



US00D749713S

(12) **United States Design Patent**
Guyuron et al.

(10) **Patent No.:** **US D749,713 S**
(45) **Date of Patent:** **** Feb. 16, 2016**

(54) **HEAT EXCHANGER**

FOREIGN PATENT DOCUMENTS

(71) Applicant: **Innovative Medical Equipment, LLC**,
Lyndhurst, OH (US)

EP 1175135 A1 1/2002

(72) Inventors: **Bahman Guyuron**, Lyndhurst, OH
(US); **Fred Bahr**, Seven Hills, OH (US);
Brad A. Pulver, Shaker Heights, OH
(US); **Jamie Horvath**, Twinsburg, OH
(US); **Glen M. Guyuron**, Lyndhurst, OH
(US)

OTHER PUBLICATIONS

Kandlikar and Hayner II, Liquid Cooled Cold Plates for Industrial High-Power Electronic Devices—Thermal Design and Manufacturing Considerations, 2009, p. 921, vol. 30 No. 12, Taylor and Francis Group, LLC.

(Continued)

(73) Assignee: **Innovative Medical Equipment, LLC**,
Lyndhurst, OH (US)

Primary Examiner — T. Chase Nelson

Assistant Examiner — Ania Aman

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

(74) *Attorney, Agent, or Firm* — Renner, Otto, Boisselle and Sklar, LLP

(21) Appl. No.: **29/498,081**

(57) **CLAIM**

The ornamental design for a heat exchanger, as shown and described.

(22) Filed: **Jul. 31, 2014**

DESCRIPTION

(51) **LOC (10) Cl.** **23-03**

(52) **U.S. Cl.**
USPC **D23/314**

(58) **Field of Classification Search**
USPC D23/314, 323, 324, 329, 341; 62/3.2,
62/3.3, 3.1
CPC Y10S 257/93; Y10S 977/833; G01N
2030/303; G01N 2030/3092; A61B
2018/00047; H01S 5/02415
See application file for complete search history.

FIG. 1 is a perspective view of a heat exchanger showing our new design.

FIG. 2 is a top view thereof.

FIG. 3 is a bottom view thereof.

FIG. 4 is a rear view thereof.

FIG. 5 is a front view thereof.

FIG. 6 is a left side view thereof.

FIG. 7 is a right side view thereof.

FIG. 8 is a perspective view of another embodiment of the heat exchanger.

FIG. 9 is a top view thereof.

FIG. 10 is a bottom view thereof.

FIG. 11 is a rear view thereof.

FIG. 12 is a front view thereof.

FIG. 13 is a left side view thereof; and,

FIG. 14 is a right side view thereof.

The broken line shown in the drawings are for the purpose of illustrating portions of the article that form no part of the claimed design.

