US00D614774S

(12) United States Design Patent

Gausmann et al.

(10) Patent No.: US D614,774 S
(45) Date of Patent: ** *Apr. 27, 2010

(54) **OCULAR IMAGING APPARATUS**

(75) Inventors: **Keith H. Gausmann**, Cary, NC (US); **Joey Nakayama**, Chicago, IL (US); **Adam Ruggles**, Chicago, IL (US); **Gary F. Prokop**, Wheaton, IL (US); **David Chesley**, Duxbury, MA (US); **Mark Wolfson**, Wellesley, MA (US); **Natan Pheil**, Chicago, IL (US); **David S. Jaggi**, Oak Park, IL (US); **Martin Rathgeber**, Chicago, IL (US)

(73) Assignee: **TearScience, Inc.**, Morrisville, NC (US)

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

(21) Appl. No.: **29/329,613**

(22) Filed: **Dec. 18, 2008**

(51) **LOC (9) Cl.** **24-01**
(52) **U.S. Cl.** **D24/172**; D24/160
(58) **Field of Classification Search** D24/158–160, D24/172, 186; 351/209–212, 206; 600/398–400, 600/402
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,747,683	A		5/1988	Doane	
4,842,401	A		6/1989	Maurice	
4,938,584	A		7/1990	Suematsu et al.	
D330,769	S	*	11/1992	Blaha et al.	D24/172
5,621,523	A		4/1997	Oobayashi et al.	
5,647,032	A		7/1997	Jutamulia	
5,719,659	A		2/1998	Suzuki	
D394,505	S	*	5/1998	Hayashi	D24/172
5,988,815	A		11/1999	Maus et al.	
6,198,540	B1		3/2001	Ueda et al.	
6,236,459	B1		5/2001	Negahdaripour et al.	
6,299,305	B1		10/2001	Miwa	
6,394,603	B2		5/2002	Miwa et al.	
6,447,119	B1		9/2002	Stewart et al.	
D465,850	S	*	11/2002	Takizawa	D24/172
D472,637	S	*	4/2003	Cooper et al.	D24/172
6,659,613	B2		12/2003	Applegate et al.	
6,685,320	B2		2/2004	Hirohara et al.	
6,736,507	B2		5/2004	Kudryashov et al.	
7,073,906	B1		7/2006	Portney	

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0943288 A1 9/1999

(Continued)

OTHER PUBLICATIONS

Prydal, Jeremy I. et al., "Study of Human Precorneal Tear Film Thickness and Structure Using Laser Interferometry," Investigative Ophthalmology & Visual Science, vol. 33, No. 6, May 1992, pp. 2006-2011.

(Continued)

Primary Examiner—T. Chase Nelson
Assistant Examiner—Anhdao Doan
(74) *Attorney, Agent, or Firm*—Withrow & Terranova, PLLC

(57) **CLAIM**

The ornamental design for an ocular imaging apparatus, as shown and described.

DESCRIPTION

FIG. **1** is a perspective view of an ocular imaging apparatus according to our design;

FIG. **2** is a right side view thereof;

FIG. **3** is a left side view thereof;

FIG. **4** is an enlarged front view thereof;

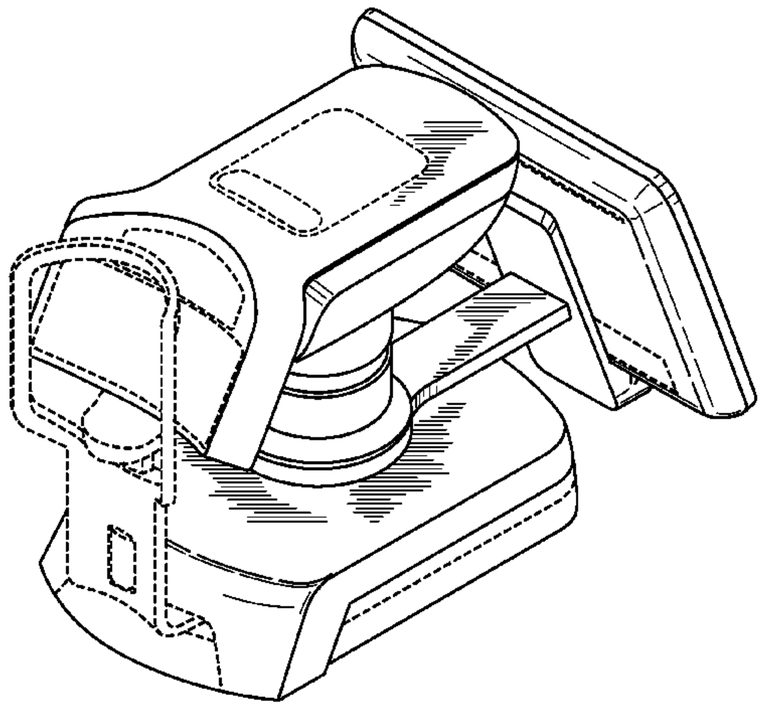
FIG. **5** is an enlarged rear view thereof;

FIG. **6** is a top view thereof; and,

FIG. **7** is a bottom side view thereof.

The broken lines in the drawing figures are included for the purpose of illustrating portions of the ocular imaging apparatus that form no part of the claimed design

1 Claim, 7 Drawing Sheets



U.S. PATENT DOCUMENTS

7,121,666	B2	10/2006	Tseng et al.	
D552,736	S *	10/2007	Yamaoka	D24/172
D582,556	S *	12/2008	Yamaoka	D24/172
D607,562	S *	1/2010	Heine et al.	D24/137
2002/0180929	A1	12/2002	Tseng et al.	
2003/0056281	A1	3/2003	Hasegawa	
2004/0212781	A1	10/2004	Mihashi et al.	
2006/0109423	A1	5/2006	Wang	
2006/0140454	A1	6/2006	Northcott et al.	
2008/0273171	A1	11/2008	Huth et al.	
2008/0316499	A1	12/2008	Korb et al.	
2008/0319323	A1	12/2008	Gravely et al.	
2009/0225276	A1	9/2009	Suzuki	

FOREIGN PATENT DOCUMENTS

EP	1900320	A1	3/2008
GB	2407378	B	9/2006
JP	8052112		2/1996
JP	2009134276	A	6/2009
WO	0026614		5/2000
WO	2005044099	A1	5/2005
WO	2008137863	A2	11/2008

OTHER PUBLICATIONS

Guillon, Jean-Pierre, "Non-Invasive Tearscope Plus Routine for Contact Lens Fitting," Contact Lens and Anterior Eye, (Supplement) 21, 1998, pp. S31-S40.

Korb, Donald R. et al., "Meibomian Gland Diagnostic Expressibility: Correlation With Dry Eye Symptoms and Gland Location," Cornea, vol. 27, No. 10, Dec. 2008, pp. 1142-1147.

Guillon, Jean-Pierre, "Use of the Tearscope Plus and Attachments in the Routine Examination of the Marginal Dry Eye Contact Lens Patient," Lacrimal Gland, Tear Film, and Dry Eye Syndrome 2, 1998, pp. 859-867.

Uchida, A. et al., "Nonivasive Interference Tear Meniscometry in Dry Eye Patients with Sjogren Syndrome," Am. J. Ophthalmol., vol. 144, No. 2, Aug. 2007, pp. 232-237.

Behrens, Ashley, MD, "Interferometry for the Detection of Dry Eye," Cataract & Refractive Surgery Today Europe, Nov./Dec. 2008. pp. 57-58.

Lopez Garcia, J.S. et al., "Measure of the Fatty Layer Thickness of Precorneal Tear Film by Interference Colours in Different Types of Dry Eye," Sociedad Espanola de Oftalmologia, vol. 78, Part 5, Jan. 2003, pp. 257-264.

Prydal, J.I. et al., "Study of Precorneal Tear Film Thickness and Structure by Interferometry and Confocal Microscopy," Investigative Ophthalmology and Visual Science, vol. 33, No. 6, May 1992, pp. 1996-2005.

Prydal, J.I. et al., "In Vivo Confocal Microscopy of the Cornea and Tear Film," Scanning, vol. 17, 1995, pp. 133-135.

Mathers, W.D., "Assessment of the Tear Film with Tandem Scanning Confocal Microscopy," Cornea, vol. 16, No. 2, 1997, pp. 162-168.

