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

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(54) **RIGHT-ANGLE ELECTRICAL CONNECTOR**

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- (73) Assignee: **FCI Americas Technology, Inc.**, Carson City, NV (US)
- (**) Term: **14 Years**
- (21) Appl. No.: **29/331,017**
- (22) Filed: **Jan. 16, 2009**

Related U.S. Application Data

- (60) Provisional application No. 61/205,276, filed on Jan. 16, 2009.
 - (51) **LOC (9) Cl.** **13-03**
 - (52) **U.S. Cl.** **D13/147; D13/154**
 - (58) **Field of Classification Search** D13/133, D13/146-147, 154, 184, 199; 439/64, 79, 439/159-160, 260, 325, 329, 395, 492, 495, 439/607-610, 630
- See application file for complete search history.

(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.
2,844,644 A	7/1958	Soule, Jr.
3,011,143 A	11/1961	Dean
3,178,669 A	4/1965	Roberts
3,208,030 A	9/1965	Evans et al.

(Continued)

FOREIGN PATENT DOCUMENTS

DE	1 665 181	4/1974
----	-----------	--------

(Continued)

OTHER PUBLICATIONS

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

(Continued)

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(57) **CLAIM**

The ornamental design for a right-angle electrical connector, as shown and described.

DESCRIPTION

In a preferred embodiment, the nature of this product is a right-angle electrical connector in the form of an electrical connector housing configured for retaining a plurality of electrical contacts.

This application is related by subject matter to U.S. Design Patent Applications entitled "vertical electrical connector" filed on even date herewith under U.S. application Ser. No. 29/331,013, "right-angle electrical connector" filed on even date herewith under U.S. application Ser. No. 29/330,990, and "vertical electrical connector" filed on even date herewith under U.S. application Ser. No. 29/330,997.

FIG. 1 is a top, left, rear perspective view of a right-angle electrical 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;

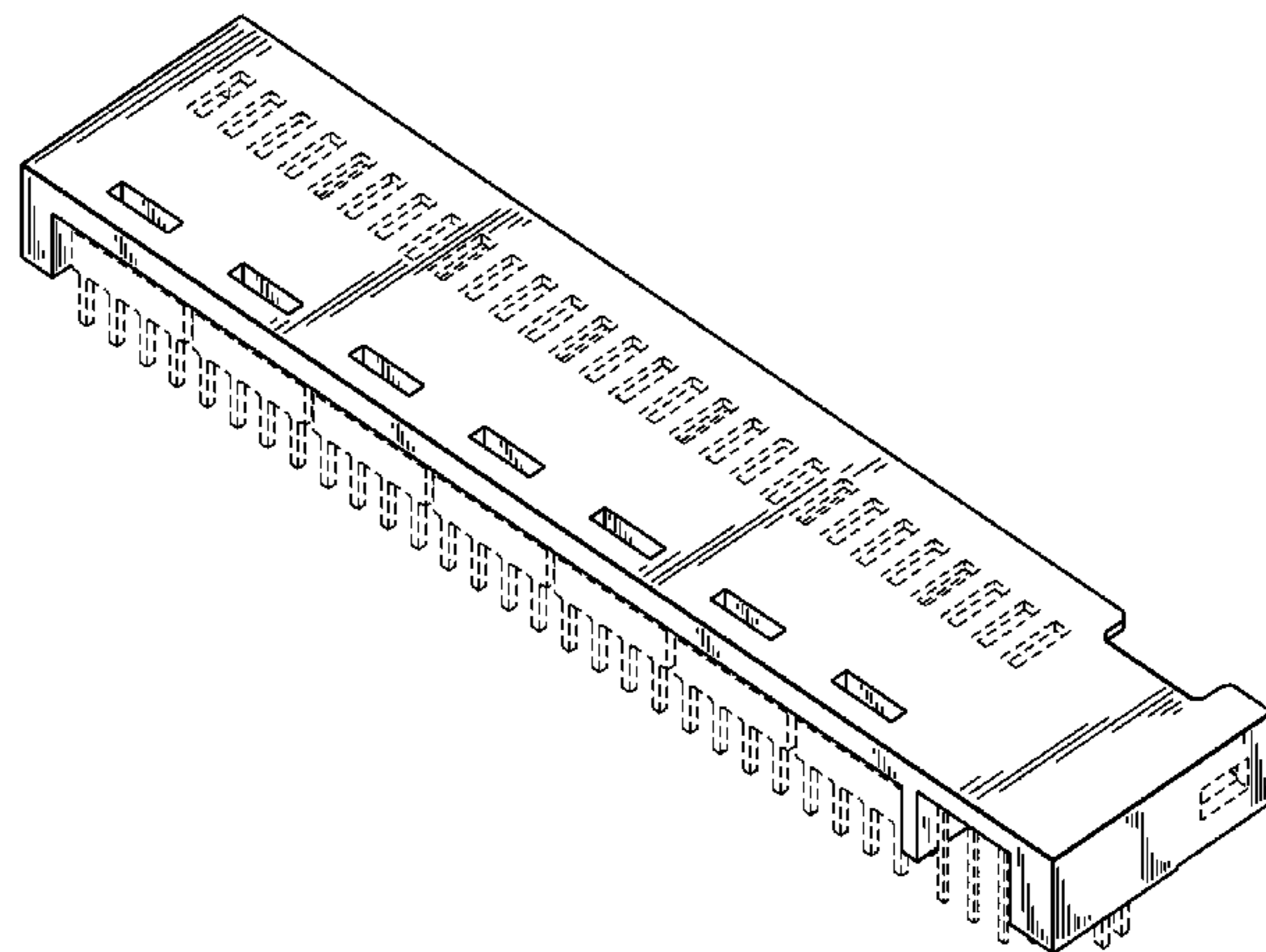
FIG. 5 is a front elevation view thereof;

