinnen et al.
4,821,629 A	4/1989	Davison et al.	5,559,714 A	9/1996	Banks et al.
4,821,917 A	4/1989	Brown	5,559,887 A	9/1996	Davis et al.
4,825,045 A	4/1989	Humble	5,561,604 A	10/1996	Buckley et al.
4,839,505 A	6/1989	Bradt et al.	5,576,951 A	11/1996	Lockwood
4,839,507 A	6/1989	May	5,594,791 A	1/1997	Szlam et al.
4,847,764 A	7/1989	Halvorson	5,608,643 A	3/1997	Wichter et al.
4,858,743 A	8/1989	Paraskevakos et al.	5,615,123 A	3/1997	Davidson et al.
4,860,876 A	8/1989	Moore et al.	5,632,681 A	5/1997	Bakoglu et al.
4,866,661 A	9/1989	De Prins	5,633,839 A	5/1997	Alexander et al.
4,875,598 A	10/1989	Dahl	5,637,845 A	6/1997	Kolls
4,882,475 A	11/1989	Miller et al.	5,638,985 A	6/1997	Fitzgerald et al.
4,893,705 A	1/1990	Brown	5,644,727 A	7/1997	Atkins
4,893,727 A	1/1990	Near	5,647,505 A	7/1997	Scott
4,896,024 A	1/1990	Morello et al.			

(56)	References Cited					
U.S. PATENT DOCUMENTS						
5,647,507 A	7/1997	Kasper	6,138,911 A	10/2000	Fredregill et al.	
5,682,276 A	10/1997	Hinnen et al.	6,161,059 A	12/2000	Tedesco et al.	
5,694,546 A	12/1997	Reisman	6,164,528 A	12/2000	Hills et al.	
5,699,262 A	12/1997	Lang et al.	6,169,483 B1	1/2001	Ghaffari et al.	
5,699,528 A	12/1997	Hogan	6,179,206 B1	1/2001	Matsumori	
5,715,403 A	2/1998	Stefik et al.	6,181,981 B1	1/2001	Varga et al.	
5,724,069 A	3/1998	Chen	6,182,857 B1	2/2001	Hamm et al.	
5,724,521 A	3/1998	Dedrick	6,195,661 B1	2/2001	Filepp et al.	
5,732,398 A	3/1998	Tagawa	6,199,141 B1	3/2001	Weinreb et al.	
5,734,150 A	3/1998	Brown et al.	6,200,720 B1	3/2001	Rudick et al.	
5,748,485 A	5/1998	Christiansen et al.	6,201,474 B1	3/2001	Brady et al.	
5,754,850 A	5/1998	Janssen	6,202,006 B1	3/2001	Scott	
5,761,071 A	6/1998	Bernstein et al.	6,209,322 B1	4/2001	Yoshida et al.	
5,765,142 A	6/1998	Allred et al.	6,243,687 B1	6/2001	Powell	
5,768,142 A	6/1998	Jacobs	6,250,452 B1	6/2001	Partyka et al.	
5,769,269 A	6/1998	Peters	6,264,104 B1	7/2001	Jenkins et al.	
5,777,884 A	7/1998	Belka et al.	6,269,285 B1	7/2001	Mignault	
H1743 H	8/1998	Graves et al.	6,286,139 B1	9/2001	Decinque	
5,790,677 A	8/1998	Fox et al.	6,289,322 B1	9/2001	Kitchen et al.	
5,806,071 A	9/1998	Balderrama et al.	6,295,482 B1	9/2001	Tognazzini	
5,822,216 A	10/1998	Satchell, Jr. et al.	6,298,972 B1	10/2001	Tedesco et al.	
5,822,291 A	10/1998	Brindze et al.	6,311,165 B1	10/2001	Coutts et al.	
5,831,862 A	11/1998	Hetrick et al.	6,317,649 B1	11/2001	Tedesco et al.	
5,832,503 A	11/1998	Malik et al.	6,321,985 B1	11/2001	Kolls	
5,850,442 A	12/1998	Muftic	6,324,520 B1	11/2001	Walker et al.	
5,870,716 A	2/1999	Sugiyama et al.	6,327,230 B1	12/2001	Miller et al.	
5,873,069 A	2/1999	Reuhl et al.	6,330,958 B1	12/2001	Ruskin et al.	
5,875,110 A	2/1999	Jacobs	6,334,110 B1	12/2001	Walter et al.	
5,884,278 A	3/1999	Powell	6,336,098 B1	1/2002	Fortenberry et al.	
5,898,594 A	4/1999	Leason et al.	6,354,501 B1 *	3/2002	Outwater	G06K 19/06028
5,900,608 A	5/1999	Iida				235/462.01
5,905,246 A	5/1999	Fajkowski	6,360,139 B1	3/2002	Jacobs	
5,923,016 A	7/1999	Fredregill et al.	6,366,914 B1	4/2002	Stern	
5,930,771 A	7/1999	Stapp	6,367,653 B1	4/2002	Ruskin et al.	
5,934,439 A	8/1999	Kanoh et al.	6,367,696 B1	4/2002	Inamitsu et al.	
5,936,452 A	8/1999	Utsuno et al.	6,397,126 B1	5/2002	Nelson	
5,938,510 A	8/1999	Takahashi et al.	6,397,199 B1	5/2002	Goodwin, III	
5,941,363 A	8/1999	Partyka et al.	6,412,654 B1	7/2002	Cleeve	
5,943,423 A	8/1999	Muftic	6,415,555 B1	7/2002	Montague	
5,950,173 A	9/1999	Perkowski	6,415,950 B1	7/2002	Robrechts	
5,954,797 A	9/1999	Sidey	6,416,270 B1	7/2002	Steury et al.	
5,956,694 A	9/1999	Powell	6,424,706 B1	7/2002	Katz et al.	
5,959,869 A	9/1999	Miller et al.	6,430,470 B1	8/2002	Nakajima et al.	
5,963,134 A	10/1999	Bowers et al.	6,435,406 B1	8/2002	Pentel	
5,963,452 A	10/1999	Etoh et al.	6,438,447 B1	8/2002	Belka et al.	
5,984,509 A	11/1999	Scott	6,456,981 B1	9/2002	Dejaeger et al.	
5,988,346 A	11/1999	Tedesco et al.	6,457,038 B1	9/2002	Defosse	
5,988,431 A	11/1999	Roe	6,462,644 B1	10/2002	Howell et al.	
5,997,170 A	12/1999	Brodbeck	6,466,658 B2	10/2002	Schelberg, Jr. et al.	
6,002,395 A	12/1999	Wagner et al.	6,466,830 B1	10/2002	Manross et al.	
6,010,239 A	1/2000	Hardgrave et al.	6,477,503 B1	11/2002	Mankes	
6,014,137 A	1/2000	Burns	6,490,502 B2	12/2002	Fellows et al.	
6,029,851 A	2/2000	Jenkins et al.	6,493,110 B1	12/2002	Roberts	
6,039,244 A	3/2000	Finsterwald	6,505,095 B1	1/2003	Kolls	
6,044,362 A	3/2000	Neely	6,522,772 B1	2/2003	Morrison et al.	
6,047,338 A	4/2000	Grolemund	6,527,176 B2	3/2003	Baric	
6,050,448 A	4/2000	Willis	6,539,282 B2	3/2003	Metcalf et al.	
6,056,150 A	5/2000	Kasper	6,540,100 B2	4/2003	Credle, Jr. et al.	
6,056,194 A	5/2000	Kolls	6,575,363 B1	6/2003	Leason et al.	
6,058,373 A	5/2000	Blinn et al.	6,584,309 B1	6/2003	Whigham	
6,061,660 A	5/2000	Eggleston et al.	6,584,450 B1	6/2003	Hastings et al.	
6,062,478 A	5/2000	Izaguirre et al.	6,584,564 B2	6/2003	Olkin et al.	
6,072,481 A	6/2000	Matsushita et al.	6,587,748 B2	7/2003	Baack	
6,076,101 A	6/2000	Kamakura et al.	6,587,835 B1	7/2003	Treyz et al.	
6,078,848 A	6/2000	Bernstein et al.	6,595,342 B1	7/2003	Maritzen et al.	
6,085,888 A	7/2000	Tedesco et al.	6,606,602 B1	8/2003	Kolls	
6,101,483 A	8/2000	Petrovich et al.	6,628,764 B1	9/2003	Petite	
6,109,524 A	8/2000	Kanoh et al.	6,640,159 B2	10/2003	Holmes et al.	
6,115,649 A	9/2000	Sakata	6,644,455 B2	11/2003	Ichikawa	
6,119,934 A	9/2000	Kolls	6,644,495 B2	11/2003	Ruskin et al.	
6,123,223 A	9/2000	Watkins	6,655,580 B1	12/2003	Ergo et al.	
6,125,353 A	9/2000	Yagasaki	6,658,323 B2	12/2003	Tedesco et al.	
6,126,036 A	10/2000	D'Alayer De Costemore D'arc et al.	6,675,067 B2	1/2004	Blad	
6,134,547 A	10/2000	Huxley et al.	6,688,523 B1	2/2004	Koenck	
			6,696,918 B2	2/2004	Kucharczyk et al.	
			6,707,380 B2	3/2004	Maloney	
			6,707,381 B1	3/2004	Maloney	
			6,708,879 B2	3/2004	Hunt	
			6,711,464 B1	3/2004	Yap et al.	