Kaisheva, M et al., "Thin Liquid Films from Water-Based Dispersions of Cellulose Acethophthalate in the Presence of Pilocarpine Hydrochloride," J. Dispersion Sci. Technol., 1997.

Licznerski, T.J. et al., "Application of Twyman-Green Interferometer for Evaluation of In Vivio Breakup Characteristic of the Human Tear Film," Journal of Biomedical Optics, vol. 4, No. 1, Jan. 1999, pp. 176-182.

Licznerski, T.J. et al., "Interference and Model Study of the Human Tear Film," Politechnika Wroclawska, Source DAI-C 60/04, Winter 1999, p. 782 (Abstract only).

Patel, S. et al., "Corneal Sensitivity and Some Properties of the Tear Film After Laser in Situ Keratomileusis," Journal of Refractive Surgery, Vo. 17, No. 1, 2001, pp. 17-24.

Kowalik, W. et al., "Corneal Topography Measurement of the Eye by Means of Radial Shearing Interferometer," Proc. SPIE—Int. Soc. Opt. Eng. vol. 4356, 2001. pp. 375-380.

Hellmuth, T. et al., "Non-Contact Measurement of the Optical Imaging Quality of an Eye," Proc. SPIE— Int. Soc. Opt. Eng. vol. 4431, 2001, pp. 52-58.

Garncarz, B.E. et al., "Corneal Topography Measurement by Means of Radial Shearing Interference II—Experiment Results," Optik, vol. 113, No. 1, 2002, pp. 46-50.

Tseng, S.C. et al., "Changes of Lipid Tear Film in Dry Eye Patients and Normal Subjects Following One Drop of a New Emulsion Eye Drop Using Kinetic Analysis of Tear Interference Images," ARVO, vol. 44, 2003, E-Abstract 2457, 2 pages.

King-Smith, P.E. et al., "Can the Mucus Layer of the Tear Film be Demonstrated by Interferometry?," IOVS, vol. 45, Supp. 2, Apr. 2004, E-Abstract 3882. 2 pages.

Paugh, J.R. et al., "White Light Tear Film Interferometry in Dry Eye Sub-Types," IOVS, vol. 45, Supp. 1, Apr. 2004, E-Abstract 93, 2 pages.

Elizondo, A.E. et al., "Detection of Blink Related Microtrauma by Kinetic Analysis of Tear Interference Images in Patients with Steven Johnson Syndrome and Toxic Epidermal Necrolysis Syndrome," IOVS, vol. 46, Supp. S, 2005, E-Abstract 2654, 2 pages.

King-Smith, P.E. et al., "Human Tear Film Breakup Studied by a New Imaging Interferometer: Preliminary Observations," IOVS, vol. 46, Supp. S, 2005, E-Abstract 4400, 2 pages.

Scaffidi, R.C. et al., "Lipid Layer Thickness and Dry Eye Symptoms," IOVS, vol. 46, Supp. S, 2005, E-Abstract 4444, 2 pages.

Korb, D. et al., "Lipid Layer Thickness Changes Following the Instillation of Two Novel Lubricant Eye Drops," IOVS, vol. 46, Supp. S, 2005, E-Abstract 2036, 2 pages.

Rolando, M. et al., "The Dynamic Lipid Interference Pattern (DLIP) Test in Normal and Dry Eyes," IOVS, vol. 46, Supp. S, 2005, E-Abstract 4422, 2 pages.

Dogru, M. et al., "Strip Meniscometry: A New and Simple Method of Tear Meniscus Evaluation," Invest. Ophthalmol. Vis. Sci., vol. 47, No. 5, May 2006, pp. 1895-1901.

Dogru, M. et al., "New Insights into the Diagnosis and Treatment of Dry Eye," Ocular Surface, vol. 2, No. 2, 2004, pp. 59-74.

Szczesna, D. et al., "Numerical Analysis of Interferograms of Tear Film Build-Up Time," Ophthalmic and Physiological Optics, vol. 29, No. 3, May 2009, pp. 211-218.

Ishida, Reiko et al., "Tear Film with 'Orgahexa Eyemasks' in Patients with Meibomian Gland Dysfunction," Optometry and Visions Science, vol. 85, No. 8, August 2008, pp. E684-E691.

Blackie, Caroline et al., "The Relationship Between Dry Eye Symptoms and Lipid Layer Thickness," Cornea, vol. 28, No. 7, August 2009, pp. 789-794.

Yokoi, N, et al., "Development of Automated Rheological Analysis for Tear Film Lipid Layer Spread Using the Cross-Correlation Method" Association for Research in Vision and Ophthalmology, 2007, 1 page.

Honan Balloon Intraocular Pressure Reducer with Valve, Complete Ambler Surgical, Ambler Product No. HBC-120.

Fanning, Gary L., M.D., "Ocular Compression: A Review" Hauser-Ross Eye Institute, Sycamore, IL, 7 pages.

McGrath, Dermot, "Iris Diaphragm IOLs Safe and Effective in Treating Aniridia" Ocular Update, 1 page. (p. 42).

Berliner, M. L., M.D., "The Margins of the Eyelid" Chapter Eight, Biomicroscopy of the Eye, Slit Lamp Microscopy of the Living Eye, vol. 1, Medical Book Department of Harper & Brothers, NYC Paul B. Hoeber, Inc., 1949, 5 pages (pp. 252-257).

Miller, David "Pressure of the Lid on the Eye" Arch. Opthalmology, vol. 78, 1967, 7 pages (pp. 382-330).

Korb, Donald R., O.D. et al., "The Phenomenon of Central Circular Clouding; the loss of corneal transparency unique to contact lens practice requiring specialized techniques for early recognition" Journal of American Optometric Association, vol. 39, No. 3, Mar. 1968, 8 pages (pp. 223-230).

Korb, Donald R., O.D., et al., "Meibomian Gland Dysfunction and Contact Lens Intolerance" Jnl American Optometric Association, vol. 51, No. 3, Mar. 1980, 9 pages (pp. 243-251).

Author Unknown, "Measurement of Intraocular Pressure" Biomedical Foundations of Ophthalmology, Intraocular Pressure, vol. 2, Chapter 7, Circa 1982, 6 pages (pp. 11-16).

