



US00D672467S

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

(10) **Patent No.:** **US D672,467 S**  
(45) **Date of Patent:** **\*\* Dec. 11, 2012**

(54) **ROTATABLE SAMPLE PROCESSING DISK**

(75) Inventors: **Jeffrey D. Smith**, Marine on St. Croix, MN (US); **Peter D. Ludowise**, Cottage Grove, MN (US)

(73) Assignee: **3M Innovative Properties Company**, St. Paul, MN (US)

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

(21) Appl. No.: **29/392,223**

(22) Filed: **May 18, 2011**

(51) **LOC (9) Cl.** ..... **24-01**

(52) **U.S. Cl.** ..... **D24/216**

(58) **Field of Classification Search** ..... D24/216, D24/217, 219, 225, 231, 232, 107, 169, 186; D10/81; 422/500, 547, 62-65, 67, 72; 435/287.1, 435/287.3; 436/43, 45, 47; 356/246; 494/16  
See application file for complete search history.

D271,993 S 12/1983 Swartz  
4,456,581 A 6/1984 Edelman et al.  
D274,553 S \* 7/1984 Perry ..... D24/226  
4,476,733 A 10/1984 Chlosta et al.  
4,488,810 A 12/1984 Hatanaka et al.  
4,498,896 A 2/1985 Leis  
D277,891 S \* 3/1985 Uffenheimer et al. .... D24/226  
4,554,436 A 11/1985 Chlosta et al.  
4,580,896 A 4/1986 Brickus et al.  
4,632,908 A 12/1986 Schultz  
D287,634 S \* 1/1987 Carr et al. .... D24/230  
D288,124 S 2/1987 Brickus et al.  
4,695,430 A 9/1987 Coville et al.  
4,766,078 A 8/1988 Gang  
4,814,279 A 3/1989 Sugaya

(Continued)

**FOREIGN PATENT DOCUMENTS**

CA 2130013 3/1999  
(Continued)

**OTHER PUBLICATIONS**

U.S. Appl. No. 60/237,151, filed Oct. 2, 2000.

(Continued)

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,555,284 A 1/1971 Anderson  
3,595,386 A 7/1971 Hradel  
3,713,124 A 1/1973 Durland et al.  
3,795,451 A 3/1974 Mailen  
3,798,459 A 3/1974 Anderson et al.  
3,856,470 A 12/1974 Cullis et al.  
3,873,217 A 3/1975 Anderson et al.  
3,912,799 A 10/1975 Chisholm  
3,964,867 A 6/1976 Berry  
4,030,834 A 6/1977 Bauer et al.  
4,046,511 A 9/1977 Stabile  
4,111,304 A 9/1978 Lucas  
4,123,173 A 10/1978 Bullock et al.  
4,244,916 A 1/1981 Guigan  
4,252,538 A 2/1981 Barr  
4,256,696 A 3/1981 Soodak  
4,284,602 A 8/1981 Kelton  
4,298,570 A 11/1981 Lillig et al.  
4,390,499 A 6/1983 Curtis et al.