(56)	References Cited						
U.S. PATENT DOCUMENTS							
6,711,465 B2	3/2004	Tomassi	7,853,600 B2	12/2010	Herz et al.		
6,715,403 B2	4/2004	Hajek, Jr. et al.	7,860,606 B2	12/2010	Rudy		
6,728,532 B1	4/2004	Ahonen	7,925,973 B2	4/2011	Allaire et al.		
6,742,673 B2	6/2004	Credle, Jr. et al.	7,988,049 B2	8/2011	Kuehnrich		
6,748,296 B2	6/2004	Banerjee et al.	8,036,774 B2	10/2011	Blust et al.		
6,748,539 B1	6/2004	Lotspeich	8,041,454 B2	10/2011	Blust et al.		
6,754,559 B2	6/2004	Itako	8,060,249 B2	11/2011	Bear et al.		
6,757,585 B2	6/2004	Ohtsuki et al.	8,078,316 B2	12/2011	Blust et al.		
6,792,334 B2	9/2004	Metcalf et al.	8,086,349 B2	12/2011	Blust et al.		
6,794,634 B2	9/2004	Hair, III et al.	8,155,784 B2 *	4/2012	Lowe	G06Q 10/06311	
6,814,256 B2	11/2004	Clark					700/232
6,847,861 B2	1/2005	Lunak et al.	8,234,207 B2	7/2012	Breitenbach et al.		
6,850,816 B2	2/2005	Garratt	8,235,247 B2	8/2012	Alvarez		
6,851,092 B2	2/2005	Chang et al.	8,306,908 B1	11/2012	Barker et al.		
6,854,642 B2	2/2005	Metcalf et al.	8,352,449 B1	1/2013	Parekh et al.		
6,923,371 B2	8/2005	Goodfellow	8,386,347 B2	2/2013	Hoblit		
6,932,270 B1	8/2005	Fajkowski	8,412,374 B2	4/2013	Kuehnrich et al.		
6,954,732 B1	10/2005	DeLapa et al.	8,417,380 B2	4/2013	Kuehnrich et al.		
6,959,285 B2	10/2005	Stefanik et al.	8,463,432 B2	6/2013	Weinshenker		
6,959,286 B2	10/2005	Perkowski	8,510,171 B2	8/2013	Pederson et al.		
6,965,869 B1	11/2005	Tomita et al.	8,538,581 B2 *	9/2013	Kuehnrich	G07F 17/005	
6,968,365 B2	11/2005	Hollstrom et al.					700/225
6,970,837 B1	11/2005	Walker et al.	2001/0011252 A1	6/2014	White et al.		
6,980,887 B2	12/2005	Varga et al.	2001/0011680 A1	8/2001	Kasahara		
6,985,607 B2 *	1/2006	Alasia	2001/0027357 A1	8/2001	Soltesz et al.		
			2001/0035425 A1	10/2001	Grobler		
			2001/0037207 A1	11/2001	Rocco et al.		
			2001/0047223 A1	11/2001	Dejaeger		
			2002/0029196 A1	11/2001	Metcalf et al.		
			2002/0046122 A1	3/2002	Metcalf et al.		
7,024,381 B1	4/2006	Hastings et al.	2002/0046123 A1	4/2002	Barber et al.		
7,024,390 B1	4/2006	Mori et al.	2002/0046123 A1	4/2002	Nicolini		
7,043,497 B1	5/2006	Carty et al.	2002/0065579 A1	5/2002	Tedesco et al.		
7,053,773 B2	5/2006	McGarry et al.	2002/0074397 A1	6/2002	Matthews		
7,058,581 B1	6/2006	Young	2002/0082917 A1	6/2002	Takano		
7,076,328 B2	7/2006	Piikivi	2002/0084322 A1	7/2002	Baric		
7,076,329 B1	7/2006	Kolls	2002/0087334 A1	7/2002	Yamaguchi et al.		
7,079,230 B1	7/2006	McInerney et al.	2002/0095680 A1	7/2002	Davidson		
7,079,822 B2	7/2006	Gunji et al.	2002/0125314 A1	9/2002	Jenkins et al.		
7,079,922 B2	7/2006	Komai	2002/0133269 A1	9/2002	Anselmi		
7,085,556 B2	8/2006	Offer	2002/0161475 A1	10/2002	Varga et al.		
7,085,727 B2	8/2006	VanOrman	2002/0165787 A1	11/2002	Bates et al.		
7,101,139 B1	9/2006	Benedict	2002/0165788 A1	11/2002	Bates et al.		
7,108,180 B2	9/2006	Brusso et al.	2002/0165821 A1	11/2002	Tree		
7,139,731 B1	11/2006	Alvin	2002/0169715 A1	11/2002	Ruth et al.		
7,167,842 B1	1/2007	Josephson, II et al.	2002/0183882 A1	12/2002	Dearing et al.		
7,167,892 B2	1/2007	Defosse et al.	2002/0195491 A1	12/2002	Bunch, III		
7,174,317 B2	2/2007	Phillips et al.	2003/0004828 A1	1/2003	Epstein		
7,191,952 B2	3/2007	Blossom	2003/0099408 A1	1/2003	Korin		
7,203,675 B1	4/2007	Papierniak et al.	2003/0023453 A1	1/2003	Hafen et al.		
7,209,893 B2	4/2007	Nii	2003/0030539 A1	2/2003	McGarry et al.		
7,213,753 B2	5/2007	Barton et al.	2003/0033054 A1	2/2003	Yamazaki		
7,233,916 B2	6/2007	Schultz	2003/0057219 A1	3/2003	Risolia		
7,234,609 B2	6/2007	DeLazzer et al.	2003/0061094 A1	3/2003	Banerjee et al.		
7,236,942 B1	6/2007	Walker et al.	2003/0105554 A1	6/2003	Eggenberger et al.		
7,236,946 B2	6/2007	Bates et al.	2003/0125961 A1	7/2003	Janda		
7,240,805 B2	7/2007	Chirnoma	2003/0130762 A1	7/2003	Tomassi		
7,240,843 B2	7/2007	Paul et al.	2003/0149510 A1	8/2003	Takahashi		
7,310,612 B2	12/2007	McQueen, III et al.	2003/0154141 A1	8/2003	Capazario et al.		
7,315,629 B2	1/2008	Alasia et al.	2003/0163382 A1	8/2003	Stefanik et al.		
7,347,359 B2	3/2008	Boyes et al.	2003/0163399 A1	8/2003	Harper et al.		
7,350,230 B2	3/2008	Forrest	2003/0167231 A1	9/2003	Winking et al.		
7,366,586 B2	4/2008	Kaplan et al.	2003/0204289 A1	10/2003	Banerjee et al.		
7,389,243 B2	6/2008	Gross	2003/0212471 A1	11/2003	Chakravarti		
7,406,693 B1	7/2008	Goodwin, III	2004/0006537 A1	1/2004	Zelechoski et al.		
7,412,073 B2	8/2008	Alasia et al.	2004/0010340 A1	1/2004	Guindulain Vidondo		
7,444,296 B1	10/2008	Barber et al.	2004/0016620 A1	1/2004	Davis		
7,447,605 B2	11/2008	Kuehnrich	2004/0030446 A1	2/2004	Guindulain Vidondo		
7,499,768 B2	3/2009	Hoersten et al.	2004/0050648 A1	3/2004	Carapelli		
7,584,869 B2	9/2009	DeLazzer et al.	2004/0064347 A1	4/2004	VanOrman		
7,747,346 B2	6/2010	Lowe et al.	2004/0064377 A1	4/2004	Ergo et al.		
RE41,543 E	8/2010	Satchell, Jr. et al.	2004/0065579 A1	4/2004	Wood		
7,774,233 B2	8/2010	Barber et al.	2004/0068346 A1	4/2004	Boucher		
7,774,268 B2 *	8/2010	Bradley	2004/0068451 A1	4/2004	Lenk et al.		
			2004/0078328 A1	4/2004	Talbert et al.		
7,787,987 B2	8/2010	Kuehnrich et al.	2004/0079798 A1	4/2004	Messenger et al.		
7,797,077 B2	9/2010	Hale	2004/0133466 A1	7/2004	Redmond et al.		
7,797,164 B2	9/2010	Junger et al.	2004/0133653 A1	7/2004	Defosse et al.		
7,853,354 B2	12/2010	Kuehnrich et al.	2004/0153413 A1	8/2004	Gross		
			700/236				

(56)	References Cited					
U.S. PATENT DOCUMENTS						
2004/0158503 A1	8/2004	Gross	2007/0011093 A1	1/2007	Tree	
2004/0158504 A1	8/2004	Gross	2007/0011903 A1	1/2007	Chang	
2004/0158871 A1	8/2004	Jacobson	2007/0050083 A1	3/2007	Signorelli et al.	
2004/0162633 A1	8/2004	Kraft et al.	2007/0050256 A1	3/2007	Walker et al.	
2004/0162783 A1	8/2004	Gross	2007/0050266 A1	3/2007	Barber et al.	
2004/0172274 A1	9/2004	Gross	2007/0051802 A1	3/2007	Barber et al.	
2004/0172275 A1	9/2004	Gross	2007/0063020 A1	3/2007	Barrafato	
2004/0172342 A1	9/2004	Gross	2007/0063027 A1	3/2007	Belfer et al.	
2004/0186783 A1	9/2004	Knight et al.	2007/0067429 A1	3/2007	Jain et al.	
2004/0243479 A1	12/2004	Gross	2007/0084872 A1	4/2007	Hair, III et al.	
2004/0243480 A1	12/2004	Gross	2007/0084917 A1	4/2007	Fajkowski	
2004/0249711 A1	12/2004	Walker et al.	2007/0094245 A1	4/2007	Vigil	
2004/0254676 A1	12/2004	Blust et al.	2007/0095901 A1	5/2007	Illingworth	
2004/0256402 A1	12/2004	Chirnomas	2007/0125104 A1	6/2007	Ehlers	
2004/0260600 A1	12/2004	Gross	2007/0130020 A1	6/2007	Paolini	
2004/0267604 A1	12/2004	Gross	2007/0136247 A1	6/2007	Vigil	
2004/0267640 A1	12/2004	Bong et al.	2007/0156442 A1	7/2007	Ali	
2005/0022239 A1	1/2005	Meuleman	2007/0156578 A1	7/2007	Perazolo	
2005/0027648 A1	2/2005	Knowles et al.	2007/0162183 A1	7/2007	Pinney et al.	
2005/0033855 A1	2/2005	Moradi et al.	2007/0162184 A1	7/2007	Pinney et al.	
2005/0060062 A1	3/2005	Walker et al.	2007/0169132 A1	7/2007	Blust et al.	
2005/0060246 A1	3/2005	Lastinger et al.	2007/0175986 A1	8/2007	Petrone et al.	
2005/0080510 A1	4/2005	Bates et al.	2007/0179668 A1	8/2007	Mellin	
2005/0085946 A1	4/2005	Visikivi et al.	2007/0185776 A1	8/2007	Nguyen et al.	
2005/0086127 A1	4/2005	Hastings et al.	2007/0210153 A1	9/2007	Walker et al.	
2005/0091069 A1	4/2005	Chuang	2007/0213871 A1	9/2007	Whitten et al.	
2005/0096936 A1	5/2005	Lambers	2007/0252003 A1	11/2007	Goldring et al.	
2005/0109836 A1	5/2005	Ben-Aissa	2007/0276537 A1	11/2007	Walker et al.	
2005/0177494 A1	8/2005	Kelly et al.	2007/0299737 A1	12/2007	Plastina et al.	
2005/0197855 A1	9/2005	Nudd et al.	2008/0005025 A1	1/2008	Legere et al.	
2005/0216120 A1	9/2005	Rosenberg et al.	2008/0027835 A1	1/2008	LeMasters et al.	
2005/0230410 A1	10/2005	DeLazzer et al.	2008/0040211 A1	2/2008	Walker et al.	
2005/0230473 A1	10/2005	Fajkowski	2008/0097770 A1	4/2008	Low et al.	
2005/0234911 A1	10/2005	Hess et al.	2008/0116262 A1	5/2008	Majer	
2005/0261977 A1	11/2005	Kiji et al.	2008/0125906 A1	5/2008	Bates et al.	
2005/0267819 A1	12/2005	Kaplan	2008/0131255 A1	6/2008	Hessler et al.	
2005/0274793 A1	12/2005	Cantini et al.	2008/0222690 A1	9/2008	Kim	
2005/0283434 A1	12/2005	Hahn-Carlson et al.	2008/0239961 A1	10/2008	Hilerio et al.	
2005/0289032 A1	12/2005	Hoblit	2008/0249658 A1	10/2008	Walker et al.	
2006/0026031 A1	2/2006	Gentling	2008/0275591 A1	11/2008	Chirnomas et al.	
2006/0026162 A1	2/2006	Salmonsen	2008/0313973 A1	12/2008	Butler Rolf	
2006/0041508 A1	2/2006	Pham et al.	2009/0018792 A1	1/2009	Kuehnrich	
2006/0045660 A1	3/2006	Di Rosa	2009/0030931 A1	1/2009	Khivesara et al.	
2006/0074777 A1	4/2006	Anderson	2009/0048932 A1	2/2009	Barber	
2006/0095286 A1	5/2006	Kimura	2009/0089187 A1	4/2009	Hoersten et al.	
2006/0095339 A1	5/2006	Hayashi et al.	2009/0113116 A1	4/2009	Thompson et al.	
2006/0096997 A1	5/2006	Yeo	2009/0139886 A1	6/2009	Blust et al.	
2006/0122881 A1	6/2006	Walker et al.	2009/0299824 A1	12/2009	Barnes, Jr.	
2006/0149685 A1	7/2006	Gross	2009/0326708 A1	12/2009	Rudy et al.	
2006/0155575 A1	7/2006	Gross	2010/0010964 A1	1/2010	Skowronek et al.	
2006/0184395 A1	8/2006	Millwee	2010/0036808 A1	2/2010	Lee	
2006/0190345 A1	8/2006	Crowley	2010/0042577 A1	2/2010	Rinearson	
2006/0212360 A1	9/2006	Stefanik et al.	2010/0057871 A1	3/2010	Kaplan et al.	
2006/0212367 A1	9/2006	Gross	2010/0127013 A1	5/2010	Butler	
2006/0231612 A1	10/2006	Walker et al.	2010/0138037 A1	6/2010	Adelberg et al.	
2006/0231613 A1	10/2006	Walker et al.	2010/0153983 A1	6/2010	Philmon et al.	
2006/0231614 A1	10/2006	Walker et al.	2010/0198400 A1	8/2010	Pascal et al.	
2006/0235746 A1	10/2006	Hammond et al.	2010/0211217 A1	8/2010	Hirsh et al.	
2006/0235747 A1	10/2006	Hammond et al.	2010/0274624 A1	10/2010	Rochford et al.	
2006/0241966 A1	10/2006	Walker et al.	2010/0296908 A1	11/2010	Ko	
2006/0241967 A1	10/2006	Gross	2010/0312380 A1	12/2010	Lowe et al.	
2006/0242059 A1	10/2006	Hansen	2010/0314405 A1	12/2010	Alvarez	
2006/0247823 A1	11/2006	Boucher	2010/0316468 A1	12/2010	Lert et al.	
2006/0247824 A1	11/2006	Walker et al.	2010/0318219 A1	12/2010	Kuehnrich et al.	
2006/0254832 A1	11/2006	Strong	2011/0004536 A1	1/2011	Hoersten et al.	
2006/0254862 A1	11/2006	Hoersten	2011/0047010 A1	2/2011	Arnold et al.	
2006/0259190 A1	11/2006	Hale	2011/0060454 A1	3/2011	Lowe et al.	
2006/0259191 A1	11/2006	Lowe	2011/0060456 A1	3/2011	Lowe et al.	
2006/0259192 A1	11/2006	Lowe et al.	2011/0093329 A1	4/2011	Bodor et al.	
2006/0265101 A1	11/2006	Kaplan et al.	2011/0103609 A1	5/2011	Pelland et al.	
2006/0265286 A1	11/2006	Evangelist et al.	2011/0130873 A1	6/2011	Yepez et al.	
2006/0266823 A1	11/2006	Passen et al.	2011/0131652 A1	6/2011	Robinson et al.	
2006/0272922 A1	12/2006	Hoersten et al.	2011/0145033 A1	6/2011	Kuehnrich et al.	
2006/0273152 A1	12/2006	Fields	2011/0153060 A1	6/2011	Yepez et al.	
2007/0005438 A1	1/2007	Evangelist et al.	2011/0153071 A1	6/2011	Claessen	
			2011/0238194 A1	9/2011	Rosenberg	
			2011/0238296 A1	9/2011	Purks et al.	
			2012/0046786 A1	2/2012	Kuehnrich et al.	

