US009875593B1

(12) **United States Patent**
Adams et al.

(10) **Patent No.: US 9,875,593 B1**
(45) **Date of Patent: Jan. 23, 2018**

(54) **SYSTEMS, METHODS AND DEVICES FOR COIN PROCESSING AND COIN RECYCLING**

(71) Applicant: **Cummins-Allison Corp.**, Mt. Prospect, IL (US)

(72) Inventors: **Thomas P. Adams**, Oconomowoc, WI (US); **Glenn S. Gordon**, Buffalo Grove, IL (US); **Matthew J. Bochnak**, Mt. Prospect, IL (US); **Curtis W. Hallowell**, Palatine, IL (US); **John R. Blake**, St. Charles, IL (US); **Mikhail B. Sobelevsky**, Streamwood, IL (US)

(73) Assignee: **Cummins-Allison Corp.**, Mt. Prospect, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/230,123**

(22) Filed: **Aug. 5, 2016**

Related U.S. Application Data

(60) Provisional application No. 62/202,571, filed on Aug. 7, 2015.

(51) **Int. Cl.**
G07D 3/00 (2006.01)
G07D 3/06 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G07D 3/06*** (2013.01); ***G07D 3/14*** (2013.01); ***G07D 9/008*** (2013.01); ***G07F 3/04*** (2013.01)

(58) **Field of Classification Search**
CPC G07D 3/00; G07D 3/14; G07D 9/004; G07D 9/008; G07F 19/00; G07F 3/04
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,099,705 A 6/1914 Lindeen
2,570,920 A 10/1951 Clough et al. 232/16
(Continued)

FOREIGN PATENT DOCUMENTS

CA 2235925 C 11/1995 ..... G07D 9/00
CA 2189330 C 12/2000 ..... G07F 17/42
(Continued)

OTHER PUBLICATIONS

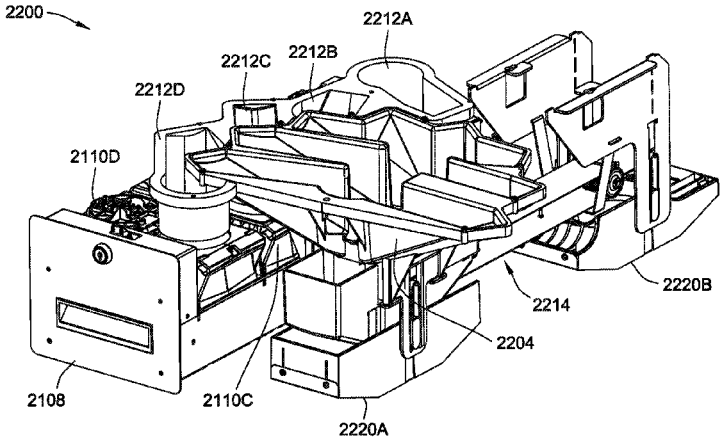
U.S. Appl. No. 13/836,117, filed Mar. 15, 2013, Blake et al., System, Method and Apparatus for Automatically Filling a Coin Cassette.
(Continued)

Primary Examiner — Mark Beauchaine
(74) *Attorney, Agent, or Firm* — Greer, Burns & Crain, Ltd.

(57) **ABSTRACT**

Currency processing systems, coin processing machines, coin sorting and recycling assemblies, and methods of making and methods of using the same are presented herein. A currency processing system is disclosed which includes a housing with a coin input area for receiving coins and coin receptacles for stowing processed coins. A disk-type coin processing unit includes a rotatable disk for imparting motion to input coins, and a sorting head for separating and discharging coins from exit stations. An automated coin chute receives coins from one of the exit stations. The automated coin chute includes a movable diverter plate that selectively transitions between a first position, whereby coins received from the exit station of the disk-type coin processing unit are redirected through a coin-recycling output passage to a coin-recycling receptacle, and a second position, whereby coins received from the exit station are redirected through a coin-depositing output passage to a coin-depositing receptacle.

2 Claims, 36 Drawing Sheets



(51) **Int. Cl.**

G07D 9/00	(2006.01)
G07D 3/14	(2006.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,669,998	A	2/1954	Buchholz	133/8
2,750,949	A	6/1956	Kulo et al.	133/8
2,835,260	A	5/1958	Buchholz	133/8
2,865,561	A	12/1958	Rosapepe	232/7
3,132,654	A	5/1964	Adams	133/1
3,376,970	A	4/1968	Roseberg	198/40
3,771,583	A	11/1973	Bottemiller	160/327
3,778,595	A	12/1973	Hatanaka et al.	235/61.7 B
3,851,755	A	12/1974	Hull et al.	206/82
3,916,922	A	11/1975	Prumm	133/3 R
3,998,237	A	12/1976	Kressin	133/3 A
3,998,379	A	12/1976	Myers et al.	229/33
4,050,218	A	9/1977	Call	53/167
4,059,122	A	11/1977	Kinoshita	133/3 D
4,075,460	A	2/1978	Gorgens	235/420
4,124,111	A	11/1978	Hayashi	194/102
4,150,740	A	4/1979	Douno	194/4 C
4,166,945	A	9/1979	Inoyama et al.	235/379
4,172,462	A	10/1979	Uchida et al.	133/3 A
4,179,685	A	12/1979	O'Maley	340/146.3 H
4,179,723	A	12/1979	Spencer	361/384
4,184,366	A	1/1980	Butler	73/163
4,197,986	A	4/1980	Nagata	235/379
4,208,549	A	6/1980	Polillo et al.	179/6.3 R
4,228,812	A	10/1980	Marti	133/3 F
4,232,295	A	11/1980	McConnell	340/152 R
4,234,003	A	11/1980	Ristvedt et al.	133/3
4,249,552	A	2/1981	Margolin et al.	133/1 R
4,251,867	A	2/1981	Uchida et al.	364/408
4,286,703	A	9/1981	Schuller et al.	194/100 A
RE30,773	E	10/1981	Glaser et al.	235/379
4,310,885	A	1/1982	Azcua et al.	364/405
4,317,957	A	3/1982	Sendrow	178/22.08
4,341,951	A	7/1982	Benton	235/379
4,355,369	A	10/1982	Garvin	364/900
4,360,034	A	11/1982	Davila et al.	133/3 D
4,369,442	A	1/1983	Werth et al.	340/825.35
4,380,316	A	4/1983	Glinka et al.	232/16
4,383,540	A	5/1983	DeMeyer et al.	133/3 H
4,385,285	A	5/1983	Horst et al.	382/3
4,412,292	A	10/1983	Sedam et al.	364/479
4,416,299	A	11/1983	Bergman	133/1 R
4,417,136	A	11/1983	Rushby et al.	235/379
4,423,316	A	12/1983	Sano et al.	235/379
4,434,359	A	2/1984	Watanabe	235/379
4,436,103	A	3/1984	Dick	133/3 D
4,454,414	A	6/1984	Benton	235/379
4,474,197	A	10/1984	Kinoshita et al.	133/4 A
4,488,116	A	12/1984	Plesko	324/236
4,531,531	A	7/1985	Johnson et al.	133/3
4,543,969	A	10/1985	Rasmussen	133/3
4,549,561	A	10/1985	Johnson et al.	133/3
4,556,140	A	12/1985	Okada	194/4 C
4,558,711	A	12/1985	Yoshiaki et al.	133/3 F
4,564,036	A	1/1986	Ristvedt	133/3
4,570,655	A	2/1986	Raterman	133/3
4,594,664	A	6/1986	Hashimoto	364/405
4,602,332	A	7/1986	Hirose et al.	364/408
4,607,649	A	8/1986	Taipale et al.	133/3 C
4,620,559	A	11/1986	Childers et al.	133/3 R
4,641,239	A	2/1987	Takesako	364/408
4,674,260	A	6/1987	Rasmussen et al.	53/212
4,681,128	A	7/1987	Ristvedt et al.	453/6
4,705,154	A	11/1987	Mash et al.	194/319
4,718,218	A	1/1988	Ristvedt	53/532
4,731,043	A	3/1988	Ristvedt et al.	453/6
4,733,765	A	3/1988	Watanabe	194/206
4,749,074	A	6/1988	Ueki et al.	194/317
4,753,624	A	6/1988	Adams et al.	453/10
4,753,625	A	6/1988	Okada	453/32
4,765,464	A	8/1988	Ristvedt	206/82
4,766,548	A	8/1988	Cedrone et al.	364/479
4,775,353	A	10/1988	Childers et al.	453/6
4,775,354	A	10/1988	Rasmussen et al.	453/10
4,778,983	A	10/1988	Ushikubo	235/381
4,803,347	A	2/1989	Sugahara et al.	235/379
4,804,830	A	2/1989	Miyagisima et al.	235/379
4,812,629	A	3/1989	O'Neil et al.	235/383
4,839,505	A	6/1989	Bradt et al.	235/381
4,840,290	A	6/1989	Nakamura et al.	221/10
4,844,369	A	7/1989	Kanayachi	242/56 R
4,848,556	A	7/1989	Shah et al.	194/212
4,863,414	A	9/1989	Ristvedt et al.	453/6
4,883,158	A	11/1989	Kobayashi et al.	194/217
4,884,212	A	11/1989	Stutsman	364/479
4,900,909	A	2/1990	Nagashima et al.	235/487
4,908,516	A	3/1990	West	250/556
4,921,463	A	5/1990	Primdahl et al.	453/3
4,936,435	A	6/1990	Griner	194/317
4,953,086	A	8/1990	Fukatsu	364/408
4,954,697	A	9/1990	Kokubun et al.	235/381
4,964,495	A	10/1990	Rasmussen	194/344
4,966,570	A	10/1990	Ristvedt et al.	453/6
4,970,655	A	11/1990	Winn et al.	364/479
4,971,187	A	11/1990	Furuya et al.	194/318
4,988,849	A	1/1991	Sasaki et al.	235/379
4,992,647	A	2/1991	Konishi et al.	235/379
4,995,848	A	2/1991	Goh	453/3
5,009,627	A	4/1991	Rasmussen	453/10
5,010,238	A	4/1991	Kadono et al.	235/379
5,010,485	A	4/1991	Bigari	364/408
5,011,455	A	4/1991	Rasmussen	453/10
5,022,889	A	6/1991	Ristvedt et al.	453/6
5,025,139	A	6/1991	Halliburton, Jr.	235/379
5,026,320	A	6/1991	Rasmussen	453/6
5,031,098	A	7/1991	Miller et al.	364/405
5,033,602	A	7/1991	Saarinen et al.	194/334
5,039,848	A	8/1991	Stoken	235/381
5,055,086	A	10/1991	Raterman et al.	453/10
5,055,657	A	10/1991	Miller et al.	235/381
5,056,643	A	10/1991	Kirberg	194/202
5,064,999	A	11/1991	Okamoto et al.	235/379
5,067,928	A	11/1991	Harris	453/17
5,080,633	A	1/1992	Ristvedt et al.	435/6
5,091,713	A	2/1992	Horne et al.	340/541
5,104,353	A	4/1992	Ristvedt et al.	453/6
5,105,601	A	4/1992	Horiguchi et al.	53/465
5,106,338	A	4/1992	Rasmussen et al.	453/10
5,111,927	A	5/1992	Schulze	194/209
5,114,381	A	5/1992	Ueda et al.	453/57
5,120,945	A	6/1992	Nishibe et al.	235/379
5,123,873	A	6/1992	Rasmussen	453/10
5,129,205	A	7/1992	Rasmussen	53/52
5,135,435	A	8/1992	Rasmussen	453/56
5,140,517	A	8/1992	Nagata et al.	364/408
5,141,443	A	8/1992	Rasmussen et al.	453/10
5,141,472	A	8/1992	Todd et al.	453/10
5,145,455	A	9/1992	Todd	453/6
5,146,067	A	9/1992	Sloan et al.	235/381
5,154,272	A	10/1992	Nishiumi et al.	194/318
5,163,866	A	11/1992	Rasmussen	453/10
5,163,867	A	11/1992	Rasmussen	453/10
5,163,868	A	11/1992	Adams et al.	453/11
5,167,313	A	12/1992	Dobbins et al.	194/317
5,175,416	A	12/1992	Mansvelt et al.	235/379
5,176,565	A	1/1993	Ristvedt et al.	453/6
5,179,517	A	1/1993	Sarbin et al.	364/410
5,183,142	A	2/1993	Latchinian et al.	194/206
5,184,709	A	2/1993	Nishiumi et al.	194/318
5,194,037	A	3/1993	Jones et al.	453/10
5,197,919	A	3/1993	Geib et al.	453/10
5,205,780	A	4/1993	Rasmussen	453/10
5,207,784	A	5/1993	Schwartzendruber	221/6
5,209,696	A	5/1993	Rasmussen et al.	453/10
5,236,071	A	8/1993	Lee	194/200
5,243,174	A	9/1993	Veeneman et al.	235/381
5,251,738	A	10/1993	Dabrowski	194/206
5,252,811	A	10/1993	Henochowicz et al.	235/379
5,253,167	A	10/1993	Yoshida et al.	364/408

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,259,491	A	11/1993	Ward, II	194/350
5,263,566	A	11/1993	Nara et al.	194/318
5,265,874	A	11/1993	Dickinson et al.	273/138 A
5,268,561	A	12/1993	Kimura et al.	235/384
5,277,651	A	1/1994	Rasmussen et al.	453/10
5,282,127	A	1/1994	Mii	364/130
5,286,226	A	2/1994	Rasmussen	453/10
5,286,954	A	2/1994	Sato et al.	235/379
5,291,003	A	3/1994	Avnet et al.	235/381
5,291,560	A	3/1994	Daugman	382/2
5,293,981	A	3/1994	Abe et al.	194/345
5,297,030	A	3/1994	Vassigh et al.	364/405
5,297,598	A	3/1994	Rasmussen	141/314
5,297,986	A	3/1994	Ristvedt et al.	453/6
5,299,977	A	4/1994	Mazur et al.	453/10
5,302,811	A	4/1994	Fukatsu	235/381
5,324,922	A	6/1994	Roberts	235/375
5,326,104	A	7/1994	Pease et al.	273/138 A
5,370,575	A	12/1994	Geib et al.	453/3
5,372,542	A	12/1994	Geib et al.	453/10
5,374,814	A	12/1994	Kako et al.	235/379
5,379,344	A	1/1995	Larson et al.	380/23
5,379,875	A	1/1995	Shames et al.	194/317
5,382,191	A	1/1995	Rasmussen	453/11
5,390,776	A	2/1995	Thompson	194/346
5,401,211	A	3/1995	Geib et al.	453/10
5,404,986	A	4/1995	Hossfield et al.	194/317
5,410,590	A	4/1995	Blood et al.	379/147
RE34,934	E	5/1995	Raterman et al.	453/10
5,425,669	A	6/1995	Geib et al.	453/10
5,429,550	A	7/1995	Mazur et al.	453/10
5,440,108	A	8/1995	Tran et al.	235/381
5,443,419	A	8/1995	Adams et al.	453/17
5,450,938	A	9/1995	Rademacher	194/206
5,453,047	A	9/1995	Mazur et al.	453/10
5,458,285	A	10/1995	Remien	232/15
5,468,182	A	11/1995	Geib	453/10
5,470,079	A	11/1995	LeStrange et al.	273/138 A
5,474,495	A	12/1995	Geib et al.	453/3
5,474,497	A	12/1995	Jones et al.	453/17
5,480,348	A	1/1996	Mazur et al.	453/10
5,489,237	A	2/1996	Geib et al.	453/12
5,500,514	A	3/1996	Veeneman et al.	235/381
5,501,631	A	3/1996	Mennie et al.	453/3
5,507,379	A *	4/1996	Mazur	G07D 3/16 194/318
5,514,034	A	5/1996	Jones et al.	453/10
5,520,577	A	5/1996	Rasmussen	453/56
5,531,309	A	7/1996	Kloss et al.	194/202
5,538,468	A	7/1996	Ristvedt et al.	453/3
5,542,880	A	8/1996	Geib et al.	453/10
5,542,881	A	8/1996	Geib	453/10
5,553,320	A	9/1996	Matsuura et al.	235/379
5,559,887	A	9/1996	Davis et al.	380/24
5,564,546	A	10/1996	Molbak et al.	194/216
5,564,974	A	10/1996	Mazur et al.	453/10
5,564,978	A	10/1996	Jones et al.	453/17
5,570,465	A	10/1996	Tsakanikas	395/114
5,573,457	A	11/1996	Watts et al.	453/31
5,584,758	A	12/1996	Geib	453/10
5,592,377	A	1/1997	Lipkin	395/242
5,602,933	A	2/1997	Blackwell et al.	382/116
5,615,625	A	4/1997	Cassidy et al.	109/45
5,620,079	A	4/1997	Molbak	194/217
5,623,547	A	4/1997	Jones et al.	380/24
5,625,562	A	4/1997	Veeneman et al.	364/479.05
5,630,494	A	5/1997	Strauts	194/317
5,641,050	A	6/1997	Smith et al.	194/210
5,650,605	A	7/1997	Morioka et al.	235/379
5,650,761	A	7/1997	Gomm et al.	235/381
5,652,421	A	7/1997	Veeneman et al.	235/381
5,665,952	A	9/1997	Ziarno	235/380
5,679,070	A	10/1997	Ishida et al.	453/41
5,684,597	A	11/1997	Hossfield et al.	356/384
5,696,366	A	12/1997	Ziarno	235/380
5,743,373	A	4/1998	Strauts	194/318
5,746,299	A	5/1998	Molbak et al.	194/200
5,774,874	A	6/1998	Veeneman et al.	705/27
5,782,686	A	7/1998	Geib et al.	453/10
5,799,767	A	9/1998	Molbak	194/217
5,813,510	A	9/1998	Rademacher	194/206
5,823,315	A	10/1998	Hoffman et al.	194/203
5,830,054	A	11/1998	Petri	453/5
5,838,812	A	11/1998	Pare, Jr. et al.	382/115
5,842,188	A	11/1998	Ramsey et al.	705/416
5,842,916	A	12/1998	Gerrity et al.	453/57
5,850,076	A	12/1998	Morioka et al.	235/379
5,854,581	A	12/1998	Mori et al.	235/379
5,865,673	A	2/1999	Geib et al.	453/10
5,875,879	A	3/1999	Hawthorn	194/350
5,880,444	A	3/1999	Shibata et al.	235/379
5,892,211	A	4/1999	Davis et al.	235/380
5,892,827	A	4/1999	Beach et al.	380/24
5,909,793	A	6/1999	Beach et al.	194/210
5,909,794	A	6/1999	Molbak et al.	194/216
5,913,399	A	6/1999	Takemoto et al.	194/200
5,918,748	A	7/1999	Clark et al.	209/534
5,940,623	A	8/1999	Watts et al.	395/712
5,941,364	A	8/1999	Wei	194/350
5,944,162	A	8/1999	Filiberti	194/204
5,944,600	A	8/1999	Zimmermann	435/10
5,944,601	A	8/1999	Hayashi et al.	453/61
5,951,476	A	9/1999	Beach et al.	600/437
5,957,262	A	9/1999	Molbak et al.	194/200
5,988,348	A	11/1999	Martin et al.	194/317
5,995,949	A	11/1999	Morioka et al.	705/43
5,997,395	A	12/1999	Geib et al.	453/10
6,017,270	A	1/2000	Ristvedt et al.	453/5
6,021,883	A	2/2000	Casanova et al.	194/217
6,032,859	A	3/2000	Muehlberger et al.	235/449
6,039,644	A	3/2000	Geib et al.	453/10
6,039,645	A	3/2000	Mazur	453/10
6,042,470	A	3/2000	Geib et al.	453/10
6,047,807	A	4/2000	Molbak	194/217
6,047,808	A	4/2000	Neubarth et al.	194/317
6,056,104	A	5/2000	Neubarth et al.	194/317
6,068,194	A	5/2000	Mazur	235/492
6,080,056	A	6/2000	Karlsson	453/3
6,082,519	A	7/2000	Martin et al.	194/350
6,086,471	A	7/2000	Zimmermann	453/3
6,095,313	A	8/2000	Molbak et al.	194/344
6,116,402	A	9/2000	Beach et al.	194/216
6,131,625	A	10/2000	Casanova et al.	141/314
6,139,418	A	10/2000	Geib et al.	453/10
6,142,285	A	11/2000	Panzeri et al.	194/328
6,145,738	A	11/2000	Stinson et al.	235/379
6,154,879	A	11/2000	Pare, Jr. et al.	902/3
6,168,001	B1	1/2001	Davis	194/200
6,171,182	B1	1/2001	Geib et al.	453/10
6,174,230	B1	1/2001	Gerrity et al.	453/57
6,196,371	B1	3/2001	Martin et al.	194/317
6,196,913	B1	3/2001	Geib et al.	453/10
6,202,006	B1	3/2001	Scott	700/231
6,213,277	B1	4/2001	Blad et al.	194/350
6,230,928	B1	5/2001	Hanna et al.	221/13
6,264,545	B1	7/2001	Magee et al.	453/3
6,308,887	B1	10/2001	Korman et al.	235/379
6,318,536	B1	11/2001	Korman et al.	194/217
6,318,537	B1	11/2001	Jones et al.	194/346
6,349,972	B1	2/2002	Geiger et al.	283/67
6,386,323	B1	5/2002	Ramachandran et al.	186/36
6,412,620	B1	7/2002	Imura	194/317
6,431,342	B1	8/2002	Schwartz	194/346
6,438,230	B1	8/2002	Moore	380/42
6,456,928	B1	9/2002	Johnson	701/114
6,471,030	B1	10/2002	Neubarth et al.	194/317
6,474,548	B1	11/2002	Montross et al.	235/379
6,484,863	B1	11/2002	Molbak	194/216
6,484,884	B1	11/2002	Gerrity et al.	209/233
6,494,776	B1	12/2002	Molbak	453/32
6,499,277	B1	12/2002	Warner et al.	53/447
6,503,138	B2	1/2003	Spoehr et al.	453/10
6,520,308	B1	2/2003	Martin et al.	194/317
6,522,772	B1	2/2003	Morrison et al.	382/124

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,547,131	B1	4/2003	Foodman et al.	235/380
6,552,781	B1	4/2003	Rompel et al.	256/71
6,554,185	B1	4/2003	Montross et al.	235/379
6,579,165	B2	6/2003	Kuhlin et al.	453/3
6,581,042	B2	6/2003	Pare, Jr. et al.	705/40
6,602,125	B2	8/2003	Martin	453/12
6,609,604	B1	8/2003	Jones et al.	194/302
6,612,921	B2	9/2003	Geib et al.	453/13
6,637,576	B1 *	10/2003	Jones	G07D 1/04 194/216
6,640,956	B1	11/2003	Zwieg et al.	194/328
6,644,696	B2	11/2003	Brown et al.	283/67
6,652,380	B1	11/2003	Luciano	463/25
6,655,585	B2	12/2003	Shinn	235/382
6,659,259	B2	12/2003	Knox et al.	194/217
6,662,166	B2	12/2003	Pare, Jr. et al.	705/39
6,663,675	B2	12/2003	Blake et al.	753/63
6,666,318	B2	12/2003	Gerrity et al.	194/347
6,719,121	B2	4/2004	Alexander et al.	194/350
6,755,730	B2	6/2004	Geib et al.	453/3
6,758,316	B2	7/2004	Molbak	194/200
6,761,308	B1	7/2004	Hanna et al.	235/379
6,766,892	B2	7/2004	Martin et al.	194/317
6,783,452	B2	8/2004	Hino et al.	453/3
6,786,398	B1	9/2004	Stinson et al.	235/379
6,854,581	B2	2/2005	Molbak	194/344
6,854,640	B2	2/2005	Peklo	235/100
6,863,168	B1	3/2005	Gerrity et al.	194/347
6,892,871	B2	5/2005	Strauts et al.	194/302
6,896,118	B2	5/2005	Jones et al.	194/217
6,928,546	B1	8/2005	Nanavati et al.	713/186
6,950,810	B2	9/2005	Lapsley et al.	705/78
6,953,150	B2	10/2005	Shepley et al.	235/379
6,957,746	B2	10/2005	Martin et al.	221/131
6,966,417	B2	11/2005	Peklo et al.	194/344
6,976,570	B2	12/2005	Molbak	194/215
6,988,606	B2	1/2006	Geib et al.	194/334
6,991,530	B2	1/2006	Hino et al.	453/3
7,004,831	B2	2/2006	Hino et al.	453/5
7,014,029	B2	3/2006	Winters	194/302
7,014,108	B2	3/2006	Sorenson et al.	235/381
7,017,729	B2	3/2006	Gerrity et al.	194/347
7,018,286	B2	3/2006	Blake et al.	453/61
7,028,827	B1	4/2006	Molbak et al.	194/346
7,036,651	B2	5/2006	Tam et al.	194/217
7,083,036	B2	8/2006	Adams	194/223
7,113,929	B1	9/2006	Beach et al.	705/65
7,131,580	B2	11/2006	Molbak	235/379
7,149,336	B2	12/2006	Jones et al.	382/135
7,152,727	B2	12/2006	Waechter	194/317
7,158,662	B2	1/2007	Chiles	382/135
7,188,720	B2	3/2007	Geib et al.	194/302
7,213,697	B2	5/2007	Martin et al.	194/317
7,243,773	B2	7/2007	Bochonok et al.	194/350
7,269,279	B2	9/2007	Chiles	382/135
7,303,119	B2	12/2007	Molbak	235/379
7,331,521	B2	2/2008	Sorenson et al.	235/381
7,337,890	B2	3/2008	Bochonok et al.	194/353
7,427,230	B2	9/2008	Blake et al.	453/63
7,438,172	B2	10/2008	Long et al.	194/347
7,464,802	B2	12/2008	Gerrity et al.	194/347
7,500,568	B2	3/2009	Cousin	209/534
7,520,374	B2	4/2009	Martin et al.	194/317
7,551,764	B2	6/2009	Chiles et al.	382/135
7,552,810	B2	6/2009	Mecklenburg	194/317
7,580,859	B2	8/2009	Economy	705/16
7,604,107	B2	10/2009	Richard et al.	194/351
7,654,450	B2	2/2010	Mateen et al.	235/379
7,658,270	B2	2/2010	Bochonok et al.	194/350
7,735,125	B1	6/2010	Alvarez et al.	726/9
7,743,902	B2	6/2010	Wendell et al.	194/302
7,778,456	B2	8/2010	Jones et al.	382/135
7,819,308	B2	10/2010	Osterberg et al.	235/379
7,874,478	B2	1/2011	Molbak	235/379
7,886,890	B2	2/2011	Blake et al.	194/347
7,931,304	B2	4/2011	Brown et al.	283/57
7,946,406	B2	5/2011	Blake et al.	194/200
7,949,582	B2	5/2011	Mennie et al.	705/35
7,963,382	B2	6/2011	Wendell et al.	194/302
7,980,378	B2	7/2011	Jones et al.	194/217
8,023,715	B2	9/2011	Jones et al.	382/135
8,042,732	B2	10/2011	Blake et al.	235/375
8,229,821	B2	7/2012	Mennie et al.	232/16
8,346,610	B2	1/2013	Mennie et al.	705/16
8,352,322	B2	1/2013	Mennie et al.	705/16
8,393,455	B2	3/2013	Blake et al.	194/350
8,443,958	B2	5/2013	Jones et al.	194/215
RE44,252	E	6/2013	Jones et al.	194/217
8,523,641	B2	9/2013	Kuykendall et al.	194/217
8,545,295	B2	10/2013	Blake et al.	453/4
8,602,200	B2	12/2013	Blake	194/216
8,607,957	B2	12/2013	Blake et al.	194/344
8,616,359	B2	12/2013	Bochonok et al.	194/202
RE44,689	E	1/2014	Wendell et al.	194/302
8,684,159	B2	4/2014	Blake	194/216
8,684,160	B2	4/2014	Hallowell et al.	194/344
8,701,860	B1	4/2014	Blake et al.	194/350
8,950,566	B2	2/2015	Hallowell et al.	194/206
8,959,029	B2	2/2015	Jones et al.	705/18
9,092,924	B1	7/2015	Rasmussen et al.	453/3
9,330,515	B1	5/2016	Rasmussen et al.	453/3
9,384,614	B2 *	7/2016	Nagoya	G07D 9/008
9,430,893	B1	8/2016	Blake et al.	G07D 3/16
9,437,069	B1	9/2016	Blake et al.	G07D 13/00
9,501,885	B1	11/2016	Yacoubian et al.	G07D 3/14
9,508,208	B1	11/2016	Jagielinski et al.	G07D 3/14
2001/0034203	A1	10/2001	Geib et al.	453/3
2001/0048025	A1	12/2001	Shinn	235/382
2002/0065033	A1	5/2002	Geib et al.	453/3
2002/0069104	A1	6/2002	Beach et al.	705/14
2002/0074209	A1	6/2002	Karlsson	194/330
2002/0085745	A1	7/2002	Jones et al.	382/135
2002/0095587	A1	7/2002	Doyle et al.	713/186
2002/0107738	A1	8/2002	Beach et al.	705/14
2002/0126885	A1	9/2002	Mennie et al.	382/135
2002/0130011	A1	9/2002	Casanova et al.	194/344
2002/0147588	A1	10/2002	Davis et al.	704/246
2002/0151267	A1	10/2002	Kuhlin et al.	453/3
2002/0174348	A1	11/2002	Ting	713/186
2002/0179401	A1	12/2002	Knox et al.	194/217
2003/0004878	A1	1/2003	Akutsu et al.	705/43
2003/0013403	A1	1/2003	Blake et al.	453/60
2003/0042110	A1	3/2003	Wilfong	194/302
2003/0081824	A1	5/2003	Mennie et al.	382/135
2003/0127299	A1	7/2003	Jones et al.	194/217
2003/0168309	A1	9/2003	Geib et al.	194/302
2003/0168310	A1	9/2003	Strauts et al.	194/302
2003/0182217	A1	9/2003	Chiles	705/35
2003/0190882	A1	10/2003	Blake et al.	453/63
2003/0230464	A1	12/2003	Deaville et al.	194/302
2003/0234153	A1	12/2003	Blake et al.	194/347
2004/0021898	A1	2/2004	Ashizaki	358/1.15
2004/0055902	A1	3/2004	Peklo	206/815
2004/0092222	A1	5/2004	Kowalczyk et al.	453/12
2004/0153406	A1	8/2004	Alarcon-Luther et al.	705/41
2004/0153421	A1	8/2004	Robinson	705/75
2004/0154899	A1	8/2004	Peklo et al.	193/33
2004/0173432	A1	9/2004	Jones	194/216
2004/0188221	A1	9/2004	Carter	194/215
2004/0195302	A1	10/2004	Washington et al.	232/15
2004/0199924	A1	10/2004	Ganesh et al.	719/313
2004/0200691	A1	10/2004	Geib et al.	194/302
2004/0238319	A1	12/2004	Hand et al.	194/207
2004/0238614	A1	12/2004	Yoshioka et al.	232/7
2004/0256197	A1	12/2004	Blake et al.	194/350
2005/0006197	A1	1/2005	Wendell et al.	194/302
2005/0035140	A1	2/2005	Carter	221/195
2005/0040007	A1	2/2005	Geib et al.	194/302
2005/0040225	A1	2/2005	Csulits et al.	235/379
2005/0045450	A1	3/2005	Geib et al.	194/318
2005/0067305	A1	3/2005	Bochonok et al.	206/8
2005/0077142	A1	4/2005	Tam et al.	194/217
2005/0086140	A1	4/2005	Ireland et al.	705/35
2005/0087425	A1	4/2005	Peklo	194/350

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0096986	A1	5/2005	Taylor et al.	705/16
2005/0098625	A1	5/2005	Walker et al.	235/381
2005/0108165	A1	5/2005	Jones et al.	705/43
2005/0109836	A1	5/2005	Ben-Aissa	235/380
2005/0121507	A1	6/2005	Brown et al.	235/379
2005/0124407	A1	6/2005	Rowe	463/25
2005/0150740	A1	7/2005	Finkenzeller et al.	194/207
2005/0156318	A1	7/2005	Douglas	257/761
2005/0205654	A1	9/2005	Carter	235/7 R
2005/0205655	A1	9/2005	Carter	235/7 R
2005/0228717	A1	10/2005	Gusler et al.	705/14
2005/0256792	A1	11/2005	Shimizu et al.	705/35
2006/0037835	A1	2/2006	Doran et al.	194/302
2006/0054455	A1	3/2006	Kuykendall et al.	194/217
2006/0054457	A1	3/2006	Long et al.	194/347
2006/0060363	A2	3/2006	Carter	172/111
2006/0064379	A1	3/2006	Doran et al.	705/42
2006/0065717	A1	3/2006	Hurwitz et al.	235/381
2006/0069654	A1	3/2006	Beach et al.	705/65
2006/0146839	A1	7/2006	Hurwitz et al.	370/401
2006/0148394	A1	7/2006	Blake et al.	453/12
2006/0149415	A1	7/2006	Richards	700/236
2006/0151285	A1	7/2006	String	194/350
2006/0154589	A1	7/2006	String	453/11
2006/0175176	A1	8/2006	Blake	194/216
2006/0182330	A1	8/2006	Chiles	382/135
2006/0196754	A1	9/2006	Bochonok et al.	194/347
2006/0205481	A1	9/2006	Dominelli	463/25
2006/0207856	A1	9/2006	Dean et al.	194/302
2006/0219519	A1	10/2006	Molbak et al.	194/346
2006/0253332	A1	11/2006	Dobbins	705/21
2006/0283685	A1	12/2006	Cousin	194/217
2007/0051582	A1	3/2007	Bochonok et al.	194/202
2007/0071302	A1	3/2007	Jones et al.	382/135
2007/0108015	A1	5/2007	Bochonok et al.	194/350
2007/0108267	A1*	5/2007	Jonsson	G07D 3/14 235/379
2007/0119681	A1	5/2007	Blake et al.	194/215
2007/0181676	A1	8/2007	Mateen et al.	235/381
2007/0187494	A1	8/2007	Hanna	235/383
2007/0221470	A1	9/2007	Mennie et al.	194/216
2007/0251800	A1	11/2007	Castleberry	194/219
2007/0269097	A1	11/2007	Chiles et al.	382/135
2007/0270997	A1	11/2007	Brumfield et al.	700/214
2008/0033829	A1	2/2008	Mennie et al.	705/16
2008/0044077	A1	2/2008	Mennie et al.	382/135
2008/0135608	A1	6/2008	Ireland et al.	232/1 D
2008/0220707	A1	9/2008	Jones et al.	453/2
2008/0223930	A1	9/2008	Rolland et al.	235/385
2009/0018959	A1	1/2009	Doran et al.	705/44
2009/0236200	A1	9/2009	Hallowell et al.	194/215
2009/0236201	A1	9/2009	Blake et al.	194/215
2009/0239459	A1	9/2009	Watts et al.	453/18
2009/0242626	A1	10/2009	Jones et al.	235/379
2009/0320106	A1	12/2009	Jones et al.	726/5
2010/0017017	A1*	1/2010	Adams	G07D 1/02 700/223
2010/0038419	A1	2/2010	Blake et al.	235/379
2010/0065623	A1	3/2010	Sauter	232/1 D
2010/0155193	A1*	6/2010	Gunst	G07D 3/06 194/350
2010/0198726	A1	8/2010	Doran et al.	705/41
2010/0234985	A1	9/2010	Shuren et al.	700/223
2010/0261421	A1	10/2010	Wendell et al.	453/4
2010/0276485	A1	11/2010	Jones et al.	235/379
2010/0327005	A1	12/2010	Martin et al.	221/98
2011/0098845	A1	4/2011	Mennie et al.	700/223
2011/0099105	A1	4/2011	Mennie et al.	705/41
2011/0259961	A1	10/2011	Fold et al.	235/385
2011/0270695	A1	11/2011	Jones et al.	705/43
2012/0067950	A1	3/2012	Blake	235/381
2012/0156976	A1*	6/2012	Blake	G07D 3/128 453/4
2013/0178139	A1	7/2013	Hallowell et al.	453/15
2013/0199890	A1	8/2013	Blake	194/216
2013/0205723	A1	8/2013	Blake et al.	53/473
2015/0302678	A1	10/2015	Blake et al.	