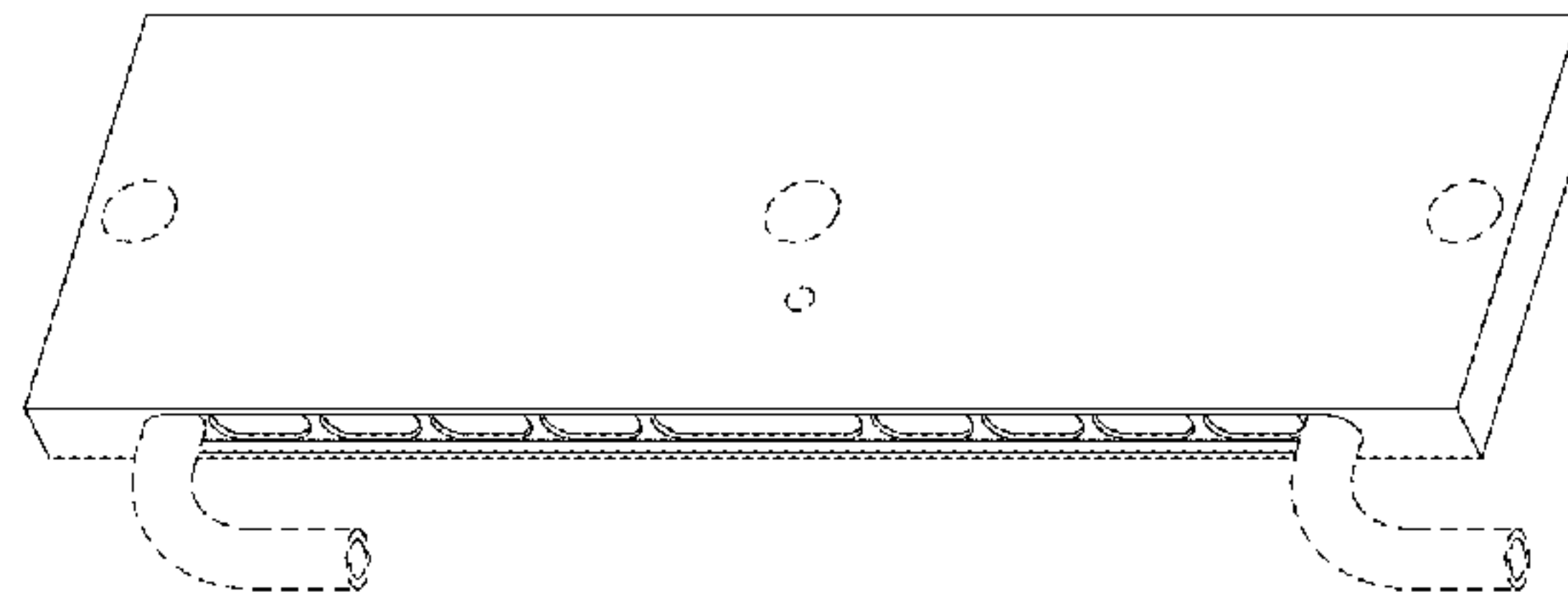
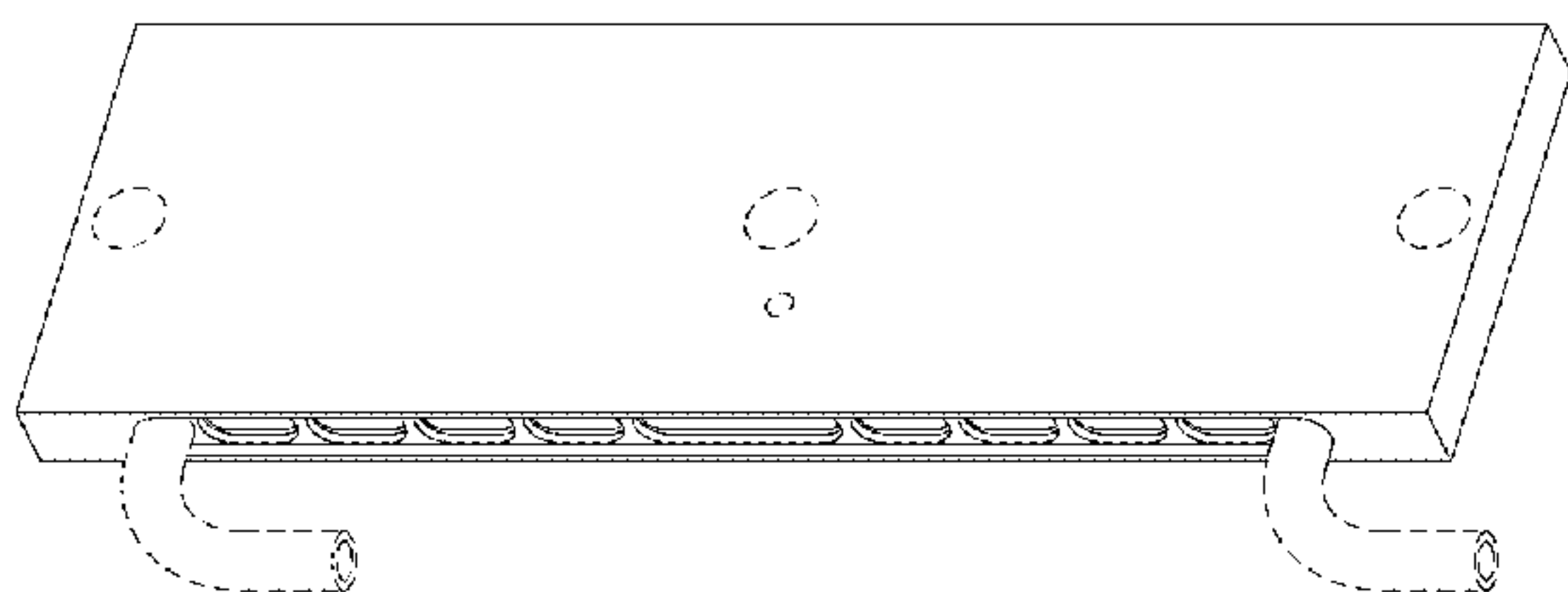
(56) **References Cited**

U.S. PATENT DOCUMENTS

2,039,593	A	5/1936	Hubbuch et al.	
4,227,068	A *	10/1980	Carter	392/370
4,712,158	A	12/1987	Kikuchi et al.	
5,057,968	A	10/1991	Morrison	
5,070,606	A	12/1991	Hoopman et al.	
5,285,347	A	2/1994	Fox et al.	
5,329,993	A	7/1994	Ettehadih	

(Continued)