Ernest, J. Terry, M.D. et al., "Ocular Massage Before Cataract Surgery" Tr. Am. Ophth. Soc., vol. LXXXIII, 1985, 13 pages (pp. 205-217).
Olsen, Thomas, "Reflectometry of the Precorneal Film" ACTA Ophthalmologica, vol. 63, 1986, 7 pages (pp. 432-438).
Leibovitch, Larry S., Ph.D., "The Shape of the Eye: Why the Eye is Round" Florida Atlantic University, Boca Raton, FL, Circa 1986, 28 pages (pp. 1-27).
Carrington, S. D., et al., "Polarized Light Biomicroscopic Observations on the Pre-Corneal Tear Film" J. Small Anim. Pract, vol. 28, 1987, 20 pages (pp. 605-622).
Doane, Marshall G., "An Instrument for in Vivo Tear Film Interferometry" (and critique of same), Optometry and Vision Science, vol. 66, No. 6, 1989, 10 pages (pp. 383-388).
Ong, B. L., et al., "Meibomian Gland Dysfunction: Some Clinical, Biochemical and Physical Observations" Ophthal. Physiol. Opt., vol. 10, Apr. 1990, 5 pages (pp. 144-148).
Danjo, Yukitaka, et al., "Measurement of the Precorneal Tear Film Thickness with a Non-Contact Optical Interferometry Film Thickness Measurement System" Jpn J Ophthal., vol. 38, 1994, 7 pages (pp. 260-266).
Doane, Marshall G., "Abnormalities of the Structure of the Superficial Lipid Layer on the in Vivo Dry-Eye Tear Film" (and critique of same) Lacrimal Gland, Tear Film, and Dry Eye Syndromes, Plenum Press, New York, 1994, 11 pages (pp. 489-493).
Greiner, Jack V., et al., "Meibomian Gland Phospholipids" Current Eye Research, Oxford University Press, 1995, 5 pages (pp. 371-375).
Greiner, Jack V., et al., "Volume of the Human and Rabbit Meibomian Gland System" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 2, Plenum Pres, New York, 1998, 5 pages (pp. 339-343).
Driver, Paul J., et al., "Meibomian Gland Dysfunction" Major Review, Survey of Ophthalmology, vol. 40, No. 5, Mar.-Apr. 1996, 25 pages (pp. 343-367).
Korb, Donald R., et al., "Tear Film Lipid Layer Formation: Implications for Contact Lens Wear" Review, Optometry and Vision Science, vol. 73, No. 3, 1996, 4 pages (pp. 189-192).
Bron, Anthony J., BSc, FRCS, FCOphth, et al., "The Ocular Appendages: Eyelids, Conjunctiva and Lacrimal Apparatus" Chapter 2, Wolffs Anatomy of the Eye and Orbit, Eighth Edition, Chapman & Hall Medical, Jan. 1997, 12 pages (pp. 30-42).
Fogt, Nick, et al., "Interferometric Measurement of Tear Film Thickness by use of Spectral Oscillations" J. Opt. Soc. Am. A., vol. 15, No. 1, Jan. 1998, 8 pages (pp. 268-275).
Lieznerski, Tomasz J., et al., "Analysis of Shearing Interferograms of Tear Film Using Fast Fourier Transforms" Journal of Biomedical Optics, vol. 3, No. 1, Jan. 1998, 6 pages (pp. 32-37).
Doane, Marshall G., et al., "Tear Film Interferometry as a Diagnostic Tool for Evaluating Normal and Dry-Eye Tear Film" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 2, Plenum Press, New York, 1998, 7 pages (pp. 397-303).
Greiner, Jack V., et al., "Effect of Meibomian Gland Occlusion on Tear Film Lipid Layer Thickness" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 2, Plenum Press, New York, 1998, 4 pages (pp. 345-348).
Hayreh, Sohan Singh, et al., "Parapapillary Chorioretinal Atrophy in Chronic High-Pressure Experimental Glaucoma in Rhesus Monkeys" Investigative Ophthalmology & Visual Science, vol. 39, No. 12, Nov. 1998, 8 pages (pp. 2296-1303).
Hickson, Ian, "The Eye" Ian Hickson's Description of the Eye, http://academia.hixie.ch/bath/eye/home.html, 1998, 11 pages.
Korb, Donald R., et al., "Human and Rabbit Lipid Layer and Interference Pattern Observations" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 2, Plenum Press, New York, 1998, 4 pages (pp. 305-308).
Sullivan, David A., et al., "Androgen Regulation of the Meibomian Gland" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 2, Plenum Press, New York, 1998, 5 pages (pp. 327-331).
Mori, Asako, M.D., et al., "Efficacy and Safety of Infrared Warming of the Eyelids" Cornea, vol. 18(2), 1999, 6 pages (pp. 188-193).
Korb, Donald R., et al., "The Tear Film" Structure, Function and Clinical Examination British Contact Lens Association, Butterworth Heinemann, Circa 1999, 15 pages (pp. 154-179).
King-Smith, P. Ewen, et al., "Three Interferometric Methods for Measuring the Thickness of Layers of the Tear Film" Optometry and Vision Science, vol. 76, No. 1, Jan. 1999, 14 pages (pp. 19-32).
Khamene, Ali, et al., "A Spectral-Discrimination Method for Tear-Film Lipid-Layer Thickness Estimation from Fringe Pattern Images" IEEE Transactions on Biomedical Engineering, vol. 47, No. 2, Jan. 2000, 10 pages (pp. 249-258).
Loveridge, Ron, "Effective Management of Induced Dry Eye Syndrome with Soft CLs" www.optometry.co.uk, April 2000, 4 pages (pp. 35-38).
Sullivan, David A., et al., "Androgen Influence on the Meibomian Gland" Investigative Ophthalmology & Visual Science, vol. 41, No. 12, November 2000, 11 pages (pp. 3732-3742).
Hamilton, Dr. Roy C., "Ocular Explosion; a Dreaded Complication of Ophthalmic Regional Anaesthesia" Ophthalmic Anaesthesia News, Issue 4, April 2001, 43 pages.
Korb, Donald R. O.D., et al., "Comparison of Fluorescein Break-Up Time Measurement Reproducibility Using.Standard Fluorescein Strips Versus the Dry Eye Test (DET) Method" pCornea, vol. 20(8), Philadelphia, 2001, 8 pages.
Fenimore, C.P., et al., "Assessment of Resolution and Dynamic Range for Digital Cinema" National Institute of Standards and Technology, Gaithersburg, MD, Circa 2002, 8 pages.
Finlayson, Graham, et al., "Hue that is Invariant to Brightness and Gamma" School of Information Systems, University of East Anglia, Norwich, United Kingdom, Circa 2002, 9 pages (pp. 303-312).
Goto, E., et al. "Treatment of Non-Inflamed Obstructive Meibomian Gland Dysfunction by an Infrared Warm Compression Device" British Journal of Ophthalmology, BJO Online, http://www.bmjjournals.com/cgi/reprintform, vol. 26, 2002, 6 pages (pp. 1402-1407).
King-Smith, P. Ewen, et al., "Evaporation from the Human Tear Film Studied by Interferometry" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, Kluwer Academic/Plenum Publishers, 2002, 5 pages (pp. 425-429).
Korb, Donald R., et al., "The Effects of Anionic and Zwitterionic Phospholipids on the Tear Film Lipid Layer" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, Kluwer Academic/Plenum Publishers, 2002, 5 pages (pp. 495-499).
Miano, Fausto, et al., "Interface Properties of Simplified Tear-Like Fluids in Relation to Lipid and Aqueous Layers Composition" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, Kluwer Academic/Plenum Publishers, 2002, 13 pages (pp. 405-417).
Nichols, Jason J., OD, MS, FAAO, et al., "Evaluation of Tear Film Interference Patterns and Measures of Tear Break-Up Time" Optometry and Vision Science, vol. 79, No. 6, Jun. 2002, 7 pages (pp. 363-369).
Thai, Lee Choon, BSc, MCOptom, et al., "Contact Lens Drying and Visual Performance: The Vision Cycle with Contact Lenses" Optometry and Vision Science, vol. 79, No. 6, Jun. 2002, 8 pages (pp. 381-388).
Tomlinson, Alan, et al., "Reliability of Measurements of Tear Physiology" Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, Kluwer Academic/Plenum Publishers, 2002, 9 pages (pp. 1097-1105).
Begley, Carolyn, G., et al., "The Relationship Between Habitual Patient-Reported Symptoms and Clinical Signs among Patients with Dry Eye of Varying Severity" Investigative Ophthalmology & Visual Science, vol. 44, No. 11, Nov. 2003, 9 pages (pp. 4753-4761).
Goto, Eiki, et al. "Computer-Synthesis of an Interference Color Chart of Human Tear Lipid Layer, by a Colorimetric Approach" Investigative Ophthalmology & Visual Science, vol. 44, No. 11, Nov. 2003, 5 pages (pp. 4693-4697).
Goto, Eiki, et al., "Kinetic Analysis of Tear Interference Images in Aqueous Tear Deficiency Dry Eye Before and After Punctual Occlusion" Investigative Ophthalmology & Visual Science, vol. 44, No. 5, May 2003, 9 pages (pp. 1897-1905).
Nichols, Jason J., OD, MS, MPH, et al., "The Effect of Eye Closure on the Post-Lens Tear Film Thickness During Silicone Hydrogel Contact Lens Wear" Cornea, vol. 22(6), 2003, 6 pages (pp. 539-544).
Nichols, Jason J., et al., "Thickness of the Pre- and Post-Contact Lens Tear Film Measured in Vivo by Interferometry" Investigative Ophthalmology & Visual Science, vol. 44, No. 1, Jan. 2003, 10 pages (pp. 68-77).

