



US00D978637S

(12) **United States Design Patent** (10) **Patent No.:** **US D978,637 S**  
**Ensworth et al.** (45) **Date of Patent:** **\*\* Feb. 21, 2023**

(54) **EMITTER PART**

FOREIGN PATENT DOCUMENTS

(71) Applicant: **Rain Bird Corporation**, Azusa, CA (US)

AU 511876 10/1978  
AU 2004208646 3/2006

(Continued)

(72) Inventors: **Mark M. Ensworth**, Orange, CA (US);  
**Mark Richard Edris**, Glendora, CA (US)

OTHER PUBLICATIONS

(73) Assignee: **Rain Bird Corporation**, Azusa, CA (US)

Low Flow Miniature Flat Dripper; DRTS; Wayback Machine (DRTS.com); Mar. 12, 2019; accessed Nov. 25, 2022; URL:< https://web.archive.org/web/20190312142059/https://drts.com/products/nano-micro/ > (Year: 2019).\*

(\*\*) Term: **15 Years**

(Continued)

(21) Appl. No.: **29/728,296**

*Primary Examiner* — Rachel A. Voorhies

(22) Filed: **Mar. 17, 2020**

*Assistant Examiner* — Benjamin D. Wannemacher

(74) *Attorney, Agent, or Firm* — Fitch, Even, Tabin & Flannery, LLP

**Related U.S. Application Data**

(62) Division of application No. 29/629,166, filed on Feb. 12, 2017, now Pat. No. Des. 883,048.

(51) **LOC (14) Cl.** ..... **08-01**

(52) **U.S. Cl.**  
USPC ..... **D8/1**

(58) **Field of Classification Search**  
USPC ..... D8/1, 2; D23/209, 213, 214; 47/1.01 R, 47/11, 12, 62 R, 62 E, 62 N, 63, 79; 239/542, 533.15  
CPC ..... A01G 25/023; A01G 25/02; A01G 25/026  
See application file for complete search history.

(57) **CLAIM**

We claim the ornamental design for an emitter part, as shown and described.

**DESCRIPTION**

FIG. 1 is a perspective view of the emitter part in accordance with our new design;  
FIG. 2 is a top plan view of the emitter part of FIG. 1;  
FIG. 3 is a bottom view of the emitter part of FIGS. 1-2;  
FIG. 4 is a rear elevation view of the emitter part of FIGS. 1-3;  
FIG. 5 is a front elevation view of the emitter part of FIGS. 1-4;  
FIG. 6 is a right side elevation view of the emitter part of FIGS. 1-5; and,  
FIG. 7 is a left side elevation view of the emitter part of FIGS. 1-6.  
The broken lines in the figures are for the purpose of illustrating portions of the emitter part and form no part of the claimed design.

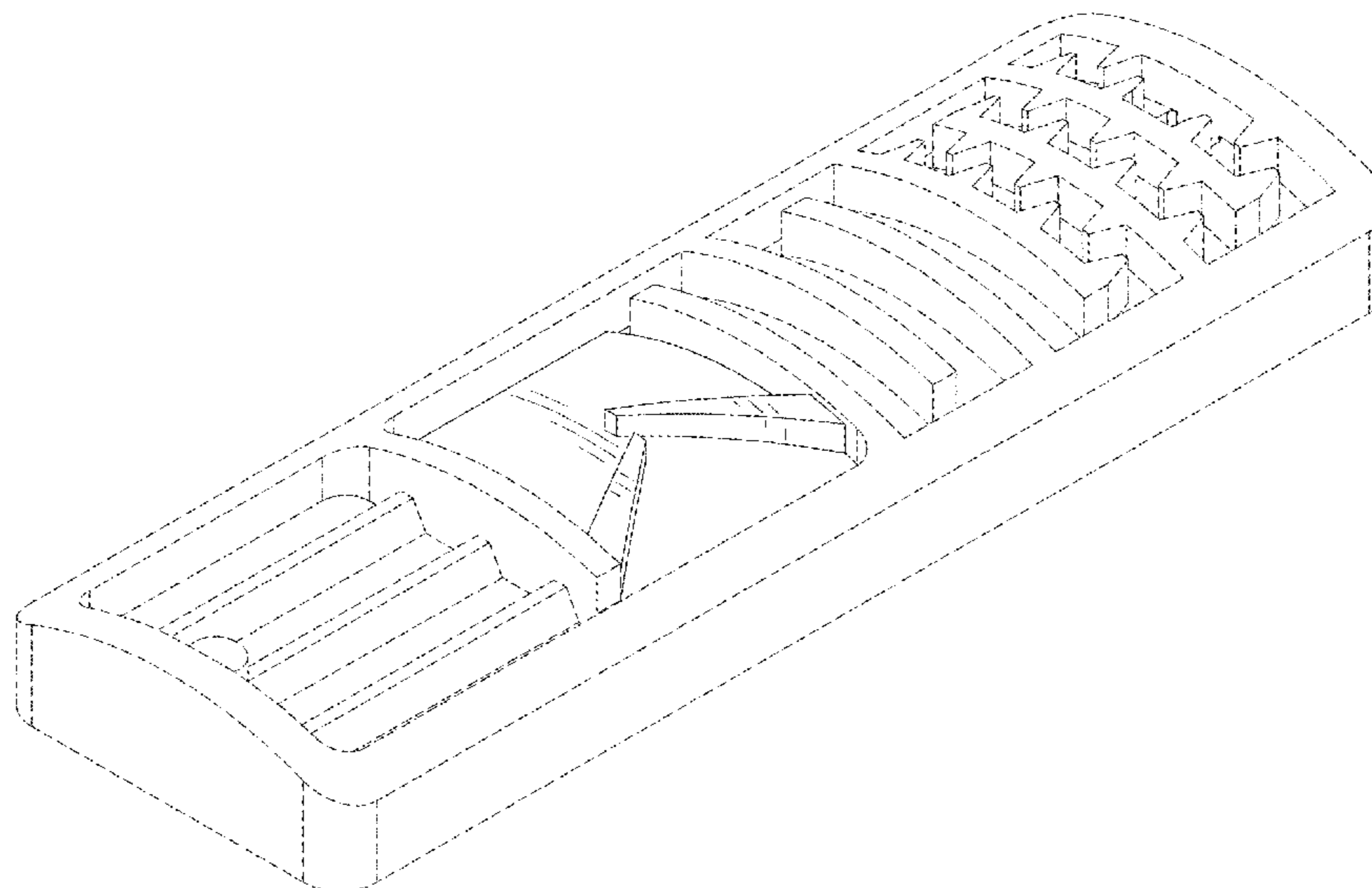
(56) **References Cited**

U.S. PATENT DOCUMENTS

1,329,559 A \* 2/1920 Tesla ..... F15D 1/02 137/842  
2,174,515 A 10/1939 Hughes  
2,449,731 A 9/1948 Therrien  
2,508,403 A 5/1950 Knauss  
2,625,429 A 1/1953 Coles  
2,639,194 A 5/1953 Wahlin

(Continued)

**1 Claim, 6 Drawing Sheets**



# US D978,637 S

(56)

## References Cited

### U.S. PATENT DOCUMENTS

2,683,061	A	7/1954 Tuttle, Jr.	4,037,791	A	7/1977 Mullett
2,762,397	A	9/1956 Miller	4,047,995	A	9/1977 Leal-Diaz
2,794,321	A	6/1957 Warner	4,054,152	A	10/1977 Ito
2,873,030	A	2/1959 Ashton	4,058,257	A	11/1977 Spencer
2,970,923	A	2/1961 Sparmann	4,059,228	A	11/1977 Werner
3,004,330	A	10/1961 Wilkins	4,077,570	A	3/1978 Harmony
3,155,612	A	11/1964 Weber	4,077,571	A	3/1978 Harmony
3,182,916	A	5/1965 Schulz	4,084,749	A	4/1978 Drori
3,199,901	A	8/1965 Jeppsson	4,092,002	A	5/1978 Grosse
3,302,450	A	2/1967 Wakar	4,095,750	A	6/1978 Gilead
3,323,550	A	6/1967 Lee, II	4,105,162	A	8/1978 Drori
3,361,359	A	1/1968 Chapin	4,121,771	A	10/1978 Hendrickson
3,420,064	A	1/1969 Blass	4,122,590	A	10/1978 Spencer
3,426,544	A	2/1969 Curtis	4,128,918	A	12/1978 Wenk
3,434,500	A	3/1969 Burrows	4,132,364	A	1/1979 Harmony
3,467,142	A	9/1969 Boyle	4,134,550	A	1/1979 Bright
3,586,291	A	6/1971 Malec	4,143,820	A	3/1979 Bright
3,672,571	A	6/1972 Goodricke	4,147,307	A	4/1979 Christy
3,693,888	A	9/1972 Rondas	4,160,323	A	7/1979 Tracy
3,697,002	A	10/1972 Parkison	4,161,291	A	7/1979 Bentley
3,698,195	A	10/1972 Chapin	4,177,946	A	12/1979 Sahagun-Barragan
3,719,327	A	3/1973 McMahan	4,177,947	A	12/1979 Menzel
3,727,635	A	4/1973 Todd	4,196,753	A	4/1980 Hammarstedt
3,729,142	A	4/1973 Rangel-Garza	4,196,853	A	4/1980 Delmer
3,753,527	A	8/1973 Galbraith	4,209,133	A	6/1980 Mehoudar
3,777,980	A	12/1973 Allport	4,210,287	A	7/1980 Mehoudar
3,777,987	A	12/1973 Allport	4,215,822	A	8/1980 Mehoudar
3,779,468	A	12/1973 Spencer	4,223,838	A	9/1980 Maria-Vittorio-Torrisi
3,780,946	A	12/1973 Smith	4,225,307	A	9/1980 Magera
3,791,587	A	2/1974 Drori	4,226,368	A	10/1980 Hunter
3,792,588	A *	2/1974 Gilaad ..... A01G 25/023 405/47	4,235,380	A	11/1980 Delmer
3,797,741	A	3/1974 Spencer	4,247,051	A	1/1981 Allport
3,804,334	A	4/1974 Curry	4,250,915	A	2/1981 Rikuta
3,807,430	A	4/1974 Keller	4,273,286	A	6/1981 Menzel
3,814,377	A	6/1974 Todd	4,274,597	A	6/1981 Dobos
3,815,636	A	6/1974 Menzel	4,281,798	A	8/1981 Lemelstrich
RE28,095	E	7/1974 Chapin	4,307,841	A	12/1981 Mehoudar
3,830,067	A	8/1974 Osborn	4,331,293	A	5/1982 Rangel-Garza
3,833,019	A	9/1974 Diggs	4,344,576	A	8/1982 Smith
3,851,896	A	12/1974 Olson	4,354,639	A	10/1982 Delmer
3,856,333	A	12/1974 Cox	4,366,926	A	1/1983 Mehoudar
3,863,845	A	2/1975 Bumpstead	4,369,923	A	1/1983 Bron
3,866,833	A	2/1975 Shibata	4,384,680	A	5/1983 Mehoudar
3,870,236	A	3/1975 Sahagun-Barragan	4,385,727	A	5/1983 Spencer
3,873,030	A *	3/1975 Barragan ..... A01G 25/023 138/42	4,385,757	A	5/1983 Muller
3,874,598	A	4/1975 Havens	4,392,616	A	7/1983 Olson
3,882,892	A	5/1975 Menzel	4,413,786	A	11/1983 Mehoudar
3,885,743	A	5/1975 Wake	4,413,787	A	11/1983 Gilead
3,895,085	A	7/1975 Suzuki	4,423,838	A	1/1984 Dinur
3,896,999	A *	7/1975 Barragan ..... A01G 25/02 239/533.13	4,424,936	A	1/1984 Marc
3,897,009	A	7/1975 Rangel-Garza	4,430,020	A *	2/1984 Robbins ..... A01G 25/02 405/36
3,903,929	A	9/1975 Mock	4,460,129	A	7/1984 Olson
3,929,258	A	12/1975 Stephens	4,473,191	A	9/1984 Chapin
3,939,875	A	2/1976 Osborn	4,473,525	A	9/1984 Drori
3,940,066	A	2/1976 Hunter	4,502,631	A	3/1985 Christen
3,948,285	A	4/1976 Flynn	4,508,140	A	4/1985 Harrison
3,954,223	A	5/1976 Wichman	4,513,777	A	4/1985 Wright
3,957,292	A	5/1976 Diggs	4,519,546	A	5/1985 Gorney
3,966,233	A	6/1976 Diggs	4,522,339	A	6/1985 Costa
3,970,251	A	7/1976 Harmony	4,533,083	A	8/1985 Tucker
3,973,732	A	8/1976 Diggs	4,534,515	A	8/1985 Chapin
3,981,452	A	9/1976 Eckstein	4,545,784	A	10/1985 Sanderson
3,993,248	A	11/1976 Harmony	4,550,878	A	11/1985 Rosenberg
3,995,436	A	12/1976 Diggs	4,572,756	A	2/1986 Chapin
3,998,244	A	12/1976 Bentley	4,573,640	A	3/1986 Mehoudar
3,998,391	A *	12/1976 Lemelshtrich ..... A01G 25/023 239/542	4,593,857	A	6/1986 Raz
3,998,427	A	12/1976 Bentley	4,613,080	A	9/1986 Benson
4,008,853	A	2/1977 Tregillus	4,626,130	A	12/1986 Chapin
4,017,958	A	4/1977 Diggs	4,627,903	A	12/1986 Chapman
4,022,384	A	5/1977 Hoyle	4,642,152	A	2/1987 Chapin
4,036,435	A	7/1977 Pecaro	4,653,695	A	3/1987 Eckstein
			4,687,143	A	8/1987 Gorney
			4,702,787	A	10/1987 Ruskin
			4,718,608	A	1/1988 Mehoudar
			4,722,481	A	2/1988 Lemkin
			4,722,759	A	2/1988 Roberts
			4,726,520	A	2/1988 Brown
			4,726,527	A	2/1988 Mendenhall

