

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BAZOOKA-FARMSTAR, LLC,

Petitioner

v.

NUHN INDUSTRIES LTD.,

Patent Owner

Case No. IPR2023-01161

Patent No. 11,358,425

**DECLARATION OF DOUGLAS S. PRAIRIE REGARDING
PATENT OWNER'S MOTION TO AMEND**

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I. INTRODUCTION

I, Douglas S. Prairie, declare as follows:

1. I have been retained by Nuhn Industries Ltd. (“Patent Owner” or “Nuhn”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“USPTO”) regarding U.S. Patent No. 11,358,425 (“the ‘425 Patent”). I have been asked to consider whether certain references disclose or suggest the features recited in Substitute Claims 22-42 of the ‘425 Patent.

2. I am being compensated at my typical rate of \$325 per hour for the time I spend on this matter. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

II. BACKGROUND AND QUALIFICATIONS

3. I am an agricultural engineer with over 25 years of experience in machine design and product development solutions, specializing in off-highway and agriculture machinery systems.

4. I grew up on a family grain and livestock farm in southern Minnesota where I operated tractors, tillage equipment, skid steers, and manure handling and spreading equipment. My father was a professional mechanic, so we serviced and repaired most of the machinery on our family’s operation. I have in-laws who own and operate an 800 head dairy farm near Sioux Falls, South Dakota. I have worked at their dairy farm many times over the past 25 years helping with feeding, equipment maintenance, harvest, tillage, and working with their manure systems. The lagoon on their dairy farm is typical of most lagoons of their herd size in the upper Midwest. It is an earthen style structure with steep side walls and a shallower concrete apron where the tractor and power take-off (“PTO”) powered agitator can be backed into the lagoon to agitate prior to the manure being pumped out. The lagoon often crusts over and has a fence around it to minimize the chance for someone to inadvertently walk on a surface that could easily be mistaken for a weedy

pasture. My father-in-law always makes sure to remind me of the hazards of the lagoon when my children might happen to be playing near that area of the farm. Fall harvest operations keep everyone busy with their operations, so they often hire a commercial manure applicator to pump the lagoon out and spread or knife in the manure on their harvested ground prior to fall tillage. The commercial manure applicator sometimes brings a floating manure agitator to speed up the lagoon agitation process and produce a more homogenous manure product. The lagoon is pumped out annually in the fall and quite often during the summer months after alfalfa harvest.

5. I am currently employed in Brookings, South Dakota as a lecturer at South Dakota State University (“SDSU”) in the Agriculture and Biosystems Engineering (“ABE”) Department. SDSU is a premier land grant research and teaching institution and is the first in the country to offer a four-year Precision Agriculture Degree. Courses I am responsible for involve every aspect of the design, operation, service, and ownership of agriculture machinery systems, including livestock manure management technologies. My students include Agriculture and Biosystems Engineers, Mechanical Engineers, Electrical Engineers, Agriculture Technology students and Precision Agriculture students. These students enter the workforce into a wide variety of career paths including design of agriculture machinery systems, design of livestock structures, design of manure management systems, livestock farm owners and operators, plus many other agriculture careers such as commercial manure applicators.

6. Prior to joining SDSU in August of 2016, I was employed within the agriculture and construction equipment industry for 20 years in roles ranging from design engineering to product and sales management. My experience includes design of planting and seeding equipment, design of concrete placing and cutting equipment, construction project management, design of high horsepower trash pumps, product/sales management of precision agriculture control systems, and research on cellulosic ethanol production systems.

7. In December of 2004, I received a master's degree from Boise State University in Mechanical Engineering, and in May of 1997, I received a bachelor's degree from SDSU in

Agricultural Engineering with a Power and Machinery Focus.

8. I am a registered Professional Engineer in the State of Idaho.

9. I have designed and developed a wide variety of agricultural and construction equipment including planting and seeding equipment, precision agriculture control systems, concrete power trowels, concrete saws, and high horsepower job site trash pumps. One of the courses I lead at SDSU is a two-semester Capstone Design course for our senior ABE students. Students that select the Natural Resource tract of the ABE program often work on projects related to the design of agriculture livestock structures and livestock waste management systems. These capstone projects are sponsored by regional livestock farmers, so the students obtain exposure to actual, modern-day livestock industry design challenges.

10. I am the named inventor on 8 patents and 1 pending patent application. These patents are generally directed to seed delivery systems, agricultural implements, and concrete machinery.

11. I have consulted as an expert witness on previous intellectual property disputes involving patents. My work in this capacity has included, among other things, reviewing and analyzing accused products, reviewing and analyzing patents, writing expert reports, and providing deposition testimony.

12. A copy of my curriculum vitae, a list of my patents and patent applications, and a list of the cases I have worked on as an expert witness are attached as EX2005.

III. MATERIAL CONSIDERED AND SUMMARY OF OPINIONS

13. The opinions contained in this Declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding agricultural equipment, farming operations, and manure lagoons.

14. In reaching the opinions and conclusions discussed herein, I reviewed, considered, and/or relied upon the following materials:

Declaration of Douglas S. Prairie Regarding Motion to Amend – August 6, 2024
U.S. Patent No. 11,358,425

<i>Exhibit #</i>	<i>Description</i>
--	Bazooka-Farmstar, LLC's Petition for IPR2023-01161
1001	U.S. Patent No. 11,358,425 ("the '425 Patent")
1002	Prosecution History of U.S. Patent No. 11,358,425
1003	Curriculum Vitae of Eric Winkel
1004	Declaration of Eric Winkel, dated June 29, 2023 ("Winkel Decl.")
1005	U.S. Patent Application Publication No. 2012/0185129 ("Carrier")
1006	DOROTEA MEKANISKA AB, TRUXOR AMPHIBIAN TOOL CARRIER ("Truxor")
1007	Declaration of Jan David Arnoldsson, dated February 26, 2023
1008	Declaration of Reidar Olofsson, dated February 27, 2023
1009	Declaration of Nathaniel E Frank-White, dated December 12, 2022
1010	KR Publication No. 20130016490 ("Yoon")
1011	English Translation of Yoon (EX1010) and Declaration of Taylor Liff, dated June 7, 2023
1012	SENWATEC-SCHRÖER UMWELT-& GEWÄSSERTECHNOLOGIE GMBH & CO. KG, LIGHT AMPHIBIOUS BOAT/VEHICLE "AMPHI-KING®" SWT--AB380 ("SenwaTec")
1013	Declaration of Ansgar Lonnemann, dated June 15, 2023
1014	U.S. Patent Application Publication No. 2014/0112093 ("Puck")
1015	U.S. Patent No. 7,314,395 ("Bryham")
1016	U.S. Patent Application Publication No. 2014/0288763 ("Bennett")
1017	U.S. Patent Application Publication No. 2021/0331752 ("Bennett-II")
1018	U.S. Provisional Patent Application No. 61/805,133 ("the '133 Provisional")
1019	Ron Lyseng, Float your boat in a slurry moat, THE WESTERN PRODUCER, dated August 29, 2013 ("Lyseng")
1020	U.S. Patent No. 7,478,817 ("Carrier-II")
1021	DOROTEA MEKANISKA AB, TRUXOR AMPHIBIAN TOOL CARRIER (2013) ("Truxor-II")
1022	DOROTEA MEKANISKA AB, TRUXOR AMPHIBIAN TOOL CARRIER (2013) ("Truxor-III")
1023	DOROTEA MEKANISKA AB, TRUXOR AMPHIBIAN TOOL CARRIER ("Truxor-IV")

