

US00D664096S

(12) **United States Design Patent**
Ngo

(10) **Patent No.:** **US D664,096 S**
(45) **Date of Patent:** **** Jul. 24, 2012**

(54) **VERTICAL ELECTRICAL CONNECTOR**

FOREIGN PATENT DOCUMENTS

(75) Inventor: **Hung Viet Ngo**, Harrisburg, PA (US)

DE 1665181 4/1974
(Continued)

(73) Assignee: **FCI Americas Technology LLC**,
Carson City, NV (US)

OTHER PUBLICATIONS

(**) Term: **14 Years**

Finan, "Thermally Conductive Thermoplastics", LNP Engineering
Plastics, Inc., Plastics Engineering 2000, www.4spe.org, 4 pages.

(21) Appl. No.: **29/408,580**

(Continued)

(22) Filed: **Dec. 14, 2011**

Primary Examiner — Daniel Bui

(74) *Attorney, Agent, or Firm* — Woodcock Washburn LLP

Related U.S. Application Data

(63) Continuation of application No. 29/397,395, filed on
Jul. 15, 2011, now Pat. No. Des. 651,981, which is a
continuation of application No. 29/380,052, filed on
Nov. 30, 2010, now Pat. No. Des. 641,709, which is a
continuation of application No. 29/345,790, filed on
Oct. 22, 2009, now Pat. No. Des. 628,536, which is a
continuation of application No. 29/330,997, filed on
Jan. 16, 2009, now Pat. No. Des. 606,497.

(57) **CLAIM**

The ornamental design for a vertical electrical connector, as
shown and described.

(51) **LOC (9) Cl.** **13-03**

(52) **U.S. Cl.** **D13/147**

(58) **Field of Classification Search** D13/147,
D13/154, 184, 199; 439/159-160, 260, 325,
439/329, 395, 492, 495, 607.01, 607.04,
439/607.05, 607.17, 607.25, 607.34, 607.41,
439/607.53, 630

DESCRIPTION

This application is related by subject matter to U.S. patent
application Ser. Nos. 29/331,013 filed on Jan. 16, 2009, now
U.S. Pat. No. D608,293; 29/331,017 filed on Jan. 16, 2009,
now U.S. Pat. No. D610,548; and 29/330,990 filed on Jan. 16,
2009, now U.S. Pat. No. D606,496, and is further related by
subject matter to U.S. Pat. D623,138 and U.S. patent appli-
cation Ser. No. 29/345,808 filed Oct. 22, 2009, now U.S. Pat.
No. D631,442.

See application file for complete search history.

FIG. 1 is a top, left, rear perspective view of a vertical elec-
trical connector according to my design;
FIG. 2 is a top plan view thereof;
FIG. 3 is a bottom plan view thereof;
FIG. 4 is a rear elevation view thereof;
FIG. 5 is a front elevation view thereof;
FIG. 6 is a left side elevation view thereof; and,
FIG. 7 is a right side elevation view thereof.

The broken line portion of the figure drawings is included to
show unclaimed subject matter only and forms no part of the
claimed design. The dash-dot line represents boundaries of
the claimed design.