Olson, Mary Catherine, B.A., et al., " Increase in Tear Film Lipid Layer Thickness Following Treatment with Warm Compresses in Patients with Meibomian Gland Dysfunction" Eye & Contact Lens, vol. 29(2), 2003, 6 pages.
Author Unknown, "Blepharitis" The Eye Digest, The Dry Eye Research Center, University of Illinois at Chicago, 2003, 3 pages.
Yokoi, Norihiko, et al., "Non-Invasive Methods of Assessing the Tear Film" Experimental Eye Research, vol. 78, Elsevier Ltd., 2003, 9 pages (pp. 399-407).
Goto, Eiki, M.D., "Quantification of Tear Interference Image; Tear Fluid Surface Nanotechnology" Cornea, vol. 23, Suppl. 1, Nov. 2004, 5 pages (pp. S20-S24).
Nichols, Jason J., et al., "The Impact of Hydrogel Lens Settling on the Thickness of the Tears and Contact Lens" Investigative Ophthalmology & Visual Science, vol. 45, No. 8, Aug. 2004, 6 pages (pp. 2549-2554).
Thai, Lee Choon, BSc, MCOptom, et al., "Effect of Contact Lens Materials on Tear Physiology" Optometry and Vision Science, vol. 81, No. 3, Mar. 2004, 11 pages (pp. 194-204).
van Veen, R. L. P., et al., "Determination of VIS- NIR Absorption Coefficients of Mammalian Fat, with Time- and Spatially Resolved Diffuse Reflectance and Transmission Spectroscopy" Circa 2004, 3 pages.
Di Pascuale, Mario A., M.D., et al., "Lipid Tear Deficiency in Persistent Dry Eye After Laser in Situ Keratomileusis and Treatment Results of New Eye-Warming Device" J Cataract Refract. Surg., vol. 31, ASCRS and ESCRS, Elsevier Inc., 2005, 9 pages (pp. 1741-1749).
Dubra, Alfredo, et al., "Double Lateral Shearing Interferometer for the Quantitative Measurement of Tear Film Topography" Applied Optics, vol. 44, No. 7, Mar. 2005, 9 pages (pp. 1191-1199).
Garcia-Resua, C., et al., "Clinical Evaluation of the Tears Lipid Layer in a Young University Population" Rev. Esp. Contact, vol. 12, 2005, 6 pages.
Iskander, D. Robert, PhD., et al., "Applications of High-Speed Videokeratoscopy" Clinical and Experimental Optometry, vol. 88, vol. 4, Jul. 2005, 9 pages (pp. 223-231).
Korb, Donald R., O.D., et al., "Lid Wiper Epitheliopathy and Dry Eye Syndrome" Eye & Contact Lens, vol. 31 (1), 2005, 7 pages (pp. 2-8).
Mitra, M. et al., "Tear Film Lipid Layer Thickness and Ocular Comfort after Meibomian Therapy via Latent Heat with a Novel Device in Normal Subjects" Eye, vol. 19, 2005, 4 pages (pp. 657-660).
Bartlett, Hannah, et al. "New Perspectives on the Investigation and Treatment of Dry Eye Syndrome - Part 1" Optician, vol. 231, No. 6038, Feb. 2006, 9 pages (pp. 27-37).
Garcia, Julius, "Research Report; Tear Film Measurement" Report No. 09354231-1; Aug. 2006, 46 pages.
Gravely, Ben, "Observations from TFA3" Aug. 2006, 4 pages.
King-Smith, P. Ewen, et al., "Interferometric Imaging of the Full Thickness of the Precorneal Tear Film" J. Opt. Soc. Am. A, vol. 23, No. 9, Sep. 2006, 8 pages (pp. 2097-2104).
Lui, Haixia, MD, et al., "Temporal Progression and Spatial Repeatability of Tear Breakup" Optometry and Vision Science, vol. 83, No. 10, Oct. 2006, 8 pages (pp. 723-730).
Lorentz, Holly Irene, "Lipid Deposition on Hydrogel Contact Lenses" Master's Thesis, University of Waterloo, Ontario, Canada, 2006, 175 pages.
Matsumoto, Yukihiro, et al., "Efficacy of a New Warm Moist Air Device on Tear Functions of Patients with Simple Meibomian Gland Dysfunction" Cornea, vol. 25, No. 6, Jul. 2006, 1 page.
Ohashi, Yoshiki, et al., "Laboratory Findings in Tear Fluid Analysis" Clinica Chimica Acta 369, 2006, 12 pages (pp. 17-28).
Patel, Sudi, PhD, FCOptom, FAAO, et al., "Tear Meniscus Height, Lower Punctum, Lacrimale, and Tear Lipid Layer in Normal Aging" Optometry and Vision Science, vol. 83, No. 10, Oct. 2006, 9 pages (pp. 732-739).
Shiel, William C., Jr., MD, FACP, FACR, "Sjogren's Syndrome" MedicineNet.com, http:www.medicinenet.com, Sep. 2006, 3 pages.
Tomlinson, Alan, et al., "Tear Film Osmolarity: Determination of a Referent for Dry Eye Diagnosis" Investigative Ophthalmology & Visual Science, vol. 47, No. 10, Oct. 2006, 7 pages (pp. 4309-4315).
Wang, Jianhua et al., "Relationships between Central Tear Film Thickness and Tear Menisci of the Upper and Lower Eyelids" Investigative Ophthalmology & Visual Science, vol. 47, No. 10, Oct. 2006, 7 pages (pp. 4349-4355).
Author Unknown, "Keratoconjunctivitis Sicca" Wikipedia, http://en.wikipedia.org/wiki/keratoconjunctivitis_sicca, Nov. 2006, 4 pages.
Author Unknown, "Thermographic Camera" Wikipedia, http://en.wikipedia.org/wiki/thermographic_camera, Sep. 2006, 4 pages.
Cruz, Daniele, "Dry Eye Syndrome More Widespread than Predicted" Ocular Surgery News, U.S. Edition, May 2007, 1 page.
Rolando, Maurizio et al., "New Test to Quantify Lipid Layer Behavior in Healthy Subjects and Patients with Keratoconjunctivitis Sicca," Cornea, vol. 27, No. 8, Sep. 2008, pp. 866-870.
Begley, Carolyn et al., Relationship between Symptom Profile & Clinical Signs Among Dry Eye Patients, 2003,1 page.
Korb, Donald R. et al., "Tear Film Lipid Layer Thickness as a Function of Blinking," Cornea, vol. 13, No. 4, 1994, pp. 354-359.
"Tomey's RT-7000 Is New and Improved," Instruments—New Product Gallery, 1 page.
Kojima, Takashi et al.., "A New Noninvasive Tear Stability Analysis System for the Assessment of Dry Eyes," Investigative Ophthalmology & Visual Science, May 2004, vol. 45, No. 5, pp. 1369-1374.
Depaiva et al., "Diagnostic Approaches to Lacrimal Keratoconjunctivitis," 2004, pp. 269-270.
McDonald, James E., "Surface Phenomena of the Tear Films," Tr. Am. Opth. Soc., vol. 66, 1968, pp. 905-939.
Norn, M.S., "Semiquantitative Interference Study of Fatty Layer of Precorneal Film," ACTA Ophthalmologica, vol. 57, 1979, pp. 766-774.
Guillon, J.P., "Tear Film Photography and Contact Lens Wear," Journal of the British Contact Lens Association, 1982, pp. 84-87.
Kilp, H. et al., "Tear Film Observation by Reflecting Microscopy and Differential Interference Contrast Microscopy," The Dry Eye Institute, Inc., 1986, pp. 564-569.
Guillon, J.P., "The Tear Film Structure of the Contact Lens Wearer," Dept. of Optometry and Visual Science, City University, London, 1987, 398 pages.
Young, G. et al., "Characteristics of the Pre-Lens Tear Films During Hydrogel Contact Lens Wear," Ophthal. Physiol. Opt., vol. 11, Jan. 1991, pp. 53-58.
Mathers, W.D., "Ocular Evaporation in Meibomian Gland Dysfunction and Dry Eye," Ophthalmology, vol. 100, No. 3, Mar. 1993, pp. 347-351.
Korb, Donald R. et al., "Increase in Tear Film Lipid Layer Thickness Following Treatment of Meibomian Gland Dysfunction," Adv. Exp. Med. Biol., vol. 350, 1994, pp. 293-298.
Korb, Donald R. et al., "Effect of Periocular Humidity on the Tear Film Lipid Layer," Cornea, vol. 15, No. 2, 1996, pp. 129-134.
Yokoi, N. et al., "Correlation of Tear Lipid Layer Interference Patterns with the Diagnosis and Severity of Dry Eye," Amercian Journal of Ophthalmology, vol. 122, Dec. 1996, pp. 818-824.
Craig, J.P. et al., "Importance of the Lipid Layer in Human Tear Film Stability and Evaporation," Optometry and Visual Science, Vol. 70, No. 1, 1997, pp. 8-14.
Guillon, J.P. et al., "Preocular Tear Film Characteristics of Nonwearers and Soft Contact Lens Wearers," Optometry and Vision Science, vol. 74, No. 5, 1997, pp. 273-279.
"Tearscope Plus Clinical Hand Book and Tearscope Plus Instructions," Keeler.
McCarty, C.A. et al., "The Epidemiology of Dry Eye in Melbourne, Australia," Ophthalmology, vol. 105, No. 6, Jun. 1998, pp. 1114-1119.
Pflugfelder, S.C. et al., "Evaluation of Subjective Assessments and Objective Diagnostic Tests for Diagnosing Tear-Film Disorders Known to Cause Ocular Irritation," Cornea, vol. 17, No. 1, 1998, pp. 38-56.
Yokoi, N. et al., "Assessment of Meibomian Gland Function in Dry Eye Using Meibometry," Arch. Ophthalmol., No. 117, Jun. 1999, pp. 723-729.
Korb, Donald R., "Alleviation of Computer-Induced Eye Discomfort Syndrome and Associated Lipid Layer Changes," Lacrimal Gland, Tear Film, and Dry Eye Syndrome 3, 2002, pp. 501-506.