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.

1 Claim, 4 Drawing Sheets



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U.S. PATENT DOCUMENTS				
		5,427,543 A	6/1995	Dynia
		5,431,578 A	7/1995	Wayne
3,286,220 A	11/1966	5,457,342 A	10/1995	Herbst, II
3,411,127 A	11/1968	5,475,922 A	12/1995	Tamura et al.
3,420,087 A	1/1969	5,490,040 A	2/1996	Gavdenzi et al.
3,514,740 A	5/1970	5,511,987 A	4/1996	Shinchi
3,538,486 A	11/1970	5,533,915 A	7/1996	Deans
3,634,811 A	1/1972	5,558,542 A	9/1996	O'Sullivan et al.
3,669,054 A	6/1972	5,577,928 A	11/1996	Duclos
3,692,994 A	9/1972	5,582,519 A	12/1996	Buchter
3,748,633 A	7/1973	5,588,859 A	12/1996	Maurice
3,845,451 A	10/1974	5,590,463 A	1/1997	Feldman et al.
3,871,015 A	3/1975	5,609,502 A	3/1997	Thumma
3,942,856 A	3/1976	5,618,187 A	4/1997	Goto
3,972,580 A	8/1976	5,637,008 A	6/1997	Kozel
4,070,088 A	1/1978	5,643,009 A	7/1997	Dinkel et al.
4,076,362 A	2/1978	5,664,973 A	9/1997	Emmert et al.
4,136,919 A	1/1979	5,691,041 A	11/1997	Frankeny et al.
4,159,861 A	7/1979	5,702,255 A	12/1997	Murphy et al.
4,217,024 A	8/1980	5,727,963 A	3/1998	LeMaster
4,260,212 A	4/1981	5,730,609 A	3/1998	Harwath
4,288,139 A	9/1981	5,741,144 A	4/1998	Elco et al.
4,371,912 A	2/1983	5,741,161 A	4/1998	Cahaly et al.
4,383,724 A	5/1983	5,742,484 A	4/1998	Gillette et al.
4,402,563 A	9/1983	5,743,009 A	4/1998	Matsui et al.
4,403,821 A	9/1983	5,745,349 A	4/1998	Lemke
4,505,529 A	3/1985	5,746,608 A	5/1998	Taylor
4,531,793 A	7/1985	5,755,595 A	5/1998	Davis et al.
4,533,187 A	8/1985	5,772,451 A	6/1998	Dozier, II et al.
4,536,955 A	8/1985	5,785,537 A *	7/1998	Donahue et al. 439/79
4,545,610 A	10/1985	5,787,971 A	8/1998	Dodson
4,552,425 A	11/1985	5,795,191 A	8/1998	Preputnick et al.
4,560,222 A	12/1985	5,810,607 A	9/1998	Shih et al.
4,564,259 A	1/1986	5,817,973 A	10/1998	Elco et al.
4,596,433 A	6/1986	5,831,314 A	11/1998	Wen
4,685,886 A	8/1987	5,857,857 A	1/1999	Fukuda
4,717,360 A	1/1988	5,874,776 A	2/1999	Kresge et al.
4,734,041 A	3/1988	5,876,219 A	3/1999	Taylor et al.
4,767,344 A	8/1988	5,876,248 A	3/1999	Brunker et al.
4,776,803 A	10/1988	5,883,782 A	3/1999	Thurston et al.
4,815,987 A	3/1989	5,888,884 A	3/1999	Wojnarowski
4,820,182 A	4/1989	5,908,333 A	6/1999	Perino et al.
4,867,713 A	9/1989	5,919,050 A	7/1999	Kehley et al.
4,878,611 A	11/1989	5,930,114 A	7/1999	Kuzmin et al.
4,881,905 A	11/1989	5,955,888 A	9/1999	Frederickson et al.
4,900,271 A	2/1990	5,961,355 A	10/1999	Morlion et al.
4,907,990 A	3/1990	5,971,817 A	10/1999	Longueville
4,915,641 A	4/1990	5,975,921 A	11/1999	Shuey
4,963,102 A	10/1990	5,980,270 A	11/1999	Fjelstad et al.
4,973,257 A	11/1990	5,980,321 A	11/1999	Cohen et al.
4,973,271 A	11/1990	5,984,726 A	11/1999	Wu
5,016,968 A	5/1991	5,993,259 A	11/1999	Stokoe et al.
5,024,610 A	6/1991	6,012,948 A	1/2000	Wu
5,035,639 A	7/1991	6,036,549 A	3/2000	Wulff
5,052,953 A	10/1991	6,050,862 A	4/2000	Ishii
5,066,236 A	11/1991	6,059,170 A	5/2000	Jimarez et al.
5,077,893 A	1/1992	6,065,951 A	5/2000	Lemke et al.
5,082,459 A	1/1992	6,068,520 A	5/2000	Winings et al.
5,094,634 A	3/1992	6,071,152 A	6/2000	Achammer et al.
5,104,332 A	4/1992	6,077,130 A	6/2000	Hughes et al.
5,147,228 A	9/1992	6,089,878 A	7/2000	Meng
5,151,056 A	9/1992	6,095,827 A	8/2000	Dutkowsky et al.
5,174,770 A	12/1992	6,102,754 A	8/2000	Capper et al.
5,214,308 A	5/1993	6,123,554 A	9/2000	Ortega et al.
5,238,414 A	8/1993	6,125,535 A	10/2000	Chiou et al.
5,254,012 A	10/1993	6,139,336 A	10/2000	Olson
5,274,918 A	1/1994	6,146,157 A	11/2000	Lenoir et al.
5,276,964 A	1/1994	6,146,202 A	11/2000	Ramey et al.
5,277,597 A	1/1994	6,146,203 A	11/2000	Elco et al.
5,295,843 A	3/1994	6,152,756 A	11/2000	Huang et al.
5,302,135 A	4/1994	6,174,198 B1	1/2001	Wu et al.
5,381,314 A	1/1995	6,180,891 B1	1/2001	Murdeshwar
5,400,949 A	3/1995	6,183,287 B1	2/2001	Po