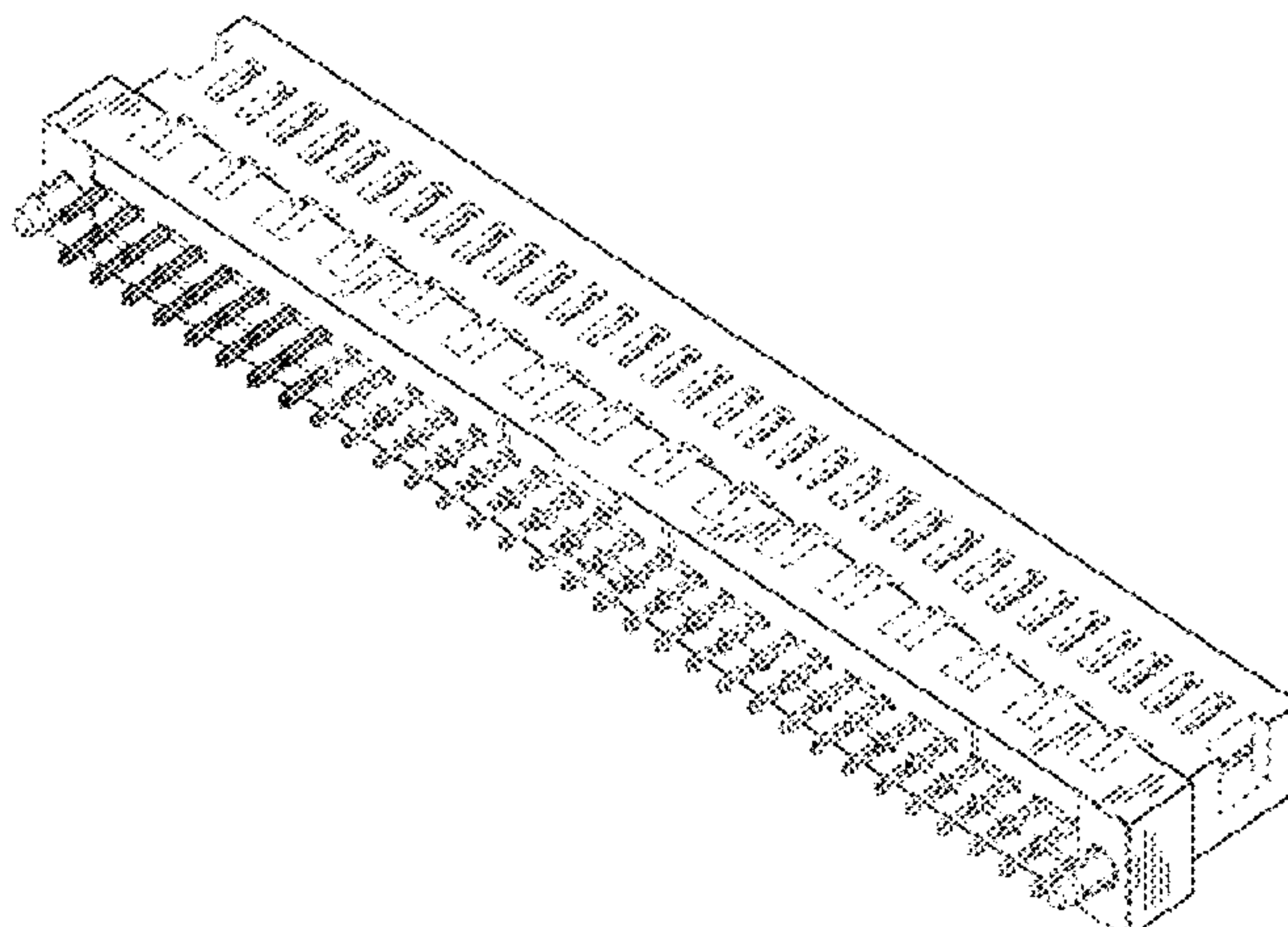
(56) **References Cited**

U.S. PATENT DOCUMENTS

318,186 A 5/1885 Hertzog
741,052 A 10/1903 Mahon
1,477,527 A 12/1923 Raettig
2,248,675 A 7/1941 Huppert
2,430,011 A 11/1947 Gillentine
2,759,163 A 8/1956 Ustin et al.
2,762,022 A 9/1956 Benander et al.
2,762,026 A 9/1956 Knohl
2,844,644 A 7/1958 Soule, Jr.
3,011,143 A 11/1961 Dean

(Continued)

