

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ELECTION SYSTEMS & SOFTWARE, LLC
Petitioner,

v.

HART INTERCIVIC, INC.
Patent Owner.

Case: PGR2025-0066
Patent 12,125,319 B2

**PETITION FOR POST GRANT REVIEW OF
U.S. PATENT NO. 12,125,319**

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LISTING OF EXHIBITS

Exhibit No.	Exhibit Description
1001	U.S. Patent No. 12,125,319
1002	File History for U.S. Patent No. 12,125,319
1003	Declaration of Dr. Shamos
1004	U.S. Patent Application Publication 2014/0231513 (“Brockhouse”)
1005	U.S. Patent 7,406,201 (“Heilper”)
1006	Brazilian Patent Application No. BR102013018558A2
1007	Certified Translation of BR102013018558A2 (“Nadaf”)
1008	U.S. Patent No. 9,401,059 (“Backert”)
1009	Schneier, B., “Applied Cryptography” (Second Ed.), John Wiley & Sons, Inc. (1996) (“Schneier”)
1010	U.S. Patent 7,080,779 (“Cummings”)
1011	U.S. Patent No. 3,609,685 (“Deutsch”)
1012	U.S. Patent 6,250,548 (“McClure”)
1013	U.S. Patent No. 5,764,799 (“Hong”)
1014	U.S. Patent No. 9,361,531 (“Stella”)
1015	‘966 PGR Final Written Decision (PGR 2020-00031, Paper 29, Sept. 1, 2001)
1016	File History For U.S. Application No. 17/483,627 (Excerpted)
1017	2015 Voluntary Voting System Guidelines. Version 1.1 (“VVSG”)
1018	RESERVED
1019	Keller et al., <i>A PC-Based Open-Source Voting Machin with an Accessible Voter-Verifiable Paper Ballot</i> , Proceedings of the 2005 USENIX Annual Technical Conference (“Keller”)
1020	U.S. Patent No. 5,377,099 (“Miyagawa”)

Exhibit No.	Exhibit Description
1021	Kim et al, <i>Improved Support for Machine-Assisted Ballot-Level Audits</i> , 1 USENIX Journal of Election Technology and Systems (JETS) 88 (2013) (“Kim”)
1022	U.S. Patent Application Publication 2006/0041468 (“Reardon”)
1023	U.S. Patent Application Publication 2009/0166417 (“Dammann”)
1024	U.S. Patent Application Publication 2009/0289115 (“Chung”)
1025	U.S. Patent Application Publication 2019/0213820 (“Sebes”)
1026	U.S. Patent No. 7,306,148 (“Morganstein”)
1027	RESERVED
1028	U.S. Patent No. 2,612,994 (“Woodland”)
1029	U.S. Patent No. 5,726,435 (“Hara”)
1030	Ashford, <i>QR Codes and Academic Libraries: Reaching Mobile Users</i> (2010) (“Ashford”)
1031	Barrera et al., <i>Optical encryption and QR codes: Secure and noise-free information retrieval</i> , 21(5) Optics Express 5373 (2013) (“Barrera”)
1032	U.S. Patent Application Publication 2010/0114674 (“Daza Fernandez”)
1033	U.S. Patent No. 9,165,417 (“Valles”)
1034	U.S. Patent Application Publication No. 2014/0012635 (“Joyce”)
1035	U.S. Patent No. 10,002,481 (“Seibel”)
1036	U.S. Patent No. 10,147,259 (“Dvorak”)
1037	WO 01/020562
1038	Krawczyk et al., <i>IETF Request for Comments 2104: HMAC: Keyed-Hashing for Message Authentication</i> (1997) https://tools.ietf.org/pdf/rfc2104.pdf (“Krawczyk”)
1039	Essex & Hengartner, <i>Hover: Trustworthy Elections with Hash-Only Verification</i> , IEEE Security and Privacy, September/October 2012 (“Essex”)

Exhibit No.	Exhibit Description
1040	U.S. Patent Application Publication No. 2018/0102013 (“Spanos”)
1041	U.S. Patent No. 7,729,991 (“Rodriguez”)
1042	WO 04/038632 (“Boldin”)
1043	U.S. Patent Application Publication No. 2011/0202464 (“Carbullido”)
1044	U.S. Patent No. 6,873,966 (“Babbitt”)
1045	Shamos, <i>Electronic Voting Glossary</i> (2011) http://euro.ecom.cmu.edu/people/faculty/mshamos/Glossary.pdf
1046	FIPS PUB 186-4 – Digital Signature Standard (DSS) (July 2013)
1047	U.S. Reissue Patent No. RE40,449 (“Provitola”)
1048	Pires Declaration
1049	<i>Microsoft Computer Dictionary</i> (2002), definition of “recursion”
1050	Barron’s <i>Dictionary of Computer and Internet Terms</i> (10 th . Ed., 2009), definition of “recursion”
1051	Rigdon’s <i>Dictionary of Computer and Internet Terms</i> (1 st edition 2016) definition of “recursion”
1052	U.S. Patent Application Publication US2015/0279139A1 (“Kincaid”)

The prosecution history (EX1002) does not include the prior art references. All exhibits not containing consecutive page numbers, including the prosecution history, are cited in this Petition using page numbers added by Petitioner. All other exhibits are cited by their original page or paragraph numbers.

EX1007 is a certified translation of the Brazilian Published Patent Application No. BR102013018558A2 (“Nadaf”) (EX1006) by Robert E. Settle. Unless specified otherwise, citations to Nadaf within this Petition are to the translation provided by

Mr. Sette (EX1007) from pages 3-32. Petitioner notes that this is the same translation provided by Patent Owner to the Board during prosecution of the '319 Patent (EX1002, 54), and the same translation that Petitioner originally provided with its successful Petition for PGR against PO's earlier related '966 Patent.

LISTING OF CHALLENGED CLAIMS

Claim Element	Claim Language
1(preamble)	1. A method for electronic voting using printed vote records, comprising:
1(a)	generating a printed vote record of at least one vote selection of a voter;
1(b)	providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection;
1(c)	electronically capturing information from the printed vote record;
1(d)	using optical character recognition (OCR) on at least a portion of the electronically captured information to generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection;
1(e)	comparing the first data set to a second data set,
1(f)	the second data set obtained from the printed vote record; and
1(g)	generating a cast vote record, which is to be a stored record of all of the voter's final vote selections and to be the voter's casted vote used for vote tabulation, the cast vote record indicating the voter's at least one vote selection, wherein, prior to generating any cast vote record which is to be a stored record of all of the voter's final vote selections and to be the voter's casted vote used for vote tabulation, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.
2	2. The method of claim 1, wherein the printed vote record further comprises encoded data based at least in part on the voter's at least one vote selection, and wherein the second data set is generated at least in part from the encoded data.
3	3. The method of claim 2, wherein electronically capturing information from the printed vote record includes capturing the encoded data.
4	4. The method of claim 1, wherein the electronically capturing information from the printed vote record comprises electronically scanning the voter readable text.
5	5. The method of claim 4, wherein the printed vote record further comprises encoded data based at least in part on the voter's at least one vote selection, and wherein the

Claim Element	Claim Language
	electronically capturing information from the printed vote record further comprises electronically scanning the encoded data.
6	6. The method of claim 5, wherein the encoded data is contained in a visual representation of encoded data.
7	7. The method of claim 1, wherein the information captured from the printed vote record comprises the voter readable text indicating the voter's at least one vote selection and other information.
8	8. The method of claim 7, wherein the other information is contained in a bar code.
9	9. The method of claim 7, wherein the second data set is based at least in part on the other information.
10	10. The method of claim 1, wherein electronically capturing information from the printed vote record comprises capturing an image of the printed vote record.
11	11. The method of claim 1, wherein the cast vote record provides the voter's sole casted vote used for vote tabulation.
12	12. The method of claim 11, wherein the information captured from the printed vote record comprises the voter readable text indicating the voter's at least one vote selection and other information.
13	13. The method of claim 12, wherein the other information is contained in a bar code.
14	14. The method of claim 12, wherein the second data set is based at least in part on the other information.
15(preamble)	15. A method for electronic voting using printed vote records, comprising:
15(a)	generating a printed vote record of at least one vote selection of a voter;
15(b)	providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection;
15(c)	electronically capturing first information from the printed vote record;
15(d)	using optical character recognition (OCR) on the first information to generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection;

Claim Element	Claim Language
15(e)	electronically capturing second information from the printed vote record, to generate a second data set, the second information comprising encoded data;
15(f)	comparing the first data set to a second data set; and
15(g)	generating a cast vote record indicating the voter's at least one vote selection, the cast vote record being a stored record of all of the voter's final vote selections, wherein, prior to generating any cast vote record which is to be a stored record of all of the voter's final vote selections, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.
16	16. The method of claim 15, wherein the encoded data is contained in a visual representation of encoded data.
17	17. The method of claim 15, further comprising confirming an accuracy of an optical character recognition (OCR) by utilizing a first hash produced from the first data set.
18	18. The method of claim 15, further comprising confirming an accuracy of an optical character recognition (OCR) by comparing a first hash produced from the first data set to a second hash, wherein the second hash is at least part of the encoded data.
19	19. The method of claim 15, wherein the comparison of the first data set and the second data set is used to confirm an accuracy of an optical character recognition (OCR) process by confirming that the at least one vote selection that the first data set is based at least in part on matches the at least one vote selection that the second data set is based at least in part on.
20	20. The method of claim 15, wherein the cast vote record is based on the first data set.
21	21. The method of claim 15, wherein using optical character recognition (OCR) on the first information to generate a first data set further comprises recursively modifying an OCR process applied to the voter readable text.
22	22. The method of claim 21, wherein after the cast vote record is generated, the cast vote record is utilized during a tabulation of an election.
23	23. The method of claim 15, wherein the cast vote record provides the voter's sole casted vote used for vote tabulation.

Claim Element	Claim Language
24	24. The method of claim 23, further comprising confirming an accuracy of an optical character recognition (OCR) by utilizing a first hash produced from the first data set.
25	25. The method of claim 23, further comprising confirming an accuracy of an optical character recognition (OCR) by comparing a first hash produced from the first data set to a second hash, wherein the second hash is at least part of the encoded data.
26	26. The method of claim 23, wherein the comparison of the first data set and the second data set is used to confirm an accuracy of an optical character recognition (OCR) process by confirming that the at least one vote selection that the first data set is based at least in part on matches the at least one vote selection that the second data set is based at least in part on.
27	27. The method of claim 23, wherein the cast vote record is based on the first data set.
28	28. The method of claim 27, wherein using optical character recognition (OCR) on the first information to generate a first data set further comprises recursively modifying an OCR process applied to the voter readable text.
29(preamble)	29. An electronic voting system for using printed vote records, comprising:
29(a)	a printer configured to generate a printed vote record of at least one vote selection of a voter,
29(b)	the printed vote record including voter readable text indicating the voter's at least one vote selection;
29(c)	a scanner configured to (1) electronically capture first information from the printed vote record, the first information including the voter readable text, and
29(d)	(2) electronically capture second information from the printed vote record, the second information comprising encoded data; and
29(e)	a processor configured to (1) use optical character recognition (OCR) on the first information to generate a first data set based at least in part on the voter readable text indicating the voter's at least one vote selection,
29(f)	(2) generate a cast vote record which is to be a stored record of all of the voter's final vote selection indicating the voter's at

Claim Element	Claim Language
	least one vote selection based on the first data set and which is to be the voter's casted vote used for vote tabulation, and
29(g)	(3) generate a second data set from the second information, and
29(h)	wherein, the processor is further configured such that prior to generating the cast vote record which is to be a stored record of all of the voter's final vote selections and to be used for vote tabulation, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.
30	30. The system of claim 29, wherein the processor is configured to recursively modify the first data set.
31	31. The system of claim 29, wherein the processor is further configured to generate an OCR hash from the first data set, and to compare the OCR hash to an encoded hash extracted from the encoded data on the printed vote record.
32	32. The system of claim 31, wherein the processor is configured to recursively modify the first data set by generating an additional OCR hash for comparison to the encoded hash until the additional OCR hash matches the encoded hash.
33	33. The system of claim 31, wherein the processor is configured to recursively modify the first data set by, in response to a mismatch between the OCR hash and the encoded hash, selecting a valid alternate OCR output.
34(preamble)	34. A method for electronic voting using printed vote records, comprising:
34(a)	generating a printed vote record of at least one vote selection of a voter;
34(b)	providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection;
34(c)	electronically capturing first information from the printed vote record;
34(d)	using optical character recognition (OCR) on the first information to generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection;

Claim Element	Claim Language
34(e)	electronically capturing second information from the printed vote record, to generate a second data set, the second information comprising encoded data;
34(f)	comparing the first data set to a second data set;
34(g)	confirming an accuracy of the at least one vote selection of the voter based at least in part on a comparison of the first data set and the second data set;
34(h)	after confirming an accuracy of the at least one vote selection, generating a cast vote record which is to be a stored record of all of the voter's final vote selections and which is to be the voter's casted vote used for vote tabulation, the cast vote record indicating the voter's at least one vote selection as determined by the first data set; the cast vote record being generated after the comparing the first data set and the second data set; and
34(i)	tabulating an election utilizing the cast vote record before vote auditing.
35	35. The method of claim 34, wherein comparing the first data set to the second data set comprises comparing a first hash produced from the first data set to a second hash extracted from the encoded data on the printed vote record.
36	36. The method of claim 35, further comprising recursively modifying the first data set, prior to generating the cast vote record.
37	37. The method of claim 36, wherein the recursively modifying the first data set comprises generating an additional OCR hash for comparison to a second hash extracted from the encoded data on the printed vote record, until the additional OCR hash matches the second hash.
38	38. The method of claim 35, wherein recursively modifying the first data set further comprises: based on the comparison of the first data set to the second data set, selecting a valid alternate OCR output based on the OCR process applied to the voter readable text.
39	39. The method of claim 34, further comprising utilizing the printed vote record for auditing the election, the auditing of the election being separate from the tabulation of the election.

Claim Element	Claim Language
40	40. The method of claim 34, wherein the cast vote record provides the voter's sole casted vote used for vote tabulation.

I. PRELIMINARY STATEMENT

The Challenged Claims of United States Patent No. 12,125,319 (the “‘319 Patent”) are directed to standard computer components executing routine prior art algorithms to deliver very predictable results. Printers, scanners, processors performing optical character recognition and hashing functions, and self-authenticating documents were long used in the prior art. The ‘319 patent does not provide an improvement on any of these known components, algorithms or the computer hardware that performs them. As explained below, each claim of the ‘319 patent is invalid under 35 U.S.C. §§101, 103, and/or 112.

Notably, the ‘319 patent is a child of U.S. Patent No. 10,445,966, which the Board previously found unpatentable in a Final Written Decision in PGR2020-00031 (“the ‘966 PGR”). *Election Systems & Software, LLC v. Hart Intercivic, Inc.*, PGR2020-00031, Paper 29 (Sept. 1, 2021) (EX1015).

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Party-in-Interest (§ 42.8(b)(1))

The real party-in-interest is Petitioner Election Systems & Software, LLC.

B. Related Matters (§ 42.8(b)(2))

Petitioner is unaware of any currently pending related matters.

C. Lead and Back-Up Counsel (§ 42.8(b)(3))

Lead Counsel: Robert M. Evans, Jr. (Reg. No. 36,794)
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Petitioner consents to electronic service to lead and backup counsel, using the email addresses above.

III. PAYMENT OF FEES

Pursuant to 37 C.F.R. § 42.203(a) and 42.15(a), the required fees are submitted herewith. If additional fees are due, the Office is authorized to charge Deposit Account No. 50-0975.

IV. GROUND FOR STANDING

Pursuant to 37 C.F.R. § 42.204(a), Petitioner certifies that the ‘319 Patent is available for PGR, and Petitioner is not barred or estopped from requesting PGR of the ‘319 Patent asserting the grounds identified in this Petition.

The ‘319 Patent is available for PGR pursuant to the America Invents Act (“AIA”), Pub. L. No. 112-29, § 3(n)(1), 125 Stat. 284, 293 (2011), as the ‘319 Patent issued on October 22, 2024 from an application filed on October 17, 2023, and each of the Challenged Claims has an effective filing date after March 16, 2013. The instant Petition was timely filed before the date that is nine months after issuance of the ‘319 Patent. 35 U.S.C. § 321(c); 37 C.F.R. § 42.202.