(56) References Cited		WO	2006116115	A2	11/2006	
U.S. PATENT DOCUMENTS						
2012/0059509 A1*	3/2012 Kuehnrich	G07F 17/005	WO	2006116116	A2 11/2006	
		700/225	WO	2006130638	A2 12/2006	
2012/0059511 A1	3/2012 Majer		WO	2007012816	A1 2/2007	
2012/0123587 A1	5/2012 Mockus et al.		WO	2009032946	A1 3/2009	
2012/0310409 A1	12/2012 Breitenbach et al.		WO	2010048375	A1 4/2010	
2012/0311633 A1	12/2012 Mandrekar et al.		WO	2011022689	A2 2/2011	
2012/0330458 A1	12/2012 Weiss		WO	2011028727	A2 3/2011	
2013/0046707 A1	2/2013 Maskatia et al.		WO	2011028728	A2 3/2011	
2013/0060648 A1	3/2013 Maskatia et al.		WO	2011031532	A2 3/2011	
2013/0238115 A1	9/2013 Smith et al.		OTHER PUBLICATIONS			
2013/0310970 A1	11/2013 Segal et al.		Article 34 Amendment for PCT Application No. PCT/US2010/046872, mailed on Jun. 28, 2011.			
2014/0018956 A1*	1/2014 Kuehnrich	G07F 17/005	Canadian Office Action for Canadian Patent Application No. 2566324, mailed on Aug. 9, 2011.			
		700/237	Canadian Office Action for Canadian Patent Application No. 2604730, mailed on Aug. 27, 2015.			
2014/0052292 A1	2/2014 Lowe		Communication from International Searching Authority transmitting International Search Report and Written Opinion, mailed Aug. 10, 2005 for International Application PCT/US05/12563.			
FOREIGN PATENT DOCUMENTS						
DE 3529155 A1	2/1987	EP 0060643 A2	9/1982	EP 0205691 A1	12/1986	
EP 0247876 A2	12/1987	EP 0249367 A2	12/1987	EP 0287367 A1	10/1988	
EP 0572119 A2	12/1993	EP 0986033 A2	3/2000	EP 1367549 A1	12/2003	
EP 2113892 A1	11/2009	EP 1396824 B1	7/2010	EP 2249367 A1	11/2010	
EP 2549624 A1	1/1985	FR 2559599 A1	8/1985	FR 2562293 A1	10/1985	
FR 380926 A	9/1932	GB 2143662 A	2/1985	GB 2172720 A	9/1986	
GB 2402242 A	12/2004	JP S55156107 A	12/1980	JP 2402242 A	12/2004	
JP S5647855 A	4/1981	JP H02178795 A	7/1990	JP H0362189 A	3/1991	
JP H03119496 A	5/1991	JP H10247982 A	9/1998	JP H03119496 A	5/1991	
JP 2000149136 A	5/2000	JP 2000306328 A	2/2003	JP H10247982 A	9/1998	
JP 2004094857 A	3/2004	JP 2004094857 A	3/2004	JP 2000149136 A	5/2000	
JP 2009043143 A	2/2009	KR 1019990066053 A	8/1999	JP 2000306328 A	2/2003	
KR 20030089154 A	11/2003	KR 20040069053 A	8/2004	KR 20060080175 A	7/2006	
KR 20060114658 A	11/2006	KR 20070021301 A	2/2007	KR 20060114658 A	11/2006	
WO 8700948 A1	2/1987	WO 8705425 A1	9/1987	WO 8700948 A1	2/1987	
WO 8804085 A1	6/1988	WO 8806771 A1	9/1988	WO 8705425 A1	9/1987	
WO 9300644 A1	1/1993	WO 9404446 A1	3/1994	WO 8804085 A1	6/1988	
WO 9618972 A1	6/1996	WO 9847799 A1	10/1998	WO 8806771 A1	9/1988	
WO 9924902 A1	5/1999	WO 0038120 A1	6/2000	WO 9300644 A1	1/1993	
WO 0072160 A1	11/2000	WO 0072160 A1	11/2000	WO 9404446 A1	3/1994	
WO 0225552 A2	3/2002	WO 0229708 A1	4/2002	WO 9618972 A1	6/1996	
WO 2004070646 A2	8/2004	WO 2005062887 A2	7/2005	WO 9847799 A1	10/1998	
WO 2006112817 A1	10/2006	WO 2006112817 A1	10/2006	WO 9924902 A1	5/1999	
WO 2006116108 A2	11/2006	WO 2006116109 A2	11/2006	WO 0038120 A1	6/2000	
WO 2006116110 A2	11/2006	WO 2006116112 A1	11/2006	WO 0072160 A1	11/2000	
WO 2006116113 A2	11/2006	WO 2006116114 A2	11/2006	WO 0225552 A2	3/2002	
WO 2006116114 A2	11/2006			WO 0229708 A1	4/2002	
				WO 2004070646 A2	8/2004	
				WO 2005062887 A2	7/2005	
				WO 2006112817 A1	10/2006	
				WO 2006116108 A2	11/2006	
				WO 2006116109 A2	11/2006	
				WO 2006116110 A2	11/2006	
				WO 2006116112 A1	11/2006	
				WO 2006116113 A2	11/2006	
				WO 2006116114 A2	11/2006	

(56)

References Cited**OTHER PUBLICATIONS**

International Search Report and Written Opinion for Application No. PCT/US2006/015131, mailed on Jul. 7, 2008, 4 pages.

International Search Report and Written Opinion for Application No. PCT/US2006/015132, mailed on May 10, 2007, 4 pages.

International Search Report and Written Opinion for Application No. PCT/US2006/015133, mailed on Jun. 6, 2007, 4 pages.

International Search Report and Written Opinion for Application No. PCT/US2010/046219, mailed on Feb. 28, 2011, 10 pages.

International Search Report and Written Opinion for Application No. PCT/US2010/046872, mailed on Mar. 29, 2011, 7 pages.

International Search Report and Written Opinion for Application No. PCT/US2010/047371, mailed on Apr. 29, 2011, 9 pages.

International Search Report and Written Opinion for Application No. PCT/US2010/047374, mailed on May 2, 2011, 9 pages.

International Search Report and Written Opinion for Application No. PCT/US2011/048686, mailed on Apr. 9, 2012, 9 pages.

International Search Report and Written Opinion for Application No. PCT/US2011/050339, mailed on Feb. 29, 2012, 8 pages.

International Search Report and Written Opinion for Application No. PCT/US2012/024900, mailed on Oct. 19, 2012, 8 pages.

International Search Report and Written Opinion for Application No. PCT/US2012/042329, mailed on Feb. 22, 2013, 28 pages.

International Search Report and Written Opinion for Application No. PCT/US2013/029414, mailed on Jun. 26, 2013, 7 pages.

International Search Report and Written Opinion for Application No. PCT/US2013/029424, mailed on Jun. 21, 2013, 9 pages.

International Search Report and Written Opinion for Application No. PCT/US2013/029443, mailed on Jun. 21, 2013, 13 pages.

International Search Report for Application No. PCT/US06/015129, mailed on Sep. 20, 2006, 1 page.

International Search Report for Application No. PCT/US06/15130, mailed on Nov. 22, 2006, 1 page.

International Search Report for Application No. PCT/US06/15132, mailed on May 10, 2007, 1 page.

International Search Report for Application No. PCT/US06/15133, mailed on Jun. 6, 2007, 1 page.

International Search Report for Application No. PCT/US2005/12563, mailed on Aug. 10, 2005, 1 page.

International Search Report for Application No. PCT/US2006/15125, mailed on Jan. 11, 2007, 1 page.

International Search Report for Application No. PCT/US2006/15126, mailed on Apr. 3, 2008, 1 page.

International Search Report for Application No. PCT/US2010/047371 mailed on Apr. 29, 2011, 3 pages.

International Search Report for Application No. PCT/US2010/050339 mailed on Dec. 13, 2010, 5 pages.

International Search Report for Application No. PCT/US2011/48686 mailed on Apr. 9, 2012, 5 pages.

International Search Report for Application No. PCT/US2012/024900 mailed on Oct. 19, 2012, 4 pages.

International Search Report for Application No. PCT/US2012/42329 mailed on Feb. 22, 2013, 13 pages.

Issue Rolling Stones Magazine, Film Rentals by Vending Machine, 1982.

Picture of U.S. Installation of Japanese Manufactured VHS Rental Kiosk, 1984.

Supplemental European Search Report for Application No. EP05736275 mailed on Jan. 21, 2009, 2 pages.

Supplemental European Search Report for Application No. EP10810691 mailed on Feb. 26, 2013, 3 pages.

Supplemental European Search Report for Application No. EP10814374 mailed on Jan. 16, 2015, 4 pages.

Supplemental European Search Report for Application No. EP10814375 mailed on Jan. 16, 2015, 4 pages.

Supplemental European Search Report for Application No. EP10815879 mailed on Mar. 19, 2013, 2 pages.

Supplemental European Search Report for Application No. EP11820476 mailed on Jun. 22, 2015, 2 pages.

Supplemental European Search Report for Application No. EP12799917 mailed on Sep. 19, 2014, 2 pages.

Supplementary European Search Report for Application No. EP05736275, mailed on Jan. 30, 2009, 3 pages.

Technophobe's best friend by MaClatchy, Smith Erika, McClatchy—Tribune Business news Oct. 22, 2007.