FOREIGN PATENT DOCUMENTS

CA	2143943	C	3/2003	G07D 3/16
DE	06 60 354		5/1938	G07F 17/26
DE	30 21 327	A1	12/1981	G07D 3/06
EP	0 351 217	A2	1/1990	G07F 9/04
EP	0 667 973	B1	1/1997	G07D 3/14
EP	0 926 634	A2	6/1999	G07D 3/14
EP	1 104 920	A1	6/2001	G07D 5/08
EP	1 209 639	A2	5/2002	G07F 19/00
EP	1 528 513	A1	5/2005	G07F 7/08
FR	2042254		2/1971	G07B 11/00
GB	2035642	A	6/1980	G07F 7/10
GB	2175427	A	11/1986	G07F 17/42
GB	2198274	A	6/1988	G07D 3/00
GB	2458387	A	9/2009	G07D 11/00
GB	2468783	A	9/2010	C07D 9/00
JP	49-058899		6/1974	
JP	52-014495		2/1977	G07F 5/10
JP	52-071300	A	6/1977	G07F 5/22
JP	56-040992	A	4/1981	G07F 5/18
JP	57-117080	A	7/1982	G07D 3/16
JP	59-079392	A	5/1984	G07D 3/16
JP	60-016271	U	2/1985	G07F 7/02
JP	62-134168	U	8/1987	G07B 1/00
JP	62-182995	A	8/1987	G07F 7/08
JP	62-221773	A	9/1987	G06F 15/30
JP	62-166562	U	10/1987	G07B 1/00
JP	64-035683	A	2/1989	G07D 9/00
JP	64-042789	A	2/1989	G07F 9/00
JP	64-067698	A	3/1989	G07F 7/08
JP	01-118995	A	5/1989	G07G 1/00
JP	01-307891	A	12/1989	G07D 9/00
JP	02-050793	A	2/1990	G07D 9/00
JP	02-252096	A	10/1990	G07D 9/00
JP	03-012776	A	1/1991	G06F 15/30
JP	03-063795	A	3/1991	G07D 3/00
JP	03-092994	A	4/1991	G07D 9/00
JP	03-156673	A	7/1991	G06F 15/30
JP	04-085695	A	3/1992	G07F 11/72
JP	04-175993	A	6/1992	G07F 5/22
JP	05-046839	A	2/1993	G07D 5/02
JP	05-217048	A	8/1993	G07D 3/16
JP	05-274527	A	10/1993	G07D 9/00
JP	06-035946	A	2/1994	G06F 15/30
JP	06-103285	A	4/1994	G06F 15/21
JP	09-251566	A	9/1997	G07F 7/08
JP	2002-117439	A	4/2002	G07D 9/00
JP	2003-242287	A	8/2003	G06F 17/60
JP	2004-213188	A	7/2004	G06F 17/60
SE	44 244		9/1988	
WO	WO 85/00909	A1	2/1985	G07D 5/02
WO	WO 91/06927	A1	5/1991	G07D 3/16
WO	WO 91/08952	A1	6/1991	B65B 11/04
WO	WO 91/12594	A1	8/1991	G07D 3/16
WO	WO 91/18371	A1	11/1991	G07D 3/16
WO	WO 92/08212	A1	5/1992	G07D 3/16
WO	WO 92/20043	A1	11/1992	G07D 3/00
WO	WO 92/20044	A1	11/1992	G07D 3/16
WO	WO 92/22044	A1	12/1992	G07D 3/00
WO	WO 93/00660	A1	1/1993	G07D 3/00
WO	WO 93/09621	A1	5/1993	H04L 9/32
WO	WO 94/06101	A1	3/1994	G07D 3/16
WO	WO 94/08319	A1	4/1994	G07D 3/16
WO	WO 94/23397	A1	10/1994	G07D 3/00
WO	WO 95/02226	A1	1/1995	G07D 3/00
WO	WO 95/04978	A1	2/1995	G07D 3/06
WO	WO 95/06920	A1	3/1995	G07D 3/16
WO	WO 95/09406	A1	4/1995	G07D 3/16
WO	WO 95/13596	A1	5/1995	G07D 3/14
WO	WO 95/19017	A1	7/1995	G07D 1/00
WO	WO 95/23387	A1	8/1995	G07D 3/16
WO	WO 95/30215	A1	11/1995	G07F 17/42
WO	WO 96/07163	A1	3/1996	G07D 3/06
WO	WO 96/07990	A1	3/1996	G07D 3/16

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO 96/12253 A1	4/1996	G07D 3/00
WO	WO 96/27525 A1	9/1996	B65B 11/02
WO	WO 96/27859 A1	9/1996	G07D 5/08
WO	WO 97/22919 A1	6/1997	G06F 7/08
WO	WO 97/25692 A1	7/1997	G07D 3/06
WO	WO 98/24041 A1	6/1998	G06F 17/60
WO	WO 98/24067 A1	6/1998	G07D 3/14
WO	WO 98/48383 A2	10/1998	G07D 1/00
WO	WO 98/48384 A2	10/1998	G07D 1/00
WO	WO 98/48385 A2	10/1998	G07D 1/00
WO	WO 98/51082 A1	11/1998	H04N 7/18
WO	WO 98/59323 A1	12/1998	G07D 3/00
WO	WO 99/00776 A1	1/1999	G07F 9/06
WO	WO 99/06937 A1	2/1999	G06F 19/00
WO	WO 99/16027 A2	4/1999	G07F 7/02
WO	WO 99/33030 A1	7/1999	G07D 3/00
WO	WO 99/41695 A1	8/1999	G06K 5/00
WO	WO 99/48057 A1	9/1999	G07D 3/06
WO	WO 99/48058 A1	9/1999	G07D 3/06
WO	WO 00/48911 A1	8/2000	B65B 67/12
WO	WO 00/65546 A1	11/2000	G07F 1/04
WO	WO 01/63565 A2	8/2001	G07D 9/00
WO	WO 02/071343 A1	9/2002	G07D 3/00
WO	WO 03/052700 A2	6/2003	
WO	WO 03/079300 A1	9/2003	G07D 7/00
WO	WO 03/085610 A1	10/2003	G07D 9/06
WO	WO 03/107280 A2	12/2003	
WO	WO 04/044853 A1	5/2004	G07D 3/12
WO	WO 04/109464 A2	12/2004	
WO	WO 05/041134 A2	5/2005	
WO	WO 05/088563 A1	9/2005	G07D 3/00
WO	WO 06/086531 A1	8/2006	G07D 9/00
WO	WO 07/035420 A2	3/2007	G06F 7/00
WO	WO 07/120825 A2	10/2007	G06K 9/00

OTHER PUBLICATIONS

U.S. Appl. No. 14/752,474, filed Jun. 26, 2015, John R. Blake et al., System, Method and Apparatus for Repurposing Currency.

U.S. Appl. No. 14/936,829, filed Nov. 10, 2015, John R. Blake et al., Systems, Methods and Devices for Processing Coins Utilizing a Multi-Material Coin Sorting Disk.

U.S. Appl. No. 14/936,846, filed Nov. 10, 2015, Tomasz M. Jagielinski, Systems, Methods and Devices for Processing Batches of Coins Utilizing Coin Imaging Sensor Assemblies.

U.S. Appl. No. 15/219,665, filed Jul. 26, 2016, Blake et al, Coin Processing Systems, Methods and Devices.

U.S. Appl. No. 15/219,837, filed Jul. 26, 2016, Blake et al, Systems, Methods and Devices for Managing Rejected Coins During Coin Processing.

U.S. Appl. No. 15/230,123, filed Aug. 5, 2016, Thomas P. Adams et al., Systems, Methods and Devices for Coin Processing and Coin Recycling.

U.S. Appl. No. 15/356,295, filed Nov. 18, 2016, Yacoubian et al, Systems, Methods and Devices for Processing Coins Utilizing Normal or Near-Normal and/or High-Angle of Incidence Lighting.

U.S. Appl. No. 15/360,004, filed Nov. 23, 2016, Jagielinski, et al, Systems, Methods and Devices for Processing Coins with Linear Array of Coin Imaging Sensors.

Amiel Industries: AI-1500 'Pulsar' High Performance Sorting and Bagging Machine, 13 pages (date unknown, but prior to Dec. 14, 2000).

AUI: Coinverter—"No More Lines . . . Self-Serve Cash-Out," by Cassius Elston, 1995 World Games Congress/Exposition Converter, 1 page (dated prior to 1995).

Brandt: 95 Series Coin Sorter Counter, 2 pages (1982).

Brandt: Model 817 Automated Coin and Currency Ordering System, 2 pages (1983).

Brandt: Model 920/925 Counter, 2 pages (date unknown, prior to Jul. 2011, possibly prior to Mar. 17, 1997).

Brandt: System 930 Electric Counter/Sorter, "Solving Problems, Pleasing Customer, Building Deposits," 1 page (date unknown, prior to Mar. 2, 2011, possibly prior to Mar. 17, 1997).

Brandt: Model 940-6 High Speed Sorter/Counter, 2 pages (date unknown, prior to Oct. 31, 1989).

Brandt: System 945 High-Speed Sorter, 2 pages (date unknown, prior to Mar. 2, 2011, possibly prior to Mar. 17, 1997).

Brandt: Model 952 Coin Sorter/Counter, 2 pages (date unknown, prior to Oct. 31, 1989).

Brandt: Model 954 Coin Sorter/Counter, 2 pages (date unknown, prior to Oct. 31, 1989).

Brandt: Model 957 Coin Sorter/Counter, 2 pages (date unknown, prior to Oct. 31, 1989).

Brandt: Model 958 Coin Sorter/Counter, 5 pages (© 1982).

Brandt: Model 960 High-Speed Coin Sorter & Counter, 2 pages (1984).

Brandt; Model 966 Microsort™ Coin Sorter and Counter, 4 pages, (1979).

Brandt: Model 970 Coin Sorter and Counter, 2 pages (1983).

Brandt: Model 1205 Coin Sorter Counter, 2 pages (1986).

Brandt: Model 1400 Coin Sorter Counter, 2 pages (date unknown, prior to Mar. 2, 2011, possibly prior to Mar. 2, 2011).

Brandt: Model 8904 Upfeed—"High Speed 4-Denomination Currency Dispenser," 2 pages (1989).

Brandt: Mach 7 High-Speed Coin Sorter/Counter, 2 pages (1992).

Case ICC Limited: CDS Automated Receipt Giving Cash Deposit System, 3 pages (date unknown, prior to Nov. 15, 2000).

Cash, Martin: Newspaper Article "Bank Blends New Technology With Service," Winnipeg Free Press, 1 page (Sep. 4, 1992).

Childers Corporation: Computerized Sorter/Counter, "To coin an old adage, time is money . . . ," 3 pages (1981).

CTcoin: CDS602 Cash Deposit System, 1 page (date unknown, prior to Jan. 15, 2001).

Cummins: Cash Information and Settlement Systems (Form 023-1408), 4 pages (date Dec. 1991).

Cummins: The Universal Solution to All Coin and Currency Processing Needs (Form 13C1218 3-83), 1 page (Mar. 1983).

Cummins: JetSort® High Speed Sorter/Counter Kits I & J—Operating Instructions (Form 022-7123-00) 12 pages (1994).

Cummins: JetSort® Coin Sorter Counter/CA-130XL Coin Wrapper, Cummins Automated Money Systems (AMS) Case Study—Fifth-Third, "6,000 Coin Per Minute Counter/Sorter Keeps pace With Fifth-Third Bank's Money Processing Needs," (Form 13C1180), 2 pages (Nov. 1981).

Cummins: JetSort®, "Venders Love JetSort," (13C1255), 1 page (Mar. 1987).

Cummins: JetSort® "High Speed Coin Sorter & Counter for Payphone Applications," "CTOCS Ready" (Form 023-1365), 2 pages (Mar. 1989).

Cummins: JetSort® mailer, "One moving part simplicity," "Vendors—Are validators changing your coin and currency needs?" (Form 023-1297), 3 pages (Apr. 1987).

Cummins: JetSort® Series V High Speed Coin Sorter/Counter, (Form 023-1383), 2 pages (Sep. 1990).

Cummins: JetSort® "Time for a Change, Be a smashing success!," (Form 023-1328), 1 page (Jun. 1988).

Cummins: JetSort® "Time for a Change—JetSort® vs. Brandt X," (Form 023-1330), 1 page (Jun. 1988).

Cummins: JetSort® "Time for a Change—No Coins Sorted After 3:00 or on Saturday," (Form 023-1327), 1 page (Aug. 1988).

Cummins: JetSort®, "What do all these Banks have in Common . . . ?", JetSort, CA-130XL coin wrapper, CA-118 coin wrapper, CA-4000 JetCount, (13C1203), 3 pages (Aug. 1982).

Cummins: JetSort® 700-01/CA-118 Coin Wrapper, Cummins Automated Money Systems (AMS) Case Study—University State Bank, "Cummins Money Processing System Boosts Teller Service at University State Bank," (Form 13C1192), 2 pages (Mar. 1982).

Cummins: JetSort® 700-01, Cummins Automated Money Systems (AMS) Case Study—First State Bank of Oregon, "JetSort® Gives Bank Coin Service Edge," (Form 13C1196), 2 pages (Apr. 1982).

Cummins: JetSort® 700-01 Coin Sorter/Counter, Operating Instructions, 14 pages (1982).

(56) **References Cited**

OTHER PUBLICATIONS

Cummins: JetSort® 701, Cummins Automated Money Systems (AMS) Case Study—Convenco Vending, "High Speed Coin Sorter increases coin processing power at Convenco Vending," (Form 13C1226), 2 pages (Jul. 1983).
Cummins: JetSort Models 701 and 750 , "State-of-the-art coin processing comes of age," 2 pages (Feb. 1984).
Cummins: JetSort® Model CA-750 Coin Processor (Item No. 50-152), 1 page (Jul. 1984).
Cummins: JetSort® Model CA-750 Coin Sorter/Counter and CA-4050 JetCount currency counter, "Money Processing Made Easy," (Form 13C1221) 2 pages (Jun. 1983).
Cummins: JetSort® Model 1701 with JetStops, Operating Instructions Manual (Form 022-1329-00), 16 pages (1984).
Cummins: JetSort® Model 1760 brochure, (Form 023-1262-00), 2 pages (Jul. 1985).
Cummins: JetSort® Models 1770 and 3000, Communication Package specification and operating instructions, 10 pages (uncertain, possibly Nov. 1985).
Cummins: JetSort® Model 1770, "JetSort® Speed and Accuracy, Now with Communications!", (Form 023-1272) 1 page (Oct. 1986).
Cummins: JetSort® 2000 Series High Speed Coin Sorter/Counter (Form 023-1488), 2 pages (Oct. 2000).
Cummins: JetSort®3000 Series High Speed Coin Sorter (Form 023-1468 Rev 1), 2 pages (Feb. 1995).
Cummins: JetSort®3000 Series Options, "Talking JetSort 3000," (Form 023-1338-000), 1 page (between Jan. 1989-Feb. 1989).
Cummins: JetSort® 3000, "3,000 Coins per Minute!," (Form 023-1312), 1 page (date unknown, est. 1987).
Cummins: JetSort® 3200, Enhanced electronics for the JetSort® 3200 (Form 023-1350), 1 page (Apr. 1987).
De La Rue: CDS 500 Cash Deponier System, 6 pages (date unknown, p. 5 has date May 1994, p. 6 has date Dec. 1992) (German).
De La Rue: CDS 5700 and CDS 5800 Cash Deponier System (German) and translation, 7 pages (date unknown, prior to Aug. 13, 1996).
Diebold: Merchant MicroBranch, "Merchant MicroBranch Combines ATM After-Hour Depository Rolled-Coin Dispenser," Bank Technology News, 1 page (Nov. 1997).
Fa. GBS-Geldbearbeitungssysteme: GBS9401SB Technical Specification, 24 pages (date unknown, prior to Nov. 10, 2010).
Frisco Bay: Commercial Kiosk, "Provide self-service solutions for your business customers," 4 pages (date unknown, prior to Mar. 2, 2011, p. 4 has date 1996).
Glory: AMT Automated Merchant Teller, 4 pages (date unknown, prior to Jan. 15, 2001).
Glory: CRS-8000 Cash Redemption System, 2 pages (1996).
Hamilton: Hamilton's Express Banking Center, In Less Space Than a Branch Manager's Desk, 4 pages (date unknown, prior to Jan. 15, 2001).
Intellectual Australia Pty. Ltd.: Microbank, "From down under: Microbank," "hand-held smart card terminal that combines smart card functions and telephone banking," 2 pages (Feb. 1996).
ISH Electronic: ISH I2005/500 Coin Counter (with translation), 4 pages (date unknown, prior to Aug. 1996).
ISH Electronic: ISH I2005/501 Self-Service Unit (with translation), 4 pages (date unknown, prior to Aug. 1996).
Namsys, Inc.: Namsys Express, Making currency management . . . more profitable, 2 pages (date unknown, prior to Jan. 15, 2001).
NGZ Geldzahlmaschinengesellschaft: NGZ 2100 Automated Coin Depository, 4 pages (date unknown, prior to Sep. 1996).
Perconta: Contomat Coin Settlement Machine for Customer Self Service, 2 pages (date unknown, prior to Apr. 2003).
Prema GmbH: Prema 405 (RE) Self Service Coin Deposit Facility, 2 pages (date unknown, prior to Apr. 2003).
Reis Eurosystems: CRS 6501/CRS 6510 Cash Receipt Systems for Self-Service Area, 3 pages (date unknown, prior to Aug. 13, 1996, maybe Feb. 1995).
Reis Eurosystems: CRS 6520/ CRS 6525 Standard-Class Coin Deposit Systems, 1 page (date unknown, prior to Apr. 2003).
Reis Eurosystems: CS 3510 Disc-Sorter, 1 page (date unknown, prior to Apr. 2003).
Royal Bank: Hemeon, Jade, "Royal's Burlington drive-in bank provides customers 24-hour tellers," The Toronto Star, 1 page (Aug. 21, 1991).
Royal Bank: Leitch, Carolyn, "High-Tech Bank Counts Coins," The Globe and Mail, 2 pages (Sep. 19, 1991).
Royal Bank: Oxby, Murray, "Royal Bank Opens 'Super Branch,'" The Gazette Montreal, 2 pages (Sep. 14, 1991).
Royal Bank: SuperBranch, "Experience the Ultimate in Convenience Banking," 2 pages (Feb. 1992).
Scan Coin: International Report, 49 pages (Apr. 1987).
Scan Coin: Money Processing Systems, 8 pages (date unknown, prior to Apr. 2003).
Scan Coin: World, 2 pages (Feb. 1988).
Scan Coin: CDS Cash Deposit System, 6 pages (date unknown, prior to Apr. 2003) [SC 0369].
Scan Coin: CDS Coin Deposit System—Technical Referens Manual, 47 pages (1989).
Scan Coin: CDS 600 User's Manual, 14 pages (date unknown, prior to Apr. 2003).
Scan Coin: CDS 600 & CDS 640 Cash Deposit System—Technical Manual, 45 pages (date unknown, prior to Apr. 2003).
Scan Coin: CDS MK 1 Coin Deposit System—Technical Manual, 32 pages (1991).
Scan Coin: SC 102 Value Counter Technical Manual, 28 pages (date unknown, prior to Apr. 2003).
Pay by Touch: Secure ID News, "Piggly Wiggly Extends Biometric Payments Throughout the Southeast U.S.," 2 pages, (Dec. 14, 2005).
ESD, Inc: Smartrac Card System, "Coinless laundry makes quarters obsolete; Smartrac Card System really makes a change in laundry industry," Business Wire, 2 pages (Feb. 23, 1996).
Meece, Mickey: Article "Development Bank of Singapore Gets Cobranding Edge with Smart Cards," American Banker, New York, NY, vol. 159, ISS. 195, p. 37, 2 pages (Oct. 10, 1994).
Scan Coin: Coin Sachet System brochure, 4 pages (last page marked "© Scan Coin / Jun. 2007").

* cited by examiner

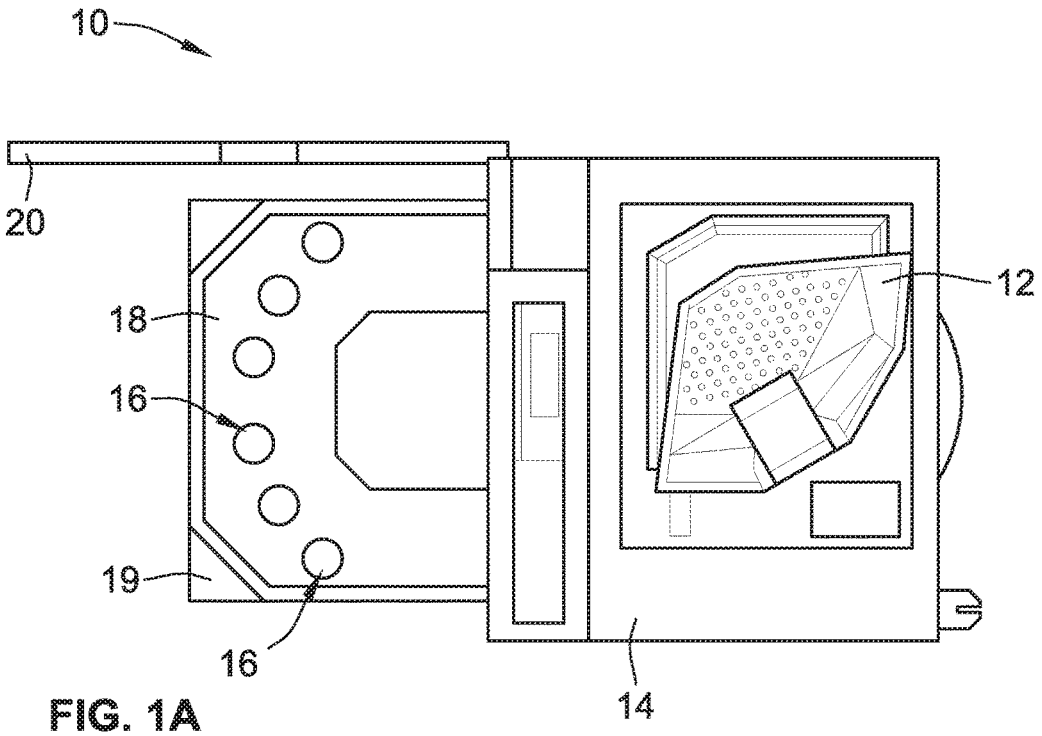


FIG. 1A

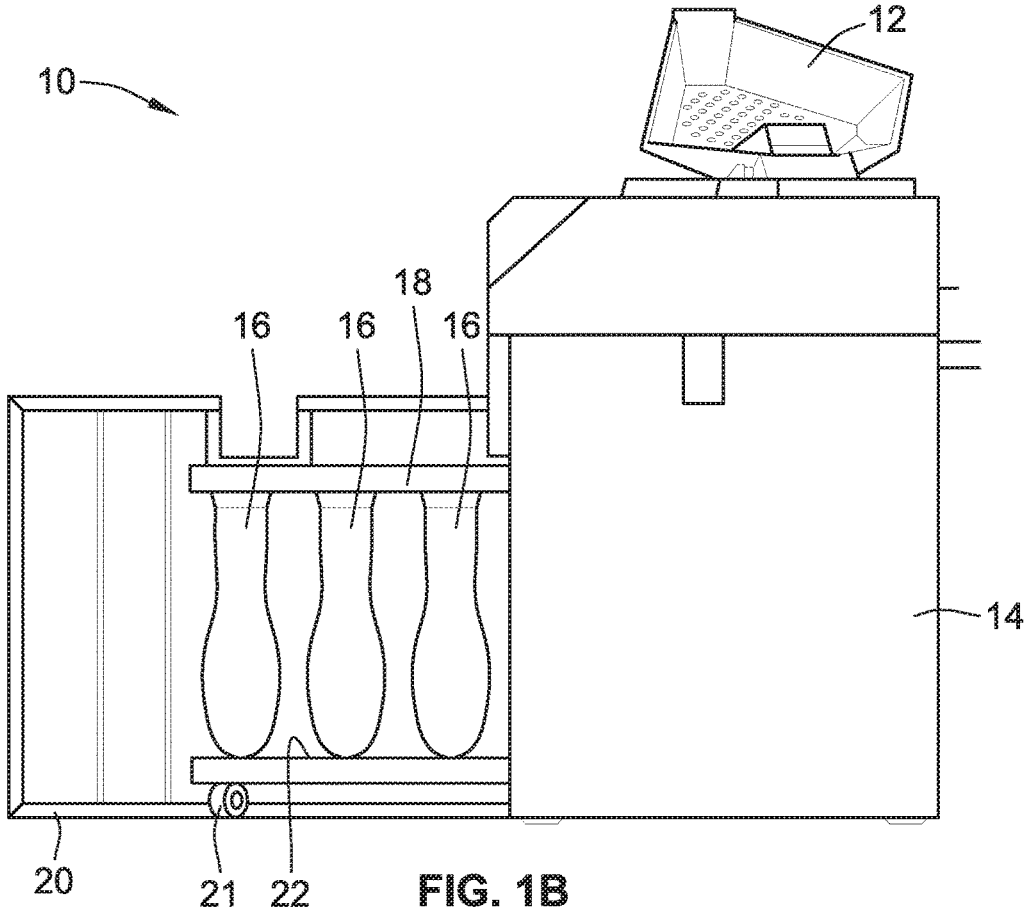


FIG. 1B

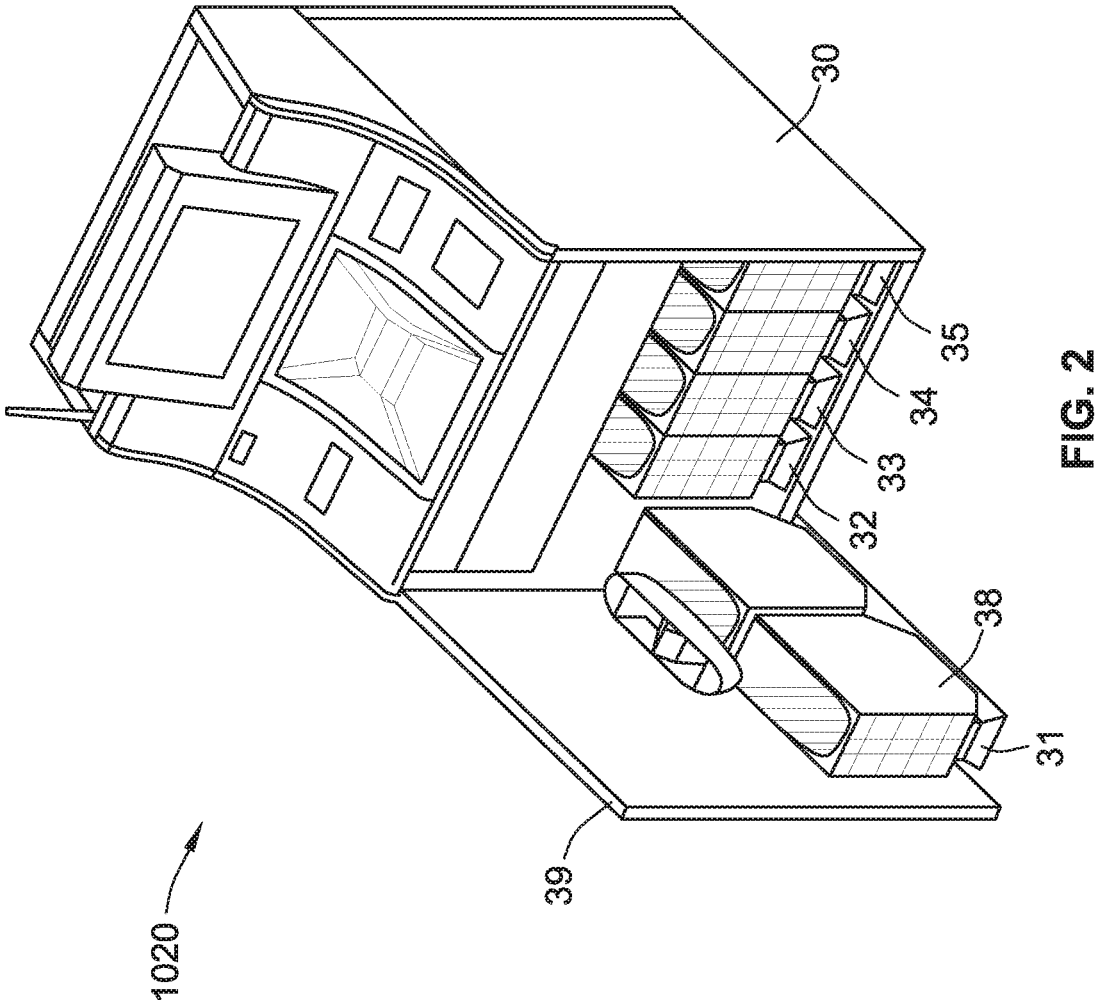


FIG. 2

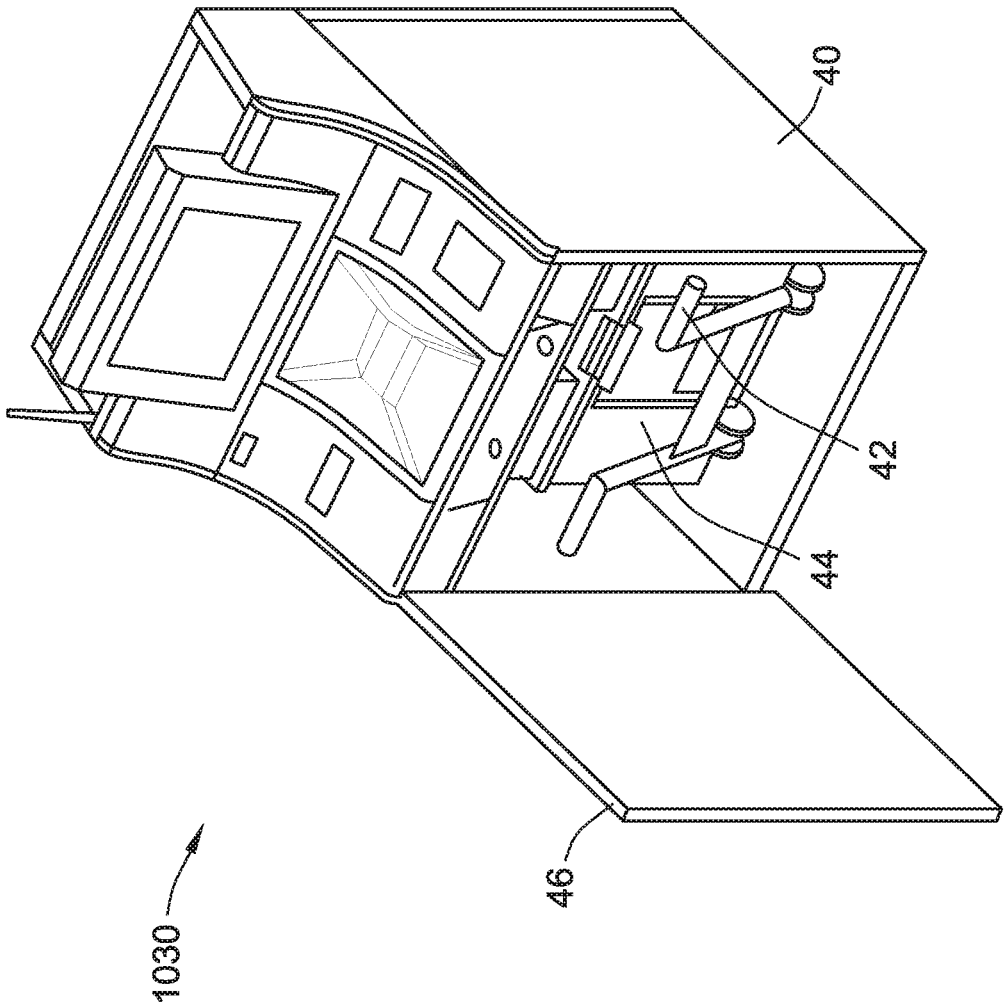


FIG. 3

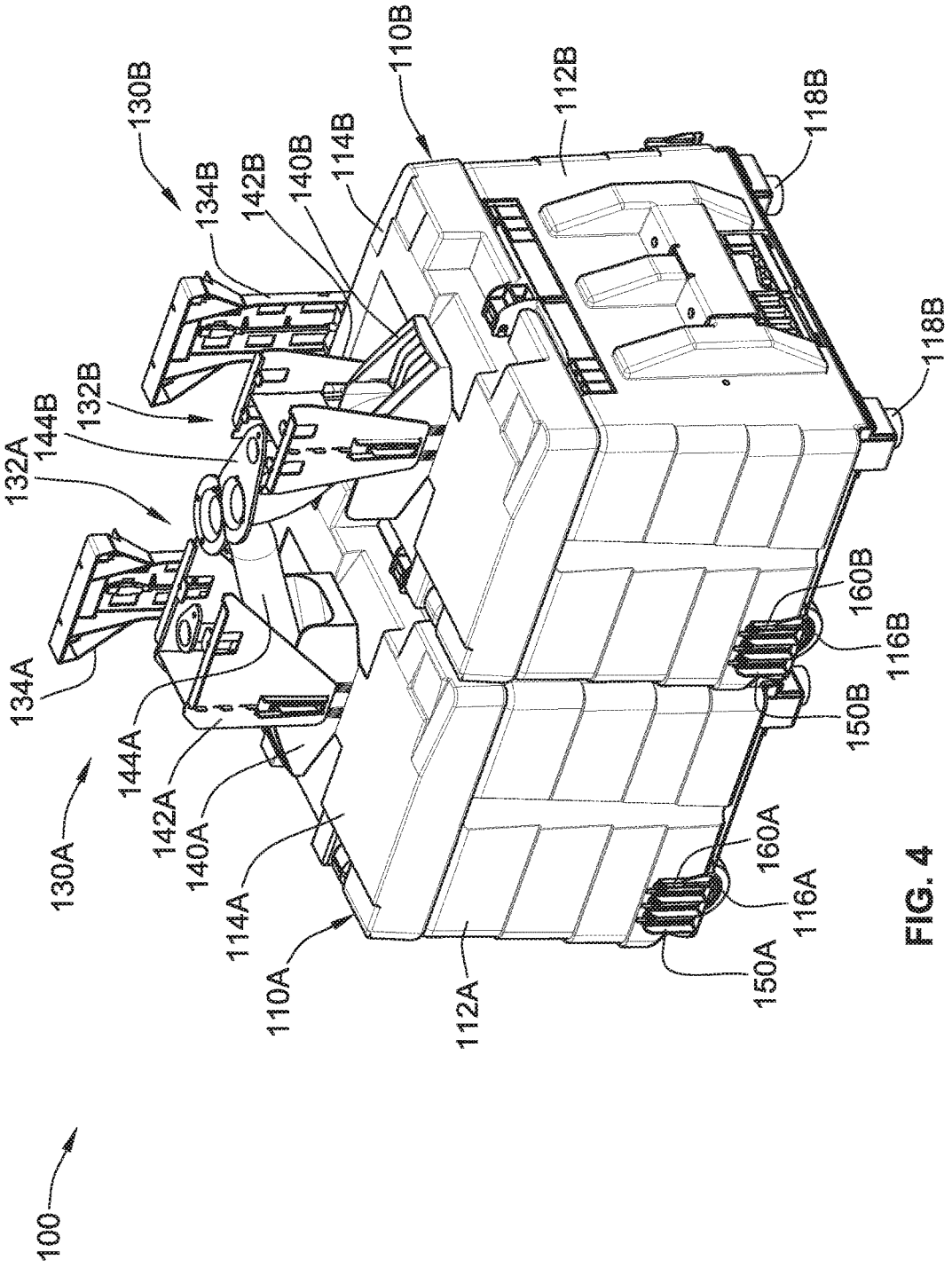

100
130A
132A
134A
144A
142A
140A
114A
110A
112A
130B
134B
132B
144B
142B
140B
114B
110B
112B
118B
118B
160B
116B
150B
160A
116A
150A

FIG. 4

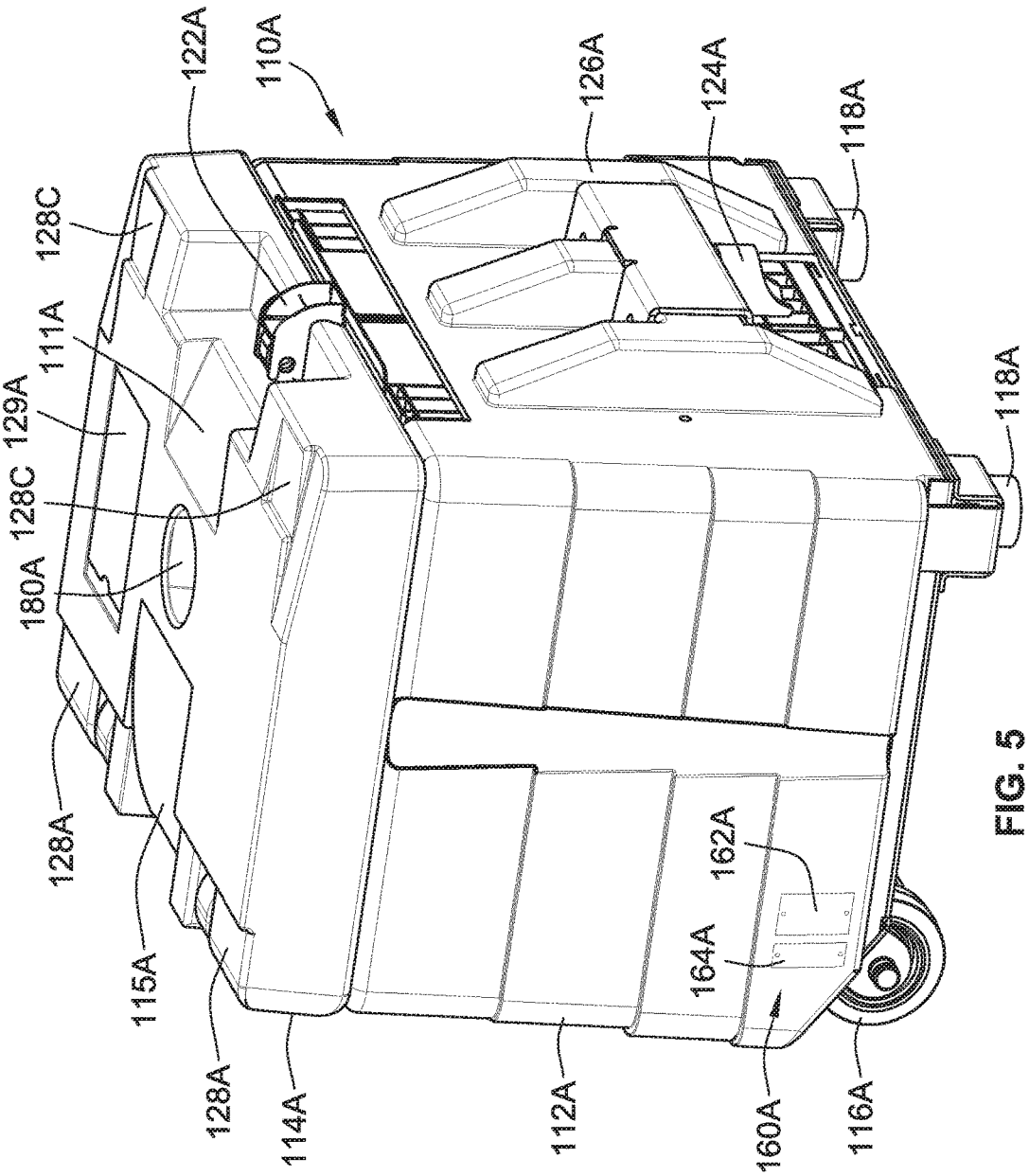

122A
110A
126A
124A
118A
128C
111A
129A
128C
180A
118A
128A
115A
128A
114A
112A
162A
164A
160A
116A

FIG. 5

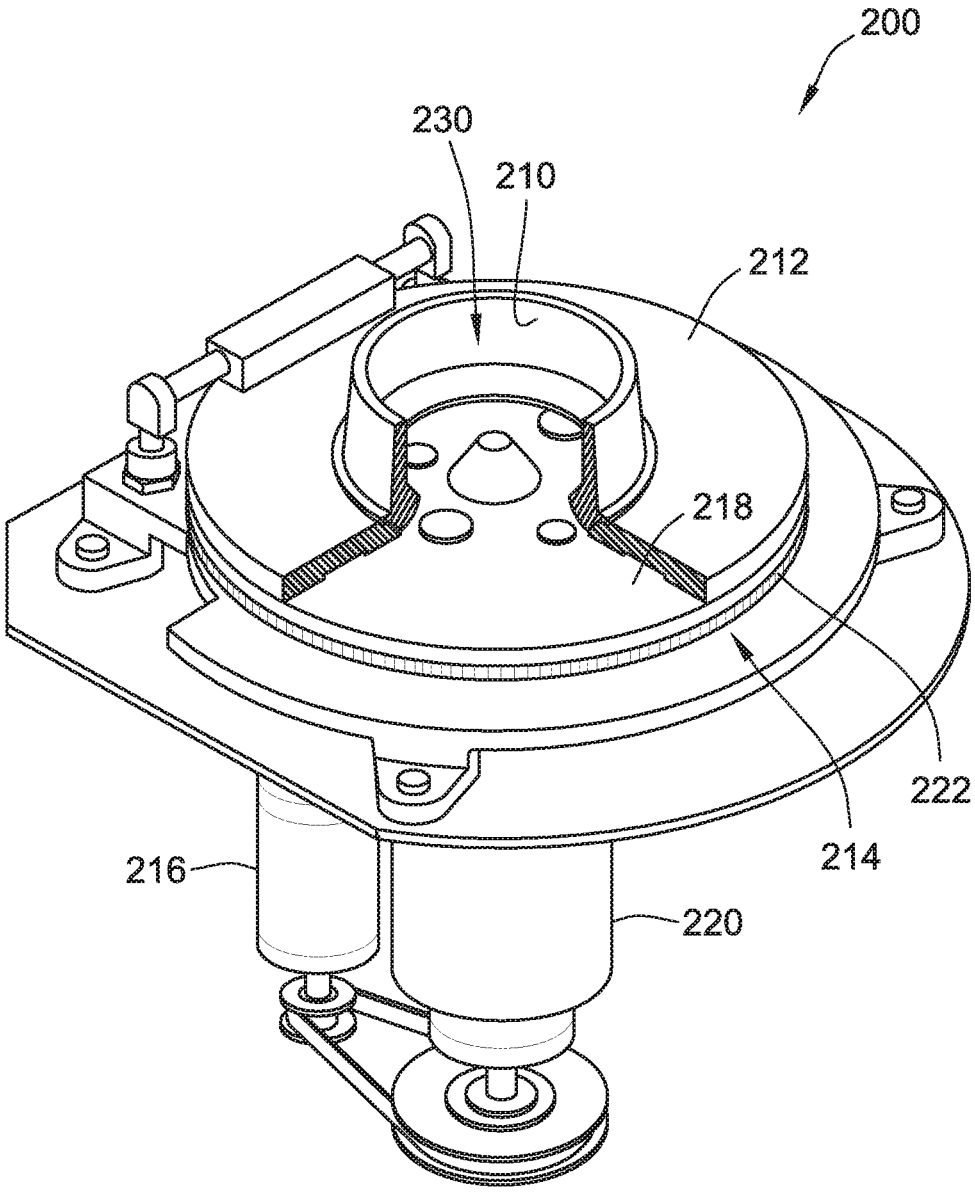


FIG. 6

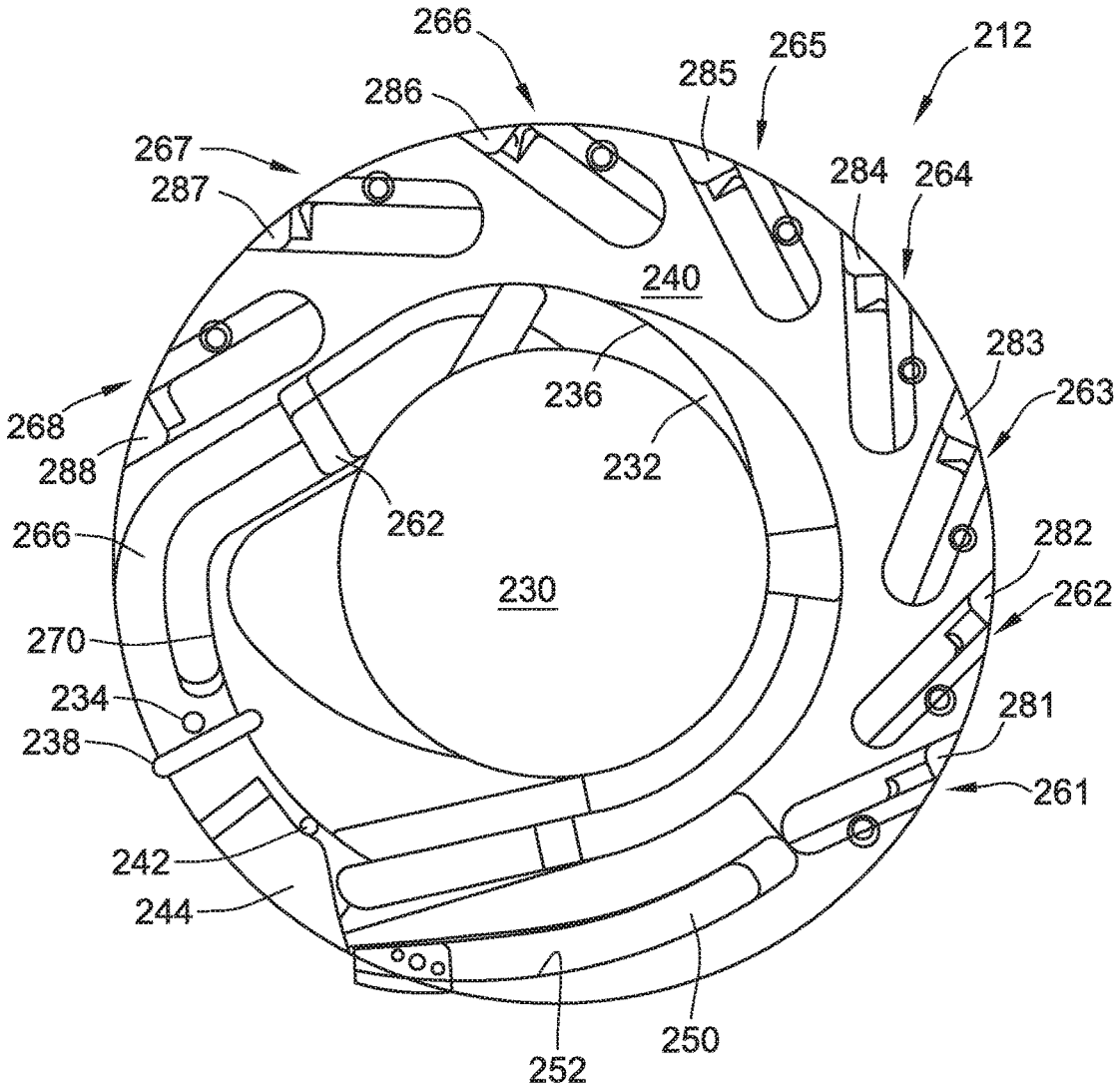

266
265
212
285
286
267
284
264
287
240
283
236
263
268
232
288
262
266
282
230
262
270
234
281
238
261
242
244
250
252