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1024	Russian Patent Application No. 2012137830/11 (“Melnikov”)
1025	English Translation of Melnikov (EX1024) and Declaration of Samuel Goldfarb, dated June 7, 2023
1026	Johanna Kaschik, Der Frosch als Vorbild, HNA (August 25, 2011), https://www.hna.de/lokales/rotenburg-bebra/frosch-vorbild-1376974.html
1027	English Translation of Der Frosch als Vorbild (EX1026) and Declaration of Beverly Santamaria, dated June 8, 2023
1028	Screenshots from UD Umwelt-Dienste GmbH Amphi-King Manure Pumping Video
1029	U.S. Patent No. 8,944,758 (“the ‘758 Patent”)
1030	U.S. Provisional Patent Application No. 61/867,598 (“the ‘598 Provisional”)
1031	International Publication of PCT Application No. PCT/CA2014/050,789 (“the ‘789 PCT”)
1032	Notification of the International Application Number and International Filing Date of PCT Application No. PCT/CA2014/050,789
1033	Excerpts of Prosecution History of U.S. Patent No. 9,694,636
1034	Excerpts of Prosecution History of U.S. Patent No. 10,124,638
1035	Excerpts of Prosecution History of U.S. Patent No. 10,710,422
1036	Excerpts of Prosecution History of U.S. Patent No. 10,974,557
1037	Excerpts of Reexamination History of U.S. Patent No. 10,974,557
1038	Excerpts of Reexamination History of U.S. Patent No. 11,358,425
1039	Stipulation Regarding Invalidity Contentions Filed in the ‘015 Litigation
1040	NE. REG’L AGRIC. ENG’G SERV., LIQUID MANURE APPLICATION SYSTEMS DESIGN MANUAL (1998)
1041	DONALD L. PFOST & CHARLES D. FULHAGE, U. MO. EXTENSION, LAND APPLICATION EQUIPMENT FOR LIVESTOCK AND POULTRY MANURE MANAGEMENT (2001) (“Pfof I”)
1042	DONALD L. PFOST & CHARLES D. FULHAGE, U. MO. EXTENSION, BEEF MANURE MANAGEMENT SYSTEMS IN MISSOURI (2000) (“Pfof II”)
1043	William F. Wright, <i>Dairy Manure Particle Size Distribution, Properties, and Implications for Manure Handling and Treatment</i> , in 2005 ASAE ANN. INT’L MEETING (2005) (“Wright”)
1044	EFFECTS OF LIQUID VISCOSITY ON ROTODYNAMIC (CENTRIFUGAL AND VERTICAL) PUMP PERFORMANCE (AM. NAT’L STANDARDS INST. 2010) (“ANSI Viscosity”)

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1045	Ole Thygesen et al., <i>Indicators of Physical Properties and Plant Nutrient Content of Animal Slurry and Separated Slurry</i> , 5(3) BIOLOGICAL ENG'G TRANSACTIONS 123 (2012)
1046	Randy L. Beaver, William E. Field, <i>Summary of Documented Fatalities in Livestock Manure Storage and handling Facilities—1975-2004</i> , 12 J. AGROMEDICINE 3 (2007)
1047	ROBBIN MARKS, NAT'L RES. DEF. COUNCIL AND THE CLEAN WATER NETWORK, CESSPOOLS OF SHAME (2001)
1048	Dwight D. Bowman & Jeffrey C. Burnham, <i>Manure Pathogens: Real Issues and Real Risks</i> , in PROCEEDINGS OF THE WATER ENV'T FED'N 694 (2000)
1049	U.S. Ctr. for Disease Control, <i>Fatalities Attributed to Entering Manure Waste Pits -- Minnesota, 1992</i> , 42 MORBIDITY & MORTALITY WKLY REP. 325 (1993)
1050	U.S. CTR. FOR DISEASE CONTROL, NAT. INST. FOR OCCUPATIONAL SAFETY AND HEALTH, PREVENTING DEATHS OF FARM WORKERS IN MANURE PITS, Publ. No. 90-103 (1990)
1051	U.S. GOV'T ACCOUNTABILITY OFF., GAO-05-96, WORKPLACE SAFETY AND HEALTH: SAFETY IN THE MEAT AND POULTRY INDUSTRY, WHILE IMPROVING COULD BE FURTHER STRENGTHENED (2005)
1052	SIDUO ZHANG, NAT'L COLLABORATING CTR. FOR ENV'T HEALTH, AIR QUALITY AND COMMUNITY HEALTH IMPACT OF ANIMAL MANURE MANAGEMENT (2011)
1053	MANURE STORAGE SAFETY ASAE EP470 JAN1992 (AM. SOC'Y OF AGRIC. AND BIOLOGICAL ENG'GS 2005)
1054	MIDWEST PLAN SERV., LIVESTOCK WASTE FACILITIES HANDBOOK (3d ed. 1993)
1055	C.A. Loto & A.P.I Popoola, <i>Environmental Surface Degradation of Galvanised and Mild Steels in Cattle and Poultry Wastes and Urea Solution</i> , 6(13) INT'L J. PHYS. SCI. 3074-81 (2011)
1056	L.M. Safley, Jr. & P.W. Westerman, <i>Corrosion of Galvanized Steel in Animal Waste Environments</i> , 40 BIORESOURCE TECH. 53 (1992)
1057	FRANK YEAPLE, FLUID POWER DESIGN HANDBOOK (3d ed. 1995)
1058	Charles D. Fulhage, <i>Solids Removal from Livestock Manure Lagoons</i> , U. MO. EXTENSION (Nov. 1995), https://extension.missouri.edu/publications/wq324
1059	U.S. Patent No. 613,809
1060	ED ODGERS ET AL., MANURE GAS SAFETY: REVIEW OF PRACTICES AND RECOMMENDATIONS FOR WISCONSIN LIVESTOCK FARMS (2008)
1061	U.K. Patent App. No. 2,366,218

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1062	U.S. DEP'T AGRIC., <i>Agricultural Waste Characteristics</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 4 (2008)
1063	U.S. DEP'T AGRIC., <i>Agricultural Waste Management System Component Design</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 10 (2009)
1064	U.S. DEP'T AGRIC., <i>Waste Utilization</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 11 (2013)
1065	U.S. DEP'T AGRIC., <i>Waste Utilization</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 11 (1996)
1066	U.S. DEP'T AGRIC., <i>Waste Management Equipment</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 12 (2011)
1067	U.S. DEP'T AGRIC., <i>Operation, Maintenance, and Safety</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 13 (2011)
1068	Scheduling and Trial Setting Order in the '015 Litigation (Dkt. 76)
1069	Declaration of Michael A. Erbele
1070-1080	Intentionally Left Blank
1081	Complete copy of UD Umwelt-Dienste GmbH Amphi-King Manure Pumping Video (EX1028)
1082	English Translation of UD Umwelt-Dienste GmbH Amphi-King Manure Pumping Video (EX1081) and declaration of Ute von Wietersheim, Dated January 31, 2024
1083	<i>Gequirlter Klärschlamm</i> , MAIN POST, https://www.mainpost.de/regional/main-spessart/gequirlter-klaerschlam-art-5778615 (last updated Oct. 15, 2010)
1084	English Translation of <i>Gequirlter Klärschlamm</i> (EX1083) and declaration of Ute von Wietersheim, Dated January 27, 2024
1085	<i>Custom Applicator Uses Dredge to Pump Lagoons</i> , 33 FARM SHOW MAG., no. 4, 2009, at 9
1086	Don D. Jones et al., <i>Closure of Earthen Manure Structures (Including Basins, Holding Ponds and Lagoons)</i> , in ANIMAL AGRICULTURE AND THE ENVIRONMENT: NATIONAL CENTER FOR MANURE AND ANIMAL WASTE MANAGEMENT WHITE PAPERS (J. M. Rice, et al., ed., 2006)
1087	U.S. Patent No. 6,922,922
1088	MANURE MANAGER, Jan./Feb. 2011 (Manure-Manager)
1089	MANURE MANAGER, July/Aug. 2011 (Manure-Manager-II)
1090	Fisher Pumps, Inc., FISHER PUMPS