V. IDENTIFICATION OF CHALLENGED CLAIMS AND RELIEF SOUGHT

Petitioner respectfully requests post grant review of claims 1-40 of the ‘319 Patent and cancellation of claims 1-40 as patent ineligible under 35 U.S.C. § 101 and/or unpatentable under 35 U.S.C. §§ 103 and/or 112. It is more likely than not that claims 1-40 are patent ineligible and/or unpatentable in view of the following grounds and prior art references:

Ground	Claims	Statutory Basis	Prior Art References
1	1-40	35 U.S.C. § 101	Not Applicable
2	1-20, 23-27, 29, 31, 34, 35, 39-40	35 U.S.C. § 103	Brockhouse, Nadaf, and Schneier
3	21, 22, 28, 30, 32, 33, 36, 37, 38	35 U.S.C. § 112 Lack of Written Description; Lack of Enablement	Not Applicable
4	30, 32, 33, 36, 37, 38	35 U.S.C. 103	Brockhouse, Nadaf, Schneier, and Heilper

VI. OVERVIEW OF THE ‘319 PATENT AND THE ‘966 PGR FINAL WRITTEN DECISION

A. The ‘319 Patent and the Challenged Claims

The ‘319 Patent, entitled “Optical Character Recognition of Voter Selections for Cast Vote Records,” issued on October 22, 2024 from U.S. Application No. 18/381,091, filed on October 17, 2023. The ‘319 Patent is directed generally to electronic voting machines that incorporate known computer technology, such as

scanners, printers, processors, optical character recognition, barcodes, and hash functions, to generate and confirm the accuracy and integrity of printed vote records (PVR) and to generate cast vote records (CVR). EX1003, ¶¶ 53-54. The ‘319 Patent does not disclose or claim any advances in these known technologies. Rather, the ‘319 Patent and the Challenged Claims generically incorporate them in the technological environment of electronic voting machines. As established in the State of the Art Section below, Hart InterCivic, Inc., (“Patent Owner” or “PO”) was not the first to incorporate these known technologies into electronic voting machines.

The ‘319 Patent posits that prior art voting systems that used a bar code printed on a PVR to identify the voter’s voting selections and generate a CVR could be problematic because “some voters may find such a process to lack transparency as the voter cannot readily review the barcode to confirm the encoded data matches the voter’s vote selections.” EX1003, ¶¶ 97-98; EX1001, 1:54-59. The ‘319 Patent further states that it “would be desirable to provide an electronic voting system that utilizes PVRs in a manner that provides better transparency to the voter.” EX1003, ¶ 98; EX1001, 1:60-62.

The ‘319 Patent purports to address this perceived problem through a voting method in which a PVR includes voter readable characters (*e.g.* the selected candidates’ names) that are subsequently scanned and OCR’d to create a cast vote

record. EX1003, ¶ 99; EX1001, 1:66-2:10. Fig. 1 of the ‘319 Patent provides “[a]n exemplary system” (“voting system 10”) of the purported invention:

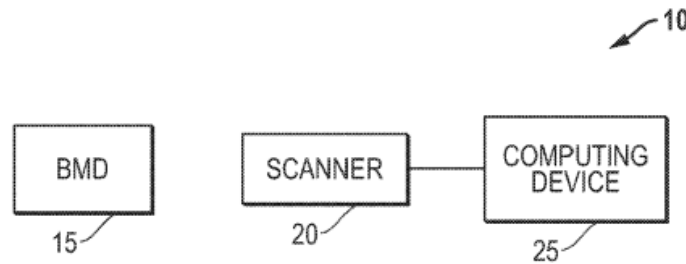
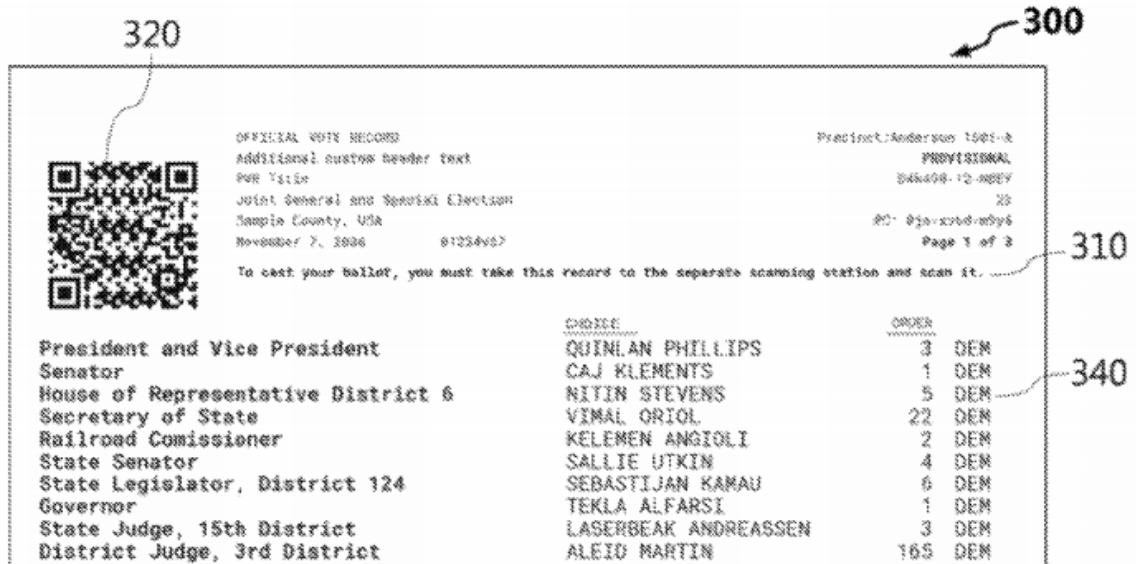


FIG. 1

EX1003, ¶ 99; EX1001, Fig. 1, 3:66-4:5. As seen, the portions of the “exemplary system” that correspond to the scanning and processing steps of the Challenged Claims include nothing more than a generic “scanner” and a “computing device.”

Like prior art electronic voting methods, the process discussed in the ‘319 Patent begins with the voter making her voting selections using known voting systems such as a ballot marking device (“BMD”). EX1003, ¶ 100; EX1001, 3:66-4:5. *See also id.*, Fig. 1, Reference 15. When the voter has completed making her voting selections, the BMD prints a PVR containing those selections in voter readable characters. EX1003, ¶ 100; EX1001, 1:66-2:10. *See also id.*, 4:58-59 (“In operation, a voter uses the BMD to generate a PVR.”).

The ‘319 Patent discloses an “exemplary embodiment” of such a PVR in Figure 3, a representative portion of which is reproduced below:



EX1003, ¶ 101; EX1001, Fig. 3.

The voting selections are printed in voter-readable text so that the voter can verify the accuracy of the PVR. EX1003, ¶ 102; EX1001, 6:51-55 (“As seen in Fig. 3, the voter selections are provided in a character form that is readable by the voter. Thus, voting transparency is provided to the voter such that the voter can confirm the PVR matches the selections entered by the voter on the BMD”). *See also id.*, 4:12-16.

After visually verifying the accuracy of the PVR, the voter inserts the PVR into a scanner. EX1003, ¶ 103; EX1001, 4:16-30. The scanner uses “conventional scanning hardware” to create a scanned image of the PVR and provides that image to a “computing device” that is connected to the scanner. *Id.* *See also id.*, Fig. 1. The “computing device,” which includes a “processor” as “known in the art,” can then perform OCR processes on the scanned image to generate a data set

representing the voter's voting selections. EX1003, ¶ 104; EX1001, 2:2-10; 2:59-62; 4:51-61. This OCR data set is ultimately used to generate a cast vote record. EX1003, ¶ 104; EX1001, Abstract; 2:4-5.

The '319 Patent proclaims that use of these known OCR and error correcting procedures provides a "what you see is what you get" PVR to the voter that is used to generate the cast vote record. EX1003, ¶ 106; EX1001, Abstract ("The OCR data is then utilized to generate the cast vote record. Thus, the electronic voting system directly interprets the voter selections from the PVR just as the voter sees the data. In this manner, 'what you see is what you get' printed vote record data is provided for a voter's viewing and that same data is used to generate the cast vote record."). *See also* EX1001, 1:66-2:10.

The '319 Patent states that the PVR may also include a bar code that can be used to "ensure the PVR is valid and/or has not been altered after printing." EX1003, ¶ 107; EX1001, 2:43-48. As the '319 Patent acknowledges, printing bar codes containing voting selections on a PVR was known in the voting machine industry before the priority date of the '319 Patent. EX1003, ¶ 107; EX1001, 1:53-55. The bar code discussed in the '319 Patent can also include a "single digitally signed hash that may be generated using a secure hash function to indicate the PVR is valid and a one way hash of the voter's vote selections." EX1003, ¶ 108; EX1001, 6:11-18. A hash of the OCR data set generated from the scanned image of the PVR may be

compared to the hash in the barcode to confirm that the PVR was generated on an authorized voting machine and that the PVR has not been altered. *Id.*; EX1003, ¶ 109. The ‘319 Patent further discloses that the bar code can be printed on the PVR in any of a wide range of commonly known barcode types, such as a 1-D barcode or a 2-D barcode, such as a QR code. EX1003, ¶ 109; EX1001, 6:27-34.

The ‘319 Patent contains four independent claims (claims 1, 15, 29, and 34) and twenty-six dependent claims. Claim 29 is representative and is provided below:

29. An electronic voting system for using printed vote records, comprising:

a printer configured to generate a printed vote record of at least one vote selection of a voter, the printed vote record including voter readable text indicating the voter's at least one vote selection;

a scanner configured to (1) electronically capture first information from the printed vote record, the first information including the voter readable text, and (2) electronically capture second information from the printed vote record, the second information comprising encoded data; and

a processor configured to (1) use optical character recognition (OCR) on the first information to generate a first data set based at least in part on the voter readable text indicating the voter's at least one vote selection, (2) generate a cast vote record which is to be a stored record of all of the voter's final vote selection indicating the voter's at least one vote selection based on the first data set and which is to be the voter's casted vote used for vote tabulation, and (3) generate a second data set from the second information, and

wherein, **the processor is further configured** such that prior to generating the cast vote record which is to be a stored record of all of the voter's final vote selections and to be used for vote

tabulation, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.

EX1001, Claim 29 (emphasis added). Independent claims 1, 15, and 34 are method claims that essentially cover the steps performed by the electronic voting system of Claim 29.

The Independent Claims generally require the following steps or generic computer hardware (printer, scanner, and a processor) configured to perform these steps:

- (1) printing a PVR bearing voter-readable text indicating the voter's vote selections;
- (2) printing the voter's vote selections in "encoded data" on the PVR;
- (3) electronically capturing, *e.g.* scanning, the voter readable text and the encoded data;
- (4) performing OCR on the scanned voter-readable text and decoding the encoded data;
- (5) comparing the OCR dataset and the decoded data to confirm that the results of the OCR match the voter's original vote selections; and
- (6) generating a CVR from the OCR dataset that is used for tabulation.

EX1003, ¶ 112-113.

The dependent claims of the '319 Patent generally include limitations directed to: (i) presenting the encoded data in a visual format such as a barcode; (ii) using hash functions to perform the comparison of the OCR data and encoded data in step (5) of the Independent Claims identified above; (iii) capturing unspecified "other

information” from the PVR; and (iv) “recursively modifying” an OCR process on the first data set (such recursive concepts are not disclosed anywhere in the written description of the ‘319 Patent).

B. The ‘966 PGR Final Written Decision

In its Final Written Decision in the ‘966 PGR, the Board held that claims very similar to the Challenged Claims were unpatentable as anticipated and/or obvious to a POSITA over, among other references, Brockhouse and Nadaf. EX1015 (PGR2020-00031, Paper 29 (Sept. 1, 2021)). More specifically, the Board held in the ‘966 PGR FWD that the prior art of record disclosed, among other things:

- (1) ballot marking devices (BMD) that print PVRs bearing voter readable text indicating the voter’s vote selections (EX1015, 12-15, 37-38);
- (2) printing a barcode on the PVR encoding the voter’s vote selections, (*Id.*);
- (3) scanning the PVR, including the voter readable text and encoded information (*Id.*, 15, 38-41, 51);
- (4) performing OCR on the scanned voter readable text (*Id.*, 15-16, 41-47);
- (5) comparing the OCR data to the data from the barcode to confirm that the results of the OCR match the voter’s original selections (*Id.*, 41-45, 51-52);
- (6) generating a CVR from the OCR data set (*Id.*, 16-17, 47-49); and
- (7) performing a hash function on the OCR data set and comparing that hash to a hash value provided on the PVR to confirm the accuracy and integrity of the PVR (*Id.*, 62-73).

For example, the Board held that Nadaf anticipated Claim 6 of the ‘966 Patent which is reproduced below (Table 1) in a side-by-side comparison with Claim 1 of the ‘319 Patent:

TABLE 1

‘966 Patent Claim 6	‘319 Patent Claim 1
6. A method for electronic voting using printed vote records, comprising: recording a voter's vote selections;	1. A method for electronic voting using printed vote records, comprising:
generating a printed vote record of the voter's vote selections,	generating a printed vote record of at least one vote selection of a voter;
the printed vote record containing voter readable text indicating the voter's vote selections;	providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection;
scanning the printed vote record, the scanning including scanning the voter readable text;	electronically capturing information from the printed vote record;
utilizing optical character recognition (OCR) on the scanned voter readable text to create a data set which identifies the voter's vote selections;	using optical character recognition (OCR) on at least a portion of the electronically captured information to generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection;
<i>providing a bar code on the printed vote record, the bar code including information indicative of the voter's vote selections,</i>	comparing the first data set to a second data set, the second data set obtained from the printed vote record; and
generating a cast vote record from the data set so that voter selections in the cast vote record are based on the voter readable text; and	generating a cast vote record, which is to be a stored record of all of the voter's final vote selections and to be the voter's casted vote used for vote tabulation, the cast vote record

‘966 Patent Claim 6	‘319 Patent Claim 1
	indicating the voter’s at least one vote selection,
wherein the bar code is utilized to confirm that results of the OCR match the voter’s original selections <i>by comparing data in the bar code to the data set created by the OCR.</i> ¹	wherein, prior to generating any cast vote record which is to be a stored record of all of the voter’s final vote selections and to be the voter’s casted vote used for vote tabulation, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.

EX1015, 52; EX1001, Claim 1. While PO filed a Notice of Appeal in the ‘966 PGR, PO voluntarily dismissed that appeal on December 20, 2021 before any briefs were submitted to the Federal Circuit. The FWD in the ‘966 PGR is thus final and binding on PO.

C. Relevant Prosecution History of the ‘319 Patent and Related Applications

The ‘319 Patent claims priority through six continuation applications to the ‘966 Patent and to Provisional application No. 62/711,212, filed on July 27, 2018. During prosecution of a separate child of the ‘966 Patent, U.S. Application No. 17/483,627 (“the ‘627 Application”), the Examiner issued a non-final rejection finding that the then-pending claims were anticipated by Nadaf or obvious over

¹ The italicized language of Claim 6 of the ‘966 Patent is emphasized to show the correlation to the second data set and comparison elements of Claim 1 of the ‘319 Patent.

Nadaf in combination with other references. EX1016, 86-101. In response, PO argued that a temporal limitation regarding when the CVR was generated—*i.e.* the CVR must be used for tabulating the election—distinguished the claims from Nadaf. This was because, PO argued, the use of OCR and comparison of the OCR and barcode datasets in the Nadaf system were used to generate a CVR to *audit* the election rather than *tabulate* it. *Id.*, 112-123 (“... The disclosure of Nadaf only compares OCR data sets in the audit stage”). As a POSITA would have known, the data used to audit the election must be equally as reliable and accurate as the data used to tabulate the election. EX1003, ¶¶ 127-129.

Thus, recognizing the tenuousness of this narrow temporal distinction, PO further asserted that it was too “difficult” to use OCR to generate a CVR prior to the invention—despite the Board’s express finding in the ‘966 PGR that the prior art taught exactly that. *See* EX1016, 113-114; EX1015 (‘966 PGR FWD), 16-17, 47-49. PO premised this “too difficult” argument on the assertion that ES&S had stated “as recently as April 2019” in a “letter to sitting U.S. Senators that no voting system could ‘use OCR to read [a candidate’s name] and record a vote reliably[.]’” EX1016, 113-114 (brackets in original). But as PO knows, ES&S’s letter made no such statement.

Indeed, the Board in the ‘966 FWD expressly stated that PO “mischaracterized ES&S’s letter” in making essentially the same argument to the

‘966 Board. EX1015, 24-26 (“Patent Owner asserts that, ‘[u]ntil at least April 2019, [Petitioner] maintained publicly that OCR could not be relied on in voting machines, in part because of situations where two candidates have the same or similar names.’... [W]e disagree with Patent Owner’s characterization of ES&S’s comments in its letter”), 33-34 (“...**Patent Owner mischaracterizes ES&S’s letter.** ... ES&S’s [letter] indicates that bar codes are trusted enough to be **used in OCR-based tabulation systems.** ... Thus, we disagree with Patent Owner that ES&S’s response in the letter indicates skepticism”) (emphasis added). In fact, the Board found exactly the opposite of PO’s assertion, explaining that the “industry, or at least ES&S, used OCR in the voting process” and that “ES&S’s response explains that barcodes can be used to determine how to count the vote after a name is recognized by OCR.” *Id.*, 25, 27 (citing Brockhouse). *See also* EX1003, ¶ 130. While PO identified the ‘966 PGR to the ‘319 Examiner in an IDS, PO did not advise the Examiner of the Board’s finding that PO had previously mischaracterized Petitioner’s 2019 Letter (and was mischaracterizing it again).