FIG. 7

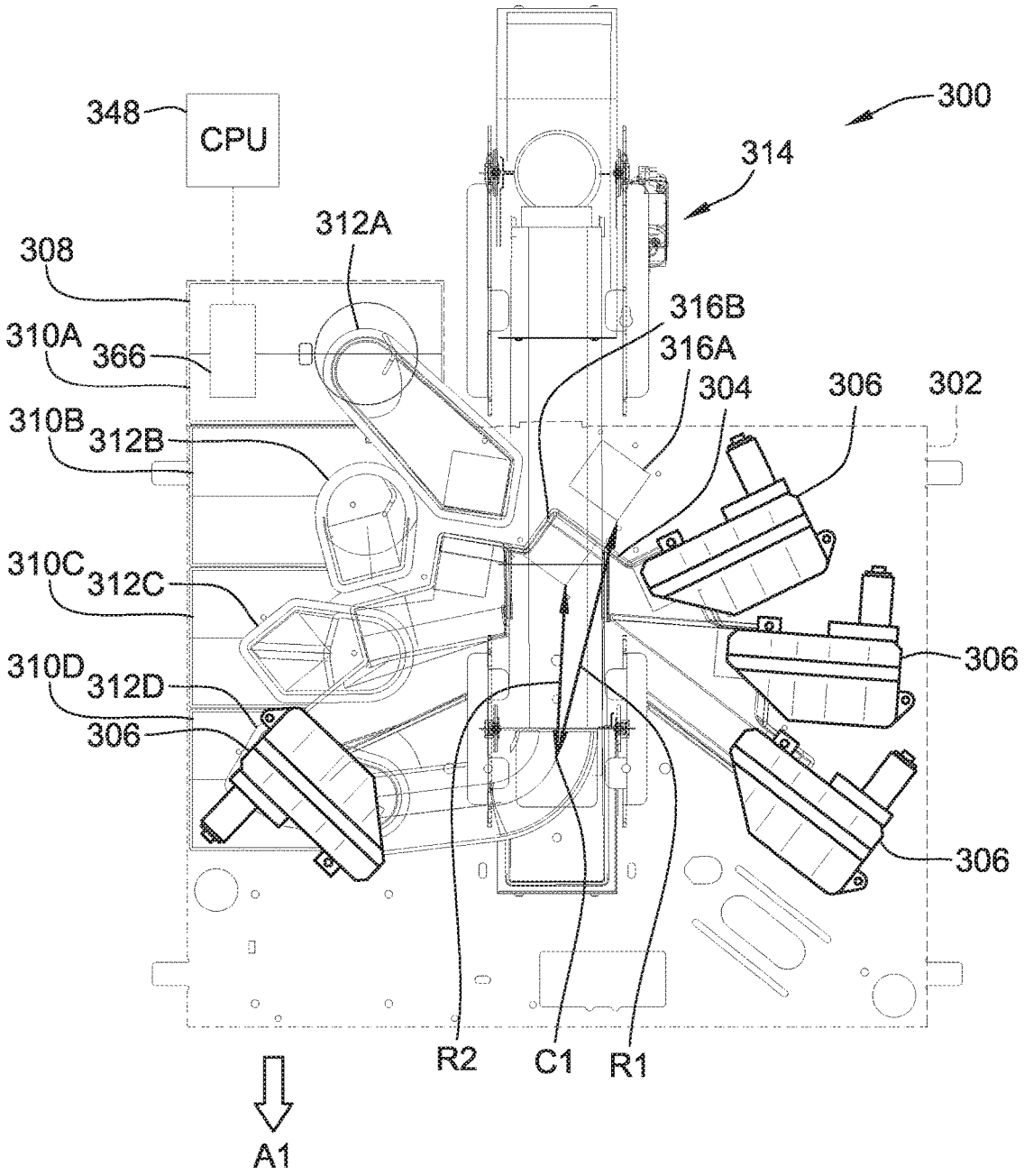

348
CPU
300
314
312A
308
316B
310A
366
316A
304
306
302
310B
312B
310C
312C
306
310D
312D
306
306
R2
C1
R1
A1

FIG. 8

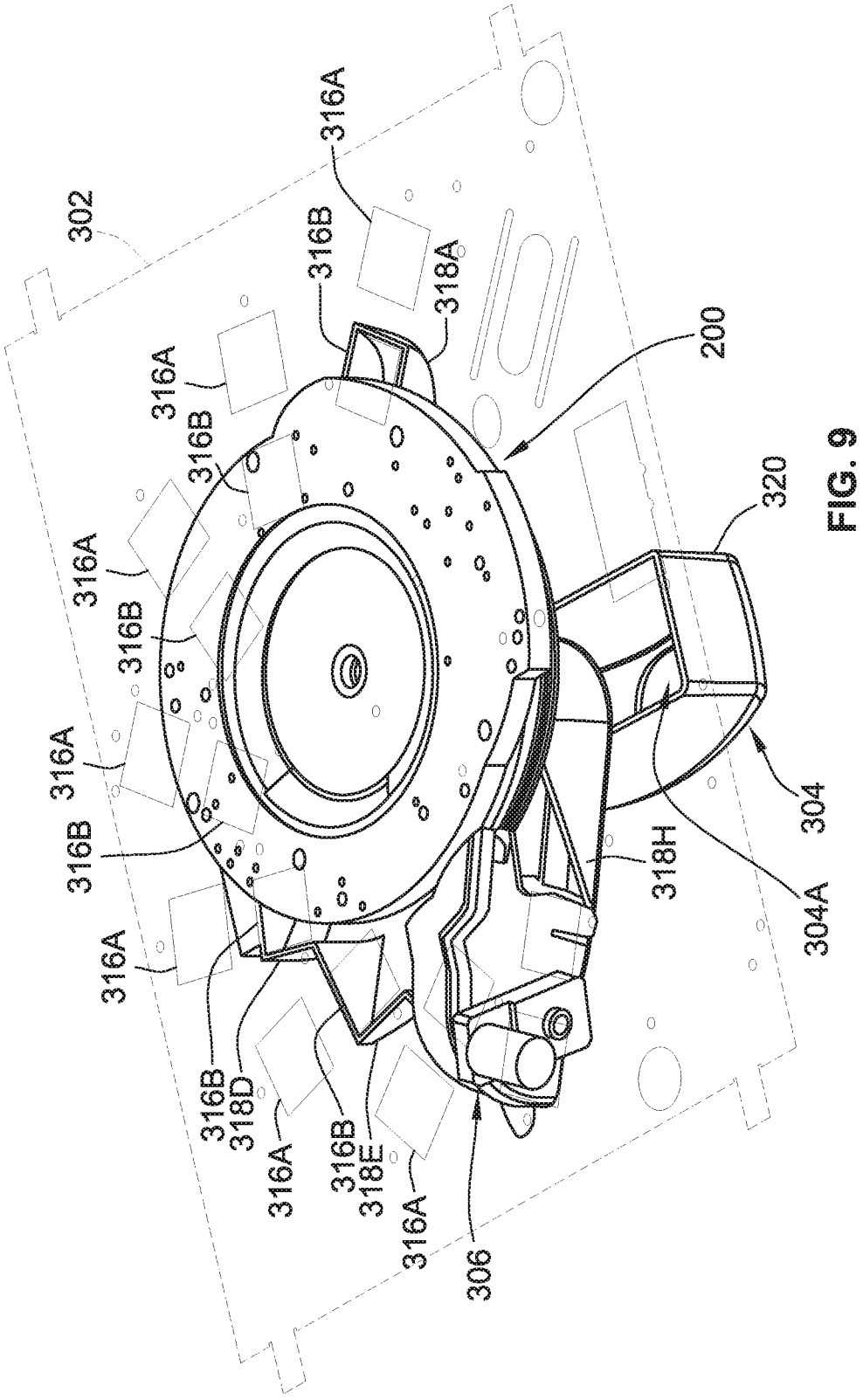

302
316A
316B
318A
200
320
304
304A
318H
306
316A
316B
318D
316A
316B
318E
316A
316B
316A
316B
316A
316B
316A

FIG. 9

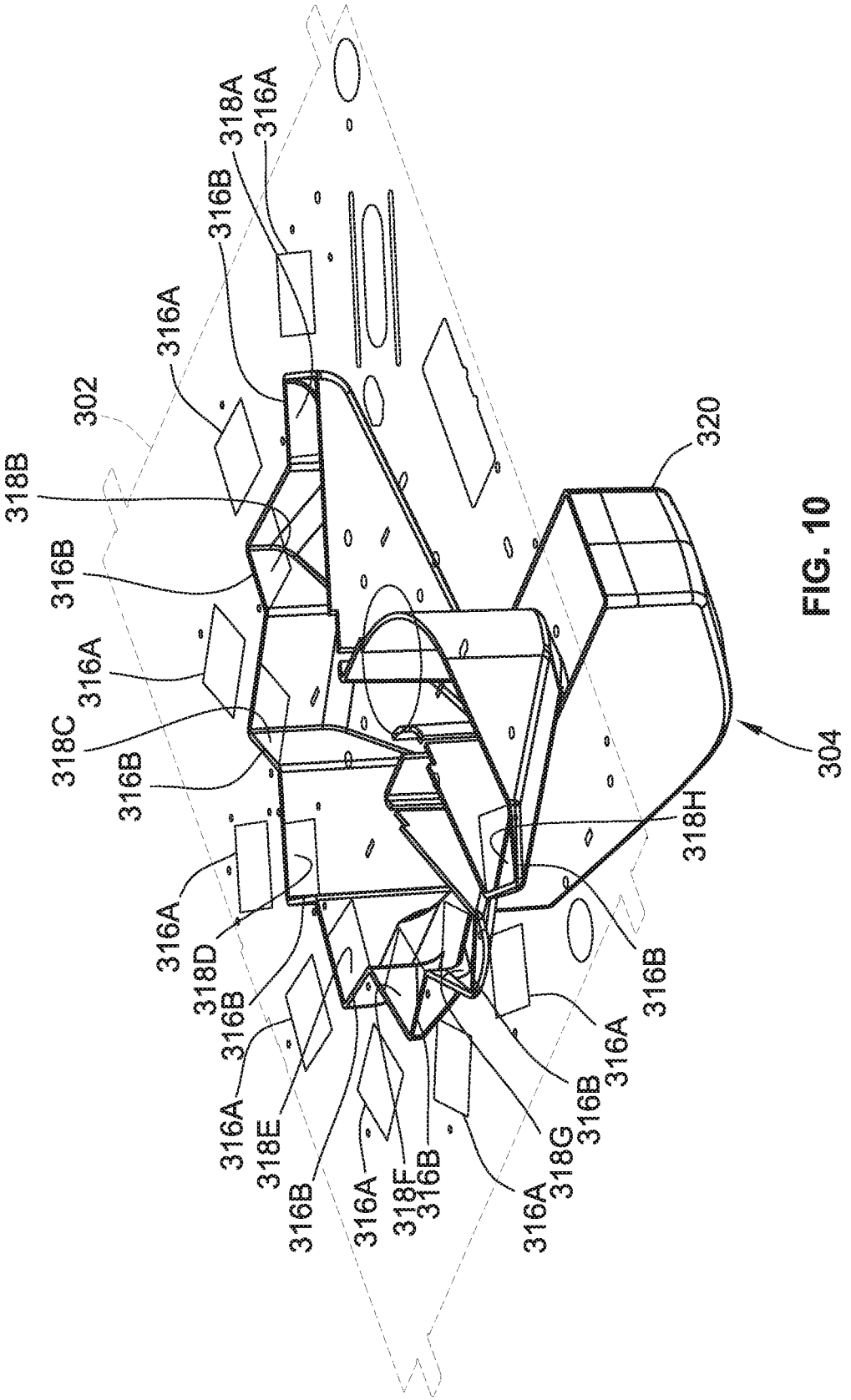

318A
316A
316B
316A
302
318B
316B
316A
318C
316B
316A
316B
318D
316B
316A
318E
316B
316A
318F
316B
316A
318G
316B
316A
316B
318H
320
304

FIG. 10

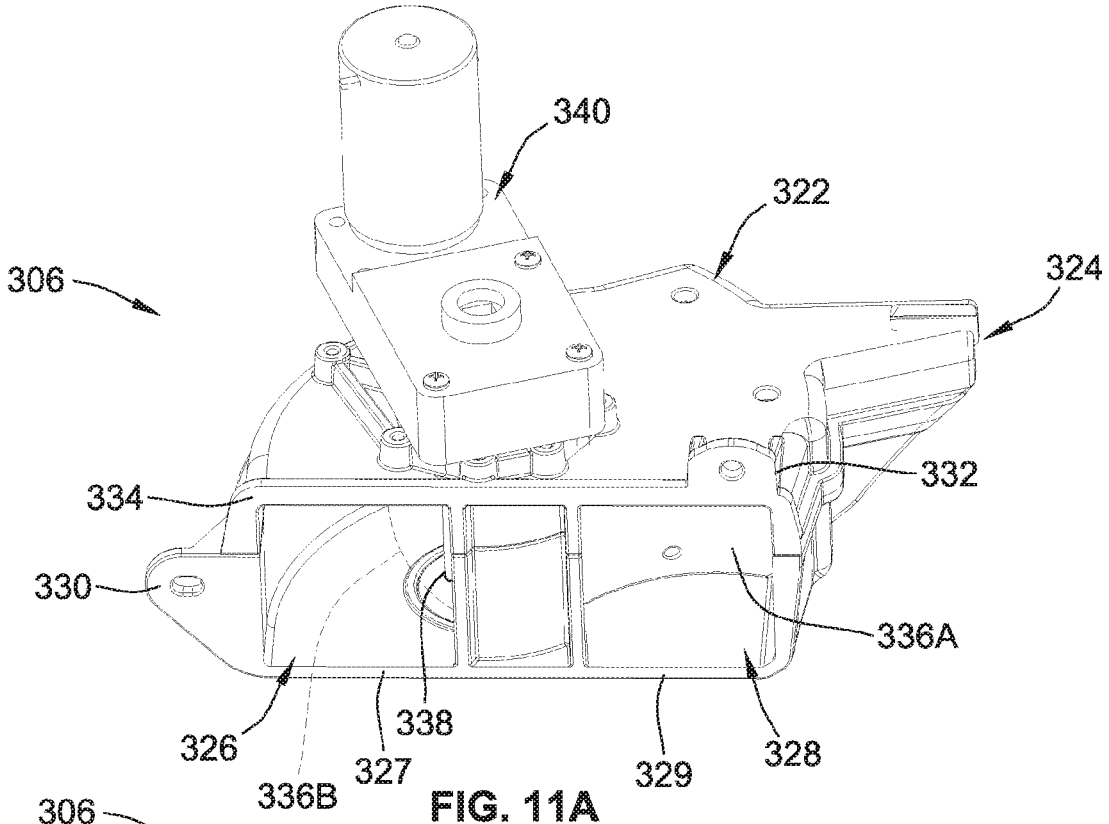


FIG. 11A

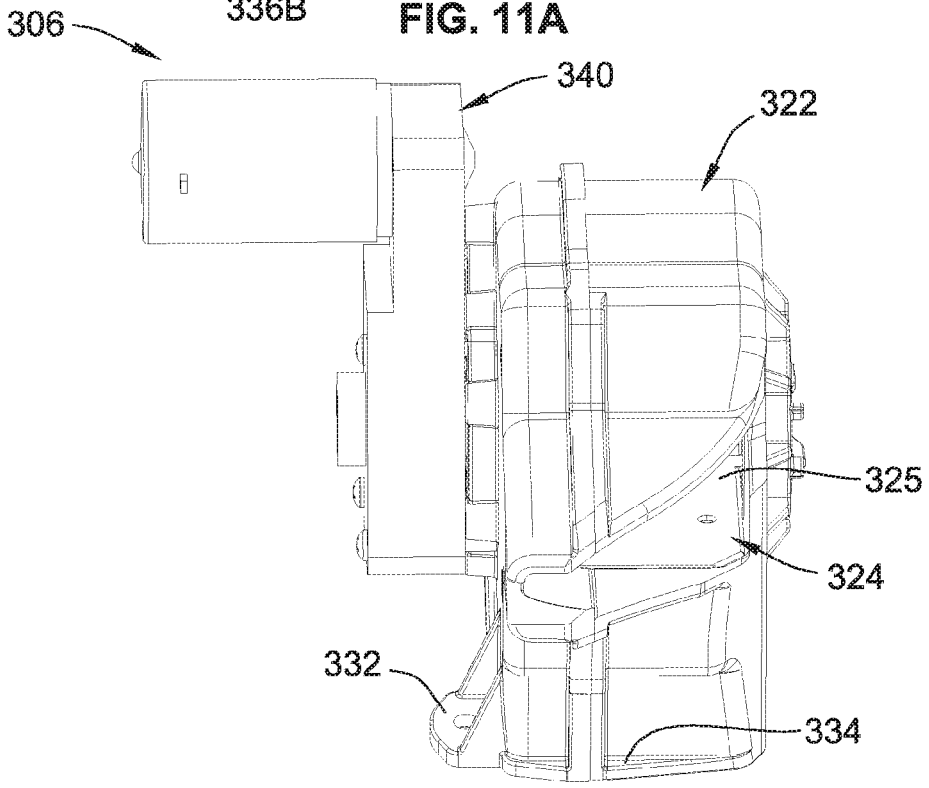


FIG. 11B

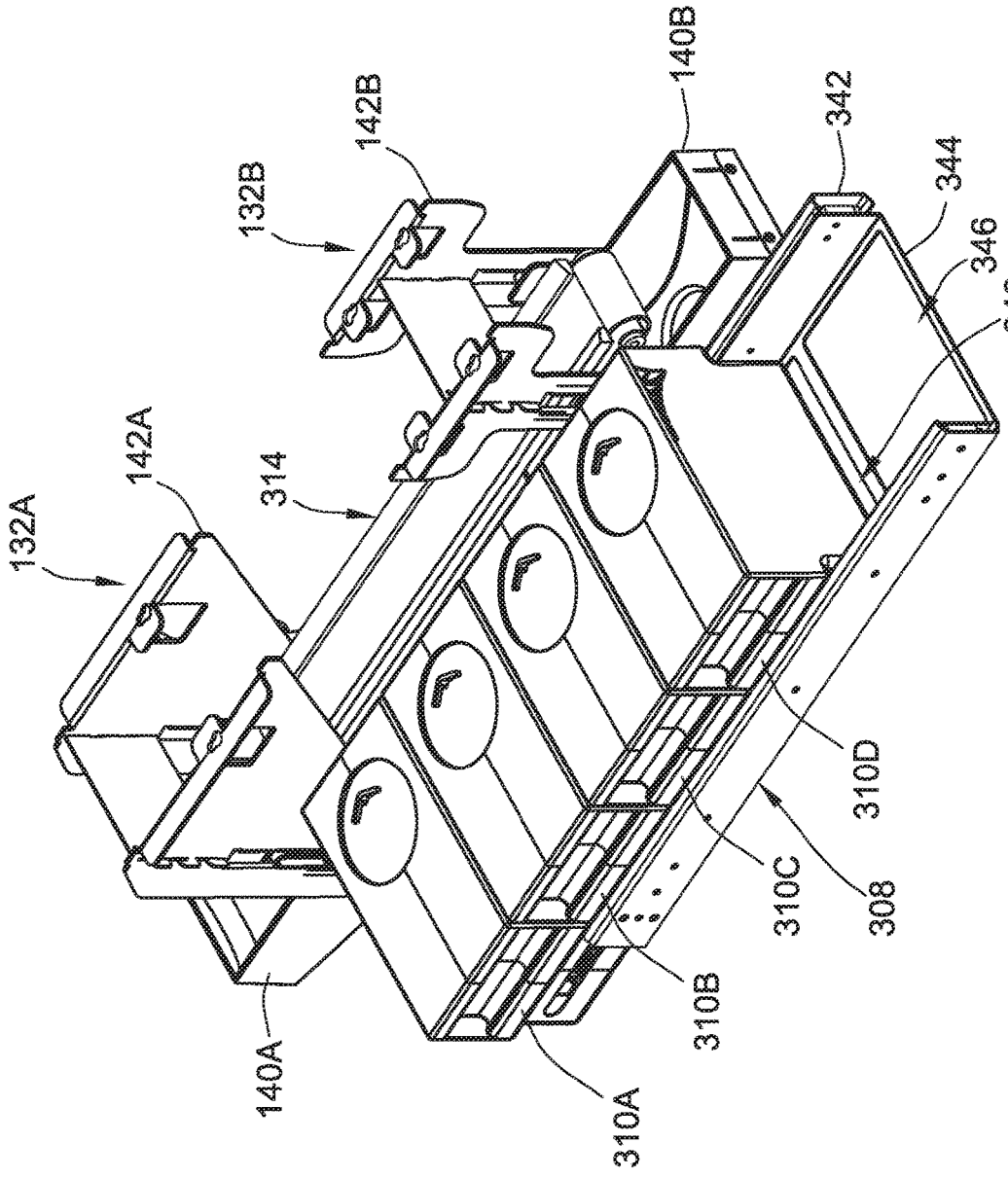

140B
142B
132B
342
344
346
346
142A
314
132A
310D
310C
308
310B
140A
310A

FIG. 12

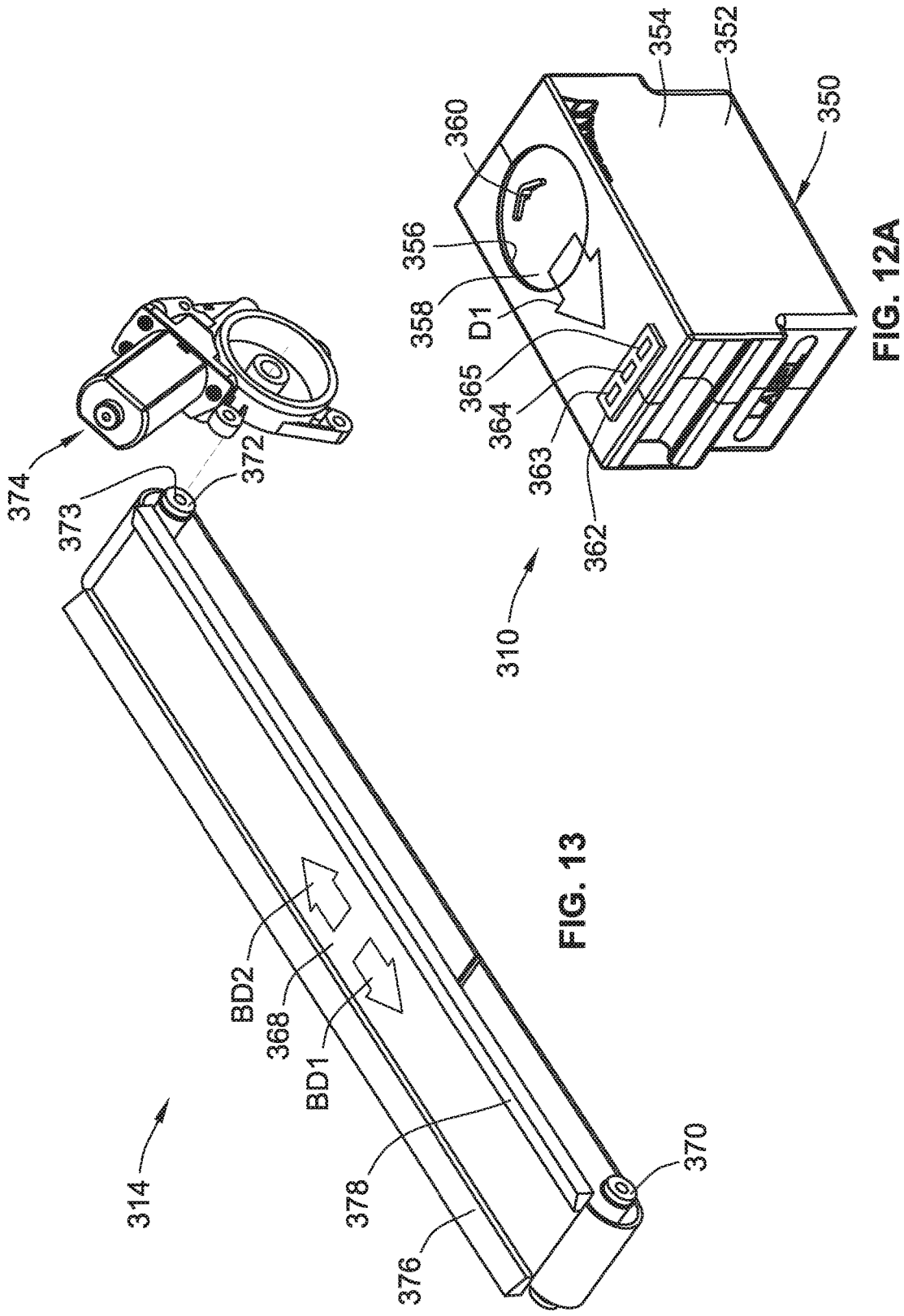


FIG. 12A

FIG. 13

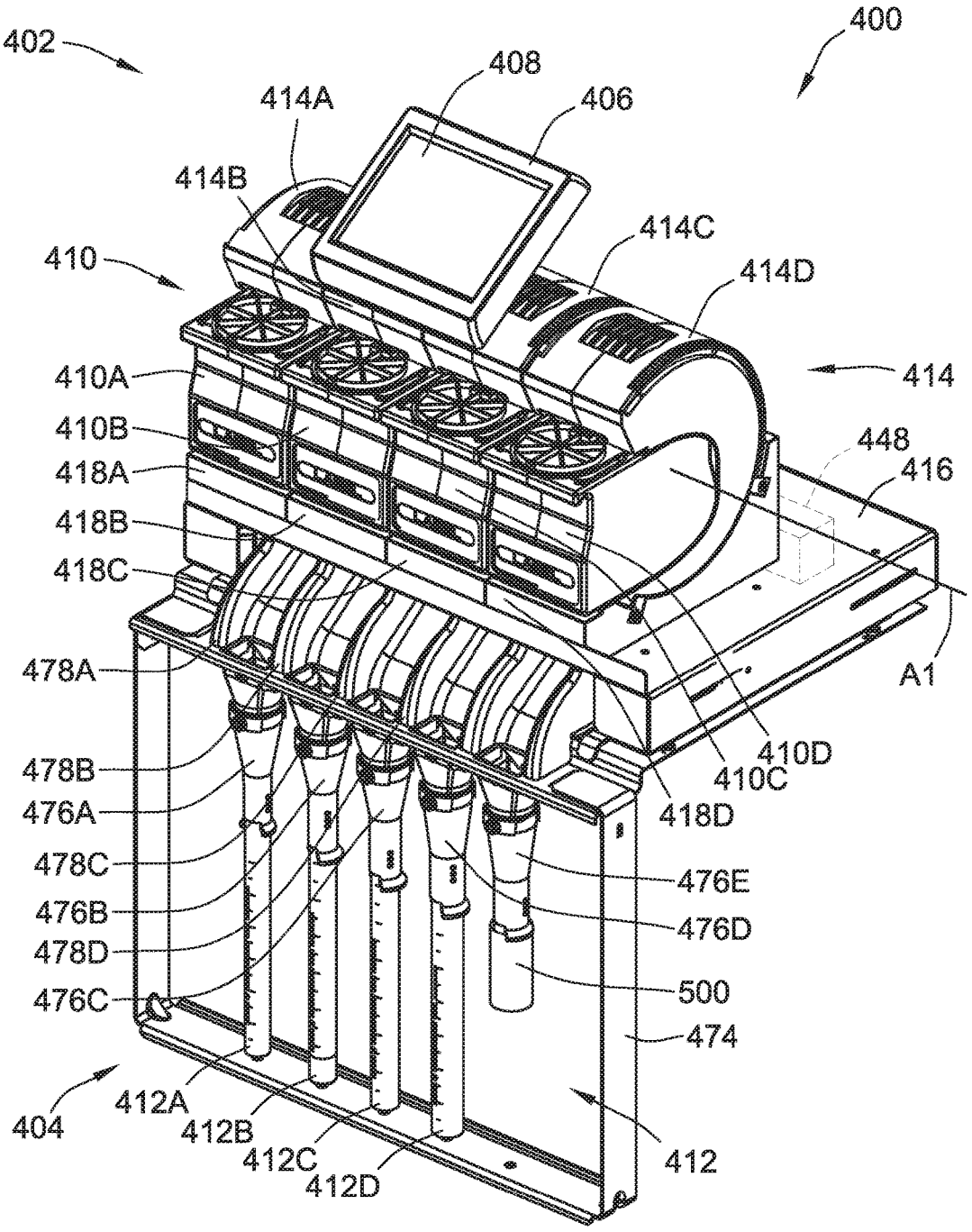

402
400
408
414A
406
414B
414C
410
414D
414
410A
410B
448
418A
416
418B
418C
478A
A1
410D
410C
478B
476A
418D
478C
476E
476B
476D
478D
500
476C
474
404
412A
412B
412
412C
412D