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1091	Declaration of Royal Burrows, Dated June 21, 2023
1092	Bazooka's Initial Invalidity Contentions
1093	Declaration of Eckhard Funck, Dated March 12, 2024
1094	English Translation of Declaration of Eckhard Funck
1095	Declaration of Reinhard Speerschneider, Dated May 9, 2024
1096	English Translation of Declaration of Reinhard Speerschneider
1097	S. C. Jett et al., <i>Size Distribution and Nutritional Value of Swine Manure Separates</i> , 17(5) TRANSACTIONS OF THE ASAE 965 (1974)
1098	Claire E. Marcato et al., <i>Particle size and metal distributions in anaerobically digested pig slurry</i> , 99(7) BIORESOURCE TECHNOLOGY 2340 (2008)
1099	Deanne Meyer et al., <i>Particle Size and Nutrient Distribution in Fresh Dairy Manure</i> , 23(1) APPLIED ENGINEERING IN AGRICULTURE 113 (2007)
1100	MIDWEST PLAN SERVICE, LIVESTOCK WASTE FACILITIES HANDBOOK (3d ed. 1998)
1101	Conrad B Gilbertson et al., <i>Pumping Liquid Manure from Swine Lagoons and Holding Ponds</i> , in PORK INDUSTRY HANDBOOK (1984)
1102	William L. Kranz et al., <i>Application of Liquid Animal Manures Using Center Pivot Irrigation Systems</i> , U. NEB. EXTENSION (May 10, 2007)
1103	T. M. Verna and L. A. Prieto-Portar, <i>A Simple Method of Risk/Hazard Assessment in Dredging</i> , WESTERN DREDGING ASSOCIATION TECHNICAL CONFERENCE AND TEXAS A&M UNIVERSITY DREDGING SEMINAR 233 (June, 2012)
1104	<i>Dredger Accidents</i> , MARITIME INJURY GUIDE, https://www.maritimeinjuryguide.org/maritime-accidents-injuries/vessel-injuries/dredger/ (last visited June 24, 2024)
1105	<i>Most Dangerous Join in the U.S.</i> , INDUSTRIAL SAFETY & HYGIENE NEWS, https://www.ishn.com/articles/110496-most-dangerous-jobs-in-the-us-the-top-20 (last visited June 24, 2024)
1106	ERIC C. TUPPER, INTRODUCTION TO NAVAL ARCHITECTURE 71 (5th ed. 2013)
1107	DONALD F. YOUNG ET AL., A BRIEF INTRODUCTION TO FLUID MECHANICS 141-142 (Penny Perrotto et al. eds., 2d ed. 2001)
1108	Deposition Transcript of Ian Nuhn, Taken on May 30, 2024
1109	Declaration of Eric Winkel, Dated June 27, 2024
1110	Deposition Transcript (Rough) of Douglas Prairie, Taken on June 25, 2024
2001	Petitioner's <i>Ex Parte</i> Reexamination Requests for U.S. Patent No. 11,358,425 and U.S. Patent No. 10,974,557

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2002	Decision Granting Patent Owner’s Petition for an Unintentionally Delayed Priority Claim in U.S. Patent. No. 10,124,638
2003	U.S. Patent No. 4,594,006 to Depeault (“Depeault”)
2004	Expert Declaration of Douglas S. Prairie (cited here for completeness)
2005	Curriculum Vitae of Douglas S. Prairie and Case List (cited here for completeness)
2006	Screenshots from Patent Owner’s YouTube Channel of Patented Product, retrieved on 10-2-23 from https://www.youtube.com/watch?v=fEgvvq9HZkk
2007	Screenshots from Petitioner’s YouTube Channel of Accused Product, retrieved on 10-2-23 from https://www.youtube.com/watch?v=3y3bSJJUOps
2008	Screenshots from Progressive Dairyman YouTube Channel of 2014 Manure Lagoon Agitation Boat Demonstration, published on 7-9-14 by Progressive Dairy, retrieved on 10-2-23 from https://www.youtube.com/watch?v=FXRS-9Ip1pE
2009	Patent Classification List for U.S. Patent No. 11,358,425, retrieved on 10-4-23 from https://patents.google.com/patent/US11358425B1/en?q=US11358425
2010	U.S. Patent No. 4,406,413 to Houle (“Houle”)
2011	U.S. Patent No. 7,833,071 to Gaither (“Gaither”)
2012	U.S. Patent No. 5,176,098 to Royle (“Royle”)
2013	U.S. Patent No. 9,462,741 to Puck (“Puck-II”)
2014	U.S. Patent No. 9,572,297 to Puck (“Puck-III”)
2015	DE2364962 to Kronseder (“Kronseder”)
2016	DE3431345 to Lüllmann (“Lüllmann”)
2017	CA2002619 to Depault (“Depault-II”)
2018	U.S. Patent No. 10,118,138 to Tews (“Tews”)
2019	DANIEL L. PFOST ET AL., UNIV. OF MO. EXTENSION, ANAEROBIC LAGOONS FOR STORAGE/TREATMENT OF LIVESTOCK MANURE (Oct. 2000)
2020	Screenshots from 2023 North American Manure Expo Website, retrieved on 10-2-23 from https://www.manureexpo.ca/
2021	Dictionary Definitions of “Dredging” and “Agitation”, retrieved on 9-30-23 from https://en.wikipedia.org/wiki/Dredging , https://www.merriam-webster.com/dictionary/dredging#dictionary-entry-1 , https://www.merriam-webster.com/dictionary/agitation , and https://www.lagoonpumping.com/articles-resources/agriculture-articles/manure-articles/
2022	ENVTL. PROT. AGENCY, PRIMER FOR MUNICIPAL WASTEWATER TREATMENT SYSTEMS (Sept. 2004)

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2023	U.S. DEP’T AGRIC., <i>Agricultural Waste Management Systems</i> , in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK ch. 9 (Dec. 2011)
2024	Screenshot of 2023 Commercial Manure Applicator Certification, retrieved on 10-3-23 from https://elearning-dnr.iowa.gov/course/index.php?categoryid=2
2025	JOSEPH AKYEAMPONG ET AL., <i>Evaluation of hydraulic excavator Human-Machine Interface concepts using NASA TLX</i> , 44 INT’L J. OF INDUS. ERGONOMICS 374, 374–82 (2014)
2026	Screenshots of 2023 Truxor Website, retrieved on 10-1-23 from https://truxor.com/en/catalog/node/products and https://truxor.com/en/catalog/node/products-truxor-machines
2027	Screenshots of 2023 Berky (formerly SenwaTec) Website, retrieved on 10-4-23 from https://www.berky.de/en/berky-nereus-240-amphi/
2028	CHRISTIAN HAAS ET AL., <i>Practical Evaluation of a Control Concept for a Remote Controlled 1.8T Excavator Using a 3D Input Device</i> , BATH/ASME 2022 Symposium on Fluid Power and Motion Control, ISBN: 978-0-7918-8633-5, FPMC2022-88959, V001T01A012-1 thru V001T01A012-7 (2022)
Paper 12	Decision Granting Institution of Inter Parties Review (IPR2023-01161) (the “Institution Decision”)
2030	K. Smith et al., <i>Natural Crusting Of Slurry Storage As An Abatement Measure For Ammonia Emissions On Dairy Farms</i> , 97 Biosystems Engineering 464 (2007)
2031	Printout of Bazooka’s webpage for its Wolverine Agitation Boat at: https://www.bazookafarmstar.com/equipment/wolverine-agitation-boat/
2032	Bazooka’s brochure for the Bazooka Wolverine Agitation Boat from: https://www.bazookafarmstar.com/wp-content/uploads/2023/01/Cutsheet-Wolverine-1.pdf .
2033	H. Landry et al., <i>Physical and Rheological Properties of Manure Products</i> , APPLIED ENGINEERING IN AGRICULTURE, at 278 (2004)
2034	<i>Hydrostatic Pto’s Run in Reverse</i> , FARM SHOW, Vol. 1 No. 5, 1977
2035	Brochure for MY2017 of Nuhn’s Gen 1 Lagoon Crawler
2036	Operator’s/Safety Manual for the MY2017 of Nuhn’s Gen 1 Lagoon Crawler
2037	Parts Catalog for Nuhn’s Gen 1 Lagoon Crawler
2038	Brochure for Nuhn’s Gen 1 Lagoon Crawler
2039	Brochure for MY2018 of Nuhn’s Gen 2 Lagoon Crawler
2040	Operator’s/Safety Manual for the MY2019 of Nuhn’s Gen 2 Lagoon Crawler
2041	Parts Book for the MY2018 of Nuhn’s Gen 2 Lagoon Crawler
2042	Brochure for Gen 2 Lagoon Crawler