1 Claim, 4 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

5,457,342	A *	10/1995	Herbst, II	.....	H01L 23/38 257/712
5,502,967	A *	4/1996	Nakagawa	.....	B43K 8/22 219/216
5,590,532	A *	1/1997	Bachman	.....	B67D 1/0869 62/3.3
5,628,769	A *	5/1997	Saringer	.....	A61F 7/007 607/98
5,737,923	A *	4/1998	Gilley et al.	.....	62/3.7
5,829,516	A	11/1998	Lavochkin		
5,859,763	A	1/1999	Nam et al.		
5,983,995	A	11/1999	Shutou et al.		
6,072,815	A *	6/2000	Peterson	.....	H01S 3/025 372/34
6,154,363	A *	11/2000	Chang	.....	H01L 23/4093 165/80.4
6,189,213	B1	2/2001	Kimura et al.		
6,345,507	B1 *	2/2002	Gillen	.....	62/3.7
6,438,964	B1 *	8/2002	Giblin	.....	A41D 13/005 62/259.3
6,725,682	B2	4/2004	Scott		
6,808,013	B2	10/2004	Lai et al.		
6,826,923	B2	12/2004	Nakano et al.		
6,923,362	B2	8/2005	Mishra		
6,988,534	B2	1/2006	Kenny et al.		
D536,773	S *	2/2007	Yeung	.....	D23/330
7,178,586	B2	2/2007	Goldman et al.		
7,298,617	B2	11/2007	Campbell et al.		
7,746,641	B2 *	6/2010	Sun	.....	G06F 1/20 165/80.4
D621,016	S *	8/2010	Garcia	.....	D23/330
7,850,061	B2	12/2010	Rigal et al.		
8,359,871	B2 *	1/2013	Woods et al.	.....	62/3.2
8,441,794	B2	5/2013	Hou et al.		
2003/0044130	A1 *	3/2003	Crane, Jr.	.....	G02B 6/3839 385/92
2003/0183839	A1 *	10/2003	Yamashita	.....	H01L 23/38 257/108
2004/0194942	A1	10/2004	Okamoto et al.		
2005/0121065	A1 *	6/2005	Otey	.....	136/205
2006/0137358	A1 *	6/2006	Feher	.....	B01N 2/5635 62/3.3
2008/0098750	A1 *	5/2008	Busier	.....	F24H 4/04 62/3.3
2010/0281884	A1 *	11/2010	Rawski et al.	.....	62/3.6
2011/0032679	A1 *	2/2011	Baek	.....	H01L 23/38 361/715
2011/0271994	A1 *	11/2011	Gilley	.....	136/205
2012/0312029	A1 *	12/2012	Brehm et al.	.....	62/3.3
2013/0061605	A1 *	3/2013	de Rochemont	.....	62/3.5
2013/0239589	A1 *	9/2013	Mahalingam	.....	H01L 23/467 62/3.2
2014/0051155	A1 *	2/2014	Evans	.....	B01L 7/52 435/287.2
2014/0075960	A1 *	3/2014	Kuo	.....	F25B 21/02 62/3.2
2014/0208772	A1 *	7/2014	Schon	.....	B01L 7/52 62/3.3
2014/0216060	A1 *	8/2014	Ilercil	.....	F25B 21/02 62/3.6
2014/0251579	A1 *	9/2014	Sloss	.....	165/96
2015/0107270	A1 *	4/2015	Oh	.....	A47G 23/0208 62/3.3
2015/0221846	A1 *	8/2015	Terauchi	.....	H01S 5/02415 136/203

OTHER PUBLICATIONS

Nelson, The Evolution of the PC Cooling Water Block, 1 page, <<<http://www.overclockers.com/the-evolution-of-the-pc-cooling-waterblock/>>>, at least as early as 2012.
 Andrew, Water Cooling Twin Peltiers, 1 page, Nov. 1, 2010.
 Foster, It's Copper Cool'n. Time, 2 pages, <<<http://www.unofficial3d.com/stevefoster/copper.htm>>>, at least as early as 2007.