FIG. 14

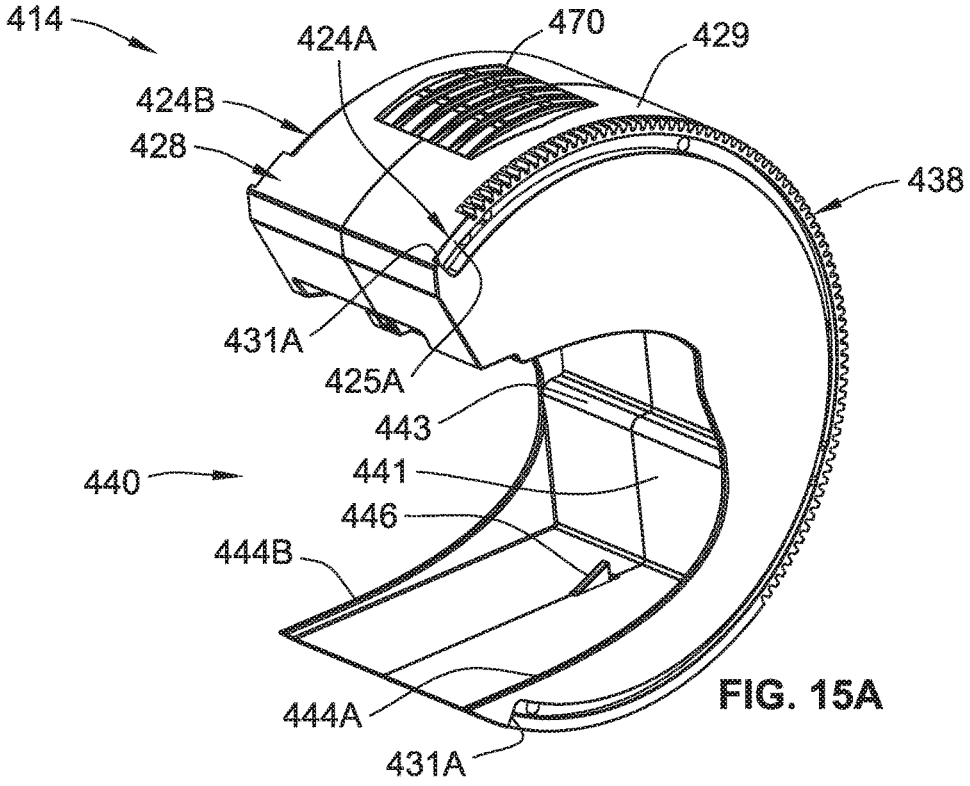


FIG. 15A

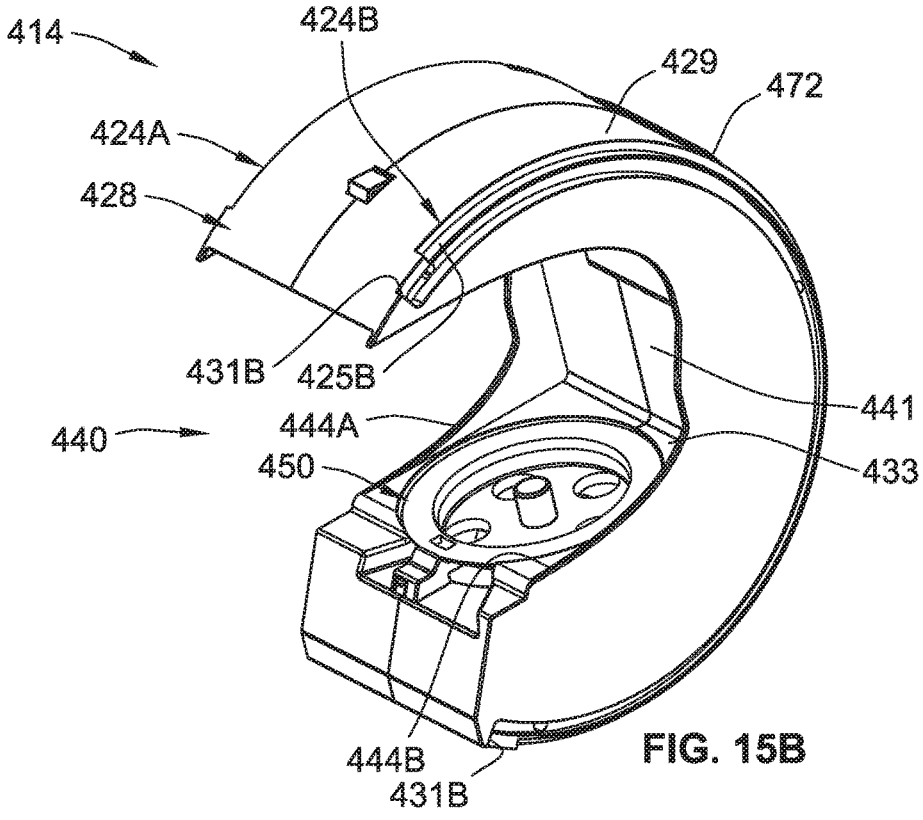


FIG. 15B

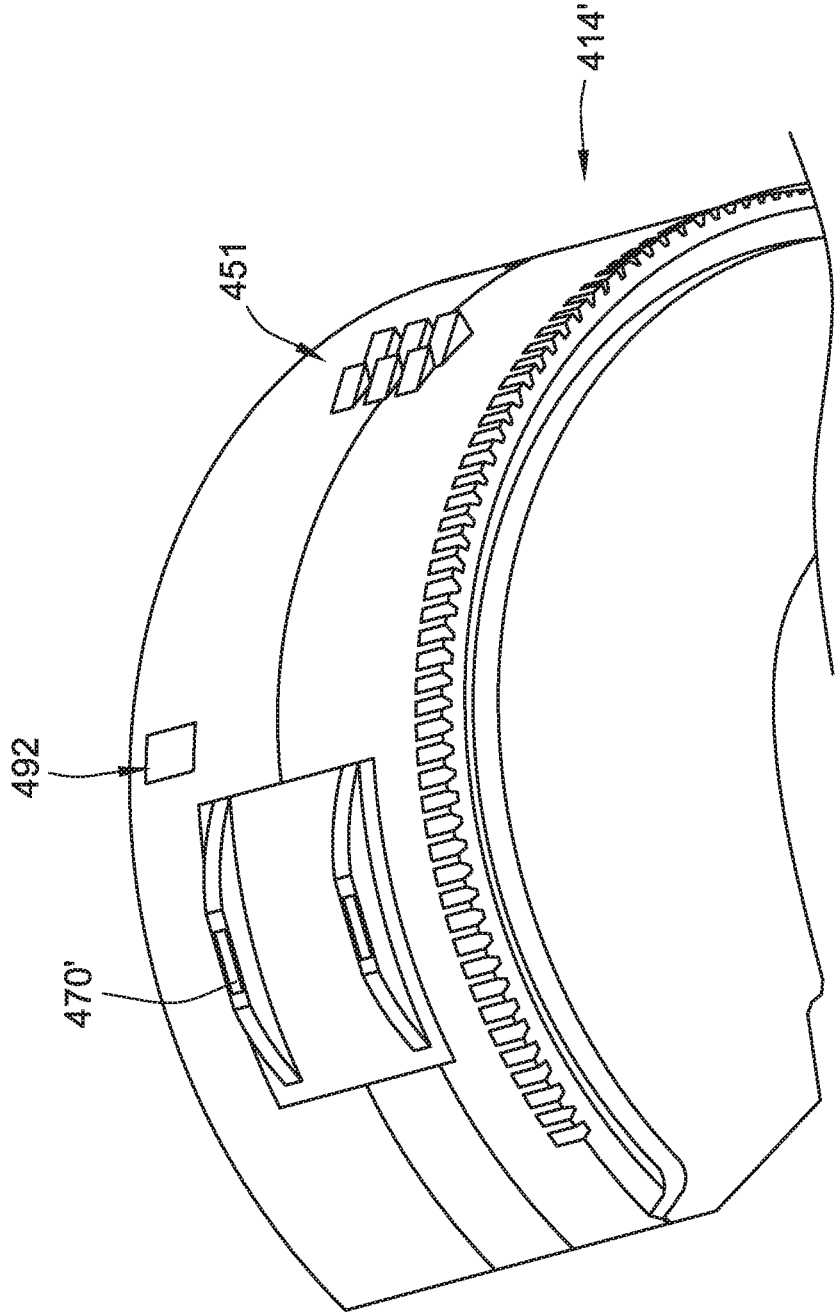


FIG. 15C

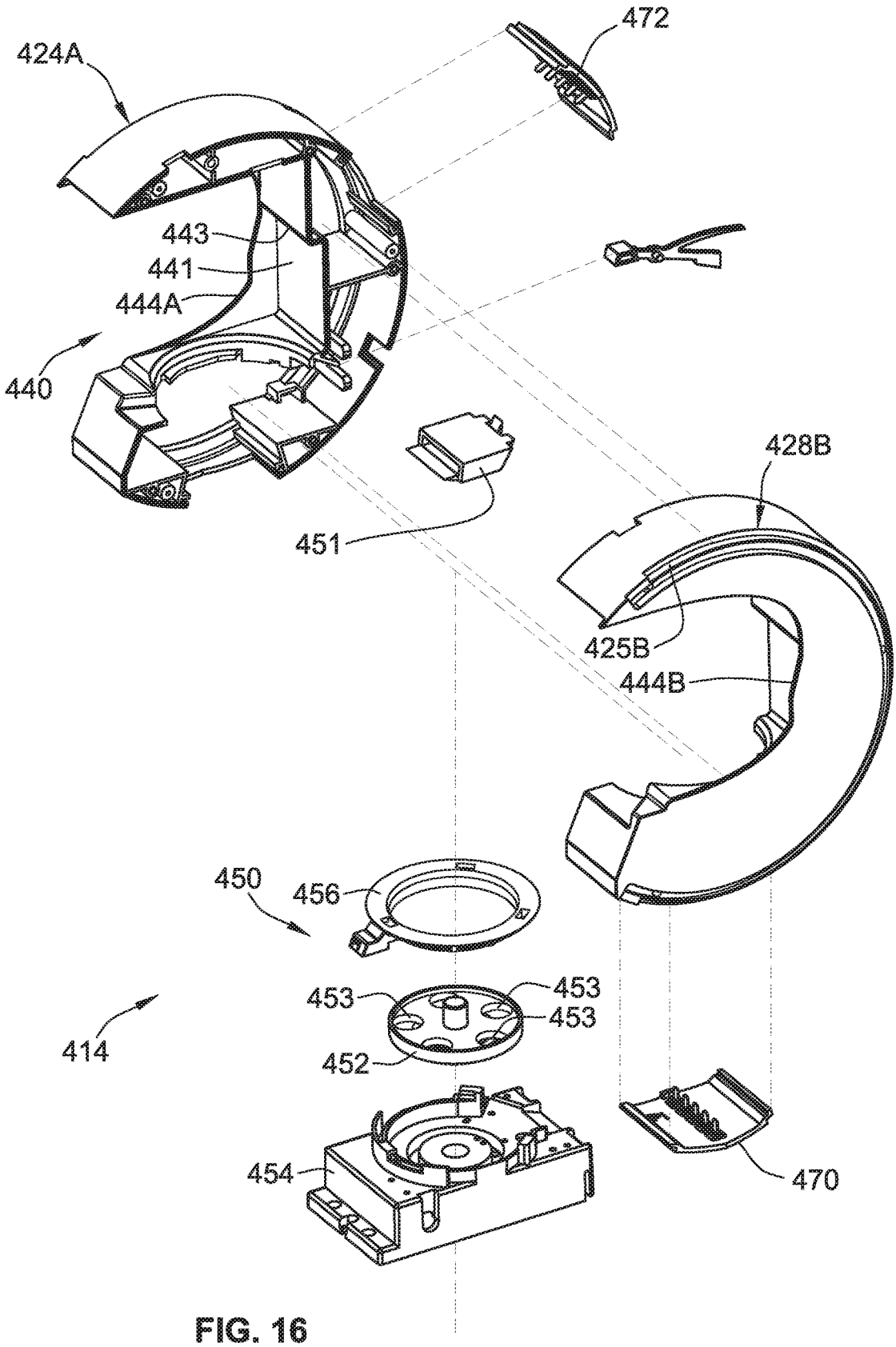

472
424A
443
441
444A
440
451
428B
425B
444B
450
456
453
453
453
414
452
454
470

FIG. 16

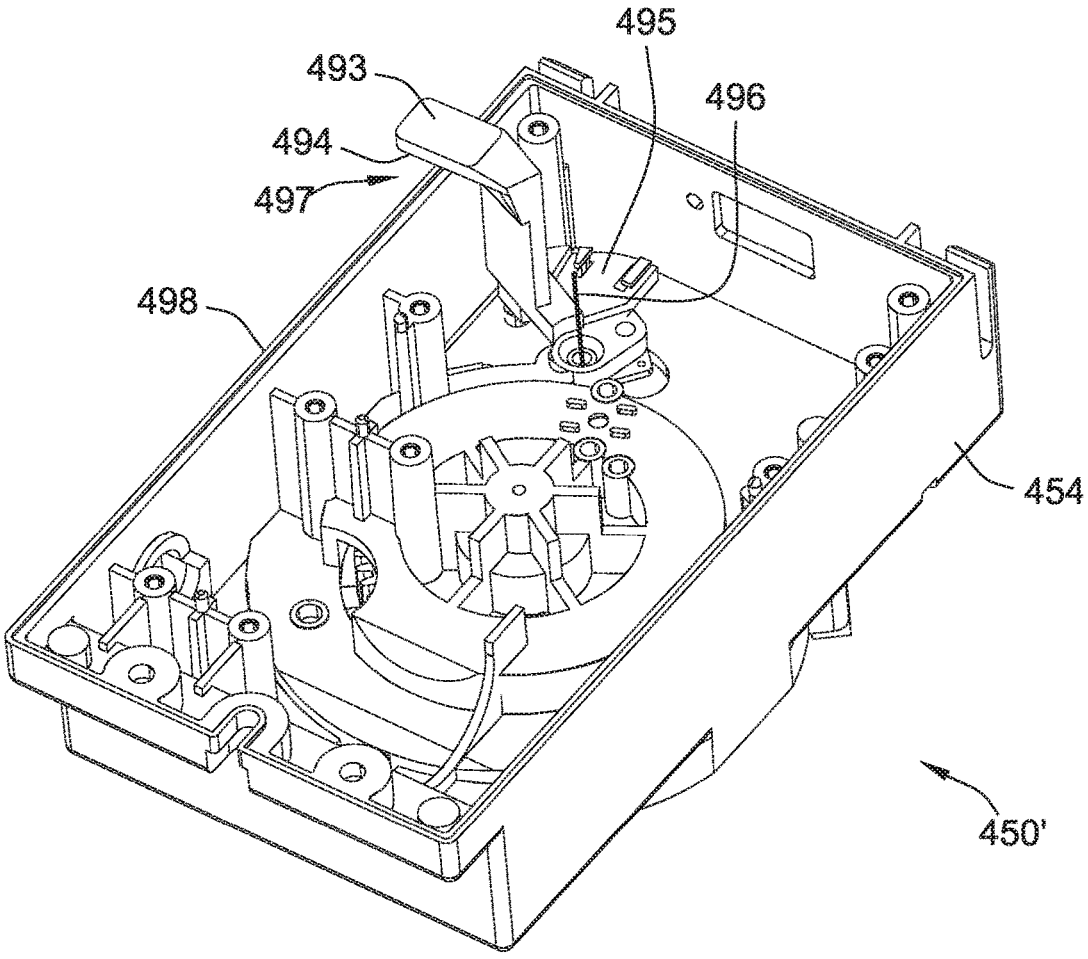


FIG. 16A

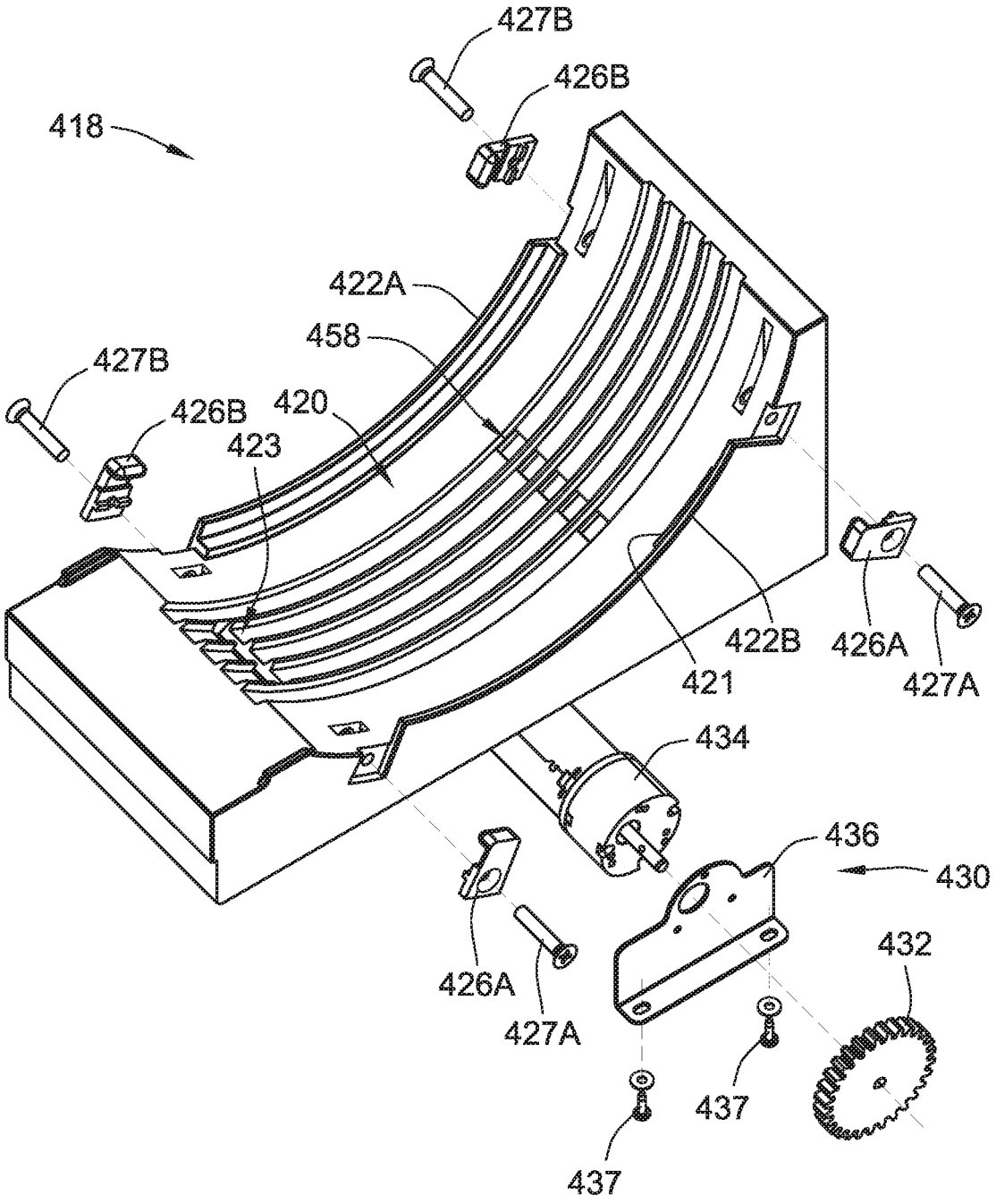

427B
426B
418
422A
458
427B
426B
420
423
422B
426A
427A
421
434
436
430
426A
427A
432
437
437

FIG. 17

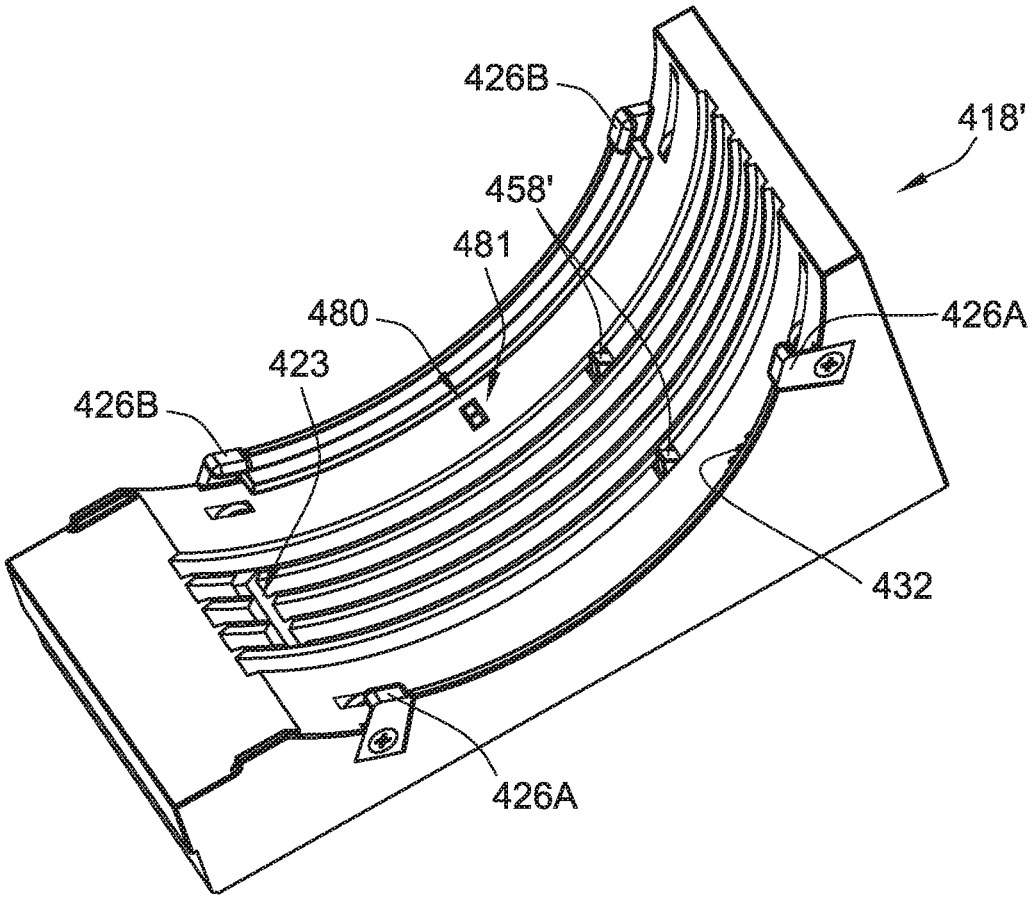


FIG. 17A

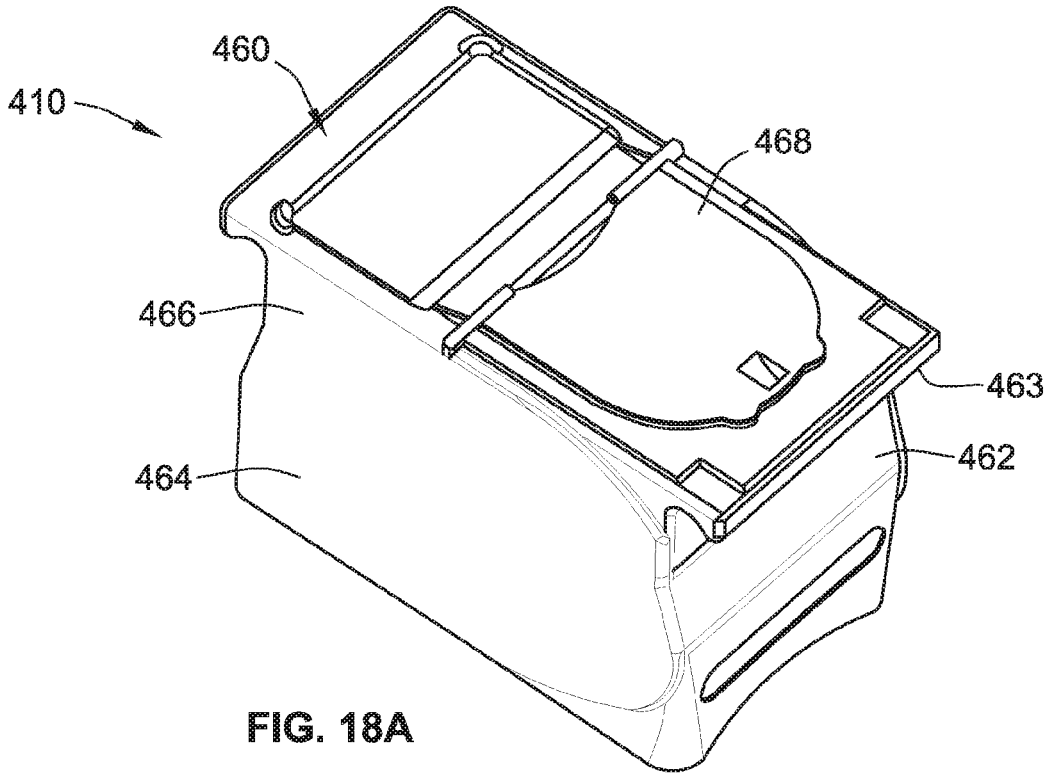


FIG. 18A

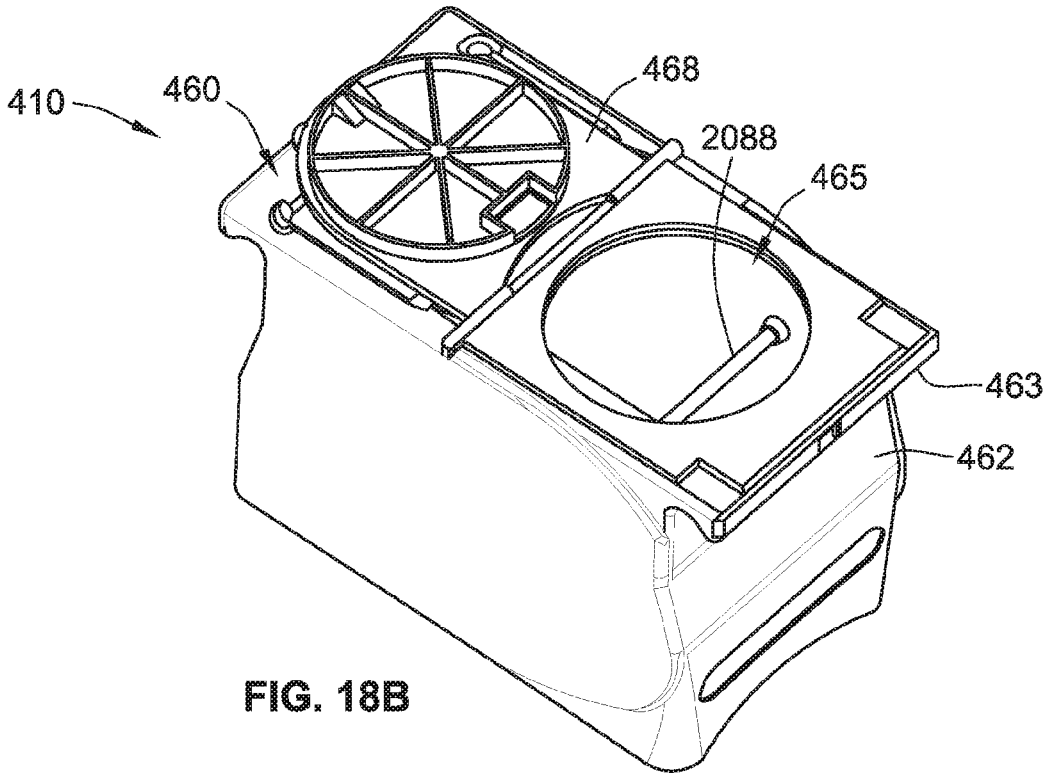


FIG. 18B

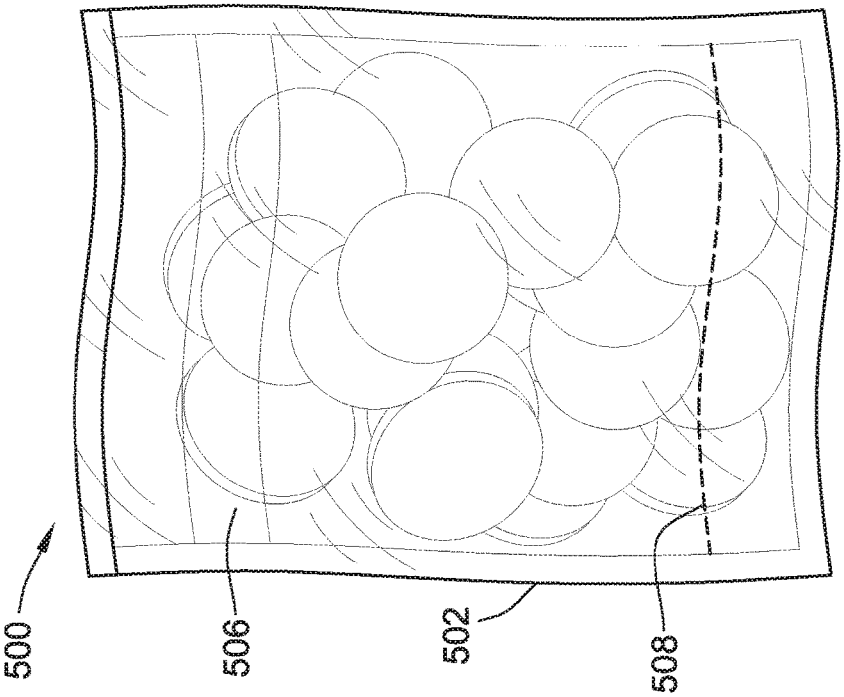


FIG. 19B

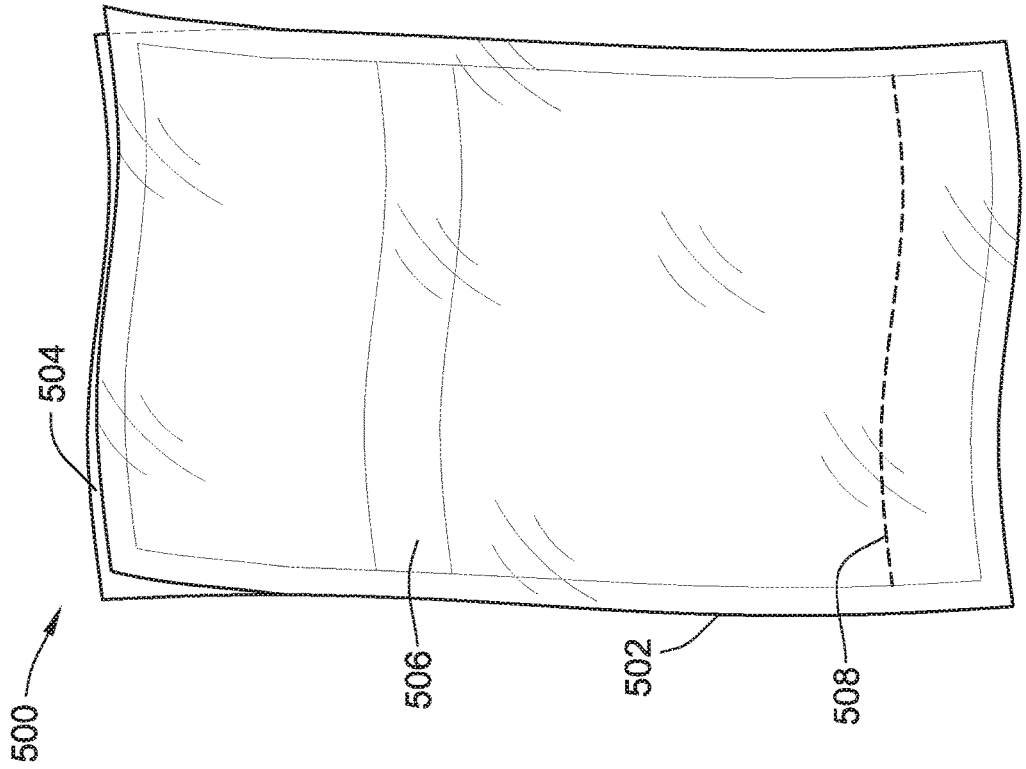


FIG. 19A

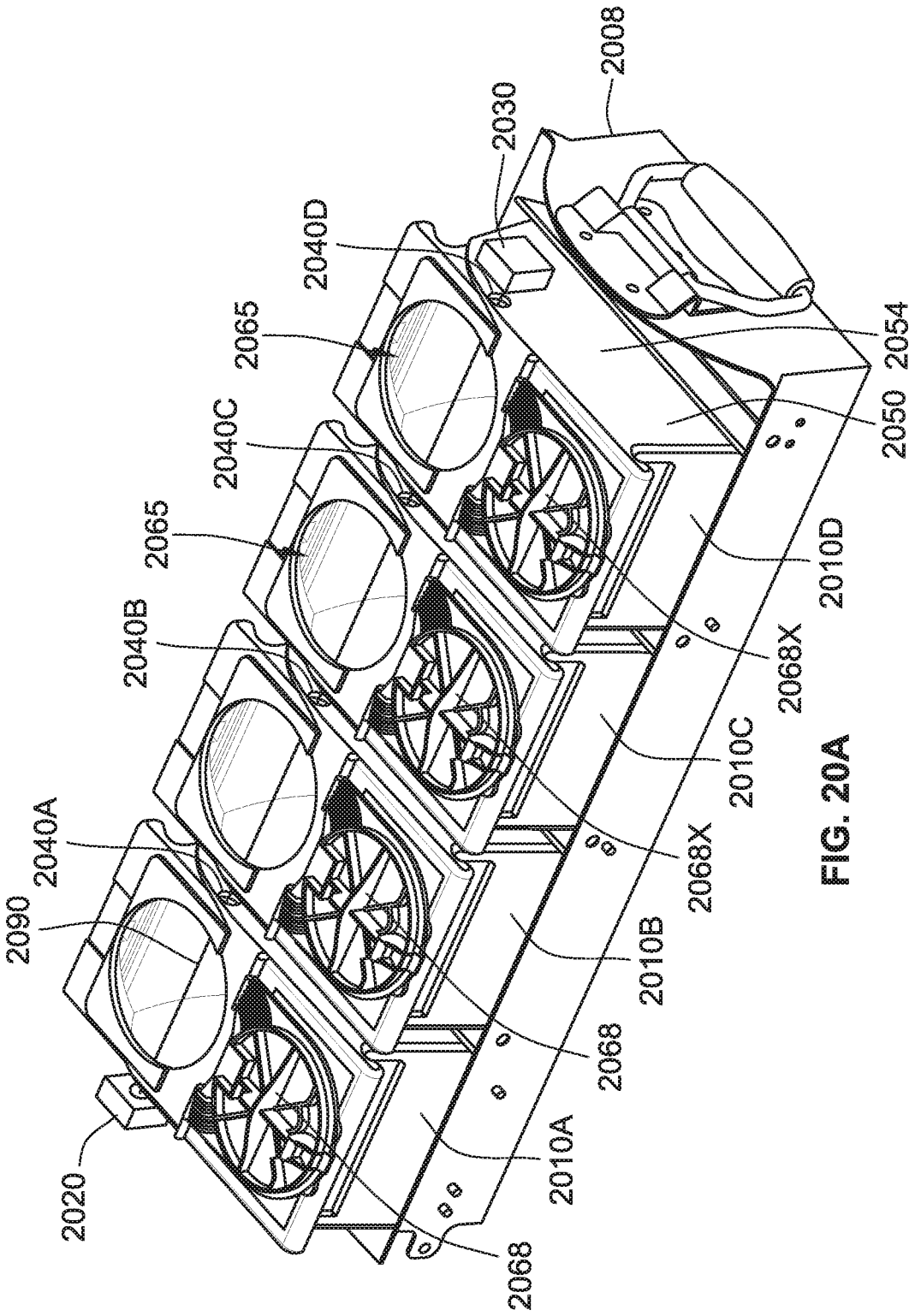

2008
2030
2040D
2065
2054
2040C
2050
2065
2010D
2040B
2068X
2010C
2040A
2068X
2090
2010B
2068
2010A
2020
2068

FIG. 20A

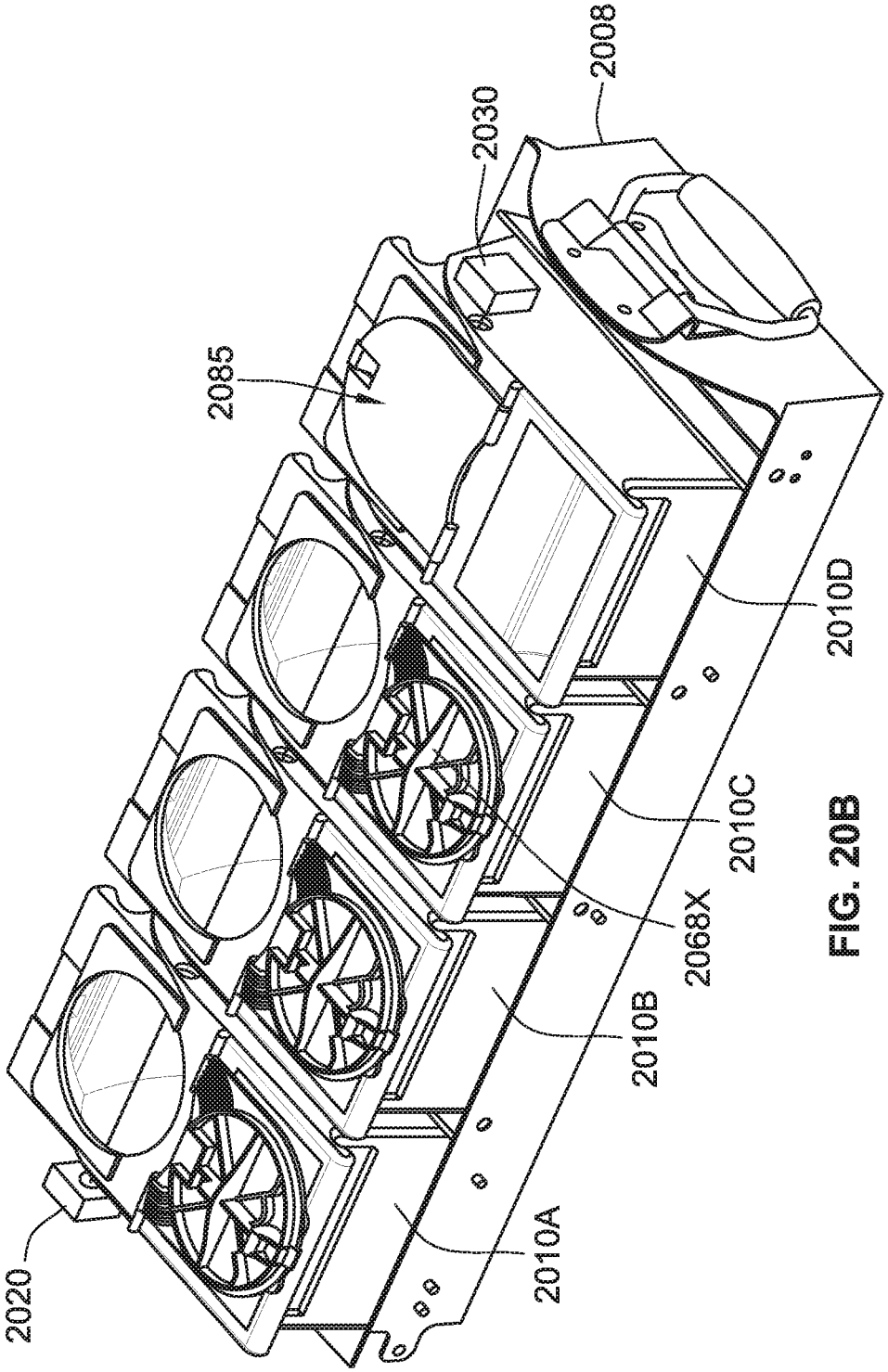


FIG. 20B

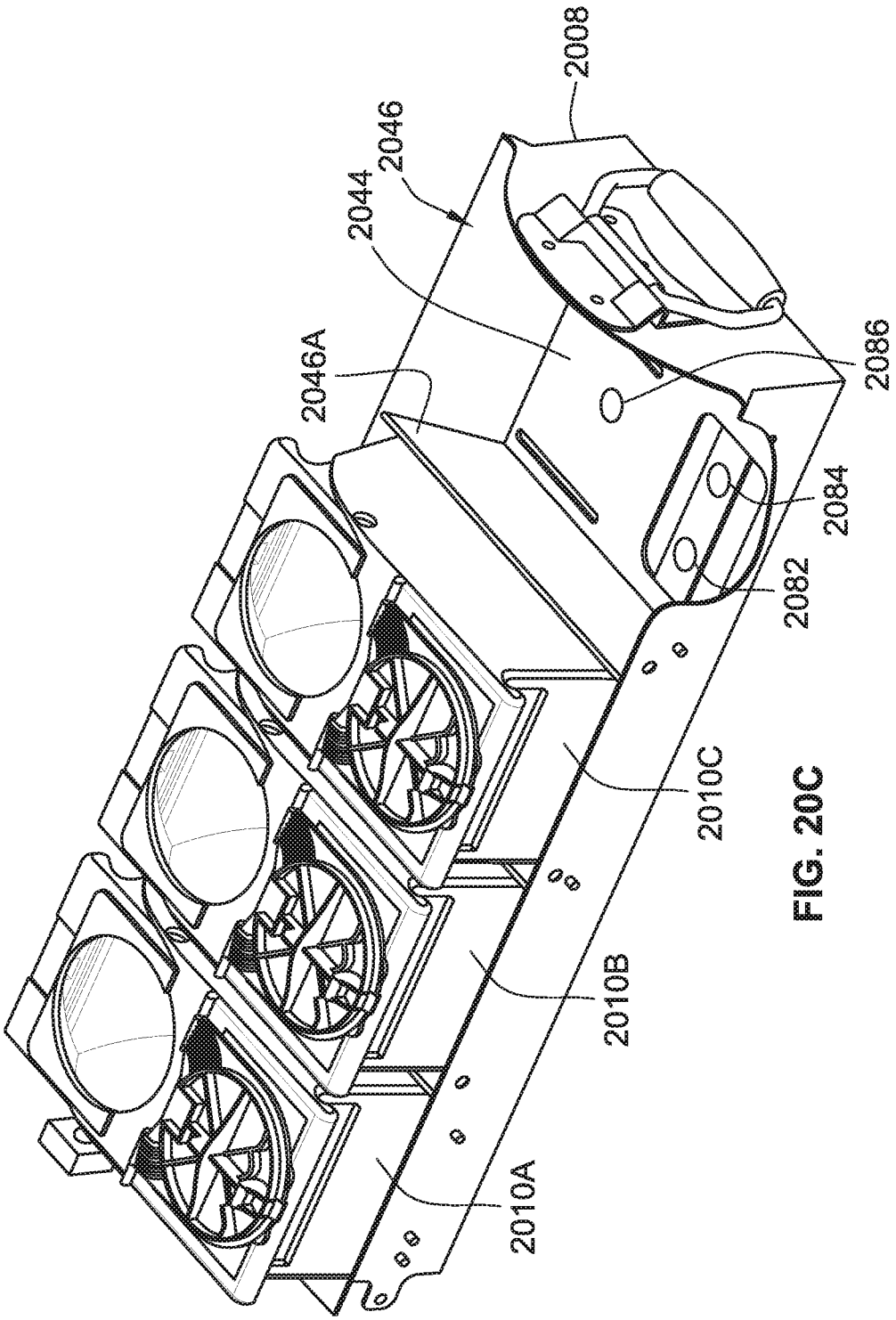


FIG. 20C

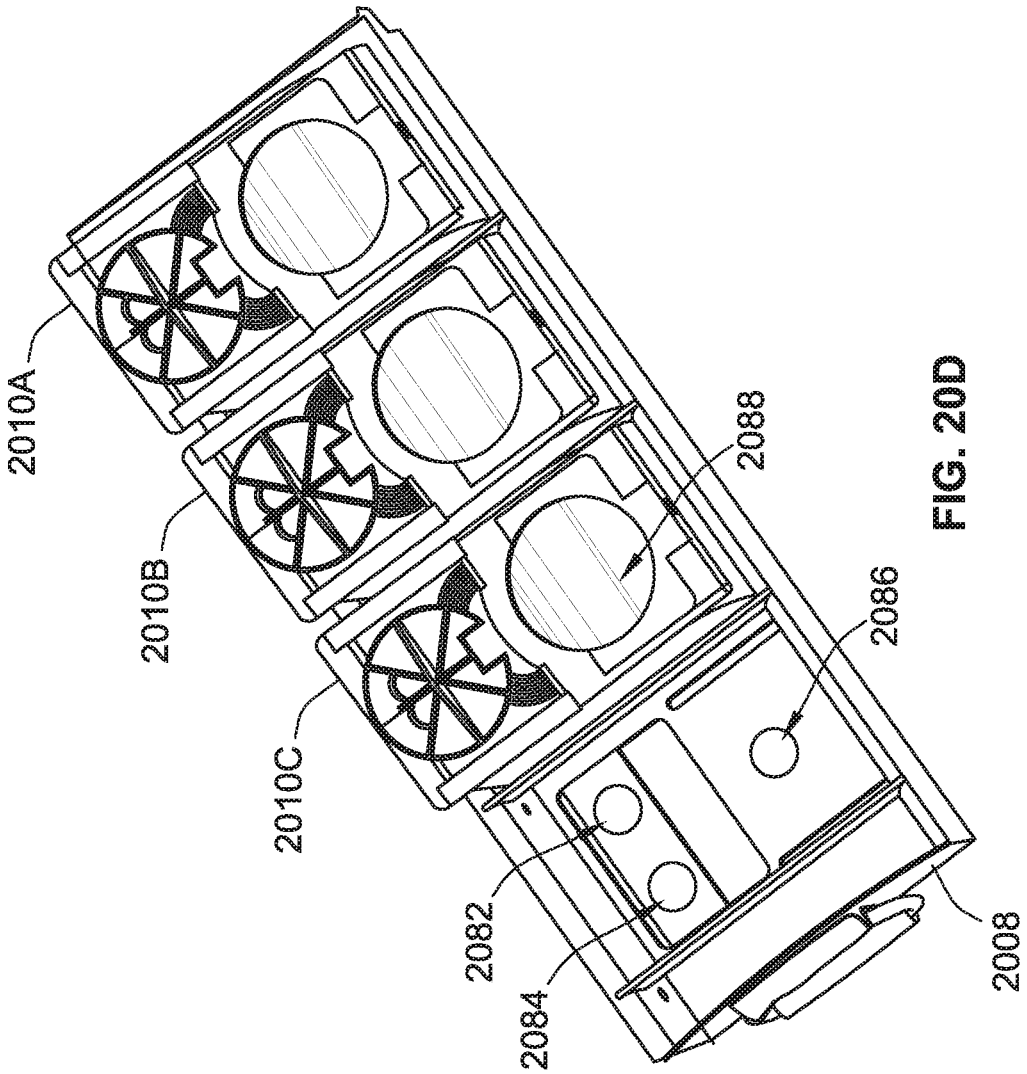


FIG. 20D

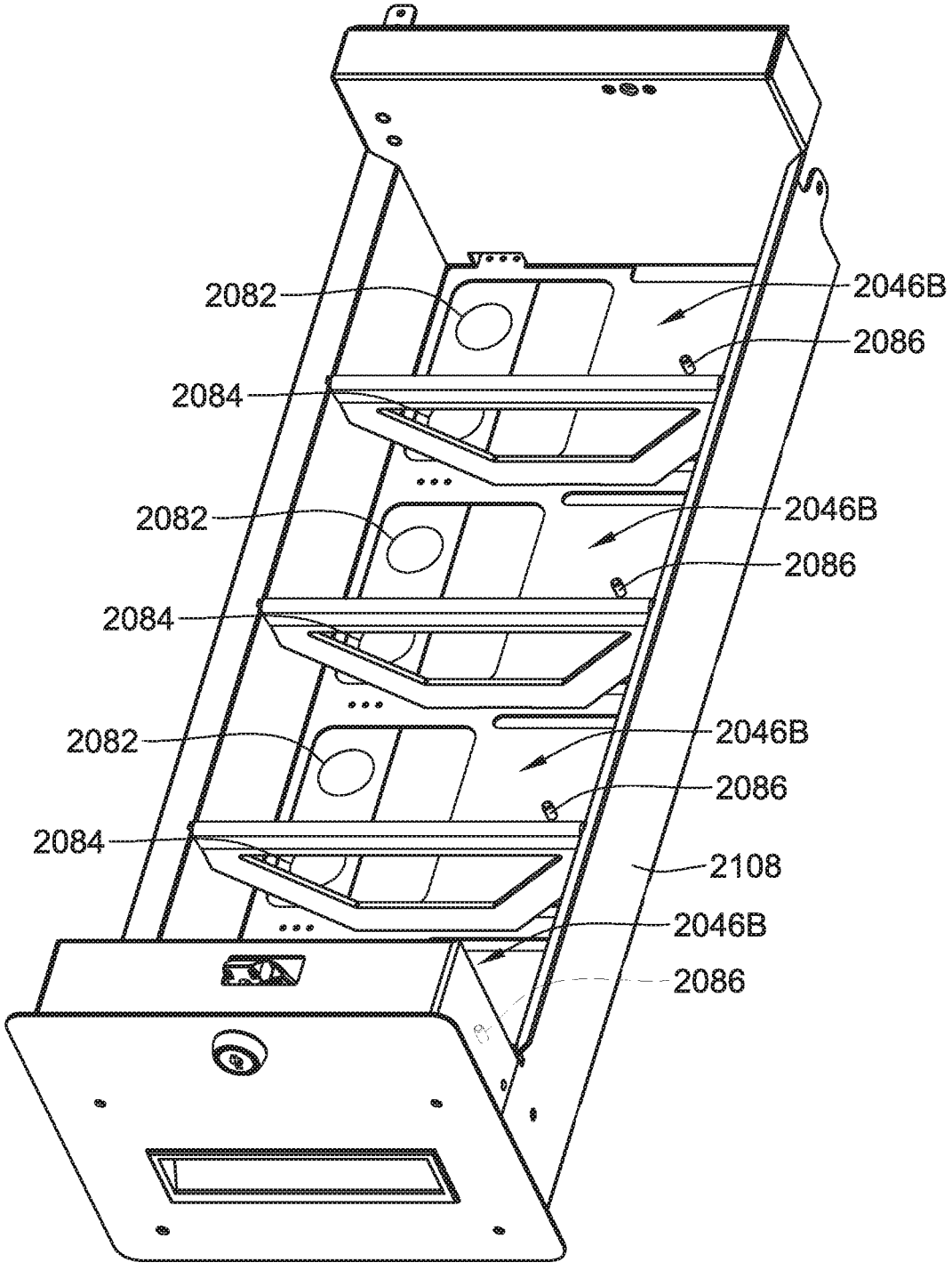

2082
2046B
2086
2084
2082
2046B
2086
2084
2082
2046B
2086
2084
2108
2046B
2086

FIG. 20E

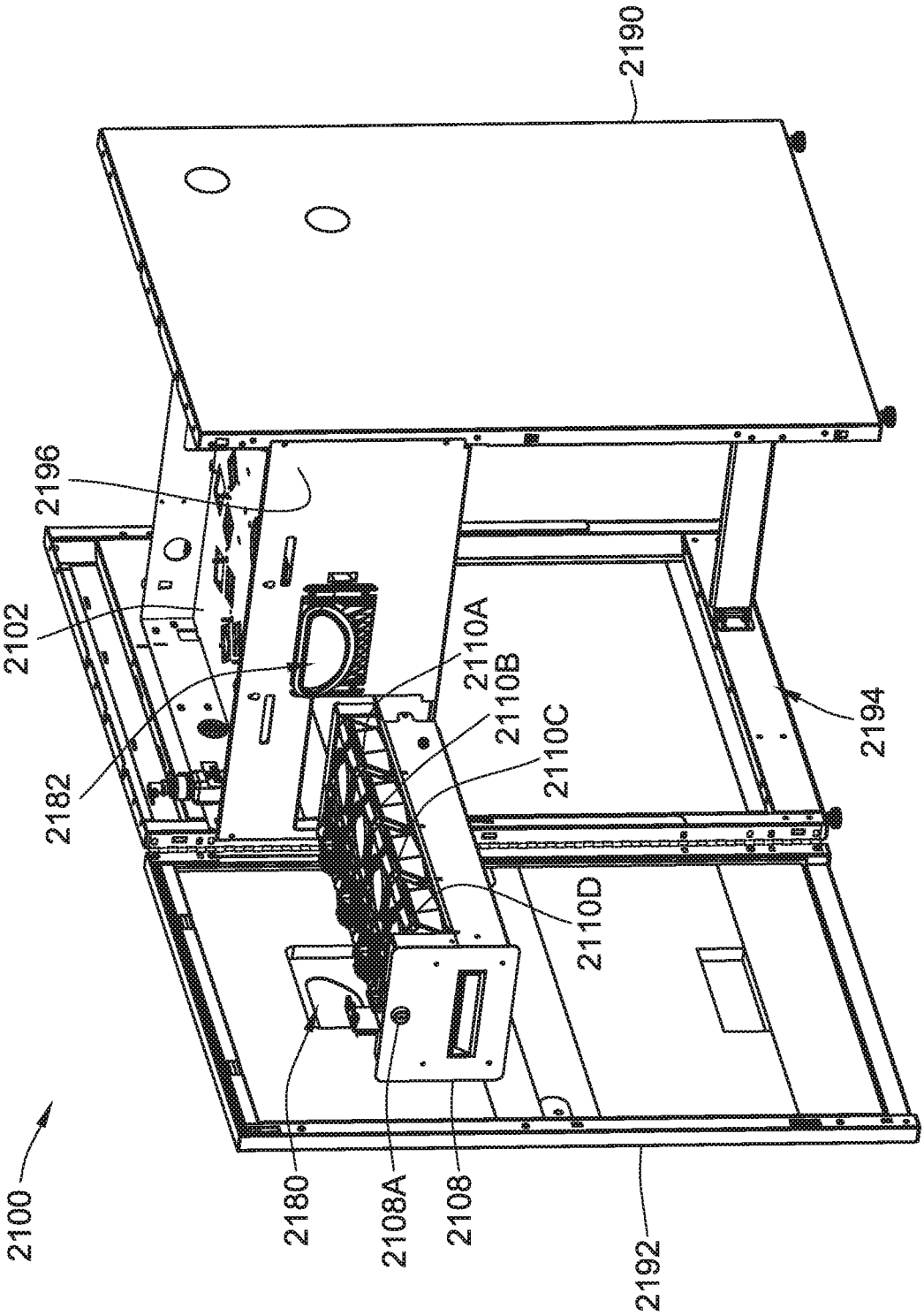

2190
2196
2102
2182
2110A
2110B
2110C
2110D
2194
2100
2180
2108A
2108
2192

FIG. 21A

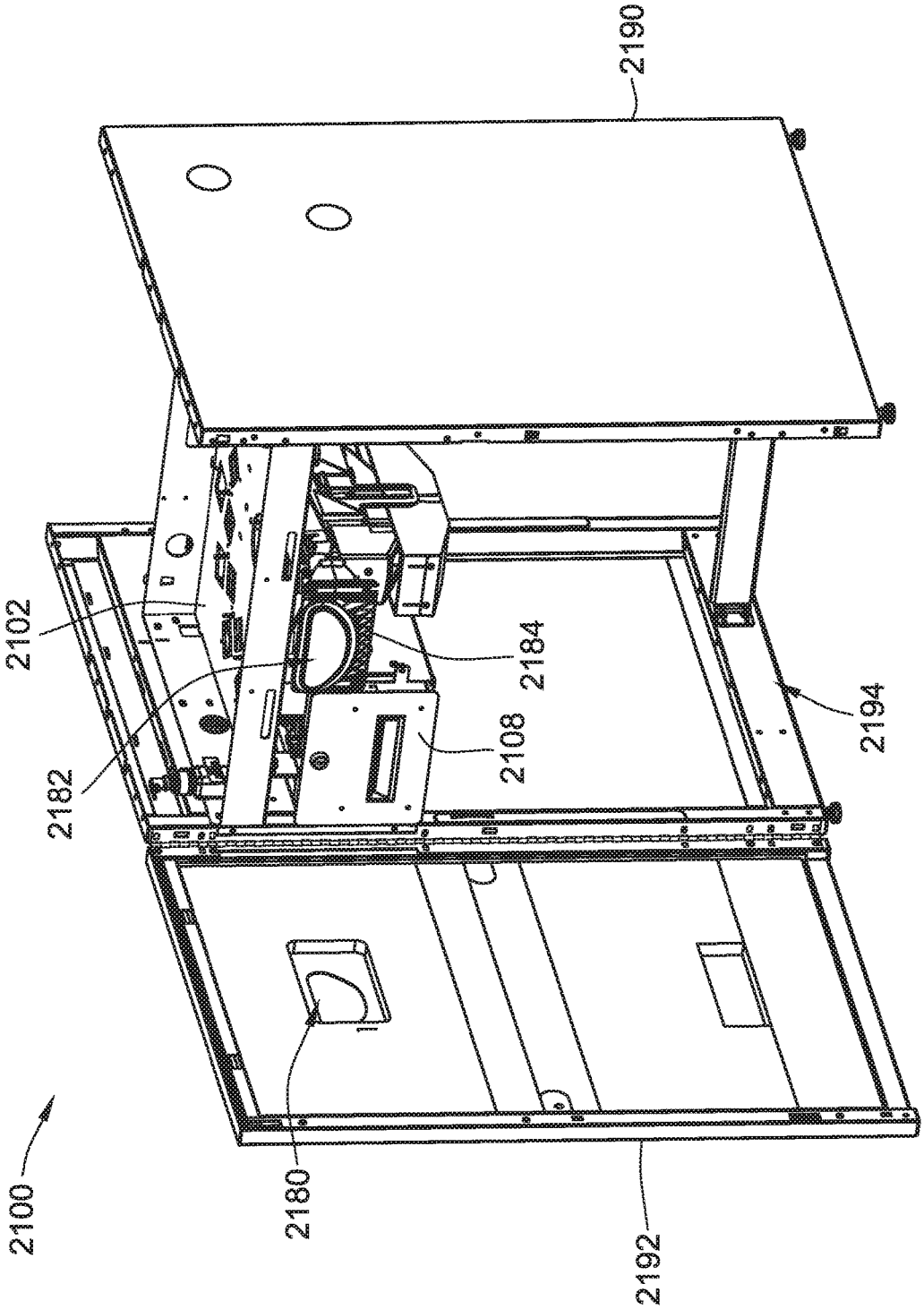


FIG. 21B

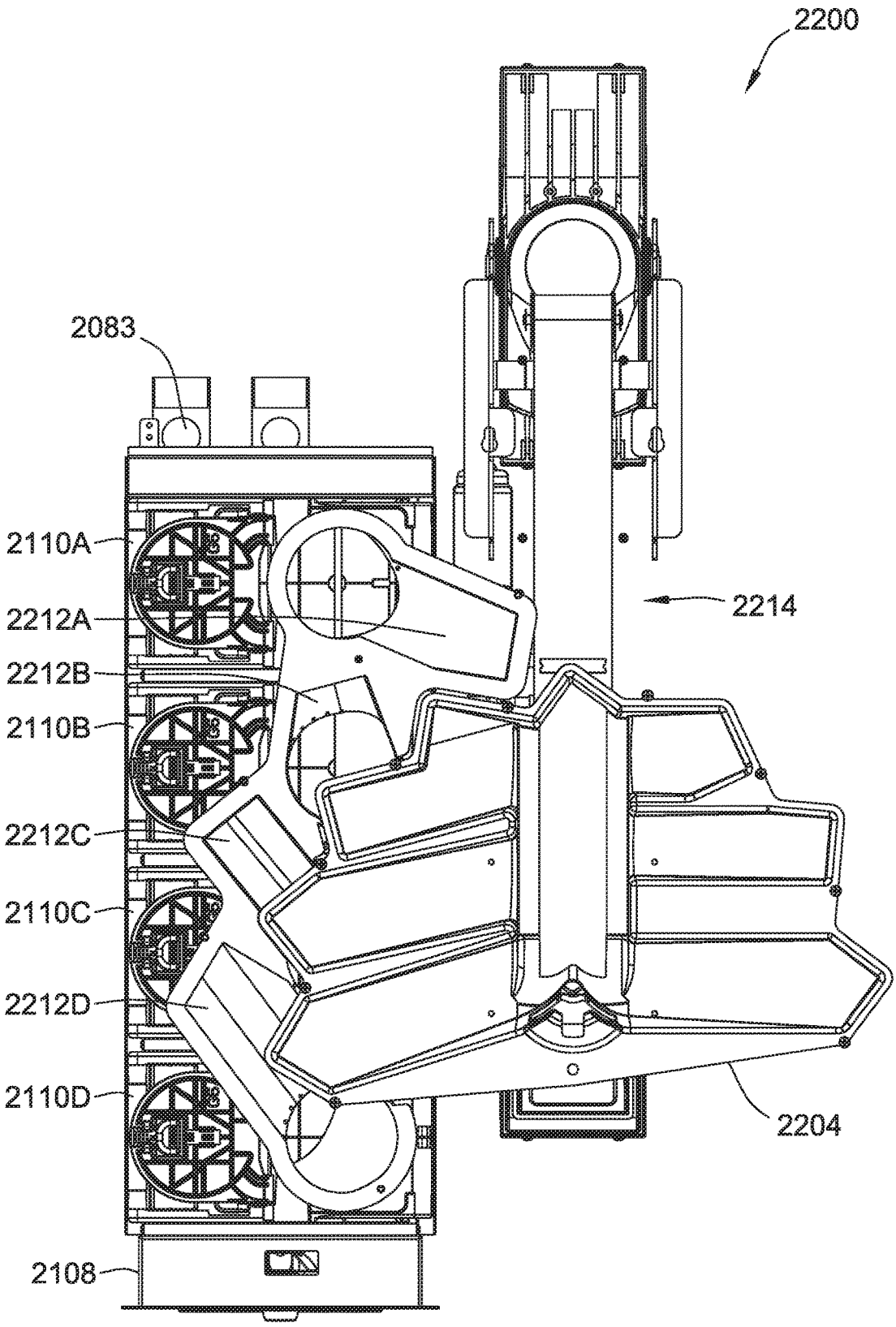

2200
2083
2110A
2212A
2212B
2110B
2212C
2110C
2212D
2110D
2108
2214
2204

FIG. 22A

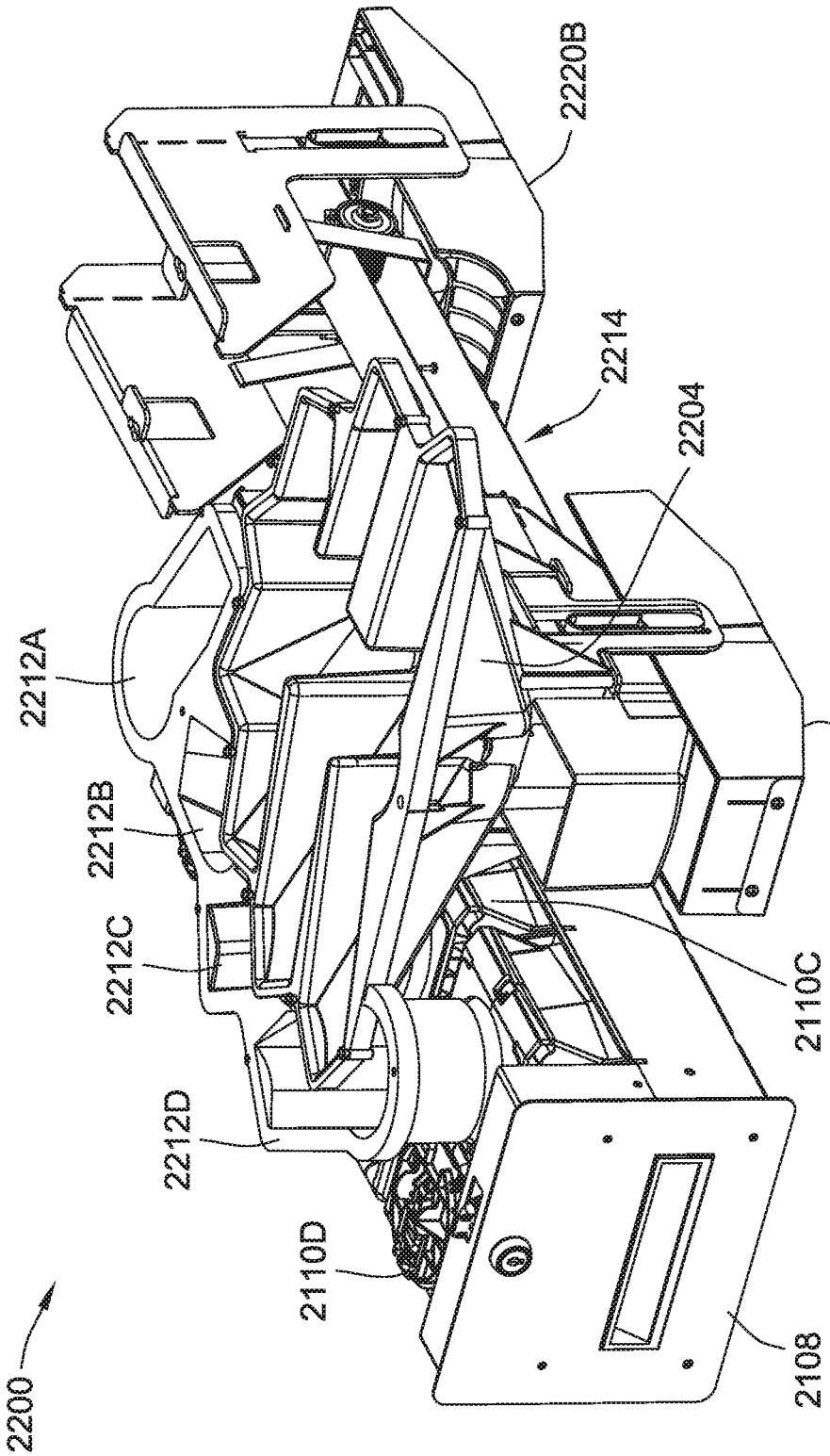

2220B
2214
2204
2212A
2220A
2212B
2212C
2110C
2212D
2110D
2108
2200

FIG. 22B

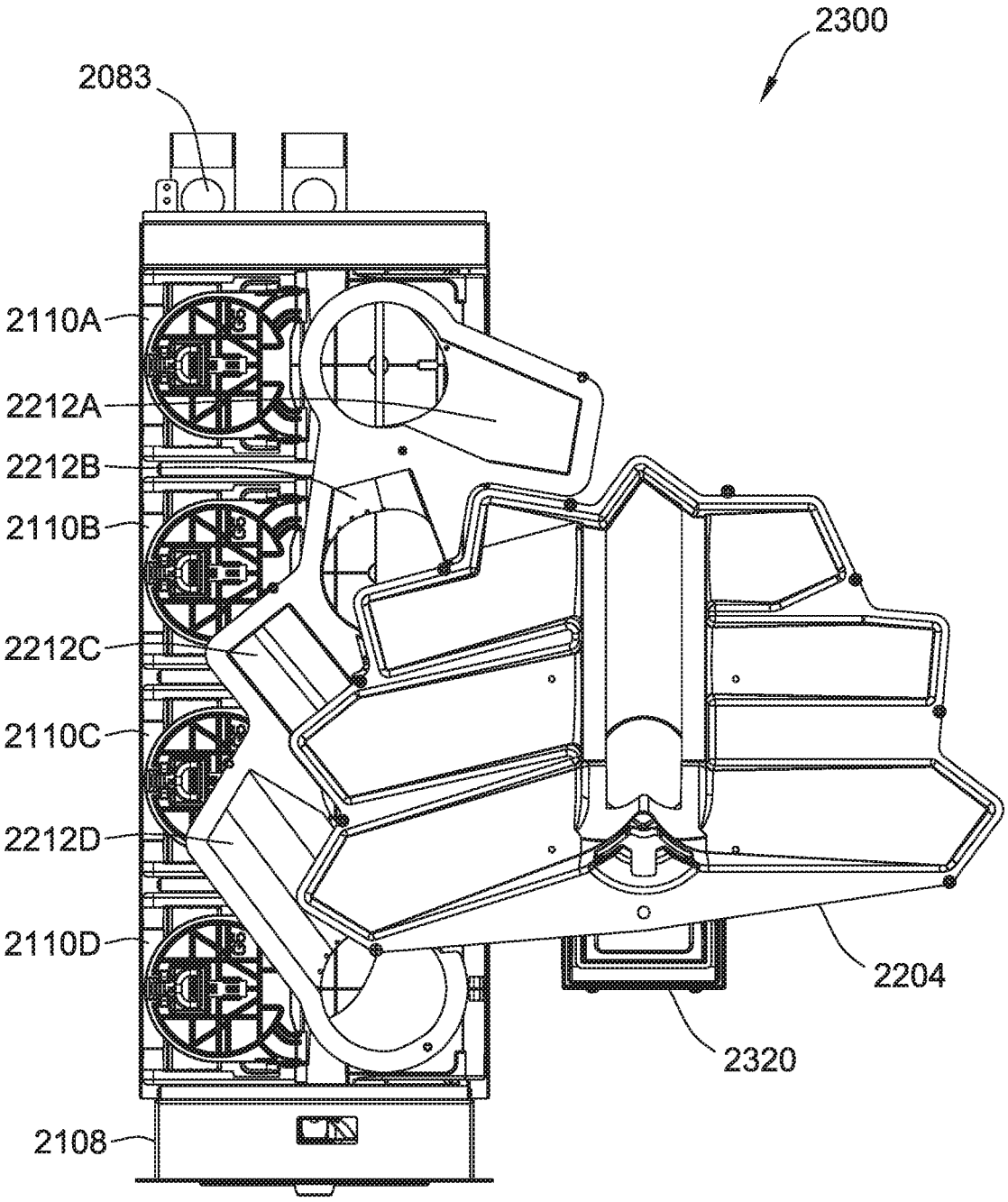

2300
2083
2110A
