

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TEXAS INSTRUMENTS INC.,
and NXP USA, INC.,
Petitioners

v.

PARKERVISION, INC.,
Patent Owner

Case IPR2024-00936¹
Patent 9,118,528

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

¹ NXP USA, Inc., who filed a petition in IPR2024-01068, is joined as petitioner in this proceeding.

i

EXHIBITS

Exhibit No.	Description
TI-1001	U.S. Patent No. 9,118,528 (“the ’528 patent”)
TI-1002	Excerpts from the Prosecution History of the ’528 Patent (“the Prosecution History”)
TI-1003	Declaration and Curriculum Vitae of Dr. Ian Galton
TI-1004	U.S. Patent No. 6,230,000 (“Tayloe”)
TI-1005	SN74CBT3253 Dual 1-of-4 FET Multiplexer/Demultiplexer Datasheet
TI-1006	Reserved
TI-1007	Reserved
TI-1008	Complaint, <i>ParkerVision, Inc. v. Texas Instruments Incorporated</i> , 6:23-cv-00384, W.D. Tex., filed May 18, 2023
TI-1009	ParkerVision, Inc.’s Proposed Claim Constructions, <i>ParkerVision, Inc. v. Texas Instruments Incorporated</i> , 6:23-cv-00384, W.D. Tex., filed February 14, 2024
TI-1010	ParkerVision Inc.’s Responsive Claim Construction Brief, <i>ParkerVision, Inc. v. Texas Instruments Incorporated</i> , 6:23-cv-00384, W.D. Tex., filed March 27, 2024
TI-1011	Claim Chart For Infringement of U.S. Patent No. 7,865,177 by TI Chips, <i>ParkerVision, Inc. v. Texas Instruments Incorporated</i> , 6:23-cv-00384, W.D. Tex., submitted December 6, 2023
TI-1012	Reserved
TI-1013	Reserved
TI-1014	Declaration of June Ann Munford
TI-1015	Declaration of Rickea McLeod

TI-1016	Reserved
TI-1017	Razavi, <i>A 900-MHz CMOS Direct Conversion Receiver</i> , IEEE Symposium on VLSI Circuits, Kyoto, Japan, 1997, pp. 113-114, doi: 10.1109/VLSIC.1997.623833.
TI-1018	Declaration of Maureen Honeycutt
TI-1019	Ziemer Tranter, <i>Principles of Communications, Systems, Modulation, and Noise</i> , Fourth Edition, Published 1995
TI-1020	Thomas H. Lee, <i>The Design of CMOS Radio-Frequency Integrated Circuits</i> , Cambridge University Press, 1998 (Excerpts)
TI-1021	U.S. Patent No. US 7,065,327 (“MacNally”)
TI-1022	U.S. Provisional Patent Application 60/099,723 (“MacNally-Provisional”), filed September 10, 1998
TI-1023	International Publication No. WO 00/16492 (“Macnally”)
TI-1024	Reserved
TI-1025	Reserved
TI-1026	Reserved
TI-1027	D. Scott Langford et al, “A BiCMOS Analog Front-end Circuit for an FDM-Based ADSL System,” IEEE Journal of Solid-State Circuits, Vol. 33, no. 9, September 1998, 1383-1393
TI-1028-1040	Reserved
TI-1041	Stipulation
TI-1042	Special Master’s Report and Recommendation Regarding Claim Construction, <i>ParkerVision, Inc. v. Texas Instruments Incorporated</i> , 6:23-cv-00384, W.D. Tex., October 21, 2024
TI-1043	U.S. Patent Application Serial Number 09/521,879, filed March 9, 2000 (“the ’879 application”)
TI-1044	Reserved

TI-1045	D. E. Johnson, J. L. Hilburn, and J. R. Johnson, Basic Electric Circuit Analysis, 7th Edition, Prentice-Hall, 1978.
TI-1046	Adel S. Sedra, Kenneth C. Smith, Microelectronics Circuits, 4th Edition, Oxford University Press, 1997.
TI-1047	D. Tayloe, <i>Norcal NC2030 Low power, High Performance 20m or 30m DC Transceiver</i> , User Manual, December 18, 2005. (https://www.norcalqrp.org/files/NC2030/NC2030_v5.pdf).
TI-1048	CBT (5-V) and CBTLV (3.3-V) Bus Switches, Texas Instruments, August, 1998 (https://www.ti.com/lit/ug/scdd001b/scdd001b.pdf)
TI-1049	Logic Selection Guide, Texas Instruments, August, 1998 (https://web.archive.org/web/20160118225253/https://my.ece.msstate.edu/faculty/reese/EE4743/data_sheets/sdyu001k.pdf)
TI-1050	Thomas H. Lee, <i>The Design of CMOS Radio-Frequency Integrated Circuits</i> , Cambridge University Press, 1998.
TI-1051	Reserved
TI-1052	B. Gilbert, <i>Advances in BJT techniques for high-performance transceivers</i> , Proceedings of the 23rd European Solid-State Circuits Conference, Southampton, UK, 31-38, 1997.
TI-1053	B. Gilbert, "The MICROMIXER: a highly linear variant of the Gilbert mixer using a bisymmetric Class-AB input stage," in <i>IEEE Journal of Solid-State Circuits</i> , vol. 32, no. 9, pp. 1412-1423, Sept. 1997.
TI-1054	I. Galton and C. Weltin-Wu, "Understanding Phase Error and Jitter: Definitions, Implications, Simulations, and Measurement,"

	<i>IEEE Transactions on Circuits and Systems I: Regular Papers</i> , vol. 66, no. 1, pp. 1–19, Jan. 2019.
TI-1055	P. R. Gray and R. G. Meyer, <i>Analysis and Design of Analog Integrated Circuits</i> , Third Edition, John Wiley and Sons, 1993.
TI-1056	D. Knollman, “Designing with op-amps: Single formula technique keeps it simple,” EDN Design Feature Article, 1998
TI-1057	1988 Linear Products Databook, Analog Devices, Inc.
TI-1058	Reimund Wittmann, Werner Schardein, Bedrich J. Hosticka, Gert Burbach, and Juergen Arndt, <i>Trimless High Precision Ratioed Resistors in D/A and A/D Converters</i> , IEEE Journal of Solid-State Circuits, VOL. 30, NO. 8, pp. 935-938, AUGUST 1995
TI-1059	A. Abidi, “Low-Power RF-ICs in Wireless Transceivers,” 1994 IEEE Symposium on Low Power Electronics
TI-1060	Design of Analog-Digital VLSI Circuits for Telecommunications and Signal Processing, J. Franca, Y. Tsividis, ed., 2nd Edition, Prentice-Hall, 1994.
TI-1061	J. C. Rudell, et. al., “A 1.9-GHz Wide-Band IF Double Conversion CMOS Receiver for Cordless Telephone Applications,” IEEE Journal of Solid-State Circuits, vol. 32, no. 12, December, 1997
TI-1062	J.R. Cogdell, Foundations of Electrical Engineering, 1996 (Prentice Hall 2ed)
TI-1063	K.R. Laker, W. M. C. Sansen, “Design of Analog Integrated Circuits and Systems,” First. Ed., McGraw-Hill, 1994 (“Laker”)
TI-1064	P. Chang et al, “A CMOS Channel-Select Filter for a Direct-Conversion Wireless Receiver,” IEEE Journal of Solid-State Circuits, VOL. 32, NO. 5, pp. 722-729, MAY 1997

TI-1065	Deposition Transcript of David Ricketts, dated June 13, 2025
TI-1066	Second Declaration of Dr. Ian Galton
TI-1067	Declaration of Dr. James Dickens
TI-1068	Deposition Transcript of David Sorrells, dated May 23, 2025
TI-1069	Second Declaration of June Munford

TABLE OF AUTHORITIES

Coleman v. Dines, 754 F.2d 353 (Fed. Cir. 1985)

Gunter v. Stream, 573 F.2d 77 (C.C.P.A. 1978))

REG Synthetic Fuels, LLC v. Neste Oil Oyj, 841 F.3d 954 (Fed. Cir. 2016)

Kolcraft Enters., Inc. v. Graco Children's Prods., Inc., 927 F.3d 1320 (Fed. Cir. 2019)

Apator Meters ApS v. Kamstrup A/S, 887 F.3d 1293 (Fed. Cir. 2018)

Davis v. Reddy, 620 F.2d 885 (C.C.P.A. 1980)

See In re Steed, 802 F.3d 1311 (Fed. Cir. 2015)

Dynamic Drinkware, LLC v. Nat'l Graphics, Inc., 800 F.3d 1375 (Fed. Cir. 2015)

Mycogen Plant Sci., Inc. v. Monsanto Co., 243 F.3d 1316 (Fed. Cir. 2001)

Medichem, S.A. v. Rolabo, S. L., 437 F.3d 1157 (Fed. Cir. 2006)

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Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223, 1228 (Fed. Cir. 1994)

Dawson v. Dawson, 710 F.3d 1347, 1352 (Fed. Cir. 2013)

I. INTRODUCTION

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

PO's prior art arguments also fail. The claimed "energy storage element" does not require a low impedance load to form a down-converted signal. But even if it did, TI's grounds still render obvious all Challenged Claims (i.e., claims 1-5, 8, 9, 11-23, 26, 27, 29-36).

II. PO'S SWEAR-BEHIND FAILS

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

A. Legal Standards

Actual reduction-to-practice requires a patentee prove it had "constructed an embodiment or performed a process" that met "all the limitations of the claim." *See In re Steed*, 802 F.3d at 1318; *Medichem*, 437 F.3d at 1169. The inventor(s) must also have determined that the invention would work for its intended purpose.

Mycogen, 243 F.3d at 1335. Constructive reduction-to-practice requires a patentee demonstrate conception and “reasonably continuous diligence” in reducing the invention to practice to the effective filing date. *Medtronic II*, 86 F.3d at 904-906; *Apator*, 887 F.3d at 1297. Conception requires proof that the inventors had a “definite and permanent idea of the complete and operative invention.” *Kolcraft*, 927 F.3d at 1324.

Conception and reduction-to-practice require corroboration of inventor testimony by other, independent information. *Medichem*, 437 F.3d at 1171; *REG Synthetic*, 841 F.3d at 962; *Apator*, 887 F.3d at 1295.