Unpublished co-pending U.S. Appl. No. 12/554,905, filed Sep. 5, 2009 (which is not being furnished herewith, pursuant to the Commissioner's Notice dated Sep. 21, 2004).

* cited by examiner

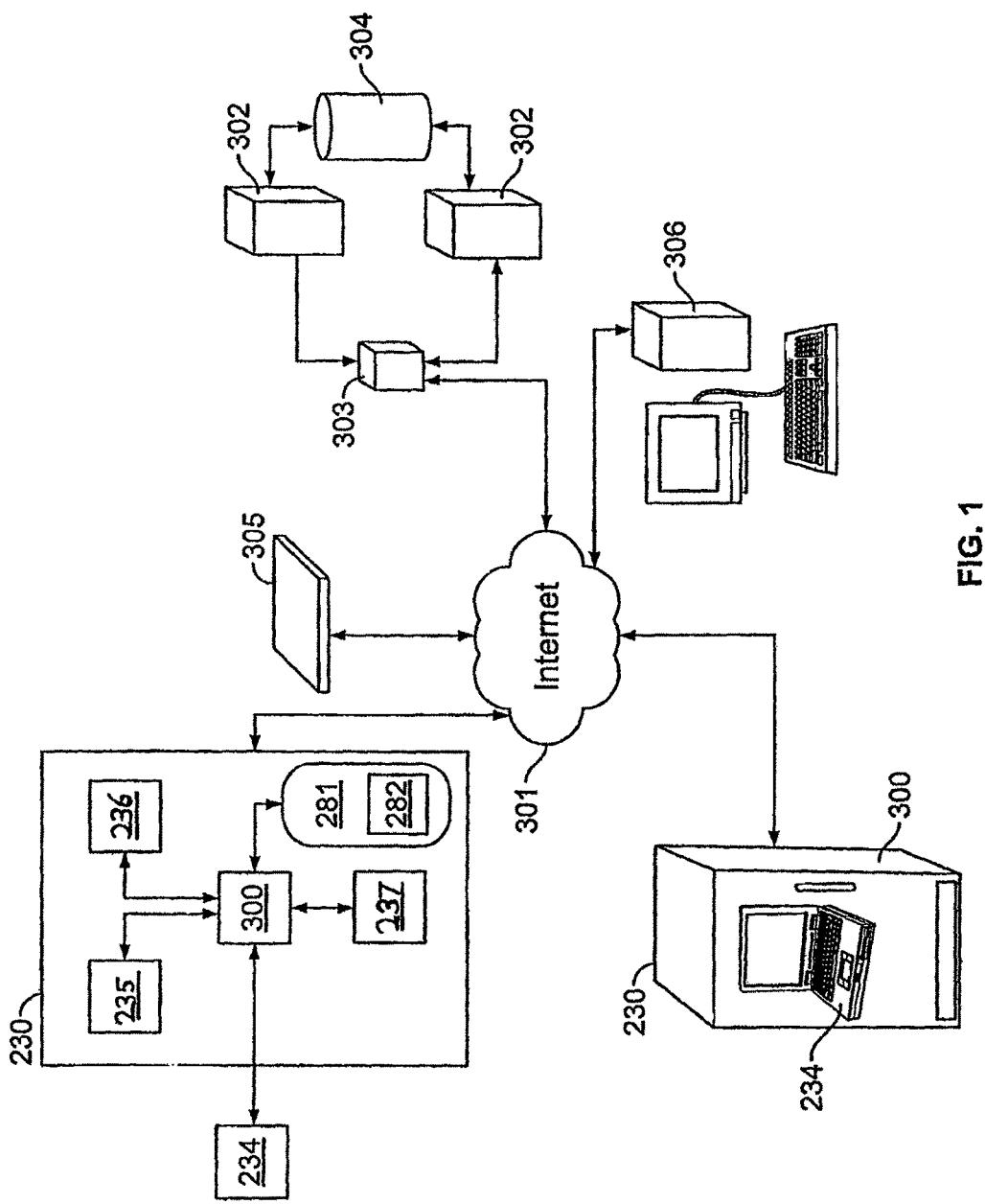


FIG. 1

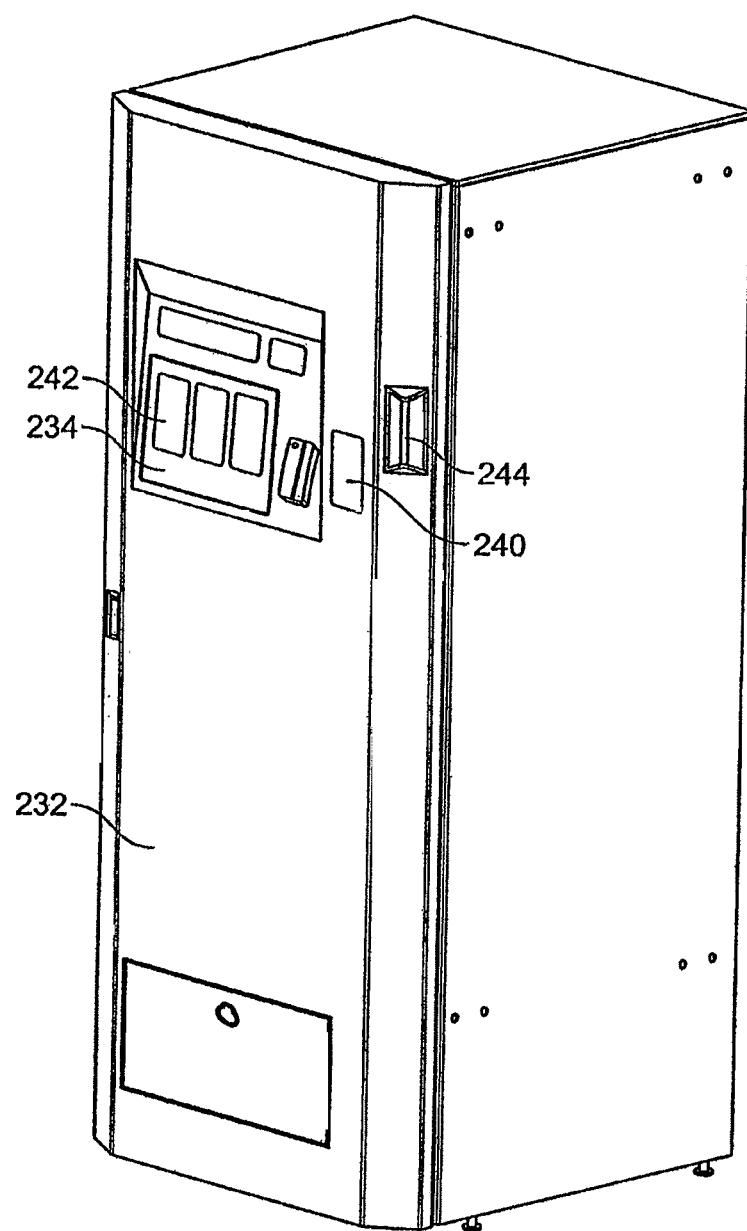


FIG. 2

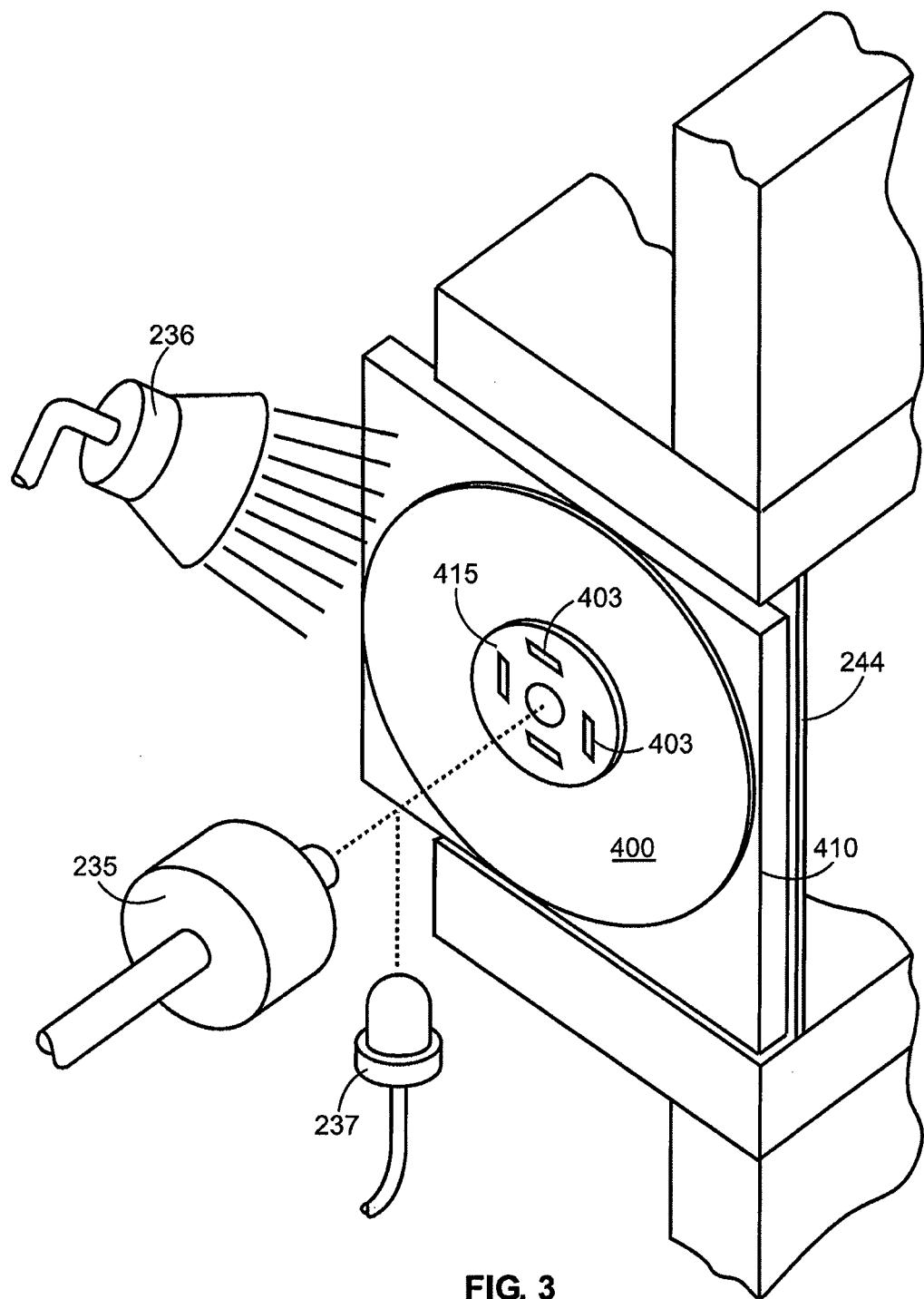
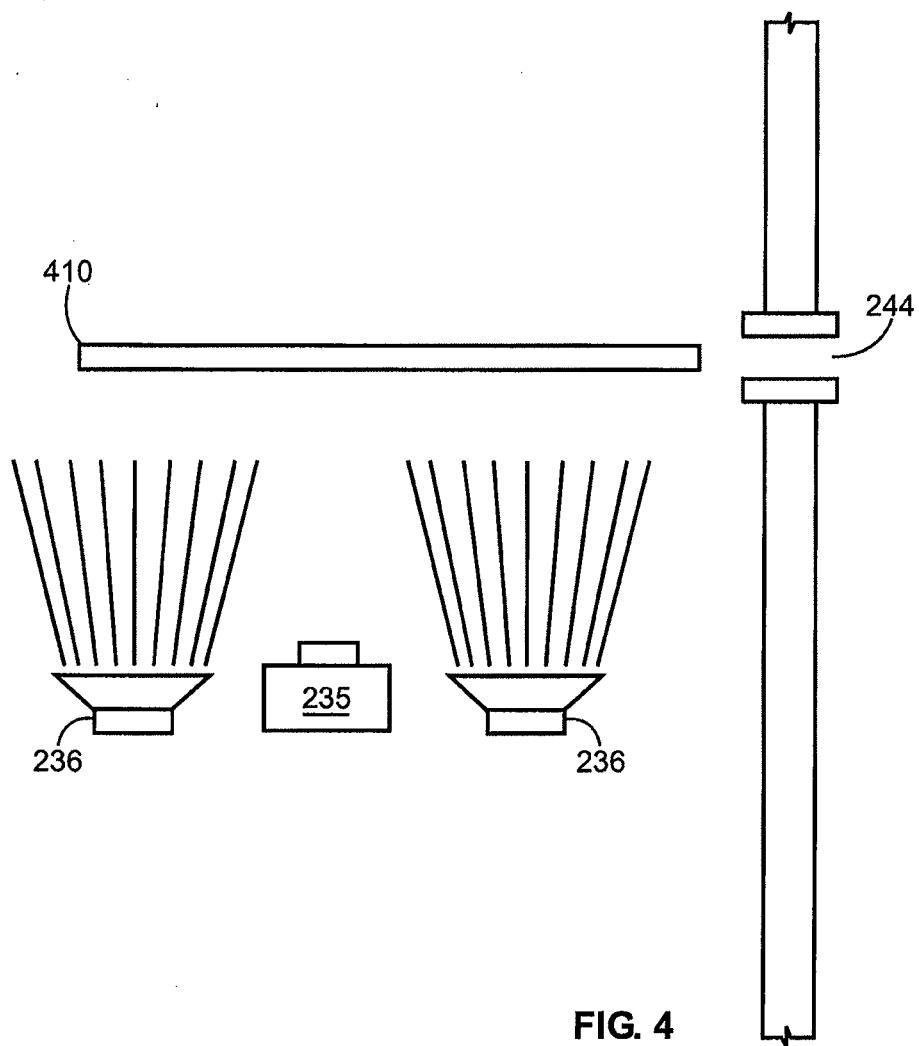