2212A
2212B
2110B
2212C
2110C
2212D
2110D
2204
2320
2108

FIG. 23A

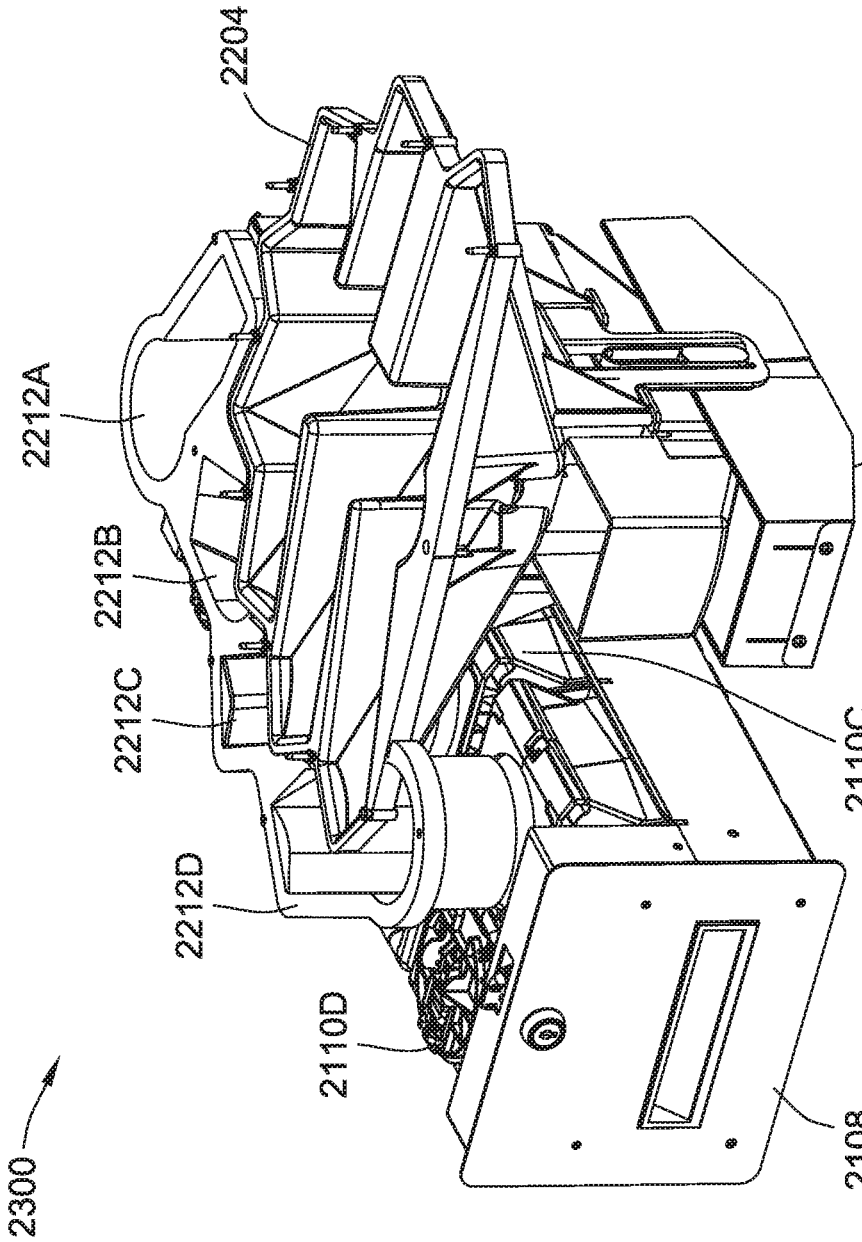


FIG. 23B

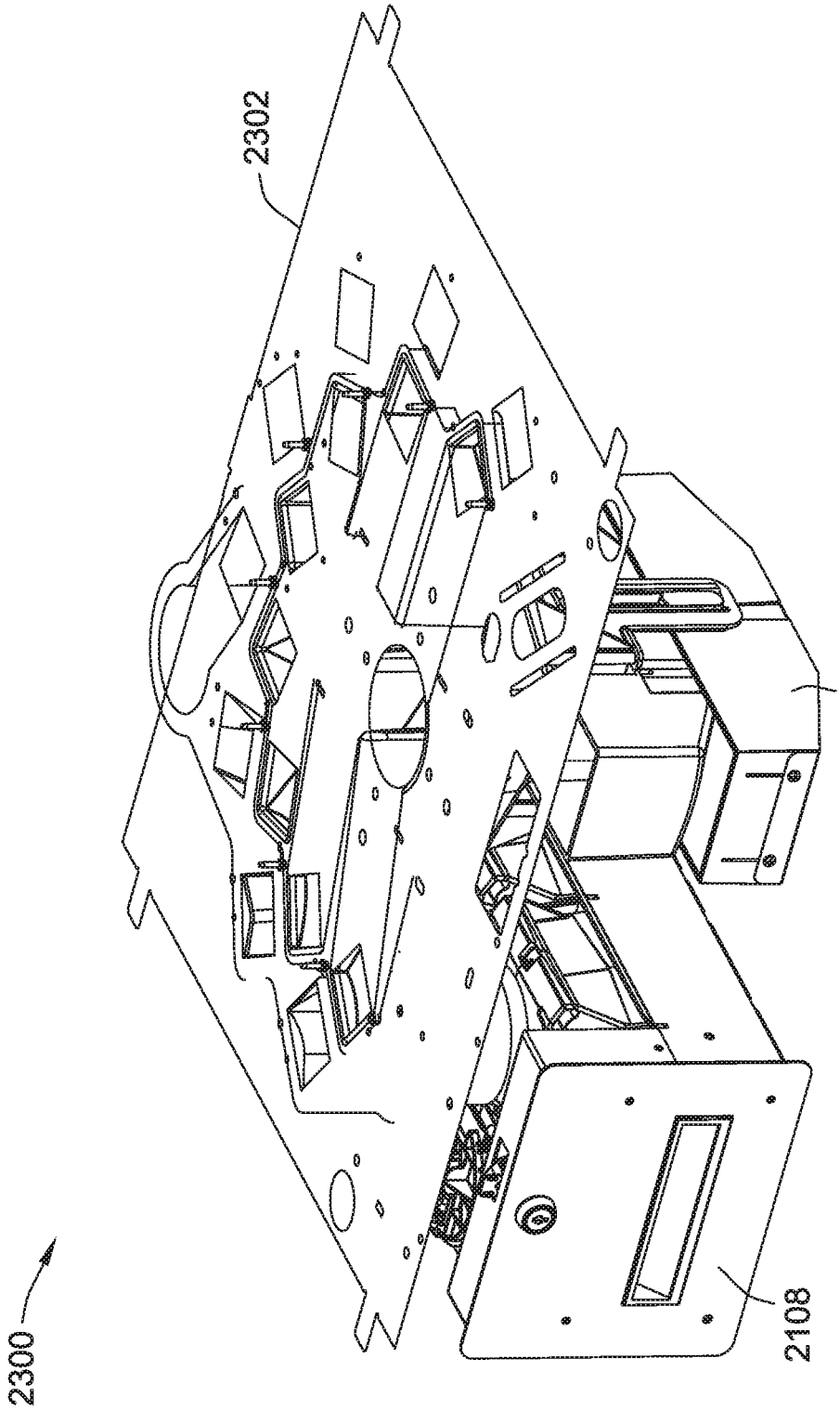


FIG. 23C

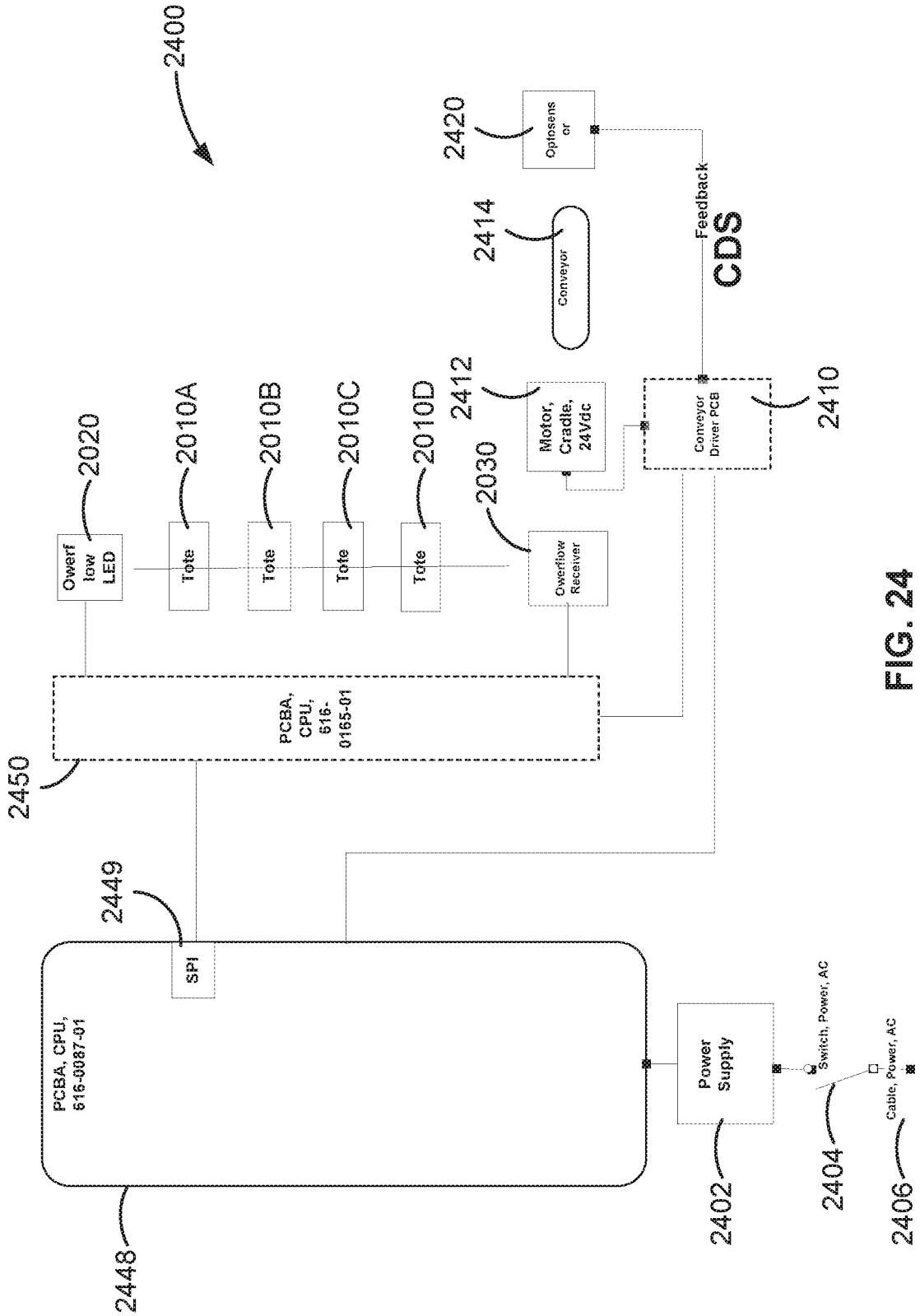

2400
2420
Optosens or
Feedback
CDS
2414
Conveyor
2412
Motor, Cradle, 24Vdc
Conveyor Driver PCB
2410
2020
2010A
2010B
2010C
2010D
2030
Owerf low LED
Tote
Tote
Tote
Tote
Owerflow Receiver
PCBA, CPU, 616-0165-01
2450
2449
SPI
PCBA, CPU, 616-0087-01
2448
Power Supply
2402
Switch, Power, AC
2404
Cable, Power, AC
2406

FIG. 24

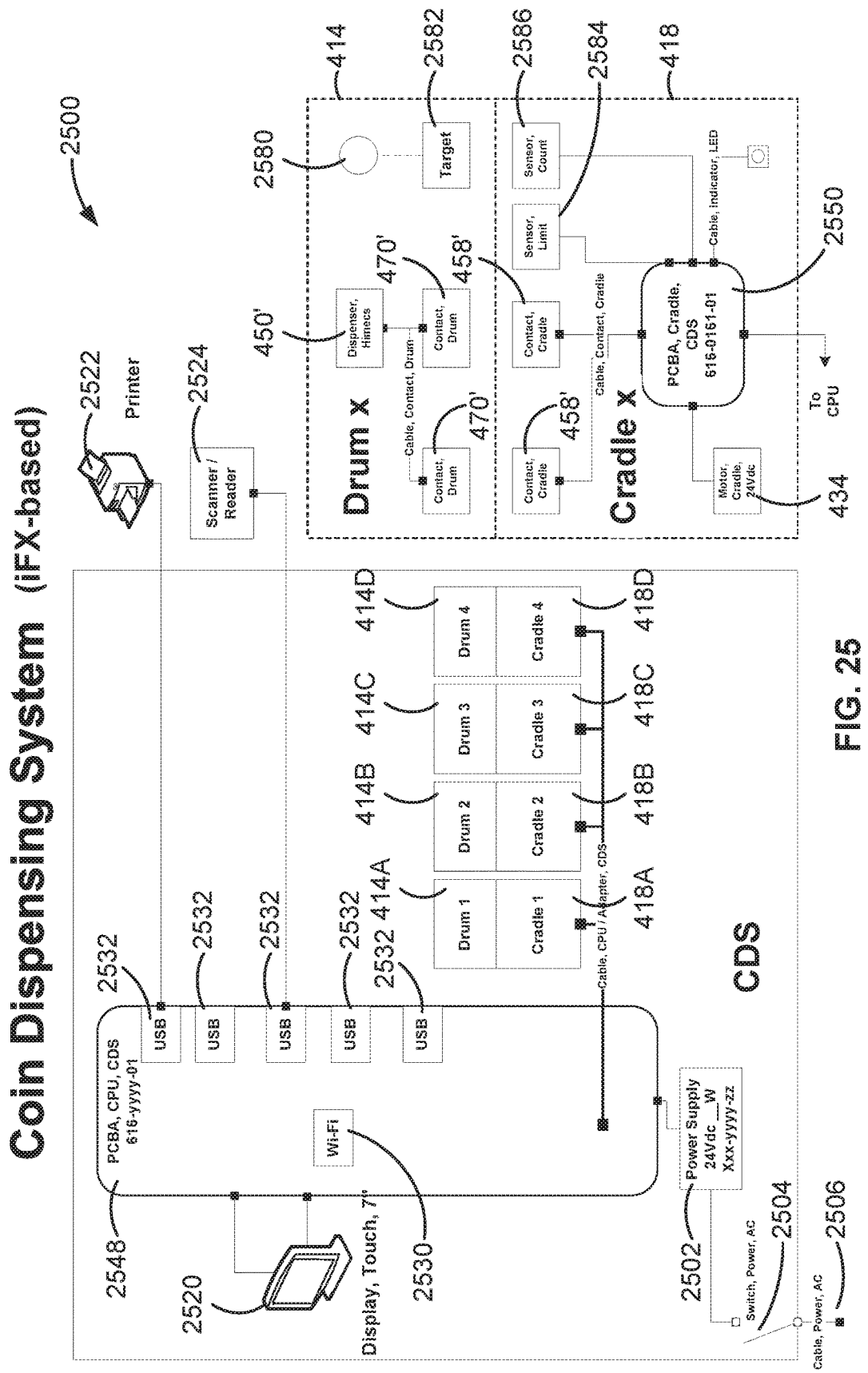

Coin Dispensing System (iFX-based)
2500
2522
Printer
2524
Scanner / Reader
2580
414
2582
Target
2586
Sensor, Count
2584
Sensor, Limit
418
450'
Dispenser, Hinecs
470'
Contact, Drum
458'
Contact, Cradle
Drum x
Cradle x
Cable, Contact, Drum
Cable, Contact, Cradle
PCBA, Cradle, CDS 616-0161-01
Cable, Indicator, LED
2550
To CPU
434
Motor, Cradle, 24Vdc
2532
USB
PCBA, CPU, CDS 616-yyyy-01
Drum 1
Drum 2
Drum 3
Drum 4
Cradle 1
Cradle 2
Cradle 3
Cradle 4
414A
414B
414C
414D
418A
418B
418C
418D
Cable, CPU / Adapter, CDS
CDS
Wi-Fi
2530
Display, Touch, 7"
2520
2548
Power Supply 24Vdc __W Xxx-yyyy-zz
2502
Switch, Power, AC
2504
Cable, Power, AC
2506

FIG. 25

SYSTEMS, METHODS AND DEVICES FOR COIN PROCESSING AND COIN RECYCLING

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Application Ser. No. 62/202,571 filed on Aug. 7, 2015, incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates generally to systems, methods and devices for processing currency. More particularly, aspects of this disclosure relate to self-service coin processing machines and coin processing systems for depositing and recycling coins.