*Primary Examiner* — Anhdao Doan

(74) *Attorney, Agent, or Firm* — Nicole J. Einerson

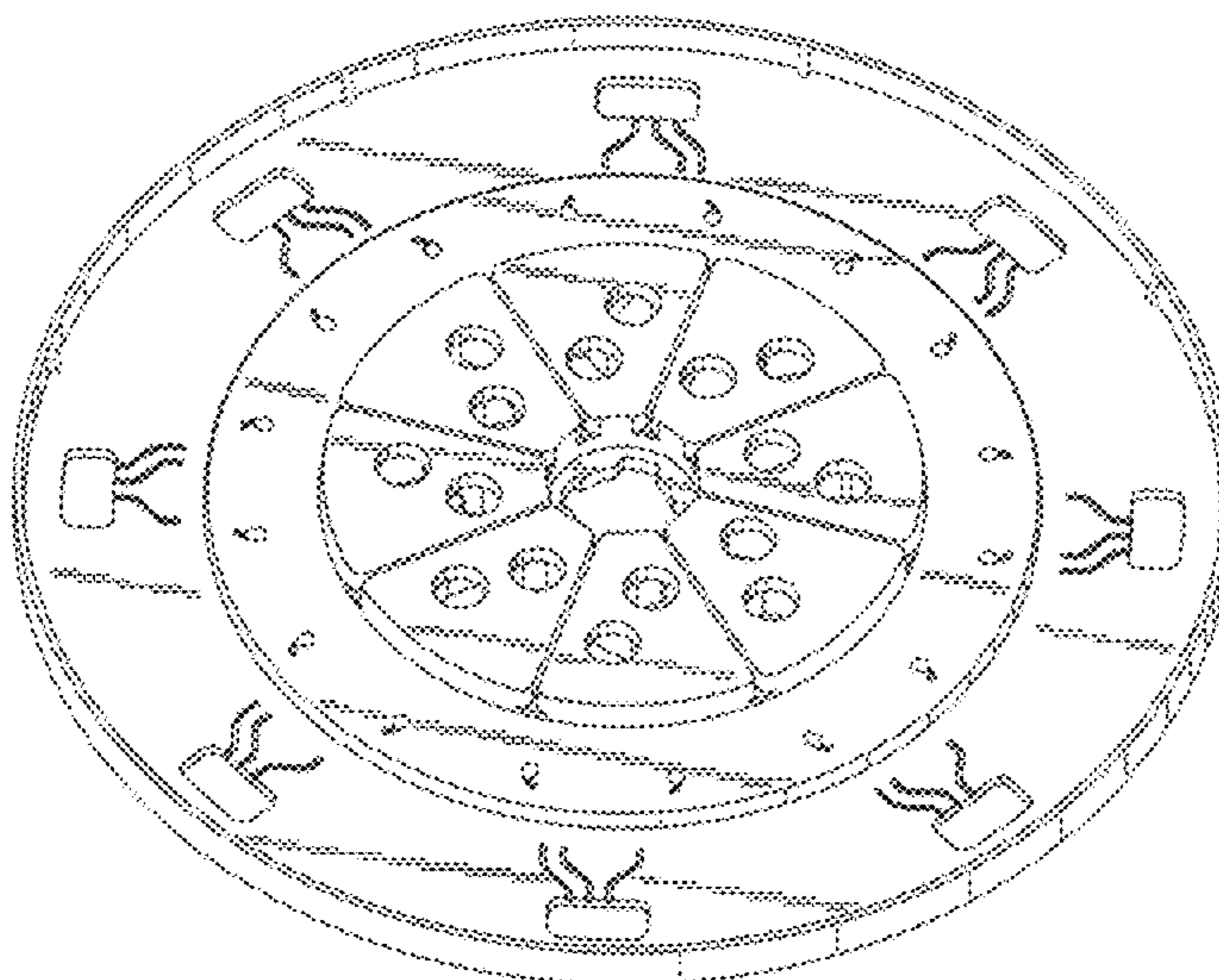
(57) **CLAIM**

The ornamental design for a rotatable sample processing disk, as shown and described.

**DESCRIPTION**

FIG. 1 is a top perspective view of a rotatable sample processing disk, showing the new design.  
FIG. 2 is a bottom perspective view thereof;  
FIG. 3 is a top plan view thereof;  
FIG. 4 is a bottom plan view thereof; and,  
FIG. 5 is a side elevational view thereof.