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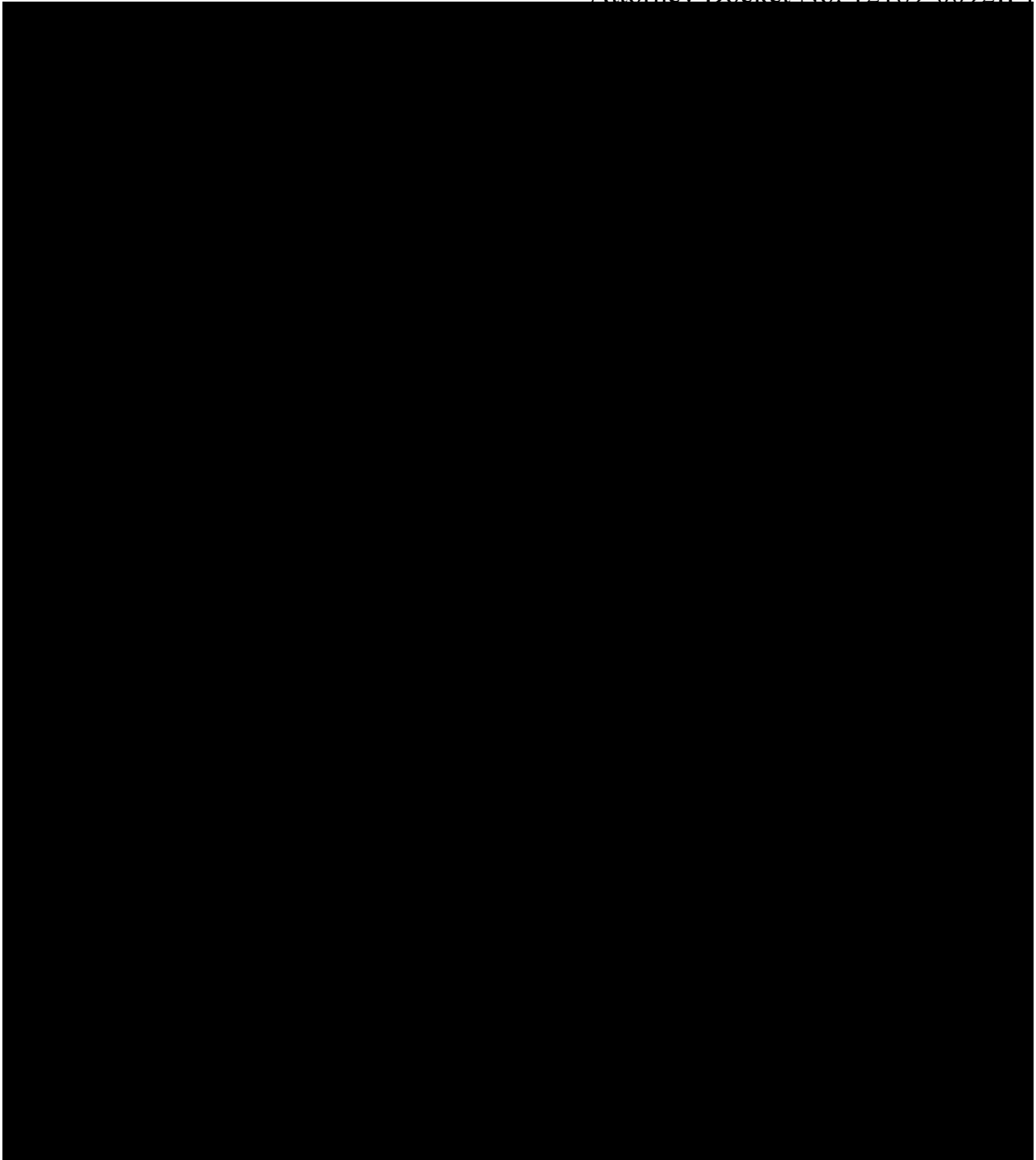
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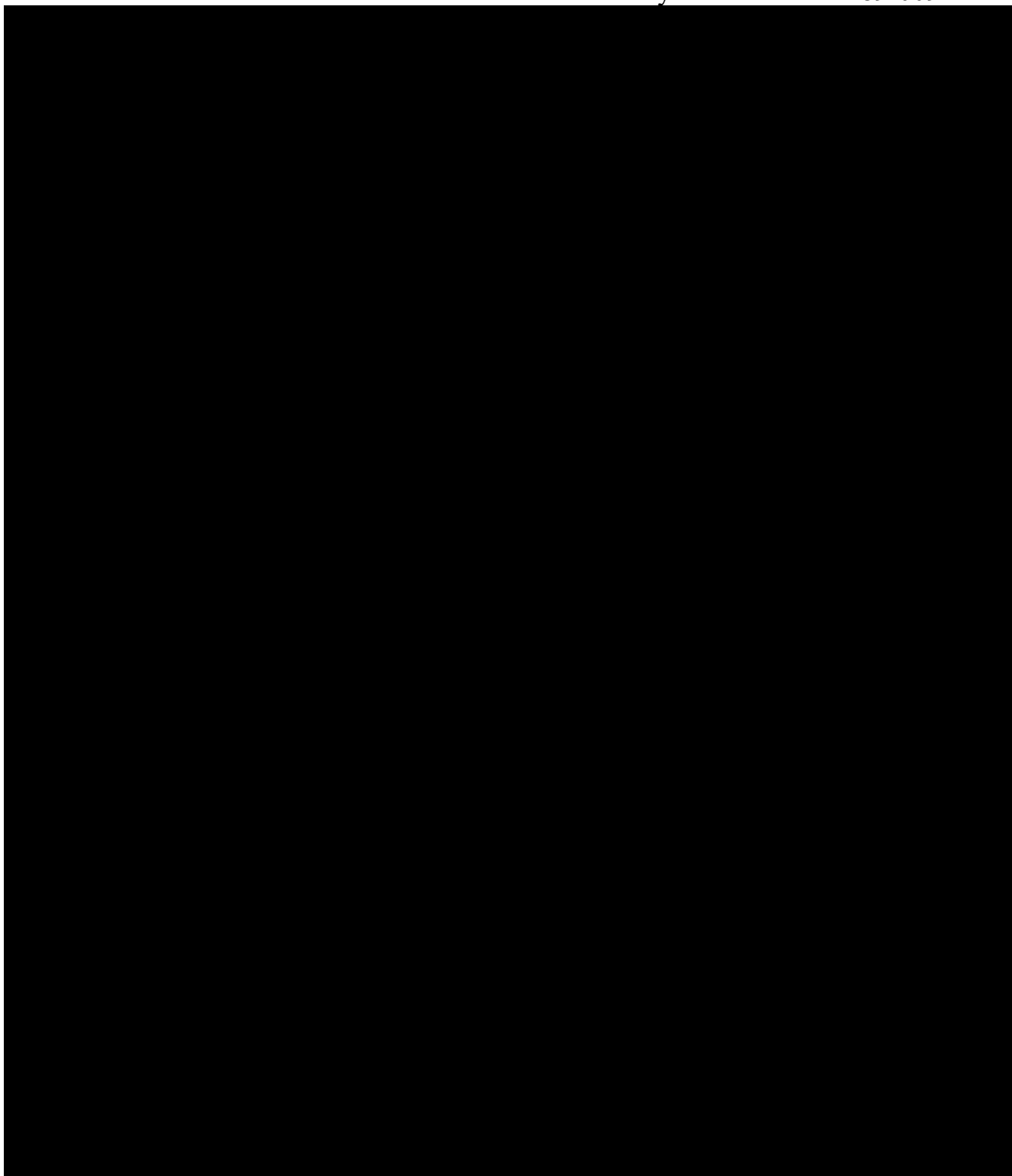
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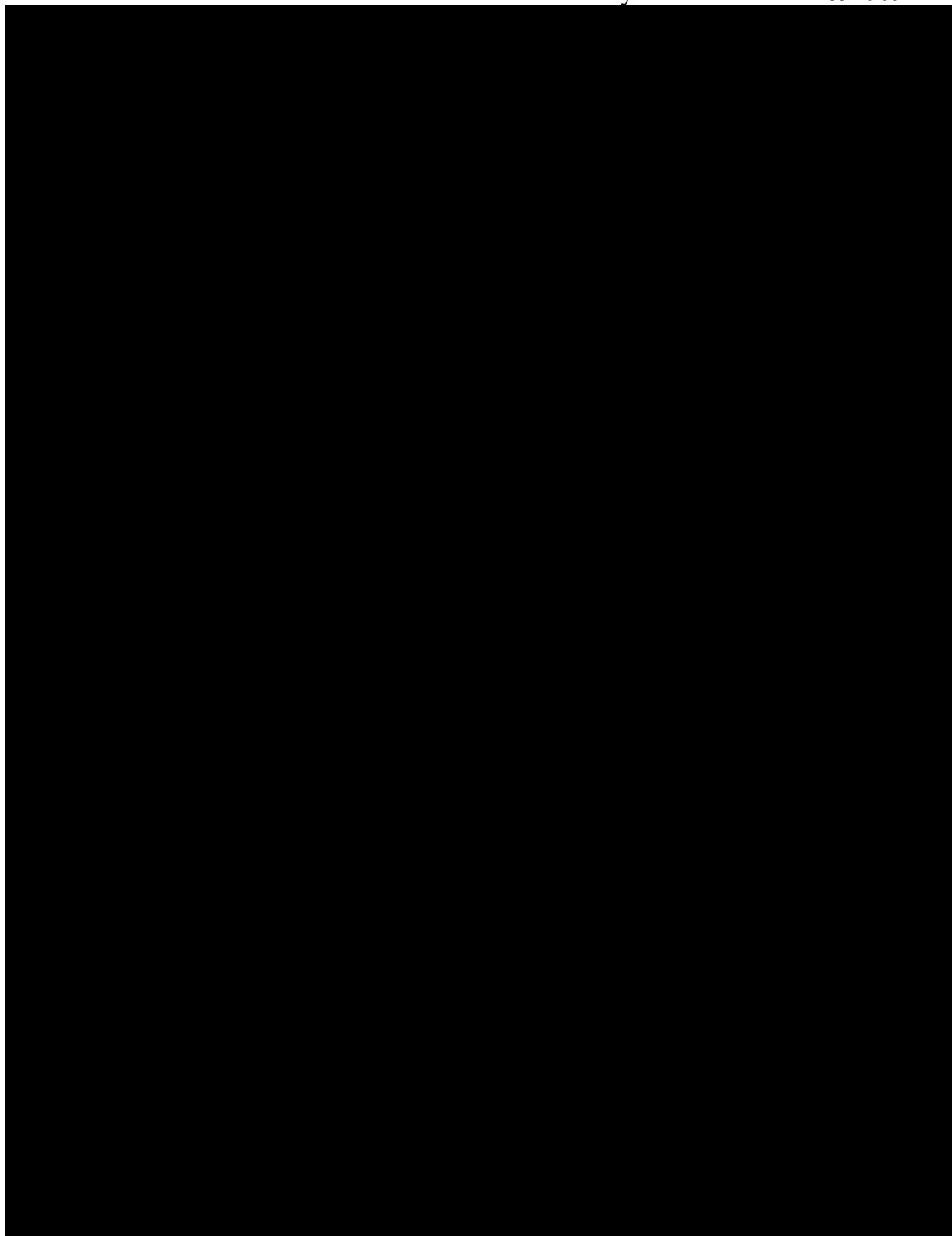