(56)

References Cited

U.S. PATENT DOCUMENTS

4,728,042 A	3/1988	Gorney	5,337,597 A	8/1994	Peake
4,735,363 A	4/1988	Shfaram	5,340,027 A	8/1994	Yu
4,749,130 A	6/1988	Utzinger	5,353,993 A	10/1994	Rosenberg
4,753,394 A	6/1988	Goodman	5,364,032 A	11/1994	De Frank
4,756,339 A	7/1988	Buluschek	5,399,160 A	3/1995	Dunberger
4,765,541 A	8/1988	Mangels	5,400,967 A	3/1995	Yu
4,775,046 A	10/1988	Gramarossa	5,400,973 A *	3/1995	Cohen ..... A01G 25/023 239/533.1
4,781,217 A	11/1988	Rosenberg	5,413,282 A	5/1995	Boswell
4,789,005 A	12/1988	Griffiths	5,423,501 A	6/1995	Yu
4,796,660 A	1/1989	Bron	5,441,203 A	8/1995	Swan
4,807,668 A	2/1989	Roberts	5,442,001 A	8/1995	Jones
4,817,875 A	4/1989	Karmeli	5,443,212 A	8/1995	Dinur
4,824,019 A	4/1989	Lew	5,449,250 A	9/1995	Burton
4,824,025 A	4/1989	Miller	5,458,712 A	10/1995	Defrank
4,850,531 A	7/1989	Littleton	5,465,905 A	11/1995	Elder
4,854,158 A	8/1989	Gates	5,522,551 A	6/1996	DeFrank
4,856,552 A	8/1989	Hiemstra	5,531,381 A	7/1996	Ruttenberg
4,859,264 A	8/1989	Buluschek	5,535,778 A	7/1996	Zakai
4,862,731 A	9/1989	Gates	5,584,952 A	12/1996	Rubenstein
4,874,132 A	10/1989	Gilead	5,586,727 A *	12/1996	Shekalim ..... A01G 25/023 239/542
4,880,167 A	11/1989	Langa	5,591,293 A *	1/1997	Miller ..... B29C 66/73711 156/218
4,900,437 A	2/1990	Savall	5,601,381 A	2/1997	Hadar
4,909,411 A	3/1990	Uchida	5,609,303 A	3/1997	Cohen
4,935,992 A	6/1990	Due	5,615,833 A	4/1997	Robillard
4,948,295 A	8/1990	Pramsoler	5,615,838 A	4/1997	Eckstein
4,984,739 A	1/1991	Allport	5,620,143 A *	4/1997	Delmer ..... A01G 25/02 239/562
4,990,256 A	2/1991	Schmidt	5,628,462 A	5/1997	Miller
5,022,940 A	6/1991	Mehoudar	5,634,594 A	6/1997	Cohen
5,031,837 A	7/1991	Hanish	5,636,797 A	6/1997	Cohen
5,040,770 A	8/1991	Rajster	5,641,113 A	6/1997	Somaki
5,052,625 A	10/1991	Ruskin	5,651,999 A	7/1997	Armentrout
5,096,206 A	3/1992	Andre	5,673,852 A	10/1997	Roberts
5,106,021 A	4/1992	Gilead	5,676,897 A	10/1997	Dermitzakis
5,111,995 A	5/1992	Dumitrascu	5,688,072 A	11/1997	Meyer
5,111,996 A *	5/1992	Eckstein ..... A01G 25/023 239/533.1	5,695,127 A	12/1997	Delmer
5,116,414 A	5/1992	Burton	5,711,482 A	1/1998	Yu
5,118,042 A	6/1992	Delmer	5,722,601 A	3/1998	DeFrank
5,118,215 A	6/1992	Freier	5,727,733 A	3/1998	Ruttenberg
5,122,044 A	6/1992	Mehoudar	5,732,887 A *	3/1998	Roberts ..... A01G 25/026 239/542
5,123,984 A	6/1992	Allport	5,744,423 A	4/1998	Van Voris
5,137,216 A	8/1992	Hanish	5,744,779 A	4/1998	Buluschek
5,141,360 A	8/1992	Zeman	RE35,857 E	7/1998	Mehoudar
5,163,622 A	11/1992	Cohen	5,785,785 A *	7/1998	Delmer ..... A01G 25/026 156/218
5,181,952 A	1/1993	Burton	5,813,603 A	9/1998	Kurtz
5,183,208 A	2/1993	Cohen	5,820,028 A	10/1998	Dinur
5,192,027 A	3/1993	Delmer	5,820,029 A	10/1998	Marans
5,200,132 A	4/1993	Shfaram	5,829,685 A	11/1998	Cohen
5,203,503 A *	4/1993	Cohen ..... A01G 25/023 239/542	5,829,686 A	11/1998	Cohen
5,207,386 A	5/1993	Mehoudar	5,855,324 A	1/1999	DeFrank
5,216,784 A	6/1993	Dyer	5,865,377 A	2/1999	DeFrank
5,232,159 A	8/1993	Abbate	5,871,325 A	2/1999	Schmidt
5,232,160 A	8/1993	Hendrickson	5,875,815 A	3/1999	Ungerecht
5,236,130 A	8/1993	Hadar	5,881,796 A	3/1999	Brown
5,246,171 A	9/1993	Roberts	5,887,640 A	3/1999	Brown
5,252,162 A	10/1993	Delmer	5,893,404 A	4/1999	Mendez
5,253,807 A	10/1993	Newbegin	5,898,019 A	4/1999	Van Voris
5,271,786 A	12/1993	Gorney	5,944,260 A	8/1999	Wang
5,279,462 A	1/1994	Mehoudar	5,957,391 A	9/1999	DeFrank
5,282,578 A	2/1994	De Frank	5,972,375 A	10/1999	Truter
5,282,916 A	2/1994	Bloom	5,988,211 A	11/1999	Cornell
5,283,916 A	2/1994	Haro	5,996,909 A	12/1999	Lin
5,294,058 A	3/1994	Einav	6,015,102 A	1/2000	Daigle
5,294,212 A	3/1994	Mehoudar	6,026,850 A	2/2000	Newton
5,310,438 A	5/1994	Ruskin	6,027,048 A	2/2000	Mehoudar
5,314,116 A	5/1994	Krauth	6,039,270 A	3/2000	Dermitzakis
5,316,220 A	5/1994	Dinur	6,062,245 A	5/2000	Berglind
5,318,657 A	6/1994	Roberts	6,085,986 A	7/2000	Yu
5,324,371 A	6/1994	Mehoudar	6,095,185 A	8/2000	Rosenberg
5,324,379 A	6/1994	Eckstein	6,109,296 A	8/2000	Austin
5,327,941 A	7/1994	Bitsakis	6,116,523 A	9/2000	Cabahug
5,330,107 A	7/1994	Karathanos	6,120,634 A	9/2000	Harrold
5,332,160 A	7/1994	Ruskin	6,164,605 A	12/2000	Drake
5,333,793 A	8/1994	DeFrank	6,179,949 B1	1/2001	Buluschek

US D978,637 S

(56)	<b>References Cited</b>	7,681,810 B2 *	3/2010	Keren .....	A01G 25/023 239/533.1
	<b>U.S. PATENT DOCUMENTS</b>	7,695,587 B2	4/2010	Kertscher	
		7,712,253 B2	5/2010	Gesser	
		7,735,758 B2	6/2010	Cohen	
		7,748,930 B2	7/2010	Gesser	
		7,775,237 B2	8/2010	Keren	
		7,802,592 B2	9/2010	McCarty	
		7,887,664 B1	2/2011	Mata	
		7,900,656 B2	3/2011	Masarwa	
		7,913,935 B2	3/2011	Einav	
		7,954,732 B2	6/2011	Shekalim	
		7,988,076 B2	8/2011	Mamo	
		7,989,076 B2	8/2011	Li	
		8,002,496 B2	8/2011	Giuffre	
		8,011,852 B2	9/2011	Gesser	
		8,033,300 B2	10/2011	McCarty	
		D648,191 S	11/2011	Thayer	
		8,051,871 B2	11/2011	Shani	
		8,079,385 B2	12/2011	Hatton	
		8,091,276 B2	1/2012	Gesser	
		8,091,800 B2	1/2012	Retter	
		8,096,491 B2	1/2012	Lutzki	
		8,136,246 B2	3/2012	So	
		8,141,589 B2	3/2012	Socolsky	
		D657,638 S *	4/2012	Einav .....	D8/1
		8,157,941 B2	4/2012	Voigtmann	
		8,167,002 B2	5/2012	Kuhne	
		8,220,727 B2	7/2012	Lee	
		8,267,115 B2	9/2012	Giuffre'	
		8,286,667 B2	10/2012	Ruskin	
		8,302,887 B2	11/2012	Park	
		8,317,111 B2	11/2012	Cohen	
		8,348,182 B2	1/2013	Keren	
		8,372,326 B2	2/2013	Mamo	
		8,381,437 B2	2/2013	Ciudaj	
		8,439,282 B2	5/2013	Allen	
		8,454,786 B2	6/2013	Guichard	
		8,469,294 B2	6/2013	Mata	
		8,475,617 B2	7/2013	Kertscher	
		8,496,193 B2	7/2013	Rosenberg	
		8,511,585 B2	8/2013	Keren	
		8,511,586 B2	8/2013	Einav	
		8,579,215 B2	11/2013	Zavoli	
		8,584,398 B2	11/2013	Gesser	
		8,628,032 B2	1/2014	Feith	
		8,663,525 B2	3/2014	Mamo	
		8,689,484 B2	4/2014	Ruskin	
		8,714,181 B2	5/2014	Shani	
		8,714,205 B2	5/2014	Loebinger	
		8,763,934 B2	7/2014	Patel	
		8,770,888 B2	7/2014	Helbig	
		8,870,098 B2	10/2014	Lutzki	
		8,882,004 B2	11/2014	Gorney	
		8,893,987 B2	11/2014	Lerner	
		8,998,112 B2	4/2015	Cohen	
		8,998,113 B2	4/2015	Keren	
		9,022,059 B2	5/2015	Cohen	
		9,022,764 B2	5/2015	Wisler	
		9,027,856 B2	5/2015	DeFrank	
		D740,940 S	10/2015	Fregoso	
		9,192,108 B2	11/2015	Kertscher	
		9,253,950 B1	2/2016	Clark	
		9,253,951 B2	2/2016	Herrera	
		9,258,949 B2	2/2016	Nourian	
		9,258,950 B2	2/2016	Kidachi	
		9,291,276 B2	3/2016	Keren	
		9,307,705 B2	4/2016	Akritanakis	
		9,345,205 B2	5/2016	Kidachi	
		9,380,749 B2	7/2016	Akritanakis	
		9,386,752 B2	7/2016	Einav	
		9,433,157 B2	9/2016	Dermitzakis	
		9,439,366 B2	9/2016	Kidachi	
		9,485,923 B2 *	11/2016	Ensworth .....	A01G 25/023
		D781,115 S *	3/2017	Einav .....	A01G 25/023 D8/1
		9,695,965 B2	7/2017	Hadas	
		9,743,595 B2	8/2017	Mavrakis	
		9,807,948 B2	11/2017	Loebinger	