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2043	Brochure for MY2022 of Nuhn's Gen 3 Lagoon Crawler
2044	Operator's/Safety Manual for the MY2020 of Nuhn's Gen 3 Lagoon Crawler
2045	Parts catalog for the MY2021 of Nuhn's Gen 3 Lagoon Crawler
2046	Brochure for Nuhn's Crawler X
2047	Parts Catalog for the MY2022 of Nuhn's Crawler X
2048	U.S. Provisional Patent Application No. 63/040,562 filed June 18, 2020
2049	U.S. Provisional Patent Application No. 63/104,887 filed October 23, 2020
2050	U.S. Patent Application Publication US 2021/0394571 published December 23, 2021
2051	Notice of Allowance in U.S. Application No. 17,590,125, Mailed April 22, 2022.
2052	Notice of Intent to Issue Ex Parte Reexamination Certificate, Control No. 90/019,107, Mailed November 2, 2022.
2053	Print No. 1 of Nuhn YouTube Video - "Nuhn Lagoon Crawler Unrivaled Lagoon Agitation!", accessed at https://www.youtube.com/watch?v=fEgvvq9HZk
2054	Lagoon Crawler Prototype Brochure, Aggressive Agitation
2055 (Under Seal)	Lagoon Crawler Sales Report - Consolidated Totals
2056 (Under Seal)	Lagoon Crawler Sales Report - 2014-2017.5
2057 (Under Seal)	Lagoon Crawler Sales Report - 2018-2019
2058 (Under Seal)	Lagoon Crawler Sales Report - 2020-2023
2059 (Under Seal)	Lagoon Crawler Sales Report - X Models
2060	Print No. 2 of Nuhn YouTube Video - "Nuhn Lagoon Crawler Unrivaled Lagoon Agitation!", accessed at https://www.youtube.com/watch?v=fEgvvq9HZk
2061	New Lagoon Crawler Demos Will Satisfy Curiosity, Canada's Outdoor Farm Show Official Show Guide for September 9-11, 2014 in Woodstock, Ontario
2062	H.Rivers, Farm show opens with a splash, The Beacon Herald(Sept. 10, 2014)
2063	B.Shypula, Transforming farming, The London Free Press (Sept.9, 2013))

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2064	B.Shypula, Crawler makes manure almost sexy, The BeaconHerald (Sept. 6, 2013)
2065	30th Annual AMC Engineering Conference Brochure for May 5-7, 2015 in Waterloo, Iowa
2066	Certificate of Services Awarded to Ian Nuhn
2067	M.Beitz, Crawler is turning heads, The Beacon Herald at A2(Jan. 30, 2014)
2068	C.Elmore, Innovative Uses of Horsepower – A real crapshoot,Diesel Progress North American Edition (Dec. 2014)
2069	D.Rankin, Nuhn Industries celebrates employees at expansiongrand opening, 100th lagoon crawler unveiling, St. MarysIndependent (Aug. 7, 2015)
2070	B.Reid, Agitator has reclaimed manure lagoons around theworld, Ontario Farmer (Aug. 18, 2015)
2071	L.Cudworth, Nuhn marks major milestone, The London FreePress (Aug. 11, 2015)
2072	L.Cudworth, Marking a major milestone, The Stratford BeaconHerald (Aug. 7, 2015)
2073	J.Algie, Made-in-Sebringville lagoon crawler to be featured onDiscovery Channel, Betterfarming.com (Sept. 2, 2015)
2074	B.Reid, Self-propelled, Western Dairy Farmer (Oct. 2015)
2075 (Under Seal)	March 21, 2022 Email to Nuhn re: Licensing Lagoon Crawler Technology
2076 (Under Seal)	Nuhn Invoice to Eldon C. Stutsman, Inc. (Sept. 9, 2015)
2077 (Under Seal)	Nuhn Invoice to Eldon C. Stutsman, Inc. (June 20, 2020)
2078 (Under Seal)	Nuhn Invoice to Eldon C. Stutsman, Inc. (Sept. 28, 2020)
2079	Print of Bazooka's YouTube Video - "Meet the Wolverine Agitation Boat," accessed at https://www.youtube.com/watch?v=ehAHKL442as
2080	Discovery Channel's Lagoon Crawler Feature (Sept. 3, 2015)
2081	U.S. Provisional Application No. 61/867,598 (filed August 19, 2013).
2082	US3384047 to Royle
2084	US20100144220A1 to Bailey
2087	Curriculum Vitae of Douglas S. Prairie and Case List – updated April 2, 2024 (cited here for completeness)

2088	Redline of the Amended Proposed Protective Order
2089	Amended Proposed Protective Order
2090	Intentionally omitted
2091	Dredge Yard Auger Dredger ECO200-A8-brochure
2092	Hydraulic Dredgers – Dredge Brokers LLC
2093- 2098	Intentionally omitted
2099	Expert Douglas Prairie Declaration Regarding Motion to Amend (cited here for completeness)
2100	US 5,267,830 to Wickoren
2101	US 8,944,758 to Nuhn
Claims Appendix to Motion to Amend	Substitute Claims 22-42
Paper 39	Preliminary Guidance on Patent Owner’s Motion to Amend

15. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art, as defined below, would have understood the claims and the specification of the ‘425 Patent at the time of the alleged invention.

16. As I discuss in detail below, it is my opinion that the prior art cited in Petitioner’s Opposition to Patent Owner’s Motion to Amend the ‘425 Patent fails to disclose or render obvious the Substitute Claims proposed in Patent Owner’s Motion to Amend, including at least independent Claim 22. In particular, it is my opinion that Petitioner has not demonstrated that the following Grounds render the Substitute Claims unpatentable:

- Ground 1 – Obviousness of Claims 22-25, 27, 28, and 33-40 by Cheramie in view of Yoon or Carrier
- Ground 2 – Obviousness of Claims 22-25, 27, 28, and 33-40 by SenwaTec in view of Yoon or Carrier
- Ground 3 – Obviousness of Claims 22-25, 27, 28, and 33-40 by Truxor in view of Yoon or Carrier

- Ground 4 – Obviousness of Claims 22-42 by Puck in view of Bryham and Manure Manager

IV. BACKGROUND ON FARM LAGOONS, MANURE AGITATION, AND SPREADING

17. This section describes the general operating environment described in the ‘425 Patent – farm lagoons and pits (i.e., manure lagoons).

18. It is common practice in livestock farming to wash animal manure into a pit or lagoon (hereafter “manure lagoon”). The manure stored in these manure lagoons is pumped out at regular intervals and applied as fertilizer to fields. During storage, the manure in a manure lagoon stratifies into layers, which often includes a hard crust on the surface. As a result, the manure in manure lagoons needs to be agitated from time to time, including before pump-out.

19. The most economic and common construction method for a manure lagoon involves creating a rectangular shaped earthen type of pond structure. This structure usually has steep side walls with bank slopes from 2:1 to 3:1 [EX2019, p. 4] and sometimes will have a shallower concrete apron for machinery access. The manure lagoon needs to be constructed such that the sides and bottom are sufficiently impermeable to protect groundwater. EX2019, p. 4. Methods and materials to provide this barrier will vary by geographic location and soil type. The magnitude of these manure lagoons will vary based on the livestock herd size and annual local rainfall. It’s not uncommon for modern day manure lagoons to be quite large, reaching a surface area of multiple acres.

20. The Depeault reference [EX2003, U.S. Pat. No. 4,594,006], which was cited during prosecution and is listed on the face of the ‘425 Patent, further explains that the crust floating on the surface of manure lagoons can become relatively hard, can reach six feet in thickness, and has a consistency of dry peat moss:

2. Description of the Prior Art

Farm animal manure is a slurry containing liquids and solids in suspension. Such manure must be held in holding reservoirs near a barn such as in-the-ground tanks or lagoons. A by product of keeping animal manure is that it can, when required, be spread by suitable spreaders on fields as a fertilizer. The apparatus for spreading the manure normally comprises a closed tank mounted on a vehicle and communicating with a spreader. When required, the manure in the holding reservoir must be transferred into the spreading tanks by suitable pumps.