US D610,548 S

6,183,301 B1	2/2001	Paagman	6,743,037 B2	6/2004	Kassa et al.
6,190,213 B1	2/2001	Reichart et al.	6,746,278 B2	6/2004	Nelson et al.
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.
6,210,197 B1	4/2001	Yu	6,776,635 B2	8/2004	Blanchfield et al.
6,210,240 B1	4/2001	Comerci et al.	6,776,649 B2	8/2004	Pape et al.
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. D13/147
6,220,895 B1	4/2001	Lin	6,811,440 B1	11/2004	Rothermel et al.
6,220,896 B1	4/2001	Bertoncici et al.	6,814,590 B2	11/2004	Minich et al.
6,234,851 B1	5/2001	Phillips	6,829,143 B2	12/2004	Russell et al.
6,238,225 B1	5/2001	Middlehurst et al.	6,835,103 B2	12/2004	Middlehurst et al.
D443,861 S *	6/2001	Ko et al. D13/147	6,840,783 B2	1/2005	Wolford et al.
6,254,435 B1	7/2001	Cheong et al.	6,843,687 B2	1/2005	McGowan et al.
6,257,478 B1	7/2001	Straub	6,848,886 B2	2/2005	Schmaling et al.
6,259,039 B1	7/2001	Chroneos, Jr. et al.	6,848,950 B2	2/2005	Allison et al.
6,269,539 B1	8/2001	Takahashi et al.	6,848,953 B2	2/2005	Schell et al.
6,274,474 B1	8/2001	Caletka et al.	6,869,294 B2	3/2005	Clark et al.
6,280,216 B1	8/2001	Bernier et al.	6,884,117 B2	4/2005	Korsunsky et al.
6,293,827 B1	9/2001	Stokoe et al.	6,890,221 B2	5/2005	Wagner
6,299,492 B1	10/2001	Pierini et al.	6,905,367 B2	6/2005	Crane, Jr. et al.
6,309,245 B1	10/2001	Sweeney	6,923,661 B1	8/2005	Bogiel et al.
6,319,075 B1	11/2001	Clark et al.	6,929,504 B2	8/2005	Ling et al.
6,322,377 B2	11/2001	Middlehurst et al.	6,947,012 B2	9/2005	Aisenbrey
6,328,602 B1	12/2001	Yamasaki et al.	6,975,511 B1	12/2005	Lebo et al.
6,347,952 B1	2/2002	Hasegawa et al.	6,994,569 B2	2/2006	Minich et al.
6,350,134 B1	2/2002	Fogg et al.	7,001,189 B1	2/2006	McGowan et al.
6,359,783 B1	3/2002	Noble	D517,488 S *	3/2006	Riku D13/147
6,360,940 B1	3/2002	Bolde et al.	7,059,892 B1	6/2006	Trout
6,362,961 B1	3/2002	Chiou	7,059,919 B2	6/2006	Clark et al.
6,363,607 B1	4/2002	Chen et al.	7,065,871 B2	6/2006	Minich et al.
6,371,773 B1	4/2002	Crofoot et al.	7,070,464 B2	7/2006	Clark et al.
6,379,188 B1	4/2002	Cohen et al.	7,074,096 B2	7/2006	Copper et al.
6,386,924 B2	5/2002	Long	7,101,228 B2	9/2006	Hammer et al.
6,394,818 B1	5/2002	Smalley, Jr.	7,104,812 B1	9/2006	Bogiel et al.
6,402,566 B1	6/2002	Middlehurst et al.	7,114,963 B2	10/2006	Shuey et al.
6,409,543 B1	6/2002	Astbury, Jr. et al.	RE39,380 E	11/2006	Davis
6,428,328 B2	8/2002	Haba et al.	7,137,848 B1	11/2006	Trout et al.
6,431,914 B1	8/2002	Billman	7,168,963 B2	1/2007	Minich et al.
6,435,914 B1	8/2002	Billman	D536,668 S *	2/2007	Ye et al. D13/147
6,450,289 B1	9/2002	Field	7,182,642 B2	2/2007	Ngo et al.
6,461,202 B2	10/2002	Kline	D540,264 S *	4/2007	Zhang D13/147
6,471,523 B1	10/2002	Shuey	7,204,699 B2	4/2007	Stoner et al.
6,471,548 B2	10/2002	Bertoncini et al.	D542,736 S	5/2007	Riku
6,488,549 B1	12/2002	Weller et al.	7,220,141 B2	5/2007	Daily et al.
6,489,567 B2	12/2002	Zachrai	7,258,562 B2	8/2007	Daily et al.
6,506,081 B2	1/2003	Blanchfield et al.	7,273,382 B2	9/2007	Igarashi et al.
6,514,103 B2	2/2003	Pape et al.	7,303,427 B2	12/2007	Swain
6,537,111 B2	3/2003	Brammer et al.	7,335,043 B2	2/2008	Ngo et al.
6,544,046 B1	4/2003	Hahn et al.	7,347,740 B2	3/2008	Minich
6,551,112 B1	4/2003	Li et al.	7,354,282 B2	4/2008	Margulis et al.
6,554,647 B1	4/2003	Cohen et al.	7,374,436 B2	5/2008	Schell et al.
6,572,410 B1	6/2003	Volstorf et al.	7,402,064 B2	7/2008	Daily et al.
6,575,774 B2	6/2003	Ling et al.	2001/0003685 A1	6/2001	Aritani
6,592,381 B2	7/2003	Cohen et al.	2002/0106930 A1	8/2002	Pape et al.
6,604,967 B2	8/2003	Middlehurst et al.	2002/0142676 A1	10/2002	Hosaka et al.
6,629,854 B2	10/2003	Murakami	2002/0159235 A1	10/2002	Miller et al.
6,645,012 B2	11/2003	Ito et al.	2002/0193019 A1	12/2002	Blanchfield et al.
6,652,318 B1	11/2003	Winings et al.	2003/0013330 A1	1/2003	Takeuchi
6,652,322 B2	11/2003	Ito et al.	2003/0143894 A1	7/2003	Kline et al.
6,663,426 B2	12/2003	Hasircoglu et al.	2003/0219999 A1	11/2003	Minich et al.
6,665,189 B1	12/2003	Lebo	2003/0220021 A1	11/2003	Whiteman, Jr. et al.
6,669,514 B2	12/2003	Wiebking et al.	2003/0236035 A1	12/2003	Kuroda et al.
6,672,884 B1	1/2004	Toh et al.	2004/0183094 A1	9/2004	Caletka et al.
6,672,907 B2	1/2004	Azuma	2005/0112952 A1	5/2005	Wang et al.
6,692,272 B2	2/2004	Lemke et al.	2006/0003620 A1	1/2006	Daily et al.
6,702,594 B2	3/2004	Lee et al.	2006/0128197 A1	6/2006	McGowan et al.
6,705,902 B1	3/2004	Yi et al.	2006/0228927 A1	10/2006	Daily
6,712,621 B2	3/2004	Li et al.	2006/0228948 A1	10/2006	Swain
6,716,068 B2	4/2004	Wu	2006/0281354 A1	12/2006	Ngo et al.
6,740,820 B2	5/2004	Cheng	2007/0197063 A1	8/2007	Ngo

US D610,548 S

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2007/0202748 A1 8/2007 Daily
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.