In response to PO’s arguments, the Examiner withdrew the anticipation rejection and issued a notice of allowance. EX1016, 127-137. The Examiner did not consider the combination of Brockhouse and Nadaf nor the disclosure in Schneier during prosecution of the ‘627 Application or the ‘319 Patent. Had the Examiner done so, the Challenged Claims would not have issued. As the Board held

in the '966 PGR, Brockhouse and/or Nadaf included the necessary hardware and software to:

- (1) print a PVR with voter-readable text and encoded data (both Brockhouse and Nadaf);
- (2) scan the PVR (both);
- (3) perform OCR on the voter-readable data (both);
- (4) generate a CVR from the OCR data set (both);
- (5) tabulate the election using that CVR (Brockhouse);
- (6) decode the encoded data (both); and
- (7) compare the OCR data set and the decoded data (Nadaf).

EX1015 at, *e.g.*, 12-17, 37-49, 51-52, 62-73

The tenuous temporal distinction relied upon by PO concerning when the scan and comparison occurs would have been obvious to a POSITA at the time of the invention in light of Schneier, which discloses that a hash function can be used at any time to authenticate the accuracy and integrity of a printed document (such as a PVR).

Ultimately, PO's arguments during prosecution of the '627 Application do not overcome the lack of patentable subject matter of the Challenged Claims. This is because the Challenged Claims are directed to nothing more than the abstract ideas of printing a vote record, verifying the accuracy of the printed vote record, and then

tabulating the vote from the verified printed vote record. Nor do PO's arguments overcome the clear teachings of the prior art as established in this Petition. The Challenged Claims are unpatentable.

VII. STATE OF THE ART

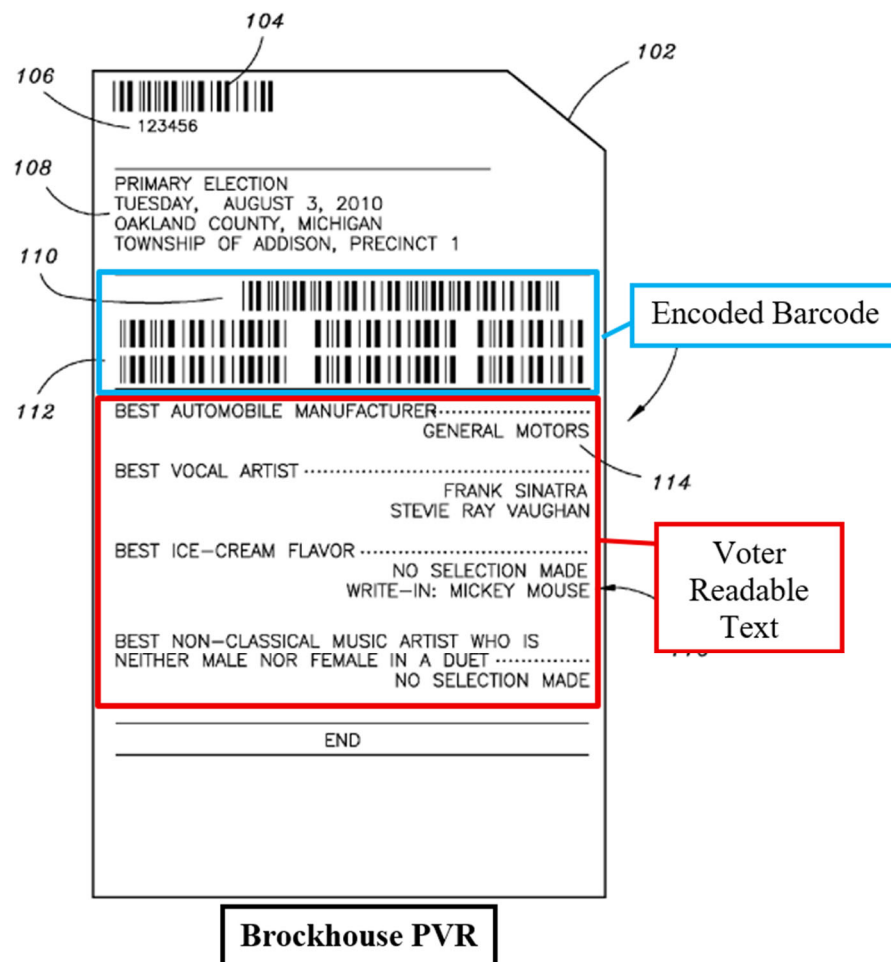
A. Printed Vote Records With Voter Readable Text and Encoded Data Indicating the Voter's Voting Selections Were Commonplace Prior to the Earliest Priority Date of the '319 Patent

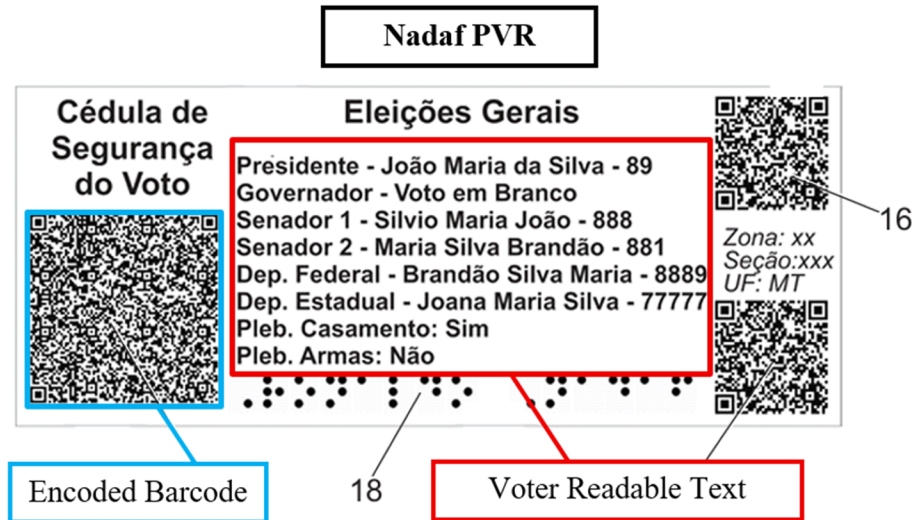
As the Board confirmed in the '966 FWD, printed vote records (PVRs) bearing voter readable text indicating a voter's voting selection(s) were known in the prior art. EX1015, 13-14 (discussing Brockhouse), 37-38 (discussing Nadaf). Sebes also discloses such PVRs, as does Provitola, which was filed in December 2000. EX1025 at, *e.g.*, ¶¶ [086], [288] ("The ballot may take any of several forms, such as ... a set of plain text representing choices; a document of plain text in an OCR friendly format; a bar code, QR code, or similar code that represents the selections; or multiple of these formulations."); EX1047, Claim 1 ("print out the election ballot according to which the voter voted with the votes of the voter printed thereon, so that the votes of the voter are readable on said election ballot by the voter and readable by a tabulating machine"). EX1003, ¶ 61.

Ballot marking devices, or "BMDs," were also well known in the prior art. EX1003, ¶¶ 55-60, 65-67. A BMD, via a computer interface, guides the voter through the voting process, receives voting selections from the voter, allows the

voter to confirm and/or change her choices, and, when the voter is satisfied with the choices, prints out a ballot marked with the voter's choices. *Id.* This voter-verified, printed ballot is a PVR. *Id.*

Printing encoded data, *e.g.*, a barcode representing the voter's voting selections on the PVR, was also known. What follows are annotated figures from Brockhouse and Nadaf showing examples of PVRs bearing voter readable text indicating the voter's voting selections and a barcode encoding, *inter alia*, those voting selections:





EX1004, Fig. 6; EX1007, Fig. 4. Sebes also disclosed printing a barcode on the PVR encoding the voter selections. EX1025, ¶¶ [0086], [0286]-[0289].

The use of barcodes to store information is ubiquitous. Barcodes date back to at least 1949 when Norman Joseph Woodland and Bernard Silver filed their patent application that later issued as U.S. Pat. No. 2,612,994. EX1003, ¶ 78; EX1028. The ‘319 Patent acknowledges that PVRs containing “a barcode that is encoded with the voter’s vote selections” was “traditional[.]” prior to the filing of the ‘319 Patent. EX1001, 1:50-54.

Barcodes encode data into a visual, machine-readable format that can be read by an optical scanner. One-dimensional barcodes encode data in a series of parallel lines with varying widths and spacing. EX1003, ¶ 79. Two-dimensional, or matrix, barcodes provide information storage on both horizontal and vertical axes. EX1003, ¶ 80. Such barcodes can store considerably more data than one-dimensional

barcodes. *Id.*; EX1029 (U.S. 5,726,435), 1:15-28. Examples are prevalent in the prior art. EX1003, ¶¶ 83-86; EX1032 (U.S. App. 2010/0114674), [0076]; EX1022, [0044]; EX.1033 (U.S. 9,165,417), 2:58-62, Fig. 1, Fig. 2; EX1034 (U.S. App. 2014/0012635), [0023], [0033]; EX1004, [0055]; EX1035 (U.S. 10,002,481), 2:33-50; EX1036 (U.S. 10,147,259), 3:48-61.

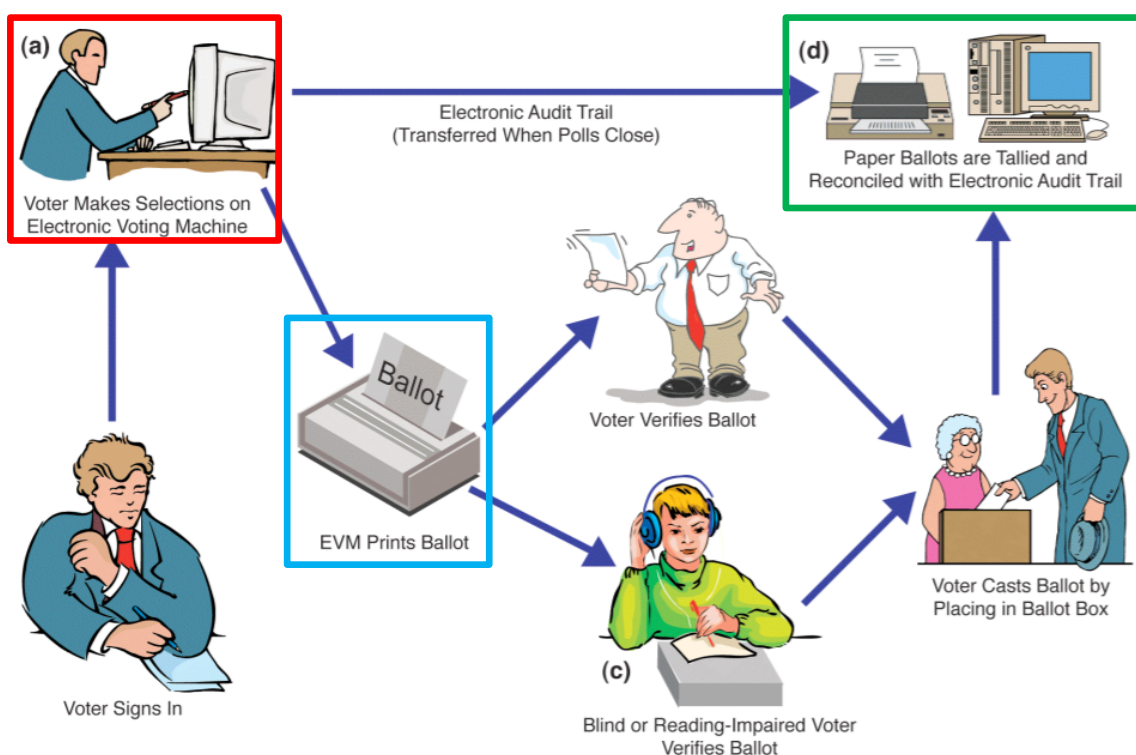
B. Optical Character Recognition Was Common in the Prior Art

Optical character recognition (OCR) is a computerized method for converting printed or handwritten text from an image format into corresponding strings of character codes, such as ASCII codes. EX1003, ¶ 68; EX1005 (U.S. 7,406,201 (“Heilper”)), 1:13-41. OCR technology has been in use for decades. EX1003, ¶¶ 68-69; *see also, e.g.*, EX1011 (U.S. 3,609,685) (OCR technology patent filed Oct. 7, 1967). OCR technology has been commonly used in routine applications such as data entry of business documents and converting printed documents to savable PDFs. EX1003, ¶ 69.

Importantly, OCR technology has long been used in electronic voting applications, including ballot scanning. EX1003, ¶¶ 69, 73; EX1012, 32:42-53. For example, Keller et al. in 2005 disclosed an electronic voting machine on which a voter’s voting selections were recorded and a PVR of those selections was created. *Id.*; EX1019, 169, 170. The PVR contained the voting selections in “human readable text” using an “OCR-friendly font.” EX1003, ¶ 74; EX1019, 169, 170. Keller taught

that the PVR was scanned and OCR processes were used to recognize and record the voter's voting selections. *Id.*

A graphic of the method and system disclosed by Keller et al. in 2005 follows with the recording of the voter's voting selections highlighted in red, the generation of a PVR highlighted in blue, and the scanning, OCRing, and casting of the PVR highlighted in green:



EX1003, ¶ 75; EX1019, 174. As seen, the voter was also provided the opportunity to confirm the accuracy of the PVR before the vote was submitted for tabulation.

Sebes similarly disclosed voting equipment, such as BMDs and tabulation devices, that: (1) generated a PVR bearing the voter's voting selections in voter readable text and/or in a barcode, (2) scanned the PVR, (3) performed OCR

processes on the voter readable text, (4) determined if the text recognized using OCR matched a ballot option in the “election definition” and, (5) if there was a match, generated a CVR from the OCR dataset. EX1025, ¶¶ [0086], [284], [286]-[289], [310], [312], [325]; EX1003, ¶ 76. The “election definition” is described in Sebes as “a complete list of the contests, candidates, and referenda that comprise the election.” EX1025, [075].

Numerous other examples of electronic voting machines using OCR processes were known in the prior art. EX1003, ¶ 77. *See, e.g.*, EX1004 (Brockhouse), [0134]; EX1020 (U.S. 5,377,099), 8:45-9:16; EX1021, 98; EX1022 (U.S. App. 2006/0041468), [0036]; EX1023 (U.S. App. 2009/0166417), [0049]-[0050]; EX1024 (U.S. App. 2009/0289115), [0098]; EX1026 (U.S. 7,306,148), 7:20-23.

A POSITA would have known that OCR processes are inherently error prone. EX1003, ¶ 71. Sebes, for example, recognized that errors could occur in the OCR process when determining the voter’s voting selections on a PVR. EX1025, [312]. Accordingly, error correction steps have long been applied to improve the accuracy of OCR processes, particularly in applications in which accurate text recognition is critical. EX1003, ¶ 72.

C. Using Hash Functions to Create Self-Authenticating Documents Was Well Known

Hash functions pre-date the ‘319 Patent by decades. In the computer science arts, a hash function is any algorithmic function that converts data of an arbitrary

size into fixed-size values. *See e.g.*, EX1037 (WO 01/20562), 16:22-24. As explained by Schneier in 1996:

Hash functions have been used in computer science for a long time. A hash function is a function, mathematical or otherwise, that takes a variable-length input string (called a pre-image) and converts it to a fixed-length (generally smaller) output string (called a hash value). ...

The point here is to fingerprint the pre-image: to produce a value that indicates whether a candidate pre-image is likely to be the same as the real pre-image.

EX1009, 30. *See also* EX1003, ¶¶ 87-88. The fixed-sized output values resulting from hash functions are interchangeably referred to under a number of labels, including: hashes, hash numbers, hash values, hash codes, or message digest. *Id.*

There are a number of different hash functions that have been developed, many of which have been widely known for decades. EX1038 (Krawczyk), 1; EX1003, ¶ 89. A defining characteristic of any hash function is that it always provides the same output for a given input. *Id.*; EX1039 (Essex), 19. Conversely, when an altered or different input is entered into the hash function, the hash function will result in a different output. EX1039, 19; EX1038, 4-5; EX1003, ¶ 90. Accordingly, a common use of hash values is as a checksum for confirming that two sets of data are identical. *Id.*; EX1040 (U.S. App. 2018/0102013), [0100].

Hash functions have long been used to create digital signatures for authenticating documents. EX1003, ¶¶ 91-92. In this application, a hash function generates a hash value based on the content of the document. EX1041 (U.S.

7,729,991), 5:6-9; EX1003, ¶ 92. Then, the hash value is encrypted and included in a digital signature that is appended to the document. EX1041, 5:12-15; EX1003, ¶ 92. The receiver uses the same hash function to calculate a hash value from the content of the document as received. EX1041, 5:16-19; EX1003, ¶ 92. The hash value as calculated by the receiver is then compared to the decrypted hash value from the digital signature appended to the document. EX1041, 5:21-24; EX1003, ¶ 92. As even the slightest change to the electronic document would result in a different hash value, the electronic document is authenticated when the hash value as calculated by the recipient matches the hash value as provided in the digital signature. *Id.* As Schneier explains, “[a] single bit change in the pre-image changes, on the average, half of the bits in the hash value. Given a hash value, it is computationally unfeasible to find a pre-image that hashes to that value.” EX1009, 30.