However, the manure in the holding reservoir tends to separate and the solids may settle to form a thick layer at the bottom of the reservoir and may also form a thick solid crust on the surface of the liquids. Such crust has a consistency of dry peat moss and must therefore be broken up before it can be mixed with the liquid into a slurry and be transferred from the reservoir into the spreading apparatus. It is necessary, therefore, to provide an apparatus for both mixing the solids and forming a slurry with the liquids in the reservoir as well as to have a pumping apparatus for pumping the so-formed slurry into the tank for the spreading apparatus.

Canadian Pat. No. 1,126,257 issued June 22, 1982, describes a proposed solution to the problem by providing a combined slurry mixing device and pump for the purpose of transferring the slurry to some other holding means such as a tank on a spreading apparatus.

There are other patents which describe generally devices for mixing manure in reservoirs for forming a slurry and then pumping the slurry. One of the problems which still exist even in the light of the solutions mentioned above, is the breaking up and mixing of the top crust. The top crust in the reservoir is mostly cow manure. This upper or floating crust can become relatively hard and can reach six feet in thickness. It causes a problem from a mixing point of view since as shown in Canadian Pat. No. 1,126,257, the mixing devices are normally provided at the bottom of the apparatus and near the bottom of the reservoir. In the case of the above mentioned Canadian patent, a nozzle is provided for diverting recirculated slurry as a jet towards the upper crust to try and break the crust. However, it has been found with conventional mixing devices including the above mentioned Canadian patent, that the breaking up of the upper crust and the mixing thereof is very time consuming and therefore, can be costly.

EX2003, U.S. Pat. No. 4,594,006, col. 1, ln. 13-58.

21. Manure lagoons are also unique in that the contents of a manure lagoon need to be

agitated into as much of a homogenous mixture as possible across the entire lagoon so that the consistency, nutrients, and chemical distribution (e.g., pH) is as uniform as possible. This uniform consistency makes it easier for the manure pumping systems to work as efficiently as possible while also producing a consistent manure product. A homogenous manure product is preferred from an agronomic standpoint as farmers will reduce or eliminate the need for synthetic fertilizers applied to their crop production fields based on the nutrient quality of the manure. If the nutrient consistency of the manure product is highly variable the product will have less economic value and might even cause environmental harm if nutrient content is higher than can be retained by the soils and plants. *See* EX2019, pp. 1, 7.

22. These aspects present a unique operating environment for manure agitation vehicles.

23. In the 2013-2014 time period (which coincides with the dates when the Patent Owner filed its provisional application and PCT application), farmers agitated manure lagoons with either pumps situated at the edge of the manure lagoon, which were typically driven by the PTO of an agricultural tractor (*see, e.g.*, the manure pump described in Depeault [EX2003]) or floating manure agitation “boats” (*see, e.g.*, the vehicle described in Puck [EX1014]).

24. In the 2013-2014 time period, floating manure agitation “boats” were barge-like structures that had to be launched and retrieved using a trailer and/or tractor. This is depicted in the screenshots attached as EX2008 and copied below, which are from a video taken by the Progressive Dairyman publication of a manure agitation boat demonstration held in 2014.

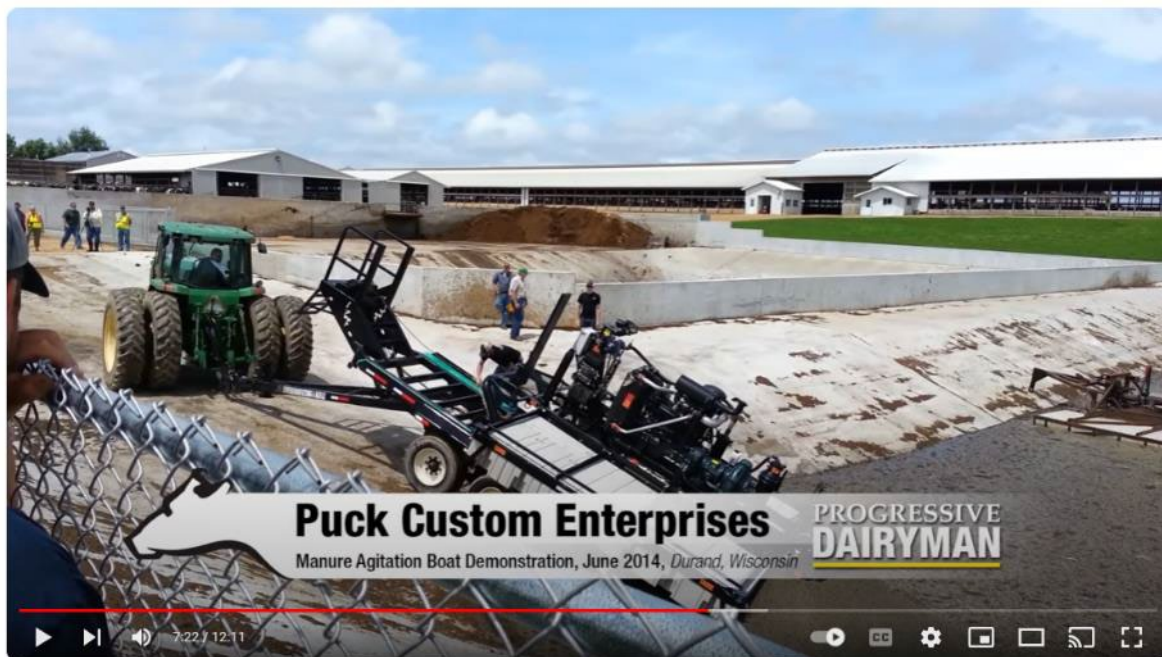
25. On October 2, 2023, I personally accessed and viewed this Progressive Dairyman video, which is posted on YouTube at the following link: <https://www.youtube.com/watch?v=FXRS-9Ip1pE>. The YouTube website indicates that this video was posted on July 9, 2014 by Progressive Dairy and that it has received around 69,000 views.

26. On October 2, 2023, I took screenshots from this Progressive Dairyman video and

compiled them as EX2008. I therefore certify that the screenshots shown in EX2008 are true and correct images of the Progressive Dairyman video identified in the paragraph above.

27. The Progressive Dairyman video shown in EX2008, states that the manure agitation boat demonstration that is depicted in the video was held in Durand, Wisconsin during the month of June, 2014.

28. Notably, this manure agitation boat demonstration featured traditional manure agitation boats, including the commercial embodiment of the Puck reference [EX1014], alongside the Patent Owner's newly-released amphibious manure agitation vehicle:



Equipment demonstrations: Manure agitation boats



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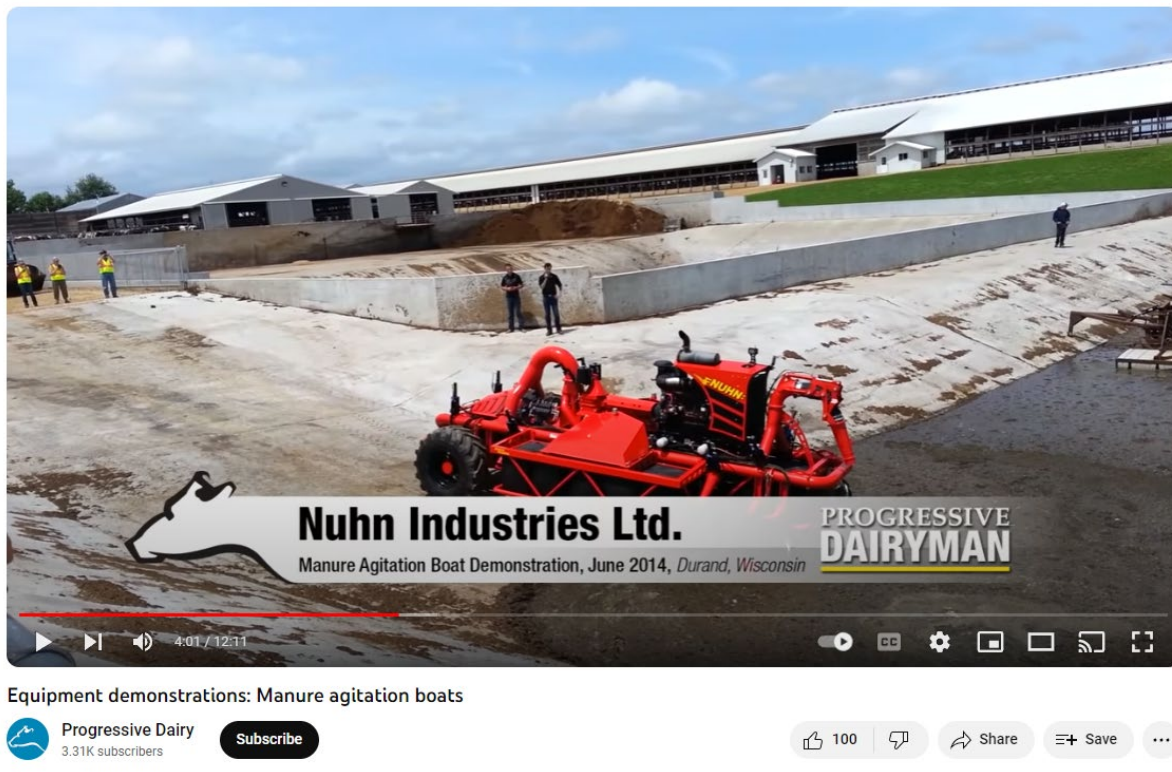
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EX2008, pp. 4-5.