FOREIGN PATENT DOCUMENTS

DE 102 26 279 C1 11/2003
EP 0 273 683 A2 7/1988
EP 0 321 257 B1 4/1993
EP 0 623 248 B1 11/1995
EP 0 789 422 A2 8/1997
EP 1091449 B1 9/2004
GB 1 162 705 8/1969
JP 06 068943 3/1994
JP 06-236788 8/1994
JP 07-114958 5/1995
JP 07 169523 7/1995
JP 0 812 5379 5/1996
JP 09 199215 7/1997
JP 2000-003743 1/2000

JP 2000-003744 1/2000
JP 2000-003745 1/2000
JP 2000-003746 1/2000
JP 2003217785 7/2003
TW 576555 8/1990
TW 546872 8/2003
WO WO 97/43885 11/1997
WO WO 97/44859 11/1997
WO WO 98/15989 4/1998
WO WO 01/29931 A1 4/2001
WO WO 01/39332 A1 5/2001

OTHER PUBLICATIONS

Sherman, L.M., "Plastics that Conduct Heat", *Plastics Technology Online*, Jun. 2001, <http://www.plasticstechnology.com>, 4 pages.
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.
Introduction to High Current Card Edge Connectors, Tyco Electronics, Catalog 1773096, Revised Jul. 2007, 19 pages.