* cited by examiner

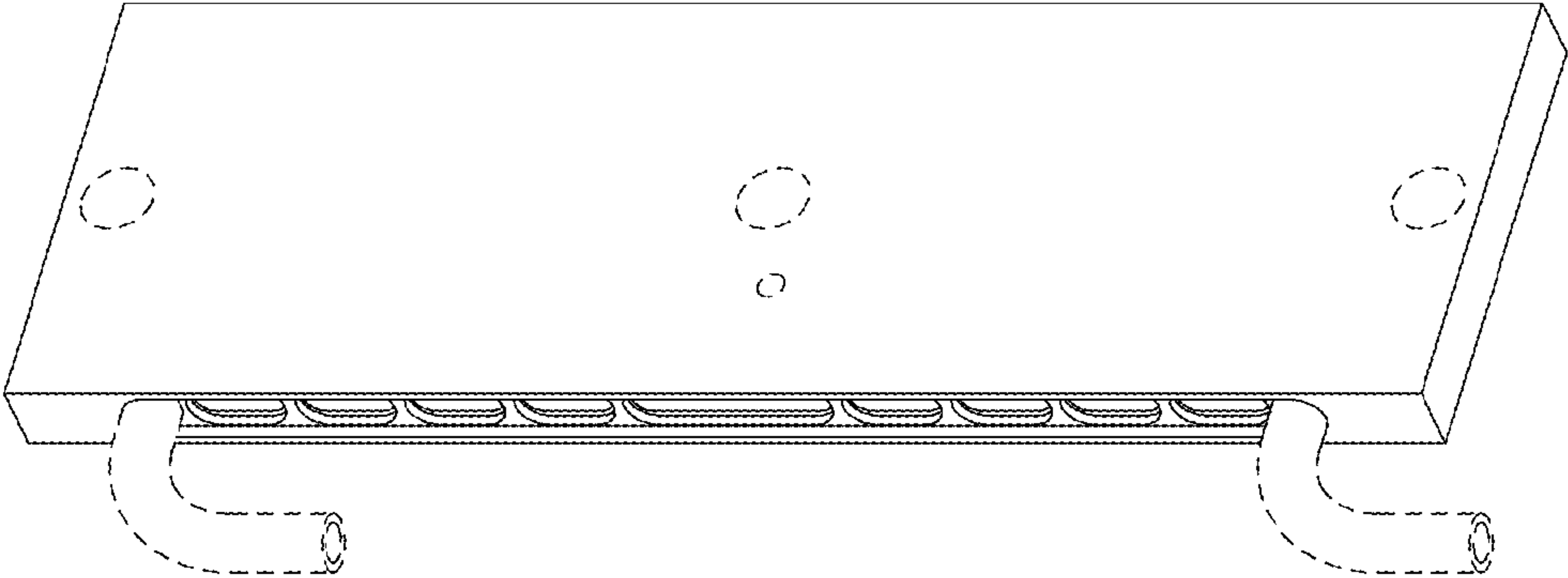


FIG. 1

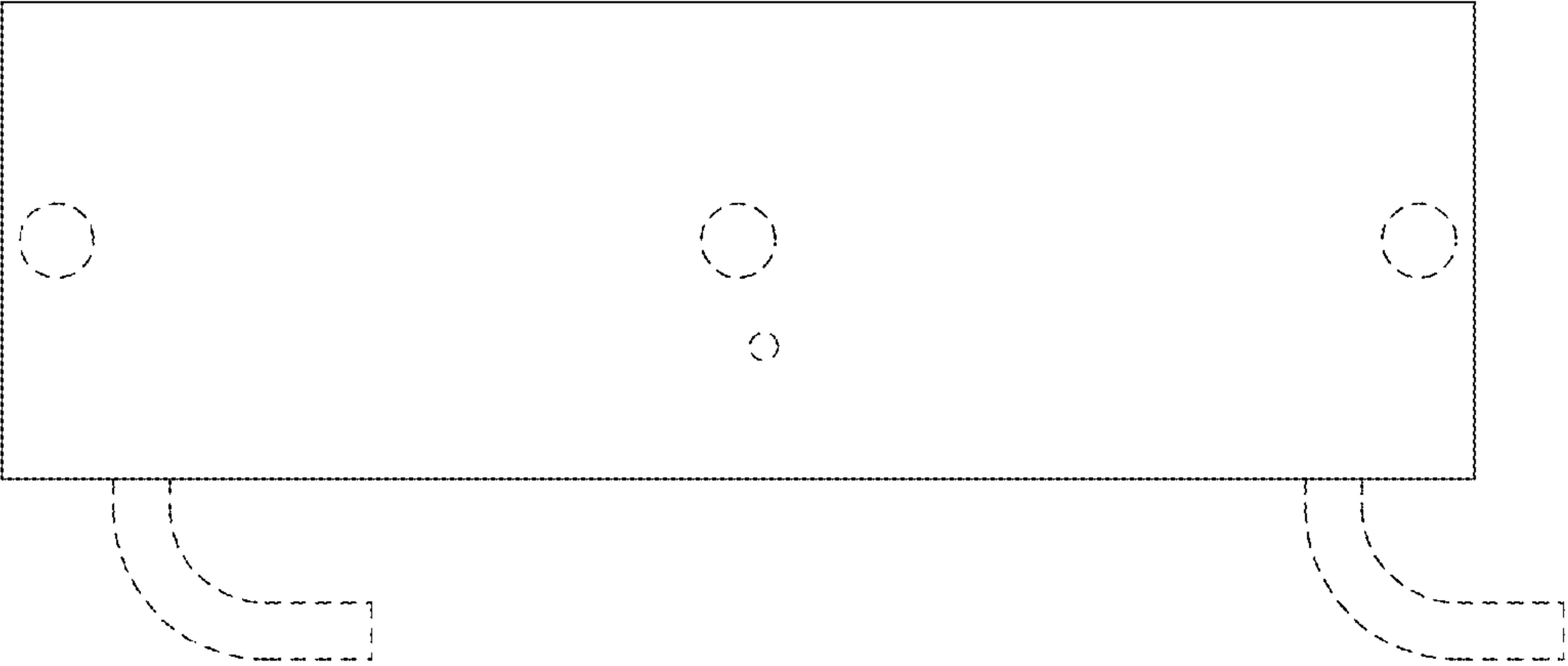


FIG. 2

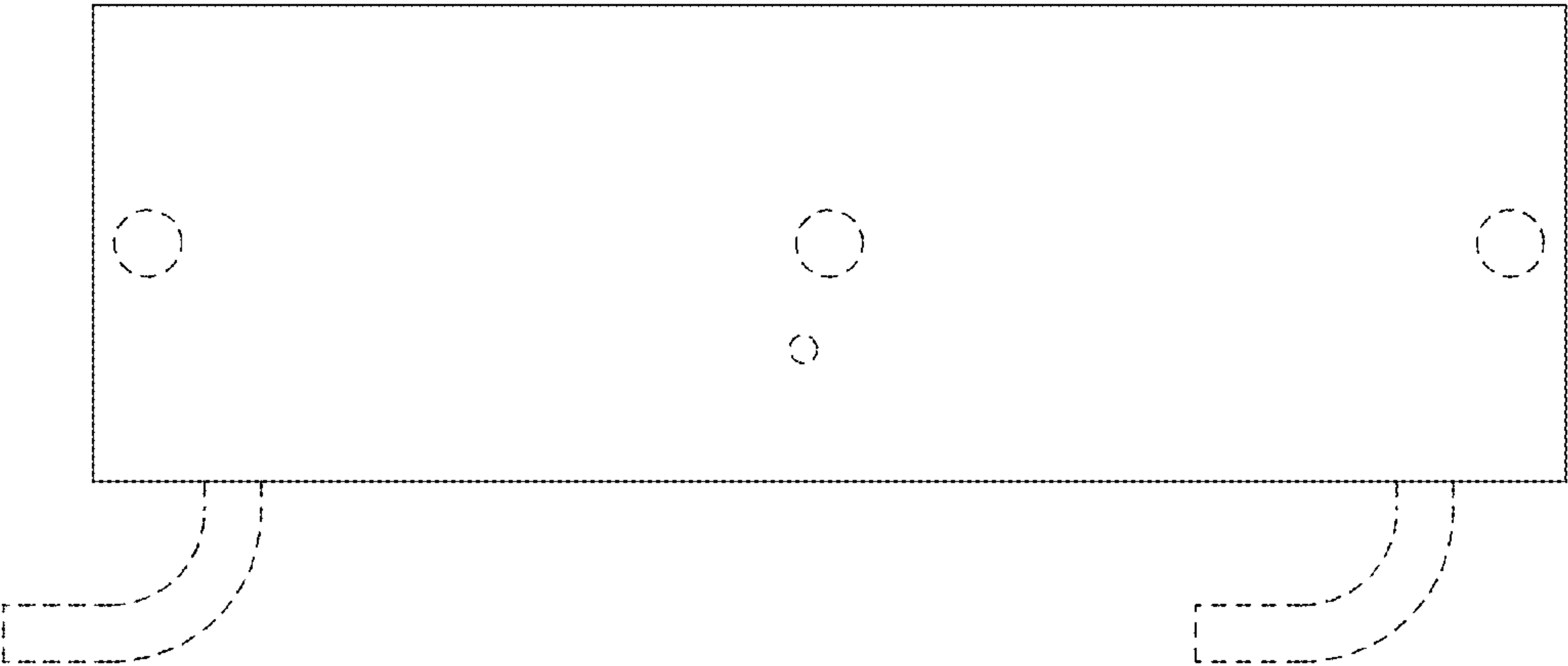


FIG. 3

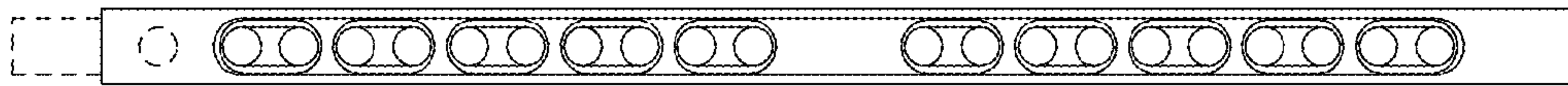


FIG. 4

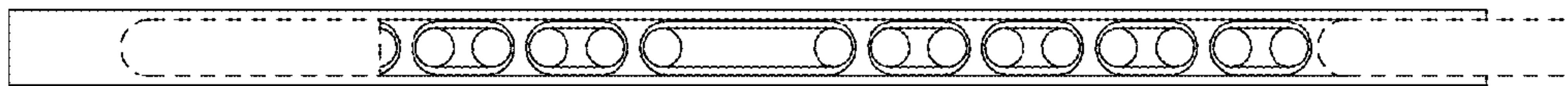


FIG. 5



FIG. 6



FIG. 7

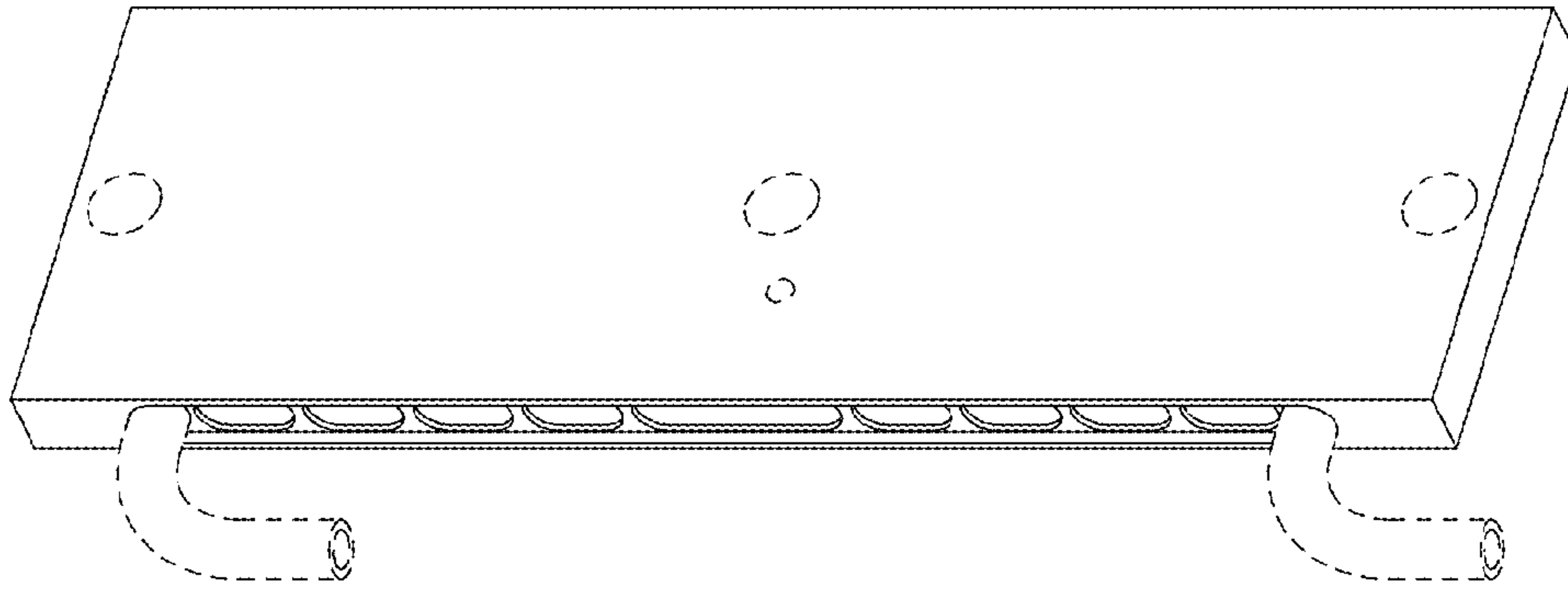


FIG. 8

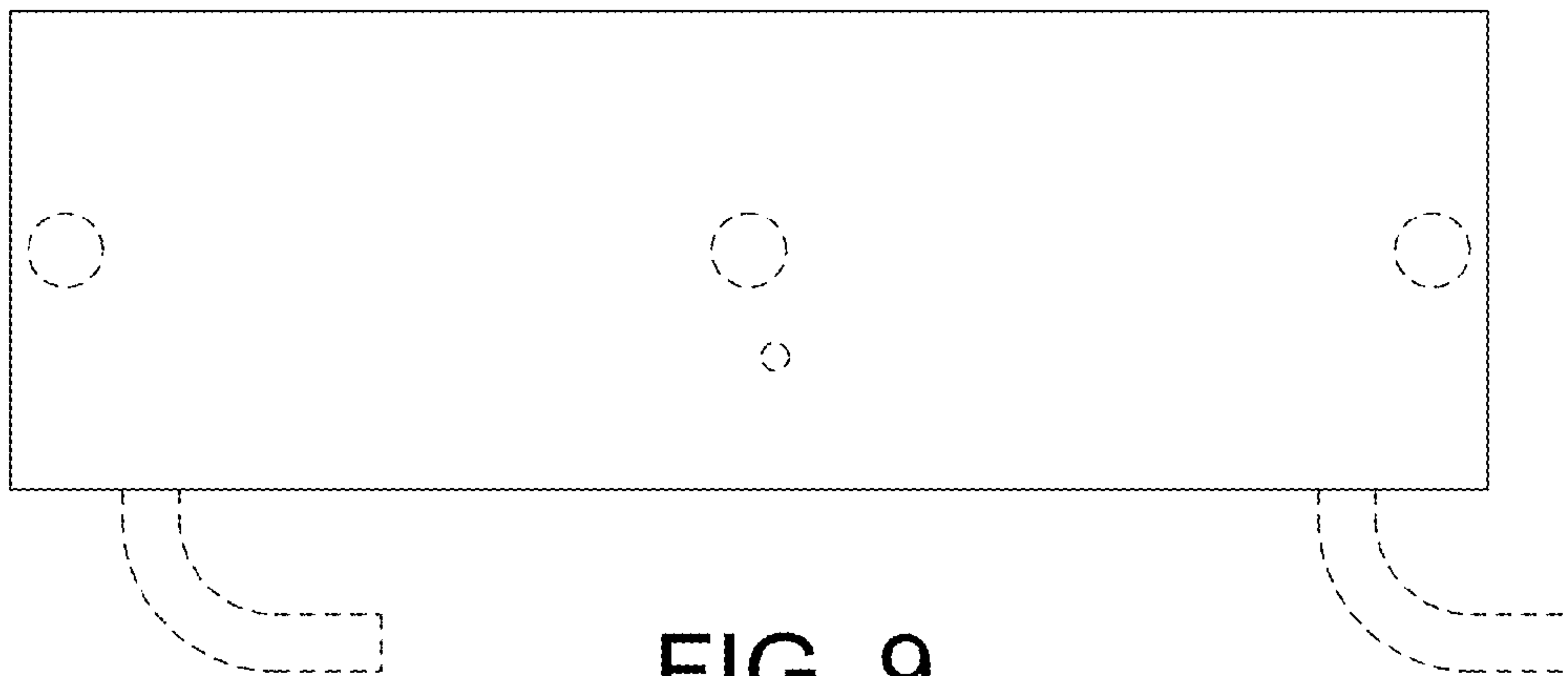