FIG. 3



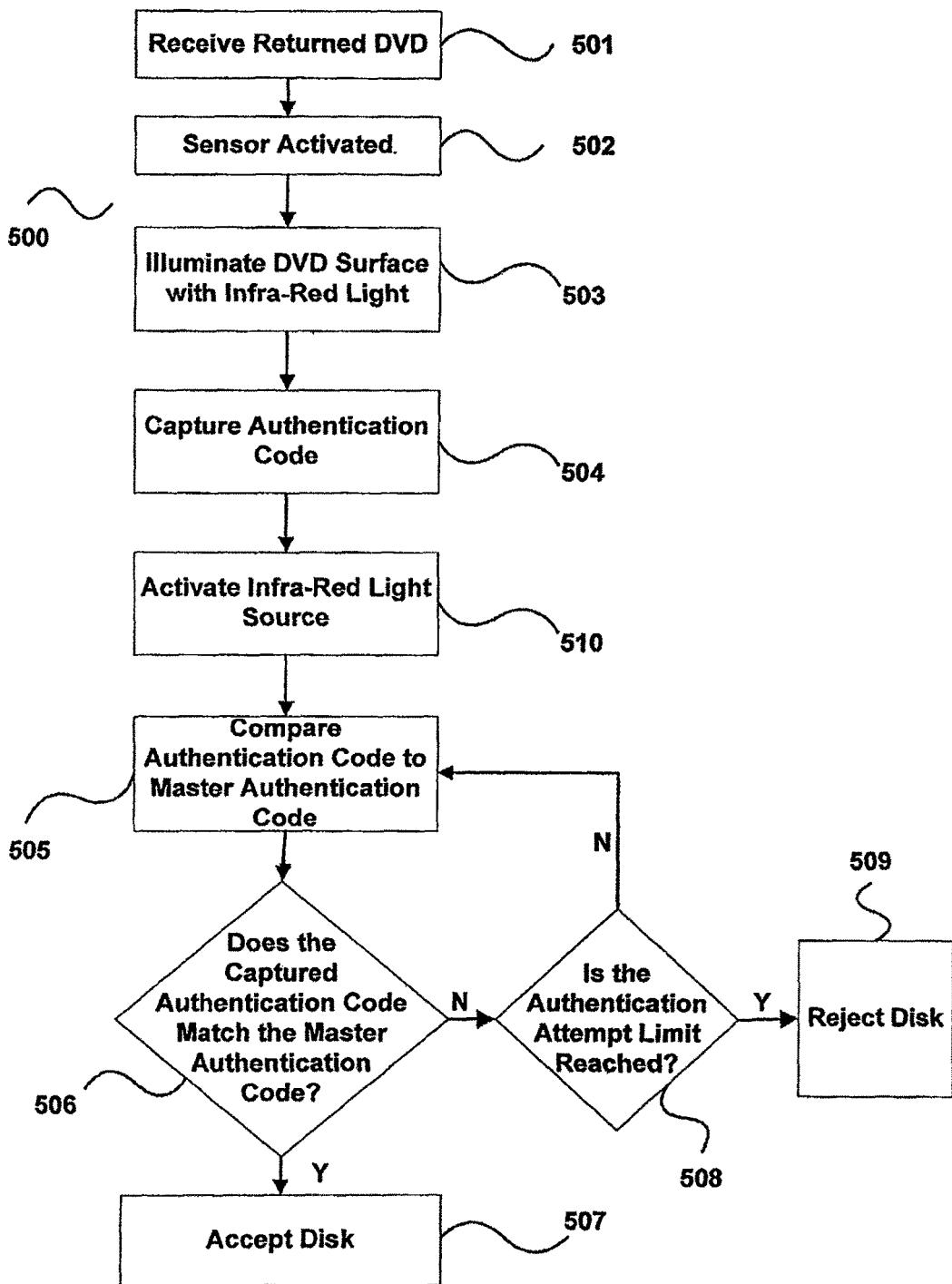


FIG. 5

FIG. 6

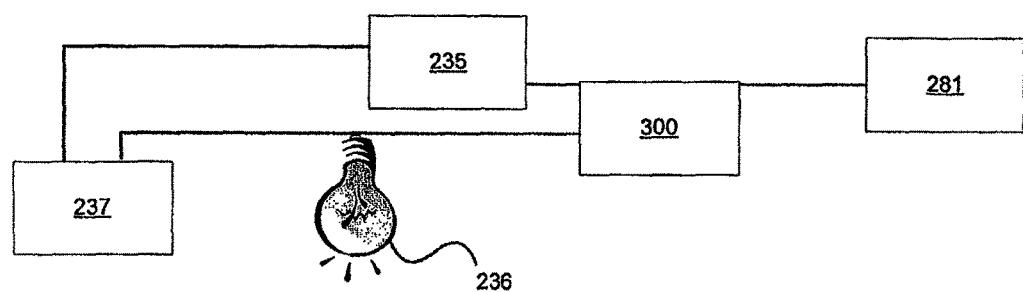
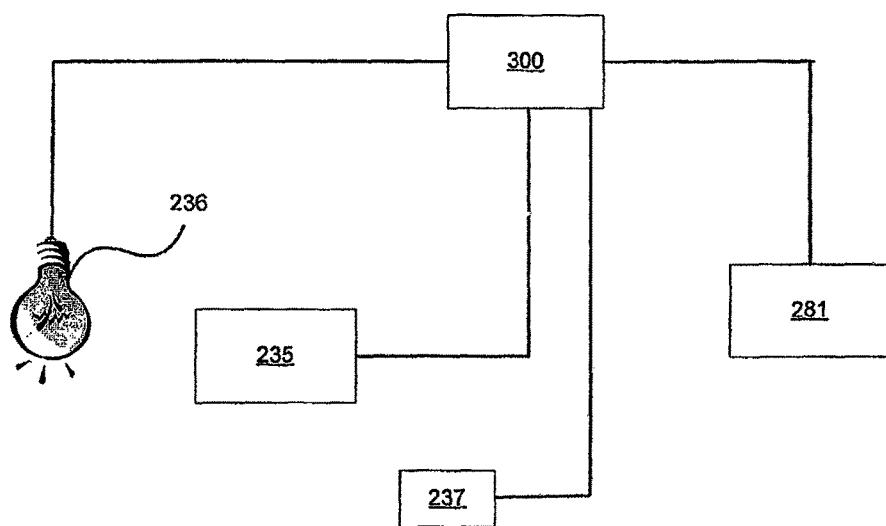