* cited by examiner

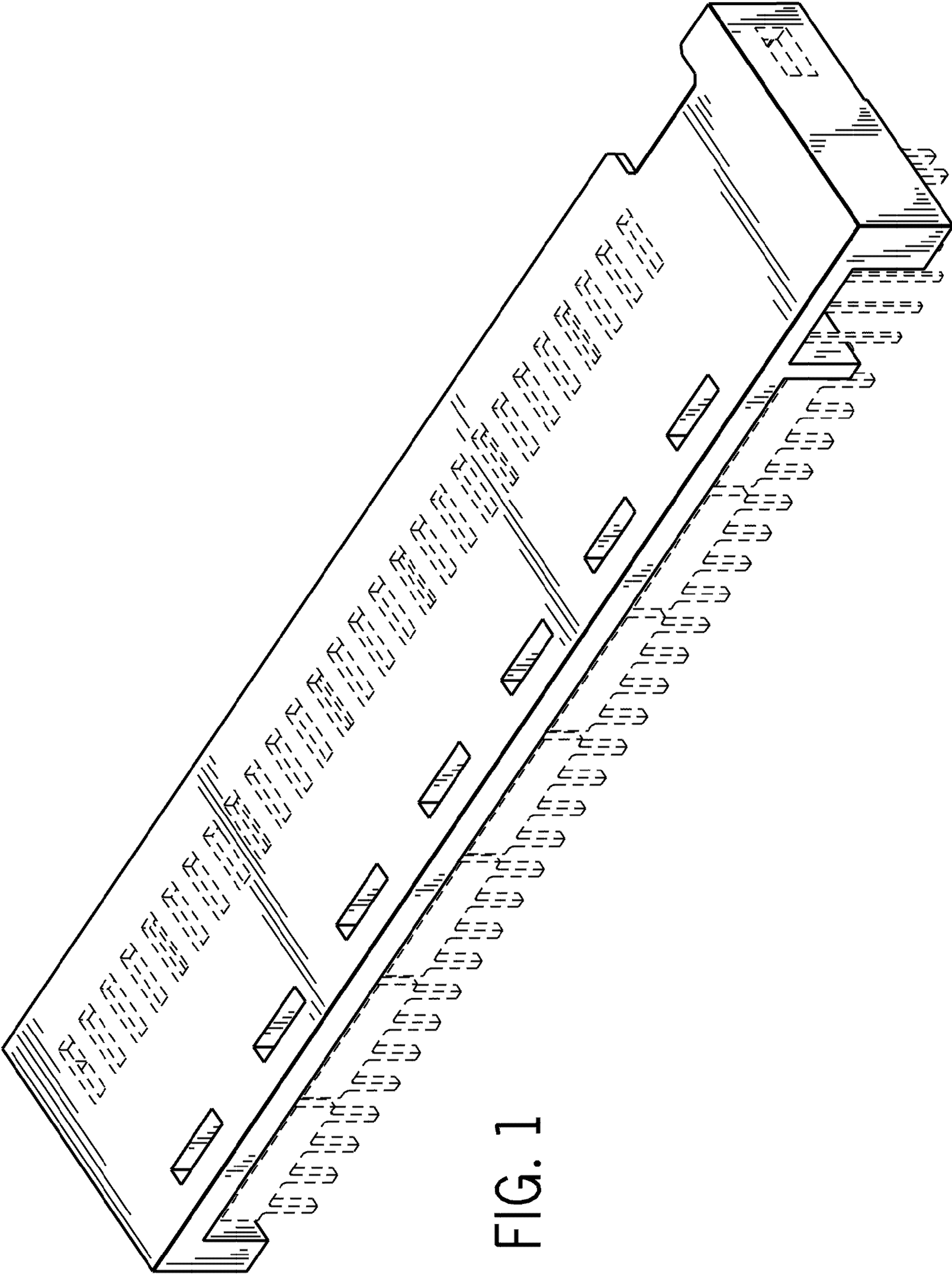


FIG. 1

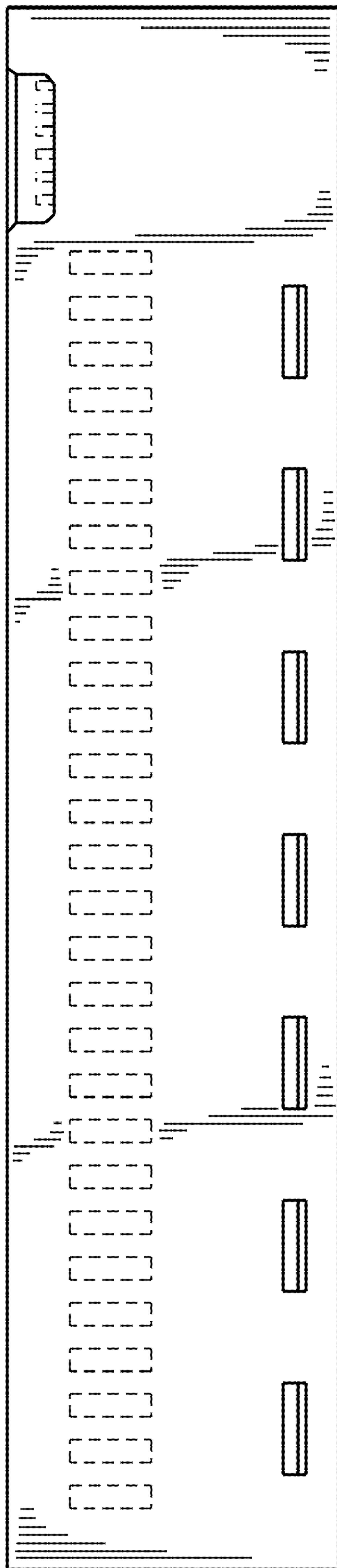