**1 Claim, 4 Drawing Sheets**



# US D672,467 S

Page 2

U.S. PATENT DOCUMENTS					
4,906,432	A	3/1990 Geiselman	6,720,187	B2	4/2004 Bedingham et al.
4,990,075	A	2/1991 Wogoman	6,734,401	B2	5/2004 Bedingham et al.
D321,057	S *	10/1991 Holen ..... D24/224	6,752,961	B2	6/2004 Kopf-Sill
D329,024	S	9/1992 Marks	6,814,935	B2	11/2004 Harms et al.
5,149,505	A	9/1992 English et al.	6,846,455	B1 *	1/2005 Carney et al. .... 422/64
5,160,702	A	11/1992 Kopf-Sill	6,889,468	B2	5/2005 Bedingham et al.
5,182,083	A	1/1993 Barker et al.	6,972,113	B1	12/2005 Ramshaw
5,207,987	A	5/1993 Kureshy et al.	6,987,253	B2	1/2006 Bedingham et al.
5,219,526	A	6/1993 Long	7,026,168	B2	4/2006 Bedingham et al.
5,229,297	A	7/1993 Schnipelsky et al.	7,164,107	B2	1/2007 Bedingham et al.
5,256,376	A *	10/1993 Callan et al. .... 422/72	7,192,560	B2	3/2007 Parthasarathy et al.
5,258,163	A	11/1993 Krause et al.	7,273,591	B2	9/2007 Sellers et al.
5,278,377	A	1/1994 Tsai	D557,425	S	12/2007 Nakamura et al.
5,281,516	A	1/1994 Stapleton et al.	D559,993	S	1/2008 Nagakubo et al.
5,310,523	A	5/1994 Smethers et al.	D559,994	S	1/2008 Nagakubo et al.
5,320,808	A *	6/1994 Holen et al. .... 422/64	D560,284	S	1/2008 Nagakubo et al.
5,336,467	A	8/1994 Heidt et al.	7,322,254	B2	1/2008 Bedingham et al.
5,411,065	A	5/1995 Meador et al.	7,323,660	B2	1/2008 Bedingham et al.
5,415,839	A	5/1995 Zaun et al.	7,332,326	B1	2/2008 Kellogg et al.
5,438,128	A	8/1995 Nieuwkerk et al.	D564,667	S *	3/2008 Bedingham et al. .... D24/216
5,496,518	A	3/1996 Arai et al.	7,396,508	B1	7/2008 Richards et al.
5,496,520	A	3/1996 Kelton et al.	7,435,933	B2	10/2008 Bedingham et al.
5,571,410	A	11/1996 Swedberg et al.	7,445,752	B2	11/2008 Harms
5,578,270	A	11/1996 Reichler et al.	7,507,575	B2	3/2009 Bedingham
5,593,838	A	1/1997 Zanzucchi et al.	7,527,763	B2	5/2009 Bedingham
5,599,501	A	2/1997 Carey et al.	7,569,186	B2	8/2009 Bedingham et al.
5,601,141	A	2/1997 Gordon et al.	D600,722	S	9/2009 Yabe et al.
5,604,130	A	2/1997 Warner et al.	7,595,200	B2	9/2009 Bedingham
5,616,301	A	4/1997 Moser et al.	D605,206	S	12/2009 Yabe et al.
5,639,428	A	6/1997 Cottingham	7,628,954	B2	12/2009 Gomm et al.
5,653,940	A *	8/1997 Carey et al. .... 422/64	7,678,334	B2	3/2010 Bedingham
5,693,233	A	12/1997 Schembri	7,709,249	B2	5/2010 Bedingham
RE35,716	E	1/1998 Stapleton et al.	7,754,474	B2	7/2010 Aysta et al.
5,795,547	A	8/1998 Moser et al.	7,763,210	B2	7/2010 Bedingham et al.
5,804,141	A	9/1998 Chianese	7,767,937	B2	8/2010 Bedingham et al.
5,819,842	A	10/1998 Potter et al.	7,837,947	B2	11/2010 Bedingham
5,856,194	A	1/1999 Arnquist et al.	7,855,083	B2	12/2010 Bedingham
5,863,502	A	1/1999 Southgate et al.	7,867,767	B2	1/2011 Bedingham
5,869,002	A	2/1999 Limon et al.	7,871,827	B2	1/2011 Parthasarathy
5,886,863	A	3/1999 Nagasaki et al.	D638,550	S	5/2011 Bedingham
5,922,617	A	7/1999 Wang et al.	D638,951	S	5/2011 Bedingham
6,013,513	A	1/2000 Reber et al.	2002/0047003	A1	4/2002 Bedingham et al.
6,015,674	A	1/2000 Woudenberg	2002/0048533	A1	4/2002 Harms et al.
6,030,581	A	2/2000 Virtanen	2002/0064885	A1	5/2002 Bedingham et al.
6,063,589	A	5/2000 Kellogg et al.	2002/0076354	A1	6/2002 Cohen
6,068,751	A	5/2000 Neukermans	2002/0097632	A1	7/2002 Kellogg
6,103,199	A	8/2000 Bjornson et al.	2003/0017567	A1	1/2003 Parthasarathy et al.
6,143,248	A	11/2000 Kellogg et al.	2003/0032173	A1 *	2/2003 Farina et al. .... 435/288.2
6,153,012	A	11/2000 Rupp et al.	2003/0044322	A1	3/2003 Andersson et al.
6,168,759	B1	1/2001 Green et al.	2003/0053934	A1	3/2003 Andersson et al.
6,168,948	B1	1/2001 Anderson et al.	2003/0118804	A1	6/2003 Bedingham et al.
6,183,693	B1	2/2001 Bogen et al.	2003/0120062	A1	6/2003 Parthasarathy et al.
6,190,617	B1	2/2001 Clark et al.	2003/0124506	A1	7/2003 Bedingham et al.
6,197,595	B1	3/2001 Anderson et al.	2003/0138779	A1	7/2003 Parthasarathy et al.
D441,873	S *	5/2001 Kohler ..... D24/219	2003/0152491	A1	8/2003 Kellogg et al.
6,235,531	B1	5/2001 Kopf-Sill	2003/0152994	A1	8/2003 Woudenberg et al.
6,265,168	B1	7/2001 Gjerde et al.	2004/0007275	A1	1/2004 Hui Liu
6,284,113	B1	9/2001 Bjornson et al.	2004/0018117	A1	1/2004 Desmond et al.
6,296,809	B1	10/2001 Richards et al.	2004/0053290	A1	3/2004 Terbrueggen
6,302,134	B1	10/2001 Kellogg et al.	2004/0121471	A1	6/2004 Dufresne et al.
6,306,273	B1	10/2001 Wainright et al.	2004/0179974	A1	9/2004 Bedingham et al.
6,319,469	B1	11/2001 Mian et al.	2004/0191125	A1	9/2004 Kellogg
6,344,326	B1	2/2002 Nelson et al.	2004/0209258	A1	10/2004 Parthasarathy et al.
6,375,898	B1	4/2002 Ulrich et al.	2005/0036911	A1	2/2005 Sellers et al.
6,391,264	B2	5/2002 Hammer et al.	2005/0109396	A1	5/2005 Zucchelli et al.
6,440,725	B1	8/2002 Pourahmadi et al.	2005/0126312	A1	6/2005 Bedingham et al.
6,461,287	B1	10/2002 Glater	2005/0129583	A1	6/2005 Bedingham et al.
6,465,225	B1	10/2002 Fuhr et al.	2005/0130177	A1	6/2005 Bedingham et al.
6,527,432	B2	3/2003 Kellogg et al.	2005/0142570	A1	6/2005 Parthasarathy et al.
6,532,997	B1	3/2003 Bedingham et al.	2005/0142571	A1	6/2005 Parthasarathy et al.
6,548,788	B2	4/2003 Kellogg et al.	2005/0142663	A1	6/2005 Parthasarathy et al.
6,582,662	B1	6/2003 Kellogg et al.	2005/0180890	A1	8/2005 Bedingham et al.
6,593,143	B1	7/2003 Gordon	2005/0224337	A1	10/2005 Iwasaki et al.
6,627,159	B1	9/2003 Bedingham et al.	2005/0277195	A1	12/2005 Holmquist et al.
6,632,399	B1	10/2003 Kellogg et al.	2005/0282290	A1	12/2005 Fujimoto
6,660,147	B1	12/2003 Woudenberg et al.	2006/0013732	A1	1/2006 Parthasarathy et al.
6,706,519	B1	3/2004 Kellogg et al.	2006/0040273	A1	2/2006 Chaiken et al.
6,709,869	B2	3/2004 Mian	2006/0076346	A1	4/2006 Bedingham et al.
			2006/0228811	A1	10/2006 Bedingham