1 Claim, 4 Drawing Sheets



US D664,096 S

Page 2

U.S. PATENT DOCUMENTS							
3,178,669	A	4/1965	Roberts	5,302,135	A	4/1994	Lee
3,208,030	A	9/1965	Evans et al.	5,381,314	A	1/1995	Rudy, Jr. et al.
3,286,220	A	11/1966	Marley et al.	5,400,949	A	3/1995	Hirvonen et al.
3,411,127	A	11/1968	Adams	5,427,543	A	6/1995	Dynia
3,420,087	A	1/1969	Hatfield et al.	5,431,578	A	7/1995	Wayne
3,514,740	A	5/1970	Filson	5,457,342	A	10/1995	Herbst, II
3,538,486	A	11/1970	Shlesinger, Jr.	5,475,922	A	12/1995	Tamura et al.
3,634,811	A	1/1972	Teagno et al.	5,490,040	A	2/1996	Gaudenzi et al.
3,669,054	A	6/1972	Desso et al.	5,511,987	A	4/1996	Shinchi
3,692,994	A	9/1972	Hirschman et al.	5,533,915	A	7/1996	Deans
3,748,633	A	7/1973	Lundergan	5,558,542	A	9/1996	O'Sullivan et al.
3,845,451	A	10/1974	Neidecker	5,577,928	A	11/1996	Duclos
3,871,015	A	3/1975	Lin et al.	5,582,519	A	12/1996	Buchter
3,942,856	A	3/1976	Mindheim et al.	5,588,859	A	12/1996	Maurice
3,972,580	A	8/1976	Pemberton et al.	5,590,463	A	1/1997	Feldman et al.
4,070,088	A	1/1978	Vaden	5,609,502	A	3/1997	Thumma
4,076,362	A	2/1978	Ichimura	5,618,187	A	4/1997	Goto
4,136,919	A	1/1979	Howard et al.	5,634,009	A	5/1997	Iddon et al.
4,159,861	A	7/1979	Anhalt	5,637,008	A	6/1997	Kozel
4,217,024	A	8/1980	Aldridge et al.	5,664,973	A	9/1997	Emmert et al.
4,260,212	A	4/1981	Ritchie et al.	5,691,041	A	11/1997	Frankeny et al.
4,288,139	A	9/1981	Cobaugh et al.	5,702,255	A	12/1997	Murphy et al.
4,371,912	A	2/1983	Guzik	5,727,963	A	3/1998	LeMaster
4,383,724	A	5/1983	Verhoevan	5,730,609	A	3/1998	Harwath
4,402,563	A	9/1983	Sinclair	5,741,144	A	4/1998	Elco et al.
4,403,821	A	9/1983	Zimmerman, Jr. et al.	5,741,161	A	4/1998	Cahaly et al.
4,425,015	A	1/1984	Rizzo	5,742,484	A	4/1998	Gillette et al.
4,464,832	A	8/1984	Asick et al.	5,743,009	A	4/1998	Matsui et al.
4,505,529	A	3/1985	Barkus	5,745,349	A	4/1998	Lemke
4,531,793	A	7/1985	Hochgesang	5,746,608	A	5/1998	Taylor
4,533,187	A	8/1985	Kirkman	5,755,595	A	5/1998	Davis et al.
4,536,955	A	8/1985	Gudgeon	5,772,451	A	6/1998	Dozier, II et al.
4,545,610	A	10/1985	Lakritz et al.	5,785,537	A	7/1998	Donahue et al.
4,552,425	A	11/1985	Billman	5,787,971	A	8/1998	Dodson
4,560,222	A	12/1985	Dambach	5,795,191	A	8/1998	Preputnick et al.
4,564,259	A	1/1986	Vandame	5,810,607	A	9/1998	Shih et al.
4,582,386	A	4/1986	Martens	5,817,973	A	10/1998	Elco
4,596,433	A	6/1986	Oesterheld et al.	5,831,314	A	11/1998	Wen
4,685,886	A	8/1987	Denlinger et al.	5,857,857	A	1/1999	Fukuda
4,687,267	A	8/1987	Header et al.	5,874,776	A	2/1999	Kresge et al.
4,717,360	A	1/1988	Czaja	5,876,219	A	3/1999	Taylor et al.
4,734,041	A	3/1988	Bruchmann et al.	5,876,248	A	3/1999	Brunker et al.
4,753,609	A	6/1988	Pfeffer et al.	5,883,782	A	3/1999	Thurston et al.
4,762,500	A	8/1988	Dola et al.	5,888,884	A	3/1999	Wojnarowski
4,767,344	A	8/1988	Noschese	5,908,333	A	6/1999	Perino et al.
4,776,803	A	10/1988	Pretchel et al.	5,919,049	A	7/1999	Petersen et al.
4,815,987	A	3/1989	Kawano et al.	5,919,050	A	7/1999	Kehley et al.
4,820,182	A	4/1989	Harwath et al.	5,930,114	A	7/1999	Kuzmin et al.
4,867,713	A	9/1989	Ozu et al.	5,955,888	A	9/1999	Frederickson et al.
4,878,611	A	11/1989	LoVasco et al.	5,961,355	A	10/1999	Morlion et al.
4,881,905	A	11/1989	Demler, Jr. et al.	5,971,817	A	10/1999	Longueville
4,900,271	A	2/1990	Colleran et al.	5,975,921	A	11/1999	Shuey
4,907,990	A	3/1990	Bertho et al.	5,980,270	A	11/1999	Fjelstad et al.
4,915,641	A	4/1990	Miskin et al.	5,980,321	A	11/1999	Cohen et al.
4,963,102	A	10/1990	Gettig et al.	5,984,726	A	11/1999	Wu
4,973,257	A	11/1990	Lhotak	5,993,259	A	11/1999	Stokoe et al.
4,973,271	A	11/1990	Ishizuka et al.	6,012,948	A	1/2000	Wu
4,975,084	A	12/1990	Fedder et al.	6,036,549	A	3/2000	Wulff
5,016,968	A	5/1991	Hammond et al.	6,050,862	A	4/2000	Ishii
5,024,610	A	6/1991	French et al.	6,059,170	A	5/2000	Jimarez et al.
5,035,639	A	7/1991	Kilpatrick et al.	6,065,951	A	5/2000	Lemke et al.
5,052,953	A	10/1991	Weber	6,068,520	A	5/2000	Winings et al.
5,064,391	A	11/1991	Buchter	6,071,152	A	6/2000	Achammer et al.
5,066,236	A	11/1991	Broeksteeg	6,077,130	A	6/2000	Hughes et al.
5,077,893	A	1/1992	Mosquera et al.	6,089,878	A	7/2000	Meng
5,082,459	A	1/1992	Billman et al.	6,095,827	A	8/2000	Dutkowsky et al.
5,094,634	A	3/1992	Dixon et al.	6,102,754	A	8/2000	Capper et al.
5,104,332	A	4/1992	McCoy	6,123,554	A	9/2000	Ortega et al.
5,147,228	A	9/1992	Miller et al.	6,125,535	A	10/2000	Chiou et al.
5,151,056	A	9/1992	McClune	6,139,336	A	10/2000	Olson
5,174,770	A	12/1992	Sasaki et al.	6,146,157	A	11/2000	Lenoir et al.
5,214,308	A	5/1993	Nishiguchi et al.	6,146,202	A	11/2000	Ramey et al.
5,238,414	A	8/1993	Yaegashi et al.	6,146,203	A	11/2000	Elco et al.
5,254,012	A	10/1993	Wang	6,152,756	A	11/2000	Huang et al.
5,274,918	A	1/1994	Reed	6,174,198	B1	1/2001	Wu et al.
5,276,964	A	1/1994	Anderson, Jr. et al.	6,180,891	B1	1/2001	Murdeshwar
5,277,597	A	1/1994	Masami et al.	6,183,287	B1	2/2001	Po
5,295,843	A	3/1994	Davis et al.	6,183,301	B1	2/2001	Paagman
				6,190,213	B1	2/2001	Reichart et al.