Korb, Donald R., "The Tear Film—Its Role Today and in the Future," 2002, 52 pages.

Begley, C.G. et al., "The Relationship Between Habitual Patient-Reported Symptoms and Clinical Signs Among Patients with Dry Eye of Varying Severity," Ophthalmology and Visual Science, vol. 44, No. 11, Nov. 2003, pp. 4753-4761.

Goto, E. et al., "Tear Evaporation Dynamics in Normal Subjects and Subjects with Obstructive Meibomian Gland Dysfunction," Investigative Ophthalmology and Visual Science, vol. 44, 2003, pp. 533-539.

Goto, E. et al., "Differentiation of Lipid Tear Deficiency Dry Eye by Kinetic Analysis of Tear Interference Images," Archives of Ophthalmology, vol. 121, No. 2 Feb. 2003, pp. 173-180.

Foulks, G.N. et al., "Meibomian Gland Dysfunction: a Clinical Scheme for Description, Diagnosis, Classification, and Grading," The Ocular Surface, vol. 1, No. 3, Jul. 2003, pp. 107-126.

Isreb, M.A. et al., "Correlation of Lipid Layer Thickness Measurements with Fluorescein Tear Film Breakup Time and Schirmer's Test," Eye, vol. 17, 2003, pp. 79-83.

Bron, A.J. et al., "The Contribution of Meibomian Disease to Dry Eye," Ocul. Surf., vol. 2, 2004, pp. 149-164.

Bron, A.J. et al., "Functional Aspects of the Tear Film Lipid Layer," Experimental Eye Research, vol. 78, 2004, pp. 347-360.

DiPascuale R.W. et al., "Sequential Changes of Lipid Tear Film After the Instillation of a Single Drop of a New Emulsion Eye Drop in Dry Eye Patients," Ophthalmology, vol. 111, No. 4, Apr. 2004, pp. 783-791.

Nichols, K.K. et al., "The Repeatability of Clinical Measurements of Dry Eye," Cornea, vol. 23, No. 3, Apr. 2004, pp. 272-285.

Nichols, K.K. et al., "The Lack of Association Between Signs and Symptoms in Patients with Dry Eye Disease," Cornea, vol. 23, No. 8, Nov. 2004, pp. 762-770.

Yokoi, N. et al., "New Instruments for Dry Eye Diagnosis," Seminars in Opthalmology, vol. 20, 2004, pp. 63-70.

Licznerski, T.J. et al., "Novel Double Path Shearing Interferometer in Corneal Topography Measurements," Proceedings of the SPIE, vol. 5959, 2005, 6 pages.

Szczesna, D.H. et al., "Interferometric Measurements of the Tear Film Irregularities on the Human Cornea," Proceedings of the SPIE, vol. 5959, 2005, 10 pages.

Goto, E. et al., "Successful Tear Lipid Layer Treatment for Refractory Dry Eye in Office Workers by Low-Dose Lipid Application on the Full-Length Eyelid Margin," American Journal of Ophthalmology, vol. 142, No. 2, Aug. 2006, pp. 264-270.

Foulks, G.N., "The Correlation Between the Tear Film Lipid Layer and Dry Eye Disease," Survey of Ophthalmology, vol. 52, No. 4, Jul.-Aug. 2007, pp. 369-374.

Author Unknown, "Introduction to the Report of the International Dry Eye WorkShop (2007)," The Ocular Surface, vol. 5, No. 2, Apr. 2007, pp. 69-70.

Schaumberg, D.A. et al., "Development and Validation of a Short Global Dry Eye Symptom Index," The Ocular Surface, vol. 5, No. 1, Jan. 2007, pp. 50-57.

Arndt, G. Dickey et al., "Microwave Treatment of Prostate Cancer and Hyperplasia," NASA Tech Briefs, Jun. 2005, 1 page.

King-Smith, P. Ewen et al., "The Thickness of the Human Precorneal Tear Film: Evidence from Reflection Spectra," Investigative Ophthalmology & Visual Science, Oct. 2000, vol. 41, No. 11, 12 pages.

Nichols, Jason J. et al., "The Thickness of the Post-Lens Tear Film Measured by Interferometry," Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, Edited by D. Sullivan et al., Kluwer Academic / Plenum Publishers, 2002, 5 pages.

Borchman, Douglas, et al., "Temperature-Induced Conformational Changes in Human Tear Lipids Hydrocarbon Chains," Biopolymers, vol. 87, No. 2-3, Jun. 13, 2007, pp. 124-133 (10 pages).

Cruz, Daniele, "Surgeon: Early Treatment Key to Avoiding Dry Eye Progression," Ocular Surgery News, U.S. Edition, May 2007, 1 page.

Korb, Donald R., OD, et al., "A Device to Standardize and Quantify the Force Used to Diagnose Meibomian Gland Obstruction and Dysfunction," 2007, 1 page.

Korb, Donald R., OD, et al., "A New Device for the Diagnosis of Meibomian Gland Dysfunction and Obstruction," 2007, 1 page.

Kronemyer, Bob, "Dry Eye Experts Unveil New Treatment Guidelines, Terminology," Ocular Surgery News, U.S. Edition, May 2007, 1 page.