# US D672,467 S

2007/0007270	A1	1/2007	Bedingham et al.	JP	2005-514014	5/2005
2007/0009382	A1	1/2007	Bedingham	JP	2005-274241	10/2005
2007/0009383	A1	1/2007	Bedingham	JP	2009-216395	9/2009
2007/0009391	A1	1/2007	Bedingham et al.	WO	WO 91/19567	12/1991
2007/0010007	A1	1/2007	Aysta et al.	WO	WO 97/21090	6/1997
2007/0132723	A1	6/2007	Lurz et al.	WO	WO 98/07019	2/1998
2007/0142780	A1	6/2007	Van Lue	WO	WO 98/49340	11/1998
2007/0160504	A1	7/2007	Parthasarathy	WO	WO 98/53311	11/1998
2008/0050276	A1	2/2008	Bedingham et al.	WO	WO 99/09394	2/1999
2008/0056949	A1	3/2008	Lee	WO	WO 99/55827	11/1999
2008/0058991	A1	3/2008	Lee	WO	WO 99/58245	11/1999
2008/0149190	A1	6/2008	Bedingham	WO	WO 00/05582	2/2000
2008/0152546	A1	6/2008	Bedingham et al.	WO	WO 00/35583	6/2000
2008/0314895	A1	12/2008	Bedingham	WO	WO 00/40750	7/2000
2009/0068062	A1	3/2009	Jafari et al.	WO	WO 00/69560	11/2000
2009/0143250	A1	6/2009	Lee	WO	WO 00/78455	12/2000
2009/0263280	A1	10/2009	Bedingham et al.	WO	WO 00/79285	12/2000
2010/0050751	A1	3/2010	Lee	WO	WO 01/06228	1/2001
2010/0129878	A1	5/2010	Parthasarathy	WO	WO 01/30995	5/2001
2010/0167304	A1	7/2010	Bedingham	WO	WO 02/00347	1/2002
2010/0175994	A1*	7/2010	Lee et al. .... 204/416	WO	WO 03/054509	7/2003
2010/0240124	A1	9/2010	Aysta	WO	WO 03/054510	7/2003
2010/0266456	A1	10/2010	Bedingham	WO	WO 03/058224	7/2003
2011/0027904	A1	2/2011	Bedingham	WO	WO 03/058253	7/2003
2011/0053785	A1	3/2011	Bedingham	WO	WO 03/093836	11/2003
2011/0117607	A1	5/2011	Bedingham	WO	WO 2004/010760	2/2004
2011/0117656	A1	5/2011	Robole	WO	WO 2004/011142	2/2004
2011/0124132	A1	5/2011	Kim	WO	WO 2004/011143	2/2004