(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0267454 A1 10/2012 Einav  
 2012/0305676 A1 12/2012 Keren  
 2013/0181066 A1 7/2013 Dermitzakis  
 2013/0248616 A1 9/2013 Ensworth  
 2013/0248622 A1 9/2013 Kim  
 2013/0340338 A1\* 12/2013 Lin ..... A01G 31/02  
 47/62 R  
 2013/0341431 A1 12/2013 Ensworth  
 2014/0027539 A1\* 1/2014 Kim ..... B29D 23/00  
 264/154  
 2014/0034753 A1 2/2014 Mavrakis  
 2014/0110506 A1 4/2014 Mavrakis  
 2014/0246520 A1 9/2014 Einav  
 2014/0263758 A1 9/2014 Turk  
 2015/0014446 A1 1/2015 Cohen  
 2015/0041563 A1\* 2/2015 Ensworth ..... A01G 25/023  
 29/890.141  
 2015/0041564 A1 2/2015 Ensworth  
 2015/0090815 A1 4/2015 Akritanakis  
 2015/0090816 A1 4/2015 Akritanakis  
 2015/0107777 A1 4/2015 Zakarian  
 2015/0144717 A1 5/2015 Turk  
 2015/0181816 A1 7/2015 Desarzens  
 2015/0181820 A1 7/2015 Crook  
 2015/0201568 A1 7/2015 Einav  
 2015/0223414 A1\* 8/2015 Kidachi ..... A01G 25/023  
 239/542  
 2015/0250111 A1 9/2015 Kidachi  
 2015/0296723 A1 10/2015 Jain  
 2015/0319940 A1 11/2015 Kidachi  
 2015/0351333 A1 12/2015 Eberle  
 2016/0057947 A1\* 3/2016 Ensworth ..... A01G 25/023  
 239/542  
 2016/0075070 A1 3/2016 Verelis  
 2016/0076965 A1 3/2016 Edris  
 2016/0088806 A1 3/2016 Haub  
 2016/0095285 A1\* 4/2016 Loebinger ..... A01G 25/023  
 239/542  
 2016/0143231 A2 5/2016 Motha  
 2016/0146388 A1 5/2016 Smith  
 2016/0198643 A1 7/2016 Cohen  
 2016/0219802 A1\* 8/2016 Ensworth ..... A01G 25/023  
 2016/0219803 A1 8/2016 Keren  
 2016/0223092 A1 8/2016 Hadas  
 2016/0227716 A1 8/2016 Kidachi  
 2016/0262319 A1 9/2016 Defrank  
 2016/0278311 A1 9/2016 Kidachi  
 2016/0286741 A1 10/2016 Kidachi  
 2016/0286743 A1 10/2016 Einav  
 2016/0295815 A1 10/2016 Defrank  
 2016/0309669 A1 10/2016 Kidachi  
 2016/0330917 A1 11/2016 Kidachi  
 2017/0035005 A1 2/2017 Kidachi  
 2017/0035006 A1 2/2017 Kim  
 2017/0112078 A1 4/2017 Ensworth  
 2017/0118927 A1\* 5/2017 Loebinger ..... A01G 25/023  
 2017/0142916 A1 5/2017 Shamsbery  
 2017/0205013 A1 7/2017 Smith  
 2017/0290277 A1 10/2017 Cohen  
 2017/0292646 A1 10/2017 Hadas  
 2018/0014477 A1 1/2018 Ensworth  
 2018/0027756 A1 2/2018 Kidachi  
 2018/0098514 A1 4/2018 Socolsky  
 2018/0110191 A1 4/2018 Keren  
 2018/0116134 A1 5/2018 Ensworth  
 2018/0168116 A1 6/2018 Morikoshi  
 2018/0168117 A1 6/2018 Noguchi  
 2018/0177145 A1 6/2018 Morikoshi  
 2018/0199524 A1\* 7/2018 Socolsky ..... A01G 25/023  
 2018/0213732 A1\* 8/2018 Ensworth ..... A01G 25/023  
 2018/0228097 A1 8/2018 Alkalay  
 2018/0266576 A1 9/2018 Balet  
 2018/0271039 A1\* 9/2018 Morikoshi ..... A01G 25/023  
 2018/0295795 A1\* 10/2018 Wlassich ..... A01G 25/02

2018/0303047 A1\* 10/2018 Wui ..... A01G 25/023  
 2018/0317406 A1 11/2018 Tsouri  
 2018/0328498 A1\* 11/2018 Rulli ..... A01G 25/023  
 2018/0338434 A1 11/2018 Wlassich  
 2018/0359962 A1 12/2018 Noguchi  
 2019/0045728 A1\* 2/2019 Daios ..... A01G 25/023  
 2019/0246577 A1 8/2019 Masarwa  
 2019/0246578 A1 8/2019 Einav  
 2019/0335687 A1 11/2019 Socolsky  
 2019/0373827 A1\* 12/2019 Ensworth ..... A01G 25/023  
 2019/0388924 A1 12/2019 Yanagisawa  
 2020/0084981 A1 3/2020 Yanagisawa  
 2020/0093076 A1 3/2020 Yanagisawa  
 2020/0288653 A1 9/2020 Socolsky  
 2020/0390043 A1 12/2020 Taylor, Jr.  
 2021/0037726 A1 2/2021 Yanagisawa  
 2021/0037727 A1 2/2021 Yanagisawa  
 2021/0176928 A1 6/2021 Ono  
 2021/0204492 A1 7/2021 Kidachi  
 2021/0321582 A1\* 10/2021 Hartranft ..... B05B 15/40  
 2022/0046870 A1\* 2/2022 Sokol ..... A01G 25/023

FOREIGN PATENT DOCUMENTS

CA 1053726 5/1979  
 CN 1627994 6/2005  
 CN 102057823 5/2011  
 CN 201821716 5/2011  
 CN 201871438 6/2011  
 CN 202617872 12/2012  
 CN 102933071 2/2013  
 DE 112706 5/1975  
 DE 3525591 1/1986  
 EP 0160299 A2 11/1985  
 EP 0344605 A2 12/1989  
 EP 0353982 2/1990  
 EP 0444425 A1 9/1991  
 EP 0480632 A2 4/1992  
 EP 0491115 A1 6/1992  
 EP 0549515 A1 6/1993  
 EP 636309 A1 2/1995  
 EP 0709020 A1 5/1996  
 EP 0730822 A2 9/1996  
 EP 0493299 5/1997  
 EP 0872172 A1 10/1998  
 EP 1372375 1/2004  
 EP 1541013 A2 6/2005  
 EP 1701147 9/2006  
 EP 2952091 A1 12/2015  
 FR 2366790 5/1978  
 GB 1498545 1/1978  
 GB 2057960 A 4/1981  
 IL 42705 A 3/1976  
 IL 53463 A 3/1983  
 IL 97564 A 7/1996  
 IL 221089 5/2016  
 IL 212105 7/2016  
 IT 1255120 10/1995  
 JP 2000228417 8/2000  
 JP 2016220620 A 12/2016  
 RU 2240682 1/2005  
 RU 2275791 3/2006  
 RU 2415565 4/2011  
 WO 9205689 A1 4/1992  
 WO 9221228 A1 12/1992  
 WO 9427728 A1 12/1994  
 WO 1995029761 11/1995  
 WO 9614939 5/1996  
 WO 9810635 A1 3/1998  
 WO 9902273 A1 1/1999  
 WO 9918771 A1 4/1999  
 WO 9955141 A1 11/1999  
 WO 0001219 A1 1/2000  
 WO 0010378 A1 3/2000  
 WO 030760 6/2000  
 WO 136106 A1 5/2001  
 WO 0156768 A1 8/2001  
 WO 2001064019 9/2001  
 WO 0204130 A1 1/2002

(56)

## References Cited

## FOREIGN PATENT DOCUMENTS

WO	2002015670	2/2002
WO	2003045577 A1	6/2003
WO	2003066228 A1	8/2003
WO	2004028778 A1	4/2004
WO	2007046105	10/2005
WO	2006030419 A2	3/2006
WO	2006038246	4/2006
WO	2007068523 A1	6/2007
WO	2010022471	3/2010
WO	2010048063	4/2010
WO	2011092557	8/2011
WO	2011101842	8/2011
WO	2012015655 A1	2/2012
WO	2012120317	9/2012
WO	2012137200	10/2012
WO	2012160121	11/2012
WO	2013148672	10/2013
WO	2013155173 A2	10/2013
WO	2013192321	12/2013
WO	2014016832	1/2014
WO	2015023624	2/2015
WO	2015044801	4/2015
WO	2015052107	4/2015
WO	2015098412	7/2015
WO	2016156814	10/2016
WO	2018078521	5/2018

## OTHER PUBLICATIONS

Pressure Compensating Flat Dripper; DRTS; Wayback Machine (DRTS.com); Aug. 8, 2020; accessed Nov. 25, 2022; URL:< <https://web.archive.org/web/20200808111512/https://drts.com/products/cyclone-pc-nd-as/> > (Year: 2020).\*

European Patent Office, Communication Pursuant to Article 94(3) EPC issued in European Application No. 13 770 084.5, dated Aug. 9, 2021, 7 pp.

U.S. Appl. No. 15/858,685; Office Action dated Apr. 16, 2021; (pp. 1-9).

U.S. Appl. No. 15/881,285; Notice of Allowance dated Mar. 4, 2021; (pp. 1-9).

U.S. Appl. No. 15/858,685; Notice of Allowance dated Aug. 5, 2021; (pp. 1-8).

U.S. Appl. No. 16/451,871; Office Action dated Jun. 22, 2021; (pp. 1-16).

Alam, M., et al., "Subsurface Drip Irrigation for Alfalfa," Kansas State University, 2009, pp. 1-8.

Alapati, Nanda K., Netafim Letter dated Mar. 30, 2012 with enclosure and attachments, 13 pages.

Alapati, Nanda K., Netafim Letter dated Mar. 30, 2012 with enclosure, 6 pages.

Arduini, I., et al., "Influence of Copper on Root Growth and Morphology of *Pinus pinea* L. and *Pinus pinaster* Ait. Seedlings," Tree Physiology, 15, 1995, pp. 411-415.

ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, K. Taylor et al, "A Mathematical Model For Pressure Compensating Emitters", Aug. 2-5, 2015, Boston, Massachusetts, USA, 10 pp.

Bernard, H., et al., "Assessment of herbicide leaching risk in two tropical soils of Reunion Island (France)," J Environ Qual 34:534-543, (2005).

Beverage, K., "Drip Irrigation for Row Crops," New Mexico State University, 2001, pp. 1-43.

Borkow, G., et al., "A Novel Anti-Influenza Copper Oxide Containing Respiratory Face Mask," PLoS ONE, www.plosone.org, Jun. 2010, vol. 5, Issue 6, pp. 1-8.

Borkow, G., et al., "Copper as a Biocidal Tool," Current Medicinal Chemistry, 2005, 12, 2163-2175.

Borkow, G., et al., "Endowing Textiles with Permanent Potent Biocidal Properties by Impregnating Them with Copper Oxide," ResearchGate, Jan. 2006.

Borkow, G., et al., "Putting copper into action:copperimpregnated products with potent biocidal activities," FASEB J, 18:1728-1730, (2004).

Brazilian Patent and Trademark Office, Search Report dated Nov. 19, 2018 for Brazilian Patent Application No. BR 11 2014 023843-0, 2 pages.

Brazilian Patent and Trademark Office, Technical Examination Report dated Nov. 19, 2018 for Brazilian Patent Application No. BR 11 2014 023843-0, 9 pages.

Cetesb and Sindiplast, Environmental Guide of the Plastic Materials Recycling and Processing Industry [electronic resource], Technical elaboration: Gilmar do Amaral et al., Collaborators: Andre H.C. Botto e Souza et al., 2011. Retrieved from the Internet: <URL: [http://file.sindiplast.org.br/download/guia\\_ambiental\\_internet.pdf](http://file.sindiplast.org.br/download/guia_ambiental_internet.pdf)>, 91 pages.

Coder, K., "Tree Root Growth Control Series: Root Control Barriers," The University of Georgia, Mar. 1998, pp. 1-7.

Crawford, M., "Copper-Coated Containers and Their Impact on the Environment," Spin Out, 2003, pp. 76-78.

Crawford, M., "Update On Copper Root Control," Spin Out, 1997. DIG® Irrigation Product Catalog 2012, <www.digcorp.com>, 2012, 32 pages.

DIG® Irrigation Product Catalog 2016, <www.digcorp.com>, Nov. 9, 2016, 72 pages.

DIG® Irrigation Product Catalog 2018 , <www.digcorp.com>, Oct. 23, 2017, 72 pages.

Diver, S., et al., "Sustainable Small-Scale Nursery Production," Attra, Nov. 2001, pp. 1-31.

Dixieline Lumber & Home Centers Catalog, DIG Irrigation Products Drip Tubing, 2003, p. 13.

Duke, K., et al., "Sewer Line Chemical Root Control with Emphasis on Foaming Methods Using Metam-Sodium and Dichlobenil," EPA United States Environmental Protection Agency, Sep. 1995.

Eason, Audra, et al., "Integrated modeling environment for statewide assessment of groundwater vulnerability from pesticide use in agriculture," Pest Manag Sci, 60:739-745 (online:2004).

Eco iMat LLC dba ecorain® USA, iMat Solution, <www.ecorainusa.>, illustrating a product available since Nov. 25, 2015, 6 pages.

ECO Rain AG, iMat® Irrigation Mat, <[http://www.ecorain.de/files/imat\\_irrigation\\_mat.pdf](http://www.ecorain.de/files/imat_irrigation_mat.pdf)>, illustrating a product available since Sep. 18, 2016, 8 pp.

Ecorain USA, iMat FAQ document, illustrating a product available since 2017, 6 pp.

Encyclopaedia Britannica, Inc., "Peristalsis," Nov. 30, 2017, [online]. Retrieved from the Internet: <URL: <https://www.britannica.com/print/article/452053> >, 2 pages.

EPO, Extended European Search Report issued in Application No. 13768209.2, dated Nov. 24, 2015 (10 pgs.).

Eurodrip U.S.A., Inc., 2009 Irrigation Products Catalog, p. 4-5, 4 pages.

Eurodrip U.S.A., Inc., Products Guide, copyright date Nov. 2007, 2 pages.

European Patent Application No. 18172143.2, Extended European Search Report, dated Oct. 15, 2018, 9 pages.

European Patent Office, Communication Pursuant to Article 94(3) EPC issued in European Application No. 13 768 209.2, dated Jan. 4, 2019, 5 pp.

European Patent Office, Communication Pursuant to Article 94(3) EPC issued in European Application No. 14 836 360.9, dated Feb. 8, 2017, 7 pp.

European Patent Office, Extended European Search Report for European Application No. 13770084.5 dated Feb. 11, 2016, 7 pages.

European Patent Office, Extended European Search Report for European Application No. 17831631.1, dated Feb. 3, 2020, 9 pp.

European Patent Office, Office Action for European Application No. 10160675.4 dated Mar. 27, 2012, 2 pp.

European Patent Office, Search Report for European Application No. 10160675.4 dated Aug. 6, 2010, 2 pp.

Final Office Action dated Aug. 25, 2015; U.S. Appl. No. 13/430,308, 11 pages.

Final Office Action dated Jul. 21, 2016; U.S. Appl. No. 13/430,308, 9 pages.

Fitch, Even, Tabin & Flannery; Letter, Apr. 23, 2008, 1 p.

(56)

## References Cited

## OTHER PUBLICATIONS

- Giles-Parker, C, EPA, Pesticide Fact Sheet, pp. 1-4.  
<http://aasystems.eu/dripper/>; Advanced Automation Systems Ltd., Dec. 18, 2015, 12 pp.  
<http://aasystems.eu/products11.html>; Advanced Automation Systems Ltd. (1 p., dated Jun. 20, 2013).  
<http://metzerplas.com/en-US/50/845/>; Meterplas Cooperative Agricultural Organization Ltd., (2 pp., dated Jun. 20, 2013).  
 Hunter Industries, Drip Design Guide, Dec. 2012, 32 pages.  
 Irritec® On Line Drippers iDrop®, Irritec S.p.A, <[www.irritec.com](http://www.irritec.com)>, Nov. 5, 2014, 2 pages.  
 Irritec® Product Catalog and Price List 2016, Irritec USA Inc., <[www.irritec.com](http://www.irritec.com)>, Oct. 2, 2015, 66 pages.  
 Irritec™ USA iDrop™ PCDS, Irritec USA Inc., <[www.irritecusa.com](http://www.irritecusa.com)>, Jul. 26, 2012, 2 pages.  
 Jaffe, E., Netafim Ltd., Patent Dept., Letter with attached Appendices A-B, Aug. 1, 2010, 35 pages.  
 Jaffe, E., Netafim Ltd., Patent Dept., Letter with attached claim charts, Feb. 4, 2008, 6 pages.  
 Jaffe, E., Netafim Ltd., Patent Dept., Letter with attached claim charts, Jul. 12, 2009, 4 pages.  
 Jaffe, E., Netafim Ltd., Patent Dept., Letter with attachment, Feb. 4, 2008, 7 pages.  
 Jaffe, E., Netafim, Ltd., Patent Dept., Letter with attached invoice, May 7, 2008, 2 pages.  
 Jain Irrigation Inc., 2009 Product Catalog, pp. 12-13, copyright date 2009 (revised Oct. 2008), 4 pages.  
 Jain® Button Emitters, Jain Irrigation Inc., <[www.jainsusa.com](http://www.jainsusa.com)>, Jan. 5, 2015, 2 pages.  
 Jain® Emission Devices, Jain Irrigation Systems Ltd., <[www.jainsusa.com](http://www.jainsusa.com)>, Nov. 22, 2016, pp. 171-182.  
 Jain® Landscape Catalog, Jain Irrigation, Inc., <[www.jainsusa.com](http://www.jainsusa.com)>, Dec. 7, 2015, 102 pages.  
 Jain® Online Emitters, Jain Irrigation Systems Ltd., <[www.jainsusa.com](http://www.jainsusa.com)>, Mar. 12, 2015, 2 pages.  
 Jiang, W. et al., “Effects of Copper on Root Growth, Cell Division, and Nucleolus of *Zea mays*,” *Biologia Plantarum*, 44(1), 2001, pp. 105-109.  
 Kuhns, L. et al., “Copper Toxicity in Woody Ornamentals,” *Journal of Arboriculture*, Apr. 1976, pp. 68-78.  
 Lady Bug Emitter, Rain Bird Sales, Inc., <<https://web.archive.org/web/19980121011011/http://www.rainbird.com:80/rbturf/products/xeri/emission/ladybug.htm>>, dated Dec. 1997, 2 pages.  
 Mastin, B.J., et al., “Toxicity and bioavailability of copper herbicides (Clearigate, Cutrine-Plus, and copper sulfate) to freshwater animals,” *Arch Environ Contam Toxicol*, 39:445-451, (2000).  
 metzerplas.com, OEM Drippers, Sep. 29, 2013, [online]. Retrieved from the Internet via the Internet Archive: Wayback Machine: <URL: <http://metzerplas.com/en-US/48/865/>> on Dec. 10, 2018, 2 pages.  
 Multi-Outlet Xeri-Bug™, Rain Bird Sales, Inc., <<https://web.archive.org/web/19980121010952/http://www.rainbird.com:80/rbturf/products/xeri/emission/moutlet.htm>>, 1997, 2 pages.  
 Murray-Gulde, C.L., et al., “Algicidal effectiveness of Clearigate, Cutrine-Plus, and copper sulfate and margins of safety associated with their use,” *Arch Environ Contam Toxicol* 42:19-27, (2002).  
 NDS Inc., Agrifim Drip and Micro Irrigation Catalog, Jan. 2004, 3 pages.  
 Netafim International—Netafim USA—Internet site, 2003, 5 pages.  
 Netafim Ltd., Appendix A, images of Netafim’s Drip Net product, 1 page.  
 Netafim Ltd., Appendix A, marked-up images of Netafim’s Ram product, 1 page.  
 Netafim Ltd., Appendix B, Invoice, Jan. 31, 1991, 1 page.  
 Netafim Ltd., Appendix C, Netafim RAM Catalog, Jan. 2000, 4 pages.  
 Netafim Ltd., Appendix D, Enlarged, marked-up excerpts from Netafim RAM Catalog, Jan. 2000, 1 page.  
 Netafim USA, Landscape & Turf Division Product Catalog, Aug. 2004, 36 pages.  
 Netafim USA, RAM Catalog Figures, Jan. 2000, 4 pages.  
 Netafim USA, Triton X Heavywall Dripperline Catalog, May 2007, 8 pages.  
 Netafim, RAM Pressure Compensating Dripperline brochure, Feb. 1997, 4 pages.  
 Netafim™ Non-Pressure Compensating Drippers, Netafim USA, <[www.netafimusa.com](http://www.netafimusa.com)>, Nov. 13, 2012, 2 pages.  
 Netafim™ Point Source Emitters, Netafim USA, <[www.netafimusa.com](http://www.netafimusa.com)>, Oct. 3, 2016, 4 pages.  
 Netafim™ Pressure Compensating (PC) Spray Stakes, Netafim USA, <[www.netafimusa.com](http://www.netafimusa.com)>, Feb. 26, 2013, 12 pages.  
 Netafim™ Pressure Compensating Drippers, Netafim USA, <[www.netafimusa.com](http://www.netafimusa.com)>, Jun. 1, 2018, 2 pages.  
 Netafim™ Pressure Compensating Drippers, Netafim USA, <[www.netafimusa.com](http://www.netafimusa.com)>, Apr. 2016, 2 pages.  
 Non-Final Office Action dated Feb. 11, 2016; U.S. Appl. No. 13/430,308, 9 pages.  
 Patent Cooperation Treaty, Application No. PCT/US2013/033866, International Search Report and Written Opinion dated Jun. 19, 2013, 38 pp.  
 Patent Cooperation Treaty, International Search Report issued in International Application No. PCT/US2013/046603, dated Sep. 19, 2013, 2 pp.  
 Patent Cooperation Treaty, International Searching Authority, Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration, issued in International Application No. PCT/US/2014/054533, dated Dec. 25, 2014, 9 pp.  
 Patent Cooperation Treaty, International Searching Authority, Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration, issued in International Application No. PCT/US2018/015516, dated Jun. 28, 2018, 8 pp.  
 Patent Cooperation Treaty, Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority issued in International Application No. PCT/US2013/033668, dated Jun. 17, 2013, 10 pp.  
 Patent Cooperation Treaty, Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority issued in International Application No. PCT/US2014/050623, dated Nov. 20, 2014, 17 pp.  
 Patent Cooperation Treaty, Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration, Issued in International Application No. PCT/US2017042378, dated Oct. 26, 2017, 7 pp.  
 Patent Cooperation Treaty, Written Opinion of the International Searching Authority issued in International Application No. PCT/US2013/046603, dated Sep. 19, 2013, 4 pp.  
 PCT International Application No. PCT/US2013/033866 filed Mar. 26, 2013.  
 Photograph of DIG® Product No. PCA-003CV, Nov. 21, 2015, 1 page.  
 Photograph of Irritec® Product No. A6-WPC2BB, Jul. 26, 2012, 1 page.  
 Photograph of Irritec® Product No. A6-WPC3BB, Jul. 26, 2012, 1 page.  
 Photograph of Jain® Product No. CTTPC2-CNL, Jan. 5, 2015, 1 page.  
 Photograph of Jain® Product No. CTTPC4-CNL, Jan. 5, 2015, 1 page.  
 Photograph of Netafim™ Product No. SPCV10, Oct. 3, 2016, 1 page.  
 Photograph of Netafim™ Product No. Techflow Emitter WPC20, Nov. 13, 2012, 1 page.  
 Photograph of Netafim™ Product No. WPC10, Nov. 13, 2012, 1 page.  
 Photograph of Netafim™ Woodpecker Junior Product No. 01WPCJL4, Jan. 2012, 1 page.  
 Photograph of Toro® Product No. DPC08-MA-Red, Jun. 22, 2012, 1 page.  
 Photographs of an in-line cylindrical drip emitter on sale or publicly disclosed more than a year before the filing of the instant application, 2 pages.