* cited by examiner

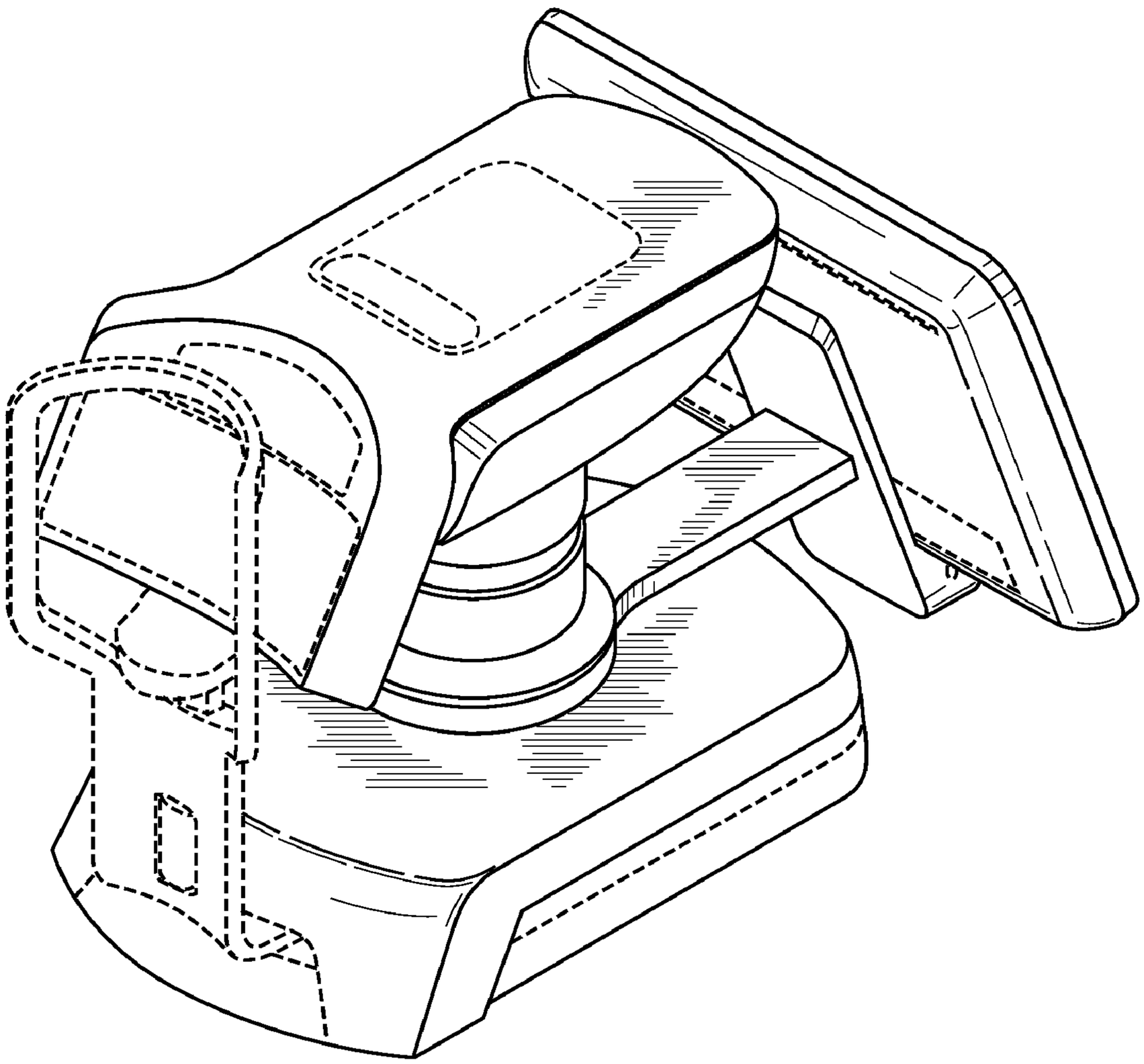


FIG. 1

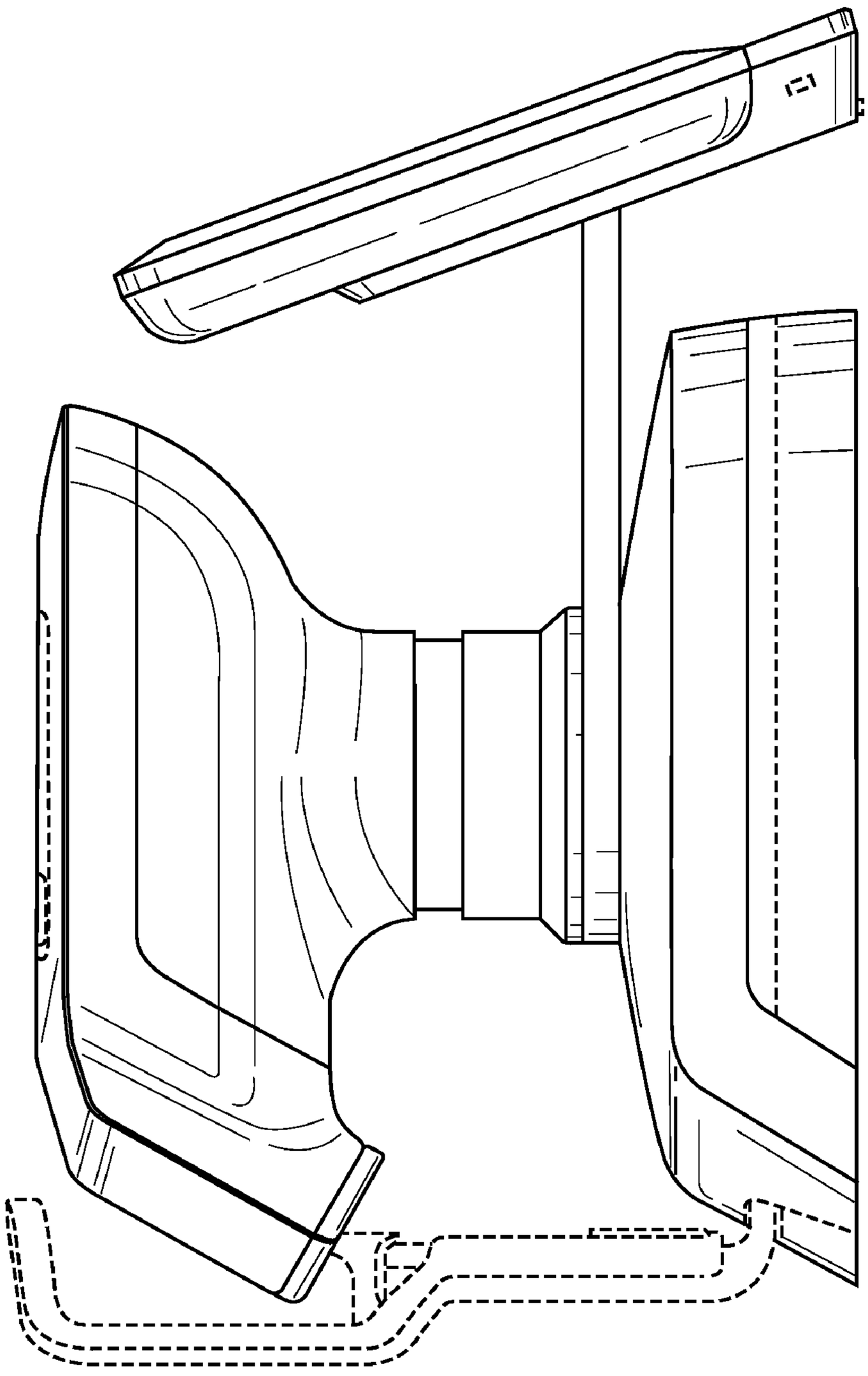


FIG. 2