FIG. 9

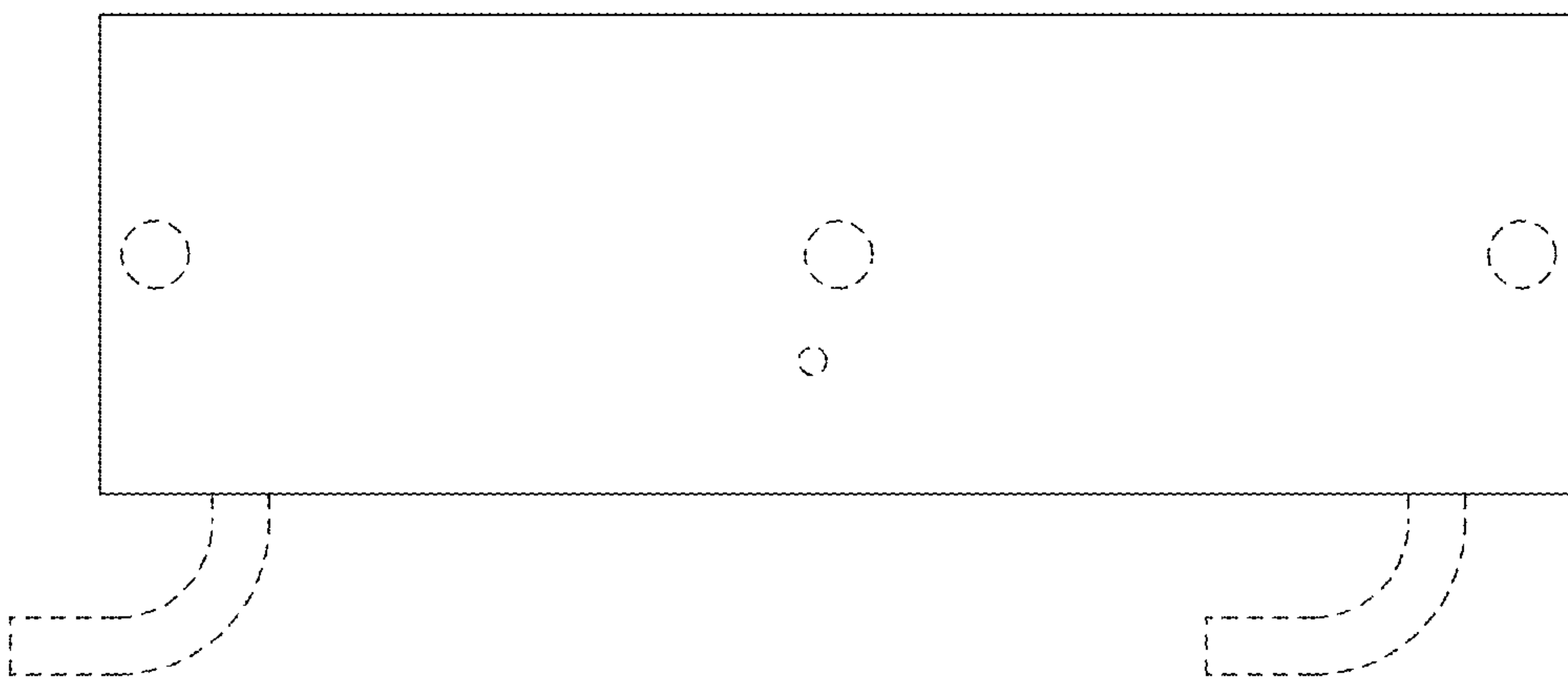


FIG. 10

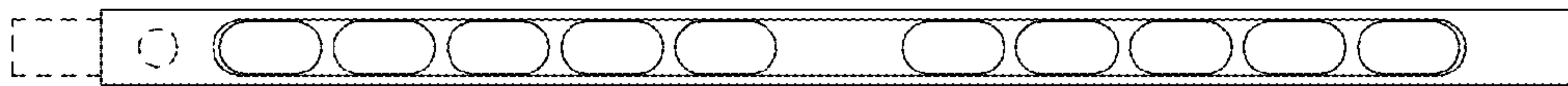


FIG. 11



FIG. 12

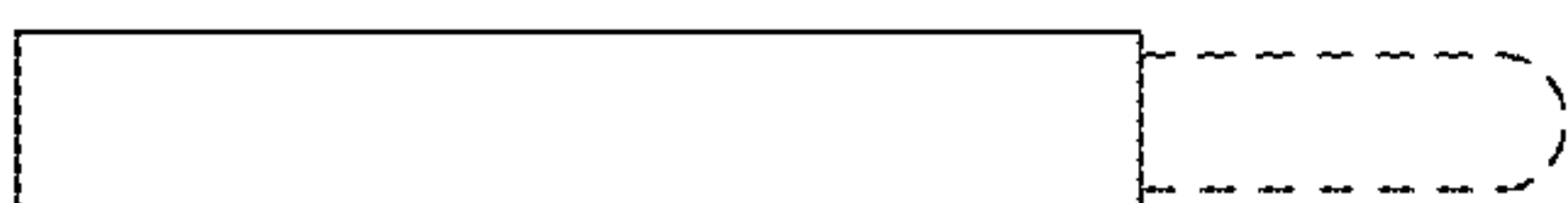


FIG. 13

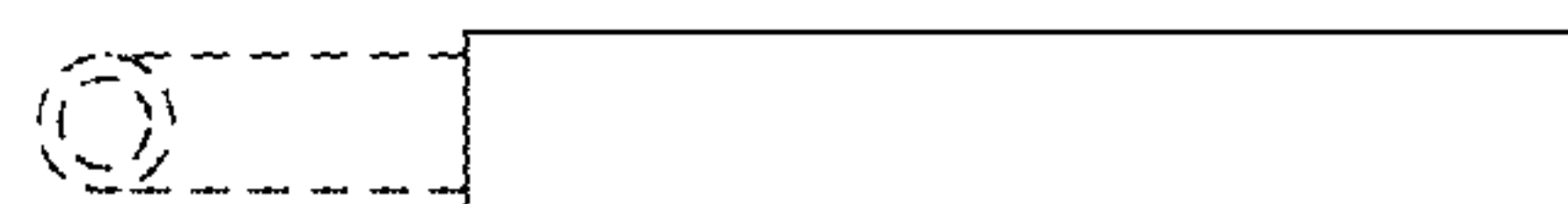


FIG. 14

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : D749,713 S
APPLICATION NO. : 29/498081
DATED : February 16, 2016
INVENTOR(S) : Fred Bahr

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:

Title Page

Item (72) inventors, please change the listing of inventors to:

Inventor(s): Fred Bahr, Seven Hills, OH (US)

Signed and Sealed this
Twenty-first Day of June, 2016



Michelle K. Lee
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : D749,713 S
APPLICATION NO. : 29/498081
DATED : February 16, 2016
INVENTOR(S) : Bahman Guyuron et al.

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:

Title Page

“Item (72) inventors, please change the listing of inventors to:

Inventor(s): Fred Bahr, Seven Hills, OH (US)”

(as corrected to read in the Certificate of Correction issued March 29, 2016) is deleted and patent is returned to its original state with the Inventors name in patent to read

--(72) Inventors: **Bahman Guyuron**, Lyndhurst, OH
(US); **Fred Bahr**, Seven Hills, OH (US);
Brad A. Pulver, Shaker Heights, OH
(US); **Jamie Horvath**, Twinsburg, OH
(US); **Glen M. Guyuron**, Lundhurst, OH
(US)--

Signed and Sealed this
Second Day of August, 2016



Michelle K. Lee
Director of the United States Patent and Trademark Office