The use of hash functions is well known in the context of electronic voting. For example, hash functions have been used to verify that voting system software has not been tampered with (EX1042, 10:14-23); that actions performed on voting machines by poll workers are authorized (EX1043, Abstract); voter authentication (EX1025, [0148]-[0149] and EX1044, 3:9-13); and, importantly here, the authenticity of ballots (EX1007, 6:2-6 and EX1037, 33:4-13). *See also* EX1003, ¶ 93.

For example, EX1041 and EX1008 each disclose the use of hash functions to provide a digital signature to completed electronic ballots for the purpose of providing a means to verify that the electronic ballots are intact and have not been changed. EX1041, 5:6-24; EX1008, 10:65-11:13; EX1003, ¶ 94. Nadaf similarly teaches use of an Elliptic Curve Digital Signature Algorithm (ECDSA) to provide a hash of the voter's voting selections that is used to authenticate the PVR and confirm the accuracy and integrity of the PVR. EX1007, 5:10-15, 14:15-19, 19:7-9; EX1003, ¶ 95. *See also* EX1046, 38 (“6.4 ECDSA Digital Signature Generate and Verification ... An approved hash function, as specified in FIPS 180, shall be used during the generation of digital signatures.”).

VIII. CLAIM CONSTRUCTION

In the '966 PGR, the Board construed “cast vote record” as a “record that indicates the determined voter's choice or selection in a manner determined in accordance with the voting system.” EX1015, 9. Petitioner submits that this construction should be used in this proceeding as well. *See* EX1003, ¶¶ 132-134.

Claims 21, 22 (by dependency), and 28 each include the phrase “recursively modifying an OCR process applied to the voter readable text.” Claims 30, 32, and 33 each contain the phrase, “wherein the processor is configured to recursively modify the first data set.” Claims 36-38 contain the phrase “recursively modifying

the first data set.” These claims collectively are referred to herein as the “Recursive Claims.”

The term “recursively modifying” appears nowhere in the ’319 Specification. It did not appear in the claims of the ’966 Patent and has not previously been construed. It should be given its plain and ordinary meaning to a POSITA.

Based on authoritative technical dictionaries, a “recursive” process or procedure is one that invokes itself. This is the sole meaning of “recursive” in the *Microsoft Computer Dictionary* (2002) (EX1049), Barron’s *Dictionary of Computer and Internet Terms* (10th. Ed., 2009) (EX1050), Rigdon’s *Dictionary of Computer and Internet Terms* (1st edition 2016) (EX1051) and the Mozilla Glossary². EX1003, ¶¶ 135-145.

Therefore, “recursively modifying” should be construed to mean “modifying by a computational procedure that calls itself.”

IX. PERSON OF ORDINARY SKILL IN THE ART

In the ‘966 PGR, the Board adopted the following definition for a person of ordinary skill in the art at the time the ‘966 patent was filed (“POSITA”):

A person of ordinary skill in the art at the time the ‘966 patent was filed (“POSITA”) would have had at least a Bachelor’s degree in electrical engineering or computer science or an equivalent field, or equivalent work experience and, in addition, at least two years’ experience with electronic voting machines, including familiarity with ballot marking

² Available at <https://developer.mozilla.org/en-US/docs/Glossary/Recursion>.

devices (“BMDs”), optical character recognition, bar codes and hash functions.

EX1015, 6-7. The ‘319 Patent has the same specification and is related to the ‘966 Patent via six continuation applications. Petitioner submits the same definition for POSITA should be applied here. *See* EX1003, ¶¶ 51-52.

X. GROUND 1: THE CHALLENGED CLAIMS RECITE ABSTRACT IDEAS AND ARE INELIGIBLE UNDER 35 U.S.C. § 101

A. Legal Framework

Section 101 of the Patent Act provides that patentable subject matter extends to four categories: “Whoever invents or discovers any new and useful [1] process, [2] machine, [3] manufacture, or [4] composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101. The Supreme Court recognizes three exceptions: (1) laws of nature, (2) physical phenomena, and (3) abstract ideas. *Alice Corp. Pty. v. CLS Bank Int’l*, 573 U.S. 208, 218 (2014). The purpose of these exceptions is to protect the “basic tools of scientific and technological work,” *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012), which are “part of the storehouse of knowledge of all men ... free to all men and reserved exclusively to none.” *Bilski v. Kappos*, 561 U.S. 593,602 (2010) (internal quotation marks and citations omitted).

In *Alice*, the Supreme Court articulated a two-step “framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Alice*, 573 U.S. at 217; *see also Mayo*, 566 U.S. at 77-78. Step one determines whether the claims are directed to one of the three patent ineligible concepts. *Alice*, 573 U.S. at 217. If so, the analysis determines whether the claims contain an additional “‘inventive concept’-i.e., an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.” *Alice*, 573 U.S. at 217-18 (*quoting, Mayo*, 566 U.S. at 72-73).³

³ In 2019, the USPTO issued two guidance documents regarding subject matter eligibility under 101 and *Alice*’s two-step framework. *See* 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“*Guidance*”); October 2019 Patent Eligibility Guidance Update, 84 Fed. Reg. 202 (Oct. 18, 2019) (“*October 2019 Guidance Update*”). That guidance continues to be available in Section 2103-2106.07 of the Manual of Patent Examination and Procedure (“MPEP”). *See* <https://www.uspto.gov/patents/laws/examination-policy/subject-matter-eligibility>. The Federal Circuit has stated that the Guidance “cannot modify or supplant the Supreme Court’s law regarding patent eligibility, or [the Federal Circuit’s] interpretation and application thereof.” *In re Rudy*, 956 F.3d 1379, 1383 (Fed. Cir. 2020); *see* MPEP § 2106(I). Accordingly, Petitioner herein applies the Supreme Court’s *Alice* two-part test and the Federal Circuit’s interpretation thereof, with reference to the *Guidance* to demonstrate that the claims are ineligible under the *Guidance* as well.

1. Alice Step 1 (Guidance Step 2A, Prongs 1 and 2)

Step 1 of *Alice* examines whether the claims are directed to a patent-ineligible concept, *e.g.* a law of nature, natural phenomenon, or abstract idea. *Alice*, 573 U.S. at 218. This inquiry centers on whether the character of the claims as a whole is directed to excluded subject matter, not just whether the claims involve an abstract idea. *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015). The focus is on “the claims, not the specification, to determine eligibility, because the ‘level of detail in the specification does not transform a claim reciting only an abstract concept into a patent-eligible system or method.’” *United Services Auto. Ass’n v. PNC Bank N.A.*, --- F.4th ----, 2025 WL 1659297, *3 (Fed. Cir. June 12, 2025) (internal citations omitted).

The Federal Circuit has repeatedly made clear that “claims directed to collecting information, analyzing information by ‘steps people go through in their minds, or by mathematical algorithms, without more,’ and presenting the results of collecting and analyzing information fall ‘within the realm of abstract ideas.” *Id.* (internal citations omitted). In such cases, “step one of the *Alice* inquiry asks ‘whether the focus of the claims is on the specific asserted improvement ***in computer capabilities*** or, instead, on a process that qualifies as an “abstract idea” for which computers are merely invoked as a tool.’” *Id.*, citing *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335-1336 (Fed. Cir. 2016) (emphasis added). *See also* MPEP

§ 2106.04(a)(3)(III) (“courts [do not] distinguish between claims that recite mental processes performed by humans and claims that recite mental processes performed on a computer.”).

2. Alice Step 2 (Guidance Step 2B)

Step 2 of *Alice* examines whether the elements of the claim contain an inventive concept sufficient to transform the abstract idea into a patent-eligible application. *Alice*, 573 U.S. at 217-18. Such an “inventive concept” may arise in “one or more of the individual claim limitations or in the ordered combination of the limitations.” *PNC Bank*, 2025 WL 1659297, *4. An “inventive concept,” however, “requires more than mere application of the abstract idea, or ‘the mere recitation of a generic computer.’” *Id.* (internal citations omitted). “For the role of a computer in a computer-implemented invention to be deemed meaningful in the context of this analysis, it must involve more than performance of ‘well-understood, routine, and conventional activities previously known to the industry.’” *Content Extraction and Trans. LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1347-48 (Fed. Cir. 2014) (internal citations omitted). “[T]he mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.” *Id.* at 1348.

B. The Challenged Claims Are Directed to an Abstract Idea Under *Alice* Step 1

The Challenged Claims fail *Alice* Step 1 because they cover the judicial exceptions of organizing human activity, managing personal behavior, and mathematical concepts. The Challenged Claims are particularly directed to a recognized abstract idea that embodies a well-established human activity, *i.e.*, printing a vote record, verifying the accuracy of the printed vote record, and then tabulating the vote from the verified printed vote record. *See* MPEP § 2106.04(a)(2)(II)(C) (identifying “voting, verifying the vote, and submitting the vote for tabulation” in the “managing personal behavior or relationships or interactions between people” subcategory of abstract ideas); MPEP § 2106.04(a)(2)(III)(C)(1) (identifying voting as “performing a mental process on a generic computer”). *See also* EX1003, ¶¶ 148-162.

The additional elements of the Challenged Claims, considered either individually or in combination, do not integrate the judicial exceptions into a practical application. *See* EX1003, ¶¶ 163-183. Accordingly, the Challenged Claims are directed to an abstract idea under *Alice* Step 1 and Step 2A, Prongs 1 and 2 of the *Guidance*.

1. The Limitations of the Challenged Claims Recite Judicial Exceptions

As a whole, each Challenged Claim is directed to the fundamental practice of printing a vote record, verifying the accuracy of the printed vote record, and tabulating the vote from the verified printed vote record. EX1003, ¶¶ 148, 191. Indeed, the ‘319 Patent states that the purpose of the purported invention is “to provide an electronic voting system that utilizes PVRs in a manner that provides better transparency to the voter”—*i.e.* by providing a “what you see is what you get” PVR to the voter. EX1001, 1:60-2:10; EX1003, ¶¶ 152, 156.

Independent Claim 29 is directed to “an electronic voting system for using printed vote records.” Claim 29 further requires: (1) a generic “printer” configured to generate a PVR including voter readable text; (2) a generic “scanner” configured to electronically capture information from the PVR, including “encoded data”; and a (3) generic “processor” configured to (i) use OCR on the electronically captured information; (ii) decode the “encoded data”; (iii) generate and compare “data set[s]” and (iv) confirm the accuracy of the data captured from the PVR; and (iv) generate a CVR. EX1003, ¶ 157.

Independent Claims 1, 15, and 34 are method claims generally covering the steps performed by the “electronic voting system” of Claim 29 and are thus directed to the same abstract ideas as Claim 29. *See Alice*, 134 S.Ct. at 2360 (“[T]he system claims are no different from the method claims in substance. The method claims

recite the abstract idea implemented on a generic computer; the system claims recite a handful of generic computer components configured to implement the same idea.”). *See also* EX1003, ¶¶ 158-159. Each of these method claims requires: (1) “generating a [PVR]” having “voter readable text indicating the voter’s at least one vote selection” (e.g. printing); (2) “electronically capturing information from the [PVR]” (e.g. scanning); (3) “using [OCR]” on the electronically captured information; (4) “comparing” data generated from the electronically captured information; and (5) “generating” a CVR. Claim 34 further requires “tabulating an election” using the CVR before vote auditing, which is also a standard part of the voting process and an abstract idea.

The Federal Circuit previously determined that claims directed to systems and methods for “voting, verifying the vote, and submitting the vote for tabulation” were ineligible abstract ideas under § 101 as “[h]umans have performed this fundamental activity that forms the basis of our democracy for hundreds of years.” *Voter Verified, Inc. v. Election Systems & Software LLC*, 887 F.3d 1376, 1385 (Fed. Cir. 2018). The patent at issue in *Voter Verified*, similar to the processes and systems of the Challenged Claims here, was directed to “a process in which a voter enters a vote into a voting system; the system generates a corresponding printed ballot; and the voter verifies the printed ballot for accuracy and submits it for tabulation.” *Id.* at 1379.

As shown in Table 2 below, the system claim found ineligible by the Federal Circuit in *Voter Verified* included claim elements very similar to those of Claim 29 of the ‘319 Patent, as both are generally directed to abstract systems for voting, printing a record of the vote, verifying the accuracy of a printed vote record, and tabulating the vote from the verified printed vote record:

TABLE 2

‘319 Patent, Claim 1	<i>Voter Verified</i>, Claim 1⁴
1. An electronic voting system for using printed vote records, comprising:	56. A self-verifying voting system comprising:
generating a printed vote record of at least one vote selection of a voter;	print out the election ballot according to which the voter voted with the votes of the voter printed thereon, so that the votes of the voter are readable on said election ballot by the voter and readable by a tabulating machine;
providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection;	<i>(c) a printer connected to said computer for printing the election ballot according to which the voter voted;</i>
electronically capturing information from the printed vote record;	(d) a ballot scanning means for reading the votes on the printed ballot printed according to the election ballot which the voter voted so that the votes shown on the printed ballot are compared by
using optical character recognition (OCR) on at least a portion of the electronically captured information to	

⁴ EX1047, Claim 1. *Voter Verified* Claim 1 included additional limitations directed to a display device and related “computer programs” for displaying information to the voter and accepting voter inputs. Those additional limitations are not included in this chart as they are not pertinent to any of the limitations of the Challenged Claims. The italicized language from *Voter Verified* Claim 1 included in this chart has been reordered to align with the language of Challenged Claim 1 for clarity.

‘319 Patent, Claim 1	<i>Voter Verified</i> , Claim 1 ⁴
generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection; comparing the first data set to a second data set, the second data set obtained from the printed vote record; and	the computer program with the votes recorded in the computer for the voter; <i>[(a)] compare the votes read by a ballot scanning machine with the votes recorded in the computer;</i>
generating a cast vote record, which is to be a stored record of all of the voter's final vote selections and to be the voter's casted vote used for vote tabulation, the cast vote record indicating the voter's at least one vote selection, wherein, prior to generating any cast vote record which is to be a stored record of all of the voter's final vote selections and to be the voter's casted vote used for vote tabulation, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.	(e) means for connecting said ballot scanning means to said computer; and a means for tabulating the printed ballots generated by said one or more voting stations.

As seen in Table 2 above, the primary difference between claim 56 in *Voter Verified* and Claim 1 of the ‘319 Patent is the explicit use of OCR on the PVR in claim 1 to generate one of the two sets of data used to confirm the accuracy of the vote. *Voter Verified* confirms that these claim elements—OCR’ing the PVR and confirming the accuracy of the PVR—are steps that can be performed in the human mind. Specifically, other method claims at issue in *Voter Verified* required that the voter perform a “comparison ... of the printed votes with the votes temporarily

stored in the computer” and make a “decision ... as to whether a printed ballot is acceptable.” *Id.* at 1384-85 (text of method claim 85 at issue in *Voter Verified*). The ‘319 Patent also confirms this, explaining that the reason the text of the claimed PVR is printed in voter readable characters is “so that the voter may visually confirm their voting selections, thus providing voting transparency to the voter.” EX1001, 4:12-16.

The Challenged Claims thus fail *Alice* Step 1 and Step 2A, Prong 1 of the *Guidance* as the claims are directed to abstract ideas of printing a vote record, verifying the accuracy of the printed vote record, and then tabulating the vote from the verified printed vote record.

2. The Abstract Ideas of the Challenged Claims Are NOT Integrated Into a Practical Application

The Patent Office’s *Guidance* also directs that the claims should be evaluated at Step 2A, Prong 2 to determine whether the abstract idea is integrated into a practical application by, for example, improving the functioning of the computer itself. MPEP §§ 2106.04(d), 2106.05(a). This inquiry is evaluated by “(1) identifying whether there are any additional elements recited in the claim beyond the judicial exception(s); and (2) evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application.” MPEP § 2106.04(d)(II). The Challenged Claims do not do so. EX1003, ¶ 165. Rather, the Challenged Claims merely use generic computer

functions and components, such as printers, scanners, and processors for “using” OCR and generating and comparing data sets to verify the PVR and generate a CVR for tabulation, to execute the abstract idea. *Id.*, ¶¶ 166-170.