29. As this video illustrates, the Patent Owner’s commercial embodiment of the ‘425 Patent was the first of its kind and was the only amphibious manure agitation vehicle that could be driven into, operated within, and driven out of the manure lagoon by wireless remote control – meaning that it did not require a tractor and/or trailer for launching and retrieval.

30. The North American Manure Expo is an annual industry trade show and educational event focused on livestock manure technologies. The Manure Expo brings together livestock producers, industry professionals, and equipment providers from across the country with the sole focus of livestock manure management. Their most recent exhibitors list, which is posted on their website at <https://www.manureexpo.ca/>, identifies only companies that are focused on livestock manure management, including lagoon management and agitation systems. I was unable to find any product or service on this list associated with marine dredging, which are the types of products cited by the Petitioner.

31. On October 2, 2023, I took screenshots from the North American Manure Expo

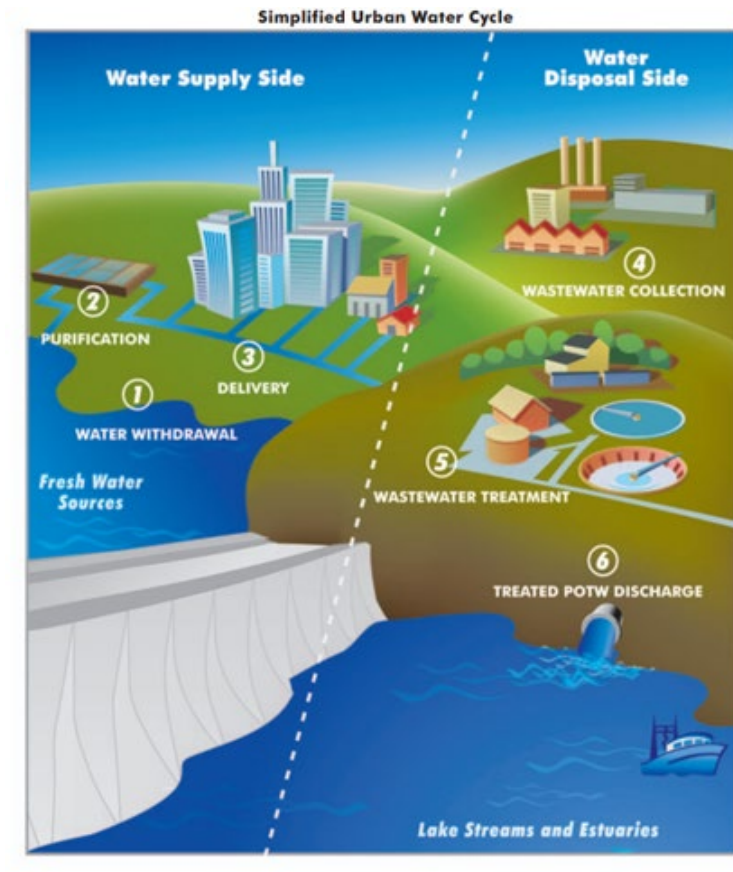
website and compiled them as EX2020. I therefore certify that the screenshots shown in EX2020 are true and correct images of the North American Manure Expo website identified in the paragraph above.

32. The Truxor and SenwaTec references [EX1006] and [EX1012] cited by the Petitioner do not show that it would have been obvious for equipment designed for marine dredging to be used to pump and agitate livestock manure lagoons. Dredging, by dictionary definition, is “to dig, gather or pull out with or as with a dredge” or “to deepen (a waterway) with a machine that removes earth usually by buckets on an endless chain or suction tube”. EX2021, p. 2. Dredging equipment is designed to excavate solids from the bottom of shallow bodies of water and transfer those solids to another location. Its design purpose is NOT to agitate and break-up both bottom solids and floating surface crust with the intention of creating a homogenous slurry throughout the entire pond/lagoon like that is desired in a manure lagoon prior to pump-out.

33. As noted, dredging is to dig, excavate, or remove solids from the bottom of shallow bodies of water and transfer those solids to another location, whereas agitation, by definition, is the “act or an instance of agitating something: a moving back and forth or with an irregular, rapid, or violent action”. EX2021, p. 2. Unlike with dredging, the agitation of a manure lagoon recirculates suspended solids rather than removing them from the lagoon. EX2021, p. 3.

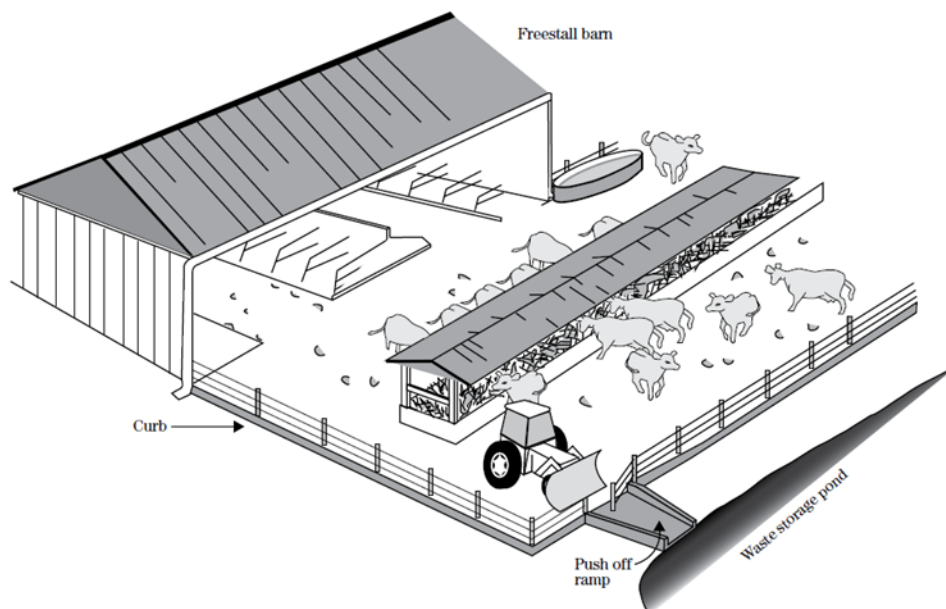
34. The Petitioner also discusses municipal waste lagoons and livestock manure lagoons as if they were the same thing. The reality is that a municipal lagoon is NOT the same as a livestock manure lagoon. In the treatment of human waste, sewer systems are designed to carry human waste, including from domestic, industrial, and commercial sources, to wastewater treatment facilities. EX2022, p. 9. Typical wastewater treatment facilities for the treatment of human waste include a primary treatment stage and a secondary treatment stage. EX2022, p. 9. In the primary treatment stage, “[c]oarse solids are removed from the wastewater.” EX2022, p. 9. Additionally, typical wastewater treatment facilities utilize preliminary treatment units before the primary and secondary treatment stages. EX2022, p. 9. During the preliminary treatment, a “screen