US D664,096 S

Page 3

6,196,871 B1	3/2001	Szu	6,769,883 B2	8/2004	Brid et al.
6,202,916 B1	3/2001	Updike et al.	6,769,935 B2	8/2004	Stokoe et al.
6,203,328 B1	3/2001	Ortega et al.	6,776,635 B2	8/2004	Blanchfield et al.
6,210,197 B1	4/2001	Yu	6,776,649 B2	8/2004	Pape et al.
6,210,240 B1	4/2001	Comerci et al.	6,780,018 B1	8/2004	Shipe
6,212,755 B1	4/2001	Shimada et al.	6,780,027 B2	8/2004	Allison
6,215,180 B1	4/2001	Chen et al.	6,790,088 B2	9/2004	Ono et al.
6,219,913 B1	4/2001	Uchiyama	6,796,831 B1	9/2004	Yasufuku et al.
6,220,884 B1	4/2001	Lin	D497,598 S	10/2004	Kimura et al.
6,220,895 B1	4/2001	Lin	6,811,440 B1	11/2004	Rothermel et al.
6,220,896 B1	4/2001	Bertoncini et al.	6,814,590 B2	11/2004	Minich et al.
6,234,851 B1	5/2001	Phillips	D499,379 S	12/2004	Zhu et al.
6,238,225 B1	5/2001	Middlehurst et al.	6,829,143 B2	12/2004	Russell et al.
D443,861 S	6/2001	Ko et al.	6,832,933 B2	12/2004	Bu et al.
6,254,435 B1	7/2001	Cheong et al.	6,835,103 B2	12/2004	Middlehurst et al.
6,257,478 B1	7/2001	Straub	6,840,783 B2	1/2005	Wolford et al.
6,259,039 B1	7/2001	Chroneos, Jr. et al.	6,843,687 B2	1/2005	McGowan et al.
6,269,539 B1	8/2001	Takahashi et al.	6,848,886 B2	2/2005	Schmaling et al.
6,272,474 B1	8/2001	Garcia	6,848,950 B2	2/2005	Allison et al.
6,280,216 B1	8/2001	Bernier et al.	6,848,953 B2	2/2005	Schell et al.
6,290,514 B1	9/2001	McHugh et al.	6,863,572 B1	3/2005	Yi et al.
6,293,827 B1	9/2001	Stokoe	6,869,294 B2	3/2005	Clark et al.
6,299,492 B1	10/2001	Pierini et al.	6,884,117 B2	4/2005	Korsunsky et al.
6,309,245 B1	10/2001	Sweeney	6,890,221 B2	5/2005	Wagner
6,319,075 B1	11/2001	Clark et al.	6,905,367 B2	6/2005	Crane, Jr. et al.
6,322,377 B2	11/2001	Middlehurst et al.	6,923,661 B1	8/2005	Bogiel et al.
6,328,602 B1	12/2001	Yamasaki et al.	6,929,504 B2	8/2005	Ling et al.
6,347,952 B1	2/2002	Hasegawa et al.	6,947,012 B2	9/2005	Aisenbrey
6,350,134 B1	2/2002	Fogg et al.	6,975,511 B1	12/2005	Lebo et al.
6,359,783 B1	3/2002	Noble	6,994,569 B2	2/2006	Minich et al.
6,360,940 B1	3/2002	Bolde et al.	7,001,189 B1	2/2006	McGowan et al.
6,362,961 B1	3/2002	Chiou	D517,488 S	3/2006	Riku
6,363,607 B1	4/2002	Chen et al.	7,011,548 B2	3/2006	Bogiel et al.
6,371,773 B1	4/2002	Crofoot et al.	D518,786 S	4/2006	Riku
6,379,188 B1	4/2002	Cohen et al.	7,059,892 B1	6/2006	Trout
6,386,924 B2	5/2002	Long	7,059,919 B2	6/2006	Clark et al.
6,394,818 B1	5/2002	Smalley, Jr.	7,065,871 B2	6/2006	Minich et al.
6,402,566 B1	6/2002	Middlehurst et al.	7,070,464 B2	7/2006	Clark et al.
6,409,534 B1	6/2002	Weisz-Margulescu	7,074,096 B2	7/2006	Copper et al.
6,409,543 B1	6/2002	Astbury, Jr. et al.	7,101,228 B2	9/2006	Hamner et al.
6,428,328 B2	8/2002	Haba et al.	7,104,812 B1	9/2006	Bogiel et al.
6,431,914 B1	8/2002	Billman	7,114,963 B2	10/2006	Shuey et al.
6,435,914 B1	8/2002	Billman	RE39,380 E	11/2006	Davis
6,450,289 B1	9/2002	Field et al.	7,137,848 B1	11/2006	Trout et al.
6,461,202 B2	10/2002	Kline	7,168,963 B2	1/2007	Minich et al.
6,471,523 B1	10/2002	Shuey	D536,668 S	2/2007	Ye et al.
6,471,548 B2	10/2002	Bertoncini et al.	7,182,642 B2	2/2007	Ngo et al.
6,488,549 B1	12/2002	Weller et al.	D540,264 S	4/2007	Zhang
6,489,567 B2	12/2002	Zachrai	7,204,699 B2	4/2007	Stoner et al.
6,506,081 B2	1/2003	Blanchfield et al.	D542,736 S	5/2007	Riku
6,514,103 B2	2/2003	Pape et al.	7,220,141 B2	5/2007	Daily et al.
6,537,111 B2	3/2003	Brammer et al.	D545,275 S	6/2007	Wei et al.
6,544,046 B1	4/2003	Hahn et al.	7,258,562 B2	8/2007	Daily et al.
6,551,112 B1	4/2003	Li et al.	7,273,382 B2	9/2007	Igarashi et al.
6,554,647 B1	4/2003	Cohen et al.	7,303,427 B2	12/2007	Swain
6,572,410 B1	6/2003	Volstorf et al.	7,335,043 B2	2/2008	Ngo et al.
6,575,774 B2	6/2003	Ling et al.	7,347,740 B2	3/2008	Minich
6,592,381 B2	7/2003	Cohen et al.	7,354,282 B2	4/2008	Margulis et al.
6,604,967 B2	8/2003	Middlehurst et al.	7,374,436 B2	5/2008	Schell et al.
6,629,854 B2	10/2003	Murakami	7,402,064 B2	7/2008	Daily et al.
6,645,012 B2	11/2003	Ito et al.	7,488,222 B2	2/2009	Clark et al.
6,648,657 B1	11/2003	Korsunsky et al.	7,520,760 B2	4/2009	Margulis et al.
6,652,294 B1	11/2003	Zhang	7,597,573 B2	10/2009	Defibaugh et al.
6,652,318 B1	11/2003	Winings et al.	D606,496 S	12/2009	Ngo
6,652,322 B2	11/2003	Ito et al.	D606,497 S	12/2009	Ngo
6,663,426 B2	12/2003	Hasircoglu et al.	D608,293 S	1/2010	Ngo
6,665,189 B1	12/2003	Lebo	D610,548 S	2/2010	Ngo
6,669,514 B2	12/2003	Wiebking et al.	D623,138 S	9/2010	Ngo
6,672,884 B1	1/2004	Toh et al.	D628,536 S	12/2010	Ngo
6,672,907 B2	1/2004	Azuma	D631,442 S	1/2011	Ngo
6,692,272 B2	2/2004	Lemke et al.	D640,637 S	6/2011	Ngo
6,702,594 B2	3/2004	Lee et al.	D641,709 S	7/2011	Ngo
6,705,902 B1	3/2004	Yi et al.	8,043,097 B2	10/2011	Ngo et al.
6,712,621 B2	3/2004	Li et al.	D651,981 S	1/2012	Ngo
6,716,068 B2	4/2004	Wu	2001/0003685 A1	6/2001	Aritani
6,740,820 B2	5/2004	Cheng	2002/0042225 A1	4/2002	Crane, Jr. et al.
6,743,037 B2	6/2004	Kassa et al.	2002/0106930 A1	8/2002	Pape et al.
6,746,278 B2	6/2004	Nelson et al.	2002/0142676 A1	10/2002	Hosaka et al.
6,746,281 B1	6/2004	Zhang	2002/0159235 A1	10/2002	Miller et al.