(56)

## References Cited

## OTHER PUBLICATIONS

Pressure-Compensating Modules, Rain Bird Sales, Inc., <<https://web.archive.org/web/19980121011024/http://www.rainbird.com:80/rbturf/products/xeri/emission/prescmp.htm>>, 1997, 2 pages.

Price Book, Oct. 2015, Rivulis Irrigation, Oct. 2015 (Revised Apr. 28, 2016), <[rivulis.com](http://rivulis.com)>, 116 pages.

Rain Bird Corporation, Agriculture Irrigation Equipment 1981 Catalog, 3 pages.

Rain Bird Corporation, Drip Watering System 1994 Catalog, 1993, 16 pages.

Rain Bird Corporation, Landscape Irrigation Products 1993-1994 Catalog, Feb. 1993, 5 pages.

Rain Bird Corporation, Landscape Irrigation Products 1993-1994 Catalog, p. 120, Feb. 1993, 3 pages.

Rain Bird Corporation, Landscape Irrigation Products 2001-2002 Catalog, Mar. 2001, 9 pages.

Rain Bird Corporation, Landscape Irrigation Products 2001-2002 Catalog, pp. 181-184, Mar. 2001, 6 pages.

Rain Bird Corporation, Landscape Irrigation Products 2005-2006 Catalog, Jun. 2004, 13 pages.

Rain Bird Corporation, Landscape Irrigation Products 2005-2006 Catalog, pp. 230-232; 247-250, Jun. 2004, 10 pages.

Rain Bird Corporation, Landscape Irrigation Products 2006-2007 Catalog, p. 222-224; 238-242, Jul. 2005, 11 pages.

Rain Bird Corporation, Nursery Equipment Catalog 1986/1987, 1986, 3 pages.

Rain Bird Corporation, PC Dripline Pressure Compensating Inline Emitter Tubing Catalog, Oct. 1998, 16 pages.

Rain Bird Corporation, Rain Bird PC Dripline brochure, copyright date Nov. 2000, 12 pages.

Rain Bird Corporation, Turf Irrigation Equipment 1982 Catalog, 1982, 4 pages.

Rain Bird Corporation, Turf Irrigation Equipment 1983 Catalog, 1983, 4 pages.

Rain Bird Corporation, Turf Irrigation Equipment 1985 Catalog, 1985, 3 pages.

Rain Bird Corporation, Turf Irrigation Equipment 1985 Catalog, p. 73, 1985, 3 pages.

Rain Bird Corporation, Turf Irrigation Equipment 1987 Catalog, 1987, 6 pages.

Rain Bird Multi-Outlet Xeri-Bug, 1998, 1 page.

Rain Bird Pressure-Compensating Module, 1998, 1 page.

Rain Bird Xeri-Bug, 1998, 3 pages.

Rain Bird® Consumer Products Catalog, Tubing, D33305-11, copyright date 2010, p. 48.

Rain Bird® Landscape Irrigation Products 1997-1998 Catalog, Component and Emission Device, D48301, copyright date Aug. 1997, pp. 128-129.

Rain Bird® Landscape Irrigation Products 1999-2000 Catalog, Emission Devices, D37200, copyright date Aug. 1998, pp. 136-137.

Rain Bird® Landscape Irrigation Products 2004 New Products Catalog, D37200D, copyright date Oct. 2003, pp. 41-42.

Rain Bird® Landscape Irrigation Products 2008-2009 Catalog, D37200H, copyright date Sep. 2007, pp. 180-187.

Rain Bird® Landscape Irrigation Products, Rain Bird Dripline Series, RBE-03-TE-10, copyright date Aug. 2003, pp. 106-107.

Rain Bird® Nursery Equipment Catalog 1986-1987, D32304, copyright date 1986, p. 13.

Rain Bird® XF Series Dripline | Design, Installation and Maintenance Guide, D40024A, copyright date Feb. 2012, 48 pages.

Rain Bird® XFCV Dripline with Heavy-Duty Check Valve, D40215, copyright date Oct. 2012, 2 pages.

Rain Bird® XFD Dripline with Greater Flexibility, D39994B, copyright date Jan. 2012, 2 pages.

Rain Bird® XFS Dripline with Copper Shield™ Technology, D39978B, copyright date Jan. 2012, 2 pages.

Rain Tape Design Guide, Rain Bird®, D35252, document was published more than a year before the filing date of the instant application, 5 pages.

RAM Invoice Jan. 31, 1991.

Schifris, Seba et al., "Inhibition of root penetration in subsurface driplines by impregnating the drippers with copper oxide particles," *Irrigation Science* (2015) 33:4, pp. 319-324.

Siplast/Irritec Multibar Pressure Compensated Coextruded Dripline, Jul. 22, 2005, 4 pages.

Smiley, E. T., "Root Growth Near Vertical Root Barriers," *International Society of Arboriculture*, 1995, pp. 150-152.

Spera, G., et al., "Subsurface drip irrigation with micro-encapsulated trifluralin. Trifluralin residues in soils and cultivations," *Commun Agric Appl Biol Sci* 71:161-170, (2006).

State Intellectual Property Office of People's Republic of China, First Office Action issued in Application No. 201480045002.0, dated Apr. 16, 2018, 20 pp.

State Intellectual Property Office, First Office Action issued in Chinese Application No. 201380016629.9, dated Nov. 4, 2015, 16 pp.

The Clean Estuary Partnership, "Copper Sources in Urban Runoff and Shoreline Activities," TDC Environmental, LLC, 2004, pp. 1-72.

The Toro Company, 2000-2001 Irrigation Products Catalog, p. 28, copyright date Oct. 1999, 3 pages.

The Toro Company, Drip In Classic Turbulent Flow Dripline brochure, Jun. 2014, 4 pages.

The Toro Company, Drip In PC Brown Dripline brochure, 2015, 2 pages.

Toro® NGE® AL Anti-Drain Pressure Compensating Emitter, The Toro Company, <[www.toro.com](http://www.toro.com)>, Jun. 23, 2012, 2 pages.

Toro® NGE® Emitters, The Toro Company, <[www.toro.com](http://www.toro.com)>, May 16, 2018, 2 pages.

Toro® NGE® New Generation Emitters, The Toro Company, <[www.toro.com](http://www.toro.com)>, Feb. 21, 2013, 2 pages.

Toro® NGE® SF Self-flushing Pressure Compensating Emitter, The Toro Company, <[www.toro.com](http://www.toro.com)>, Jun. 22, 2012, 2 pages.

Toro® Turbo-SC® Plus Pressure-compensating Emitter, The Toro Company, <[www.toro.com](http://www.toro.com)>, May 6, 2009, 2 pages.

U.S. Appl. No. 11/359,181, filed Feb. 22, 2006, entitled "Drip Emitter," and issued on Jan. 19, 2010 as U.S. Pat. No. 7,648,085.

U.S. Appl. No. 11/394,755, filed Mar. 31, 2006, entitled "Drip Emitter."

U.S. Appl. No. 12/347,266, filed Dec. 31, 2008, entitled "Low Flow Irrigation Emitter."

U.S. Appl. No. 12/367,295, filed Feb. 6, 2009, entitled "Low Flow Irrigation Emitter."

U.S. Appl. No. 12/436,394, filed May 6, 2009, entitled "Drip Emitter and Methods of Assembly and Mounting."

U.S. Appl. No. 12/495,178, filed Jun. 30, 2009, entitled "Drip Emitter."

U.S. Appl. No. 12/495,193, filed Jun. 30, 2009, entitled "Drip Emitter," which is a continuation of U.S. Appl. No. 11/359,181.

U.S. Appl. No. 13/430,249, filed Mar. 26, 2012.

U.S. Appl. No. 13/964,903, filed Aug. 12, 2013.

U.S. Appl. No. 14/139,217, filed Dec. 23, 2013.

U.S. Appl. No. 14/036,881; Notice of Allowance dated Aug. 24, 2017, 7 pages.

U.S. Appl. No. 13/839,726; Notice of Allowance dated Sep. 14, 2017, 5 pages.

U.S. Appl. No. 13/964,903; Notice of Allowance dated Apr. 5, 2018, 5 pages.

U.S. Appl. No. 13/964,903; Notice of Allowance dated Aug. 4, 2017, 11 pages.

U.S. Appl. No. 13/964,903; Notice of Allowance dated Sep. 18, 2017, 7 pages.

U.S. Appl. No. 14/036,881; Corrected Notice of Allowability dated May 21, 2018, 2 pages.

U.S. Appl. No. 14/036,881; Corrected Notice of Allowability dated May 22, 2017, 2 pages.

U.S. Appl. No. 14/036,881; Notice of Allowability dated Nov. 29, 2017, 2 pages.

U.S. Appl. No. 14/036,881; Notice of Allowability dated Dec. 26, 2017, 2 pages.

U.S. Appl. No. 14/036,881; Notice of Allowance dated May 8, 2017, 9 pages.

(56)

**References Cited**

## OTHER PUBLICATIONS

U.S. Appl. No. 14/036,881; Notice of Allowance dated May 9, 2018, 5 pages.

U.S. Appl. No. 14/036,881; Notice of Allowance dated Dec. 23, 2016, 8 pages.

U.S. Appl. No. 14/036,881; Office Action dated Aug. 2, 2016, 11 pages.