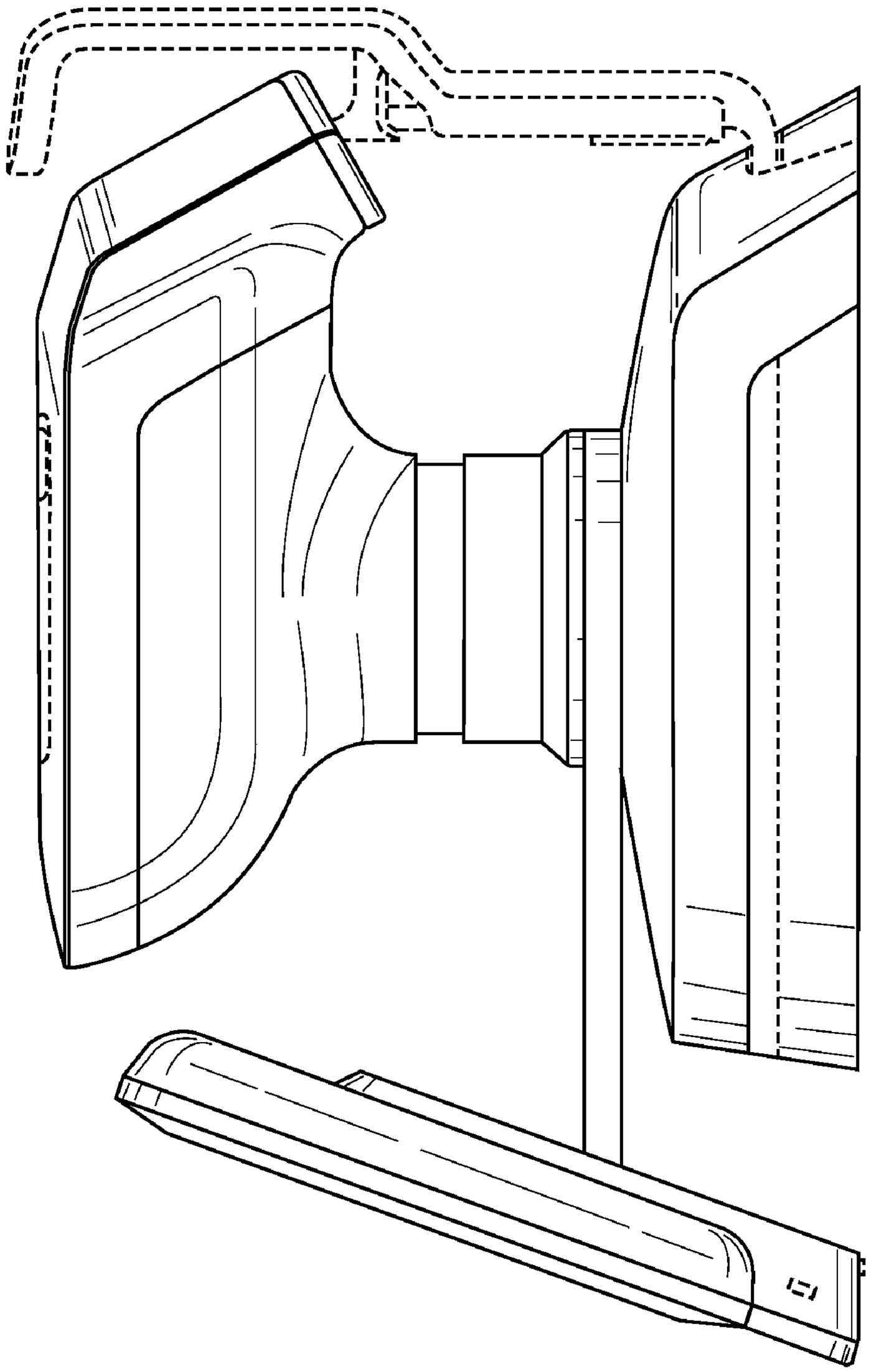


FIG. 3

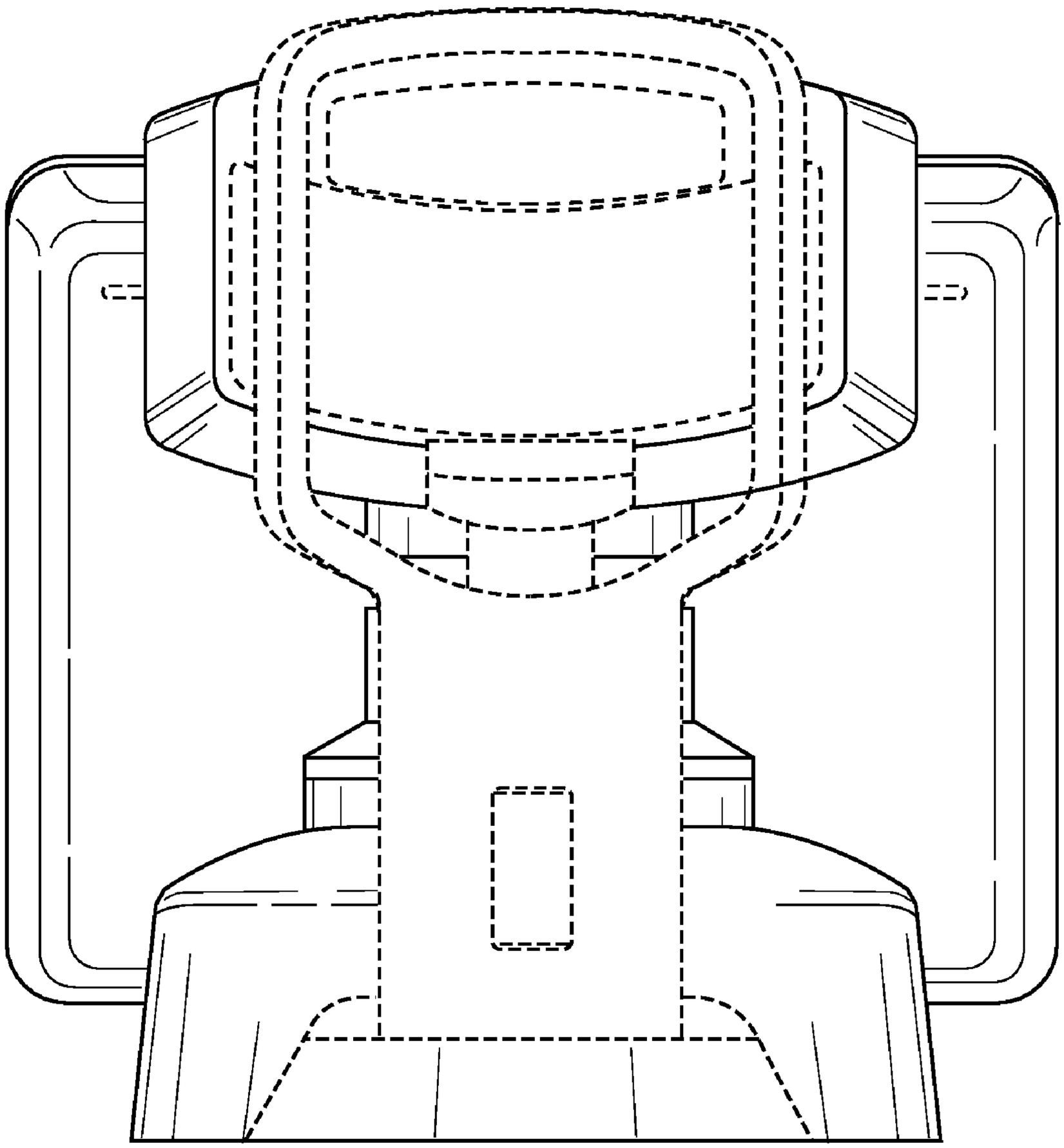


FIG. 4

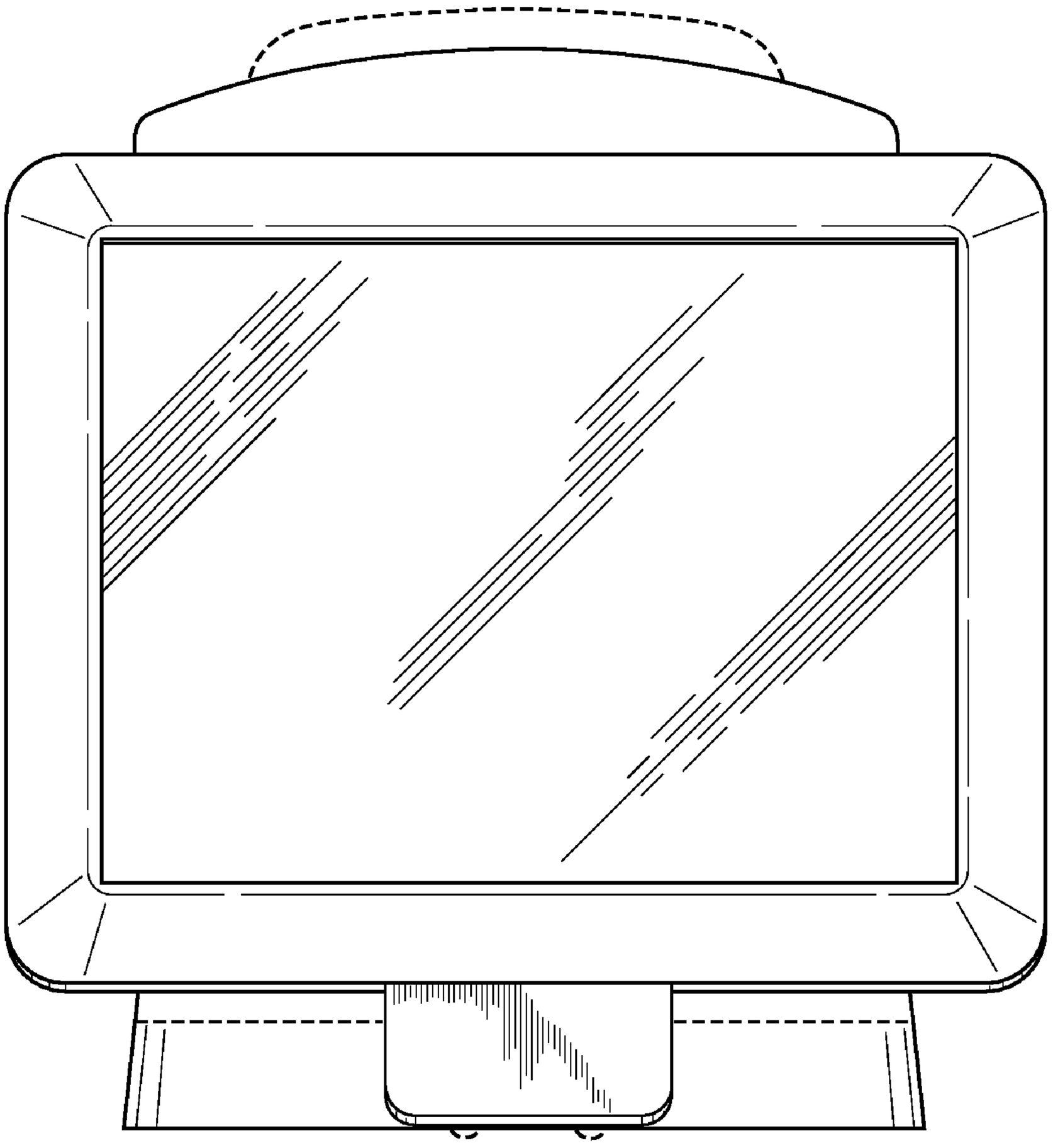