2002/0168901	A1	11/2002	Choumach	JP	08125379	5/1996
2002/0193019	A1	12/2002	Blanchfield et al.	JP	09199215	7/1997
2003/0013330	A1	1/2003	Takeuchi	JP	00/003743	1/2000
2003/0143894	A1	7/2003	Kline et al.	JP	00/003744	1/2000
2003/0219999	A1	11/2003	Minich et al.	JP	00/003745	1/2000
2003/0220021	A1	11/2003	Whiteman, Jr. et al.	JP	00/003746	1/2000
2003/0224628	A1	12/2003	Korsunsky et al.	JP	03/217785	7/2003
2003/0236035	A1	12/2003	Kuroda et al.	TW	576555	8/1991
2004/0183094	A1	9/2004	Caletka et al.	TW	546872	8/2003
2005/0112952	A1	5/2005	Wang et al.	WO	WO 97/43885	11/1997
2006/0003620	A1	1/2006	Daily et al.	WO	WO 97/44859	11/1997
2006/0128197	A1	6/2006	McGowan et al.	WO	WO 98/15989	4/1998
2006/0228927	A1	10/2006	Daily et al.	WO	WO 01/29931 A1	4/2001
2006/0228948	A1	10/2006	Swain et al.	WO	WO 01/39332 A1	5/2001
2006/0281354	A1	12/2006	Ngo et al.			
2007/0004291	A1	1/2007	Bogiel et al.			
2007/0197063	A1	8/2007	Ngo			
2007/0202748	A1	8/2007	Daily et al.			
2007/0275586	A1	11/2007	Ngo			
2007/0293084	A1	12/2007	Ngo			
2008/0038956	A1	2/2008	Swain			
2008/0207029	A1	8/2008	Defibaugh et al.			
2009/0088028	A1	4/2009	Ngo et al.			
2009/0142953	A1	6/2009	Patel et al.			
2009/0298303	A1	12/2009	Vrenna et al.			
2010/0124848	A1	5/2010	Atkinson et al.			
2010/0184339	A1	7/2010	Ngo et al.			

FOREIGN PATENT DOCUMENTS

DE	10226279	C1	11/2003
EP	0273683	A2	7/1988
EP	0321257	B1	4/1993
EP	0623248	B1	11/1995
EP	0789422	A2	8/1997
EP	1091449		9/2004
GB	1162705		8/1969
JP	06068943		3/1994
JP	06236788		8/1994
JP	07114958		5/1995
JP	07169523		7/1995

OTHER PUBLICATIONS

[http://www.molex.com/molex/products/family?channel=products&chanName=family&pageTitle=Introduction&key=extreme_](http://www.molex.com/molex/products/family?channel=products&chanName=family&pageTitle=Introduction&key=extreme_poweredge)
 poweredge , EXTreme PowerEdge™: EXTreme.PowerEdge™ connectors with signal contacts for combined high-power and signal card edge or busy bar tab applications, printed Feb. 25, 2010, 1 page.
[http://www.molex.com/molex/products/family?channel=products&chanName=family&pageTitle=Introduction&key=extreme_](http://www.molex.com/molex/products/family?channel=products&chanName=family&pageTitle=Introduction&key=extreme_lphpower)
 lphpower, EXTreme LPHPower™ Low-Profile Hybrid PowerConnector: High-current, low-profile EXTreme LPHPower™ connector extends mounting flexibility to backplane or midplane mating applications, printed Feb. 25, 2010, 1 page.
 Ogando, J., "And now-An Injection-Molded Heat Exchanger", Sure, plastics are thermal insulators, but additive packages allow them to conduct heat instead, Global Design News, Nov. 1, 2000, 4 pages.
 Product Sketch, "PCI express card edge assembly", Product No. 10018783, Aug. 2, 2008, 7 pages.
 Sherman, L. M., "Plastics that Conduct Heat", Plastics Technology Online, Jun. 2001, <http://www.plasticstechnology.com>, 4 pages.
 Tyco Electronics Corp, "Tyco Electronics releases new card edge power connector", Release dated Feb. 16, 2009, Harrisburg, Pennsylvania, 4 pages.
 Tyco Electronics, "Introduction to high current card edge connectors", Catalog 1773096, Revised Jul. 2007, 19 pages.