U.S. Appl. No. 14/036,881; Office Action dated Dec. 9, 2015, 9 pages.

U.S. Appl. No. 14/385,564; Notice of Allowability dated Nov. 29, 2017, 2 pages.

U.S. Appl. No. 14/385,564; Notice of Allowability dated Dec. 26, 2017, 2 pages.

U.S. Appl. No. 14/385,564; Notice of Allowance dated Aug. 22, 2017, 8 pages.

U.S. Appl. No. 14/475,435; Office Action dated Sep. 27, 2017, 9 pages.

U.S. Appl. No. 14/518,774; Notice of Allowance dated Jan. 4, 2018, 4 pages.

U.S. Appl. No. 14/518,774; Notice of Allowance dated Oct. 26, 2017, 7 pages.

U.S. Appl. No. 14/851,545; Office Action dated Oct. 30, 2017, 27 pages.

U.S. Appl. No. 14/910,573; Office Action dated Feb. 13, 2018, 10 pages.

U.S. Appl. No. 15/331,407; Corrected Notice of Allowability dated Dec. 28, 2017, 2 pages.

U.S. Appl. No. 15/331,407; Notice of Allowability dated Nov. 30, 2017, 2 pages.

U.S. Appl. No. 15/331,407; Notice of Allowance dated Oct. 27, 2017, 9 pages.

U.S. Appl. No. 15/331,407; Office Action dated Apr. 27, 2017, 7 pages.

U.S. Appl. No. 15/344,843; Corrected Notice of Allowability dated Dec. 28, 2017, 2 pages.

U.S. Appl. No. 15/344,843; Notice of Allowability dated Nov. 30, 2017, 2 pages.

U.S. Appl. No. 15/344,843; Notice of Allowance dated Oct. 16, 2017, 7 pages.

U.S. Appl. No. 15/650,379; Office Action dated May 18, 2018, 8 pages.

U.S. Appl. No. 13/964,903; Notice of Allowance dated Mar. 26, 2019 (pp. 1-5).

U.S. Appl. No. 13/964,903; Notice of Allowance dated Sep. 26, 2018 (pp. 1-5).

U.S. Appl. No. 13/964,903; Notice of Allowance dated Dec. 14, 2018 (pp. 1-5).

U.S. Appl. No. 14/036,881; Notice of Allowance dated Jun. 21, 2019 (pp. 1-6).

U.S. Appl. No. 14/036,881; Notice of Allowance dated Aug. 30, 2018 (pp. 1-6).

U.S. Appl. No. 14/851,545; Notice of Allowance dated Apr. 17, 2019 (pp. 1-9).

U.S. Appl. No. 14/851,545; Office Action dated Jul. 3, 2018, 29 pages.

U.S. Appl. No. 14/851,545; Office Action dated Oct. 29, 2018 (pp. 1-32).

U.S. Appl. No. 14/910,573; Notice of Allowance dated Feb. 26, 2020 (pp. 1-5).

U.S. Appl. No. 14/910,573; Notice of Allowance dated Sep. 3, 2019 (pp. 1-11).

U.S. Appl. No. 14/910,573; Notice of Allowance dated Dec. 23, 2019 (pp. 1-5).

U.S. Appl. No. 14/910,573; Office Action dated May 6, 2019 (pp. 1-11).

U.S. Appl. No. 14/910,573; Office Action dated Sep. 26, 2018 (pp. 1-11).

U.S. Appl. No. 15/595,427; Notice of Allowance dated Jan. 23, 2020 (pp. 1-7).

U.S. Appl. No. 15/595,427; Notice of Allowance dated Feb. 25, 2020 (pp. 1-7).

U.S. Appl. No. 15/595,427; Office Action dated Apr. 4, 2019 (pp. 1-6).

U.S. Appl. No. 15/595,427; Office Action dated Jun. 6, 2019.

U.S. Appl. No. 15/595,427; Office Action dated Dec. 17, 2018 (pp. 1-6).

U.S. Appl. No. 15/650,379; Notice of Allowance dated Feb. 19, 2019 (pp. 1-5).

U.S. Appl. No. 15/650,379; Notice of Allowance dated Mar. 26, 2019 (pp. 1-5).

U.S. Appl. No. 15/650,379; Notice of Allowance dated Oct. 24, 2018 (pp. 1-7).

U.S. Appl. No. 15/665,848; Office Action dated Jan. 8, 2020 (pp. 1-11).

U.S. Appl. No. 15/665,848; Office Action dated Aug. 30, 2019 (pp. 1-12).

U.S. Appl. No. 15/853,135; Notice of Allowance dated May 20, 2019.

U.S. Appl. No. 15/858,685; Office Action dated Jan. 14, 2020 (pp. 1-10).

U.S. Appl. No. 15/881,285; Office Action dated Dec. 30, 2019 (pp. 1-12).

U.S. Appl. No. 15/952,510; Office Action dated Aug. 6, 2019 (pp. 1-14).

U.S. Appl. No. 16/532,006; Office Action dated Jan. 6, 2020 (pp. 1-10).

U.S. Appl. No. 11/394,755; Office Action dated Aug. 14, 2008, 9 pages.

U.S. Appl. No. 11/394,755; Office Action dated Feb. 7, 2008, 18 pages.

U.S. Appl. No. 11/394,755; Office Action dated Jul. 17, 2007, 16 pages.

U.S. Appl. No. 11/394,755; Office Action dated Jul. 17, 2009, 8 pages.

U.S. Appl. No. 11/394,755; Office Action dated Mar. 31, 2009, 13 pages.

U.S. Appl. No. 11/394,755; Office Action dated May 12, 2011, 15 pages.

U.S. Appl. No. 11/394,755; Office Action dated Dec. 19, 2011, 10 pages.

U.S. Appl. No. 12/347,266; Office Action dated Mar. 7, 2011, 17 pages.

U.S. Appl. No. 12/347,266; Office Action dated Nov. 17, 2010, 15 pages.

U.S. Appl. No. 12/347,266; Office Action dated Sep. 7, 2010, 5 pages.

U.S. Appl. No. 12/367,295; Office Action dated Feb. 11, 2011, 14 pages.

U.S. Appl. No. 12/367,295; Office Action dated Jul. 15, 2011, 16 pages.

U.S. Appl. No. 12/367,295; Office Action dated Jun. 8, 2012, 21 pages.

U.S. Appl. No. 12/495,178; Office Action dated Feb. 3, 2010, 20 pages.

U.S. Appl. No. 12/495,178; Office Action dated Apr. 18, 2014, 12 pages.

U.S. Appl. No. 12/495,178; Office Action dated Jun. 21, 2012, 8 pages.

U.S. Appl. No. 12/495,178; Office Action dated Mar. 11, 2015, 6 pages.

U.S. Appl. No. 12/495,178; Office Action dated Nov. 18, 2014, 8 pages.

U.S. Appl. No. 12/495,178; Office Action dated Oct. 6, 2015, 8 pages.

U.S. Appl. No. 12/495,193; Office Action dated Jan. 6, 2012, 18 pages.

U.S. Appl. No. 12/495,193; Office Action dated May 11, 2011, 19 pages.

U.S. Appl. No. 12/495,193; Advisory Action dated Sep. 5, 2013, 3 pages.

U.S. Appl. No. 12/495,193; Notice of Allowance dated Feb. 10, 2017, 7 pages.

(56)

**References Cited**

## OTHER PUBLICATIONS

U.S. Appl. No. 12/495,193; Notice of Allowance dated May 4, 2017, 7 pages.  
 U.S. Appl. No. 12/495,193; Notice of Allowance dated Oct. 14, 2016, 7 pages.  
 U.S. Appl. No. 12/495,193; Office Action dated Apr. 18, 2014, 23 pages.  
 U.S. Appl. No. 12/495,193; Office Action dated Aug. 29, 2016, 7 pages.  
 U.S. Appl. No. 12/495,193; Office Action dated Jan. 15, 2015, 11 pages.  
 U.S. Appl. No. 12/495,193; Office Action dated Jun. 18, 2013, 13 pages.  
 U.S. Appl. No. 12/495,193; Office Action dated Oct. 1, 2015, 9 pages.  
 U.S. Appl. No. 13/430,249; Notice of Allowance dated Apr. 14, 2016, 7 pages.  
 U.S. Appl. No. 13/430,249; Notice of Allowance dated Sep. 19, 2016, 6 pages.  
 U.S. Appl. No. 13/430,249; Office Action dated Mar. 24, 2015, 10 pages.  
 U.S. Appl. No. 13/430,249; Office Action dated Oct. 26, 2015, 10 pages.  
 U.S. Appl. No. 13/800,354; Office Action dated Sep. 25, 2014, 13 pages.  
 U.S. Appl. No. 13/839,726; Notice of Allowance dated Aug. 15, 2016, 5 pages.  
 U.S. Appl. No. 13/839,726; Notice of Allowance dated Dec. 1, 2016, 5 pages.  
 U.S. Appl. No. 13/839,726; Notice of Allowance dated Dec. 31, 2015, 5 pages.  
 U.S. Appl. No. 13/839,726; Office Action dated Apr. 26, 2016, 4 pages.  
 U.S. Appl. No. 13/839,726; Office Action dated Mar. 20, 2017, 4 pages.  
 U.S. Appl. No. 13/839,726; Office Action dated May 28, 2015, 5 pages.  
 U.S. Appl. No. 13/839,726; Office Action dated May 30, 2017, 4 pages.  
 U.S. Appl. No. 13/964,903; Office Action dated Jun. 3, 2015, 21 pages.  
 U.S. Appl. No. 13/964,903; Office Action dated Mar. 7, 2016, 21 pages.  
 U.S. Appl. No. 14/047,489; Office Action dated Jun. 29, 2015, 7 pages.  
 U.S. Appl. No. 14/047,489; Office Action dated Oct. 7, 2015, 9 pages.  
 U.S. Appl. No. 14/139,217; Office Action dated Apr. 8, 2015, 9 pages.  
 U.S. Appl. No. 14/139,217; Office Action dated Sep. 18, 2015, 11 pages.

U.S. Appl. No. 14/385,564; Office Action dated Aug. 10, 2016, 9 pages.  
 U.S. Appl. No. 14/385,564; Office Action dated Mar. 10, 2017, 8 pages.  
 U.S. Appl. No. 14/475,435; Office Action dated Jan. 26, 2017, 10 pages.  
 U.S. Appl. No. 14/475,435; Office Action dated Jul. 20, 2016, 9 pages.  
 U.S. Appl. No. 14/518,774; Office Action dated May 10, 2017, 8 pages.  
 U.S. Appl. No. 14/851,545; Office Action dated Apr. 24, 2017, 20 pages.  
 U.S. Appl. No. 14/910,573; Office Action dated Jun. 27, 2017, 10 pages.  
 U.S. Appl. No. 15/344,843; Office Action dated Apr. 28, 2017, 7 pages.  
 U.S. Appl. No. 13/964,903; Office Action dated Oct. 31, 2016, 22 pages.  
 Wagar, J. Alan, et al., "Effectiveness of Three Barrier Materials for Stopping Regenerating Roots of Established Trees," *Journal of Arboriculture*, 19(6), Nov. 1993, pp. 332-338.  
 Westgate, Philip J., "Preliminary Report on Copper Toxicity and Iron Chlorosis in Old Vegetable Fields," *Florida State Horticultural Society*, 1952, pp. 143-146.  
 U.S. Appl. No. 16/436,467; Non-Final Rejection dated Dec. 27, 2021 (pp. 1-10).  
 U.S. Appl. No. 16/451,871; Notice of Allowance and Fees Due (PTOL-85) dated Dec. 8, 2021 (pp. 1-11).  
 U.S. Appl. No. 15/858,685; Office Action dated Dec. 9, 2020 (pp. 1-9).  
 European Patent Office, Communication Pursuant to Article 94(3) EPC issued in International Application No. 18 172 143.2, dated Apr. 29, 2020, 7 pp.  
 Intellectual Property India, The Patent Office, First Examination Report issued in Appln. No. IN201647007822, dated Sep. 17, 2020, 6 pp.  
 U.S. Appl. No. 15/665,848; Notice of Allowance dated Jul. 21, 2020 (pp. 1-7).  
 U.S. Appl. No. 15/858,685; Office Action dated Apr. 24, 2020 (pp. 1-9).  
 U.S. Appl. No. 15/881,285; Office Action dated Jul. 16, 2020 (pp. 1-16).  
 U.S. Appl. No. 15/952,510; Office Action dated Apr. 16, 2020 (pp. 1-19).  
 U.S. Appl. No. 16/532,006; Notice of Allowance dated Apr. 20, 2020 (pp. 1-7).  
 U.S. Appl. No. 16/436,467; Final Rejection dated Apr. 5, 2022 (pp. 1-12).  
 U.S. Appl. No. 16/451,871; Notice of Allowance and Fees Due (PTOL-85) dated Apr. 8, 2022 (pp. 1-5).