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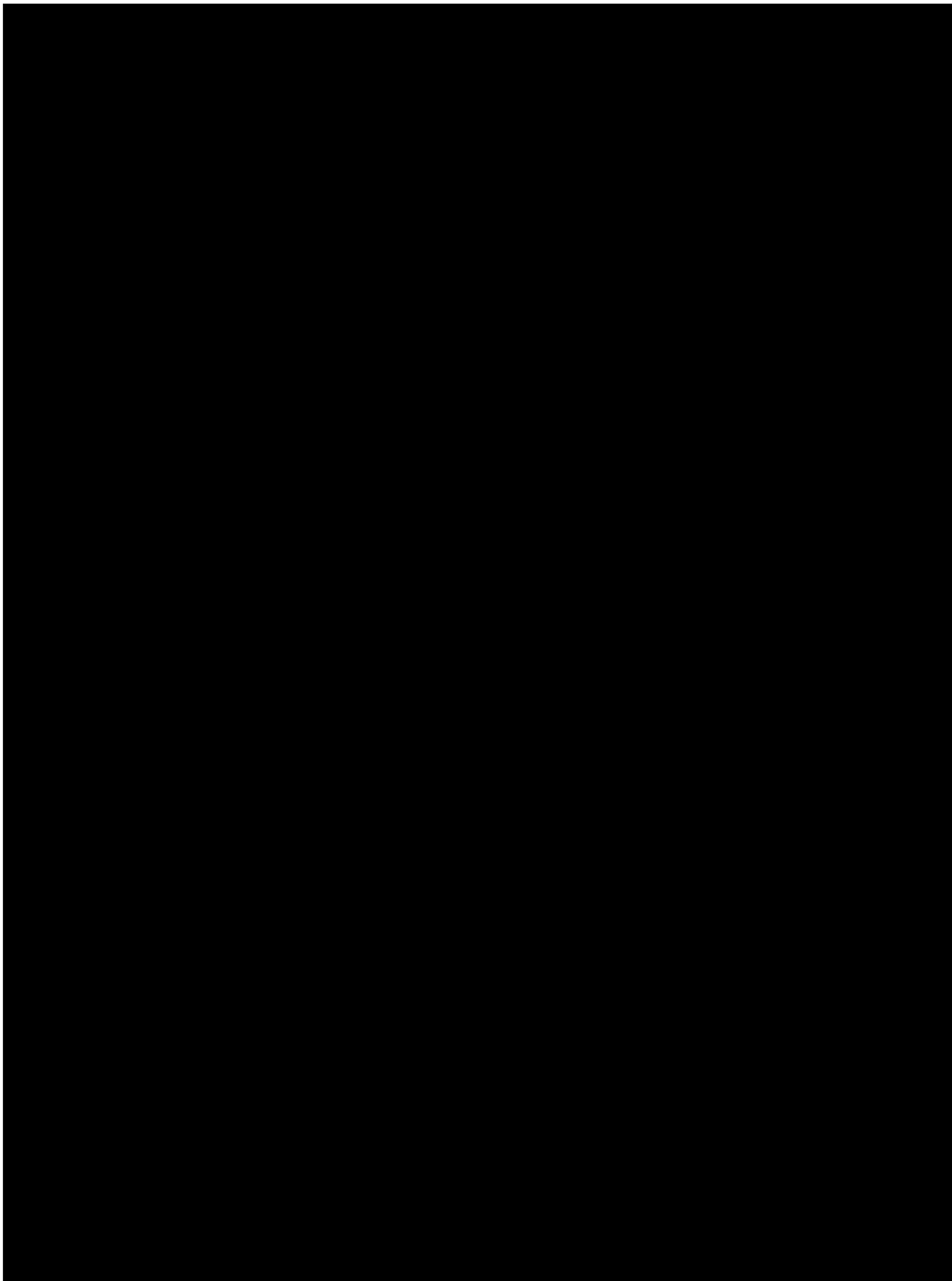
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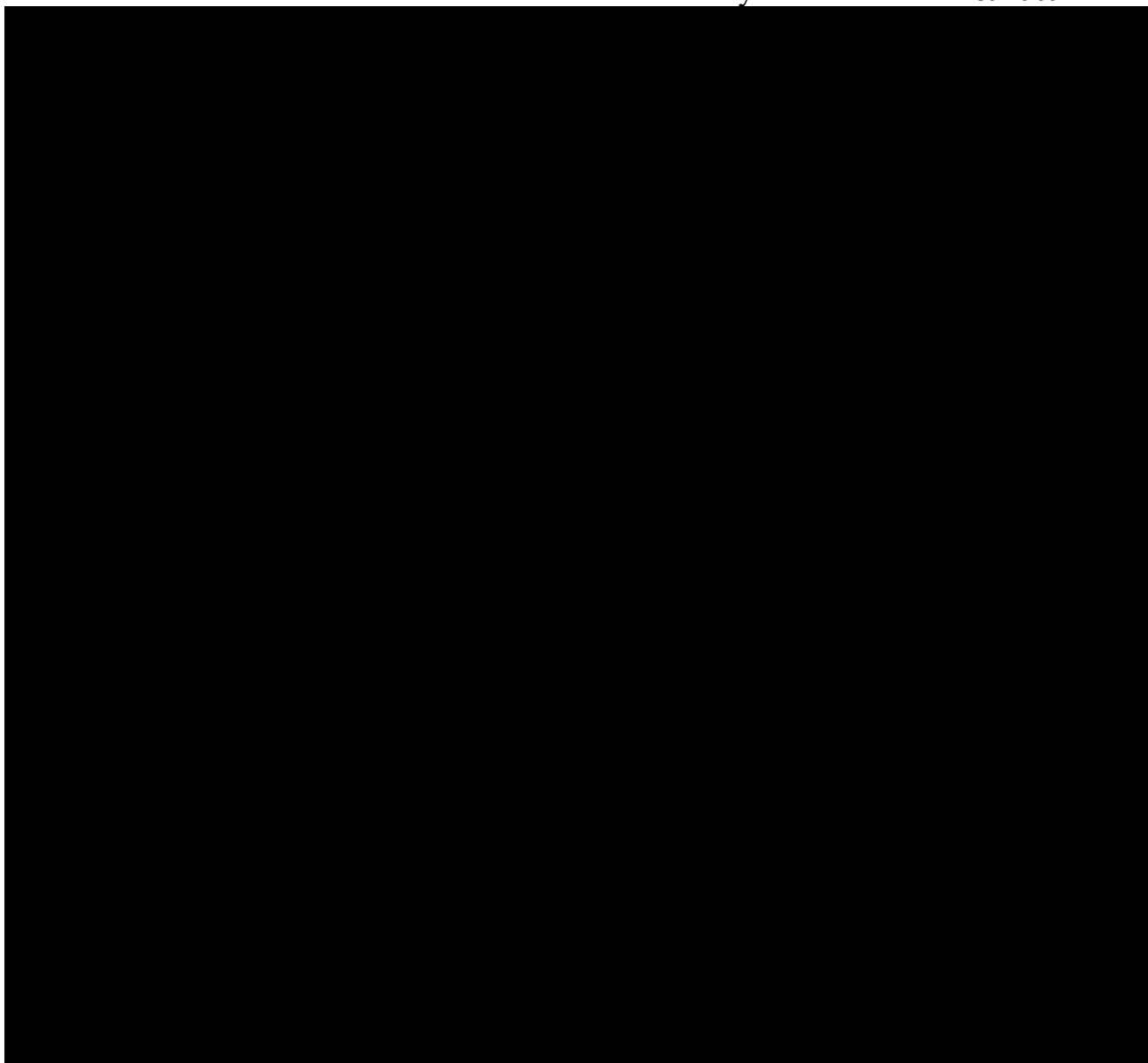
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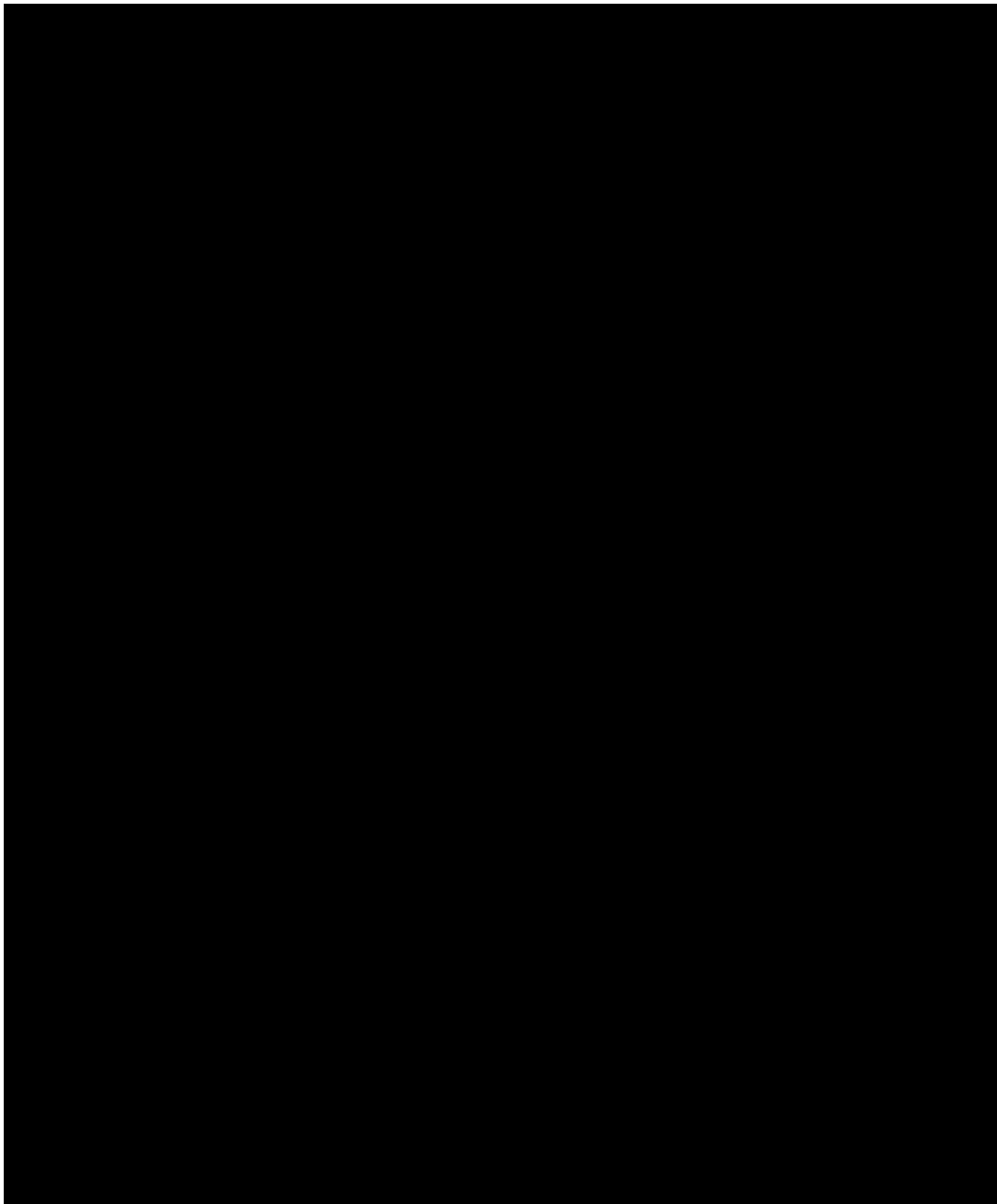