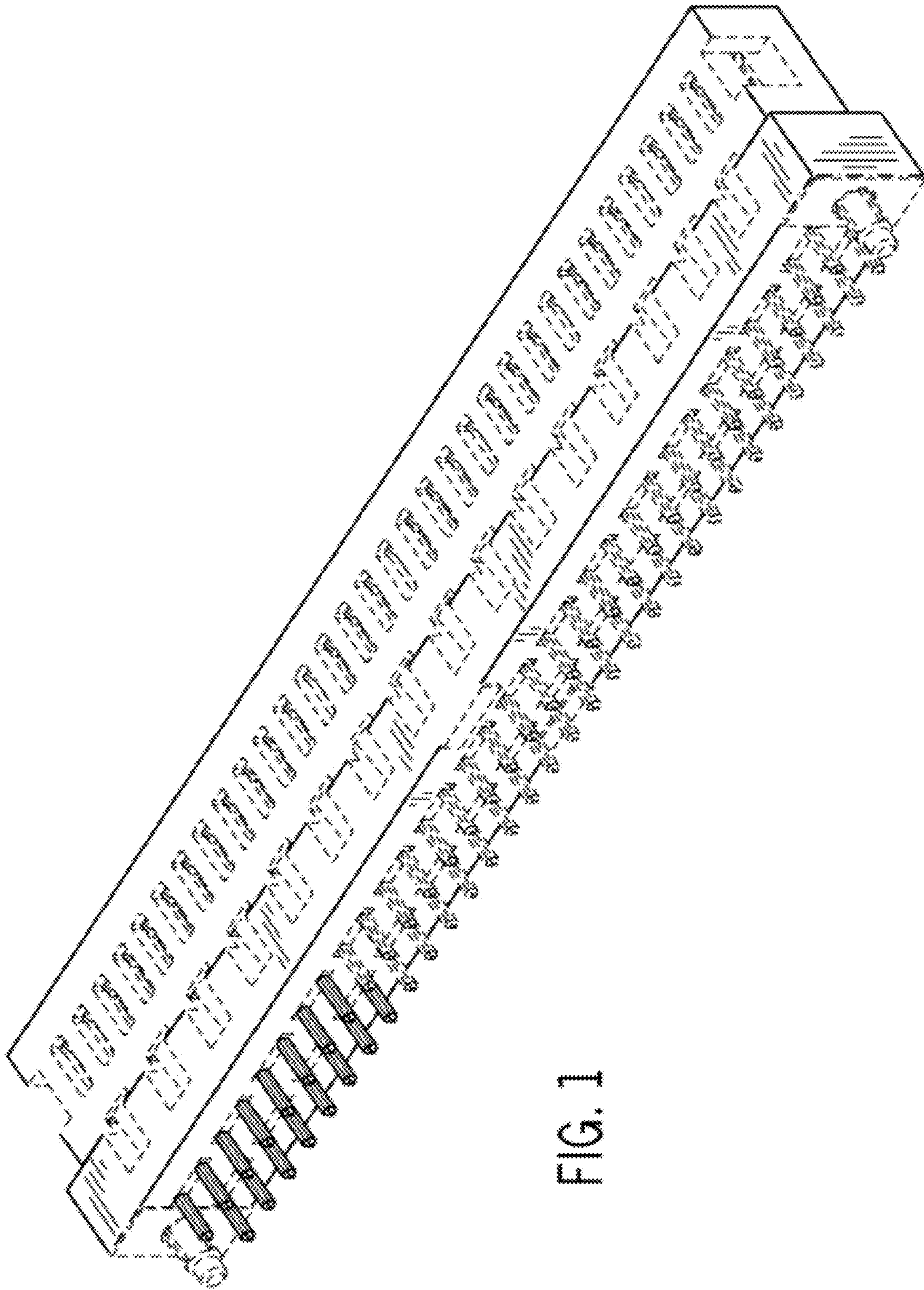


FIG. 1

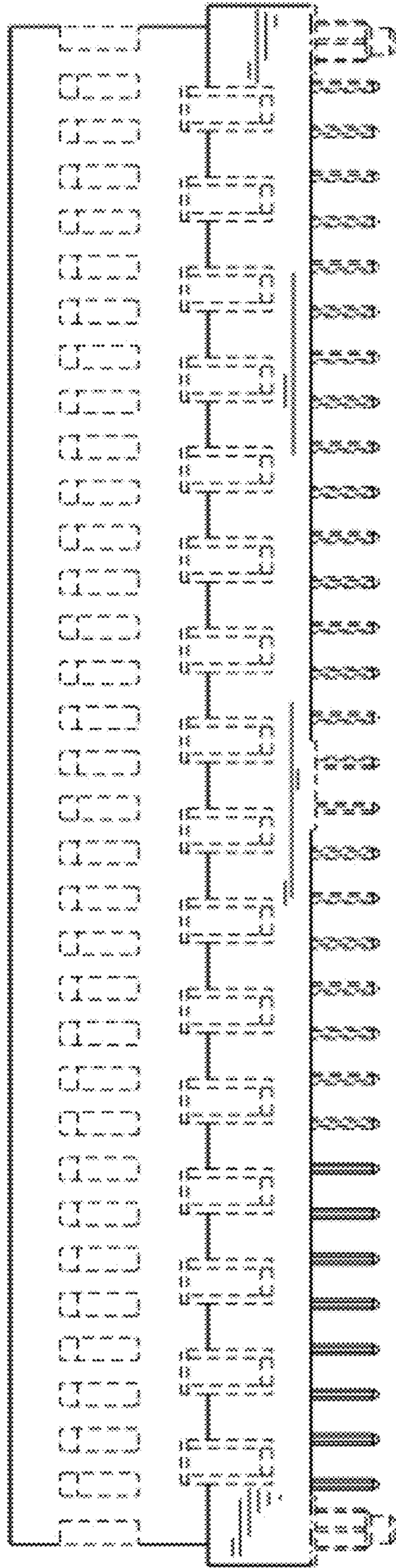


FIG. 2

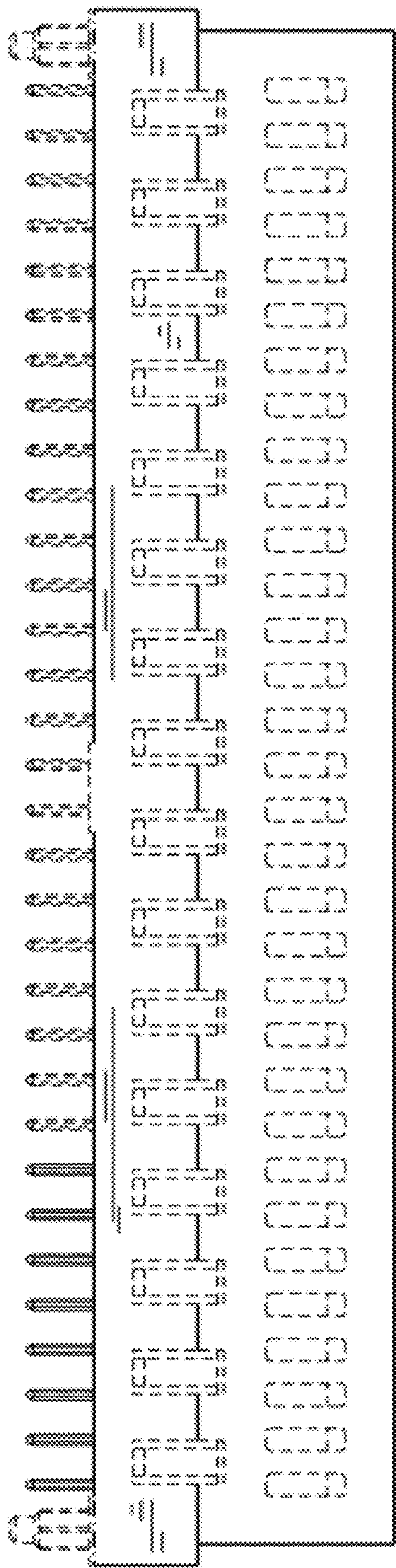


FIG. 3

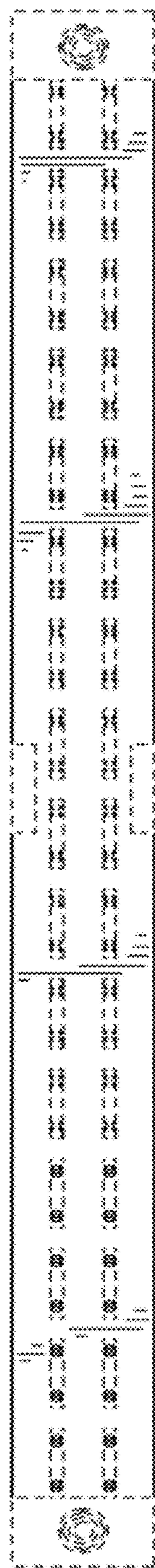


FIG. 4

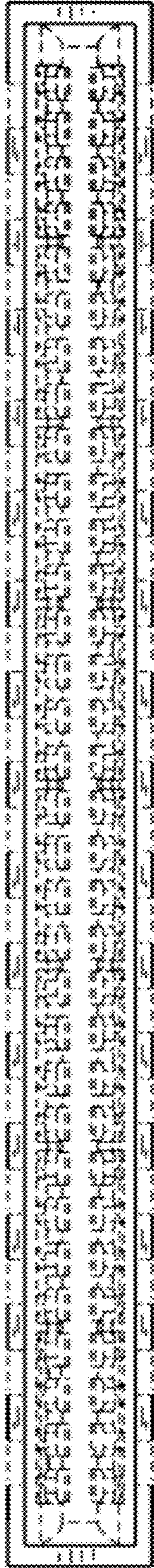


FIG. 5

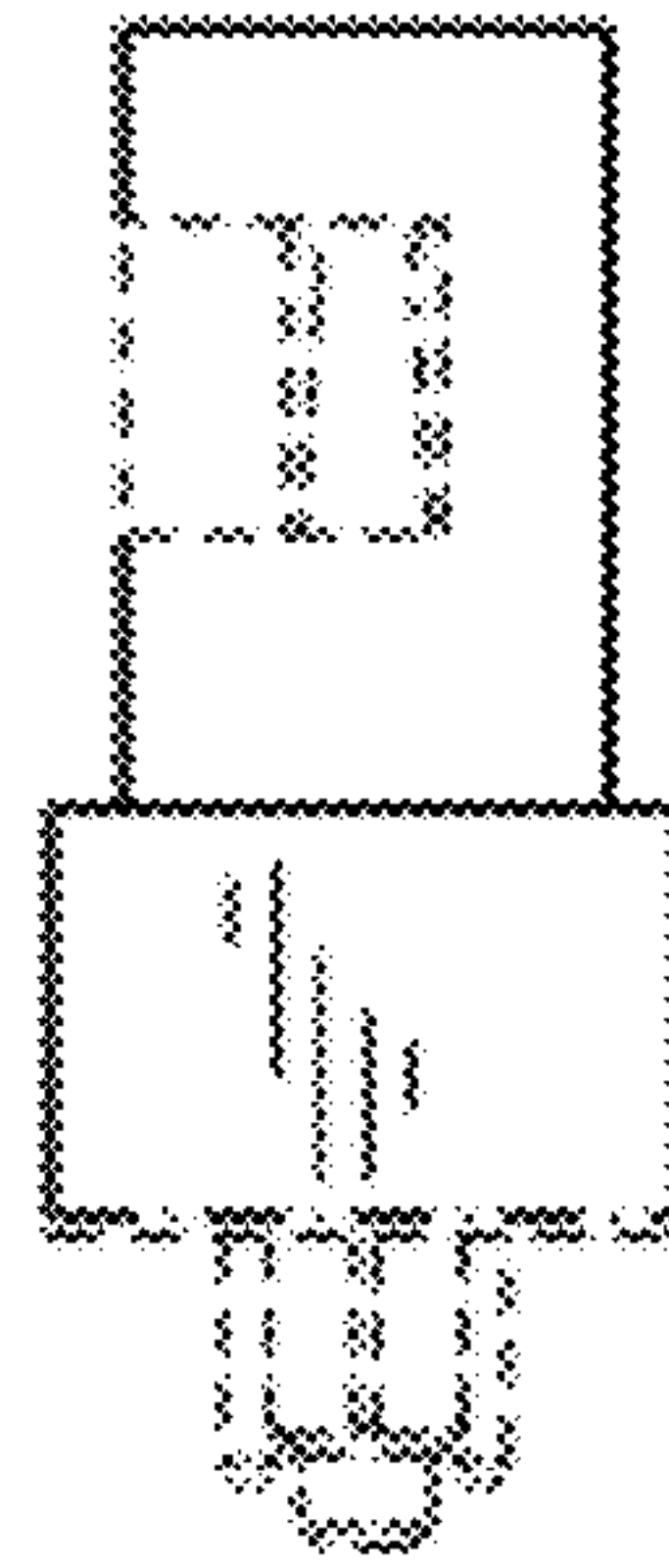


FIG. 6