FIG. 7



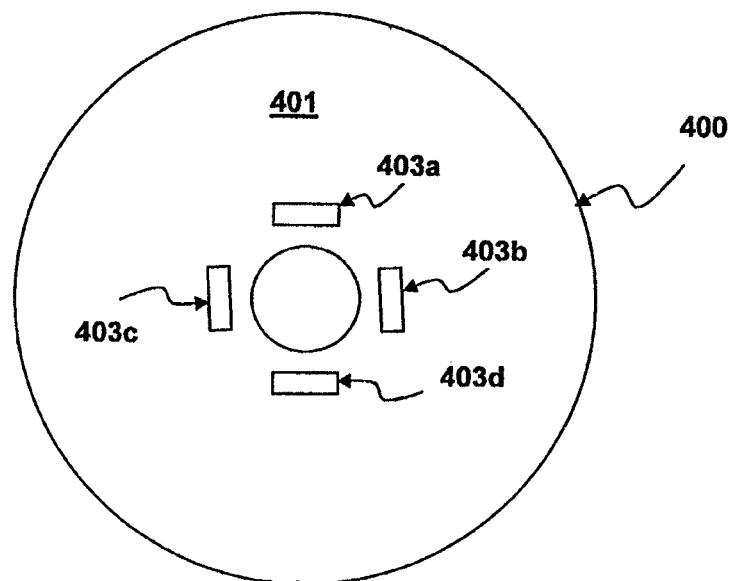


FIG. 8

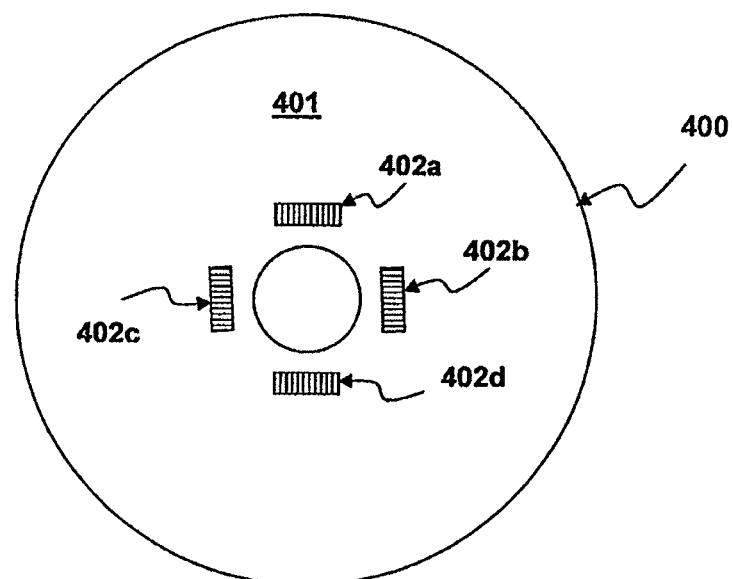


FIG. 9

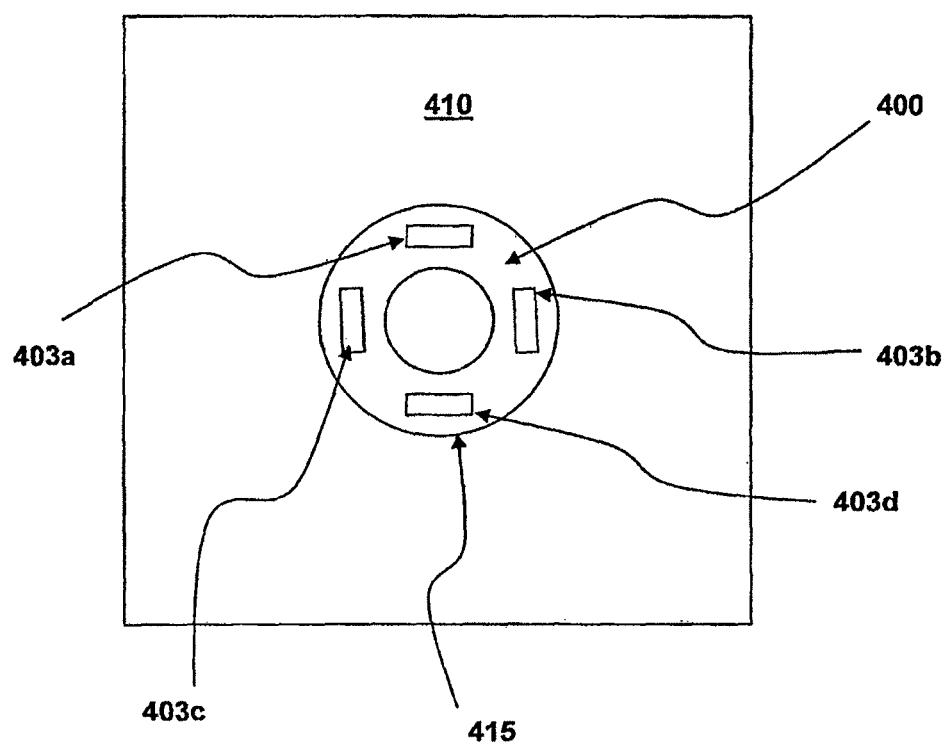


FIG. 10

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**ARTICLE VENDING MACHINE AND
METHOD FOR AUTHENTICATING
RECEIVED ARTICLES**

**CROSS REFERENCE TO RELATED
APPLICATION**

This application is a continuation of U.S. application Ser. No. 12/876,046, filed on Sep. 3, 2010, entitled "ARTICLE VENDING MACHINE AND METHOD FOR AUTHENTICATING RECEIVED ARTICLES," which is incorporated herein by reference in its entirety. The subject matter of the present application relates to and can work in conjunction with the subject matter of U.S. patent application Ser. No. 12/861,689, filed on Aug. 23, 2010, entitled "ARTICLE RETURN SYSTEM AND METHOD OF USING SAME" which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present invention relates to improvements in article dispensing machines and components and methods related to the same. More particularly, the present invention relates to a digital video disc (DVD) dispensing apparatus and method for authenticating returned DVDs having a security feature.

**BACKGROUND AND SUMMARY OF THE
INVENTION**

While the present invention is often described herein with reference to a digital video disc distribution system, an application to which the present invention is advantageously suited, it will be readily apparent that the present invention is not limited to that application and can be employed in article dispensing systems used to distribute a wide variety of rentable articles.

An improved DVD dispensing machine is disclosed in commonly owned U.S. Pat. No. 7,234,609, which is herein incorporated by reference in its entirety. The invention of the U.S. Pat. No. 7,234,609 and the present invention can function as a DVD dispensing machine-based distribution system that will typically have multiple units of each new release per DVD dispensing machine. The dispensing machines of the U.S. Pat. No. 7,234,609 and the present invention can stock up to two thousand DVDs (movies, games or other entertainment content), making the system competitive with existing brick-and-mortar video rental superstores.

The dispensing machine and system of the U.S. Pat. No. 7,234,609 and the present invention distinguishes itself from such stores by offering major benefits not conventionally offered by such stores, including additional cross-marketing programs (e.g., promotional rentals for a certain amount of dollars spent at the hosting store) and convenience (e.g., open always).

The dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention yields a competitive advantage in the DVD rental marketplace by offering consumers cross-marketing/promotional programs, convenience of selection (e.g., computer-based searches for movies and recommendations based on consumer profiles), and potentially extended hours. The present invention employs a more cost-effective, convenient platform than brick-and-mortar stores. In addition, with the present invention, DVD dispensing machines can be situated in hosting locations having

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high foot traffic, such as at a popular grocery store, restaurant, drug store, and/or other popular hosting locations.

The dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention can be operated at a substantial savings over the costs associated with traditional brick-and-mortar video rental stores. For example, the present invention does not require hourly employees manning the dispensing machines or restocking them with inventories, due to the ability of the article transport storage units to be delivered to/picked up from host locations by third-party delivery services, such as traditional or contracted courier services.

Unlike brick-and-mortar stores, the dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention does not require an on-site store manager because all operational decisions can be made at a centralized location by a management team located remote from the hosting locations. Unlike brick-and-mortar stores, the dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention does not require significant physical space. Unlike brick-and-mortar stores, the dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention has low operating costs because no heating or air conditioning is required for the dispensing machines and they consume a relatively low level of electrical energy. In addition, the dispensing machine of the U.S. Pat. No. 7,234,609 has low maintenance costs and downtime. Furthermore, the dispensing machines disclosed herein may also be situated outdoors and, where necessary, may include heating and/or air conditioning units to accommodate less temperate climates.

The dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention addresses the shortcomings of traditional brick-and-mortar stores in a convenient and cost-effective delivery vehicle having the added bonus of serving as an effective promotional platform that drives incremental sales to hosting locations. In addition, the dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention overcomes these disadvantages by at least offering more new releases and older selections for any given time period, and lower cost per viewing with significantly more convenience than Internet-based and pay-per-view services.

The dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention is a fully automated, integrated DVD movie video and video game rental and/or purchase systems. It preferably incorporates robust, secure, scalable software that provides a fully personalized user experience and real-time feedback to hosting locations and advertisers, scalable hardware that leverages existing technologies such as touch screen, focused audio speakers and plasma video monitors, technology utilizing the Internet through a system website, and an article transport storage unit that facilitates the exchange of new DVDs for old DVDs in each machine with virtually no need for human intervention. These technologies and others fill long-felt needs in the art and give advantages over conventional video distribution options. The dispensing machine of the U.S. Pat. No. 7,234,609 and the present invention functions as much as a promotional platform as it does a rental kiosk.

By utilizing the dispensing machines and the fully-interactive, real-time, linked Internet website, consumers can rent one or more DVD movie videos, video games, or other entertainment content directly from dispensing machines as well as indirectly by making a rental reservation through the website for later pickup at a conveniently located machine. These dispensing machines are preferably networked with each other, with the inventory control and/or supply office and with the system website by phone-line, DSL, or other

Internet connection at each hosting location. Through this linked network, the rental experience for each consumer can be customized based on a profile for each consumer, such as via personalized home pages and rental screens.

With such DVD dispensing machines, there exists the potential for a customer to attempt to return a DVD other than the DVD that the customer rented and retain the rented DVD for his or her own use. Conventional DVD dispensing machines have used a device such as a code printed on the DVD or the DVD case, which was validated by the dispensing machine, to defeat such attempted fraud. Nevertheless, such conventional validation efforts may be defeated by users who create a photocopy of the authentic label and apply it to the non-authentic DVD or DVD case. Furthermore, such conventional validation systems typically suffered from one of the following drawbacks: they were expensive to implement, they could be readily defeated through duplication, or the device was susceptible to being damaged, thereby resulting in a false rejection of an authentic DVD.

The present invention is directed to DVD dispensing machines, a system and method for authenticating returned DVDs and DVDs or other media storage devices for use in such machines and systems. In one embodiment, the system employs a DVD having a security feature such as a code that cannot be copied by a standard photocopier. The DVD has an encrypted authentication code, such as a data matrix code applied as a first layer in a carbon-containing ink. A second layer overtop of and concealing the authentication code may be a black square applied in substantially carbon free ink, such that the naked eye sees only the black square, not the underlying authentication code. When the customer returns the DVD, the article dispensing machine exposes the DVD surface to infrared light, thereby enabling the dispensing machine to read the underlying authentication code. The system overcomes many of the drawbacks of conventional authentication systems in that it is inexpensive to implement, it cannot be defeated through simple means for duplication of a label and it is robust, at least because the system is not prone to false rejections of authentic DVDs. Other features and advantages are provided by the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration of a system for communicating and processing information in a network of article dispensing machines and dispensing apparatus;

FIG. 2 is a perspective view of an article dispensing machine constructed in accordance with the principles of the present invention;

FIG. 3 is a partially open perspective view of a portion of the article dispensing machine of FIG. 2 with certain elements removed for clarity;

FIG. 4 is a plan view of the portion of the article dispensing machine of FIG. 3;

FIG. 5 is a flowchart illustrating an order of operations performed by an article dispensing machine for authenticating a returned article;

FIG. 6 is a schematic drawing of a first embodiment of portions of an article dispensing machine constructed in accordance with the principles of the present invention;

FIG. 7 is a schematic drawing of a second embodiment of portions of an article dispensing machine constructed in accordance with the principles of the present invention;

FIG. 8 is a plan view of a DVD in accordance with the principles of the present invention;

FIG. 9 is a plan view of the DVD in FIG. 8 when exposed to a first predetermined wavelength of electromagnetic radiation; and

FIG. 10 is a plan view of the DVD of FIG. 8 housed in a case.

DETAILED DESCRIPTION OF THE INVENTION

10 While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to the embodiments illustrated.

15 FIGS. 1-3 illustrate an article dispensing machine designated 230. Article dispensing machine 230 may be one of a plurality of article dispensing machines included within an article distribution system having a plurality of such machines situated at a plurality of hosting locations. The article dispensing machines of a particular article distribution system preferably form a network. As such, those machines are preferably in communication with each other and/or with a central server or central controller.

20 As shown in FIG. 1, each article dispensing machine 230 includes a dispensing machine processor 300, also referred to herein as a vending controller, which is connected to a user interface control system 234, an image capture device 235, an infrared light source 236 and, preferably, an article sensor 237, collectively referred to as "the peripheral devices." The processor 300 is capable of executing various programs to provide input to and/or receive outputs from the peripheral devices. Suitable processors for such use are 25 known to those of skill in the art. In addition, the processor is operably connected to at least one memory storage device 281, such as a hard-drive or flash-drive or other suitable memory storage device.

30 Article dispensing machine memory storage device 281 can include any one or a combination of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, SDRAM, etc.)) and nonvolatile memory elements (e.g., ROM, hard drive, tape, CDROM, etc.). Moreover, article dispensing machine memory storage 35 device 281 may incorporate electronic, magnetic, optical, and/or other types of storage media. Article dispensing machine memory storage device 281 can have a distributed architecture where various components are situated remote from one another, but are still accessed by processor. Article dispensing machine memory storage device includes an article dispensing machine database 282.

40 The article dispensing machines 230 preferably comprise a network of machines in communication with one another. As shown in FIG. 1, in the preferred configuration, the article dispensing machines 230 are networked with one another via a central server or central controller 302 in a hub-and-spoke system. However, optionally, the article dispensing machines may be connected and communicate directly with one another, and/or subsets of article dispensing machines may communicate with one another directly as well as with the central server 302.

45 Generally, in terms of hardware architecture, the central server 302 includes a central processor and/or controller, central memory, and one or more input and/or output (I/O) devices (or peripherals) that are communicatively coupled via a local interface. The architecture of the central server is 50 set forth in greater detail in U.S. Pat. No. 7,234,609, the

contents of which are incorporated herein by reference. Numerous variations of the architecture of the central server can be understood by one of skill in the art and are encompassed within the scope of the present invention.

Steps and/or elements, and/or portions thereof of the system and method may be implemented using a source program, executable program (object code), script, or any other entity comprising a set of instructions to be performed. When a source program, the program needs to be translated via a compiler, assembler, interpreter, or the like, which may or may not be included within the memory, so as to operate properly in connection with the operating system (O/S). Furthermore, the software embodying the present system and method can be written as (a) an object oriented programming language, which has classes of data and methods, or (b) a procedural programming language, which has routines, subroutines, and/or functions, for example but not limited to, C, C++, Pascal, Basic, Fortran, Cobol, Perl, Java, and Ada. frequency (RF) or other transceiver, a telephonic interface, a bridge, and a router.