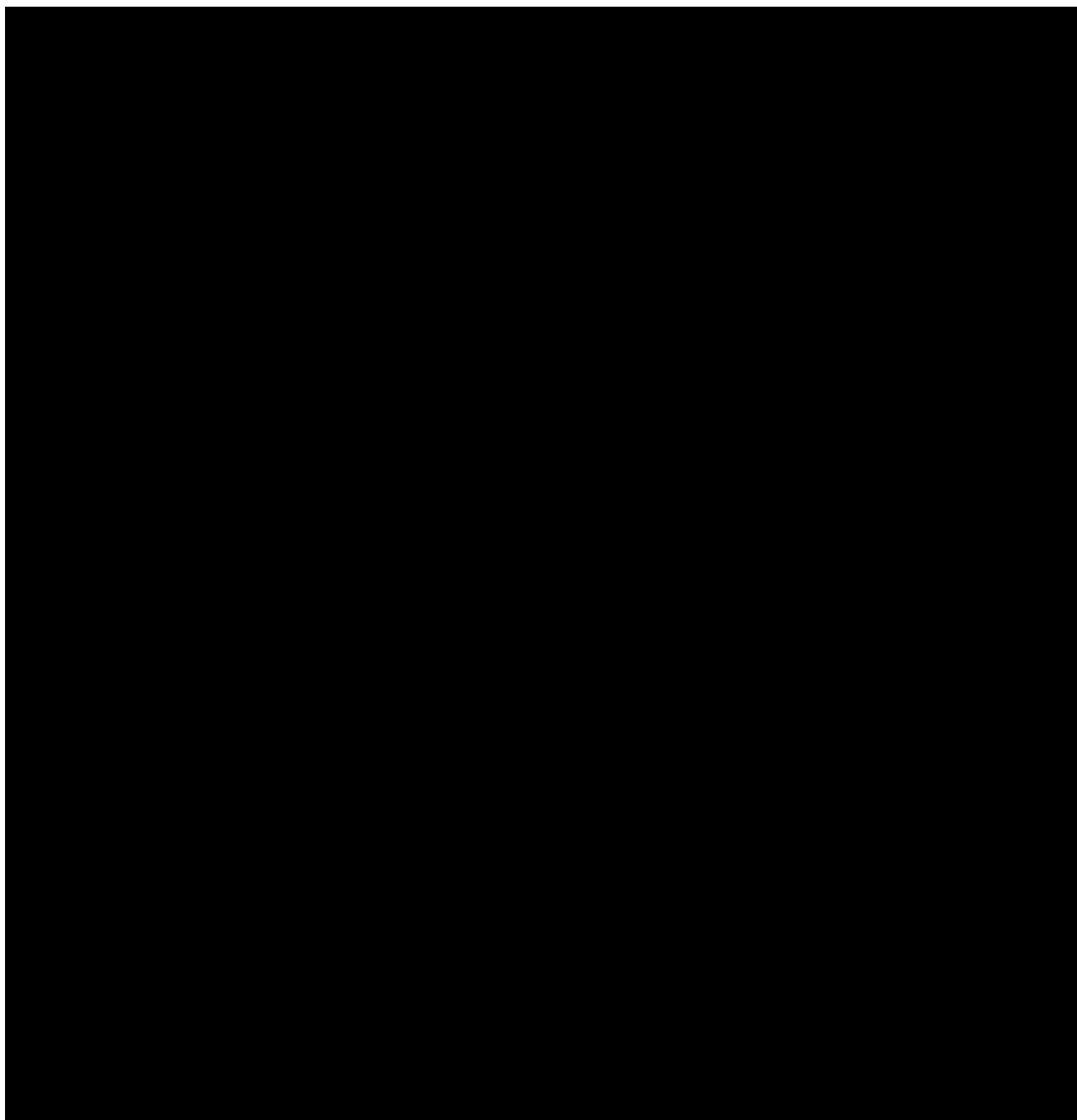


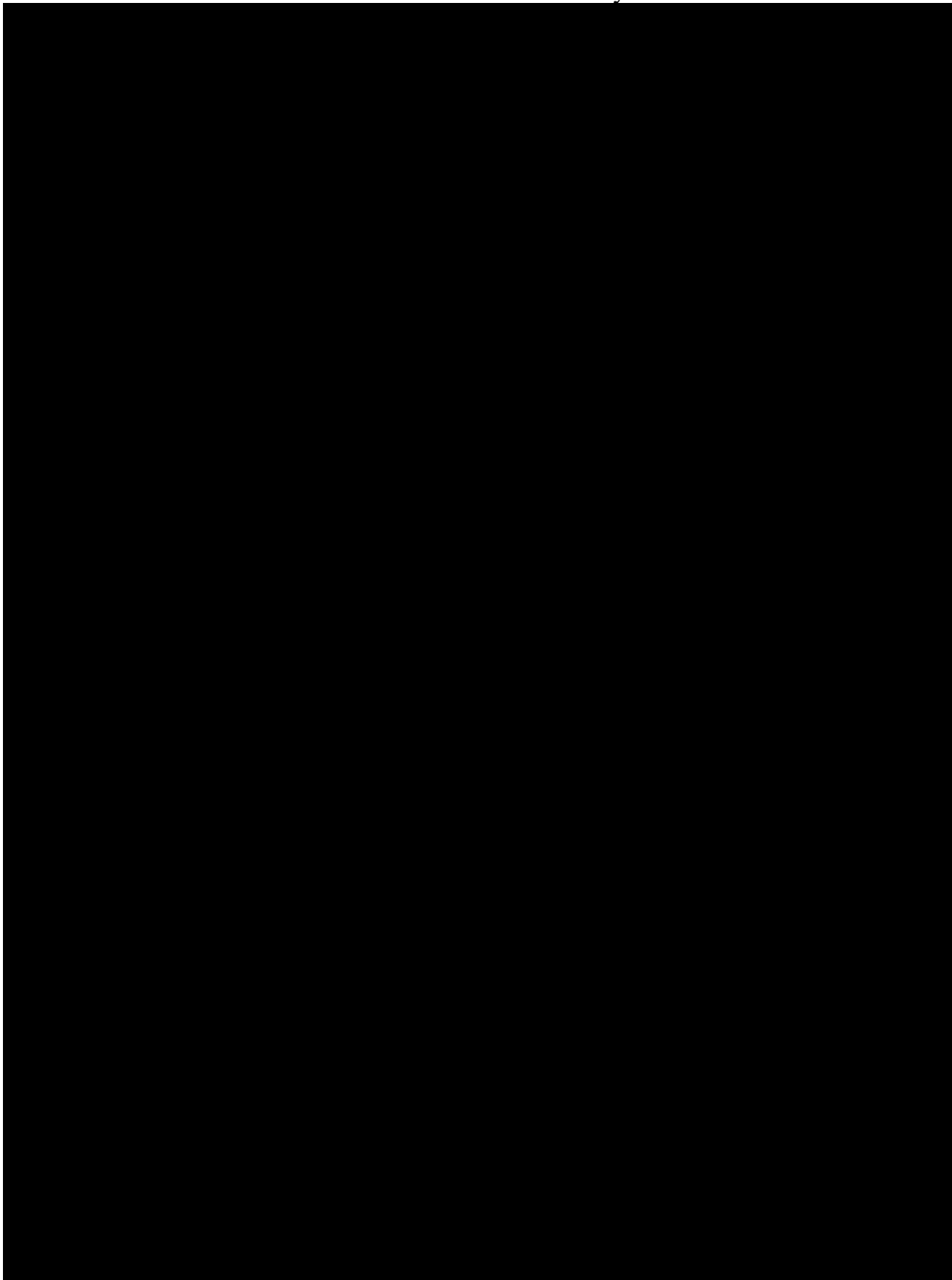


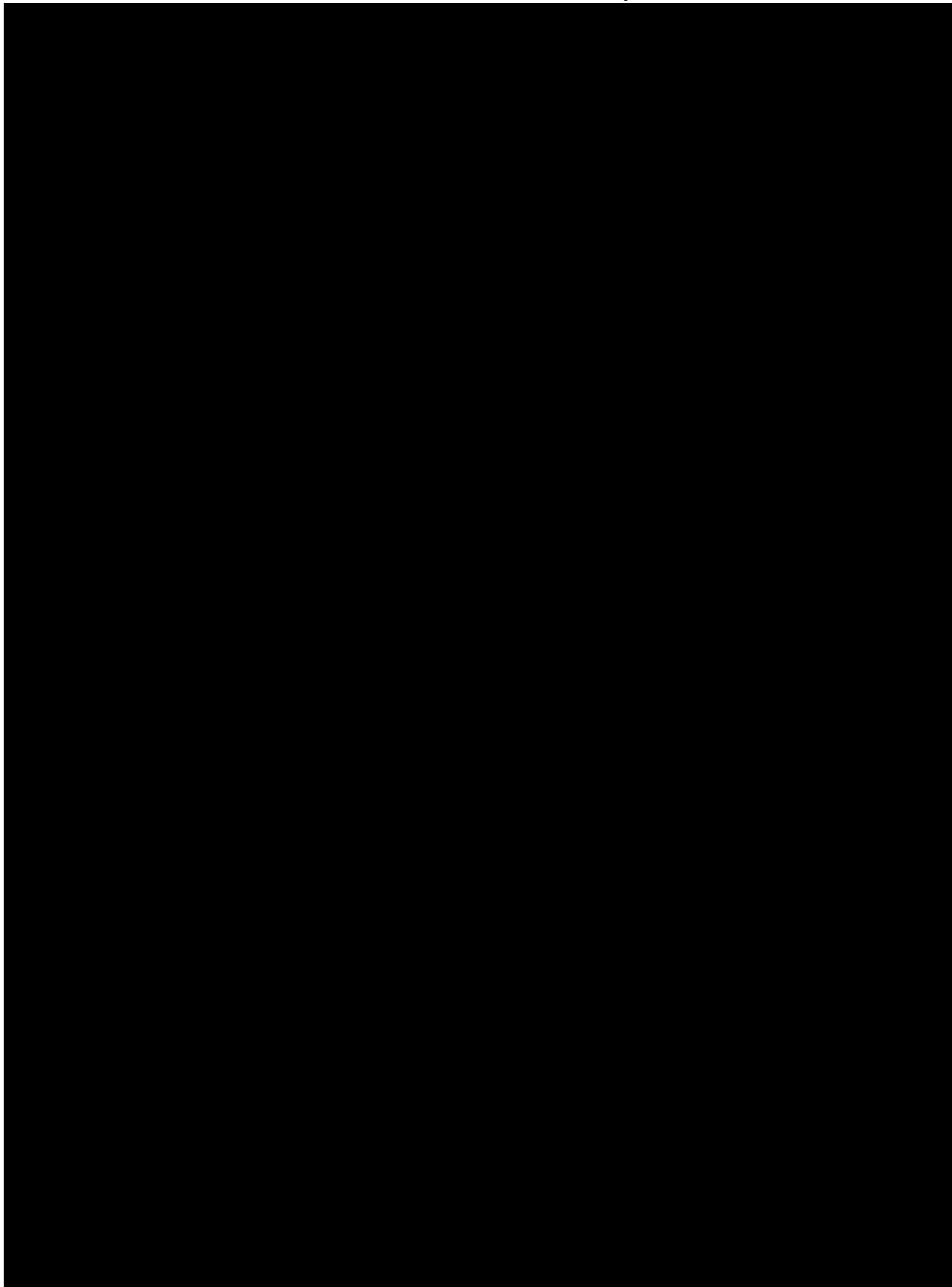












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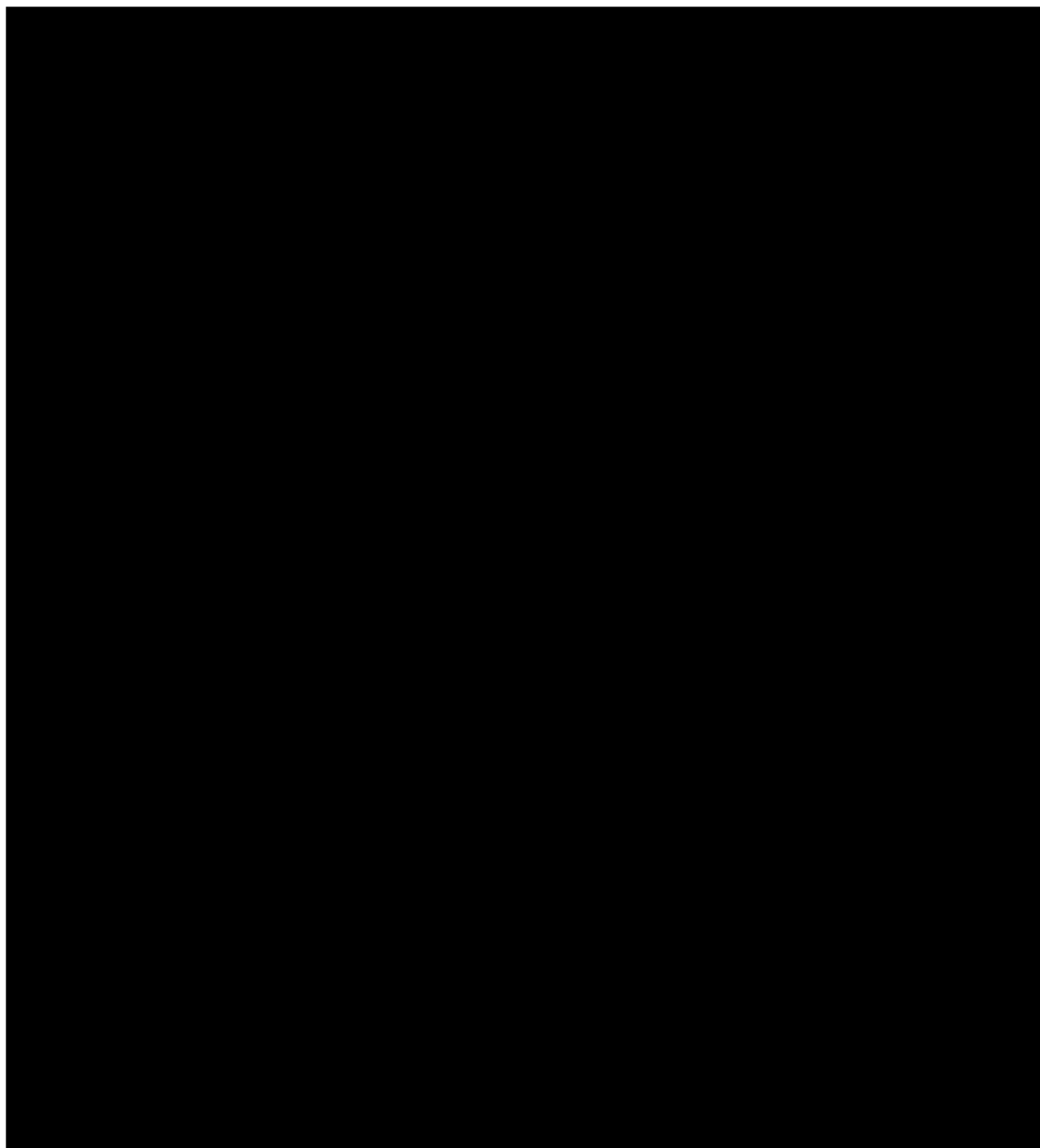
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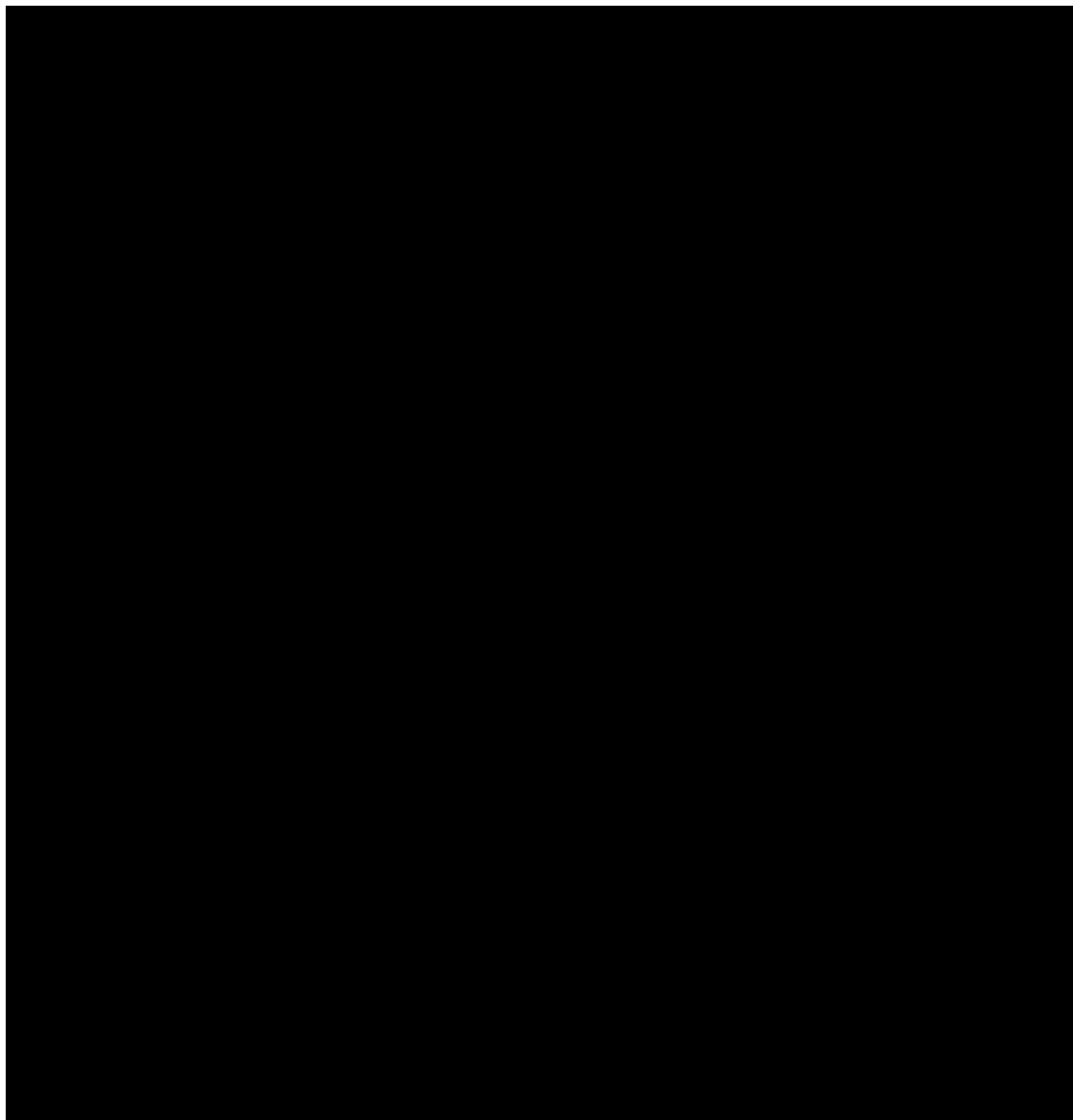
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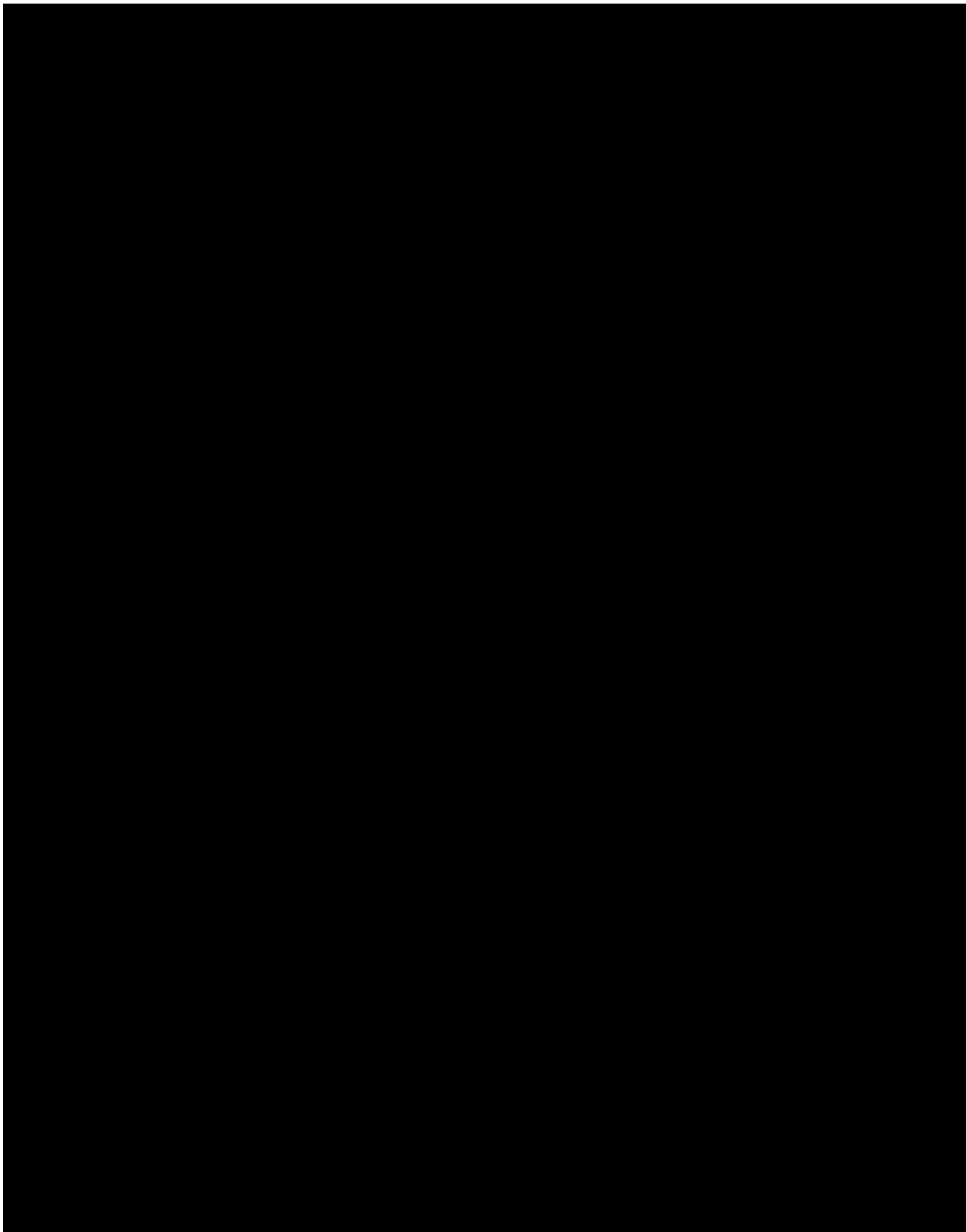
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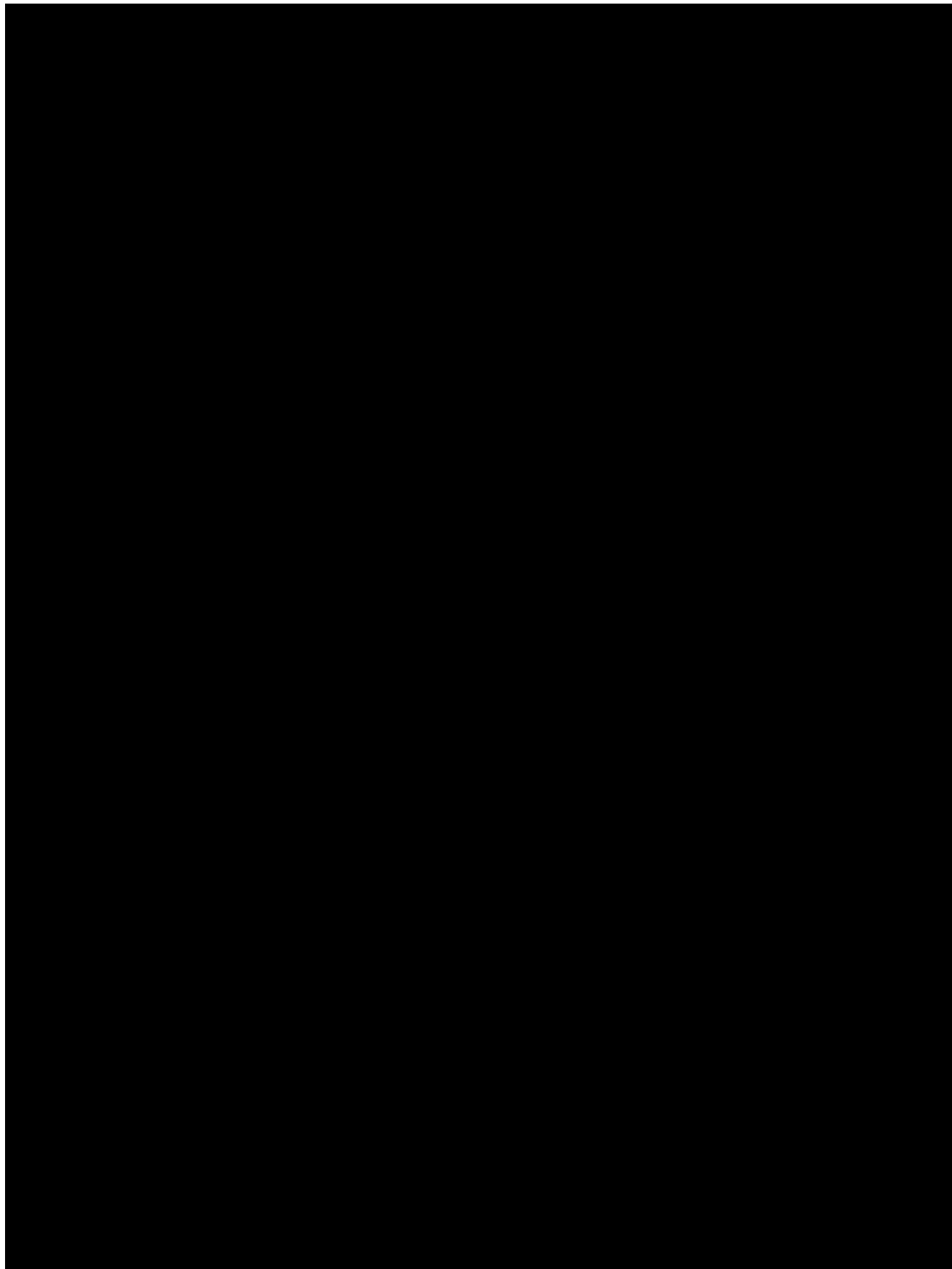
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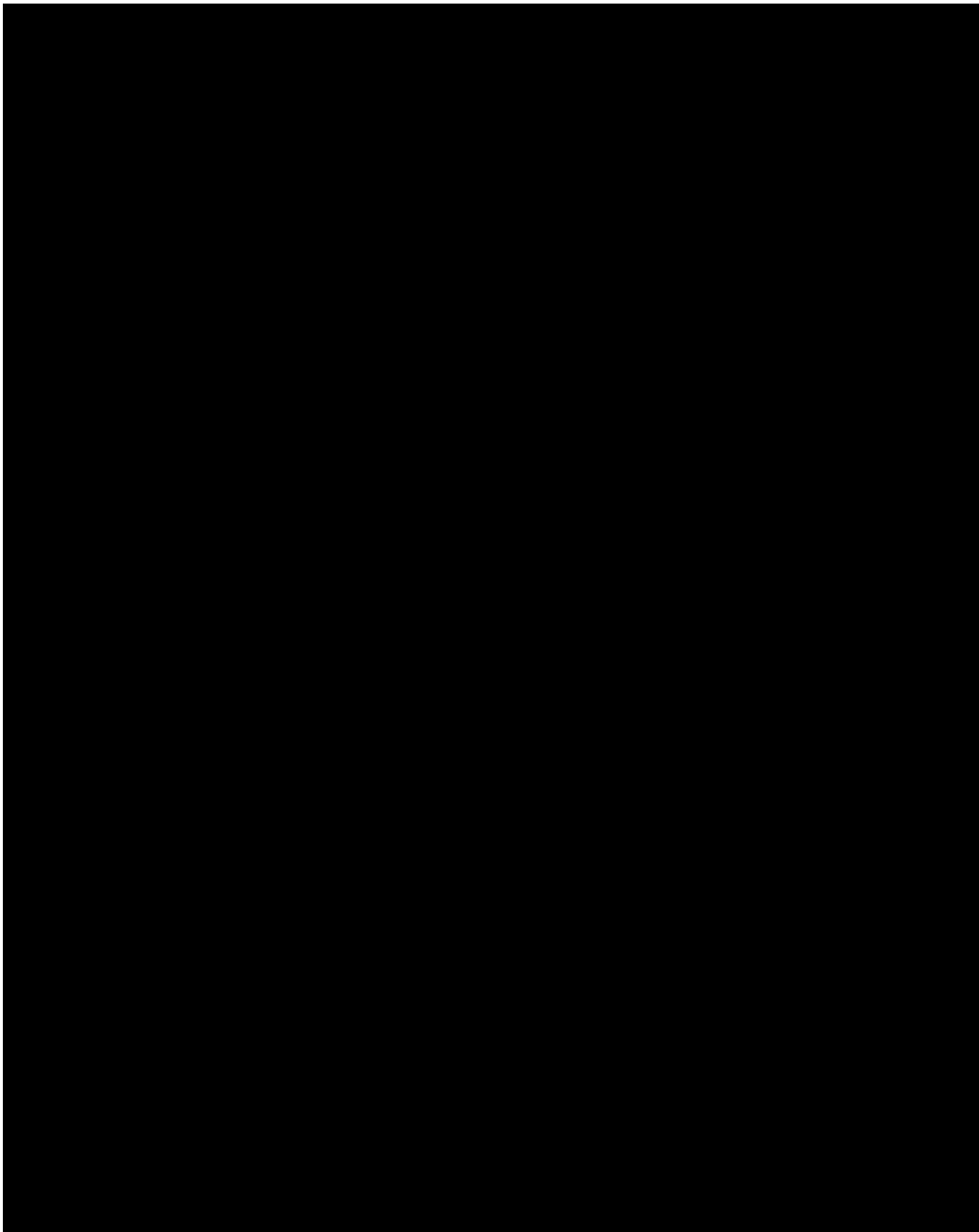
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Category	Value (approximate percentage)
Category 1	85
Category 2	95
Category 3	98
Category 4	100
Category 5	92
Category 6	96
Category 7	75

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III. CLAIM CONSTRUCTION

The '528 Patent uses the terms “storage element” and “energy storage element” interchangeably. Pet. 3-4. The Board agrees. Inst. Decision, 13-15. Yet, in an attempt to shoehorn in limitations, PO now argues “energy storage element” is distinct from “storage element.” POR, 53 (“Otherwise, the term ‘energy’ in ‘*energy* storage element’ would be meaningless.”). “An ‘energy storage element’ is a use to denote a component of an energy transfer system.” POR, 54.⁶ An

⁶ PO alleges: “The Federal Circuit recently held [ParkerVision’s ‘energy sampling’ differs from ‘voltage sampling’ in] *ParkerVision v. Qualcomm*, 116 F.4th 1345, 1349 (Fed. Cir. 2024).” However, the holding of this case is on the scope of collateral estoppel, not claim construction. *Id.*

energy transfer system purportedly has “a low impedance load,” which is “what enables a storage capacitor to discharge....” POR, 16, ¶¶VI.B.