BACKGROUND

Some businesses, particularly banks and casinos, are regularly faced with large amounts of currency which must be organized, counted, authenticated and recorded. To hand count and record large amounts of currency of mixed denominations requires diligent care and effort, and demands significant manpower and time that might otherwise be available for more profitable and less tedious activity. To make counting of bills and coins less laborious, machines have been developed which automatically sort, by denomination, mixed assortments of currency, and transfer the processed currency into receptacles specific to the corresponding denominations. For example, coin processing machines for processing large quantities of coins from either the public at large or private institutions, such as banks, casinos, supermarkets, and cash-in-transit (CIT) companies, have the ability to receive bulk coins from users of the machine, count and sort the coins, and store the received coins in one or more coin receptacles, such as coin bins, coin cassettes, or coin bags. One type of currency processing machine is a redemption-type processing machine wherein, after the deposited coins and/or bank notes are counted, funds are returned to the user in a pre-selected manner, such as a payment ticket or voucher, a smartcard, a cash card, a gift card, and the like. Another variation is the deposit-type processing machine where funds which have been deposited by the user are credited to a personal account. Hybrid variations of these machines are also known and available.

A well-known device for processing coins is the disk-type coin sorter. In one exemplary configuration, the coin sorter, which is designed to process a batch of mixed coins by denomination, includes a rotatable disk that is driven by an electric motor. The lower surface of a stationary, annular sorting head (or "sort disk") is parallel to and spaced slightly from the upper surface of the rotatable disk. A mixed batch of coins may be progressively deposited onto the top surface of the rotatable disk. As the disk is rotated, the coins deposited on the top surface thereof tend to slide outwardly due to centrifugal force. As the coins move outwardly, those coins which are lying flat on the top surface of the rotatable disk enter a gap between the disk and the sorting head. The lower surface of the sorting head is formed with an array of exit channels which guide coins of different denominations to different exit locations around the periphery of the disk. The exiting coins, having been sorted by denomination for separate storage, are counted by sensors located, for example, along the exit channel. A representative disk-type coin sorting mechanism is disclosed in U.S. Pat. No. 5,009,627, to James M. Rasmussen, which is incorporated herein by reference in its entirety and for all purposes.

It is oftentimes desirable in the sorting of coins to discriminate between valid coins and invalid coins. Use of the term "valid coin" can refer to genuine coins of the type to be sorted. Conversely, use of the term "invalid coin" can refer to items in the coin processing unit that are not one of the coins to be sorted. For example, it is common that foreign (or "stranger") coins and counterfeit coins enter a coin processing system for sorting domestic coin currency. So that such items are not sorted and counted as valid coins, it is helpful to detect and discard these "invalid coins" from the coin processing system. In another application wherein it is desired to process only U.S. quarters, nickels and dimes, all other U.S. coins, including dollar coins, half-dollar coins, pennies, etc., are considered "invalid." Additionally, coins from all other coins sets including Canadian coins and European coins, for example, would be considered "invalid" when processing U.S. coins. In another application it may be desirable to separate coins of one country (e.g., Canadian coins) from coins of another country (e.g., U.S. coins). Finally, any truly counterfeit coins (also referred to in the art as "slugs") are always considered "invalid" regardless of application.

Self-service coin redemption machines are used in banking environments (e.g., in patron-accessible areas), business environments (e.g., armored transport services, telephone companies, etc.), and retail environments, (e.g., convenience stores, grocery stores, etc.). In operation, a user deposits a mixed batch of coins into a coin tray of the coin redemption machine. Coins are progressively fed into a coin processing unit whereby the machine discriminates items that are invalid, determines the value of the valid coins, and outputs a receipt indicative of the determined amount. In some systems, the receipt also indicates a second, lesser amount, which reflects a commission charged for use of the machine. In one example, a coin redemption and voucher dispensing machine disclosed in U.S. Pat. No. 6,976,570, which is incorporated herein by reference in its entirety, receives bunches of unsorted coins, counts the total value of the coins, and outputs a voucher or store coupon related to the total amount, less a commission charge for the use of the machine. Customers take the voucher/coupon to a cashier or clerk for redemption, following verification of the authenticity of the voucher by the cashier or clerk.

Coin recycling historically required user-deposited coins be pulled from circulation, shipped to a separate site for sorting and authentication, then repackaged and distributed for recirculation. Typically, coin recycling is performed by privately owned and operated armored car services ("armored carriers"). Generally, an armored car carrier sends out an armored vehicle to a number of different businesses, some of which provide customers with one or more self-service coin redemption machines having coin receptacles requiring pickup and processing. Once the armored car has picked up all of the redemption machines coins and dropped off packaged coins according to the requirements of the businesses, the armored car returns to the armored car carrier where the collected coins are processed and repackaged for delivery on subsequent routes. The armored carrier charges a "Deposit Pick Up Charge" for picking up the store's deposit each day, including excess notes, coin and checks, and a "Change Order Delivery Charge" for dropping off cash (coin/notes) needed by the store to fund daily activities. There are further fees, for example, for the "Currency Furnished" (e.g., $1.25 per $1000), "Rolled Coin Provided (per roll)" (e.g., $0.10 per roll) and a "Deposit Processing

Charge" charged by the deposit processor (armored carrier or bank) to count and verify each deposit.

SUMMARY

Currency processing systems, coin processing machines, coin processing units, and methods of processing batches of coins are presented herein. For example, aspects of the present disclosure are directed to disk-type coin processing units and currency processing machines with disk-type coin processing units. In some embodiments, a self-service coin processing and recycling machine is presented which denominates, authenticates, and off-sorts a portion of customer-deposited coins into handheld, portable coin totes or other receptacles that can be retrieved from the machine and used by the host, either at the machine's location or at another location. This allows the host to stock currency coins without the need for paying an armored carrier to retrieve, haul away and process bulk coin, and then buying back coin from that same or a different armored carrier with attendant service fees.

For some system configurations, the coin processing unit is provided with sorted exits for at least four denominations of coins (e.g., penny, nickel, dime, quarter) that are routed to respective containers. These containers may comprise dedicated coin totes that are accessible via a lockable drawer accessible at the front or back of the machine. Once a given tote has been filled to capacity or a predetermined amount of its denomination of coin, the remaining coins of that denomination are sent to a dedicated or mixed-denomination bin, e.g., for retrieval by armored carrier. For at least some configurations, the system utilizes a single mixed-denomination bin or dual mixed-denomination bins. As an example, a dual-bin configuration can use a conveyor belt to selectively move coins forward to a front bin and rearward to a rear bin. The conveyor system can be eliminated altogether on a single bin machine. Optional or alternative configurations could employ a gravity feed tube system to the front and/or rear bin.

In accordance with aspects of the present disclosure, various currency processing systems are presented. One such currency processing system includes a housing with a coin input area that is configured to receive a batch of coins, e.g., from a customer or other user. The currency processing system also includes coin receptacles that are operatively coupled to the housing and configured to stow processed coins. These receptacles include one or more coin-recycling receptacles and one or more coin-depositing receptacles. A disk-type coin processing unit is operatively coupled to the coin input area and the coin receptacles to transfer coins therebetween. The coin processing unit includes a rotatable disk that is configured to impart motion to a plurality of the coins, and a sorting head with a lower surface that is generally parallel to and at least partially spaced from the rotatable disk. The lower surface forms a number of shaped regions that guide the coins, under the motion imparted by the rotatable disk, to exit channels that sort and discharge the coins through a plurality of exit stations.

The currency processing system also includes one or more automated coin chutes, each of which has a chute body defining an input passage connected to coin-recycling and coin-depositing output passages. The automated coin chute includes a movable diverter plate that is configured to selectively transition (e.g., pivot back and forth) between first and second positions. When in the first position, coins received from one of the exit stations of the coin processing unit by the input passage are redirected by the diverter plate through the coin-recycling output passage to one of the coin-recycling receptacles. When in the second position, coins received by the input passage of the automated coin chute from the same exit station are redirected by the movable diverter plate through the coin-depositing output passage to one of the coin-depositing receptacles.

Other aspects of the present disclosure are directed to self-service coin processing machines. In an example, a self-service coin processing machine is presented that includes a housing with a coin input area configured to receive coins. A plurality of coin receptacles is removably positioned inside the housing and configured to receive and store processed coins. These coin receptacles include a plurality of coin-recycling receptacles and a plurality of coin-depositing receptacles. A coin processing unit is configured to receive coins from the coin input area, process the coins, and output the processed coins through coin exit stations. The coin processing machine also includes automated coin chutes, each of which has chute body defining an input passage connected to coin-recycling and coin-depositing output passages. Each automated coin chute includes a movable diverter plate that selectively transitions between a first position, whereby coins received by the input passage from a respective one of the exit stations are redirected through the coin-recycling output passage to a respective one of the coin-recycling receptacles, and a second position, whereby coins received by the input passage from the respective one of the exit stations are redirected through the coin-depositing output passage to a respective one of the coin-depositing receptacles.

According to other aspects of this disclosure, methods of processing and recycling batches of coins are disclosed. As an example, one method includes: receiving a batch of mixed coins in a self-service currency processing machine comprising a coin processing unit that is configured to authenticate and sort received coins, at least one coin-depositing receptacle, and a plurality of coin-recycling receptacles, each of the coin-recycling receptacles being associated with a single denomination of coin; discharging authenticated and sorted coins from the coin processing unit through a plurality of exit stations, each of the exit stations being associated with a single denomination of coin; receiving coins from each of the exit stations via one of a plurality of automated coin chutes, each of the automated coin chutes including a movable diverter plate that is configured to selectively transition between a first position, whereby coins received from the exit station are directed through a coin-recycling output passage, and a second position, whereby coins received from the exit station are directed through a coin-depositing output passage; discharging coins from the coin-recycling output passage of each of the automated coin chutes into a respective one of the coin-recycling receptacles; and discharging coins from the coin-depositing output passage of each of the automated coin chutes into the at least one coin-depositing receptacle.

According to yet other aspects of this disclosure, coin-recycling systems and coin-recycling dispenser assemblies are presented. In an example, disclosed is a coin-recycling dispenser assembly for sorting coins stowed in coin totes into a plurality of coin containers. The coin-recycling dispenser assembly includes a housing with a plurality of tote docking stations. Each tote docking station includes a guide mechanism and a drive mechanism. The coin-recycling dispenser assembly also includes a plurality of tote docks coupled to the housing. Each tote dock is rotatably mounted to one of the tote docking stations and is configured to seat therein one of the coin totes. Movement of each tote dock is

limited by the guide mechanism. The drive mechanisms of tote docking stations are each selectively actuable to rotate one of the tote docks back and forth between a loading position, whereat the coin tote can be placed in or removed from the tote dock, and a dispensing position, whereat coins stowed inside the coin tote are dispensed, one at a time, into one of the coin containers.

As another example, a coin-recycling system is disclosed. In according to some such embodiments, the coin-recycling system includes an electronic display device that is configured to display information and user-selectable options to users. An electronic user input device is configured to receive one or more user selections to control one or more operations of the coin-recycling system. A central processing unit (CPU) or processor is communicatively coupled to the electronic display device and the electronic user input device for control thereof. The coin-recycling system also includes an assortment of hand-held coin totes. Each said coin tote has a respective rigid tote body with a wall defining therethrough a coin hole. A lid is attached to the tote body and is configured to move back and forth between a first position, whereat the lid covers the coin hole, and a second position, whereat the lid exposes the coin hole such that coins can be passed into and out of the tote body. The coin-recycling system further includes a coin till with a plurality of coin chutes attached to a till housing and a plurality of coin funnels stowed inside the till housing. Each coin funnel has removably mounted at a narrow end thereof a respective coin cylinder. Additionally, each coin chute is configured to direct coins, under the force of gravity, into a respective one of the coin cylinders through one of the coin funnels.

The coin-recycling system also includes a dispenser assembly housing with a plurality of tote docking stations. Each of the tote docking stations includes a respective guide track with a rotation stop, a respective motor-driven gear assembly, and a respective coin slot configured to transmit coins, under the force of gravity, one at a time, to one of the coin chutes. Juxtaposed on the dispenser assembly housing is a plurality of tote docks, each of which is rotatably mounted to a respective one of the tote docking stations. Each tote dock has a respective tote pocket that is configured to removably seat therein one of the coin totes, and a respective stopping shoulder configured to mate with a rotation stop of one of the tote docking stations and thereby limit rotation of the tote dock. Each of the tote docks also includes a respective guide rail that is configured to mate with a guide track of one of the tote docking stations and thereby limit lateral movement of the tote dock during rotation thereof. Each tote dock further comprises an automated coin disk assembly that is configured to separate coins received from the coin totes, and a respective toothed track that is engaged with the motor-driven gear assembly. The motor-driven gear assemblies are each selectively actuable to rotate a respective one of the tote docks back and forth between a loading position and a dispensing position. When in the loading position, a coin tote can be pushed into and removed from the tote dock. Conversely, when in the dispensing position, coins stowed inside the coin tote are dispensed, one at a time, from the tote dock, through the tote docking station, to the coin till and into one of the coin cylinders through one of the coin funnels.

Also disclosed herein are specialized coin containers. In an example, a coin bag for storing a plurality of coins is disclosed. The coin bag comprises an at least partially transparent and flexible polymeric body. The coin bag body has a first end with an opening configured to receive therethrough plural coins. The coin bag also includes a seal for securing close the opening in the first end. A second end of the coin bag body has a frangible portion that is configured to be manually opened such that coins can be emptied from the coin bag through the opened frangible portion. One or more segments of the coin bag body may be opaque. The coin bag body may be sized to fit in a single hand of an average adult male.

An advantage of one or more of the disclosed coin-recycling concepts is a reduction in carbon footprint by utilizing reusable coin totes instead of cardboard coin boxes and paper coin rolls, and by reducing fuel consumption required to transport coins to and from multiple business locations. Coin recycling, as disclosed herein, can also help to reduce operating costs by: (1) reducing/eliminating payments to CIT companies for coin processing and for rolled coin delivery; (2) reducing/eliminating expenses associated with CIT up charges for emergency coin orders and delivery services; and (3) allowing recycled coins to be shared among stores/branches within an organization. Customers can also enjoy an additional revenue stream by packaging and selling recycled coins at a premium to consumers and local businesses. Coin recycling can be leveraged for numerous coin activities in many businesses, including vending machines, self-service checkout lanes, point-of-sale (POS) lanes, cash tills, automated coin dispensers, etc.

The above summary is not intended to represent every embodiment or every aspect of the present disclosure. Rather, the foregoing summary merely provides an exemplification of some of the novel aspects and features set forth herein. The above features and advantages, and other features and advantages of the present disclosure, which are considered to be inventive singly or in any combination, will be readily apparent from the following detailed description of representative embodiments and modes for carrying out the present invention when taken in connection with the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B are alternate views of a representative self-service coin processing machine in accordance with aspects of the present disclosure.

FIG. **2** is an elevated perspective-view illustration of a representative currency processing machine in accordance with aspects of the present disclosure.

FIG. **3** is an elevated perspective-view illustration of another representative currency processing machine in accordance with aspects of the present disclosure.

FIG. **4** is a perspective-view illustration of selected components of a representative coin processing system in accordance with aspects of the present disclosure.

FIG. **5** is a perspective-view illustration of one of the coin bins of FIG. **4**.

FIG. **6** is a partially broken away perspective-view illustration of an example of a disk-type coin processing unit in accordance with aspects of the present disclosure.

FIG. **7** is an enlarged bottom-view illustration of the sorting head of the exemplary disk-type coin processing unit of FIG. **6**.

FIG. **8** is a plan-view illustration of selected components of a representative coin depositing and recycling unit ("CDR Unit") in accord with aspects of the present disclosure.

FIG. **9** is a perspective-view illustration of the base plate, coin processing unit, coin-mixing manifold and one of the automated coin chutes of the CDR Unit of FIG. **8**.

FIG. **10** is a perspective-view illustration of the base plate and coin-mixing manifold of the CDR Unit of FIG. **8**.

FIGS. **11**A and **11**B are perspective-view illustrations of one of the automated coin chutes of the CDR Unit of FIG. **8**.

FIG. **12** is a perspective-view illustration of the tote drawer and totes, tote chutes, and conveyor assembly of the CDR Unit of FIG. **8**.

FIG. **12**A is a perspective-view illustration of one of the handheld coin totes of the CDR Unit of FIG. **8**.

FIG. **13** is a perspective-view illustration of the conveyor assembly of FIG. **8**.

FIG. **14** is a perspective-view illustration of a representative coin-recycling system with a coin-recycling dispenser assembly in accordance with aspects of the present disclosure.

FIGS. **15**A and **15**B are top and bottom perspective-view illustrations, respectively, of one of the coin tote docks of FIG. **14**.

FIG. **15**C is a bottom perspective view of an alternative embodiment of a tote dock or drum.

FIG. **16** is a partially exploded perspective-view illustration of one of the coin tote docks of FIG. **14**.

FIG. **16**A is a bottom perspective view of an alternative embodiment of automated coin disk assembly or HIMECS dispenser.

FIG. **17** is a partially exploded perspective-view illustration of one of the coin tote docking stations of FIG. **14**.

FIG. **17**A is a perspective view of an alternative embodiment of tote docking station or cradle.

FIGS. **18**A and **18**B are perspective-view illustrations of one of the coin totes of FIG. **14** with the tote lid in a closed position and an open position, respectively.

FIGS. **19**A and **19**B are front-view illustrations of a representative tamper-evident coin bag in accordance with aspects of the present disclosure.

FIGS. **20**A-**20**E are perspective views of tote drawers.

FIGS. **21**A and **21**B are perspective views of selected components of a representative coin depositing and recycling unit.

FIGS. **22**A and **22**B illustrate a top view and a perspective view, respectively, of portions of a CDR Unit.

FIGS. **23**A-**23**C illustrate a top view, a perspective view, and another perspective view, respectively, of portions of a CDR Unit.

FIG. **24** is a block diagram of selected components of a coin depositing and recycling unit ("CDR Unit").

FIG. **25** is a block diagram of selected components of a coin-recycling system **2500** such as coin-recycling system.

The present disclosure is susceptible to various modifications and alternative forms, and some representative embodiments have been shown by way of example in the drawings and will be described in detail herein. It should be understood, however, that the inventive aspects are not limited to the particular forms illustrated in the drawings. Rather, the disclosure is to cover all modifications, equivalents, combinations, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

This disclosure is susceptible of embodiment in many different forms. There are shown in the drawings, and will herein be described in detail, representative embodiments with the understanding that the present disclosure is to be considered as an exemplification of the principles of the present disclosure and is not intended to limit the broad aspects of the disclosure to the embodiments illustrated. To that extent, elements and limitations that are disclosed, for example, in the Abstract, Summary, and Detailed Description sections, but not explicitly set forth in the claims, should not be incorporated into the claims, singly or collectively, by implication, inference or otherwise. For purposes of the present detailed description, unless specifically disclaimed or logically prohibited: the words "including" or "comprising" or "having" means "including without limitation." Moreover, words of approximation, such as "about," "almost," "substantially," "approximately," and the like, can be used herein in the sense of "at, near, or nearly at," or "within 3-5% of," or "within acceptable manufacturing tolerances," or any logical combination thereof, for example.

FIGS. **1**A and **1**B show an example of a self-service coin processing machine **10** having a pivoting coin input tray **12** that is shaped and sized to hold batches of coins prior to inputting coins into the coin processing machine **10**. The coin tray **12** pivots upwardly, e.g., via manual manipulation or motor-driven automation, to cause coins deposited therein to move, under the force of gravity through a hopper, funnel, or chute, into a coin processing unit (e.g., FIGS. **6** and **7**) disposed within a cabinet or housing **14**. The processing unit discharges sorted coins to a plurality of receptacles (e.g., coin bags **16** of FIG. **1**B) suspended within the cabinet **14**. The bottoms of the bags may rest upon a movable platform **22** and/or may hang from bag holders, clamps or funnels attached to a support member of a moveable bag receptacle station **18**. The station **18** moves (e.g., via casters **21**, etc.) to travel into and out of the housing **14** to facilitate access by authorized personnel to the coin receptacle bags via door **20** (shown in an open position).

FIG. **2** shows an example of a self-service currency processing machine **1020** wherein coin receptacles, such as discrete coin bins **38**, are disposed on glide units **31**-**35** that slide into and out of the housing **30** of a coin processing device. These moveable receptacles **38** comprise coin bag partitions that prevent coins bags disposed in the moveable receptacles **38** from interfering with adjacent coin bags as the coin bags become filled. A door **39** (shown in an open position) facilitate access by authorized personnel to the coin bins or receptacles **38**.

FIG. **3** shows an example of another coin processing device **1030**, this example including a mixed-denomination coin bin **44** that is disposed within the housing **40**, behind door **46**, which is shown in an open position. In this configuration, all of the processed coins are commingled in the coin bin **44**. The coin bin **44** is disposed on wheels and includes a handle **42** pivotally attached thereto for pulling the coin bin from within the housing. Although differing in appearance, each of the various currency and coin processing units, systems and machines illustrated in the figures may include any of the features, options, and alternatives described herein with respect to the other units, systems and machines unless explicitly disclaimed or logically prohibited.

FIG. **4** illustrates select portions of a representative coin processing system, designated generally at **100**, in accordance with aspects of the present concepts. The coin processing system **100** is portrayed herein by a number of representative parts, including first and second wheeled bins **110**A and **110**B, respectively, which are removably lodged in complementary bin stations **130**A and **130**B. Each bin station **130**A, **130**B includes a respective floating funnel

system **132**A and **132**B that is mounted to a housing, which is represented herein by a pair of support columns **134**A and **134**B. Each floating funnel system **132**A and **132**B includes a respective funnel **140**A and **140**B that is movably mounted, e.g., to the underside of base plate **302**, via a respective metal bracket **142**A and **142**B. Optional coin tubes **144**A and **144**B direct coins from a coin processing unit to a respective coin funnel **140**A and **140**B. The features of the present disclosure are not limited to the two-bin implementation presented in FIG. **4**; rather, these features are similarly amenable to coin processing systems with greater or fewer than two wheeled bins and corresponding bin stations. In this regard, only selected components of the coin processing system **100** have been shown and will be described in detail herein. Nevertheless, the coin processing system **100** can include numerous additional components, such as a coin processing mechanism, security doors, input devices, such as a computer-based user interface, a variety of output devices, such as display screens, lighting elements, and audio speakers, many of which are described in the various patents and patent publications incorporated herein by reference.

Wheeled bins **110**A, **110**B (also referred to herein as "coin receptacles") function generally as mobile coin containers—receiving coins from a coin processing device, such as the disk-type coin sorter described below, and transporting the received coins to another location. As seen in FIGS. **4** and **5**, each wheeled bin **110**A, **110**B includes a respective box-shaped coin container **112**A and **112**B with a security lid **114**A and **114**B that extends across and covers the container **112**A, **112**B. The coin containers **112**A, **112**B and security lids **114**A, **114**B can be fabricated from a variety of rigid and robust materials, including synthetic polymers, such as medium density polyethylene, and metallic materials, such as aluminum or steel, and combinations thereof. The coin containers **112**A, **112**B are each supported for movement thereof on a respective pair of laterally spaced casters or wheels **116**A and **116**B, located at a forward end of the container **112**A, **112**B. A pair of laterally spaced support stanchions **118**A, **118**B, is located at a rearward end of the container **112**A, **112**B on the opposite side of the casters **116**A, **116**B. In alternative configurations, the wheeled bins **110**A, **110**B may include greater of fewer than two casters/wheels each. Moreover, the bins **110**A, **110**B can be designed without wheels and moved via alternative means, such as air bearings, fork lifts, moving dollies, etcetera.

In the illustrated embodiment, the first and second wheeled bins **110**A, **110**B of FIG. **4** are substantially structurally identical; thus, for brevity and conciseness, additional features of the bins **110**A, **110**B will be described with respect to the wheeled bin **110**A portrayed in FIG. **5**. The lid **114**A of the wheeled bin **110**A includes a centrally located hole **180**A through which coins received from the funnel system **132**A pass into the coin container **112**A. Leading and trailing guide ramps **115**A and **111**A, respectively, are integrally formed in the lid **114**A, disposed on opposing sides of the central hole **180**A. Hinged to a forward peripheral edge of the container **112**A, the lid **114**A can be swung open to provide access to the inside of the container **112**A, for example, to simplify removal of the contents of the container **112**A. Conversely, the lid **114**A can be swung closed and locked shut, for example, via an optional security latch **122**A for securing the contents of the container **112**A.

The lid **114**A can also be provided with optional structural features for securely supporting another wheeled bin on top of the wheeled bin **110**A. In the illustrated embodiment, these features comprise four recessed stacking platforms: a pair of recessed wheel platforms **128**A at a forward end of the lid **114**A for nesting the wheels of another bin, and a pair of recessed stanchion platforms **128**C at a rearward end of the lid **114**A for nesting the support stanchions of another bin. The recessed platforms **128**A, **128**C allow for another wheeled bin, such as the second wheeled bin **110**B, to be generally immobilized and securely stacked on top of the first wheeled bin **110**A. The lid **114**A can also be provided with an optional RFID reader or transmitter/receiver for wirelessly communicating, receiving and storing information, as described in detail in U.S. Pat. No. 8,545,295, incorporated herein by reference in its entirety. Moreover, a clean sleeve **129**A for holding and displaying a receipt or other printed information is situated on the top of the lid **114**A adjacent the coin hole **180**A.

The wheeled bin **110**A is designed to be quickly and easily moved into and out of the bin station **130**A. A socket **124**A projects downward from a hitch chassis **126**A, which projects from the rear side of the coin container **112**A. A complementary socket-ball of a cantilevered dolly (not shown) can be inserted into the socket **124**A. The cantilevered dolly provides a mechanical advantage (e.g., **10**:**1**) for lifting the rear end of the container **112**A. By inserting the socket-ball into the socket **124**A and applying a downward force to the opposite end of the cantilevered dolly, a moment arm is applied to the coin container **112**A causing the wheeled bin **110**A to pitch slightly forward (e.g., counter-clockwise in FIG. **5**) off of the support stanchions **118**A, placing the weight of the bin **110**A on the casters **116**A and cantilevered dolly. This allows for the wheeled bin **110**A to be readily wheeled in and out of the bin station **130**A. To prevent damage to sensitive electronics and other equipment in the bin station **130**A, the housing **134**A, **134**B and/or bin **110**A can be provided with means (e.g., a bracket) for limiting the height to which the wheeled bin **110**A can be raised. The aforementioned wheel-and-stanchion arrangement, in combination with the use of the cantilevered dolly, helps to minimize the height of the wheeled bin **110**A in comparison to its conventional counterparts.

When the wheeled bins **110**A, **110**B are properly lodged inside their respective bin stations **130**A, **130**B, this condition can be communicated to or detected by a processor of the coin processing system **100**, for example, via wired or wireless communication. By way of non-limiting example, the bin logic system utilizes a number of electrically conductive interfaces for determining information. These electrically conductive interfaces are exemplified in the drawings by two contact blocks **150**A and **150**B that are connected to respective bin stations **130**A, **130**B, and a set of contact plates **162**A and **164**A (FIG. **5**) that are connected to each respective bin **110**A, **110**B. When the contact blocks **150**A, **150**B come into contact with the contact plates **162**A, **164**A one or more electrical circuits are completed. The completion or non-completion of these one or more electrical circuits is indicated to different conditions associated with the wheeled bins **110**A, **110**B such as, for example, that the bins **110**A, **110**B are properly lodged inside their respective bins stations **130**A, **130**B, and/or whether a given bin **110**A, **110**B is empty, has coins therein, or has reached a full level of coins. One or more of the contact blocks **150**A, **150**B and contact plates **162**A, **164**A may also be used to dissipate electrostatic charge associated with the wheeled bins **110**A, **110**B and/or coins within those wheeled bins.

FIG. **6** shows a non-limiting example of a coin sorting device, represented herein by a disk-type coin processing unit **200** that can be used in any of the currency processing systems, methods and devices disclosed herein. The coin

processing unit **200** includes a hopper channel, a portion of which is shown at **210**, for receiving coins of mixed denominations from a coin input area (e.g., coin input areas **12** of FIGS. **1**A and **1**B). The hopper channel **210** feeds the coins through a central opening **230** in an annular, stationary sorting head **212** (oftentimes referred to as a "sorting disk" or "sort disk"). As the coins pass through this opening, the coins are deposited onto the top surface of a resilient pad **218** disposed on a rotatable disk **214**. According to some embodiments, coins are initially deposited by a user onto a coin tray (e.g., coin tray **12** of FIG. **1**A) disposed above the coin processing unit **200**; coins flow from the coin tray into the hopper channel **210** under the force of gravity.

This rotatable disk **214** is mounted for rotation on a shaft (not visible) and driven by an electric motor **216**. The rotation of the rotatable disk **214** of FIG. **6** is slowed and stopped by a braking mechanism **220**. The disk **214** typically comprises a resilient pad **218**, preferably made of a resilient rubber or polymeric material, that is bonded to, fastened on, or integrally formed with the top surface of a solid disk **222**. The resilient pad **218** may be compressible such that coins laying on the top surface thereof are biased or otherwise pressed upwardly against the bottom surface of the sorting head **212** as the rotatable disk **214** rotates. The solid disk **222** is typically fabricated from metal, but it can also be made of other materials, such as a rigid polymeric material.

The underside of the inner periphery of the sorting head **212** is spaced above the pad **218** by a distance which is approximately the same as or, in some embodiments, just slightly less than the thickness of the thinnest coin that the coin processing unit **200** is designed to sort. While the disk **214** rotates, coins deposited on the resilient pad **218** tend to slide outwardly over the top surface of the pad **218** due to centrifugal force. As the coins continue to move outwardly, those coins that are lying flat on the pad **218** enter a gap between the upper surface of the pad **218** and the lower surface of the sorting head **212**. As is described in further detail below, the sorting head **212** includes a plurality of coin directing channels (also referred to herein as "exit channels") for manipulating the movement of the coins from an entry area to a plurality of exit stations (or "exit slots") where the coins are discharged from the coin processing unit **200**. The coin directing channels may sort the coins into their respective denominations and discharge the coins from exit stations in the sorting head **212** corresponding to their denominations. Sorting head **212** can also be provided with means for off-sorting invalid coins and foreign objects deposited into the unit **200**.

Referring now to FIG. **7**, the underside of the sorting head **212** is shown. The coin set for a given country can be sorted by the sorting head **212** due to variations in the diameter and/or thickness of the individual coin denominations. For example, according to the United States Mint, the U.S. coin set has the following diameters:

Penny=0.750 in. (19.05 mm)
Nickel=0.835 in. (21.21 mm)
Dime=0.705 in. (17.91 mm)
Quarter=0.955 in. (24.26 mm)
Half Dollar=1.205 in. (30.61 mm)
Presidential One Dollar=1.043 in. (26.49 mm)

The coins circulate between the stationary sorting head **212** and the rotating pad **218** on the rotatable disk **214**, as shown in FIG. **6**. Coins that are deposited on the pad **218** via the central opening **230** initially enter an entry channel **232** formed in the underside of the sorting head **212**. It should be kept in mind that the circulation of the coins in FIG. **7** appears counterclockwise as FIG. **7** is a view of the underside of the sorting head **212**.

An outer wall **236** of the entry channel **232** divides the entry channel **232** from the lowermost surface **240** of the sorting head **212**. The lowermost surface **240** is preferably spaced from the pad **218** by a distance that is slightly less than the thickness of the thinnest coins that the coin processing unit **200** is designed to process. Consequently, the initial outward radial movement of all the coins is terminated when the coins engage the outer wall **236**, although the coins continue to move more circumferentially along the wall **236** (e.g., in a counterclockwise direction in FIG. **7**) by the rotational movement imparted to the coins by the pad **218** of the rotatable disk **214**.

While the pad **218** continues to rotate, those coins that were initially aligned along the wall **236** move across the ramp **262** leading to a queuing channel **266** for aligning the innermost edge of each coin along an inner queuing wall **270**. The coins are gripped between the queuing channel **266** and the pad **218** as the coins are rotated through the queuing channel **266**. The coins, which were initially aligned with the outer wall **236** of the entry channel **232** as the coins move across the ramp **262** and into the queuing channel **266**, are rotated into engagement with inner queuing wall **270**. As the pad **218** continues to rotate, the coins which are being positively driven by the pad move through the queuing channel **266** along the queuing wall **270** past a trigger sensor **234** and a discrimination sensor **238**, which may be operable for discriminating between valid and invalid coins. In some embodiments, the discrimination sensor **238** may also be operable to determine the denomination of passing coins. The trigger sensor **234** sends a signal to the discrimination sensor **238** that a coin is approaching.

In the illustrated example, coins determined to be invalid are rejected by a diverting pin **242** that is lowered into the coin path such that the invalid coin impacts the pin **242** and thereby redirects the invalid coin to a reject channel **244**. In some embodiments, the reject channel **244** guides the rejected coins to a reject chute that returns the coin to the user (e.g., rejected coins ejected into a coin reject tube to a coin dispensing receptacle). The diverting pin **242** depicted in FIG. **7** remains in a retracted "non-diverting" position until an invalid coin is detected. Those coins not diverted into the reject channel **244** continue along inner queuing wall **270** to a gauging region **250**. The inner queuing wall **270** terminates just downstream of the reject channel **244**; thus, the coins no longer abut the inner queuing wall **270** at this point and the queuing channel **266** terminates. The radial position of the coins is maintained, because the coins remain under pad pressure, until the coins contact an outer gauging wall **252** of the gauging region **250**.

The gauging wall **252** aligns the coins along a common outer radius as the coins approach a series of coin exit channels **261-268** which discharge coins of different denominations through corresponding exit stations **281-288**. The first exit channel **261** is dedicated to the smallest coin to be sorted (e.g., the dime in the U.S. coin set). Beyond the first exit channel **261**, the sorting head **212** shown in FIGS. **6** and **7** forms seven more exit channels **262-268** which discharge coins of different denominations at different circumferential locations around the periphery of the sorting head **212**. Thus, the exit channels **261-268** are spaced circumferentially around the outer periphery of the sorting head **212** with the innermost edges of successive channels located progressively closer to the center of the sorting head **212** so that coins are discharged in the order of increasing

diameter. The number of exit channels can vary according to alternative embodiments of the present disclosure.

The innermost edges of the exit channels **261-268** are positioned so that the inner edge of a coin of only one particular denomination can enter each channel **261-268**. The coins of all other denominations reaching a given exit channel extend inwardly beyond the innermost edge of that particular exit channel so that those coins cannot enter the channel and, therefore, continue on to the next exit channel under the circumferential movement imparted on them by the pad **218**. To maintain a constant radial position of the coins, the pad **218** continues to exert pressure on the coins as they move between successive exit channels **261-268**.

Further details of the operation of the sorting head **212** shown in FIGS. **6** and **7** are disclosed in U.S. Patent Application Publication No. US 2003/0168309 A1, which is incorporated herein by reference in its entirety. Other disk-type coin processing devices and related features that may be suitable for use with the coin processing devices disclosed herein are shown in U.S. Pat. Nos. 6,755,130; 6,637,576; 6,612,921; 6,039,644; 5,997,395; 5,865,673; 5,782,686; 5,743,373; 5,630,494; 5,538,468; 5,507,379; 5,489,237; 5,474,495; 5,429,550; 5,382,191; and 5,209,696, each of which is incorporated herein by reference in its entirety and for all purposes. In addition, U.S. Pat. Nos. 7,188,120 B2, 6,996,263 B2, 6,896,118 B2, 6,892,871 B2, 6,810,137 B2, 6,748,101 B1, 6,731,786 B2, 6,124,926 B2, 6,678,401 B2, 6,637,576 B1, 6,609,604, 6,603,872 B2, 6,579,165 B2, 6,318,537 B1, 6,171,182 B1, 6,068,194, 6,042,470, 6,039,645, 6,021,883, 5,982,918, 5,943,655, 5,905,810, 5,564,974, and 4,543,969, and U.S. Patent Application Publication Nos. 2013/0205723 A1, 2007/0119681 A1 and 2004/0256197 A1, and U.S. patent application Ser. No. 14/752,474 are incorporated herein by reference in their respective entireties and for all purposes.