FIG. 2

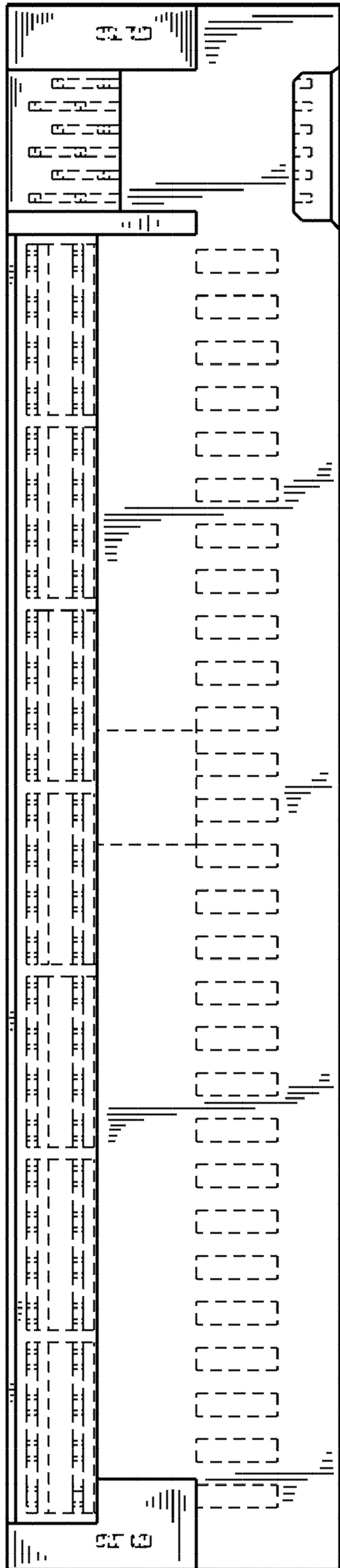


FIG. 3