### FOREIGN PATENT DOCUMENTS

DE	3712624	11/1988
EP	0169306	5/1990
EP	0693560	1/1996
EP	0807468	11/1997
EP	1010979	6/2000
EP	1681553	7/2006
JP	60-57259	4/1985
JP	60-238745	11/1985
JP	2292720	12/1990
JP	3-048770	3/1991
JP	5-093729	4/1993
JP	5-507878	11/1993
JP	6-050981	2/1994
JP	9-72912	3/1997
JP	9-189704	7/1997
JP	10-019884	1/1998
JP	2003-504637	2/2003
JP	2004-525339	8/2004

WO	WO 2004/011147	2/2004
WO	WO 2004/011148	2/2004
WO	WO 2004/011365	2/2004
WO	WO 2004/011681	2/2004
WO	WO 2004/094672	11/2004
WO	WO 2005/005045	1/2005
WO	WO 2005/028096	3/2005
WO	WO 2007/005810	1/2007
WO	WO 2007/005853	1/2007
WO	WO 2007/057788	5/2007
WO	WO 2008/080046	7/2008
WO	WO 2008/134470	11/2008
WO	WO 2009/085884	7/2009

### OTHER PUBLICATIONS

Leu et al., "Pressure Barrier of Capillary Stop Valves in Micro Sample Separators", Sensors and Actuators A 115 (2004) 508-515.