Turning next to FIG. **8**, there are shown select components of a coin depositing and recycling unit, designated generally at **300**, for receiving processed coins from a coin sorting device, such as the disk-type coin processing unit **200** of FIGS. **6** and **7**, and distributing those coins in accordance with a predetermined coin logic procedure to one or more coin-recycling receptacles and one or more coin-depositing receptacles. As indicated above, the coin depositing and recycling unit **300** (also referred to herein as "CDR Unit") can be incorporated into any of the illustrated systems and machines, as well as accommodate any of the optional configurations and functional alternatives described herein with respect to the examples shown in FIGS. **1-7**, and thus can include any of the corresponding options and features.

The CDR Unit **300** portrayed in FIG. **8** includes a base plate **302** that is positioned underneath the disk-type coin processing unit **200**, disposed over a coin-mixing manifold **304** and coin bins **110**A and **110**B (FIGS. **4** and **5**), and supports thereon a plurality of automated coin chutes **306**. While there are four automated coin chutes **306** shown in FIG. **8**, the illustrated example can include as few as one and as many as eight (or potentially more) automated coin chutes **306** depending, for example, on the intended application and design requirements of the CDR Unit **300**. CDR Unit **300** further includes a tote drawer **308** (see FIGS. **8** and **12**), which carries a variety of handheld coin totes **310**A-**310**D, as well as an assortment of tote chutes **312**A-**312**D positioned above the totes **310**A-**310**D. Adjacent the tote drawer **308** and coin totes **310**A-**310**D is a conveyor belt assembly, designated generally as **314**, all of which are located underneath the base plate **302**. The illustrated example is shown comprising four coin totes with four corresponding chutes; nevertheless, it is within the scope and spirit of this disclosure to incorporate greater or fewer than four totes and chutes into the CDR Unit **300**. In addition, the base plate **302** is shown hidden in FIGS. **8-10** (i.e., illustrated with dashed lines) to more clearly show the components positioned underneath the base plate **302** and to more clearly convey how those components interact with the components positioned on top of the base plate **302**.

Base plate **302**, which is shown as a single-piece unitary structure, is fabricated from a rigid, generally inflexible material, such as a stamped or laser-cut sheet of stainless steel or aluminum. Typically mounted within the outer housing of a coin processing machine (e.g., housing **14** of processing machine **10**) or currency processing system (e.g., housing **134** of processing system **100** of FIG. **4**), this base plate **302** acts to provide subjacent support for various components, including the disk-type coin processing unit **200** and automated coin chutes **306**, as well as other constituent parts that are not shown in FIGS. **8** and **9**, such as a funnel-shaped coin hopper, a wiring harness, a central processor, etc. As seen in FIGS. **8-10**, an arrangement of coin ports, represented herein by eight square-shaped first coin ports **316**A (also referred to herein as "coin-recycling ports") and eight square-shaped second coin ports **316**B (also referred to herein as "coin-depositing ports"), are spaced circumferentially about the coin processing unit **200**. Each coin port **316**A, **316**B extends through the base plate **302** and is spaced a predetermined distance from the coin processing unit **200**. For instance, as seen in FIG. **8**, the coin-recycling ports **316**A are spaced a first radial distance R**1** from the center C**1** of the processing unit's rotatable disk **214**, whereas the coin-depositing ports **316**B are spaced a second radial distance R**2** from the center C**1** of the rotatable disk **214**. As shown, the first radial distance R**1** is greater than the second radial distance R**2**. It should be readily understood that the shape, location and quantity of the coin ports can be varied, singly or in any combination, from that which is shown in the drawings.

As best seen in FIGS. **9-10**, positioned underneath the base plate **302**, pressing flush against an underside surface thereof, is a coin-mixing manifold **304** that is configured to receive coins sorted by the disk-type coin processing unit **200**, recombine the sorted coins, and direct the recombined coins to one or more coin-depositing receptacles. According to the illustrated example, the coin-mixing manifold **304** is a single-piece polymeric construction comprising a plurality of individually shaped, ramped coin baffles **318**A-**318**H which coalesce to an integrally formed outlet plenum **320**. Coin inlet ports of these ramped coin baffles **318**A-**318**H are complementary to and aligned with the base plate's coin-depositing ports **316**B. By contrast, a coin outlet port **304**A of the plenum **320** is suspended above the conveyor belt assembly **314**. Coins that are received by the coin baffles **318**A-**318**H through the ports **316**B of base plate **302** are directed, under the force of gravity, to the outlet plenum **320** of the manifold **304**. Outlet plenum **320** pools together coins received from the coin baffles **318**A-**318**H, and feeds the combined coins, under the force of gravity, through a coin outlet port **304**A onto the conveyor belt assembly **314**. While shown as an integrally formed single-piece construction, the manifold **304** may comprise multiple segments that are mechanically or otherwise functionally connected. Moreover, the manifold **304** may comprise greater or fewer than eight baffles **318**A-**318**H, for example, to coincide with the number of coin-depositing ports **316**B in the base plate **302**. According to some embodiments, the coin depositing and

recycling unit (CDR Unit) **300** has only a single wheeled bin **110**A, **110**B associated therewith and coins falling through the coin outlet port **304**A are directed into such bin **110**A, **110**B and no conveyor belt assembly **314** is present.

Returning to FIG. **8**, automated coin chutes **306** are bolted on the base plate **302**, positioned to generally circumscribe the disk-type coin processing unit **200**. For illustrative purposes, one such automated coin chute **306** is shown in FIG. **9** bolt to base plate **302**. The coin processing unit **200**, in turn, is mounted on the base plate **302** concentric with a common center of the circumferential array of coin ports **316**A and **316**B. With this arrangement, a respective input passage of each automated coin chute **306** is seated against or otherwise functionally coupled to one of the exit stations of the disk-type coin processing unit **200** to receive coins therefrom. In the illustrated embodiment, the automated coin chutes **306** of FIG. **8** are substantially structurally identical; thus, for brevity and conciseness, additional features of these coin chutes **306** will be described with respect to the automated coin chute **306** presented in FIGS. **11**A and **11**B. Automated coin chute **306** includes a polymeric, bipartite chute housing **322** that defines therein an input passage **324** which forks to a pair of (coin-recycling and coin-depositing) output passages **326** and **328**, respectively. The chute housing **322** is provided with a pair of mounting tabs **330** and **332** through which are received bolts or other mechanical fasteners (not shown) for mounting the automated coin chute **306** onto the base plate **302**. A base flange **334**, which extends continuously about the lower periphery of the chute housing **322** around the output passages **326** and **328**, provides lateral stability for the chute **306** during operation thereof. According to the illustrated example, the mouth **325** of the input passage **324** is designed to seat generally flush against the outer periphery of the sorting head **212**, whereas the exit peripheries **327** and **329** of the output passages **326** and **328**, respectively, are each designed to seat flush against the base plate **302** and circumscribe one of the coin ports **316**A, **316**B. It is contemplated that the automated coin chute **306** may comprise any number of input passages, output passages, and mechanized diverter plates such that coins can be received from one or multiple exit stations and/or diverted to one or multiple sets of coin ports.

Each coin chute **306** is selectively operable to direct coins received from the coin processing unit **200** to one of the coin-recycling ports **316**A or, when desired, to one of the coin-depositing ports **316**B. As shown, the automated coin chute **306** includes a curved diverter plate **336** that can selectively transition between a first position, shown at **336**A in FIG. **11**A, and a second position, designated hidden at **336**B in FIG. **11**A. This movable diverter plate **336** is rotatably mounted on a diverter shaft **338**, both of which are located inside of the chute housing **322** intermediate the output passages **326** and **328**. A driving mechanism, which may be in the nature of a 24-volt DC electric motor and gear train assembly **340**, is connected to the diverter shaft **338** and is selectively actuable to shift the diverter plate **336** back-and-forth between the first and second positions. When in the first position **336**A, coins received from one of the exit stations **281**-**288** in the sorting head **212** of the coin processing unit **200** by the input passage **324** are redirected by the diverter plate **336** through coin-recycling output **326** to one of the coin-recycling output passages **316**A to a coin-recycling receptacle. Conversely, when in the second position, coins that are received by the input passage **324** from an exit station are redirected by the diverter plate **336** through coin-dispending output **328** to one of the coin-depositing output passages **316**B to a coin-depositing receptacle.

As indicated above, CDR Unit **300** is designed to selectively sort processed coins received from a coin processing device into one or more coin-recycling receptacles, such as handheld coin totes **310**A-**310**D of FIGS. **8** and **12** (and/or **410**, **410**A-**410**D of FIGS. **14**, **18**A-**18**B and **2010**A-**2010**D of FIGS. **20**A-**20**D, **2110**A-**2110**D of FIGS. **21**A and **22**A-**23**B), and one or more coin-depositing receptacles, such as wheeled coin bins **110**A and **110**B of FIGS. **4** and **5**. It may be desirable, for at least some configurations, that all of the automated coin chutes **306** be operable to divert coins into the same coin-depositing receptacle(s), whereas select coin chutes **306** are each dedicated to diverting coins to a single one of the coin-recycling receptacles. By way of non-limiting example, a first of the automated coin chutes **306** (e.g., the coin chute **306** at the 8-o-clock position in FIG. **8**) receives dimes from one of the exit stations **281** of the sorting head **212**, and diverts a select number of said dimes (e.g., approximately 3000 coins) through a corresponding coin port **316**A in the base plate **302**, which are then passed via tote chute **312**D into one of the coin totes **310**D. Once a threshold or limit number of dimes (e.g., approximately 3000 coins) is reached, the diverter plate **336** is repositioned, e.g., via a system processor or CPU sending a signal to the appropriate motor **340** to activate the motor to change the position of the corresponding diverter plate **336** from a first coin-recycling position **336**A to a second coin-depositing position **336**B, such that the first coin chute **306** diverts the remainder of processed dimes through a corresponding coin port **316**B in the base plate **302** to the conveyor assembly **314** via coin-mixing manifold **304** for distribution to one or both of the coin bins **110**A, **110**B. In the same vein, a second of the automated coin chutes **306** (e.g., the coin chute **306** at the 9-o-clock position in FIG. **8**) receives pennies from one of the exit stations **282** of the sorting head **212**, and diverts a select number of said pennies (e.g., approximately 2500 coins) into one of the coin totes **310**C via tote chute **312**C. And once that select or threshold number of pennies is reached, the second coin chute **306** diverts the remainder of processed pennies to the coin-mixing manifold **304** for distribution to one or both of the coin bins **110**A, **110**B, for example, by a system processor or CPU sending a signal to the appropriate motor **340** to activate the motor to change the position of the corresponding diverter plate **336** from a first coin-recycling position **336**A to a second coin-depositing position **336**B. Third and fourth automated coin chutes **306** can be similarly configured and operated for filling the other two coin totes **310**A and **310**B with selected numbers of quarters and nickels, respectively, with the remainder being diverted to one or both coin bins **110**A, **110**B. One or more coin chutes can be employed for diverting coins and other objects (e.g., slugs and extraneous refuse) to coin bags, coin cassettes, reject bins, return slots, etc.

For enhanced security and ease of use, the four handheld coin totes **310**A-**310**B can be removably seated in a lockable tote drawer **308**, which is movably mounted inside, yet at least partially retractable from the coin processing machine/system's housing. Tote drawer **308** of FIGS. **8** and **12**, for example, can be manually or automatically slid back-and-forth, e.g., on a roller-and-rail track system **342**, between a stowed position, as shown in FIG. **8**, and an extracted position when the tote drawer **308** is slide in the direction indicated by arrow A**1**. When in the stowed position, the tote drawer **308** is disposed substantially or entirely inside the housing. An optional locking mechanism (not shown) can

secure the drawer **308** inside the housing. Conversely, when in the extracted position, the tote drawer **308** is disposed at least partially outside the housing such that the coin totes **310**A-**310**D can be readily unseated form the drawer **308** and removed from the housing. An optional drawer handle (not shown) can be provided to facilitate manually sliding the drawer in and out of the housing. The tote drawer **308** includes a base **344** with a plurality of tote compartments **346**, which are portrayed in FIG. **12** as rectangular apertures, for properly orienting and securing in place the totes **310**A-D.

In at least some system configurations, the handheld coin totes **310**A-**310**D of FIGS. **8** and **12** are substantially structurally similar; thus, for brevity and conciseness, common features of these coin totes **310**A-**310**D will be described with respect to the handheld coin tote **310** presented in FIG. **12**A. The coin tote **310** of FIG. **12**A includes a rigid polymeric body **350** with a generally polyhedral shape and integrally formed bottom and top portions **352** and **354**, respectively. To securely seat the coin tote **310** in the tote drawer **308**, each tote compartment **346** of the drawer **308** is shaped and sized to complement and receive therein the rectangular base portion **352** of one of the coin totes **310**. The rectangular top portion **354** of the tote body **350**, on the other hand, is slightly wider than the base portion **352** such that the outwardly projecting ends of the top portion **354** rests on top of the tote drawer **308** when the coin tote base portion **352** is passed into the compartment **346**. It is desirable, for at least some embodiments, that a "handheld" coin tote, as disclosed hereinabove and hereinbelow, weighs less than one pound (e.g., when empty) to approximately twenty or fewer pounds (e.g., when full), and be shaped and sized to be comfortably held in the hand or hands of one teenage or adult human. It is envisioned that the coin tote **310** take on alternative shapes and sizes from that which are shown in the drawings. It should be further recognized that the coin totes **310**A-**310**D need not be structurally identical but could vary, for example, in size, shape, color and configuration from one tote to the next.

With continuing reference to FIG. **12**A, a top wall of the top portion **354** of the tote body **350** defines therethrough a coin hole **356** which is covered by a slidable tote lid **358**. When the base portion **352** of the coin totes **310** is properly situated in one of the tote compartments **346**, and the tote drawer **308** is slid to the stowed position **308**A (FIG. **8**) inside of the housing, a triangular biasing feature **360** projecting upwardly from the tote lid **358** engages a corresponding tab (not visible in the views provided) that projects downward, for example, from the base plate **302** of CDR Unit **300**. As these two features engage, the biasing feature **360** is urged in an opening direction D**1** which, in turn, operates to open the tote lid **358** such that coins can be passed from one of the tote chutes **312**A-**312**D through the coin hole **356** into the tote body **350**. According to some embodiments, when the tote drawer **308** is slid to the extracted position **308**B (FIG. **8**) outside of the housing, the triangular biasing feature **360** disengages the tab and, concomitantly, the tote lid **358** is closed, for example, by an internally mounted spring-biased closing feature (not shown). Optional features for the handheld coin totes **310** can include color coding and/or labels that help to identify which handheld coin tote is associated with which particular denomination of coin.

When the coin totes **310**A-**310**D are in one or more predetermined positions, information about the location and/or condition of the totes can be communicated (such as via wired or wireless communication) to a CPU **348** and/or other controller of the CDR Unit **300**. For example, such information may be communicated to a communication interface of a controller of the coin processing system/machine. As used herein, "wirelessly communicate" is inclusive of, but not exclusive to, the transmission of information signals between two devices without the use of connecting hardline or wired couplings between the two devices. By way of example, and not limitation, the CDR Unit **300** utilizes a number of electrically conductive interfaces for detecting and/or communicating information about or between one or more or all of the coin totes **310**A-**310**D and a controller and/or CPU **348** of a coin processing system/machine (e.g., FIGS. **1**-**4**). For instance, the coin tote **310** is shown in FIG. **12**A including at least one and, in some embodiments, a plurality of electrical contacts, which may comprise a contact junction **362** with first, second and third electrical contact **363**-**365**. The first electrical contact **363** (FIG. **12**A) can be configured to cooperate with a complementary electrical contact on a contact pad **366** (FIG. **8**) of the CPU **348** to thereby communicate to a system controller a signal indicative of a presence (or absence) of the coin tote **310** in the tote drawer **308**. Moreover, the second electrical contact **364** can be configured to cooperate with a complementary electrical contact on the contact pad **366** of the CPU **348** to thereby communicate to the system controller a signal indicating that the coin tote **310** in the drawer **308** is full (or not full). The third electrical contact **365**, on the other hand, is configured to cooperate with a complementary electrical contact on the contact pad **366** of the CPU **348** to thereby communicate to the system controller a signal indicating that the coin tote **310** in the drawer **308** is empty (or not empty). When respective contacts **363**-**365** physically contact respective portions of contact pad **366**, one or more electrical circuits are completed and the completion of such circuits is sensed by CPU **348**. According to some embodiments, the CPU **348** also acts as a system controller and no separate system controller is needed. For at least some configurations, the coin processing unit **200** can be rendered inoperable if the tote drawer **308** is not in the proper position and/or if a tote security door is not properly closed with at least one coin tote or all four coin totes being present with sufficient storage volume to receive coins. In this regard, the system can be provided with a sensor which detects the position of the door (e.g., door open, door closed, door locked, etc.). Notably, the system can be provided with greater or fewer or alternative sensors than those described above. For instance, the system can be provided with an electrostatic discharge (ESD) sensor and, optionally, an ESD dissipation mechanism. Moreover, the system can be provided with sensors which monitor coin overflow in one or more or all of the coin totes. This overflow sensor can be further operable to render the coin processing unit **200** inoperable if any one of the coin totes is determined to be in an overflow condition. In this regard, one or more of the sensors can be replaced with a single sensing mechanism.

As indicated above, coins redirected by the automated coin chutes **306** through the coin ports **316**B of the base plate **302** are deposited by the coin-mixing manifold **304** onto a conveyor belt assembly **314** for transport to coin-depositing receptacles, such as first and second coin bins **110**A, **110**B disposed inside the housing **134** (FIG. **4**). As seen in FIG. **8**, the conveyor belt assembly **314** is disposed underneath the base plate **302**, e.g., mounted to the brackets **142**A and **142**B, positioned downstream from the coin processing unit **200** and automated coin chutes **306** and upstream from the coin bins **110**A, **110**B. The conveyor belt assembly **314** may be operable as a one-way transport system or a bidirectional

transport system. According to the example illustrated in FIGS. **12** and **13**, the conveyor belt assembly **314** comprises an elastomeric, continuous conveyor belt **368** which functions to transport articles placed upon its visible surface. Conveyor belt **368** rides on an idler roller **370** and is driven by a driven roller **372**. A driven shaft **373** of the driven roller **372** can be driven by various suitable means, including a two-way brushless DC electric motor assembly **374**. Lateral track rails **376**, **378** help to ensure coins deposited on top of the belt **368** do not accidentally fall off of the conveyor belt assembly **314**. The conveyor belt assembly **314** can be configured to selectively operate in a first belt direction BD**1**, whereby coins received from the automated coin chutes **306** are delivered to a first coin bin, e.g., **110**A of FIG. **4**. For at least some configurations, the conveyor belt assembly **314** is also configured to selectively operate in a second belt direction BD**2**, whereby coins received from the automated coin chutes **306** are delivered to the second coin bin, e.g., **110**B of FIG. **4**. In other optional configurations, such as those which employ a single bin, the conveyor assembly can run in a single direction or, optionally, could be removed in its entirety from the system.

Turning next to FIG. **14**, there is shown a representative coin-recycling system, designated generally at **400**, for processing coins stowed in handheld coin totes, and sorting the processed coins into single-denomination handheld coin containers. The coin-recycling system **400** has two primary sections: a coin-recycling dispenser assembly **402** that is operatively connected to a coin-recycling till assembly **404**. A dispenser assembly housing **416** securely houses various input devices, output devices, input/output devices, internal electronic/electromechanical components, wiring, etc. By way of example, the output device(s) includes an electronic display device **406** that is operatively mounted to the dispenser assembly housing **416** and configured to display information and user-selectable options to a user of the coin-recycling system **400**. The coin-recycling dispenser assembly **402** can also be provided with one or more electronic user input devices, such as a touchscreen **408** on the display device **406**, for receiving user selections to control one or more operations of the coin-recycling system **400**. A resident (or remotely located) processor or central processing unit (CPU) **448** is communicatively coupled to the electronic display device **406** and user input device **408**. Only select components of the coin-recycling system **400** have been shown and will be described in detail herein. It should be understood, however, that numerous other peripheral devices and other elements exist and are readily utilizable in any number of combinations to create various forms of a coin-recycling system in accord with the present concepts.

As will be described in further detail below, the coin-recycling dispenser assembly **402** is capable of dispensing coins—one coin at a time—from each of plural handheld coin totes **410** into an assemblage of single-denomination coin cylinders **412** stowed inside the coin till assembly **404**. According to some embodiments, the coin cylinders **412** are sized to hold three to four times the number of coins as traditional coin rolls, for example, they may be sized to hold 120-200 coins stacked therein. According to some embodiments, filled coin cylinders **412** may be removed and used in other devices such as coin dispensers and the removed coin cylinders **412** may be replaced with empty coin cylinders **412** so the device **400** may resume operating. It is desirable, for at least some configurations, that the dispenser assembly **402** dispense coins at about 300 to about 500 coins per minute or, in some embodiments approximately 400 coins per minute. According to at least some configurations, coin-recycling system **400** monitors the number and/or denomination of handheld coin totes **410** docked in the coin-recycling dispenser assembly **402**, as well as whether there are coins remaining in any of the docked coin totes. For at least some configurations, the coin-recycling system **400** is capable of tracking the number of coins dispensed from a particular coin tote **410** and, optionally, is operable to provide a total number of dispensed coins and/or a total value of dispensed coins for a particular set of coin totes **410** emptied into the coin till **404**. For at least some configurations, the dispenser assembly **402** is selectively and/or automatically operable to clear coin jams during emptying of a coin tote. Some implementations provide simplified disassembly or physical manipulation of key sections of the coin-recycling system **400** to allow for manual clearing of a jam condition.

According to the illustrated example, the coin-recycling dispenser assembly **402** is capable of docking four handheld coin totes **410**, for example, a first (penny (**10**)) coin tote **410**A, a second (nickel (**50**)) coin tote **410**B, a third (dime (**100**)) coin tote **410**C, and a fourth (quarter (**250**)) coin tote **410**D. A series of tote docks or drums **414** secure these four coin totes **410**A-**410**D to the dispenser assembly **402** for recycling of coins. As shown, the set of tote docks **414** includes a first (penny) dock **414**A, a second (nickel) dock **414**B, a third (dime) dock **414**C, and a fourth (quarter) dock **414**D. It is envisioned that the coin-recycling dispenser assembly **402** comprise greater or fewer than four tote docks **414** to accommodate greater or fewer than four coin totes **410**, which may comprise any combination of coin denominations of any known currency or substitute currency. Some optional features for the dispenser assembly **402** include denomination labels and color coding for the tote docks **414** to ensure correct matching with the coin totes **410** of the corresponding denomination. By way of example, the first (penny (**10**)) coin tote **410**A may have a blue color and/or a label with a visual indication of the denomination of coin stowed in the tote; the first (penny) dock **414**A can take on the same/similar color and/or label to indicate the denomination processed at that dock. In the same vein, the tote docks **414** and coin totes **410** can be configured with complementary structural features to ensure that only totes of the corresponding denomination can be securely seated within a particular tote dock. In a similar regard, the tote docks **414** and coin totes **410** can be configured with complementary structural features to ensure that an apposite coin tote cannot be inserted incorrectly into a particular tote dock.

With continuing reference to FIG. **14**, the coin-recycling dispenser assembly **402** includes a rigid housing **416** which provides subjacent support for a series of tote docking stations or cradles **418**, namely first, second, third and fourth tote docking stations **418**A-**418**D that coincide in number with the four tote docks **414**A-**414**D. In accordance with the illustrated example, the tote docking stations **418**A-**418**D of FIG. **14** are substantially structurally identical; thus, for brevity and conciseness, additional features of these docking stations **418**A-**418**D will be described with respect to the tote docking stations **418** presented in FIG. **17**. In a similar regard, the illustrated tote docks **414**A-**414**D of FIG. **14** are generally structurally identical; thus, for brevity and conciseness, common features of these tote docks **414**A-**414**D will be described with respect to the tote dock **414** presented in FIGS. **15**A, **15**B and **16**. Notably, there may be structural differences between the tote docks **414**A-**414**D, for example, to ensure that only certain coin totes dedicated to a particular

coin denomination can be seated in a given dock, as indicated in the preceding paragraph. Likewise, there may be structural distinctions between the tote docking stations **418**A-**418**D, for example, to accommodate applications where the coin totes may have different sizes and/or gross weights and, thus, require larger docks and/or larger driving mechanisms.

Tote docking station or cradle **418** of FIG. **17** generally functions to mount one of the tote docks or drums **414** to the housing **416** and to regulate movement of the tote dock **414** during operation of the coin-recycling system **400**. To provide said functionality, each docking station **418** is configured with a drive mechanism, which effectuates controlled movement of the tote dock **414**, and a guide mechanism, for stabilizing movement of the tote dock **414**. For instance, the guide mechanism of the tote docking station **418** of FIG. **17** includes an arcuate guide track **420** with a pair of laterally spaced barrier rails **422**A and **422**B on opposing sides of the track **420**. The tote docking station **418** is also provided with two pairs of retention tabs, namely a first pair of retention tabs **426**A secured (e.g., via bolts **427**A) at opposing ends of the first barrier rail **422**B, and a second pair of retention tabs **426**B secured (e.g., via bolts **427**B) at opposing ends of the second barrier rail **422**A. To operatively interface with the docking station's guide mechanism, the tote dock **414** of FIGS. **15**A and **15**B includes first and second arcuate guide channels **424**A and **424**B, respectively, on opposing sides of an arcuate sliding surface **429** of a drum-shaped dock body **428**. Each guide channel **424**A, **424**B has a respective flange **425**A and **425**B projecting laterally outward from the drum-shaped dock body **428**. The guide channels **424**A, **424**B and flanges **425**A, **425**B can be seen in FIGS. **15**A and **15**B extending along the outer circumference of the drum-shaped dock body **428**.

When the tote dock **414** is properly seated on top of the tote docking station **418**, arcuate sliding surface **429** lies generally flush against the complementary arcuate guide track **420**. Concomitantly, inboard surfaces of the laterally spaced barrier rails **422**A, **422**B press against outwardly facing surfaces of the flanges **425**A, **425**B. Retention tabs **426**A contemporaneously slidably press against an inner diameter (ID) surface of the first flange **425**A, while retention tabs **426**B slidably press against an ID surface of the second flange **425**B. In so doing, the guide track **420**, barrier rails **422**A, **422**B and retentions tabs **426**A, **426**B prevent radial and transverse rectilinear (i.e., non-rotational) movement of the tote dock **414** while still allowing for selective rotation of the drum-shaped dock body **428** and any contents thereof around central axis A**1** (FIG. **14**).

As indicated above, the tote docks **414** are rotatably coupled to the tote docking stations **418** such that coin totes **410** seated in the docks **414** can be sufficiently rotated (e.g., turned upside down) to empty their contents into the coin till assembly **404**. The coin totes **410** are seated in the docks **414** with the lids **468** in the open position so that when the docks are rotated coins may fall out of the coin totes **410** through the coin holes **465** in each tote **410**. The tote docking station **418** is portrayed in FIG. **17** with a drive mechanism that is selectively actuable to rotate at least one of the tote docks **414**. Said drive mechanism may be in the nature of a motor-driven gear assembly, designated generally at **430**, which comprises a spur gear **432** that is driven by a two-way 24-volt DC electric motor **434**. The motor-driven gear assembly **430** is mounted inside the tote docking station **418** underneath the guide track **420**, e.g., via a bracket **436** and bolts **437**, such that several of the teeth of the spur gear **432** project through a slot **421** in the track **420**. To operatively interface with the docking station's drive mechanism, the tote dock **414** includes a toothed track **438** (FIG. **15**A) that extends along the outer circumference of the drum-shaped body **428** adjacent the first arcuate guide channel **424**A. This toothed track **438** has teeth that interleave with the teeth of the spur gear **432** of the motor-driven gear assembly **430**. Through this engagement, the motor-driven gear assembly **430** can be activated in a first direction (e.g., counterclockwise in FIG. **14**) to rotate the tote dock **414** from a loading position, whereat the coin tote **410** can be inserted into or removed from the tote dock **414**, to a dispensing position, whereat the coins stowed inside the coin tote **414** are dispensed, one at a time, through the tote docking station **418** into one of the coin containers **412**A-D. The tote docking station **418** includes a coin slot **423** that transmits coins, one at a time, from the tote **410** and tote dock **414**, through the docking station **418**, and into one of the coin containers **412** in the coin-recycling till assembly **404**. After the tote **410** is emptied or to remedy a coin-jam condition, the motor-driven gear assembly **430** can be activated in a second direction (e.g., clockwise in FIG. **14**) to rotate the tote dock **414** from the dispensing position back to the loading position or stopping at any location therebetween.

The retentions tabs **426**A, **426**B can also act as a rotation limiting/stopping mechanism. In the illustrated example, each of the tote docks **414** includes a first pair of stopping shoulders **431**A (FIG. **15**A), with one located at each end of the first guide channel **424**A, and a second pair of stopping shoulders **431**B (FIG. **15**B), with one located at each end of the second guide channel **424**B. During rotation of the tote dock **414** in a first direction (e.g., clockwise in FIG. **14**), the stopping shoulders **431**A and **431**B at the top of the tote dock **414** (e.g., in FIG. **15**A) will abut the rotation stop (e.g., the retentions tabs **426**A, **426**B to the right in FIG. **17**) at a predetermined rotational distance and thereby limit rotation of the tote dock in the first direction. Conversely, when the tote dock **414** is rotated in a second direction (e.g., counterclockwise in FIG. **14**) the stopping shoulders **431**A and **431**B at the bottom of the tote dock **414** (e.g., in FIG. **15**A) will abut the rotation stop (e.g., the retentions tabs **426**A, **426**B to the left in FIG. **17**) at a predetermined rotational distance and thereby limit rotation of the tote dock in the second direction. Rotation of the tote docks **414** can also/alternatively be regulated through modulation of a corresponding drive mechanism **430**. While the tote docks **414**A-**414**D may be driven independently by separate motors **434** according to some embodiments, according to some embodiments, in single motor may be used to drive all tote docks **414**A-**414**D simultaneously.

Referring again to FIGS. **15**A and **15**B, the drum-shaped dock body **428** of the tote dock **414** includes a tote pocket **440** that is shaped and sized to slidably receive therein one of the coin totes **410**. Lateral guide walls **444**A and **444**B of the tote pocket **440** help to direct the coin tote **410** as it is being inserted into or retracted from the tote dock **414**. For at least some embodiments, this tote pocket **440** is provided with a contoured inside surface **441** with one or more geometric features, such as a distinctly shaped shelf **443**. This shelf **443** will seat thereon a corresponding overhang **463** of the coin tote **410** such that the contoured inside surface **441** will lie flush against a complementary contoured wall **462** of the tote's rigid polymeric body **460** (FIGS. **18**A and **18**B). The mating of these structural features helps to ensure the proper orientation of the coin tote **410** when inserted into the tote pocket **440** as the contoured wall **441** and shelf **443** will prevent the coin tote **410** from being seated completely inside the tote dock **414** unless it is

properly oriented (e.g., with the topside facing up and the coin hole **465** (FIG. **18**B) being presented with the leading end). Likewise, the contoured surface **441** and/or shelf **443** of the tote dock **414** can be distinctly shaped and/or sized to only mate with those coin totes of a particular denomination that have a contoured wall **463** and overhang **463** sized and shaped to mate with that tote dock **414**. A spring loaded latch mechanism **446** on the floor of the tote pocket **440** will engage a corresponding slot in the base of the coin tote **410** when the tote is properly oriented and completely seated inside the tote dock **414**.

With reference to FIG. **16**, each tote dock **414** is outfitted with an automated coin disk assembly or HIMECS dispenser **450** that is selectively actuable to separates coins received from a docked coin tote **410** through coin hole **465** such that coins are transmitted, one at a time, from the coin tote **410** out of a coin channel **451** in the tote dock **414** (not shown in FIGS. **15**A and **15**B but is visible in FIG. **15**C) to the coin slot **423** of a tote docking station **418**. Automated coin disk assembly **450** includes a coin rotor **452** that is rotatably mounted to a disk motor **454** via a bezel **456**. The disk motor **454** and, thus, the coin rotor **452** are mounted to a roof deck **433** of the drum-shaped tote dock body **428**. The coin rotor **452** has plural disc-shaped openings **453** that receive therein coins from a docketed coin tote **410**. When the tote dock **414** is inverted (e.g., as seen in FIG. **15**B) through operation of the docking station **418**, the disk motor **454** is selectively actuable to rotate the coin rotor **452**. Spinning the coin rotor **452** operates to sequentially pull coins from a docked coin tote **410** that has been inverted, and transmit coins, on a piecemeal basis, to through the slot **423**.

According to some embodiments, the tote docking station **418** includes an array electrical contacts **458** that electrically couples with first and second electrical contact pads **470** and **472** when the tote dock **414** is rotated to first and second predetermined dock orientations, respectively. For instance, rotation of the tote dock **414** to a first predetermined orientation (e.g., as seen in FIG. **15**B) mates the first electrical contact pad **470** with the array of electrical contacts **458**, which operates to selectively actuate the disk motor **454** of the coin disk assembly **450**. Rotation of the tote dock **414** to a second predetermined orientation (e.g., as seen in FIG. **15**A), on the other hand, mates the second electrical contact pad **472** with the array of electrical contacts **458** such that coin data is transferrable from a coin sensor. This coin data may include, for example: (1) the presence/absence/type of a coin tote docked in the tote dock **414**; (2) the presence/absence of coins in a coin tote docked in the tote dock **414**; (3) a tote full condition of a coin tote docked in the tote dock **414**.

FIG. **15**C is a bottom perspective view of an alternative embodiment of a tote dock or drum **414'** similar in operation and construction to tote dock **414** described above. FIG. **16**A is a bottom perspective view of an alternative embodiment of automated coin disk assembly or HIMECS dispenser **450'** similar in operation and construction to automated coin disk assembly or HIMECS dispenser **450** described above. FIG. **17**A is a perspective view of an alternative embodiment of tote docking station or cradle **418'** similar in operation and construction to tote docking station or cradle **418** described above. Only the differences from tote dock **414**, automated coin disk assembly or HIMECS dispenser **450**, and docking station or cradle **418** will be described. The tote docking station **418'** has an infrared (IR) transmitter **480** that generates and projects an infrared (IR) beam generally upward as view in FIG. **17**A. Adjacent to the IR transmitter **480** is an infrared (IR) detector **481**. The array of five electrical contacts **458** of tote docking station **418** in FIG. **17** is replaced with an array of two electrical contacts **458'** in tote docking station **418'**. The tote dock **414'** an aperture **492** to allow infrared beam generated by IR transmitter **480** and reflected to IR detector **481** to pass there through. Electrical contact pad **470** of tote dock **414** is replaced with an electrical contact pad **470"** on tote dock **414'**. Turning to FIG. **16**C, automated coin disk assembly **450'** has a coin counting assembly **497** comprises a reflective surface **493** mounted on an arm **494** of a base **495** which pivots about axis **496**.

In operation, when the tote dock **414'** is rotated into a coin dispensing position (as is FIG. **15**B), the IR beam proceeds from the IR transmitter **480** and through the hole or aperture **492** in the tote dock **414'**. When the arm **494** is an outward extending position (as shown in FIG. **16**A), the IR beam strikes the reflective surface **493** and is reflected back through the aperture **492** and is detected by IR detector **481**. When the arm **494** and the reflective surface **493** are positioned inboard of a side wall **498** of the disk motor **454**, the IR beam is not reflected back to the IR detector **481**. A processor controls the coin counting assembly **497** so that it rotates to an inward extending position every time a coin is passed through the slot **423** such that the arm **494** and the reflective surface **493** are positioned inboard of a side wall **498** of the disk motor **454**; but otherwise, rotates it to the outward extending position. The rotation and position of the coin counting assembly **497** is controlled by a motor coupled to base **495**. Accordingly, the IR detector **481** can count every time a coin is dispensed through slot **423** by detecting each time it does not detect the IR beam when the tote dock **414'** is in the dispensing position.

Turning back to FIG. **14**, the coin till assembly **404** includes a rigid outer till housing **474** with a plurality of coin funnels **476**A-**476**D stowed inside the till housing **474**. Shown hanging from the top of the till housing **474**, each coin funnel **476**A-**476**D has removably mounted at a narrow bottom end thereof one of the coin cylinders **412**A-**412**D, respectively. A row of coin chutes **478**A-**478**D functionally and mechanically attaches the till housing **474** to the dispenser assembly housing **416**. Each coin chute **478**A-**478**D receives coins from a respective coin tote **410**A-**410**D that are transmitted through a respective tote dock **414**A-**414**D and docking station **418**A-**418**D, and direct those coins, under the force of gravity, into one of the coin containers **412**A-**412**D through one of the coin funnels **478**A-**478**D.

For at least some configurations, the handheld coin totes **410**A-**410**D of FIG. **14** are substantially structurally similar; thus, for brevity and conciseness, common features of these coin totes **410**A-**410**D will be described with respect to the handheld coin tote **410** presented in FIGS. **18**A and **18**B. Along the same lines, the handheld coin tote **410** presented in FIGS. **18**A and **18**B can share features and options with the handheld coin tote **310** discussed above with respect to FIG. **12**A, and vice versa. Coin tote **410** of FIGS. **18**A and **18**B, for example, includes a rigid polymeric body **460** with integrally formed bottom and top portions **464** and **466**, respectively. Similar to the tote **310**, handheld coin tote **410** can be shaped and sized to securely seat in the tote drawer **308** presented in FIGS. **8** and **12**. In addition, a top wall of the top portion **466** of the tote body **460** defines therethrough a coin hole **465** which is covered by a tote lid **468** that is hinged to the tote body **460**. The coin tote **410** may also have a rigid bar **2088** extending from one side of the tote to the other below the opening **465**. This bar will be described more below in connection with FIG. **20**D.

The coin totes **410**A-**410**D can be configured to stow a predetermined quantity of a selected coin denomination. By way of non-limiting example, first (penny) tote **410**A can be sized to hold approximately 2400-2500 coins (about 50 rolls of pennies); second (nickel) coin tote **410**B can be sized to hold approximately 1500-1600 coins (about 37-40 rolls of nickels); third (dime) coin tote **410**C can be sized to hold approximately 2500-3000 coins (about 50-60 rolls of dimes); and fourth (quarter) coin tote **410**D can be sized to hold approximately 1100-1200 coins (about 30 rolls of quarters). As indicated above, each tote **410** is individually removable from and insertable into the tote drawer **308** and the coin-recycling dispenser assembly **402**. It is desirable, for at least some applications, that the coin tote **410** be configured to inserted and removed at any time, whether full, partially full, or empty. As shown, the tote body **460** is ergonomic, robust and easy to carrying. The tote lid **468** can be locked, for example, with a security tie wrap. For at least some embodiments, the coin tote **410** must withstand drops from at least approximately 4 ft high without fracturing or loosing coins. For at least some embodiments, the coin tote **410**, when fill, is not to exceed approximately 20 pounds or, for some embodiments, not to exceed approximately 17 pounds or, for some embodiments, weighs about 14-16.5 lbs. The total envelope dimensions for at least some configurations is about 4.5 inches by about 8 inches by about 5⅜ inches.