When article dispensing machine 230 is in operation, the article dispensing machine processor is configured to execute software stored within article dispensing machine memory, to communicate data to and from the dispensing machine memory, and to generally control operations of article dispensing machine pursuant to the software. The software aspects of the present invention and the O/S, in whole or in part, but typically the latter, are read by processor, perhaps buffered within the processor, and then executed.

When the present system and method, or aspects thereof, are implemented in software, it should be noted that the software can be stored on any computer readable medium for use by or in connection with any computer related system or method. In the context of this document, a computer readable medium is an electronic, magnetic, optical, or other physical device or means that can contain or store a computer program for use by or in connection with a computer related system or method. The present invention can be embodied in any computer-readable medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions. In the context of this document, a "computer-readable medium" can be any means that can store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The computer readable medium can be for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, device, or propagation medium. More specific examples (a non-exhaustive list) of the computer-readable medium would include the following: an electrical connection (electronic) having one or more wires, a portable computer diskette (magnetic), a random access memory (RAM) (electronic), a read-only memory (ROM) (electronic), an erasable programmable read-only memory (EPROM, EEPROM, or Flash memory) (electronic), an optical fiber (optical), and a portable compact disc read-only memory (CDROM) (optical). Note that the computer-readable medium could even be paper or another suitable medium upon which the program is printed, as the program can be electronically captured, via, for instance, optical scanning of the paper or other medium, then compiled, interpreted or otherwise processed in a suitable manner if necessary, and then stored in a computer memory.

For communication with the central server 302, article dispensing machine 230 is equipped with network communication equipment and circuitry. In a preferred embodiment, the network communication equipment includes a network card such as an Ethernet card. In a preferred network environment, each of the plurality of article dispensing machines 230 on the network is configured to use the TCP/IP protocol to communicate via the network 301. It will be understood, however, that a variety of network protocols can also be employed, such as IPX/SPX, Netware, PPP and others. It will also be understood that while a preferred embodiment of the present invention is for article dispensing machine 230 to have a "broadband" connection to the network 301, the principles of the present invention are also practicable with a dialup connection using a standard modem. Wireless network connections are also contemplated, such as wireless Ethernet, satellite, infrared and radio frequency networks.

The central controller 302 communicates with the article dispensing machine controllers 300 via the network 301. The central controller 302 is preferably located at a central station or office that is remote from the plurality of article dispensing machines 230. The central controller 302 can operate as the server for communicating over the network 301 between the plurality of article dispensing machines 230. The central controller 302 receives communications and information from the article dispensing machines 230, and also transmits communications and information to the machines 230. For example, when a DVD rental transaction is performed at the article dispensing machine 230, transaction data such as the rented DVD title is then transmitted from the machine 230 to the central controller 302 via the network 301. It will be understood that central servers in general, such as the central controller 302, are often distributed. A plurality of central servers/controllers 302 may optionally be arranged in "load balanced" architecture to improve the speed and efficiency of the network. To accomplish the implementation of multiple controllers 302, the controllers 302 may be in communication with a router/distributor 303.

The central controller 302 is also in communication with a central database 304. The central database 304 stores information regarding the transaction network. For example, the central database 304 stores data regarding the vending inventory at each of the plurality of article dispensing machines 230. The central database 304 also stores sales information regarding the sales quantities of the vending merchandise stored in the machines 230. For example, the central database 304 stores information regarding the sales totals for each DVD title and for each machine 230 vending location. Central database 304 also stores user information and rental transaction information, such as user IDs, PINs, the date on which DVDs are due to be returned, and the date on which DVDs were rented from the machines 230. Some of this information is also preferably stored in article dispensing machine database 282. The central database 304 may also store a master inventory list of the DVDs housed in each of the dispensing machines.

Central database 304 is preferably a relational database, although other types of database architectures may be used without departing from the principles of the present invention. For example, database 304 may be a SQL database, an Access database or an Oracle database, and in any such embodiment have the functionality stored herein. Central database 304 is also preferably capable of being shared, as illustrated, between a plurality of central controllers 302 and its information is also preferably capable of being transmitted

ted via network 301. It will be understood that a variety of methods exist for serving the information stored in central database 304. In a preferred embodiment, .net and Microsoft Reporting Services are employed, however, other technologies such as ODBC, MySQL, CFML and the like may be used.

The central controller 302 and central database 304 are also preferably accessible by a personal computer 306. The personal computer 306 will be understood as comprising hardware and software consistent with marketable personal computers, such as a display monitor, a keyboard, a pointing device, and a microprocessor with memory. The personal computer also comprises Internet browser software such as Firefox or Internet Explorer. Using the browser software, a user at the personal computer 306 can access a web interface through the central controller 302. To that end, central controller 302 preferably comprises web server software such as IIS or Apache. It will be understood that a variety of web server software and web browser software exists to implement the principles of the present invention without departing therefrom. Through the web browser software, the personal computer 306 communicates with the central controller 302 and allows the user to login to a central command functionality of the central controller 302 and to view and modify data stored in the central database 304. The browser interface also allows the user to perform certain system functions, which will affect the inventory and behavior of the article dispensing machines 230.

In a preferred embodiment, a financial server 305 is also in communication with the network 301. It will be understood that a variety of financial services exist for processing financial information via the Internet and other networks 301. Those services allow for the processing of credit card and debit card information, so that users of the services do not have to interface directly with credit and debit card companies. In FIG. 1, the financial server 305 is illustrated as a single server, although the financial server 305 may comprise an entire sub-network of financial servers 305 responsible for processing financial information.

As shown in FIG. 2, article dispensing machine 230 includes a machine housing 232 with front, rear, top, bottom and side panels. The machine housing 232 is preferably a combination molded fiberglass and sheet metal cabinet. However, those skilled in the art will appreciate that the housing can be constructed from a variety of other suitable materials and with a variety of other suitable manufacturing techniques.

As shown most clearly in FIG. 2, a user interface portion 234 of housing 232 includes a card reader 240, a keypad and/or touch screen 242 and an article transfer opening 244. The card reader 240 is preferably designed in known fashion to read magnetically encoded membership and/or credit cards for authorizing the distribution of articles of inventory through the article transfer opening 244. Keypad and/or touch screen 242 permits consumers and/or inventory stocking personnel to communicate with the dispensing machine 230 and/or a central office linked in electrical communication with the dispensing machine. Keypad and/or touch screen 242 also permits consumers and/or inventory stocking personnel to enter appropriate commands directed to carrying out specific machine tasks. It will be appreciated that the optional touch screen includes a monitor made with known technologies making it capable of being utilized as a user interface for entry of commands designed to carry out machine tasks.

Furthermore, it will be appreciated that additional user interface portions having additional or even identical user

interface components could be incorporated within article dispensing machine 230. For example, these components could be incorporated on other panels of the housing 232 of machine 230 so that the machine can be used simultaneously by multiple consumers, translating into more efficient distribution of articles in high traffic areas.

As shown in FIG. 3, the dispensing machine contains a light source 236, positioned to illuminate a DVD received by the receptacle 244 with electromagnetic radiation of a predetermined wavelength range outside of the visible light spectrum (300 nm to 760 nm). In a preferred embodiment, the light source 236 illuminates the DVD with electromagnetic radiation within the infrared light range (1 mm to 750 nm). The dispensing machine also contains an image capture device 235 positioned to photograph or otherwise capture the image of at least a portion of the surface of the returned DVD. The image capture device is preferably a digital camera, such as a charge coupled device (CCD) camera or a complementary metal oxide semiconductor (CMOS) camera, or a personal computer camera that are configured to capture images in the first predetermined wavelength range as known in the art, such as e.g. an infrared camera. Alternatively, the image capture device could be a constant recording device such as a digital video camera configured to capture images in the first predetermined wavelength range. The image capture device preferably has an automatic focusing feature as is known in the art.

The dispensing machine may further include an article sensor 237 for detecting the presence of an article inserted into the receptacle. The article sensor 237 may be simple mechanical switch, a proximity sensor, a light bar, or any other suitable sensor known in the art for detecting presence. In the preferred embodiment, the article sensor 237 detects the presence of the returned DVD and activates the infrared light source 236. The infrared light source 236 is preferably turned on after the returned DVD has been inserted into the receptacle 244.

FIG. 6 shows a schematic of a portion of the system for authenticating an article, in which the detection of the presence of an article by article sensor 237 directly activates the light source 236. The triggering of the sensor may directly activate the light source 236 or, as shown in schematic FIG. 7, the signal may be sent to the processor 300, which activates the light source 236.

Alternatively, the light source 236 could be activated by the initiation of the return process by the consumer. For example, the user-selection of a "Return" option via the user interface may cause the processor to activate the infrared light source 236. Yet, alternatively, the light source could constantly be on whenever the machine has power.

As shown in FIGS. 3 and 4, the light source 236 is positioned to illuminate a first surface 401 of the returned DVD with infrared light. FIG. 9 shows a first surface 401 of the DVD 400. The first surface has a machine-readable authentication code 402, which is substantially visible when exposed to the first predetermined wavelength and forming a first layer. In a preferred embodiment, in which the light source 236 provides infra red light, the machine-readable authentication code 402 may be a carbon containing ink, which, when exposed to infrared light, is visible. As shown in FIG. 9, the authentication code 402 is preferably a data matrix that represents an alpha-numeric sequence. However, the authentication code could be a bar code, numerical or binary sequence or any other symbol. The authentication code is preferably printed on the first surface of the DVD in a plurality of locations 402 a, b, c, d to increase the ease of reading the authentication code and to allow the authenti-

cation code to be read even if one of the authentication codes is damaged. The authentication code may also be printed to a label affixed to the first surface of the DVD. The authentication code may comprise toner imaged onto the DVD via electron beam or ion deposition techniques, electrophotographic or electrographic methods or via ink jet. As shown in FIG. 10, in a preferred embodiment, the DVD is contained within a case 410 having an opening 415 aligned with the location of the authentication code or codes 402, so that the authentication codes are not concealed by the DVD case. Alternatively, the DVD case could include a transparent section aligned with the authentication code thereby allowing the authentication code to be viewed through the DVD case.

FIG. 9 shows the first surface of DVD 400 as it appears in visible light. A second layer 403 is applied in a medium that is substantially opaque in visible light, but substantially transparent when exposed to the first predetermined wavelength of electromagnetic radiation. For example, in the preferred embodiment, the second layer is preferably a substantially carbon free ink, which is applied overtow of and at least partially concealing the authentication codes. Preferably, the second layers 403 a, b, c, and d are solid geometric shapes that entirely cover and conceal the authentication codes that form the first layers. The second layers are preferably printed in black ink or another color of ink sufficiently opaque when viewed in white light. The substantially carbon free ink shapes conceal the authentication codes 402a-d and prevent them from being viewed by the naked eye in white light or from being copied by a standard photocopying machine. When the first surface 401 of DVD 400 is exposed to infrared light, the carbon-containing authentication codes are visible through the second layers, which are sufficiently transparent in infrared light. The second layers may be applied by litho or flexographic techniques, or by ink jet, electrophotographic or electrographic methods.

Turning now to the functioning of the machine during a consumer transaction, as a consumer approaches an article dispensing machine, the consumer observes the display monitor and the user interface 234. The consumer may also observe a plasma/LCD monitor displaying marketing information, or a lightbox containing marketing information for branding the vending apparatus 230. The consumer then enters the appropriate commands at the user interface control 234 associated with the dispensing machine to select a DVD to be dispensed by the machine. The user interface can employ simple menus and a fixed set of keys for consumers to make their selections, it can employ break-resistant touch screens, or it can employ a combination of both. Once a selection has been made, the consumer then merely inserts a card, such as a credit card, into the card reader 240 positioned at the front of the dispensing machine 230 and, in response, the machine will dispense the selected DVD without the need for further input by the consumer.