PO’s attempt to distinguish “energy storage element” from “storage element” ignores that even the ’528 claims use the two terms interchangeably. Pet., 3-4, TI-1066, ¶5 (dependent claims recite “storage element” with antecedent basis in claim 1 reciting “energy storage element”). The ’528 specification likewise does not differentiate between “energy storage” and “storage.” TI-1066, ¶¶5-9. PO has not, and cannot, point to an express definition that informs the alleged distinction. The only express definition is of “storage element” and implicitly the storage element is an energy storage element, because “*energy*” is what is stored. *Id.* PO’s logic for applying additional meaning to the word “energy” because it is rendered redundant by the claims’ requirement of storing “non-negligible amounts of energy” makes no sense. POR, 53. By that logic, “storage” is also rendered redundant by the recitation that “energy storage element *stores* the transferred energy.”

PO’s construction is also wrong for reading into the claims an entire unrecited system, a contention already rejected by the Board. IPR2020-1265, Paper 44, 32-38 (declining to read “*an energy transfer system*” into “storage element” in related 7,110,444), 38 (aff’d *Parkervision, Inc. v. Vidal*, 88 F.4th 969, 976 (Fed. Cir. 2023)). Like the ’444 patent above, the ’528 claims here do not

recite any energy transfer system when mentioning the terms “system,” “energy,” and “transfer” in isolation. Pet., 3-5.

PO’s construction is additionally wrong for requiring “a low impedance load.” At best, the ’528 patent states “the non-negligible amounts of transferred energy ensure that, even for low impedance loads, the storage capacitance 8208 accepts and maintains sufficient energy or charge to drive the load,” (TI-1001,73:65-74:1). This implies the energy transfer system can drive loads that are not low-impedance. Energy transfer is achieved independent of the load. TI-1066, ¶9.

Nonetheless, even if the claimed “energy storage element” were construed to require a low impedance load (which it does not), the proposed grounds still provide the limitation. Pet., §III; TI-1066, ¶10.

IV. ALL CHALLENGED CLAIMS ARE OBVIOUS

A. Grounds 1A/1B

1. TI’s application of prior art meets all claim limitations.

PO initially and improperly focuses on Tayloe and the TI-Datasheet without addressing the actual combination that also includes Macnally. PO’s attacking the references individually is improper *See, Game & Tech. Co., Ltd. v. Wargaming Grp. Ltd.*, 942 F.3d 1343, 1352 (Fed. Cir. 2019).

PO now conclusory asserts, with no explanation,⁷ that Tayloe/TI-Datasheet do not disclose: (1) “energy storage element,” (2) deriving a baseband signal portion, or (3) outputting a differential baseband signal. POR, 77. PO also asserts Tayloe/TI-Datasheet does not disclose claims 8-9 and 26-27. *Id.* PO is wrong.

To PO’s first point, the Petition explains that Tayloe’s capacitor is an “energy storage element” because it “*stores non-negligible amounts of energy from an input EM signal*,” i.e., the RF input signal f_i . Pet., 3-5, 34-36 (citing, e.g., TI-1001, 5:1-16 (“output[s]...are used to generate baseband...signals”), TI-1003, ¶¶153-158). PO merely cites Ricketts who asserts Tayloe’s capacitors “do not discharge energy...and thus cannot generate any baseband signal portion” because Tayloe’s amplifiers 50, 52 are allegedly high impedance. EX2024, ¶¶279-284, 213. Ricketts, however, did not acknowledge that Tayloe, indeed, generates baseband signals using the stored energy. TI-1001, 5:1-16. Nor did Ricketts consider textbook knowledge that amplifier circuits, like Tayloe’s, using a feedback resistor, have an impedance equal to its input resistor, which is low impedance. TI-1066, ¶¶11-35 (citing TI-

⁷ PO’s bare conclusions citing only to expert testimony is improper incorporation by reference. *3M Co. v. Westech Aerosol Corp.* IPR2018-00576, Paper 48, 8 (citing 37 C.F.R. § 42.6 and denying rehearing request) (PTAB, August 7, 2019) (aff’d by Federal Circuit June 25, 2021).

1046, TI-1055). Tayloe describes use of its non-inverting terminals (180/270 degrees) without the feedback resistor as optional and, when used, increase gain of the baseband signals generated through the inverting (low impedance) terminals. TI-1001, 5:12-16; TI-1066, ¶97. TI-1001, 5:12-16; TI-1066, ¶97 (also explaining terminal impedance needn't match).

Regardless, as applied in the Tayloe combination, Tayloe's capacitors are coupled to Macnally's differential amplifier circuit which provides a low impedance load "in the kilo ohm range." Pet., 36, 22-30, 5. As observed by Dr. Galton, high impedance in Macnally is impractical, and a POSITA would have known, or found it obvious, to use impedance in the kilo ohm range on grounds of bandwidth and noise performance. TI-1066, ¶¶36-40 (citing TI-1047, 111, TI-1055, 12-13, FIG.11.7; TI-1062, 20-21 (avoiding large values), TI-1046, 79 (characterizing a few mega ohms as "impractically large")).

To PO's second point, Tayloe teaches deriving a baseband signal portion from the accumulated transferred energy because Tayloe teaches "producing baseband in-phase signal" from charge build-up on its capacitor. Pet., 33-35 (citing TI-1001, 2:56-59, 5:1-16; TI-1003, ¶¶164-65, 201-202). In the Tayloe combination, Tayloe's capacitors also meet PO's requirement of a low impedance load. Pet., 36; TI-1066, ¶¶41-43.

To PO's third point, the combination outputs a "differential" baseband signal because the combination applies a fully differential amplifier, as taught in Macnally, to provide "differential output having two complementary components," (Pet., 38-40, 27-30). TI-1004, 2:56-67, Abstract, Fig. 3; TI-1021, 5:64-67; TI-1003, ¶¶141-143, ¶¶166-69. PO fails to address the combination. TI-1066, ¶¶44-46.

To PO's assertion that Tayloe does not transfer energy when a switch is OFF (claims 8-9 and 26-27), PO fails to move the needle again, because as noted above, both Tayloe and Macnally present a low impedance load allowing the claimed energy transfer. TI-1066, ¶¶46-51 (two of Tayloe's capacitors already see a low impedance load and Macnally, as applied in the combination, provides low impedance load to all four capacitors).

2. PO fails to refute TI's motivation to combine.

PO also attacks motivation to combine, alleging TI used the claimed invention as a roadmap to reconstruct a completely new circuit. POR, 78-98. However, the circuit is not new. Tayloe expressly discloses using the TI-Datasheet multiplexer/demultiplexer as the switch in its Fig. 3 (EX1004, 5:33-37) and also expressly discloses Fig. 6 as "an alternate embodiment" for the resistor-capacitor network in Fig. 3, (EX1004, 4:46-49). Pet., 22-30 (citing e.g., TI-1003, ¶¶130-143).

(a) Tayloe does not teach away from using Figure 6

PO asserts Tayloe's Figure 6 "uses a *per-path* resistor configuration," requiring greater component count, complexity, cost, and precise matching than the "*shared* resistor configuration" of Figure 3. POR, 81-83.

But Figure 6 of Tayloe does not teach away because it does not contradict TI's motivation to combine with Macnally. In the combination, the fully-differential amplifier (like Macnally's) generally reduces area and power consumption relative to those of a comparable single-ended amplifier (like Tayloe's). TI-1066, ¶89 (area/power reduction matters more than component count). Specifically, the signal swing of the fully-differential amplifier is approximately double that of a single-ended amplifier, and so it can handle four times more noise power than a single-ended amplifier for the same signal-to-noise ratio. *Id.* This allows reducing the size of the fully-differential amplifier and its bias current while achieving the same signal-to-noise ratio. *Id.*

Matching resistors during IC fabrication was routine, as evidenced by prior art demonstrating on-chip resistors matched to a fraction of a percent of accuracy. TI-1066, ¶¶53-57 (citing EX1058, 935 ("layout of the resistors...optimized with respect to area and matching requirements...better than 0.25%")). When combining Tayloe and the TI-Datasheet, using matched resistors would be just part of the "standard CMOS and BiCMOS processes." EX1058, 935-939; TI-1003, ¶141.

Nonetheless, obviousness “does not require the motivation be the best option, only that it be a suitable option from which the prior art did not teach away.” *Par Pharm., Inc. v. TWi Pharm., Inc.*, 773 F.3d 1186, 1197-98 (Fed. Cir. 2014); *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2003) (petitioner “never had to show that [the combination] was an ‘improvement’ in a categorical sense.”)

Additionally, in alleging teaching away, PO only cited Ricketts’ uncorroborated, conclusory testimony parroting the POR. *Compare* POR, 81-83 with EX2024, ¶¶300-303; *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 (PTAB Aug. 24, 2022) (“conclusory assertion” given little or no weight).

(b) Tayloe does not teach away from the combination

PO asserts “Tayloe’s capacitors would not be suitable for integration due to their large size.” POR, 83.

PO is arguing bodily incorporation, but obviousness is not bodily incorporation. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Here, Tayloe expressly states that “this invention is not limited to the particular forms shown.” TI-1001, 6:5-8. Using different component values than Tayloe’s example does not “depart from the spirit and scope of [Tayloe’s] invention.” *Id.*; TI-1066, ¶¶58-63.

[REDACTED]

[REDACTED]

██████ The proffered obviousness combination does not preclude such off-chip capacitors. TI-1066, ¶¶62-63.

PO also alleges that Tayloe's prototype could not handle higher frequency, but the challenged claims do not recite any operating frequency. TI-1066, ¶¶58-61. Tayloe specifically targeted lower-frequency operation, and the proffered obvious combination need not deviate from that operation to satisfy the claims. *Id.*; TI-1003, 5:49-60.

(c) Macnally and TI-Datasheet are combinable

PO asserts the switches in TI-Datasheet are not fast enough for Macnally's mixer. POR, 85-86. But again, neither the claims nor the combination require high-frequency operation. TI-1066, ¶¶64-69. Significantly, Macnally's mixer is not part of the proposed combination. Pet., 20-21 (citing e.g., TI-1021/TI-1022, FIG. 3), 27-30.