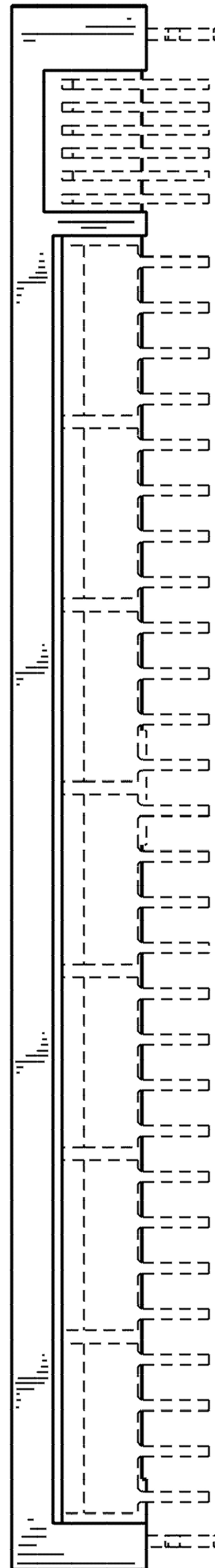


FIG. 4

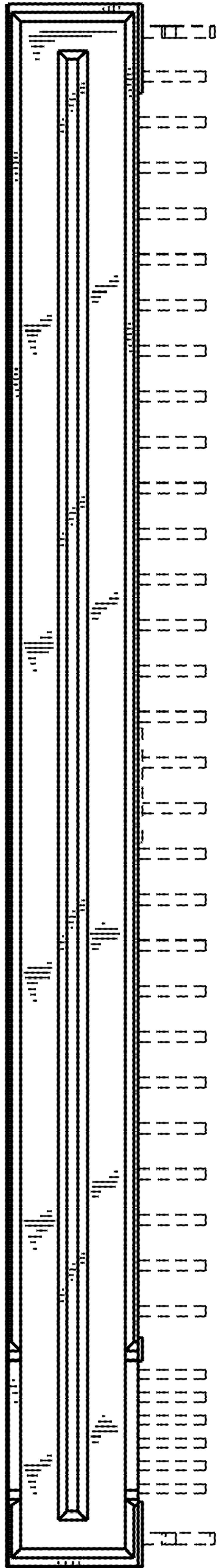


FIG. 5