FIG. 5

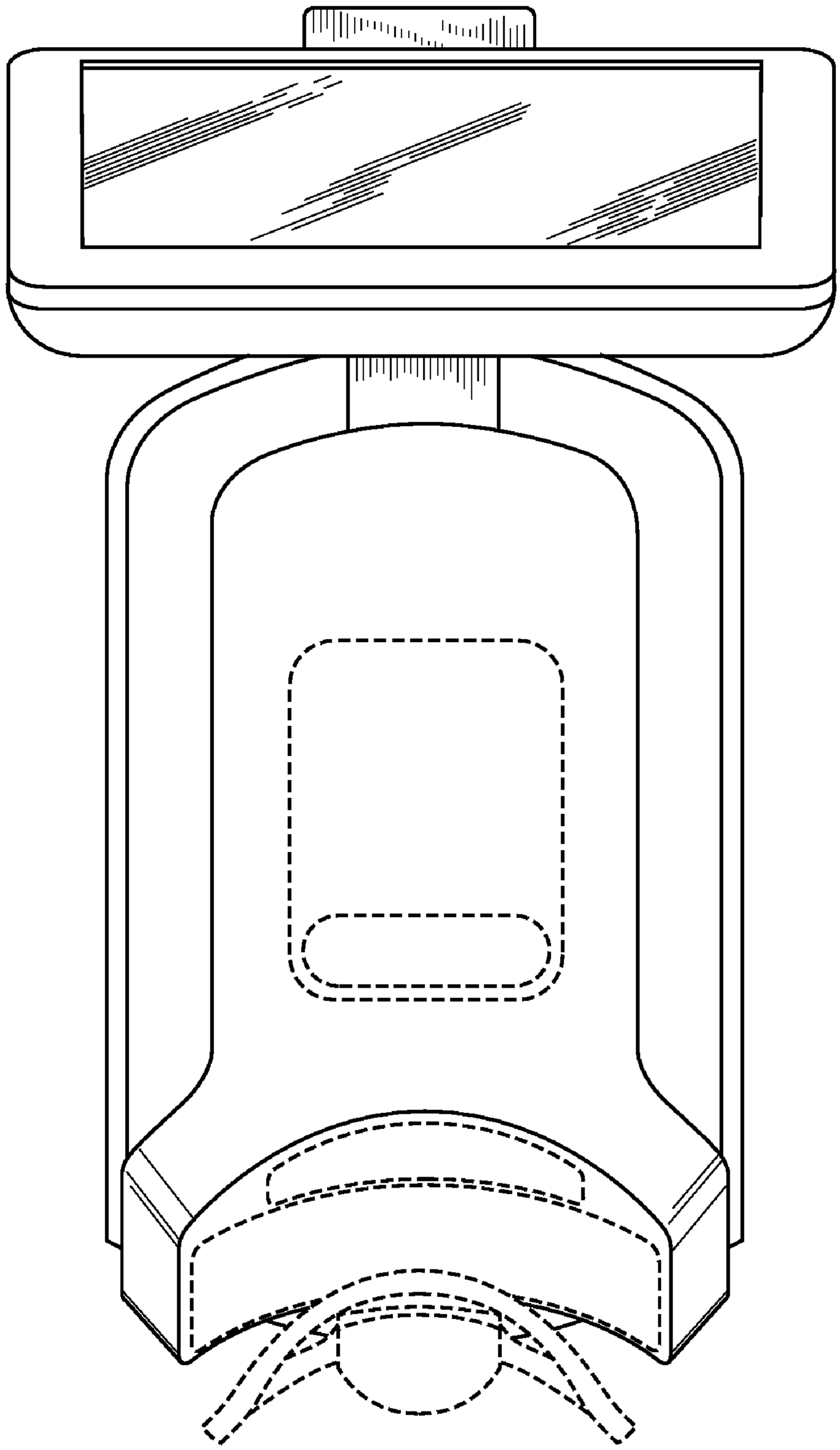


FIG. 6

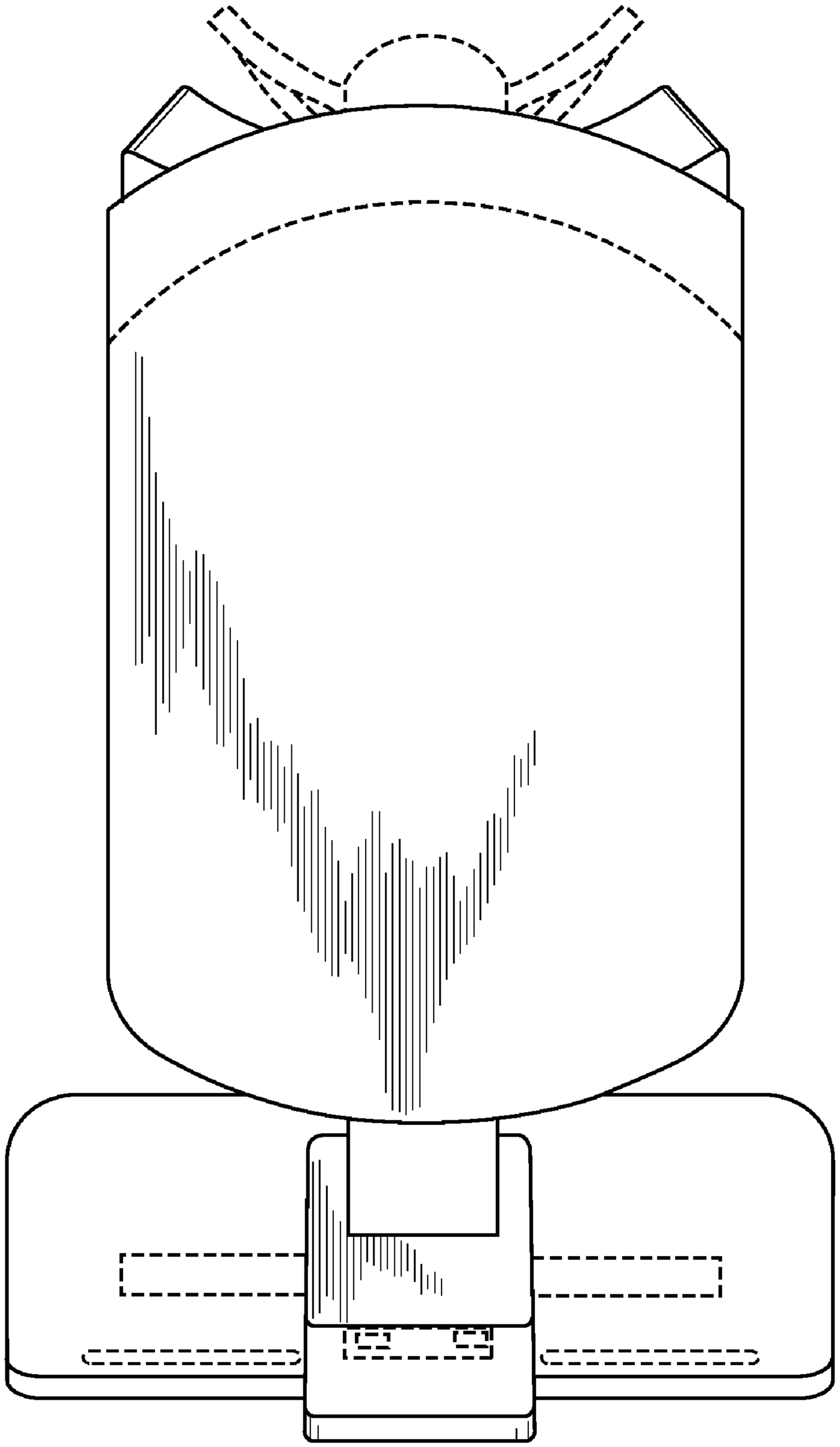


FIG. 7