FIG. 5 shows a process 500 for authenticating a returned DVD. The consumer may initiate the return process via the user interface 234, for example by selecting the option "RETURN A DISK" on a touchscreen. The consumer then inserts the DVD into the dispensing/receiving receptacle 244, which may be an opening in the front panel of the machine, and the DVD is received by the article vending machine through the opening as illustrated by step 501.

Once the DVD is inserted in the article transfer opening 244, optionally, sensor 237 is triggered by the receipt of the DVD as shown in step 502. The surface of the DVD is illuminated by the infrared light source 236, as shown in step

503. Then, image capture device 235 is activated and captures the image of at least a portion of the first surface 401 of the DVD, including the authentication code as shown in step 504. The image capture device 235 captures the image of the authentication code and converts it to a digital file. The image capture device 235 may capture a series of images of the authentication code in rapid succession, or, in the case of a digital video camera, may take a continuous video of the authentication code. The image capture device 10 may further capture the image of the authentication code from multiple locations on the DVD 402 a, b, c, and d. The digital file or files are then transmitted to the processor 300 where the authentication code is read from the digital file and compared to a pre-programmed or "master" authentication code as shown in steps 505-506.

If the authentication code matches the master authentication code, the disk is authenticated and the processor continues the return process as shown in step 507. If the authentication code cannot be read or does not match the 20 master authentication code, the processor may be programmed to attempt to read the authentication code from a subsequently transmitted digital file. This process may repeat the steps of reading 505 and comparison 506 for a predetermined number of digital files or a predetermined 25 time period, referred to herein as the authentication attempt limit as shown in step 508. If the authentication attempt limit has been reached and the authentication code has not been 30 authenticated, the authentication process is terminated and the DVD is rejected 509. The rejected DVD may be ejected from the receptacle 244 for return to the user and the user interface may display a message to the consumer that the disk could not be authenticated.

Alternatively, the rejected DVD may be retained by the 35 article dispensing machine and quarantined. The DVD may be quarantined by being physically transferred to a separate holding area contained within the machine. Preferably, the DVD is quarantined by designating the DVD as not to be vended or "inoperable" in the article dispensing machine 40 database 282. DVDs marked as "inoperable" may be stored 40 with the other inventory in an open storage slot 369 in the vending machine.

In the embodiments in which the infrared light source is activated each time a DVD is returned (instead of remaining on when the machine has power), the infrared light source 45 236 and the image capture device 235 may be set to be deactivated after a predetermined time period as shown in step 510. In the preferred embodiment, the infrared light source and the image capture device are activated for three to four seconds. Alternatively, the processor 300 may be 50 configured to deactivate the image capture device and infrared light source after the authentication code encryption has successfully been authenticated or after the authentication attempt limit has been reached.

In the preferred embodiment, the first surface of the DVD 55 401, in addition to having an authentication code thereon, also includes an article identifier. The article identifier is preferably a bar code that encodes a serial number uniquely assigned to the DVD, but may also be a data matrix or alpha-numeric sequence or the like. The article identifier is 60 printed on the first surface of the DVD in a carbon-containing ink, thereby enabling the article identifier to be viewed and photographed or otherwise captured in infrared light, and eliminating the need for a second light source. The image capture device may also capture the article identifier 65 at the same time that the authentication code is captured by the image capture device. Thus, the digital images transferred to the processor contain both the authentication code

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and the article identifier. However, in an alternate embodiment, the article identifier and the authentication code may be captured and/or transferred separately.

After the DVD has been authenticated by the processor (or concurrently with the authentication process) the article identifier is read from the digital image. The article identifier is then used to identify the returned DVD during the return and restocking process and is used to update an article dispensing machine inventory database. The article identifier may further be used in the billing process to identify the rented article that the customer has returned and to calculate the charge for the rental, the details of which are set forth in U.S. Pat. No. 7,234,609, the contents of which are herein incorporated by reference in their entirety.

In certain embodiments, the article identifier and the authentication code may both be components of a single device, for example a data matrix in which a first section of the data matrix represents the authentication code and a second section represents the article identifier.

Any process descriptions or blocks in figures represented in the figures should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the embodiments of the present invention in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those having ordinary skill in the art.

While the specific embodiments have been illustrated and described, numerous modifications come to mind without significantly departing from the spirit of the invention, and the scope of protection is only limited by the scope of the accompanying Claims.

What is claimed is:

1. An article dispensing machine for authenticating a returned article, the article dispensing machine comprising:
 - a receptacle for receiving the returned article, the returned article comprising an authentication code disposed on a surface of the returned article and a layer substantially opaque in visible light and at least partially overlaying the authentication code;
 - an article sensor configured to detect a presence of the returned article;
 - a light source in communication with the article sensor and configured to illuminate the surface of the returned article with electromagnetic radiation in a predetermined range in response to the article sensor detecting the presence of the returned article, wherein when the surface is illuminated, the authentication code is visible through the layer;
 - an image capture device configured to capture an image of the authentication code when the surface is illuminated; and
 - a processor in communication with the image capture device, wherein the processor is configured to identify the authentication code from the image and compare the authentication code that was identified to a master authentication code.
2. The article dispensing machine of claim 1, wherein the authentication code is multiplicatively disposed on the surface of the returned article, and wherein the image capture device is configured to capture multiple images of one or more of the multiplicatively disposed authentication codes.

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3. The article dispensing machine of claim 1, wherein the processor cannot identify the authentication code from the image, the processor is configured to:

access an additional image of the authentication code captured by the image capture device;

identify the authentication code from the additional image; and

compare the authentication code that was identified from the additional image to the master authentication code.

4. The article dispensing machine of claim 3, wherein the processor is configured to repeat the identification and the comparison for a predetermined number of images.

5. The article dispensing machine of claim 3, wherein the processor is configured to repeat the identification and the comparison until a predetermined time period is reached.

6. The article dispensing machine of claim 1, wherein when the surface is illuminated, an article identifier disposed on the surface of the returned article is also visible through the layer.

7. The article dispensing machine of claim 6, wherein the processor is further configured to:

identify the article identifier from the image; and

update an inventory database according to the article identifier.

8. The article dispensing machine of claim 1, wherein the predetermined range is in an infrared spectrum, the authentication code is comprised of a carbon-containing ink visible in the infrared spectrum, and the layer is comprised of a substantially carbon-free ink.

9. A method of authenticating a returned article, the method comprising:

detecting, by an article sensor, a presence of the returned article via a receptacle, the returned article comprising an authentication code disposed on a surface of the returned article, and a layer substantially opaque in visible light and at least partially overlaying the authentication code;

illuminating, by a light source in response to the detecting by the article sensor, the surface of the returned article with electromagnetic radiation in a predetermined range, wherein when the surface is illuminated, the authentication code is visible through the layer;

capturing, by an image capture device, an image of the authentication code when the surface is illuminated;

identifying, by a processor, the authentication code from the image; and

comparing the authentication code that was identified to a master authentication code.

10. The method of claim 9, wherein the authentication code is multiplicatively disposed on the surface of the returned article, and wherein capturing the image comprises capturing multiple images of one or more of the multiplicatively disposed authentication codes.

11. The method of claim 9, wherein if the processor cannot identify the authentication code from the image, the method further comprises:

accessing an additional image of the authentication code captured by the image capture device;

identifying the authentication code from the additional image; and

comparing the authentication code that was identified from the additional image to the master authentication code.

12. The method of claim 11, further comprising: repeating the identifying and the comparing for a predetermined number of images.

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13. The method of claim 11, further comprising: repeating the identifying and the comparing until a predetermined time period is reached.

14. The method of claim 9, wherein when the surface is illuminated, an article identifier disposed on the surface of the returned article is also visible through the layer.

15. The method of claim 9, wherein the method further comprises:

identifying, by the processor, the article identifier from the image; and
updating an inventory database according to the article identifier.

16. The method of claim 9, wherein the predetermined range is in an infrared spectrum, and wherein the authentication code is comprised of a carbon-containing ink visible in the infrared spectrum, and the layer is comprised of a substantially carbon-free ink.

17. A non-transitory computer readable medium comprising instructions, for execution on a computer processor and for performing steps for authenticating a returned article, the steps comprising:

detecting, by an article sensor, a receipt of the returned article via a receptacle, the returned article comprising an authentication code disposed on a surface of the returned article, and a layer substantially opaque in visible light and at least partially overlaying the authentication code;

configuring a light source to illuminate, in response to the article sensor detecting the receipt of the returned article, the surface of the returned article with electromagnetic radiation in a predetermined range, wherein when the surface is illuminated, the authentication code is visible through the layer;

configuring an image capture device to capture an image of the authentication code when the surface is illuminated;

identifying the authentication code from the image; and
comparing the authentication code that was identified to a master authentication code.

18. The non-transitory computer readable medium of claim 13, wherein the authentication code is multiplicatively disposed on the surface of the returned article, and wherein the image capture device captures multiple images of one or more of the multiplicatively disposed authentication codes.

19. The non-transitory computer readable medium of claim 17, wherein if the authentication code cannot be identified from the image, the steps further comprise:

accessing an additional image of the authentication code captured by the image capture device;
identifying the authentication code from the additional image; and
comparing the authentication code that was identified from the additional image to the master authentication code.

20. The non-transitory computer readable medium of claim 19, wherein the steps further comprise: repeating the identifying and the comparing for a predetermined number of images.

21. The non-transitory computer readable medium of claim 19, wherein the steps further comprise: repeating the identifying and the comparing until a predetermined time period is reached.

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22. The non-transitory computer readable medium of claim 17, wherein the predetermined range is in an infrared spectrum, and wherein the authentication code is comprised of a carbon-containing ink visible in the infrared spectrum and the layer is comprised of a substantially carbon-free ink.

23. The non-transitory computer readable medium of claim 17, wherein the captured image is at least one of digital data representing the captured image or a digital file.

24. The non-transitory computer readable medium of claim 17, wherein the steps further comprise: sending a signal from the article sensor to the light source and the image capture device to respectively activate the light source and the image capture device.

25. The non-transitory computer-readable medium of claim 24, wherein the steps further comprise: turning off the light source and the image capture device after a predetermined time interval.

26. The non-transitory computer-readable medium of claim 17, wherein the steps further comprise:

sending a first signal from the article sensor to the processor indicating the presence of the returned article; and
sending a second signal from the processor to the light source and the image capture device to respectively activate the light source and the image capture device.

27. The non-transitory computer-readable medium of claim 26, wherein the steps further comprise: turning off the light source and the image capture device after a predetermined time interval.

28. The non-transitory computer-readable medium of claim 26, wherein the steps further comprise: turning off the light source and the image capture device after a predetermined number of images have been captured.

29. The non-transitory computer-readable medium of claim 26, wherein the steps further comprise: turning off the light source and the image capture device after authenticating the authentication code.

30. The non-transitory computer-readable medium of claim 17, wherein the authentication code is a data matrix.

31. The non-transitory computer readable medium of claim 17, wherein when the surface is illuminated, an article identifier disposed on the surface of the returned article is also visible through the layer, and the image captured by the image capture device further includes the article identifier.

32. The non-transitory computer readable medium of claim 31, wherein the steps further comprise:
identifying the article identifier from the image; and
updating an inventory database according to the article identifier.

33. The non-transitory computer readable medium of claim 31, wherein the article identifier is a serial number that identifies the returned article.

34. The non-transitory computer-readable medium of claim 31, wherein the authentication code and the article identifier are included in a data matrix.

35. The non-transitory computer-readable medium of claim 31, wherein the authentication code and the article identifier are printed in a carbon-containing ink that is visible in the predetermined range.

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