FIGS. **19**A and **19**B show a coin bag **500** for storing a plurality of coins. The coin bag includes an at least partially transparent and flexible polymeric body **502** with a first (top) end having an opening **504** configured to receive therethrough plural coins, and a seal **506** for securing close the opening in the first end. A second end of the coin bag body **502** has a frangible portion **508** that can be manually opened such that coins can be emptied from the coin bag **500** through the opened frangible portion **508**. Utilizing this specially designed coin bag **500**, obstacles are removed for retailers and other businesses needing prepackaged coin. The bag **500** is designed for uniformity, visibility, durability, validity, is also tamper evident, easy to open and low cost. The coin bag **500** shape and size can be the same for all denominations. Coins are visible through the transparent/partially transparent body **502** and, thus, it is easier to verify the contents and denomination of the bag **500**. Strong polymeric body **502** is durable to withstand drop tests. The coin bag **500** is also provided with tamper indicators to show signs of tampering and reduce likelihood of theft. The coin bag **500** is relatively inexpensive (e.g., lower cost than paper rolls). The coin bag **500** eliminates the need for special automated coin wrapping machines to create coin rolls in a format that is acceptable to the retailer. According to some embodiments, coin cylinders **412**A-**412**D of FIG. **14** can be removed and replaced with coin bags **500**. One such coin bag **500** is illustrated in FIG. **14** coupled to coin funnel **476**E such as by a bag clamp. According to some embodiments, coin cylinders **412**A-**412**D of FIG. **14** can be removed and replaced with coin wrappers such as paper coin wrappers. Coins are dispensed into and stacked in the coin wrappers.

Turning to FIGS. **20**A and **20**B, four coin totes **2010**A-**2010**D are positioned in a tote drawer **2008**. Each of the coin totes **2010**A-**2010**D are similar to coin totes **310**A-**310**D and coin totes **410**A-**410**D described above and have a tote body **2050** having an upper portion **2054**. Similarly, tote drawer **2008** is similar to tote drawer **308** described above. Each coin tote **2010**A-**2010**D has a coin hole **2065** and a tote lid **2068**. Each coin tote **2010**A-**2010**D has a plurality of openings or infrared transparent regions **2040**A-**2040**D located in top portions **2054** of the tote body **2050** near the coin hole **2065** (note only one opening **2040** in visible in each tote **2010**). When the coin totes **2010**A-**2010**D are positioned in the tote drawer **2008**, the openings or infrared transparent regions **2040**A-**2040**D are lined up along a common axis **2090**.

When the tote drawer **2008** is positioned in an operable position such as the position **308**A of tote drawer **308** in the coin depositing and recycling unit (CDR Unit) **300** of FIG. **8**, an infrared source **2020** is positioned adjacent to an opening **2040**A in a first coin tote **2010**A and an infrared receiver or sensor **2030** is positioned adjacent to an opening **2040**D in a fourth coin tote **2010**D. When all tote lids **2068** are in the open position, an infrared light beam travels from the infrared source **2020** along the common axis **2090** and is sensed by infrared sensor **2030**.

Each tote lids **2068** has an infrared opaque flange **2068**X. When a tote lid **2068** is positioned in its closed position (as seen in FIG. **20**B for coin tote **2010**D), the infrared opaque flange **2068**X is positioned so as to traverse and block the common axis **2090** and the infrared beam emitting from the infrared light source **2020**. Similarly, if enough coins are received in a coin tote **2010**A-**2010**D, they will be piled high enough so a coin blocks the common axis **2090** and the infrared beam emitting from the infrared light source **2020**.

Thus, according to some embodiments, whether any coin totes **2010**A-**2010**D have a lid **2068** in a closed position can be determined using a single infrared source **2020** and a single infrared sensor **2030**. Likewise, according to some embodiments, whether any coin totes **2010**A **2010**D have coins piled herein above a certain height can be determined using the same single infrared source **2020** and the same single infrared sensor **2030**. According to some embodiments, if the infrared sensor **2030** stops detecting the infrared light beam from the infrared source **2020**, a controller communicatively coupled to the infrared sensor **2030** sends a signal setting a full coin tote condition status in a memory communicatively coupled to the controller that in turn causes a controller or CPU to halt the coin sorter such as by halting the rotatable disk **214** shown in FIG. **6** in the coin processing machine **10**, **1020**, **1030** of FIGS. **1-3** or coin processing machine **100** of FIG. **4** or coin depositing and recycling unit **300** of FIG. **8**. Thus, the infrared sensor **2030** can detect a coin tote full condition by detecting when a coin tote has a pile of coins therein that a stacked so high as to interrupt of the infrared light beam, which in turn can be used to prevent coins from overfilling a coin tote **2010**A-**2010**D.

Similarly, if an attendant loads coin totes **2010**A-**2010**D onto the coin drawer **2008** and forgets to open a tote lid **2068** of any coin tote **2010**A-**2010**D, the infrared sensor **2030** will detect this condition and prevent the coin processing machine or system, or coin depositing and recycling unit from starting.

Turning to FIG. **20**C, the coin drawer **2008** of FIGS. **20**A and **20**B is shown with one coin tote **2010**D removed. The tote drawer **2008** includes a base **2044** with a plurality of coin tote compartments **2046**, which are portrayed in FIG. **20**C as generally rectangular compartments, for properly orienting and securing in place the totes **2010**A-D. Adjacent compartments **2046** are separated by compartment partitions **2046**A. A coin presence inductive coil **2082**, a tote presence inductive coil **2084** and an electrostatic discharge (ESD) bleedoff post **2086** are illustrated positioned adjacent to the base **2044** in the open compartment **2046**. According to some embodiments, each compartment (four such compartments are illustrated in FIGS. **20**A-**20**C), has a coin presence

inductive coil **2082**, a tote presence inductive coil **2084** and an electrostatic discharge (ESD) bleedoff post **2086** although these features are only visible in the open compartment illustrated in FIG. **20**C.

Each coin tote **2010**A-**2010**D has a small piece of metal (like a rivet or something similar) imbedded into or coupled to the bottom wall of the tote **2010**A-**2010**D. According to some embodiments, the small piece of metal is imbedded into or coupled to a wall of each tote **2010**A-**2010**D in a location such that when a tote **2010**A-**2010**D is seated in a coin tote compartment **2046** the metal is positioned adjacent the tote presence inductive coil **2084** of the compartment. The tote presence inductive coil **2084** in each compartment **2046** can sense if a coin tote **2010**A-**2010**D has been seated in a corresponding compartment **2046** by sensing the presence of the metal imbedded into or coupled to the bottom of a corresponding coin tote **2010**A-**2010**D. Accordingly, if an attendant forgets to place all coin totes **2010**A-**2010**D in the tote drawer **2008** in the machine, the tote presence inductive coils **2084** detect that one or more coin totes **2010**A-**2010**D are missing which in turn can be used to prevent the machine from operating. For example, when a tote presence inductive coils **2084** detect that one of coin totes **2010**A-**2010**D is missing, a missing coin tote condition status can be set in a memory and when all tote presence inductive coils **2084** detect that all coin totes **2010**A-**2010**D have been seated in the corresponding compartments **2046**, the missing coin tote condition status can be cleared in memory. If the missing coin tote condition status is set in memory, then a controller or CPU controlling the operation of the coin sorter can detect this condition and prevent the coin sorter from being restarted or if the coin sorter is running to stop its operation.

The coin presence inductive coil **2082** which may be an eddy current sensor can detect if at least one coin is present within a corresponding coin tote **2010**A-**2010**D seated in a corresponding compartment **2046** of the coin drawer **2008**. Each coin presence sensor **2082** detects coins in an adjacent coin tote **2010**A-**2010**D through the plastic body of the coin tote **2010**A-**2010**D. After a full tote condition has occurred (such as when coins within one of the coin totes **2010**A-**2010**D blocks infrared light from reaching infrared sensor **2030** and the associated coin sorter, system, machine or unit (e.g., **10**, **1020**, **1030**, **100**, **300**) halts operation, a controller coupled to the coin presence inductive coil can sense if a coin tote reinserted into the corresponding compartment **2046** is empty of coins. If so, the controller can send a signal to the system controller or CPU to automatically clear the corresponding full coin tote condition status and in some embodiments setting an empty tote condition status in a communicatively coupled memory.

The information obtainable from the infrared sensor **2030**, the coin presence inductive coils **2082**, and the tote presence inductive coils **2084** can be used to determine various conditions regarding the state of the machine. For example, if an empty coin tote is installed in one of the compartments **2046** with its lid closed, a corresponding tote presence inductive coil **2084** can detect the presence of the coin tote **2010**A-**2010**D, the corresponding coin presence inductive coil **2082** can detect that there are no coins on the coin tote **2010**A-**2010**D, but the infrared sensor **2030** will fail to detect the infrared light beam because the infrared opaque flange **2068**X of the closed lid will block the infrared light beam from reaching the infrared sensor **2030**. This combination of conditions can be used to determine that an empty container has been placed in the machine with its lid closed and a corresponding error condition status can be set in the memory. The presence of this error condition can be used to display an appropriate error condition warning to a user of the machine such as via a displayed message on a display and/or an audible warning generated using a speaker. Likewise, the presence of the error condition can be used by an associated controller or CPU to prevent the machine from being started.

Each of the ESD bleedoff posts **2086** acts a ground for static electricity present on incoming coins deposited into a corresponding coin tote **2010**A-**2010**D. Each post **2086** extends through a hole in the floor of each coin tote **2010**A-**2010**D. Each post **2086** also provides a secondary benefit of acting as an additional alignment point for installing the coin totes **2010**A-**2010**D into the compartments **2046**.

As shown in FIG. **20**D, each coin tote **2010**A-**2010**D has a metal bar **2088** spanning the interior width of each coin tote **2010**A-**2010**D. As better illustrated in FIG. **18**B, each metal bar **2088** is positioned below the coin hole **2065**, **465** of the corresponding coin tote **2010**A-**2010**D, **410**. The metal bar **2088** adds some structural integrity to each coin tote **2010**A-**2010**D, **410**. Additionally, when each coin tote **2010**A-**2010**D, **410** is inserted into a corresponding tote dock **414**A-**414**D of the coin-recycling assembly **402** of FIG. **14** and turned upside down for dispensing, the bar **2088** takes the weight of some of the coins in the coin tote **2010**A-**2010**D, and thereby takes some weight and/or pressure off of the rotating coin rotor **452** (see FIGS. **15**B and **16**) of the coin-recycling assembly **402**. By taking some weight and/or pressure off of the coin rotor **452** jamming of the dispenser near the coin rotors **452** is reduced and failure of the disk motors **454** due to overwork may also be reduced.

FIG. **20**E is a perspective view of a coin drawer **2108** similar to coin drawer **2008** but with all coin totes removed. As with coin drawer **2008**, coin drawer **2108** has two inductive sensors **2082**, **2084** and an electrostatic discharge (ESD) bleedoff post **2086** in each coin tote compartment **2046**B. The coin tote compartments **2046**B are similar to coin tote compartments **2046** discussed above. Although not illustrated in FIG. **20**E (but illustrated in FIGS. **22**A and **22**A), the coin drawer **2008** has a ninth inductive sensor **2083** located outside of the coin tote compartments **2046**, **2046**B which may be used as a calibration sensor to calibrate the inductive sensors **2082**, **2084**. According to some embodiments, the nine inductive sensors **2082**-**2084** are arranged linearly along a single printed circuit board (PCB). The inductive sensors **2082**, **2084** of coin drawer **2108** operate in the same manner as discussed above in connection with coin drawer **2008**.

FIGS. **21**A and **21**B are perspective view illustrations of selected components of a representative coin depositing and recycling unit ("CDR Unit") **2100** in accord with aspects of the present disclosure. The CDR Unit **2100** is similar to the CDR Unit **300** that discussed above such as in conjunction with FIG. **8** and similar numbering with be used for similar components. The CDR Unit **2100** portrayed in FIGS. **21**A and **21**B includes a base plate **2102** similar to base plate **302** that is positioned underneath the disk-type coin processing unit **200**, disposed over a coin-mixing manifold (not shown) similar to coin-mixing manifold **304**. Handheld coin totes **2110**A-**2110**D similar to handheld coin totes **410** (FIGS. **18**A-**18**B) are shown seated in a tote drawer **2108** similar to tote drawer **308** (see FIGS. **8** and **12**). The CDR Unit **2100** has a housing or cabinet **2190** having a door **2192**. According to some embodiments, the door **2192** may have a lock thereby permitting the door **2192** to be closed and locked so as to inhibit access inside the cabinet. Likewise, the drawer **2108** may have a lock **2108**A thereby permitting the drawer

2108 to be closed and locked so as to inhibit or prevent the drawer 2108 being retracted from its operational position shown in FIG. 21B. The drawer 2108 is shown in a retracted position in FIG. 21A whereat coin totes 2110A-2110D may be accessed by an operator and inserted and/or removed from the drawer 2108. Inside the cabinet 2190 is a coin bin storage area 2194 sized to accommodate one or more coin bins 110A, 110B (see FIGS. 4 and 5). In FIG. 21A a plate 2196 is shown which cover some of the interior components of the CDR Unit 2100. For illustration purposes, this plate 2196 has been removed in FIG. 21B. According to some embodiments, the door 2192 of the CDR Unite 2100 has an opening 2180 which is lined up with an opening 2182 of a reject coin bin 2184 when the door 2192 is in a closed position. The openings 2180 and 2182 permit an operator to reach into the reject coin bin and withdraw any coins rejected by the the diverting pin 242 of the sorting head 212 (see FIG. 7) into a coin reject tube. The CDR Unit 300 discussed above may have a similar cabinet 2190, cabinet door 2192, and tote drawer 2108 to that described in conjunction with FIGS. 21A and 21B.

FIGS. 22A and 22B illustrate a top view and a perspective view, respectively, of portions of a CDR Unit 2200 similar to CDR Units 300 and 2100 described above and similar numbering with be used for similar components. As described above, the CDR Unit 2000 further includes a tote drawer 2108, which carries a variety of handheld coin totes 2110A-2110D, as well as an assortment of tote chutes 2212A-2212D positioned above the totes 2110A-2110D. The tote chutes 2212A-2212D are the same or similar to tote chutes 312A-312D discussed above. Adjacent the tote drawer 2108 and coin totes 2110A-2110D is a conveyor belt assembly, designated generally as 2214, all of which are located underneath the base plate 2102, not shown in FIGS. 22A and 22B—see, e.g, FIGS. 21A, 21B and base plate 302 shown in FIGS. 8-10. The base plate 2102 may be the same or similar to base late 302. The illustrated example is shown comprising four coin totes with four corresponding chutes; nevertheless, it is within the scope and spirit of this disclosure to incorporate greater or fewer than four totes and chutes into the CDR Unit 2200. For example, another drawer 2108 holding an additional four coin totes 2110 may be positioned on the right side of the cabinet and receive coins through the rightmost apertures or coin ports 316A in base plate 302 (see FIGS. 8-10) via tote chutes similar to tote chutes 2212A-2212D. The conveyor belt assembly 2214 operates the same as described above in conjunction with conveyor belt assembly 314 and is configured coins received from manifold 2204 into either of two coins bins 110A, 110B positioned below the outlet plenums 2220A, 2220B of the manifold 2204. Outlet plenums 2220A, 2220B may be the same or similar to outlet plenum 320 discussed above.

FIGS. 23A-23C illustrate a top view, a perspective view, and another perspective view, respectively, of portions of a CDR Unit 2300 similar to CDR Units 300, 2100, and 2200 described above and similar numbering with be used for similar components. In generally CDR Unit 2300 is the same as CDR Unit 2200 except that the CDR Unit 2300 is configured to deliver coins from a mixed coin manifold 2204 into a single coin bin 110A via a single outlet plenum 2320. The conveyor belt assembly 2214 has been omitted in the CDR Unit 2300. A base plate 2302 which may be the same or similar to base plate 302 is illustrated in FIG. 23C. Although not shown in FIGS. 22A-22B, the same base plate 2302 may be used in conjunction with CDR Unit 2200.

Coin bins 2110A and 110B (FIGS. 4 and 5), and supports thereon a plurality of automated coin chutes 306. While there are four automated coin chutes 306 shown in FIG. 8, the illustrated example can include as few as one and as many as eight (or potentially more) automated coin chutes 306 depending, for example, on the intended application and design requirements of the CDR Unit 300.

FIG. 24 is a block diagram of selected components of a coin depositing and recycling unit ("CDR Unit") 2400 such as CDR Units 300, 2100, 2200, 2300. The CDR Unit 2400 has a processor or CPU 2448 powered by a power supply 2402 coupled thereto. The power supply 2402 is coupled to a power source 2406 such as an electrical outlet via a switch 2404. The CDR Unit 2400 illustrated has four coin totes 2010A-2010D as well as an infrared light source 2020, infrared receiver or sensor 2030 as described above. The CDR Unit 2400 illustrated also has a conveyer belt assembly 2414 such as conveyor belt assemblies 314 and 2214 described above. The conveyor belt assembly is selectively driven by a motor 2412. The position of the conveyor belt assembly is monitored by an optical sensor 2420. The motor 2412 and the optical sensor 2420 are coupled to a processor 2410 which controls the operation of the motor 2412 and receives and interprets signals from the optical sensor 2420. The processor 2410 is communicatively coupled to both the CPU 2448 and another processor 2450. The processor 2450 is coupled to the infrared light source 2020 and the infrared receiver or sensor 2030. The processor 2450 controls the IR light source 2020 and receives data signals from the IR sensor 2030 and interprets those data signals. The processor 2450 is also communicatively coupled to the CPU 2448 via a port 2449. The communications between the components can be made via hard wire and/or wirelessly. While an exemplary block diagram is provided, the exact configuration can be altered without departing from the spirit of the present disclosure. For example, the functionality of the three processors 2448, 2410, and 2450 could be combined into one or two processors or distributed to additional processors.

FIG. 25 is a block diagram of selected components of a coin-recycling system 2500 such as coin-recycling system 400. The coin-recycling system 2500 has a processor or CPU 2548 powered by a power supply 2502 coupled thereto. The power supply 2502 is coupled to a power source 2506 such as an electrical outlet via a switch 2504. The CPU 2548 is communicatively coupled to an input/output device 2520 such as a display and/or touchscreen, and may also be communicatively coupled to a printer 2522 and/or a scanner/reader 2524 such as via USB ports 2532. The coin-recycling system 2500 also comprises a plurality of tote docks or drums 414A-414D and a plurality of associated tote docking stations or cradles 418A-418D as described above. The tote docking stations 418A-418D communicatively coupled to the CPU 2548. The CPU 2548 may also have a WiFi interface for wireless communication. Each tote dock 414 comprises an automated coin disk assembly or HIMECS dispenser 450' and a plurality of contacts 470' such as two contacts as describe above. Each tote dock 414 also comprises a target 2582.

Each corresponding tote docking station 418 comprises a motor 434, a plurality of contacts 458' such as two contacts, a limit sensor 2584, and a count sensor 2586, all communicatively coupled to a processor 2550. Each processor 2550 is communicatively coupled to the CPU 2548. According to some embodiments, when contacts 458' and 470' are in physical contact, an electrical circuit is completed and power to drive the automated coin disk assembly or HIMECS dispenser 450' is supplied to the automated coin disk assembly 450' from the tote docking station 418 through the

contacts **458'**, **470'**. The communications between the components can be made via hard wire and/or wirelessly. While an exemplary block diagram is provided, the exact configuration can be altered without departing from the spirit of the present disclosure. For example, the functionality of the three processors **2548** and **2450** could be combined into fewer or distributed to more processors.

ALTERNATIVE EMBODIMENTS

Embodiment 1

A currency processing system comprising: a housing with a coin input area configured to receive a batch of coins; a plurality of coin receptacles operatively coupled to the housing, the plurality of coin receptacles including a coin-recycling receptacle and a coin-depositing receptacle; a disk-type coin processing unit operatively coupled to the coin input area and the coin receptacles to transfer coins therebetween, the coin processing unit including: a rotatable disk configured to impart motion to a plurality of the coins, and a sorting head having a lower surface generally parallel to and at least partially spaced from the rotatable disk, the lower surface forming a plurality of shaped regions configured to guide the coins, under the motion imparted by the rotatable disk, to a plurality of exit channels configured to sort and discharge the coins through a plurality of exit stations; and an automated coin chute with an input passage connected to coin-recycling and coin-depositing output passages, the automated coin chute including a movable diverter plate configured to selectively transition between a first position, whereby coins received from one of the exit stations of the disk-type coin processing unit by the input passage are redirected through the coin-recycling output passage to the coin-recycling receptacle, and a second position, whereby coins received by the input passage from the one exit station are redirected through the coin-depositing output passage to the coin-depositing receptacle.

Embodiment 2

The currency processing system of embodiment 1, wherein the automated coin chute comprises a chute housing defining therein the input passage, the coin-recycling passage, and the coin-depositing passage.

Embodiment 3

The currency processing system of embodiment 2, wherein the movable diverter plate is rotatably mounted on a diverter shaft inside of the chute housing.

Embodiment 4

The currency processing system of embodiment 3, wherein the automated coin chute further comprises a motor connected to the diverter shaft, the motor being selectively actuable to transition the diverter plate between the first and second positions.

Embodiment 5

The currency processing system of embodiment 1, further comprising a base plate disposed between the disk-type coin processing unit and the plurality of coin receptacles, the base plate defining therethrough coin-recycling and coin-depositing ports, wherein the automated coin chute is mounted to the base plate with the coin-recycling and coin-depositing output passages aligned with the coin-recycling and coin-depositing ports, respectively.

Embodiment 6

The currency processing system of embodiment 5, wherein the coin-recycling ports are spaced circumferentially about the coin processing unit a first radial distance from the center of the rotatable disk, and the coin-depositing ports are spaced circumferentially about the coin processing unit a second radial distance, distinct from the first radial distance, from the center of the rotatable disk.

Embodiment 7

The currency processing system of embodiment 5, wherein the disk-type coin processing unit is mounted on the base plate adjacent the automated coin chute.

Embodiment 8

The currency processing system of embodiment 1, further comprising a plurality of the automated coin chutes, the respective input passage of each of the automated coin chutes being coupled to only one of the exit stations of the disk-type coin processing unit to receive coins therefrom.

Embodiment 9

The currency processing system of embodiment 8, wherein the coin receptacles include a plurality of coin-recycling receptacles, and wherein each of the automated coin chutes is operable to divert coins received from the coin processing unit to only one of the coin-recycling receptacles.

Embodiment 10

The currency processing system of embodiment 8, wherein all of the automated coin chutes are operable to divert coins received from the coin processing unit to the coin-depositing receptacle.

Embodiment 11

The currency processing system of embodiment 1, further comprising a coin-mixing manifold configured to receive coins sorted by the disk-type coin processing unit, combine the sorted coins, and direct the combined coins to the coin-depositing receptacle.

Embodiment 12

The currency processing system of embodiment 11, wherein the automated coin chute diverts coins received by the input passage from the one exit station to the coin-depositing receptacle via the coin-mixing manifold.

Embodiment 13

The currency processing system of embodiment 1, wherein the coin-depositing receptacle includes first and second coin bins disposed inside the housing.

Embodiment 14

The currency processing system of embodiment 13, further comprising a conveyor belt assembly disposed between

the automated coin chute and the coin bins, the conveyor belt assembly being configured to selectively operate in a first direction, whereby coins received from the automated coin chute are delivered to the first coin bin, and a second direction, whereby coins received from the automated coin chute are delivered to the second coin bin.

Embodiment 15

The currency processing system of embodiment 1, wherein the coin-recycling receptacle comprises a plurality of handheld coin totes removably stowed inside the housing.

Embodiment 16

The currency processing system of embodiment 15, wherein the handheld coin totes are removably seated inside a tote drawer, the tote drawer being configured to transition between a stowed position, whereat the tote drawer is disposed at least substantially inside the housing, to an extracted position, whereat the tote drawer is disposed at least partially outside the housing such that the coin totes can be removed therefrom.

Embodiment 17

The currency processing system of embodiment 16, wherein the tote drawer includes a base defining a plurality of tote compartments, each of the tote compartments being configured to receive therein a base portion of one of the coin totes.

Embodiment 18

The currency processing system of embodiment 15, wherein each of the coin totes includes a first electrical contact configured to cooperate with a system interface contact to thereby communicate to a system controller a signal indicative of a presence of the coin tote in the tote drawer.

Embodiment 19

The currency processing system of embodiment 15, wherein each of the coin totes includes a second electrical contact configured to cooperate with a system interface contact to thereby communicate to a system controller a signal indicating a full coin tote in the tote drawer.

Embodiment 20

The currency processing system of embodiment 15, wherein each of the coin totes includes a third electrical contact configured to cooperate with a system interface contact to thereby communicate to a system controller a signal indicating an empty coin tote in the tote drawer.

Embodiment 21

The currency processing system of embodiment 11, further comprising a plurality of sorted coin chutes, each of the sorted coin chutes being configured to direct coins received from the coin processing unit into a respective one of the coin totes.

Embodiment 22

A self-service coin processing machine comprising: a housing with a coin input area configured to receive coins; a plurality of coin receptacles removably positioned inside the housing and configured to receive and store processed coins, the plurality of coin receptacles including a plurality of coin-recycling receptacles and a plurality of coin-depositing receptacles; a coin processing unit configured to receive coins from the coin input area, process the coins, and output the processed coins through coin exit stations; a plurality of automated coin chutes each having a chute body defining an input passage connected to coin-recycling and coin-depositing output passages, each of the automated coin chutes including a movable diverter plate configured to selectively transition between a first position, whereby coins received by the input passage from a respective one of the exit stations are redirected through the coin-recycling output passage to a respective one of the coin-recycling receptacles, and a second position, whereby coins received by the input passage from the respective one of the exit stations are redirected through the coin-depositing output passage to a respective one of the coin-depositing receptacles.

Embodiment 23

A method of processing and recycling coins, the method comprising: receiving a batch of mixed coins in a currency processing machine comprising a coin processing unit configured to sort received coins, at least one coin-depositing receptacle, and a plurality of coin-recycling receptacles, each of the coin-recycling receptacles being associated with a single denomination of coin; discharging sorted coins from the coin processing unit through a plurality of exit stations, each of the exit stations being associated with a single denomination of coin; receiving coins from each of the exit stations via one of a plurality of automated coin chutes, each of the automated coin chutes including a movable diverter plate configured to selectively transition between a first position, whereby coins received from the exit station are directed through a coin-recycling output passage, and a second position, whereby coins received from the exit station are directed through a coin-depositing output passage; discharging coins from the coin-recycling output passage of each of the automated coin chutes into a respective one of the coin-recycling receptacles; and discharging coins from the coin-depositing output passage of each of the automated coin chutes into the at least one coin-depositing receptacle.

Embodiment 24

The method of embodiment 23, wherein each of the automated coin chutes comprises a chute housing defining therein the coin-recycling passage and the coin-depositing passage.

Embodiment 25

The method of embodiment 25, wherein each of the automated coin chutes further comprises a motor connected to the diverter shaft, the motor being selectively actuable to transition the diverter plate between the first and second positions.

Embodiment 26

The method of embodiment 23, wherein the currency processing machine further comprises a base plate disposed between the coin processing unit and the coin receptacles, the base plate defining therethrough coin-recycling and

coin-depositing ports, wherein each of the automated coin chutes is mounted to the base plate with the coin-recycling and coin-depositing output passages aligned with the coin-recycling and coin-depositing ports, respectively.

Embodiment 27

The method of embodiment 26, wherein the coin-recycling ports are spaced circumferentially about the coin processing unit a first radial distance from a center of the unit, and the coin-depositing ports are spaced circumferentially about the coin processing unit a second radial distance, distinct from the first radial distance, from the center of the unit.

Embodiment 28

The method of embodiment 23, wherein the coin processing unit is mounted on the base plate adjacent the plurality of automated coin chutes.

Embodiment 29

The method of embodiment 23, wherein the currency processing machine further comprises a coin-mixing manifold configured to receive coins sorted by the coin processing unit, recombine the sorted coins, and direct the recombined coins to the at least one coin-depositing receptacle.

Embodiment 30

The method of embodiment 29, wherein the plurality of automated coin chutes divert coins received from the exit stations to the at least one coin-depositing receptacle via the coin-mixing manifold.

Embodiment 31

The method of embodiment 23, wherein the at least one coin-depositing receptacle includes first and second coin bins.

Embodiment 32

The method of embodiment 31, wherein the currency processing machine further comprises a conveyor belt assembly configured to selectively operate in a first direction, whereby coins received from the automated coin chutes are delivered to the first coin bin, and a second direction, whereby coins received from the automated coin chutes are delivered to the second coin bin.

Embodiment 33

The method of embodiment 23, wherein the plurality of coin-recycling receptacles includes a plurality of handheld coin totes removably mounted inside a housing of the currency processing machine.

Embodiment 34

The method of embodiment 33, wherein the handheld coin totes are removably mounted to a tote drawer, the tote drawer being configured to transition from a stowed position, whereat the tote drawer is disposed at least substantially inside the housing, to an extracted position, whereat the tote drawer is disposed at least partially outside the housing such that the coin totes can be removed therefrom.

Embodiment 35

The method of embodiment 34, wherein the tote drawer includes a base defining a plurality of tote compartments, each of the tote compartments being configured to receive therein a base portion of one of the coin totes.

Embodiment 36

The method of embodiment 33, wherein each of the coin totes includes a first electrical contact, and the housing includes a second electrical contact configured to cooperate with the first electrical contact to thereby communicate to a system controller a signal indicative of a presence of the coin tote in the tote drawer.

Embodiment 37

The method of embodiment 33, wherein each of the coin totes includes a third electrical contact, and the housing includes a fourth electrical contact configured to cooperate with the third electrical contact to thereby communicate to a system controller a signal indicating a full coin tote in the tote drawer.

Embodiment 38

The method of embodiment 33, wherein each of the coin totes includes a fifth electrical contact, and the housing includes a sixth electrical contact configured to cooperate with the fifth electrical contact to thereby communicate to a system controller a signal indicating an empty coin tote in the drawer.

Embodiment 39

The method of embodiment 23, wherein the currency processing machine further comprises a plurality of sorted coin chutes, each of the sorted coin chutes being configured to direct coins received from the coin processing unit into a respective one of the coin totes.

Embodiment 40

A coin-recycling dispenser assembly for dispensing coins stowed in one or more coin totes into one or more coin containers, the coin-recycling dispenser assembly comprising: a housing with one or more tote docking stations, each of the tote docking stations including a guide mechanism and a drive mechanism; one or more tote docks coupled to the housing, each of the tote docks being rotatably coupled to one of the tote docking stations and configured to seat therein one of the coin totes, movement of each of the tote docks being limited by the guide mechanism, wherein each of the drive mechanisms is selectively actuable to rotate one of the tote docks between a loading position, whereat the coin tote is removable from the tote dock, and a dispensing position, whereat the coins stowed inside the coin tote are dispensed, one at a time, into one of the coin containers.

Embodiment 41

The coin-recycling dispenser assembly of embodiment 40, wherein each of the guide mechanisms of the tote

docking stations includes a guide track, and each of the tote docks includes a guide channel configured to mate with the guide track and thereby limit rectilinear movement of the tote dock during rotation thereof.

Embodiment 42

The coin-recycling dispenser assembly of embodiment 41, wherein each of the guide tracks of the tote docking stations includes a retention tab pressing against a flange of the guide channel and thereby retaining the tote dock in contact with the tote docking station.

Embodiment 43

The coin-recycling dispenser assembly of embodiment 41, wherein each of the tote docks includes a drum-shaped body, the guide channel extending along the outer circumference of the drum-shaped body.

Embodiment 44

The coin-recycling dispenser assembly of embodiment 40, wherein each of the guide mechanisms of the tote docking stations includes a rotation stop, and each of the tote docks includes a stopping shoulder configured to abut the rotation stop and thereby limit rotation of the tote dock.

Embodiment 45

The coin-recycling dispenser assembly of embodiment 40, wherein each of the drive mechanisms of the tote docking stations includes a motor-driven gear assembly, and each of the tote docks includes a toothed track configured to engage with the motor-driven gear assembly.

Embodiment 46

The coin-recycling dispenser assembly of embodiment 45, wherein each of the tote docks includes a drum-shaped body, the toothed track extending along the outer circumference of the drum-shaped body.

Embodiment 47

The coin-recycling dispenser assembly of embodiment 40, wherein each of the tote docking stations includes a coin slot configured to transmit coins, one at a time, to one of the coin containers.

Embodiment 48

The coin-recycling dispenser assembly of embodiment 40, wherein each of the tote docks includes a tote pocket configured to slidably receive therein one of the coin totes.

Embodiment 49

The coin-recycling dispenser assembly of embodiment 48, wherein each of the tote pockets includes a contoured surface configured to lie flush against a complementary contoured wall of a coin tote and thereby ensure proper orientation of the coin tote when seated inside the tote pocket.

Embodiment 50

The coin-recycling dispenser assembly of embodiment 40, further comprising a coin till assembly with a till housing and one or more coin funnels stowed inside the till housing, each of the coin funnels having removably mounted at a narrow end thereof one of the coin containers.

Embodiment 51

The coin-recycling dispenser assembly of embodiment 50, wherein the coin till assembly further comprises one or more coin chutes attaching the till housing to the dispenser assembly housing, each of the coin chutes being configured to direct coins, under the force of gravity, into one of the coin containers through one of the coin funnels.

Embodiment 52

The coin-recycling dispenser assembly of embodiment 40, wherein each of the tote docks includes an automated coin disk assembly selectively actuable to separate coins received from the coin tote such that coins are transmitted one at a time from the tote dock to the tote docking station.

Embodiment 53

The coin-recycling dispenser assembly of embodiment 52, wherein each of the coin disk assemblies includes a disk motor and a rotor mounted to a roof deck of the tote dock, the rotor having disc-shaped openings configured to receive therein coins from the coin tote, the disk motor being selectively actuable to rotate the rotor.

Embodiment 54

The coin-recycling dispenser assembly of embodiment 52, wherein each of the tote docking stations includes an array of electrical contacts and each of the tote docks includes an electrical contact pad, wherein rotation of the tote dock to a predetermined position mates the electrical contact pad with the array of electrical contacts and thereby selectively actuates the disk motor.

Embodiment 55

The coin-recycling dispenser assembly of embodiment 40, wherein each of the tote docks includes a coin sensor configured to count coins received from the coin tote.

Embodiment 56

The coin-recycling dispenser assembly of embodiment 55, wherein each of the tote docking stations includes an electrical contact pad, and each of the tote docks includes an electrical contact, wherein rotation of the tote dock to a predetermined position mates the electrical contact with the electrical contact pad such that coin data is transferrable from the coin sensor.

Embodiment 57

A coin-recycling system comprising: an electronic display device configured to display information and user-selectable options; an electronic user input device configured to receive one or more user selections to control one or more operations of the coin-recycling system; a central processing unit communicatively coupled to the electronic display device and the electronic user input device; a plurality of hand-held coin totes, each of the hand-held coin totes having a respective rigid tote body with a wall defining a coin hole, and a

lid attached to the tote body and configured to move between a first position, whereat the lid covers the coin hole, and a second position, whereat the lid exposes the coin hole such that coins can be passed therethrough; a coin till assembly with a till housing, a plurality of coin chutes attached to the till housing, and a plurality of coin funnels stowed inside the till housing, each of the coin funnels having removably mounted at a narrow end thereof a respective coin cylinder, and each of the coin chutes being configured to direct coins, under the force of gravity, into a respective one of the coin cylinders through one of the coin funnels; a dispenser assembly housing with a plurality of tote docking stations, each of the tote docking stations including a respective arcuate guide track with a rotation stop and laterally spaced rails, a respective motor-driven gear assembly, and a respective coin slot configured to transmit coins, one at a time, to one of the coin chutes; a plurality of tote docks juxtaposed on the dispenser assembly housing and rotatably coupled to a respective one of the tote docking stations, each of the tote docks having a respective tote pocket configured to removably seat therein one of the coin totes, a respective stopping shoulder configured to mate with the rotation stop and thereby limit rotation of the tote dock, a respective pair of guide channels configured to mate with the laterally spaced rails of the guide track and thereby limit lateral movement during rotation of the tote dock, and a respective coin disk configured to separate coins received from the coin tote, and a respective toothed track engaged with the motor-driven gear assembly, wherein each of the motor-driven gear assemblies is selectively actuable to rotate a respective one of the tote docks between a loading position, whereat the coin tote is pushable into and removable from the tote dock, and a dispensing position, whereat the coins stowed inside the coin tote are dispensed, one at a time, from the tote dock, through the tote docking station, to the coin till assembly and into one of the coin cylinders through one of the coin funnels.

Embodiment 58

A coin bag for storing a plurality of coins, the coin bag comprising: an at least partially transparent and flexible polymeric body with a first end having an opening configured to receive therethrough plural coins, a seal for securing close the opening in the first end, and a second end with a frangible portion configured to be manually opened such that coins can be emptied from the coin bag through the opened frangible portion.

Embodiment 59

A coin tote drawer comprising: a plurality of coin tote compartments, each tote compartment configured to accommodate a coin tote therein, wherein each tote compartment has at least two inductive sensors residing therein; wherein one of the inductive sensors in each compartment is a coin presence inductive coil and wherein one of the inductive sensors in each compartment is a tote presence inductive coil; wherein each coin tote configured to be accommodated in each compartment has a piece of metal imbedded into or coupled to a wall of the coin tote; and wherein the tote presence inductive coil in each compartment can sense if a coin tote has been positioned in a corresponding compartment by sensing the presence of the metal imbedded into or coupled to a corresponding coin tote.

Embodiment 60

The coin tote drawer of embodiment 59 wherein each tote compartment an electrostatic discharge (ESD) bleedoff post therein.

The present invention is not limited to the precise construction and compositions disclosed herein. Rather, any and all modifications, changes, and variations apparent from the foregoing descriptions are within the scope and spirit of the invention as defined in the appended claims. Moreover, the inventive aspects of the present disclosure expressly include any and all combinations and subcombinations of the preceding embodiments, elements and features.

What is claimed:

1. A coin tote drawer comprising:

a plurality of coin tote compartments, each tote compartment configured to accommodate a coin tote therein, wherein each tote compartment has at least two inductive sensors residing therein; wherein one of the inductive sensors in each compartment is a coin presence inductive coil and wherein one of the inductive sensors in each compartment is a tote presence inductive coil;

wherein each coin tote configured to be accommodated in each compartment has a piece of metal imbedded into or coupled to a wall of the coin tote; and

wherein the tote presence inductive coil in each compartment is configured to sense if a coin tote has been positioned in a corresponding compartment by sensing the presence of the metal imbedded into or coupled to a corresponding coin tote.

2. The coin tote drawer of claim **1** wherein each tote compartment comprises an electrostatic discharge (ESD) bleedoff post therein.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 9,875,593 B1
APPLICATION NO. : 15/230123
DATED : January 23, 2018
INVENTOR(S) : Adams et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

At item (72) (Inventors):
Please delete "Sobelevsky" and insert -- Sobolevsky -- therefor.

On page 6, Column 2, Lines 21-22:
Please delete "Brandt: Model 1400 Coin Sorter Counter, 2 pages (date unknown, prior to Mar. 2, 2011, possibly prior to Mar. 2, 2011)." and insert -- Brandt: Model 1400 Coin Sorter Counter, 2 pages (date unknown, prior to March 2, 2011, possibly prior to 3/17/97). -- therefor.

Signed and Sealed this
Eleventh Day of December, 2018

Andrei Iancu
Director of the United States Patent and Trademark Office