\* cited by examiner

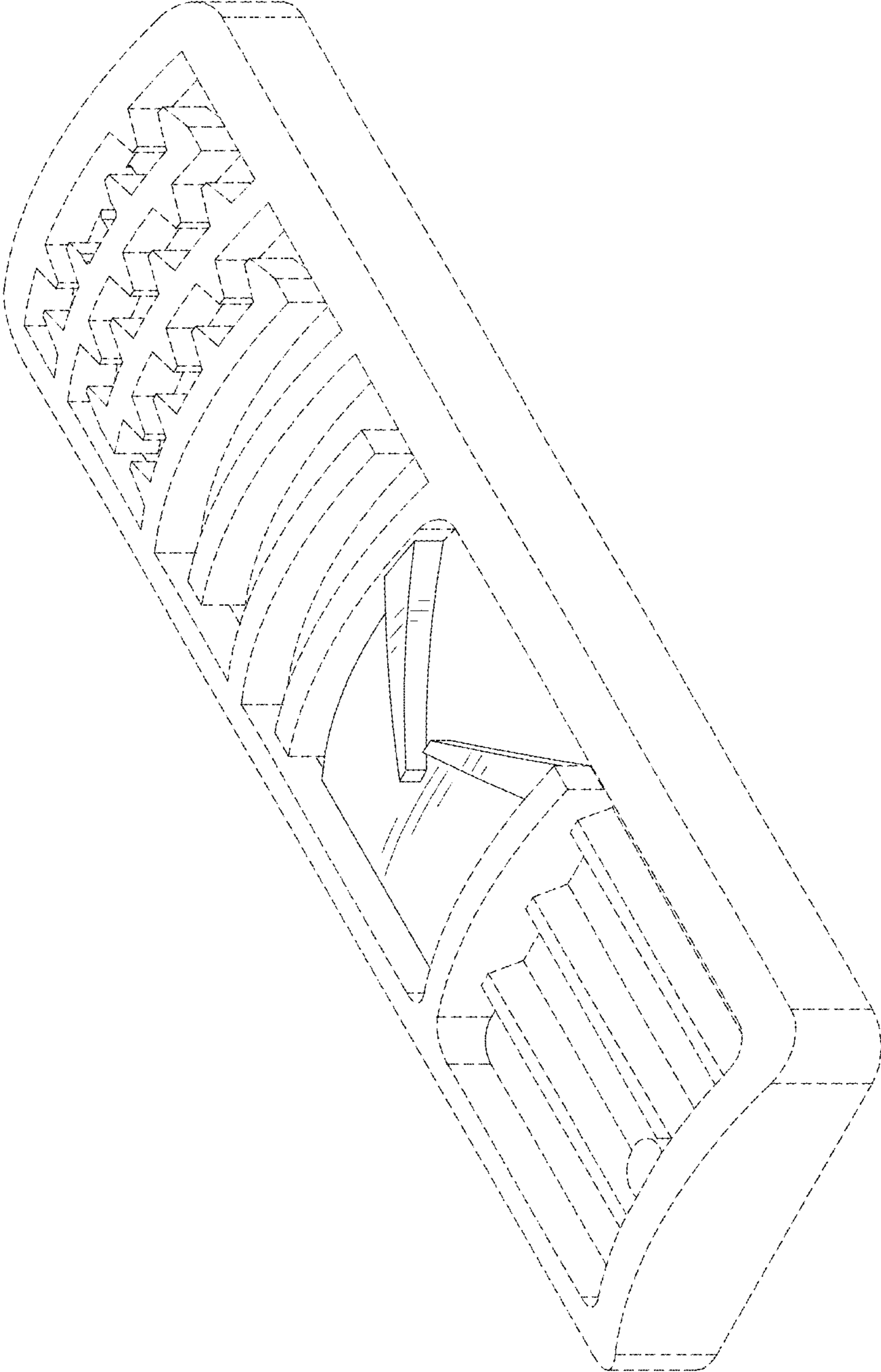


FIG. 1

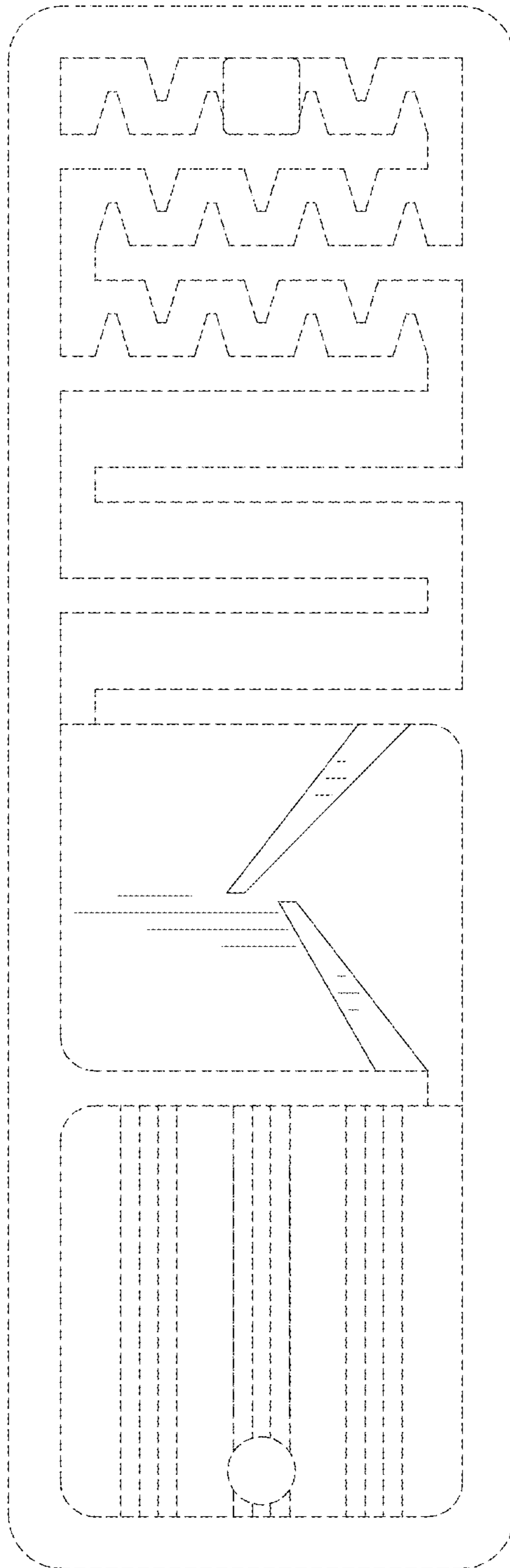


FIG. 2

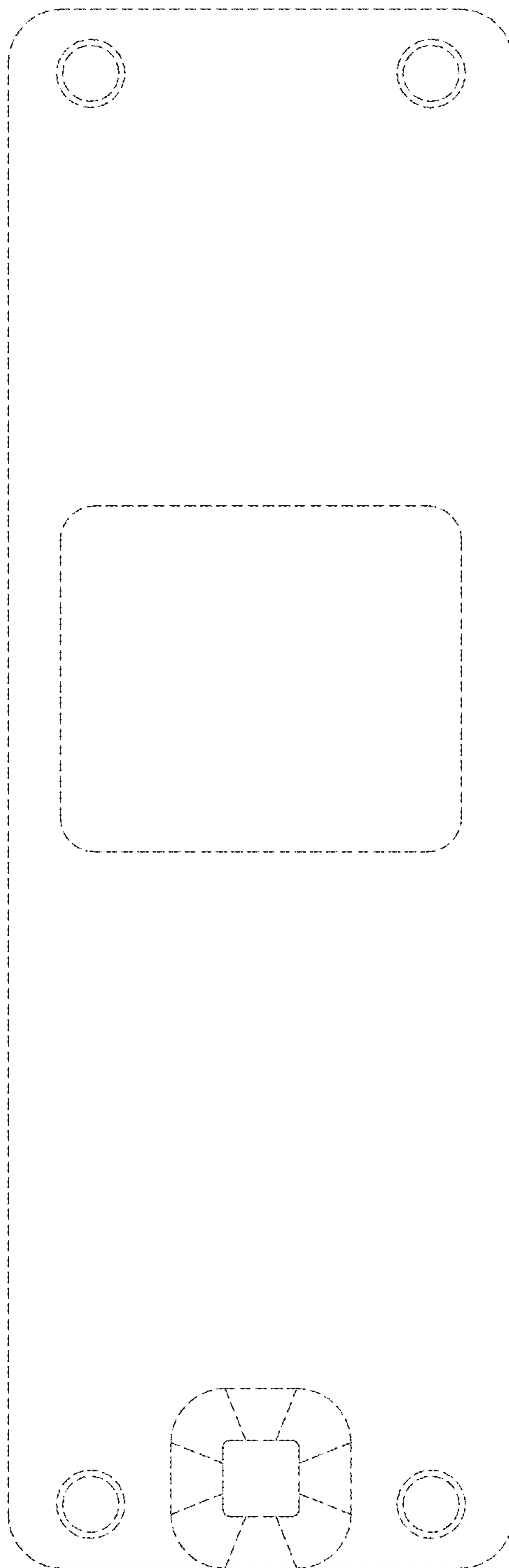


FIG. 3

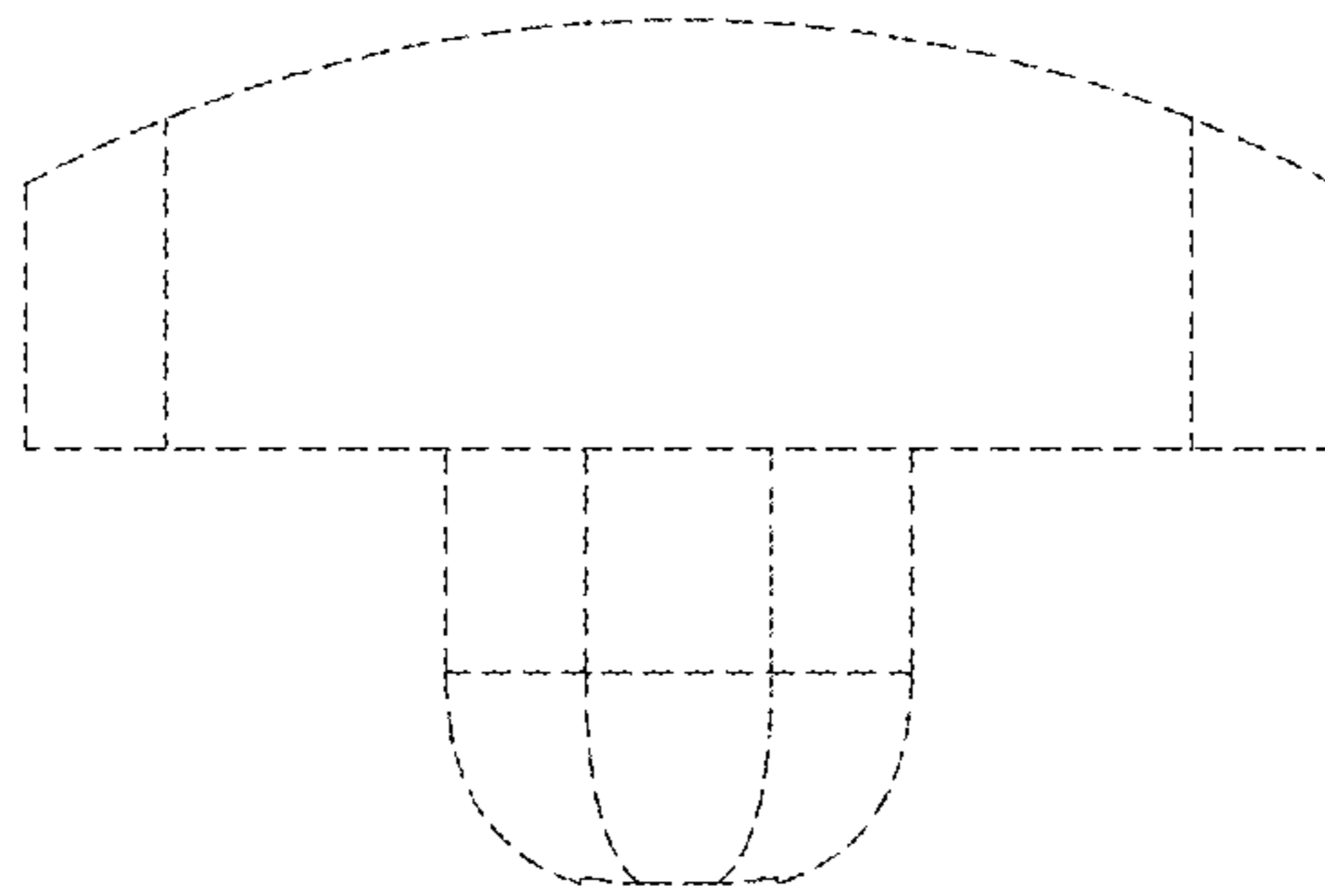


FIG. 4

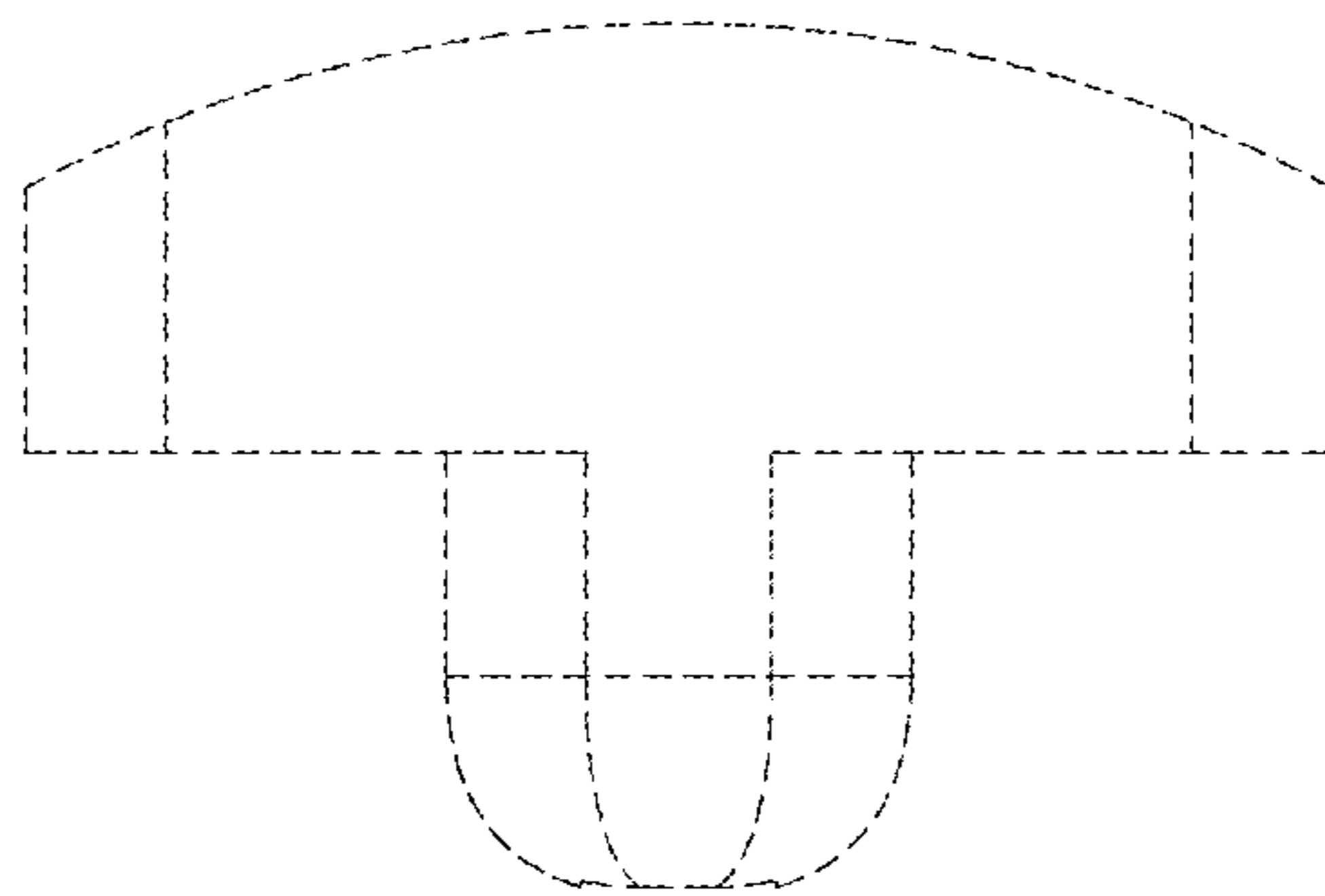


FIG. 5

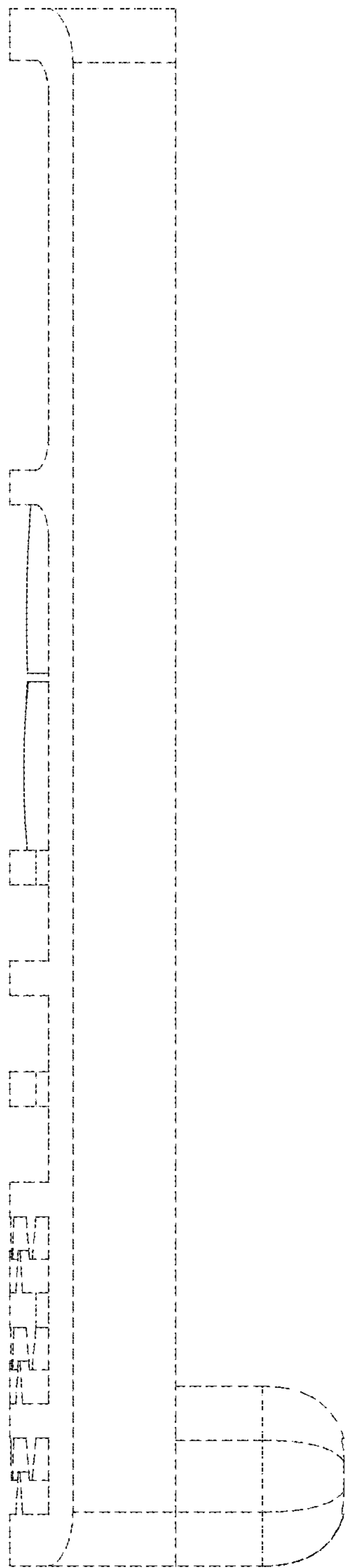


FIG. 6



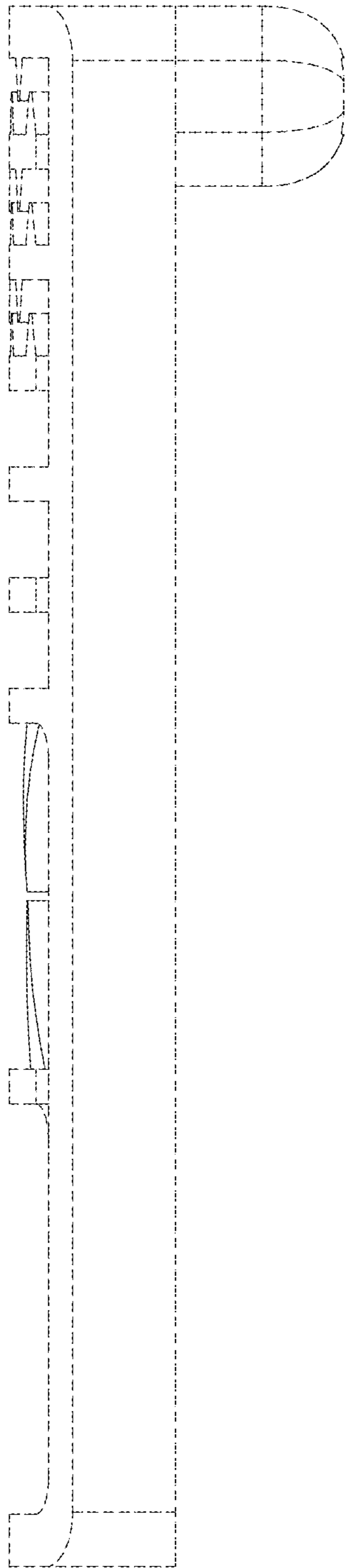


FIG. 7

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : D978,637 S  
APPLICATION NO. : 29/728296  