removes large floating objects, such as rags, cans, bottles and sticks that may clog pumps, small pipes, and down stream processes. The screens vary from coarse to fine and are constructed with parallel steel or iron bars with openings of about half an inch, while others may be made from mesh screens with much smaller openings.” EX2022, p. 9. Following screening, the wastewater flows “into a grit chamber where sand, grit, cinders, and small stones settle to the bottom,” and this grit and screenings are periodically collected and removed from the system. EX2022, p. 10. After screening, primary sedimentation takes place. EX2022, p. 11. At that point, “wastewater still contains dissolved organic and inorganic constituents along with suspended solids.” EX2022, p. 11. Therefore, the wastewater enters a sedimentation tank, at which point the water is slowed down and the suspended solids gradually sink to the bottom of the tank and form a mass of solids called primary sludge. EX2022, p. 11. This primary sludge is removed from the sedimentation tank. EX2022, p. 11. After the primary treatment process is the secondary treatment stage, during which “up to 90 percent of the organic matter in wastewater” is removed “by using biological treatment processes,” such as through attached growth processes and/or suspended growth processes. EX2022, pp. 11. It is during this secondary stage, after coarse solids, grit, sand, and suspended solids have already been removed from the wastewater, that a municipal lagoon may be employed to use “sunlight, algae, bacteria, and oxygen to interact” to “improve water quality” and “purify wastewater.” EX2022, pp. 13-14, 27. As such, a municipal lagoon is typically placed at the end of the wastewater treatment process and is primarily meant to disinfect the water before it’s released back to the environment:



EX2022, p. 7. This multi-step process to remove solids and sediment from human waste *before* being deposited into a municipal waste lagoon is much different than the process of filling livestock manure lagoons. Specifically, a livestock manure lagoon receives its material directly from the livestock barn and often includes water, livestock feed, bedding, sand, livestock feces, and livestock urine:

Figure 9-5 Confinement area with curbing



EX2023, p. 13, Figure 9-5. These materials stratify once they enter the manure lagoon and need to be periodically agitated to allow effective biological breakdown and removal. A large amount of the solids and debris found in manure lagoons is bedding material, such as straw and sand, that sticks to the manure and gets washed into the manure lagoon. When this material settles out, the straw floats, contributing to the surface crust, and the sand sinks to the bottom. EX2019, p. 5. Due to the differences between the composition and treatment of human waste versus animal manure, a POSITA would have understood that the requirements for pumping human waste in a municipal sewage lagoon or pond is different than the requirements for pumping manure in a manure lagoon.

V. OVERVIEW OF THE ‘425 PATENT

35. The ‘425 Patent, titled “AMPHIBIOUS PUMPING VEHICLE,” issued on June 14, 2022, from U.S. Patent Application No. 17/590,125, which was filed on February 1, 2022. The ‘425 Patent claims priority to U.S. Provisional Patent Application No. 61/867,598, which was filed on August 19, 2013. EX1001, ‘425 Patent, pp. 1-2.

36. The “BACKGROUND” section of the ‘425 Patent explains that animal manure produced by cattle and hogs is typically washed into a manure lagoon for storage and later pump

out for land application as fertilizer:

BACKGROUND

Manure produced during animal husbandry, particularly hog and cattle manure, is transferred by washing to a pit or lagoon for storage prior to removal for land application or further processing. During storage, a crust can develop on the surface of the pit or lagoon that must be disrupted prior to or during removal of the manure. Pumps are employed for this purpose with jets that return a percentage of the manure back to the pit or lagoon in the form of a high volume spray to disrupt the crust and recirculate the manure. Pumps for use in recirculating manure from smaller pits are known; however, these pumps are typically suitable for accessing the pit or lagoon from its edge and are connected to a tractor or similar land vehicle for operational power. They are therefore limited in their ability to recirculate manure to the middle of large lagoons, which are becoming increasingly common as the size of animal husbandry operations increases.

EX1001, '425 Patent, col. 1, ln. 33-49. As explained above, one unique problem that occurs with manure lagoons is that over time a floating “crust” develops on the surface of the manure lagoon that must be disrupted (i.e., broken up) before pump out.

37. The '425 Patent specification explains that operation of the claimed amphibious vehicle in a manure lagoon disrupts the crust and recirculates the manure:

5 In operation, an operator uses the remote controls to
maneuver the vehicle to the lagoon entrance, drive the
vehicle into the lagoon, raise the ground engaging propul-
sion structure (wheels), lower the fluid pump, begin pump-
10 ing fluid with the fluid pump through the fluid conduits and
selectively open at least the second fluid nozzles to cause the
vehicle to move out on to the surface of the lagoon. The
valves associated with the side fluid nozzles may also be
opened or closed to provide directional control of the vehicle
15 on the lagoon. Once the vehicle is in the desired position, the
valves associated with the first fluid nozzle are opened and
the first articulation structure is used to position the first fluid
nozzle at a desired angular orientation relative to the vehicle
body. This is generally an upward orientation so that the
20 fluid is sprayed widely to break crusts of material floating on
the surface of the lagoon. In this manner, fluid is recirculated
and directed to desired locations in the lagoon. As fluid is
emptied from the lagoon, the floating vehicle is permitted to
lower with the fluid level. When the lagoon has been
25 sufficiently emptied, the operator is able to reverse the
foregoing process in order to maneuver the vehicle to the
lagoon exit, lower the wheels, and drive the vehicle up the
muddy bank out of the lagoon.

EX1001, '425 Patent, col. 8, ln. 5-27.

38. After reading the entire disclosure, a POSITA would come away with the understanding that the amphibious vehicle claimed in the '425 Patent is not a general-purpose amphibious vehicle, but rather is one that is specially adapted for the particular purpose of breaking up the crust that forms on the surface of manure lagoons and recirculating the manure in manure lagoons.

VI. COMMERCIAL EMBODIMENTS

39. Nuhn has its own YouTube channel with videos showcasing its products. On October 2, 2023, I personally accessed and viewed a video showcasing Nuhn's Lagoon Crawler, which is posted on YouTube at the following link:

<https://www.youtube.com/watch?v=fEgvvq9HZkk>

The YouTube website indicates that this video was posted on November 6, 2014 by Nuhn and that it has received around 42,000 views.

40. On October 2, 2023, I took screenshots from this video of Nuhn's Lagoon Crawler

and compiled them as EX2006. I therefore certify that the screenshots shown in EX2006 are true and correct images of the Nuhn video identified in the paragraph above.

41. Below is a screenshot taken from a video of Nuhn’s Lagoon Crawler, which I understand to be the Patent Owner’s commercial embodiment of the ‘425 Patent, breaking up the surface crust formed on a manure lagoon:



EX2006, p. 2.

42. Like Nuhn, Bazooka-Farmstar (“Bazooka”) also has its own YouTube channel with videos showcasing its products. On October 2, 2023, I personally accessed and viewed a video showcasing Bazooka’s Wolverine Agitation Boat, which is posted on YouTube at the following link:

<https://www.youtube.com/watch?v=3y3bSJJUOps>

The YouTube website indicates that this video was posted on July 11, 2021 by BazookaFarmstar and that it has received around 6,000 views.

43. On October 2, 2023, I took screenshots from this video of Bazooka's Wolverine Agitation Boat and compiled them as EX2007. I therefore certify that the screenshots shown in EX2007 are true and correct images of the BazookaFarmstar video identified in the paragraph above.

44. Below is a screenshot taken from a video of Bazooka's Wolverine Agitation Boat, which I understand to be the accused product in the underlying litigation, breaking up the surface crust formed on a manure lagoon:



Bazooka Farmstar | Wolverine Agitation Boat



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EX2007, p. 3.

45. As these videos demonstrate, the crust that forms on the surface of manure lagoons can become quite dense and overgrown with grass and other plants, making agitation and pump-out difficult.