(d) PO misconstrues Macnally

Again ignoring the proffered combination, PO further asserts there is no motivation for replacing Macnally's mixer because its gain "is not due to the biquad two-pole filter." POR, 86. Yet, in making its irrelevant argument, PO misconstrues Macnally where over half of Macnally's gain (measured in dB) comes from its biquad two-pole filters. TI-1066, ¶¶70-75 (citing TI-1021, 7:7-20).

(e) Reason for combining Tayloe and Macnally

PO asserts (i) Tayloe's amplifiers already provide gain, (ii) Tayloe already performs filtering, (iii) Tayloe's amplifiers already process complementary inputs, (iv) the combination would significantly increase the number of components, and (v) Tayloe features "a simple and inexpensive product detector." (POR, 87-92).

PO's assertions are unfounded. The Board already recognized that "just because Tayloe has a simple and inexpensive product with performance benefits does not mean that one of ordinary skill in the art would not seek to continue to improve Tayloe further." Inst. Decision, 31. Nonetheless, obviousness "does not require the motivation be the best option, only that it be a suitable option from which the prior art did not teach away." *Par Pharm* at 1197-98; *Intel* at 1381.

To PO's first point, Macnally's amplifier topology offers "advantages...for baseband processing on an IC" over a single ended amplifier. Pet., 28; TI-1003, ¶34 ("the signal information is represented as the difference between the two signals of each pair"). As explained above, this differential signal enables reducing the size of the fully-differential amplifier and its bias current while achieving the same signal-to-noise ratio. See, *supra*, §IV.A.2(a).

To PO's second point, Tayloe's filtering is provided by an RC filter with a single pole. TI-1066, ¶¶81-83. Dr. Galton notes "more filtering is generally needed than that offered by a single pole filter." TI-1066, ¶81 (citing Razavi, and TI-1064).

To PO's third point, Dr. Galton also explains that, while Tayloe's amplifier processes complementary inputs, it provides a single-ended output, an asymmetric arrangement sensitive to interference from other parts of the system. TI-1003, ¶¶34-35; TI-1066, ¶¶84-90. In contrast, fully differential amplifiers (like Macnally's) are far less sensitive to such interference. TI-1003, ¶35 (further noting reduction of "even order nonlinear distortion" is distinct from Tayloe's disclosure).

To PO's fourth point, PO alleged the combination requires "more components" and "additional subsequent circuitry." POR, 90-91. As explained *supra* §IV.A.2(a), mere count of components on an IC is less significant than the area/power consumption, both of which are improved in the combination. TI-1066, ¶89 (citing TI-1060). In the combination, subsequent circuitry is likewise differential to enjoy similar benefits of Macnally's fully-differential amplifier. TI-1066, ¶¶87-90. Here, the appearance of additional parts does not translate into increased area or power consumption for the same reason as above. *Id.* (noting subsequent circuitry also implemented with fully-differential circuitry to pursue similar benefits of fully-differential amplifiers); TI-1003, ¶¶34-37.

To PO's fifth point, PO's blanket assertion was already dismissed. Inst. Decision, 31. Above, TI has explained "the relative scale of potential benefits" resulting from the combination. *Id.* Moreover, the obviousness framework "does

not require the motivation be the best option, only that it be a suitable option.” *Par Pharm* at 1197-98; *Intel* at 1381.

3. Tayloe and Macnally are not incompatible

PO’s assertion of incompatibility (POR, 93-94) is unsupported. In fact, the top inputs of Tayloe’s summing amplifier boxes 50/52 have low impedances. TI-1066, ¶¶95-97, *supra* §IV.A.1(a)(i). Therefore, replacing Tayloe’s boxes 50/52 with fully-differential amplifier circuits having comparable input impedances would not significantly alter the behavior of Tayloe’s circuit with respect to the 0° and 90° outputs of switch 38. TI-1066, ¶¶95-97. Despite the 180° and 270° being optional, matching the 180° and 0° paths and matching the 270° and 90° paths (e.g., using Macnally’s fully differential amplifiers) would improve the system’s overall signal-to-noise ratio. TI-1066, ¶97 (additional explanation).

PO’s assertion must also fail for characterizing Tayloe as a voltage sampling system. POR, 92-94. PO does not, and could not, reconcile the fact that two of Tayloe’s four capacitors are already coupled to low impedance loads. TI-1066, ¶96. *Supra*, §III (no energy transfer system).

4. TI has proffered reasonable expectations of success.

PO merely rehashes its earlier assertions on incompatibility, altering fundamental operation, and existing filtering of Tayloe. POR, 94-98. The same assertions were rejected by the Board and refuted above. Inst. Decision, 34-35; *supra*

§§IV.A.2-3; TI-1066, ¶¶98-101. PO has not provided additional evidence.

Moreover, bodily incorporation, as argued by PO, is not “[t]he test for obviousness.”

In re Keller, 642 F.2d 425.

B. Grounds 2A/2B

PO similarly asserts that Razavi does not teach various claimed features and resorts to bodily incorporation against the combination. POR, 99-114. PO’s arguments are erroneous, as further explained below.

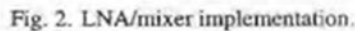
1. Razavi teaches transferring energy when the switch is ON

PO asserts: “no energy is transferred from the RF input signal as an output of M5 or M6,” and move upward to V_{DD} in Figure 2 of Razavi. POR, 98-103.

However, PO’s description of Razavi ignores the laws of physics. TI-1066, ¶¶102-137. The experts agree that, in Razavi’s Figure 2, electrons from the input signal flow through the transistors M_5 and M_6 toward the positive supply terminal V_{DD} . *Id.*, TI-1065, 12:1-14:25. PO’s assertion is both misleading and erroneous. POR, 98-103 (alleging “Razavi does not sample”), 70; TI-1066, ¶¶102-137 (explanation of Razavi’s sampling), 144-148 (citing cl. 8/26).

Tellingly, PO’s own annotation demonstrates transferring energy output from Razavi’s switch (i.e., M_5 and M_6). As reproduced below, PO argues that “current A” representing “the RF input signal flowing into the node” causes “current B,” which,

terminals. POR, 68-69.



EX2024, ¶¶248-249 (annotating EX1017, FIG. 2)

As Dr. Galton explains, current B (annotated by Ricketts above-right) represents the signal component that oscillates (not unidirectional) which provides charging to the capacitors of Razavi. TI-1066, ¶¶138-139; TI-1003, ¶¶232, 248-249; Pet, 68, 71, 82-83, 84-85.

2. Razavi teaches storing transferred energy (claims 1/19).

PO similarly asserts no energy can be stored. POR, 104. As explained *supra* §IV.B.1, Razavi teaches transferring energy from the RF input signal. TI-1066, ¶¶140-141, 102-139. In the Razavi-Macnally combination, the transferred energy is

stored and accumulated/integrated “in the same manner as described by the ’528 patent.” Petition, 71-73 (citing EX1003, ¶¶239-241), 69-70, 83-84, 86.

3. Razavi teaches transferring energy from the modulated carrier signal to the storage element when the switch is ON (claims 8/26).

PO asserts that Razavi’s capacitors C_p/C_m would charge when M_5 or M_6 are OFF based on PO’s erroneous description of Razavi, (POR, 104-105). PO is wrong, as addressed *supra* §§IV.B.1-2. TI-1066, ¶¶149-152 (using PO’s characterization, the ’528 patent’s own example would not meet claims 8/26); Pet. 76 (citing TI-1003, ¶¶251-252), 87-88.

Dr. Galton elaborates that each side of V_{out} of Razavi (Figure 2) is represented as a bias and a signal component, and when a respective switch (e.g., M_5 or M_6) is on, the corresponding signal component, resulting from the RF input signal, charges the corresponding capacitor connected to R_1 or R_2 . TI-1066, ¶¶142-148.

4. TI has shown sufficient motivation to combine Razavi and Macnally

PO argues there is no motivation to combine because (1) Razavi discloses an amplifier, (2) Razavi discloses low-pass filters, and (3) Macnally’s filter would require more components, POR, 105-109. PO’s assertions are flawed for similar reasons discussed *supra* §IV.A.

To PO’s first point, Razavi’s existing features would not preclude further improvement. Inst. Decision, 31; TI-1066, ¶¶152-155. In fact, Razavi indicates the need for additional low-pass filtering. TI-1017, 113; Pet., 66 (benefits for

combining); TI-1003, ¶¶227-228.

To PO's second point, Razavi's mixer has a single-pole RC filter for lowpass filtering. As Dr. Galton explains, "more filtering is generally needed than that offered by a single pole filter." TI-1066, ¶¶156-158. And, as noted above, Razavi suggests additional lowpass filtering. Pet., 66; TI-1017, 113, Fig. 4; TI-1003, ¶¶227-228.

To PO's third point, as explained *supra* §IV.A.2(e), using a fully differential amplifier generally reduces area and power consumption, which matters more for IC implementation than component count. TI-1066, ¶159.

(a) Razavi does not teach away

PO asserts Razavi teaches against Figure 4(a). POR, 109-110. However, all three permutations, namely, Figures 4(a) to 4(c) of Razavi, illustrate combined amplification and lowpass filters. TI-1066, ¶¶161-163. While each shows a distinct order for combining, all three are consistent with benefits of the proposed combination to "achieve both amplification and 'channel-selection filtering' at baseband." Pet., 66. Moreover, TI presented all "three permutations in Fig. 4" as "high-level examples," (Pet., 66). TI-1066, ¶¶161-163.

(b) Razavi is compatible with Macnally

PO asserted that the combination "would alter the operation of Razavi's circuit." POR, 111-112. PO is wrong. Dr. Galton calculated the resistance of each of R_1 and R_2 in Razavi is less than 1.25 kilo-ohm. TI-1066, ¶¶164-165, §V.A.1. This

is low impedance according to PO. POR, §§VII.C, V.B (citing TI-1001, Fig. 82B (low impedance load around 2k-ohm)). Thus, coupling Razavi's mixer to Macnally's circuit would not cause the alleged compatibility issue. TI-1066, ¶¶164-165.

(c) Reasonable expectation of success

PO takes the same issues with Razavi's Figure 4a and the alleged incompatibility. POR, 112-114. Both have been addressed *supra* §IV.B.4(a)-(b). TI-1066, ¶¶166-169, §V.A.1.

(d) Energy transfer system

PO alleges no prior art teaches an energy transfer system. POR, 114-115. As explained *supra* §III, no energy transfer system is required. Moreover, Grounds 1A/1B and 2A/2B both provide a low-impedance load to each (energy) storage element. Pet., §III.

Respectfully submitted,

Dated: June 27, 2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,579, which is less than the 5,600 allowed under 37 CFR § 42.24.

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e), the undersigned certifies that on June 27, 2025, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and accompanying exhibits were provided by email to the Patent Owner by serving the correspondence email addresses of record as follows:

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