DATED : February 21, 2023  
INVENTOR(S) : Mark M. Ensworth and Mark Richard Edris

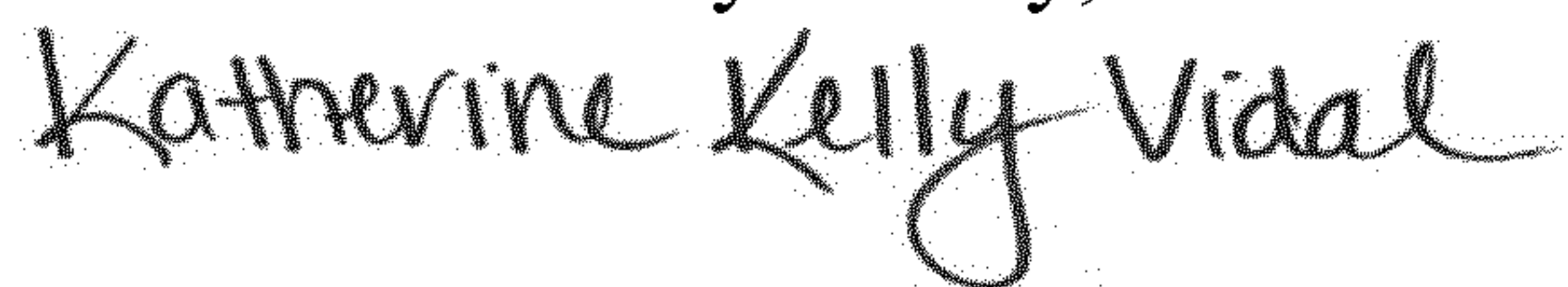
Page 1 of 1

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

On the Title Page

Column 1, Related U.S. Application Data, item (62), Line 1, delete "Feb." and insert --Dec-- therefor.

Signed and Sealed this  
Sixteenth Day of July, 2024



Katherine Kelly Vidal  
*Director of the United States Patent and Trademark Office*