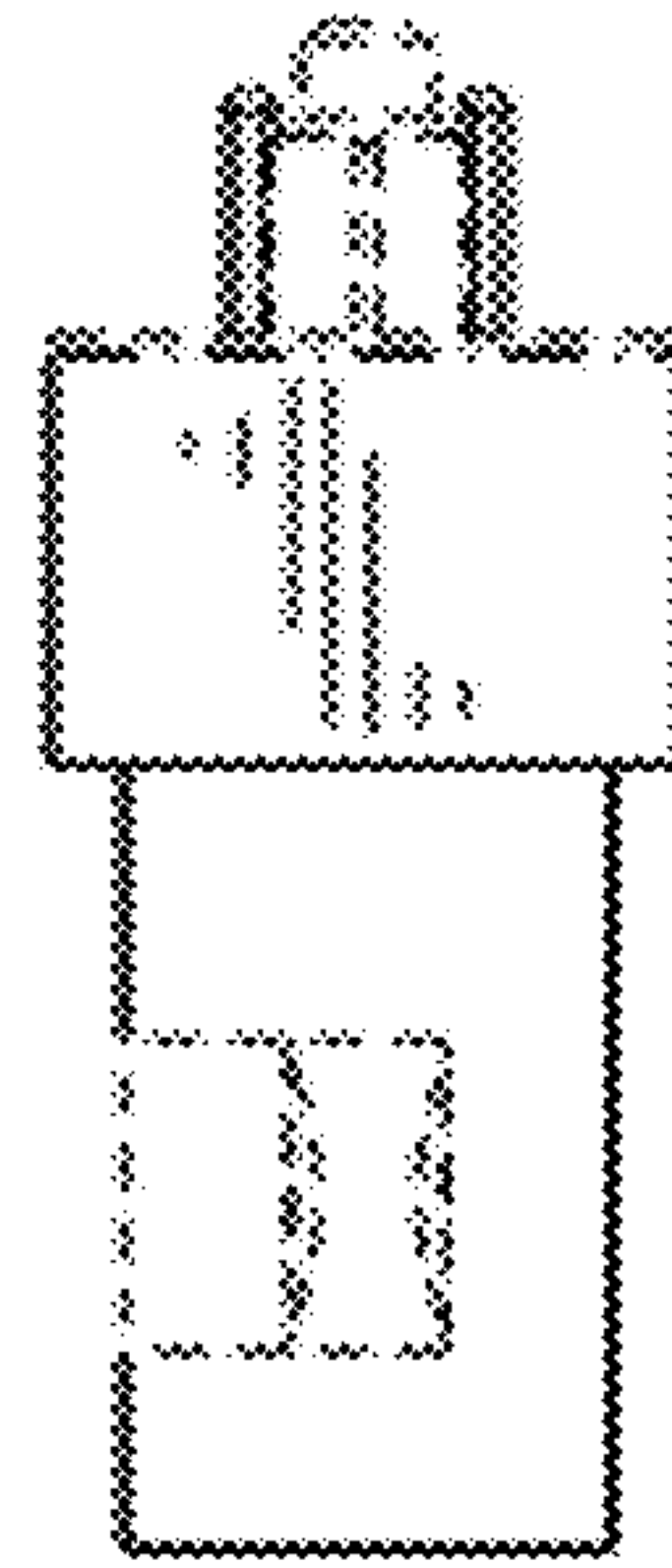


FIG. 7

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : D664,096 S
APPLICATION NO. : 29/408580
DATED : July 24, 2012
INVENTOR(S) : Hung Viet Ngo

Page 1 of 1

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

On Cover Page, at DESCRIPTION, line 1, after "This application is related
by subject matter to" insert -- **U.S. Patent Application Serial No. 12/687,237, filed on
January 15, 2010, now U.S. Patent No. 8,043,097, and is further related by subject matter to --**

Signed and Sealed this
Fourth Day of September, 2012



David J. Kappos
Director of the United States Patent and Trademark Office