\* cited by examiner

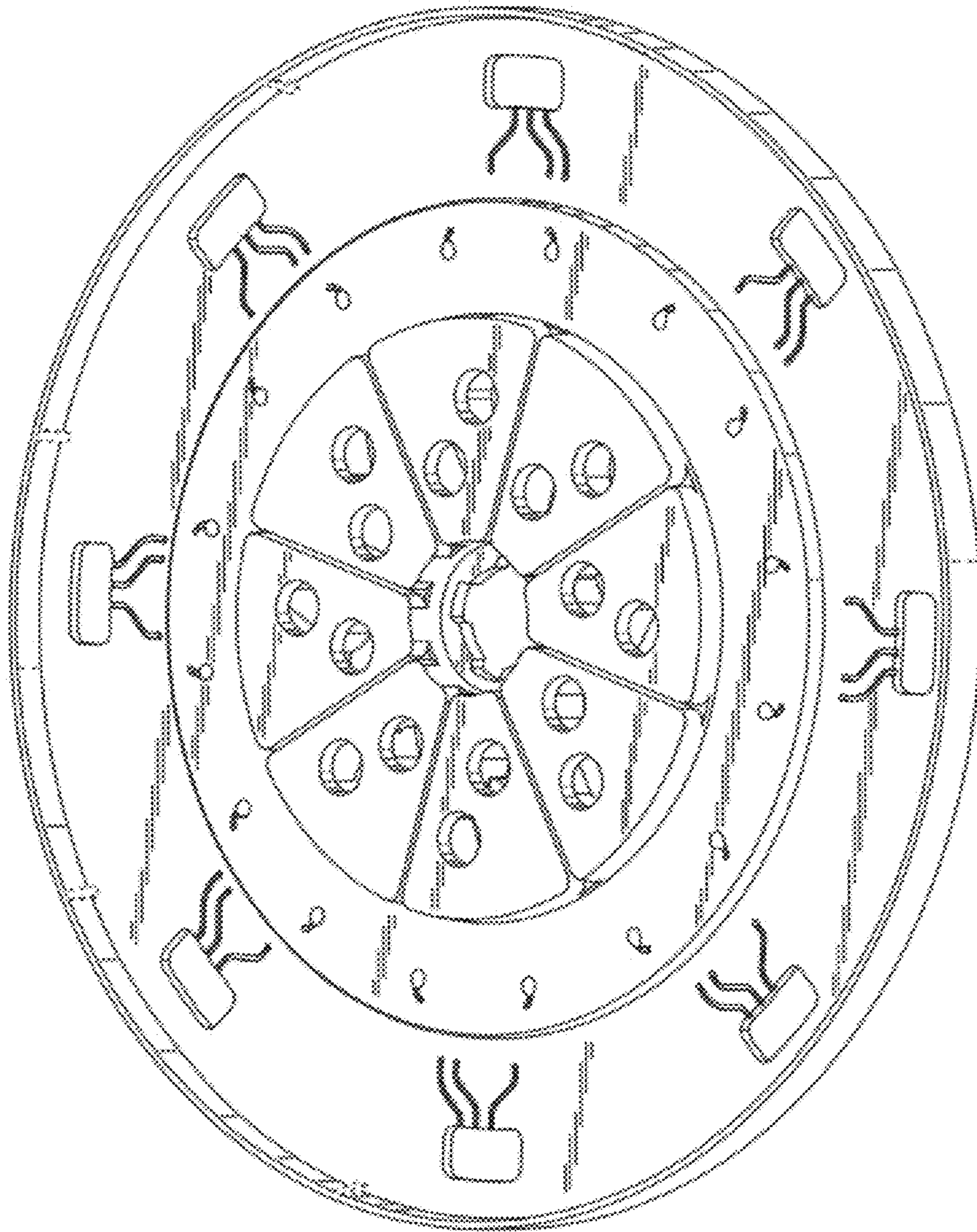