As the Supreme Court and the Federal Circuit have consistently held, the “mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.” *Alice*, 134 S. Ct. at 2358; *buySAFE, Inc. v. Google, Inc.*, 765 F. 3d 1350, 1354 (Fed. Cir. 2014) (“[A] claim directed to an abstract idea does not move into section 101 eligibility territory by ‘merely requir[ing] generic computer implementation.’”) (quoting *Alice*, 134 S. Ct. at 2357). To this end, the Federal Circuit has repeatedly recognized that “[t]he concept of data collection, recognition, and storage is undisputably well known; indeed, humans have always performed these functions.” *Solutran, Inc. v. Elavon, Inc.*, 931 F.3d 1161, 1166 (Fed. Cir. 2019) (quoting *Content Extraction & Transmission, LLC v. Wells Fargo Bank, National Ass’n*, 776 F.3d 1342, 1347 (Fed. Cir. 2014). *See also*, e.g., *In re 4 TLI Comm’cns Pat. Litig.*, 823 F.3d 607, 612 (Fed. Cir. 2016) (holding ineligible claims that were “directed to use of conventional or generic technology in a nascent but well-known environment, without any claim that the invention reflects an inventive solution to any problem presented by combining the two”); *Two-Way Media Ltd. v. Comcast Cable Commc’ns, LLC*, 874 F.3d 1329, 1337 (Fed. Cir. 2017) (“Claims directed to generalized steps to be performed on a computer using

conventional computer activity are not patent eligible.”); *Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1055 (Fed. Cir. 2017) (“Our prior cases have made clear that mere automation of manual processes using generic computers does not constitute a patentable improvement in computer technology.”).

In *Content Extraction*, for example, the claims at issue generally recited a method of “1) extracting data from hard copy documents using an automated digitizing unit such as a scanner, 2) recognizing specific information from the extracted data, and 3) storing that information in a memory.” 776 F.3d at 1345. The Federal Circuit recognized that the claims simply used known scanning technology and computers to “perform well-understood, routine, and conventional activities commonly used in industry.” *Id.* at 1348. Accordingly, the Federal Circuit held that the *Content Extraction* claims were patent ineligible, noting “[a]t most, [the] claims attempt to limit the abstract idea of recognizing and storing information from hard copy documents using a scanner and a computer to a particular technological environment” – check clearance. *Id.* The Federal Circuit further made clear that simply limiting the claims to a particular technological environment is “insufficient to save a claim in this context.” *Id.* See also MPEP § 2106.05(h) (“employing generic computer functions to execute an abstract idea, even when limiting the use of the idea to one particular environment, does not add significantly more”).

The Federal Circuit’s recent decision in *United Services Auto. Ass’n* is also instructive. --- F.4th ----, 2025 WL 1659297 (Fed. Cir. June 12, 2025). At issue in *PNC Bank* was a patent directed to processes for depositing checks “implementing real-time error checking steps, like using optical character recognition (OCR).” *Id.* at *1. In reversing the district court’s finding that the claims were patent-eligible, the Federal Circuit explained that “the claim recites routine data collection and analysis steps that have been traditionally performed by banks and people depositing checks—namely reviewing checks, recognizing relevant data, checking for errors, and storing the resultant data.” *Id.* at *4. The claim was “drafted in a result-oriented fashion” and performing those steps on “a general-purpose device ... in a conventional way” was insufficient to render the claims directed to patent-eligible subject matter” under *Alice* Step 1. *Id.* at 3-4.

The same is true of the Challenged Claims here, which each require printing a PVR bearing voter readable text, scanning the PVR, recognizing relevant data from the scanned PVR, confirming the accuracy and integrity of the PVR, and storing data generated from the scanned PVR in the form of a CVR for tabulation. As shown in the paragraphs that follow, the Challenged Claims accomplish these steps using conventional computer hardware. Similar to the *Content Extraction* and *PNC Bank* decisions discussed above, the Challenged Claims at most seek to limit the abstract idea of confirming the accuracy of a printed document to the technological

environment of voting machines rather than check clearing. But such a limitation is insufficient as the Challenged Claims do not improve the functionality of any computer. See § MPEP 2106.05(h). See also *Bilski*, 561 U.S. at 612 (“*Flook* established that limiting an abstract idea to one field of use or adding token postsolution components did not make the concept patentable”).

Figure 1 of the ‘319 Patent (reproduced below) shows an “embodiment of a voting system for utilizing the techniques described” in the ‘319 Patent. EX1001, 3:66-4:2. That “exemplary embodiment” consists of nothing more than a prior art BMD voting machine, a generic scanner, and a generic “computing device” (collectively referred to as a “voting system 10” in the ‘319 Patent):

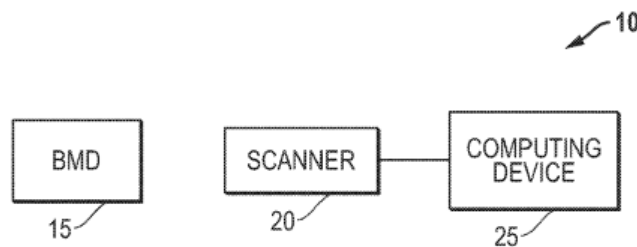


FIG. 1

EX1003, ¶¶ 168-170.

The ‘319 Patent further states that the “BMD” includes an “**internal printer**” and “**a variety of hardware and software**, including a memory, **processors**, associated election software, input devices, etc., **all as is known in the art.**” EX1001, 4:46-65 (emphasis added). Similarly, the scanner of the voting system discussed in the ‘319 Patent is described as merely using “conventional scanning

hardware.” *Id.*, 4:16-27 (“The scanning hardware for the scanner 20 may be **conventional scanning hardware**”) (emphasis added). The ‘319 Patent explains that after the voter confirms the accuracy of the PVR, such “conventional scanning hardware” is used to create an image of the PVR. *Id.*, 4:4-4:8, 4:13-15. OCR techniques are then used to create a data set indicating the voter’s voting selections from the voter readable characters on the PVR. *Id.*, 4:8-9. *See also* EX1003, ¶¶ 171-172.

The ‘319 Patent provides almost no description of the generic “computing device 25” of Figure 1. The only discussion of the “computing device 25” merely states that the computing device can receive an image from the scanner, perform “data analysis” such as OCR, and generate a CVR. EX1001, 3:66-4:38, 6:9-55; EX1003, ¶ 173. Claim 29 confirms that all of the steps of the independent claims other than printing and scanning—including using OCR, generating the first and second data sets, comparing the data sets, and generating the CVR—can be performed by the “processor.” EX1001, Claim 29, elements (e)-(h). Notably, the word “processor” appears only once in the ‘319 Patent, and that single usage explains that the “processor” is among the hardware components of the “voting processing unit 110” that are “known in the art.” *Id.*, 4:39-47. No “improvements” to the processor are disclosed or claimed. EX1003, ¶ 165. Using such a generic computer 25 and processor to run conventional algorithms for OCR processes,

hashing, and processing scanned information is the very type of abstraction that is not patent eligible under Section 101. *See, e.g., Content Extraction*, 776 F.3d at 1348; *Voter Verified*, 887 F.3d at 1386.

To the contrary, electronically scanning or otherwise extracting data from a physical document and using OCR are examples well-understood, routine, and conventional activity previously known and used in the voting industry. *See* EX1003, ¶¶ 155, 166-167. *See, e.g.,* EX1004, [0134]; EX1020, 8:45-9:16; EX1021, 98; EX1022, [0036]; EX1023, [0049]-[0050]; EX1024, [0098]; EX1025, [0287]-[0288]; EX1026, 7:20-23. *See also Content Extraction*, 776 F.3d at 1348 (“This limitation merely describes generic optical character recognition technology, which ... was a routine function of scanning technology at the time the claims were filed”).⁵ While the ‘319 Patent generically states that “additional processing beyond traditional OCR processes may also be utilized **for recognizing the characters presented on the PVR,**” the Challenged Claims do not include any such non-traditional “additional processing.” EX1001, 2:59-62 (emphasis added); EX1003, ¶ 155.

⁵ The patent at issue in this part of the *Content Extraction* decision was U.S. Patent No. 5,768,416, which issued on June 16, 1998, 20-years before the priority date of the ‘319 Patent.

To wit, none of Independent Claims 1, 15, 29, or 34 require anything beyond “using OCR” to “generate a first data set.” Dependent Claims 21 and 28 require “recursively modifying an OCR process,” but the claims do not indicate why such modifications are made. And there is no discussion of such “recursive” modifications to the OCR process anywhere in the specification of the ‘319 Patent. To the contrary, the term “recursively” appears only in the Claims 21, 22 (by dependency) and 28 (recursively modifying the OCR process) and Claims 30, 32, 33, 36, 37, and 38 (recursively modifying the first data set).

As explained in Section XII below regarding Ground 4, these “recursively modifying” claims are invalid under Section 112 as they lack written description support and are not enabled. Regardless, nothing in the dependent “recursively modifying” claims improves the functionality of the underlying generic computer components purportedly used to perform such processes in the Challenged Claims. EX1003, ¶¶ 180-181. Ultimately, the ‘319 Patent does not disclose or claim any new OCR techniques or advances over then existing OCR techniques. EX1003, ¶ 155.

In short, none of the generic computer components and processes discussed and claimed in the ‘319 Patent reflects an improvement in the functioning of a computer. EX1003, ¶¶ 163-183. The Challenged Claims thus fail Step 2A-Prong 2 of the *Guidance*. See, e.g., *Elec. Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) (“The focus of the claims is not on an improvement in

computers as tools, but on certain independently abstract ideas that use computers as tools.”)

C. The Challenged Claims Do NOT Provide an Inventive Concept That Amounts to “Significantly More” than the Abstract Idea under *Alice* Step 2

The Challenged Claims fail *Alice* Step 2 because the claim limitations, considered individually or as an ordered combination, do not disclose an inventive concept that amounts to significantly more than the abstract idea. *See Alice*, 134 S. Ct. at 2358-59. The Challenged Claims contain no “inventive concept” that “transforms” the claimed abstract idea into a patent-eligible application. *See Alice*, 134 S.Ct. at 2357; MPEP §2106.05.

This is because the Challenged Claims do not “purport to improve the functioning of the computer itself” or “effect an improvement in any other technology or technical field.” *See id.* Rather, the Challenged Claims simply use generic computer technology (*e.g.*, printers, scanners, and processors) to automate mental processes and routine steps that have long been performed by individuals—printing a vote record (*e.g.* providing a “‘what you see is what you get’ printed vote record.”), verifying the accuracy of the printed vote record, and tabulating the vote from the verified printed vote record. *See EX1001*, 1:48-65-2:10. *See also, e.g., Voter Verified*, 887 F.3d at 1384-86.

1. The Independent Claims Do Not Contain “Something More”

The elements of the Challenged Claims are recited at a high level of generality and the general purpose computer components recited in the ‘319 Patent operate in their ordinary and conventional capacity to perform well-understood, routine, and conventional functions. EX1003, ¶¶ 186-187. The elements of the Independent Claims, considered as an ordered combination, fail to add anything that is not also present when they are considered separately. Again, Figure 1, which shows nothing more than a BMD, a scanner, and a generic “computing device” having a “processor ... as is known in the art,” is described in the ‘319 Patent as “an exemplary voting system for utilizing the techniques described herein.” EX1001, 3:52-54, Fig. 1; EX1003, ¶¶ 168-173, 189-190.

The Independent Claims each generally require: (1) generating (*e.g.* printing) a PVR with voter readable text, (2) capturing (*e.g.* scanning) first information and second information from the PVR, (3) performing OCR on the first information to generate a first data set based at least in part on the voter readable text; (4) comparing the first data set to a second data set also captured from the PVR to confirm the accuracy of the first data set; and (5) using the confirmed dataset to generate a CVR for tabulation. EX1001, Claims 1, 15, 29, 34. EX1003, ¶ 186. Claims 15, 29, and 34 further require that the second information captured from the PVR comprise “encoded data”—an example of which is a barcode, which has been used for

decades. Claim 34 further requires the election is tabulated using the CVR before the vote is audited.

None of these elements, each of which can be performed using generic printers, scanners, and processors, constitutes an “inventive concept” as they were well-known, routine and conventional activities. *See Mayo*, 566 U.S. at 72-73 (where claimed elements involve “well-understood, routine, [and] conventional activity previously engaged in,” they do not include an “inventive concept.”). And none of these steps or activities are used in an unconventional manner or produce an unexpected result. EX1003, ¶¶ 186-192, 195-196. The Federal Circuit’s recent decision in *PNC Bank* is again instructive. Regarding Step 2 of the *Alice* inquiry, the Federal Circuit explained that the claim at issue in *PNC Bank* “recites nothing more than routine image capture, OCR, and data processing steps—all of which were well-known and routine” and did not provide a “fundamental change to how any of the technology functions, because it is all operating in a conventional way.” *PNC Bank*, 2025 WL 1659297, *5. The claims thus failed *Alice* Step 2 and were not patent eligible. *Id.*

The same is true of the Challenged Claims here, and thus the Challenged Claims fail to provide any “inventive concept” that would render the Challenged Claims patent eligible under § 101. *See Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016) (“We have repeatedly held that such

invocations of computers and networks that are not even arguably inventive are ‘insufficient to pass the test of an inventive concept in the application’ of an abstract idea.”); *Intellectual Ventures I LLC v. Cap. One Fin. Corp.*, 850 F. 3d 1332, 1341-42 (Fed. Cir. 2017) (holding that “using generic computer components and conventional computer data processing activities” was not sufficient to find an “inventive concept”); *Content Extraction*, 776 F3.d at 1347-48 (“There is no ‘inventive concept’ in [Content Extraction’s] use of a generic scanner and computer to perform well-understood, routine, and conventional activities commonly used in the industry.”).

2. The Dependent Claims Do Not Contain “Something More”

The dependent claims also fail to provide any practical application of the abstract concept of printing a vote record, verifying the accuracy of the printed vote record, and then tabulating the vote from the verified printed vote record. Rather, the dependent claims of the ‘319 Patent merely recite additional well-understood, routine, and conventional activities.

The dependent claims also include generic and known use of “encoded data” and barcodes (Claims 2, 3, 5, 6, 8, 13, 16, 19, 26) to confirm the accuracy of the OCR data set,⁶ and/or use of a generic “hash” (Claims 17, 18, 24, 25, 31, 32, 33, 35,

⁶ The ‘319 Patent acknowledges the use of barcodes in the electronic voting machine industry predates the ‘319 Patent. *See* Section VII(A), *Supra*.

37) to confirm the accuracy of the OCR and/or authenticity of the printed vote record.⁷ The claims do not specify the hash function to be used, and the specification only generically refers to a “secure hash function,” a “one way hash,” and a “digitally signed hash.” EX1001 at, *e.g.*, 2:43-58; Using a computer to receive data, process data, generate data, and perform data calculations (*e.g.* perform a hash function) are very basic functions of any computer. EX1003, ¶¶ 175, 193-194, 196.

Claims 9, 12, 13, 14 generically require that the “second data set” in Claim 1 is based at least in part on undefined “other information” and thus add nothing substantive that would pass the *Alice* Step 2 inquiry. EX1003, ¶ 176.

Claims 4, 7, 10 are directed to well-known, conventional, and routine scanning functions, such as scanning and capturing “voter readable text” and capturing an “image” of the PVR. EX1003, ¶ 177.

Claims 11, 23, and 40 merely require that the CVR is the only casted vote used for tabulation. Claim 22 similarly requires only that the CVR is utilized during tabulation. Using CVRs for tabulation was also well-known, conventional and routine. EX1003, ¶ 178.

⁷ Use of hash functions to confirm the authenticity of a document pre-dates the ‘319 Patent by decades. *See* Section VII(C), *supra*.

Claims 20 and 27 require only that the CVR is based on the first data set of Claim 15, wherein the first data set is based on the voter readable text of the PVR. EX1003, ¶ 179.

Claims 21, 22, 28, 30, 32, 33, 36, and 38 require recursively modifying an OCR process applied to the voter readable text or recursively modifying the first data set. EX1003, ¶ 180. None of this improves the functioning of the generic computer. And as explained in Section XIII below regarding Ground 4, these claims lack written description support and are not enabled, and are thus invalid for these additional reasons.

Lastly, Claim 39 requires using the PVR to audit the election. Again, an election audit is nothing more than a well-understood, routine, and conventional process long used in the voting machine industry as recognized in the ‘319 Patent. EX1001, 1:41-50. *See also* EX1003, ¶ 182.

All of the concepts contained in the dependent claims were well understood and routine prior to the filing of the ‘319 Patent. None of the dependent claims thus provides an inventive concept that would render any of those claims patent eligible under *Alice* and the *Guidance*.

The elements of the Challenged Claims, individually and considered as a whole, do nothing more than use generic computers performing ordinary processes to automate a well-established human activity – printing a vote record, verifying the

accuracy of the printed vote record, and then tabulating the vote from the verified printed vote record. This is insufficient to transform the claimed abstract ideas into patent-eligible subject matter. *See Voter Verified*, 887 F.3d at 1385-86 (holding that “the [challenged method and system] claims as a whole are drawn to the concept of voting, verifying the vote, and submitting the vote for tabulation. Humans have performed this fundamental activity that forms the basis of our democracy for hundreds of years” and that recitation of “general purpose computers,” “data storage devices,” “a laser printer,” and “a scanner” “from the well-known art” were insufficient to transform the abstract claims into patent-eligible subject matter).