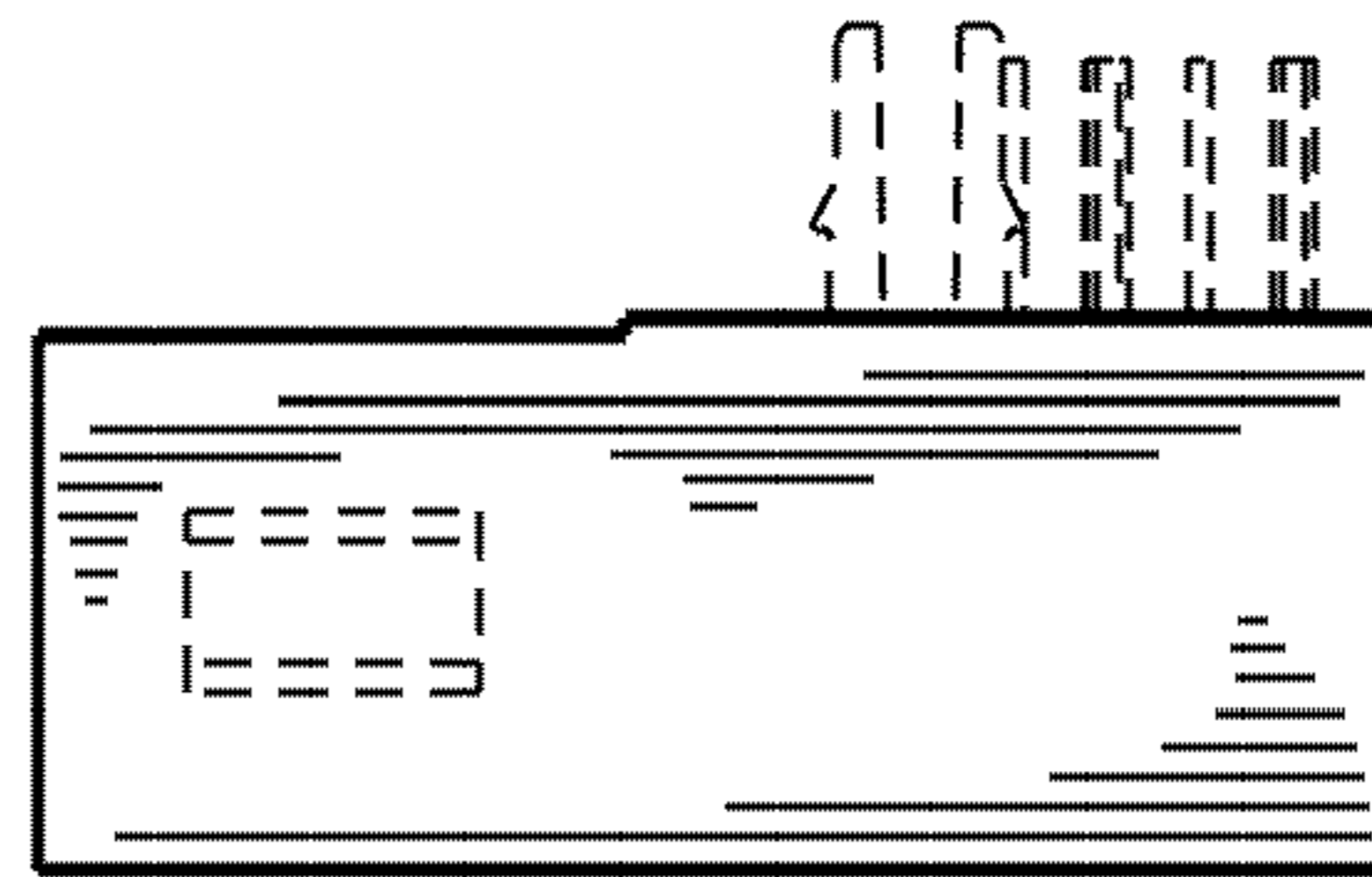


FIG. 6

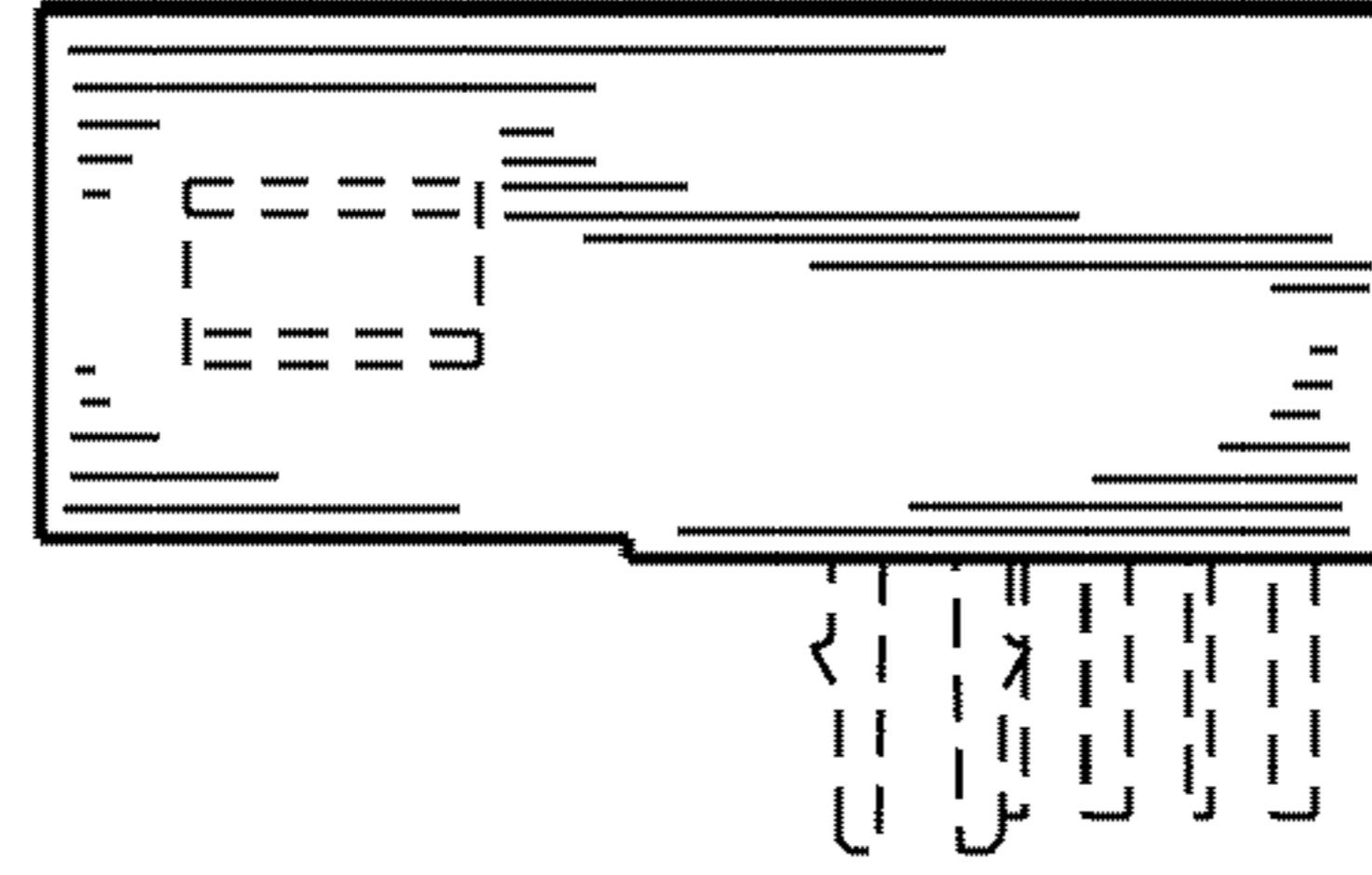


FIG. 7