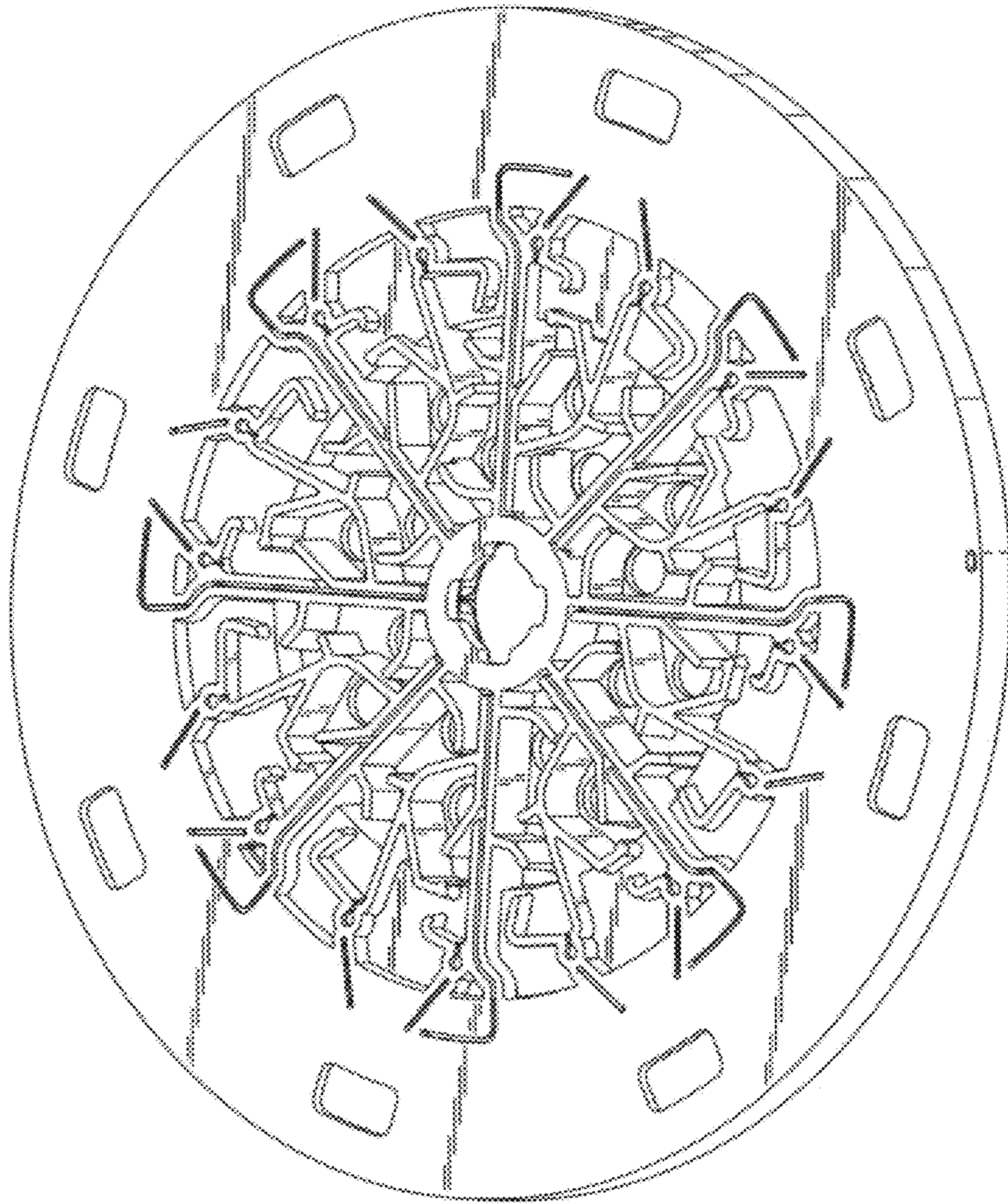
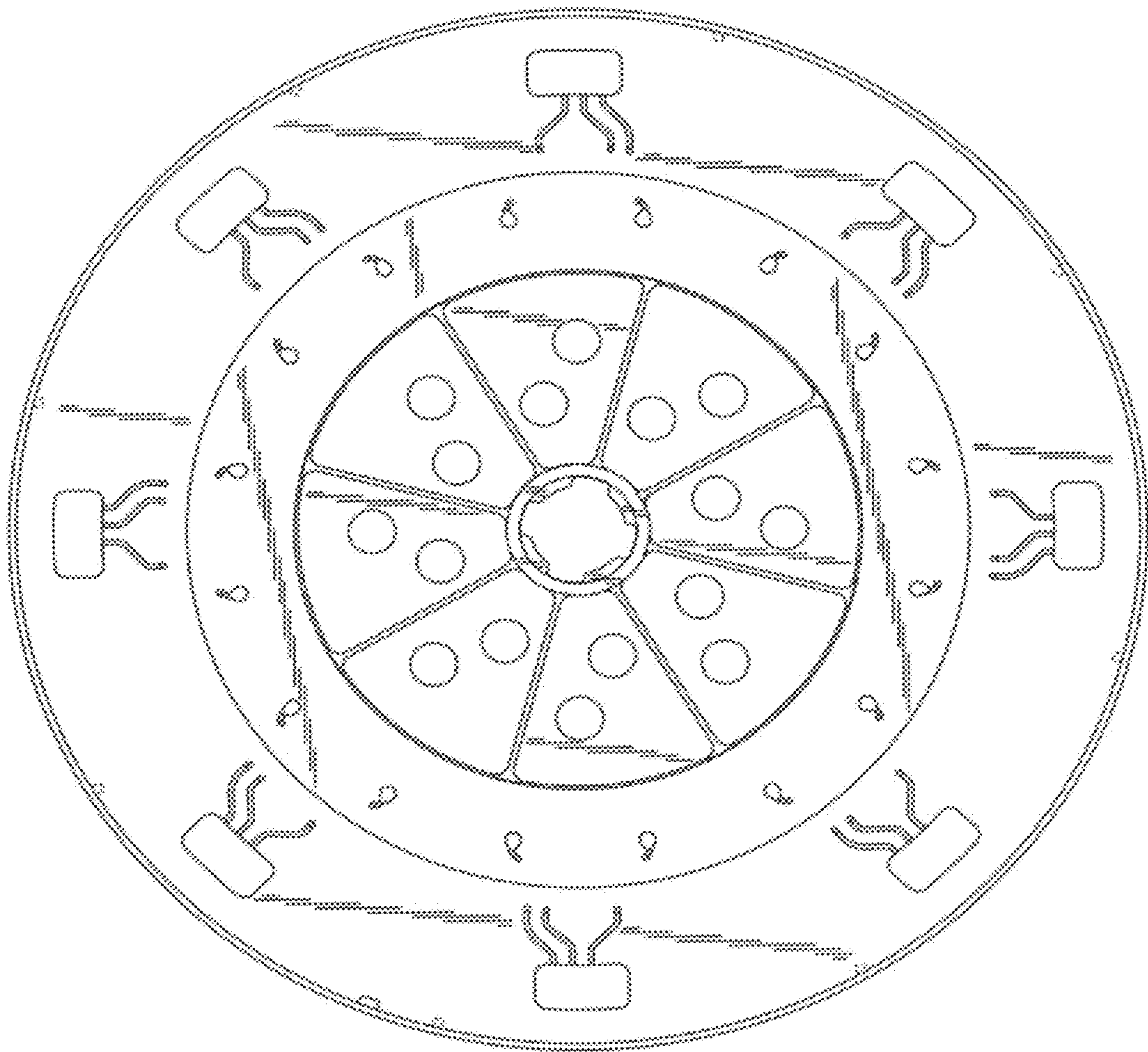


