

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 March 2002 (14.03.2002)

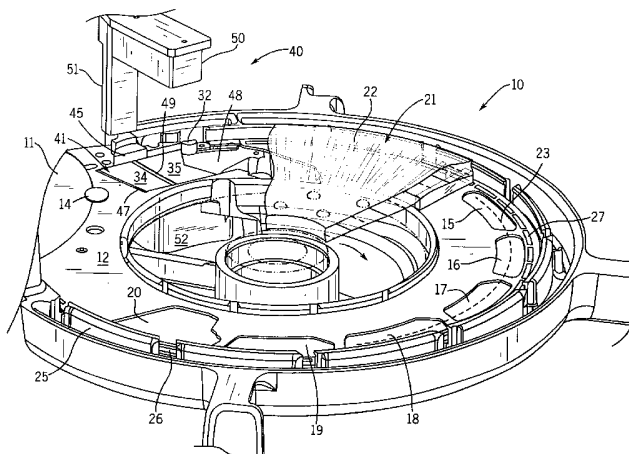
PCT

(10) International Publication Number
WO 02/021461 A3

- (51) International Patent Classification⁷: G07D 5/02, 5/08, 3/14, 3/06
- (74) Agent: MCGOVERN, Michael, J.; Quarles & Brady, 411 E. Wisconsin Avenue, Milwaukee, WI 53202-4497 (US).
- (21) International Application Number: PCT/US01/27369
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date: 4 September 2001 (04.09.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/230,577 5 September 2000 (05.09.2000) US
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant: DE LA RUE CASH SYSTEMS, INC. [US/US]; 705 S. 12th Street, P.O. Box 200, Watertown, WI 53094 (US).
- (72) Inventors: BRANDLE, Daniel; Gartenstrasse 3, 8580 Amriswill (CH). MULLER, Klaus; Moltkenstrasse 26, 69120 Heidelberg (DE). ZWIEG, Robert, L.; 523 Carl Schurz Drive, Watertown, WI 53098-2031 (US). ADAMS, Thomas, P.; 7524 Thomas Drive, Oconomowoc, WI 53066 (US). GRAJEWSKI, John, P.; W1259 Hooper Road, Palmyra, WI 53156 (US).
- Published: — with international search report
- (88) Date of publication of the international search report: 15 May 2003

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR DETECTION OF COIN DENOMINATION AND OTHER PARAMETERS



(57) Abstract: A coin sorting apparatus and method uses a light source (50) disposed on one side of the coin path (23); a coin moving member (21) of light transmissive material; a coin path insert (41) having at least a portion the is light transmissive; an optical detector (55) disposed on an opposite side of the coin path (23) from the light source (50) for detecting coin size as a coin (14) passes the coin path insert (41); a coin core alloy composition sensor (42) a coin surface alloy composition sensor (43); an edge sensor (46) disposed along a reference edge (45) along the coin path; and a plurality of processors (90, 94, 95, 107, 96) for receiving data developed from signals from the optical detector (55), the coin core alloy sensor (42), the coin surface (43) alloy detector, and the coin edge sensor (46), the data being for comparison with stored valued for a plurality of denominations to determine the denomination of the coin (14). A lens array (56) helps direct light from the light source (55) to the optical detector (55). The coin path insert can have an upper surface of zirconia ceramic (34, 35) with a sapphire window (49), or the upper surface can be an integral sapphire element (37).



WO 02/021461 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/27369

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G07D5/02 G07D5/08 G07D3/14 G07D3/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G07D G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 0 683 473 A (LAUREL BANK MACHINE CO) 22 November 1995 (1995-11-22) abstract figures 1-4	1, 5-32, 39-42 2-4, 33-38
X A	US 5 551 542 A (STOCKLI RUDOLF) 3 September 1996 (1996-09-03) column 2, line 1 - line 41	1, 5-32, 39-42 2-4, 33-38
X A	DE 94 03 691 U (EMERALD COMMUNICATIONS LTD) 7 July 1994 (1994-07-07) the whole document	5-32, 39-42 2-4, 33-38

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

15 November 2002

Date of mailing of the international search report

25/11/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Van Dop, E

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/US 01/27369

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0683473	A	22-11-1995	JP 8036661 A	06-02-1996
			CN 1118095 A ,B	06-03-1996
			EP 0683473 A2	22-11-1995
			KR 172146 B1	30-03-1999
			US 5538123 A	23-07-1996
<hr/>				
US 5551542	A	03-09-1996	AT 163102 T	15-02-1998
			AU 660251 A1	15-06-1995
			BR 9404951 A	08-08-1995
			CA 2137527 A1	14-06-1995
			DE 59405229 D1	12-03-1998
			DK 657855 T3	11-05-1998
			EP 0657855 A1	14-06-1995
			ES 2111829 T3	16-03-1998
			FI 945828 A	14-06-1995
			JP 2648664 B2	03-09-1997
			JP 7200911 A	04-08-1995
			NO 944773 A	14-06-1995
			PL 306254 A1	26-06-1995
<hr/>				
DE 9403691	U	07-07-1994	DE 9403691 U1	07-07-1994
			AU 1892695 A	18-09-1995
			WO 9524024 A1	08-09-1995
			EP 0749616 A1	27-12-1996
			FI 963444 A	01-11-1996
			JP 9509771 T	30-09-1997
			US 5788046 A	04-08-1998
<hr/>				