Petitioner respectfully requests the Board grant the Petition and find the Challenged Claims unpatentable as directed to ineligible subject matter under § 101.º

XI. GROUND 2: CHALLENGED CLAIMS 1-20, 23-27, 29, 31, 34, 35, 39, AND 40 ARE INVALID AS OBVIOUS UNDER 35 U.S.C. § 103

Claims 1-20, 23-27, 29, 31, 34, 35, 19, and 40 are invalid under 35 U.S.C. §103. This is because the ‘319 Patent, as established in the preceding sections, does nothing more than take known printing functionality, known OCR procedures, known barcodes, and known hashing functions and apply them in the environment of existing electronic voting machines such as BMDs. The Challenged Claims, like the similar claims at issue in the ‘966 PGR, are unpatentable as obvious and the Petition should be granted on this basis as well.

As the Board held in the ‘966 PGR FWD, and as explained in the sections that follow, Brockhouse and Nadaf disclosed all of the components and functionality necessary to perform every element of the Challenged Claims, including: (1) printing a PVR bearing voter-readable text and encoded data; (2) scanning the PVR; (3) performing OCR on the voter-readable text; (4) generating a CVR from the OCR data to be used for tabulation; (5) performing hash functions; (6) decoding the encoded data from the PVR; and (7) comparing the OCR data and the decoded data to ensure the accuracy of the OCR data.

As previously explained, the purported difference between the Challenged Claims and the claims found unpatentable by the Board in the ‘966 PGR is that the Challenged Claims include a temporal limitation that requires that the comparison of element (7) above be performed before generating the CVR that is used for tabulation. It is this tenuous temporal limitation (as well as PO’s mischaracterization of Petitioner’s April 2019 letter) that PO asserted was sufficient to overcome an anticipation rejection in a related application based on Nadaf, which performed the comparison prior to generating a CVR used to audit, rather than tabulate, the election.

Performing this comparison of the OCR data set to the encoded data to ensure the accuracy of the OCR process before the CVR is created in the Brockhouse system would have been obvious to a POSITA in view of Schneier and Nadaf. As

also explained in the subsections that follow, a POSITA would have been motivated to do so for numerous reasons, such as: (1) OCR processes are known to be error-prone, and a POSITA in 2018 would have been highly motivated to confirm the accuracy of the OCR data set in Brockhouse before generating a CVR that would ultimately be used when tabulating the election; and (2) a comparison would also ensure that the PVR had not been altered, thereby increasing security of the election as well.

Incorporating Schneier's teaching to use a hash function to authenticate a printed document and ensure its accuracy, before generating the CVR used for tabulation, would accomplish these goals and would use the existing components of Brockhouse and Nadaf with no change in their respective functions and would do no more than yield predictable results. The Challenged Claims are therefore unpatentable as obvious.

A. Legal Standards for Obviousness

A patent claim is invalid under 35 USC § 103 where “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art.”

To invalidate a patent claim on obviousness grounds, a challenger generally must show: (1) that the claim elements were known in the prior art; and (2) that a

skilled artisan would have been motivated to combine these known elements.

Western Union Co. v. MoneyGram Payment Systems, Inc., 626 F. 3d 1361, 1369

(Fed. Cir. 2010). As the Supreme Court explained in *KSR*:

For over a half century, the Court has held that a ‘patent for a combination which only unites old elements with no change in their respective functions ... obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men.’ This is a principal reason for declining to allow patents for what is obvious. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.

KSR Intern. Co. v. Teleflex, Inc., 550 U.S. 398, 415-16 (2007) (internal citations omitted).

To qualify as prior art for an obviousness analysis, a reference must qualify as “analogous art.” *Innovention Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1321 (Fed.Cir. 2011). A reference is considered analogous if it is “from the same field of endeavor” or is “reasonably pertinent to the particular problem with which the inventor is involved.” *Id.* A reference is reasonably pertinent if it, as a result of its subject matter, “logically would have commended itself to an inventor’s attention in considering his problem.” *Id.*

The motivation to combine analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim,” but instead “can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *See KSR*, 550 U.S. at 418. In performing this analysis, it is

important to note that a POSITA “is also a person of ordinary creativity, not an automaton.” *Id.* at 421.

B. A POSITA Would Have Been Motivated to Combine Brockhouse, Nadaf, and Schneier With a Reasonable Expectation of Success

Brockhouse and Nadaf each disclose electronic voting machines that utilize PVRs and generate CVRs. Further, Brockhouse and Nadaf disclose the use of OCR processes on voter-readable text printed on the PVR, as well as barcodes (encoded data) printed on the PVR. Schneier also discloses protocols for using hash functions and digital signatures for “computerized voting” systems to ensure “individual privacy” and “prevent cheating.” EX1009, 125. It follows that these references are analogous art to the ‘319 Patent, in the same field of endeavor, and reasonably pertinent to the problems the inventors faced. EX1003, ¶ 229.

Brockhouse also teaches that the OCR data set created after scanning the PVR can be used to generate the CVR that is used in tabulation of the election. EX1004, [134]. As a POSITA would know that OCR processes are error prone, a POSITA would look to other references such as Nadaf and Schneier to ascertain ways to verify the accuracy of the OCR processes before generating a CVR for tabulation of the vote. EX1003, ¶ 230. *See also, e.g.*, EX1025 (Sebes), [0312] (“OCR does sometimes create errors, for example ‘Johm Quincy Adams.’”); EX1005, 1:13–41. And, as the Board explained in its FWD in the ‘966 PGR, “hashes provide a solution

to the altered-ballot problem ...[and] adding hashes would provide an additional measure of security.” EX1015, 65.

Schneier instructs that “[c]omputerized voting will never be used for general elections unless there is a protocol that maintains individual privacy and prevents cheating.” EX1009, 125-126. Among the considerations Schneier identifies for the adoption of such “computerized voting” are:

....

5. No one can change anyone else’s vote without being discovered.
6. Every voter can make sure that his vote has been taken into account in the final tabulation.

Id. Schneier further proposes several possible methodologies for accomplishes these (and other) considerations, including the use of hash functions and digital signatures.

Id. Schneier further teaches that, “[t]o save time, digital signature protocols are often implemented with one-way hash functions. ... Speed increases drastically and, since the chances of two different documents having the same 160-bit hash are only one in 2^{160} , anyone can safely equate a signature of the hash with a signature of the document.” *Id.*, 38. *See also id.*, 30 (“A single bit change in the pre-image changes, on the average, half of the bits in the hash value. Given a hash value, it is computationally unfeasible to find a pre-image that hashes to that value.”).

Nadaf similarly teaches that the accuracy of the OCR data set can be confirmed before generating a CVR by comparing the OCR data set to the content

of the bar code also printed on the PVR. EX1015 (‘966 FWD), 45 (“It is undisputed that Nadaf’s equipment 19 compares the ‘text vote information’ to ‘the vote information encoded into the bar code.’”). Nadaf further teaches the use of hash functions and digital signatures, including via the Elliptic Curve Digital Signature Algorithm, to confirm the accuracy of the OCR data set and the authenticity of the PVR. *Id.*, 14:15-18 (explaining the PVR has barcodes printed on it that will “provide a digital signature, in this case related to the text of the vote printed on the [PVR].”). EX1015 (966 FWD), 44-45. A POSITA would have known that ECDSA uses a hashing algorithm to create the digital signatures. EX1003, ¶¶ 96, 231, 260. *See also* EX1046, 38; EX1009 (Schneier), 480-481 (explaining in 1996 that “Elliptic curves have been studied for many years”).

Brockhouse further discloses that its systems include a “security sensor that detects counterfeit ballots and ballots or activation cards that have been tampered with.” EX1004, [0085]. Brockhouse, however, does not disclose the details of such a “security sensor.” A POSITA would therefore be motivated to look to other references, such as Nadaf and Schneier, for additional disclosures of processes and systems for protecting against counterfeit or tampered ballots. EX1003, ¶ 232. And, again, the Board already found that using hash functions would provide a solution to the altered-ballot problem and provide additional security. EX1015, 65.

Thus, by incorporating a hash value or digital signature as taught by Schneier and Nadaf, the Brockhouse system can quickly and efficiently verify the accuracy and integrity of the PVR used to generate the CVR for tabulation. EX1003, ¶ 233. As the combination involves well-known prior art elements and would have predictable results in document and data authentication, a POSITA would have been motivated to make the combination. EX1003, ¶¶ 229-233. *See also KSR*, 550 U.S. at 416.

C. The Independent Claims Are Unpatentable As They Would Have Been Obvious to a POSITA at the Time of the Invention

As seen in Appendix B to the Declaration of Dr. Shamos, Independent Claims 1, 15, and 34 of the ‘319 Patent are generally directed to the same method for electronic voting using printed vote records, with minor variations in language. For example, Independent Claim 1 requires “electronically capturing information from the printed vote record,” whereas Claims 15 and 34 require capturing “first information from the printed vote record.” Claims 15 and 34 similarly require “electronically capturing second information ... comprising encoded data,” whereas Claim 1 requires only that a “second data set [be] obtained from the printed vote record.”

Independent Claim 29 is a system claim that requires generic computer components, namely a “printer,” “scanner,” and a “processor,” configured to perform the steps the of the method claims.

The Independent Claims would have been obvious to a POSITA at the time of the invention. The Independent Claims are nothing more than a combination of familiar elements according to known methods that does no more than yield predictable results. The individual elements of the Independent Claims are addressed in the subsections that follow, with reference to the limitations as identified in the Listing of Claims on Page xi of this Petition.

1. Claim Elements 1(preamble); 15(preamble); 29(preamble); 34(preamble):

***A method for electronic voting using printed vote records*⁸**

Whether or not the preambles are considered limitations of the Challenged Claims, the preambles are disclosed in Brockhouse and Nadaf as the Board held in the ‘966 PGR. More specifically, Brockhouse discloses “a voting system including a universal voting station and a tabulation device. The voting station is operable to receive an activation card on which it prints a voter’s voting selection.” EX1004, Abstract. An exemplary system is shown in Figure 1 of Brockhouse reproduced below:

⁸ In this subsection and those that follow that address elements of the Independent Claims, the language of Claim 15 is presented (emphasized in bold and underlining) as exemplary. Specific differences, if any, amongst the Independent Claims will be addressed in each subsection. As noted above, Claim 29 is a system claim and generally requires a generic printer, a “conventional” scanner, and a generic processor “as is known in the art” to perform the steps recited in the method claims.

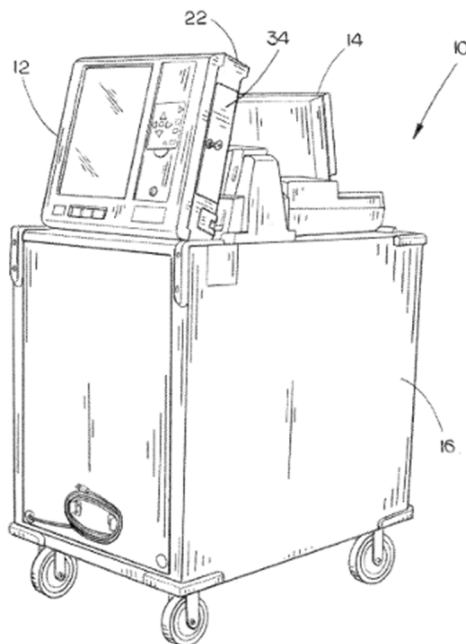


FIG. 1

EX1004., Fig. 1 *See also id.*, Fig. 6 (showing exemplary PVR); EX1003, ¶ 235.

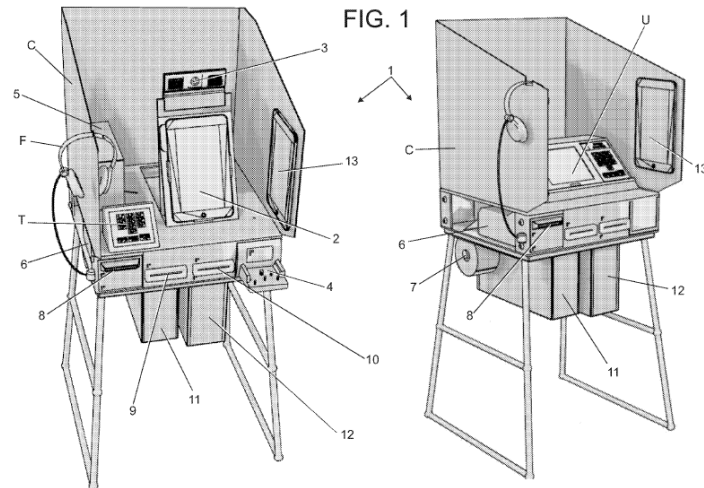
Nadaf also discloses systems and methods for electronic voting using printed vote records:

The vote in text form produced for the ballot will be generated by an electronic vote recording device (Direct Recording Electronic – DRE) that can even be the actual urn in use today, which will be connected, via a USB port, to the VERIFICATION BALLOT PRINTING AND COLLECTION EQUIPMENT.

The system will make it possible for the user to vote electronically which, after it is completed, **will generate the printed vote, providing the voter with assurance of their choice and preventing equipment failure from being able to change the vote cast digitally.**

Id., 10:13-11:1 (capitals in original, bolding added for emphasis). EX1003, ¶ 236.

Such an electronic voting machine is shown in Figure 1 of Nadaf:



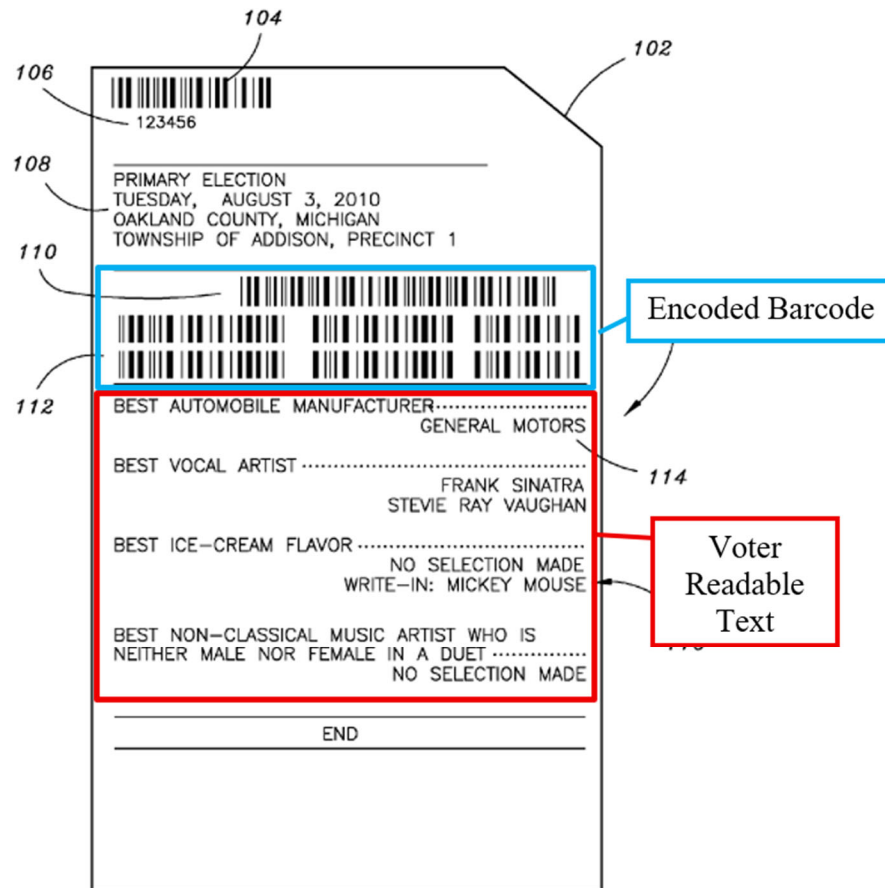
Id., Fig. 1.

2. Claim Elements 1(a)-(b), 15(a)-(b), 29(a)-(b), and 34(a)-(b)

generating a printed vote record of at least one vote selection of a voter

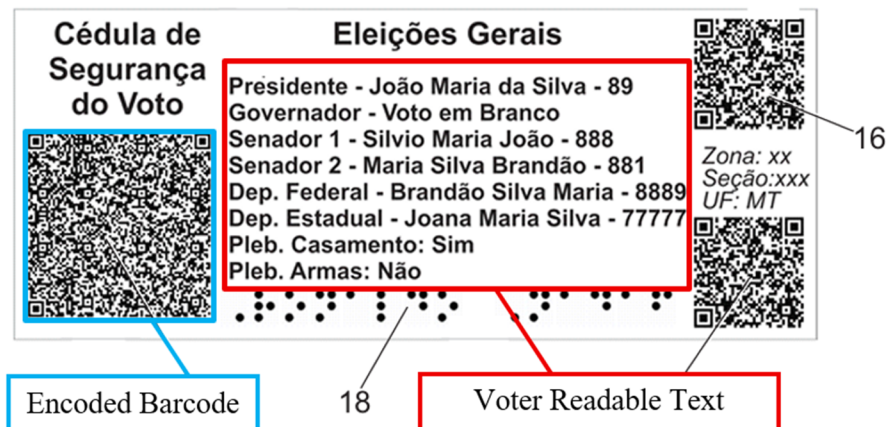
providing, on the printed vote record, voter readable text indicating the voter's at least one vote selection

The Board previously held in the '966 PGR that Brockhouse and Nadaf disclose these claim elements, as shown in the following Figures:



Brockhouse PVR

Nadaf PVR



EX1015, 14-15, 37-38; EX1004, Fig. 6 (annotated); EX1007, Fig. 4 (annotated). *See also* EX1004, ¶¶ [0016], [0053], [0106]; EX1007, 14:7-14 (emphasis added); EX1003, ¶¶ 237-238.