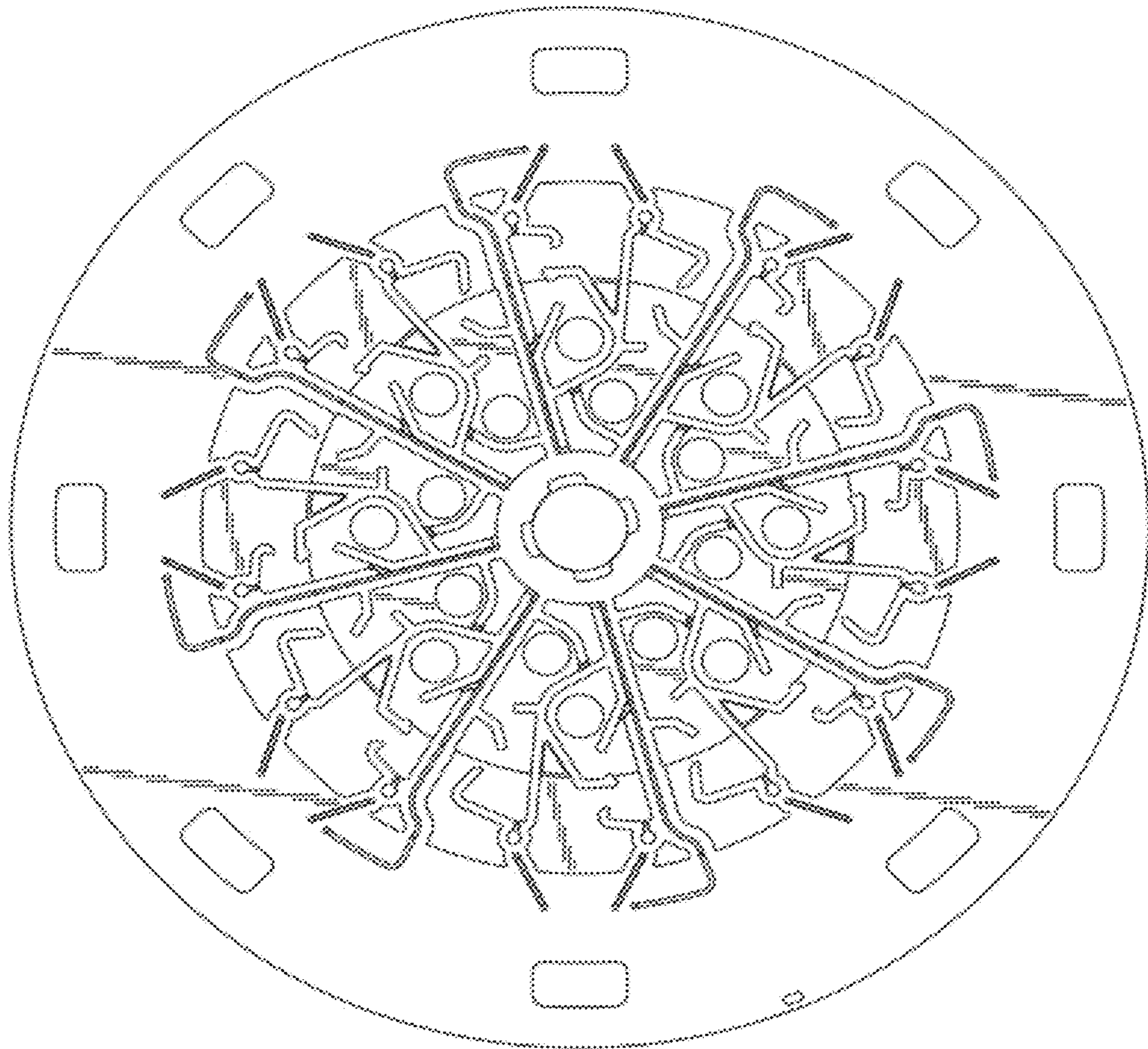
Fig. 1



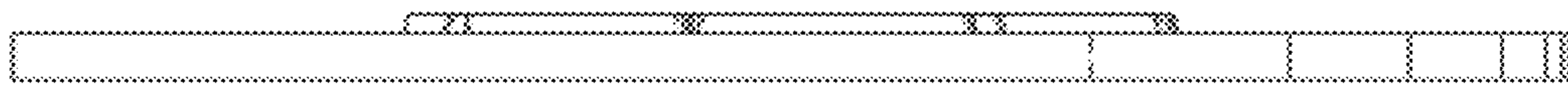
*Fig. 2*



*Fig. 3*



*Fig. 4*



*Fig. 5*