3. Claim Elements 1(c), 15(c), 29(c), 29(d), 34(c)

electronically capturing first information from the printed vote record;

Claim 1 requires only that “information” from the PVR be electronically captured. Claims 15 and 34 refer to this as “first information.” Claim 29 requires a “scanner” that is “configured to (1) electronically capture first information.” It follows that “electronically capturing” information from the PVR can be performed by “scanning” the PVR. EX1003, ¶ 239.

Brockhouse, as the Board held in the ‘966 PGR, discloses scanning the PVR including the voter readable text. EX1015, 15. *See also* EX1004, [0106] (“Scanner 74 produces an image of the activation card 20 and the master barcode 110, vote selection barcodes 112, and vote selections 114 printed thereon.”); [0130] (“tabulation device 14 receives an activation card 20 in ballot insertion tray 188 instead of receiving a paper ballot. Ballot scanner assembly 194 scans activation card 20 to capture its image as it does with a paper ballot, and transmits the captured image to the processor of CPU board 196.”); [0134] (“In each of the embodiments described above, universal voting station 12 and/or tabulation device 14 may use

optical character recognition (OCR) to decode the voter selections 114 on the printed activation cards”). *See also* EX1003, ¶¶ 240-241.

So, too, does Nadaf as the Board also held. EX1015, 41. More specifically, Nadaf teaches the ballot can be inserted into an “optical reader”—a scanner—that scans the printed ballot and “compar[es] the text vote information to the vote information encoded into the bar code.” EX1007, 19:7-9. The scanner in the Nadaf system thus scans the voter readable text on the PVR. EX1003, ¶ 242.

4. *Claim Elements 1(d), 15(d), 29(e), 34(d)*

using optical character recognition (OCR) on the first information to generate a first data set, the first data set based at least in part on the voter readable text indicating the voter's at least one vote selection

Again, the Board already held in the ‘966 PGR that Brockhouse discloses using OCR on the voter readable text on the PVR to create a data set which identifies the voter’s vote selections and is subsequently used to generate the CVR used for tabulation. EX1015, 11; EX1004, [0134] (“In each of the embodiments described above, universal voting station 12 and/or tabulation device 14 may use optical character recognition (OCR) to decode the voter selections 114 on the printed activation cards as an alternative to decoding the vote selection barcodes 112 to determine the corresponding voting selections.”). *See also* EX1003, ¶¶ 243-244.

Nadaf also teaches, as the Board held in the ‘966 PGR, that OCR is used on the scanned image to create a data set which identifies the voter’s vote selections.

EX1015, 43-45; EX1003, ¶ 245. The “optical reader” of Nadaf is “an optical OCR and QR code reader.” EX1007, 18:9. The Nadaf system takes the result of the scan of the PVR and determines if the “text vote information” and the decoded barcode information match. EX1007, 19:7-9.

5. *Claim Elements 1(f), 15(e), 29(d), 34(e)*

electronically capturing second information from the printed vote record, to generate a second data set, the second information comprising encoded data

Unlike the other Independent Claims, Claim 1 does not specify that the second data set must comprise “encoded data.” Rather, Claim 1 more broadly requires a “second data set obtained from the [PVR].” As explained in the State of the Art Section above, a POSITA would have known that a barcode encodes data into a visual, machine-readable format that can be read by an optical scanner. A POSITA also would have known that printing a barcode that encodes a voter’s voting selection(s) on a PVR was known in the art at least as early as 2005. EX1019, 164; EX1003, ¶ 246.

Brockhouse discloses that the voter’s vote selections are presented on the PVR in two formats: (1) voter readable text that can be scanned and recognized using OCR processes; and (2) encoded in a barcode. EX1004, [0134]. While Brockhouse teaches that OCR may be used “to decode the vote selections on the [PVR] as an alternative to decoding the vote selection barcodes,” a POSITA, as explained in the

Motivation to Combine Section above, would have been motivated to capture both sets of data (OCR and barcode) and compare them to ensure accuracy of the OCR process given that a POSITA would have known that OCR processes are error prone. *See also* EX1003, ¶ 248. A POSITA also would have been motivated to electronically capture both data sets and compare them to ensure that the PVR had not been altered—*i.e.* to confirm the integrity of the PVR. *Id.*

Nadaf discloses including a barcode on the PVR in which the voter's vote selections are encoded. As the Board held in the '966 PGR, the information in Nadaf's barcode is decoded—thus creating a second data set—that is compared to the first (OCR) data set. EX1015, 44-45; EX1003, ¶ 247. *See also* EX1007, 14:10-13 (“The verification ballot (14) for the vote, shown in Figure 4, will show the choices of the voter for each office being contested in that election and/or ballot measure, stated in sufficiently legible text. **The ballot (14) will also show the complete vote by the voter encoded in a two-dimensional bar code. . .**”) (emphasis added).

6. Claim Elements 1(e), 15(f), 29(h) (partial), 34(f)

comparing the first data set to [the] second data set

As the Board held in the '966 PGR, “[i]t is undisputed that Nadaf's equipment 19 compares ‘the text vote information’ to ‘the vote information encoded into the bar code.’” EX1015, 45, citing EX1007, 19:7-9. More specifically, Nadaf discloses

that the “collection urn” (ballot box) containing the PVRs is subsequently taken to the Equipment for Auditing and Counting Votes Printed on Verification Ballots (equipment 19). *Id.*, 17:16-18:3. “The [PVRs] (14) are then fed through the optical reader (25), which will read the bar codes (16), (17) or (18), extracting and verifying the digital signatures, and **comparing the text vote information to the vote information encoded into the bar code.**” *Id.*, 19:7-9 (emphasis added). *See also* EX1003, ¶¶ 251-253.

It is also undisputed that the Brockhouse system generates a PVR that bears both the voter-readable text and a bar code encoding the voter’s vote selections. It is further undisputed that, as the Board in the ‘966 PGR held, Brockhouse teaches generating a CVR from the OCR data set that is used for tabulation. EX1015, 16-17 (“Brockhouse teaches that the tabulation device uses OCR to decode voter selections on the card and generates the cast vote record from the resulting data set”). As explained in the following subsection, it would have been obvious to a POSITA at the time of the invention to perform a comparison of that OCR data set to the decoded data from the bar code to ensure the accuracy of the OCR data set before generating the CVR used for tabulation. EX1003, ¶ 249.

7. *Claim Elements 1(g), 15(g), 29(f), 29(h), 34(g), 34(h)*

generating a cast vote record indicating the voter's at least one vote selection, the cast vote record being a stored record of all of the voter's final vote selections, wherein, prior to generating any cast vote record which is to be a stored record of all of the voter's final vote selections, an accuracy of data to be cast is confirmed based at least in part on a comparison of the first data set and the second data set.

This element of the Independent Claims generally requires that: (1) the CVR is generated after the accuracy of the data set used to generate the CVR is confirmed by the comparison of the “first data set” and the “second data set;” and (2) the CVR is used for tabulating the vote. Claim 34 specifies that the CVR must “indicat[e] the voter’s at least one vote selection as determined by the first data set.” Claim 29 similarly requires that the CVR be “based on the first data set.” Claims 1 and 15 do not specify the data set from which the CVR must be generated. Claims 1, 29, and 34 require that the CVR be “the voter’s casted vote used for vote tabulation.” EX1003, ¶¶ 254, 256.

While the Examiner of the related ‘627 Application ultimately accepted PO’s argument that the temporal requirement of performing the compare step before generating a CVR that is used for tabulation was sufficient to overcome an anticipation rejection based on Nadaf,⁹ neither the Examiner of the ‘627 Application

⁹ See Section VI(C), *supra*.

nor the ‘319 Patent considered the combination of Brockhouse and Nadaf. Nor did PO advise the Examiner that the Board in the ‘966 PGR had rejected PO’s mischaracterization of Petitioner’s April 2019 regarding the use of OCR data to generate a CVR used for tabulating the vote. Had the Examiner considered the combination of Brockhouse, Nadaf, and Schneier, the Challenged Claims would not have issued. EX1003, ¶ 257.

As established in the preceding Sections, Brockhouse discloses a system in which a CVR used for tabulation is generated from the OCR (first) data set. EX1015, 16-17; EX1003, ¶¶ 255. Nadaf similarly discloses a voting system that generates a CVR from the OCR (first) data set after a “comparative audit” is performed between the OCR dataset and the data from the decoded barcode. As the Board held in the ‘966 PGR, “the result of Nadaf’s comparative audit—the CVR—is ‘generated from the’ OCR-scan results, as claimed.” EX1015, 48-49 (rejecting PO’s argument “that Nadaf’s equipment 19 does not generate the CVR based on the OCR-created data set.”).

A POSITA would have known that OCR processes can produce errors and, given the importance of ensuring that a CVR is accurate in an official election, a POSITA would have been highly motivated to implement safeguards in Brockhouse’s systems and processes to ensure the OCR data set used to generate a CVR was accurate and authentic before tabulating an election using that CVR.

EX1003, ¶¶ 249-250, 258. Indeed, Brockhouse discloses use of a “security sensor that detects counterfeit ballots and ballots or activation cards that have been tampered with,” though Brockhouse does not disclose the details of such a sensor. *Id.*; EX1004, [0085]. A known way to confirm the accuracy of the PVR and that the PVR has not been tampered with is the use of a one-way hash function, as is taught by Schneier. EX1009, 30 (“[h]ash functions have been used in computer science for a long time.”). *See also* EX1003, ¶ 259. Notably, in the ‘966 PGR, the Board held that a POSITA would have been motivated to use hash functions to “further improve security because it would provide an additional assessment of the ballot’s integrity.” EX1015, 67-70.

Schneier explains that the “point” of a hash function is “to fingerprint the pre-image” or “fingerprinting files.” EX1009, 30-31. The accuracy of the text of the document is readily confirmed because “a single bit change in the pre-image changes, on the average, half of the bits in the hash value.” *Id.* Schneier further explains that using a hash function to confirm the accuracy and integrity of a printed document can be performed at any time, using financial transactions as an example. Schneier explains that hash functions are “particularly useful” in such transactions, as “you don’t want a withdrawal of \$100 to turn into a withdrawal of \$1000 **somewhere in the network.**” *Id.*, 31 (emphasis added). In the context of Brockhouse, the “pre-image” is the PVR and, more specifically, the voter’s vote

selections as represented in the OCR dataset. EX1003, ¶ 261. A POSITA would be motivated to use the hash function of Schneier to confirm the accuracy of the data set used to generate the CVR and to verify the authenticity of the PVR itself given the known and obvious importance of getting the vote selections accurately recorded and submitted for tabulation in any election *Id.*, ¶¶ 261-263.

This is confirmed by Nadaf, which compares the OCR and decoded bar code datasets to confirm the accuracy of the OCR dataset used to generate the audit CVR. As a POSITA would know, the data used to audit an election must be equally as accurate and reliable as the data used to tabulate the election, else the results of the audit will not provide a valid check of the election results. EX1003, ¶ 127. Nadaf further teaches use of an ECDSA which, as a POSITA would know, uses a hash function to generate the digital signature. EX1003, ¶¶ 95, 260. EX1007, 5:10-15. Nadaf also teaches that two bar codes (16) and (17) will be printed on the PVR and each will “provide a **digital signature**, in this case **related to the text of the vote printed on the [PVR]**.” EX1007, 14:15-18 (emphasis added). Equipment 19 in Nadaf subsequently “extract[s] and verif[ies] the digital signatures” in the bar codes. Ex. 1007, 19:7-9. To verify the digital signature “related to the text of the vote” printed on the PVR necessarily requires that the text of the vote—*i.e.* the OCR data set—be subjected to the hashing algorithm in ECDSA. EX1007, 14:15-19; EX1003, ¶ 260.

The use of hash functions to confirm the accuracy of the OCR dataset used to generate the CVR is plainly within the scope of the comparison requirements of the Independent Claims. For example, Claim 18, which depends from Claim 15, specifically requires “confirming an accuracy of an optical character recognition (OCR) by comparing a first hash produced from the first data set to a second hash, wherein the second hash is at least part of the encoded data.” Claim 35, which depends from Claim 34, similarly requires that “comparing the first data set to the second data set [in claim 34] comprises comparing a first hash produced from the first data set to a second hash extracted from the encoded data on the printed vote record.”

Adding Schneier’s hash function and/or Nadaf’s comparison functionality to Brockhouse to confirm the accuracy of the OCR data set before generating the CVR would have required nothing more than the combination of familiar elements according to known methods to yield predictable results. EX1003, ¶ 262-63. Such a solution would have been particularly apt and inexpensive to incorporate into the Brockhouse system as the Brockhouse system already had the ability to: (1) print the voter’s selections on the PVR in voter readable text; (2) encode and print the voter’s vote in a barcode form on the PVR; (3) perform OCR on the scanned voter readable text; and (4) scan and decode the bar code. *Id.*, ¶ 258. *See also* EX1004, Fig. 6.

8. Claim Element 34(i)

**tabulating an election utilizing the cast vote record before
vote auditing**

The final element of Claim 34 merely requires that the cast vote record be tabulated before any audit is conducted. This is the standard practice in elections, and thus plainly would have been obvious to a POSITA at the time of the invention. EX1003, ¶ 264. Indeed, before the vote is tabulated there is nothing to audit. *Id.*

In summary, the Independent Claims would have been obvious to a POSITA at the time of the invention over Brockhouse combined with Nadaf and Schneier. EX1003, ¶ 265. The claims are not patentably distinct from those already found unpatentable by the Board in the '966 PGR. Merely injecting a temporal limitation as to when the CVR is created is nothing more than the application of known techniques to a known device to yield a predictable result. The Independent Claims are not patentable.

D. Dependent Claims 2-14, 16-20, 23-27, 31, 35, 39 and 40 Are Unpatentable as They Would Have Been Obvious to a POSITA

The Dependent Claims do not add anything to the Independent Claims that would have been non-obvious to a POSITA at the time of the invention. The Board should also find these claims unpatentable as obvious under Section 103.

1. Claims 2-6, 16 – “Electronically Scanning” and “Encoded Data”

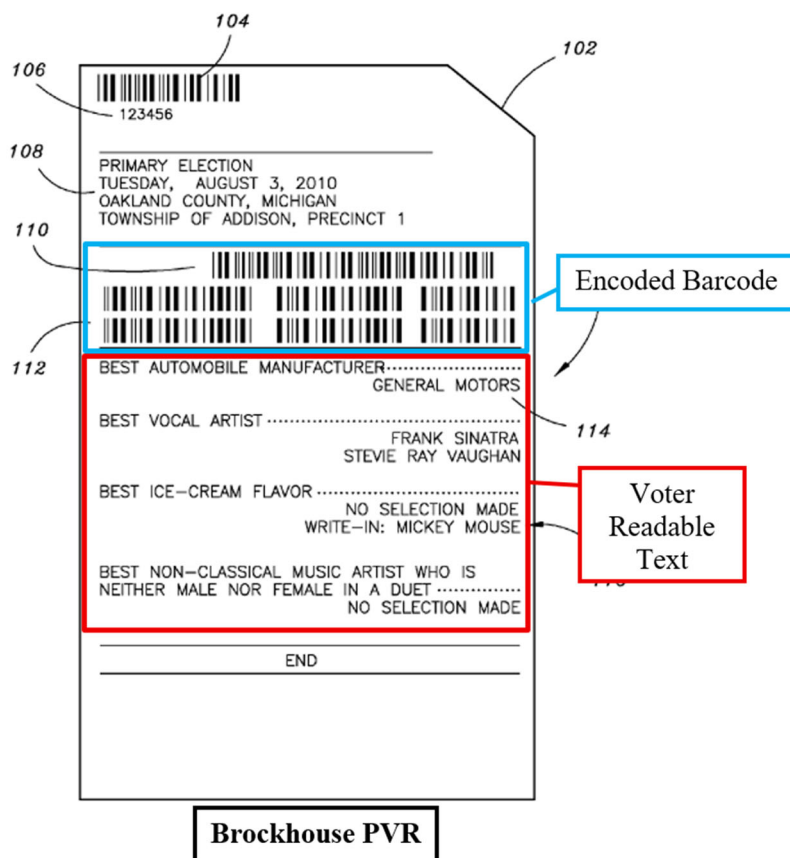
Unlike Independent Claims 15, 29, and 34, Claim 1 does not require that the PVR include encoded data or that the second data set is generated from such encoded data. Claims 2, 3, 5 and 6 depend from Claim 1 and generally include these “encoded data” elements. More specifically, Claim 2 requires that the PVR include “encoded data based at least in part on the voter’s at least one vote selection” and that the “second data set is generated at least in part from the encoded data.” Claim 3 merely requires that the encoded data of Claim 2 be electronically captured. EX1003, ¶¶ 267, 273.

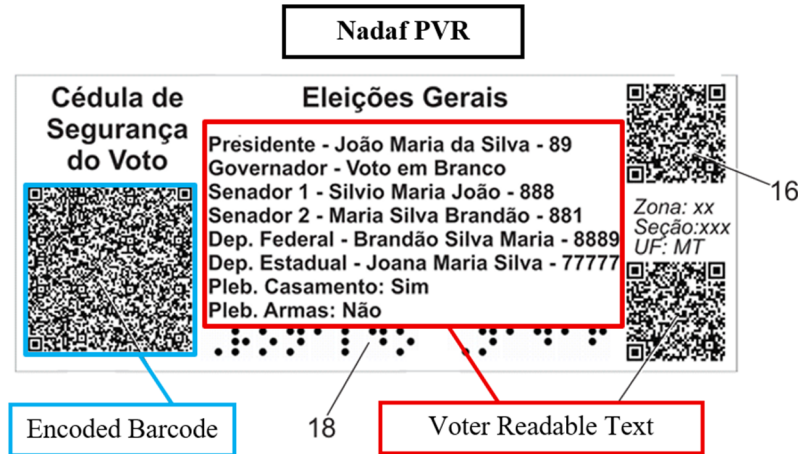
Claim 4 requires electronically capturing the voter readable text by “electronically scanning” the text. This “scanning” requirement was addressed above in Section XI(C)(3) regarding “electronically capturing” information and is unpatentable for the same reasons. Claim 5 depends from Claim 4 and, similar to claims 2 and 3, requires that the PVR include “encoded data based at least in part on the voter’s at least one vote selection” and that the “encoded data” is scanned as part of the “electronically capturing” step. Claim 6 depends from Claim 5 and requires that the “encoded data” is contained in a “visual representation” on the PVR.

Claim 16 depends from Independent Claim 15 and, like Claim 6, requires that the “encoded data” is contained in a “visual representation” on the PVR. A POSITA

would have known that a barcode is a “visual representation” of encoded data. EX1003, ¶ 268.

As discussed above in Section X(C)(5) regarding the Independent Claims, each of Brockhouse and Nadaf include “encoded data,” which includes the voter’s vote selections, in the form of a barcode on the PVR. EX1003, ¶ 269. What follows are exemplary figures from Brockhouse and Nadaf showing the voter readable text corresponding to the voter’s vote selections and the barcode containing, *inter alia*, encoded data representing those vote selections:





EX1007, Fig. 4. *See also id.* at, e.g., 14:7-14 (“The ballot (14) will also show the **complete vote by the voter encoded in a two-dimensional bar code**, which will also contain the digital signatures of the Elections Judge and the other institution auditing the process (15)”) (emphasis added). EX1004, Fig. 6. *See also id.* at, e.g., [0053], [0106] (“Printer 72 prints on activation card 20 the master barcode 110, **vote selection barcodes 112, and vote selections 114 corresponding to the vote selections made by the voter**, as shown in FIG. 6”) (emphasis added). Brockhouse and Nadaf each also teach using a scanner to electronically capture the voter readable text. EX1003, ¶ 270.

Nadaf further teaches scanning the PVR and comparing the OCR dataset with the encoded data in the barcode. Nadaf explains that the ballot can be inserted into an “optical reader”—a scanner— that scans the printed ballot and “compar[es] the text vote information to the vote information encoded into the bar code.” EX1007, 19:7-9. Nadaf thus discloses electronically capturing the encoded data. EX1003, ¶ 271.

Accordingly, each of Claims 2-6 and 16 would have been obvious to a POSITA at the time of the invention. EX1003, ¶¶ 272, 274.

2. Claims 7-9, 12-14 – “Other Information”

Claim 7 requires that the information captured from the PVR include voter readable text indicating a voter’s vote selection and unspecified “other information.” Claim 8 requires that the “other information” of claim 7 is contained in a “bar code.” Claim 9 requires that the “second data set” be based at least in part on the “other information” of Claim 7. EX1003, ¶ 275.

Claim 12 depends from Claim 11¹⁰ and, like Claim 7, requires that the information captured from the PVR also include “other information.” Claim 13 requires that the “other information” of Claim 12 be presented in a barcode, and Claim 14 requires that the “second data set” be based at least in part on the “other information” of Claim 12. EX1003, ¶ 276.

The phrase “other information” does not appear in the specification of the ‘319 Patent. The ‘319 Patent does, however, refer to “additional information” such as a “sequence number data affiliated with a candidate line number data affiliated

¹⁰ Claim 11 is specifically addressed in Section XI(D)(3) below, and merely requires that the CVR of Claim 1 be “the voter’s sole casted vote used for tabulation.” Tabulating an election is, as one would expect, a step performed in every election and thus would have been obvious to a POSITA. See EX1003, ¶ 115, 264.

with a contest, and/or the contest name itself.” EX1001, 5:30-34. As the Board held in the ‘966 PGR, Brockhouse and Nadaf each disclose the capture of “additional information” on the PVR. EX1015, 32-34, 78-80. *See also* EX1003, ¶¶ 277-278.

3. Claims 11, 23, 39, and 40 – “Tabulation” and “Audit”

As the Federal Circuit explained in *Voter Verified*, tabulating votes is one of the fundamental activities that has been the basis of our democracy for hundreds of years. *Voter Verified*, 887 F.3d at 1386. Using a CVR to tabulate the vote, as shown above regarding element 34(h) of Claim 34, would have been obvious to a POSITA at the time of the invention. EX1003, ¶¶ 279-282. It also would have been obvious to a POSITA that only one vote be cast by each voter—*i.e.* that the CVR is the sole casted vote if the CVR is used for such a purpose. *Id.* Claims 11, 23, and 40 are thus unpatentable as obvious over Brockhouse, Nadaf, and Schneier.

Claim 39 simply requires that the PVR be used for auditing the election. Using PVRs for audits has long been known in the art. EX1003, ¶ 281. Nadaf and Brockhouse both disclose such use of PVRs. EX1004, [0056] (“The activation card **20** including the master barcode **110**, vote selection barcodes **112**, and vote selections **114** serves as a voter verifiable, auditable record of a voter's voting selections.”); EX1007, 18:9-14. Claim 39 is thus also unpatentable as obvious.

4. Claims 17, 18, 24, 25, 31, 35 – “Hashes”

Each of these claims generally require the use of a “hash” to confirm the accuracy of the OCR process used in Independent Claims 15, 29 and 34. Claims 17 and 24 require only that the OCR accuracy be confirmed by using a first hash produced from the first data set. Claims 17 and 24 do not specify how the hash is used to confirm accuracy. EX1003, ¶ 283.

Claims 18 and 25 specify that the “first hash” is compared to a “second hash” of “at least part of the encoded data.” Claim 31 requires that the processor of Claim 29 is further configured to “generate an OCR hash from the first data set” and to compare that “OCR hash” to an “encoded hash extracted from the encoded data.” Claim 35 similarly requires comparing the first hash and the second hash as part of the step of “comparing the first data set to the second data set” in Independent Claim 34. EX1003, ¶ 283.

As discussed above, Schneier teaches that one-way hash functions can be used to verify the accuracy and integrity of a printed document. EX1009, 30-31, 38. Nadaf similarly teaches the use of ECDSA, which also uses a hash function. EX1007, 5:10-15. Nadaf further teaches that two bar codes (16) and (17) will be printed on the PVR and each will “provide **a digital signature**, in this case **related to the text of the vote printed on the [PVR].**” EX1007, 14:15-18 (emphasis added). Equipment 19 in Nadaf subsequently “extract[s] and verif[ies] the digital signatures”

in the bar codes. Ex. 1007, 19:7-9. To verify the digital signature “related to the text of the vote” printed on the PVR necessarily requires that the text of the vote—*i.e.* the OCR data set—be subjected to the hashing algorithm in ECDSA. EX1003, ¶¶ 284-285; EX1046, 22 (“3.3 Digital Signature Verification and Validation ... A message digest **shall** be generated on the data whose signature is to be verified (*i.e.*, not on the received digital signature) using the same hash function that was used during the digital signature generation process”) (emphasis in original). Claims 17, 18, 24, 25, 31, and 35 thus would have been obvious to a POSITA at the time of the invention.

5. Claims 19 and 26 – Accuracy of the OCR Process

Claims 19 and 26 require that the comparison of the first data set and a second data set be used to confirm the accuracy of the OCR process. This is done by confirming that the at least one vote selection in the first data set (OCR) matches the at least one vote selection in the second data set (encoded data or barcode). This limitation would have been obvious to a POSITA at the time of the invention. EX1003, ¶ 286.

As established above, a POSITA would have known that OCR processes are error prone. Section VII(B), *supra*. See also EX1003, ¶ 287. A POSITA using the voting systems and processes disclosed by Brockhouse, wherein the CVR is generated from the OCR dataset resulting from the scan of the voter readable text,

would have been motivated to implement error correction processes and safeguards to ensure the accuracy of that dataset. *Id.* One such known method is taught by Nadaf, which discloses comparing the OCR dataset and the encoded data to confirm that accuracy of the vote record. *Id.*; EX1007, 19:1-15. Brockhouse includes both the voter readable text and the barcode on its PVR, and scanning both and comparing the resulting datasets would have been nothing more than applying known techniques to known devices to yield a predictable result. EX1003, ¶¶ 287-288.

6. *Claims 20 and 27 – CVR Based on First Data Set*

Claims 20 and 27 each requires that the “cast vote record is based on the first data set” of Claim 15. This limitation is similar to the limitations of Independent Claims 29 and 34, which require that the CVR is based on the “first data set.” For the reasons explained above regarding Claims 29 and 34, this limitation would have been obvious to a POSITA at the time of the invention based on the combination of Brockhouse, Nadaf, and Schneier. Section VII(C)(7), *supra*. See also EX1003, ¶ 289.

XII. GROUND 3: CHALLENGED CLAIMS 21, 22, 28, 30, 32, 33, 36, 37, AND 38 ARE INVALID FOR LACK OF WRITTEN DESCRIPTION AND LACK OF ENABLEMENT UNDER 35 U.S.C. § 112

Each of Challenged Claims 21, 22 and 28 require “recursively modifying an OCR process applied to the voter readable text.” Challenged Claims 30, 32, 33, 36, 37, and 38 require “recursively modify[ing] the first data set.” Claims 33 and 38

further require that “recursively modify[ing] the first data set” by “selecting a valid alternate OCR output.” Claims 21, 22, 28, 30, 32, 33, 36, 37 and 38 are collectively referred to herein as the “Recursive Claims.” Each of the Recursive Claims is invalid under Section 112 for lacking written description support and not being enabled. EX1003, ¶¶ 293, 295.

Section 112(a) provides:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

“[T]he hallmark of written description is disclosure.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). A specification adequately describes an invention when it “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* at 1351. The specification under 112(a) must also “enable the full scope of a claimed invention.” *AK Steel Corp. v. Sollac and Ugine*, 344 F.3d 1234, 1241 (Fed. Cir. 2003).

No form of the word “recursive” appears in the specification of the ‘319 Patent or any of its parent applications. EX1001, *generally*; EX1003, ¶¶ 292, 294-295. Nor is there any mention in the specification of “modifying” a data set. As is true of “recursive,” neither of the words “modify” or “modifying” appear in the

specification of the '319 Patent. In addition to the lack of disclosure of “recursively modifying” anything in the '319 Patent, there is also no disclosure of selecting or even generating alternate OCR outputs. *Id.*, ¶ 296. As the '319 Patent and its parent applications provide no insight as to the meaning of the term “recursive,” a POSITA would rely on its plain and ordinary meaning in the computer sciences. *Id.*, ¶ 294.

The plain and ordinary meaning of the term “recursive” is a process or procedure that calls itself. EX1003, ¶¶ 135-145. *See also* EX1049 (Microsoft Computer Dictionary), 443 (“The ability of a routine to call itself”); EX1050 (Barron’s Dictionary of Computer and Internet Terms), 397 (“the calling of a procedure by itself, creating a new copy of the procedure”); EX1051 (Ridgon’s Dictionary of Computer and Internet Terms), 6 (“The ability of a routine to call itself”). As an example, the following function definition is a simple recursive definition of the series 1, 2, 4, 8, 16, ..., i.e., the powers of two:

$$a(1) = 1; a(n) = 2 a(n-1);$$

EX1003, ¶ 138. The “recursive” part is the fact that in order to calculate $a(n)$ one must first calculate $a(n-1)$. Thus, the function calls itself. *Id.*

Nothing in the '319 Patent or its parent applications discloses, or even hints at, any procedure calling itself, despite the use of “recursively modifying” in the claims. EX1003, ¶¶ 295-296. This is true both for “recursively modifying an OCR process” and “recursively modifying a first data set.” No recursion is disclosed in

the '319 Patent and a POSITA would not have understood the inventors of the '319 Patent to have been in possession of any recursive invention nor enabled a POSITA to use a “recursive” invention. *Id.*, ¶ 297.

If the Board does not adopt Petitioner’s proffered construction of “recursively modifying,” and instead construes the term to mean “iteratively modifying,” Claims 21, 22, and 28 would still be unpatentable under § 112. EX1003, ¶ 299. There is no disclosure in the '319 Patent of modifying an OCR process in any way, let alone a specific disclosure of “iteratively” modifying an OCR process. Given this dearth of disclosure, a POSITA at the time of the invention would not know how to implement such an “iterative” modification of an OCR process. *Id.*, ¶ 297.

XIII. GROUND 4: CHALLENGED CLAIMS 30, 32, 33, 36, 37, AND 38 ARE INVALID AS OBVIOUS UNDER 35 U.S.C. § 103

Claims 30, 32, and 33 depend from Independent Claim 29 and require that the processor is configured to “recursively modify the first data set.” Claims 36-38 depend from Independent Claim 34 and similarly require “recursively modifying the first data set.” As established in Ground 3 above, these Recursive Claims lack written description support and are not enabled under the Petitioner’s plain and ordinary meaning construction of the term “recursively modifying.” EX1003, ¶ 297.

If the Board construes “recursively modify[ing]” as used in Claims 30, 32, 33, and 36-38 to mean “iteratively modifying,” these Claims would have been invalid as obvious under Section 103 to a POSITA at the time of the invention over

Brockhouse, Nadaf, Schneier, and Heilper. The motivation to combine Brockhouse, Nadaf, and Schneier was addressed above in Section VII(B). A POSITA also would have been motivated to incorporate the OCR correction procedures of Heilper as a POSITA would have known that OCR processes are error-prone. EX1003, ¶¶ 302-303. Indeed, the Board in the ‘966 PGR held in its FWD that: (1) a POSITA would have been motivated to combine Heilper with each of Brockhouse and Nadaf; (2) the combinations would have been within the level of ordinary skill in the art; and (3) a POSITA would have had a reasonable expectation of success in making the combination. EX1015, 17-28, 34, 58-60, 73-76. *See also* EX1003, ¶ 303-04.

The only “modification” of the first data set disclosed in the ‘319 Patent involves successively correcting entries in the first data set by minimizing the Levenshtein distance between the entry and the elements of an election dictionary. EX1001, 2:11-41; 7:46-63; EX1003, ¶ 296. Heilper discloses an approximate string-matching algorithm, including the same Levenshtein algorithm used in the ‘319 Patent, to compare successive OCR’d words to a dictionary. EX1005, 1:21–40; EX1003, ¶ 302. Comparing successive OCR’d words to a dictionary for correction is “iteratively modifying” the first data set. *Id.*

XIV. CONCLUSION

For the reasons stated above, Petitioner submits that claims 1-40 of the '319 Patent are unpatentable.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

Under 37 C.F.R. § 42.6(e), the undersigned certifies that on July 17, 2025, a copy of the foregoing PETITION FOR POST GRANT REVIEW OF U.S. PATENT NO. 12,125,319, Petitioner's Power of Attorney, and all associated exhibits were served in their entirety on the following counsel of record for Patent Owner via Priority Mail Express or by means at least as fast and reliable as Priority Mail Express:

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**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME
REQUIREMENTS UNDER 37 C.F.R. § 42.24**

Under 37 C.F.R. § 42.24(d), the undersigned certifies that this PETITION FOR POST GRANT REVIEW OF U.S. PATENT NO. 12,125,319 complies with the type-volume limitation of § 42.24(a)(1)(ii) because it contains 18,646 words, excluding the parts of the Petition exempted by § 42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(2)(ii) and the type style requirements of 37 C.F.R. § 42.6(a)(2)(iii) and (iv).

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