46. As shown above, both Patent Owner's Lagoon Crawler and Petitioner's Wolverine Agitation Boat create a pocket or opening in the crust that aids in the breaking up and agitation of

the crust and liquid manure. This working pocket or opening is created by the combined action of the moving wheels and the displacement of the floatable vehicle body, which helps to break up the hard, thick crust and forms a protective perimeter around the immersible liquid manure pump, keeping the crust away from the pump. The four wheels, which are also positioned around this perimeter, allow the vehicle to break-through / sink into the crust and muck of a manure lagoon and the churning action of the wheels helps chew through the crust and muck. The ability of Nuhn's invention to create this "working pocket" or opening in severely crusted over lagoons allows the liquid manure pump to operate in a comparatively clear area, reducing the chance of clogging.

47. A POSITA may have expected the incorporation of powered wheels onto an agitation boat would have assisted in moving an agitation boat to and from a manure lagoon. However, it is my opinion that a POSITA would not have expected the powered wheels to provide the ability for the agitation boat to chew a hole into the thick crust of poorly managed manure lagoons, or that the wheels would have helped to move the vehicle around and off of—as well as break up—any shallow areas in the lagoon formed by built up sludge. Thus, it is my opinion the wheels of the amphibious vehicle described and claimed in the '425 Patent provided these new and unexpected results. It is my opinion these new capabilities provided the ability for the amphibious vehicle described and claimed in the '425 Patent to agitate manure lagoons that were poorly served by an agitation boat like Puck's.

48. The ability to remotely control the amphibious vehicle described and claimed in the '425 Patent while it is on land and floating in the manure lagoon, as well as the ability to remotely control the flow of liquid manure from the fluid pump, allowed it to move through the manure lagoon even in areas of thick crust and shallow areas where sludge had built up to agitate and break up the crust like no other vehicle before it. Simply, the amphibious vehicle described and claimed in the '425 Patent is able to act like an icebreaker, breaking through and breaking up all portions of a manure lagoon, especially large manure lagoons that were unable to be agitated by prior edge-

based agitation pumps or Puck’s agitation boat.

VII. APPLICABLE LEGAL STANDARDS AND PRINCIPLES

49. I am not an attorney and do not purport to offer legal opinions. In forming my opinions, however, I have been asked to apply certain standards pertaining to the patentability issues presented in this proceeding that I know from my experience as an inventor and expert witness or were provided to me by counsel for the Patent Owner.

50. I understand that for a patent to be valid, the invention claimed in the patent must be new, useful, and non-obvious. I understand that, in this *inter partes* review, the Petitioner has the burden of proving that each challenged claim is unpatentable by a preponderance of the evidence.

A. The Prior Art

51. I understand that applicable patent law provides categories of information that constitute prior art that may be used to “anticipate” patent claims or to render them “obvious.” I understand that for a reference to qualify as “prior art” in an *inter partes* review, the reference must have been published, patented, or must have been the subject of a patent application by another person, before the priority date of the patent, and in this matter, must satisfy one of the standards of 35 U.S.C. § 102.

B. Anticipation

52. I understand that a claim of a patent is invalid if the claimed invention is not new. I understand that the scope of prior art is limited in *inter partes* reviews. It is my understanding that a claimed invention is not new if all the limitations of the claim are described in a single prior art reference, and as arranged in the claim.

53. I understand that the prior art reference does not have to use the same words as those used in the claim, but that all the limitations must be present, either expressly or inherently, so that a person having ordinary skill in the art viewing the reference would have everything

necessary to make and use the invention as claimed. I understand that something is inherent in a prior art reference if it necessarily exists in the prior art reference.

54. Therefore, it is my understanding that a single prior art reference that discloses each requirement of a claim, either expressly or inherently, invalidates the claim by anticipation.

C. Obviousness

55. I understand that a claim is unpatentable if the differences between the claim and the prior art are such that the claimed subject matter as a whole would have been obvious to a person having ordinary skill in the art. Obviousness may be shown by a single prior art reference or by a combination of prior art references.

56. Although I understand that a finding of obviousness may be based upon combining prior art references, I also understand that a patent claim may not be proved obvious merely by demonstrating that each of its limitations was independently known in the prior art. I further understand that there must be a motivation to combine elements of the prior art in the manner claimed. I also understand that a claim cannot be found obvious based on a hindsight combination of components selected from the prior art using the patent claims as a roadmap.

57. I further understand that in determining whether a prior art reference would have been combined with other prior art, a showing must be made that a person of ordinary skill in the art would have a reasonable expectation that the asserted combination could be made successful and would achieve the claimed invention.

58. In determining whether a claim would have been obvious, I understand that obviousness is determined from the perspective of a person having ordinary skill in the art in the field of the claimed invention. I understand that as part of my analysis of whether a given patent claim is obvious, I should consider: (1) the level of ordinary skill in the pertinent art; (2) the scope and content of the prior art; (3) the differences, if any, between the prior art as a whole and the claim at issue; and (4) as appropriate, secondary considerations of non-obviousness.

VIII. PERSON OF ORDINARY SKILL IN THE ART

59. I understand that Petitioner asserts that a person of ordinary skill in the art (“POSITA”) for the technology underlying the ‘425 Patent would have had “a bachelor’s degree in mechanical engineering or similar field, and two years of professional experience in marine and off-road vehicles. A [POSITA] would have had a working knowledge of fluid pumps and livestock manure.” Petition, p. 31; EX1004, Winkel Decl. ¶82. Petitioner also states that a “[l]ack of work experience can be remedied by additional education, and vice versa.” *Id.*

60. I disagree with the Petitioner’s definition of a POSITA because it excludes those most familiar with manure agitation equipment – livestock farmers and commercial manure applicators. A commercial manure applicator is a person who is employed by a business entity engaged in the business of transporting, handling, storing, or applying manure for a fee. *See* EX2024.

61. The Petitioner’s definition of a POSITA is overly generic and made without reference or regard to the sole application for the claimed vehicle – manure lagoon agitation/pumping.

62. The ‘425 Patent repeatedly mentions “animal husbandry” (i.e., livestock farming operations) and the problems encountered when storing and pumping animal manure in farm lagoons or pits. EX1001, ‘425 Patent, col. 1, ln. 26-49; col. 3, ln. 14-21; col. 7, ln. 20-46; col. 8, ln. 5-25.

63. Moreover, the ‘425 Patent has been classified as being directed to “amphibious vehicles specially adapted for particular purposes” and “manure” handling:

Classifications

- [B60F3/0061](#) Amphibious vehicles specially adapted for particular purposes or of a particular type
- [A01C23/045](#) Filling devices for liquid manure or slurry tanks
- [A01C3/026](#) Storage places for manure, e.g. cisterns for liquid manure; Installations for fermenting manure with mixing or agitating devices

EX2009, p. 2.

64. The ‘425 Patent does not suggest that the claimed vehicle finds utility in doing anything other than operating in manure lagoons.

65. Based on this intrinsic evidence, it is my opinion that a POSITA is “a livestock farmer or commercial manure applicator familiar with manure agitation equipment or an engineer with at least 2 years of experience designing agricultural equipment and knowledge of manure agitation equipment.”

66. All of my opinions in this declaration are from the perspective of a POSITA, as I have defined it in the preceding paragraph, during the relevant timeframe of August, 2013.

IX. CLAIM CONSTRUCTION

67. I understand that in an *inter partes* review proceeding, the claim terms are to be construed in accordance with the ordinary and customary meaning of such term as understood by a POSITA. I understand that when interpreting the claims, the primary focus must be on the intrinsic evidence, which consists of the claim language, the specification, and the prosecution history. I further understand that extrinsic evidence, such as definitions found in dictionaries and handbooks, is less pertinent and persuasive than the intrinsic evidence. I also understand that express definitions of terms in the patent should govern the construction of the claims. I have followed these claim construction principles in my analysis.

68. It is my opinion that the positions advanced by Petitioner’s declarant, Dr. Winkel, are divorced from the real life conditions that POSITAs face in manure lagoon management and are focused on the pumping of liquid manure *after* it has been agitated and the hard, thick crust that forms on liquid manure lagoons is disrupted. As stated herein, it is my opinion that a POSITA, in view of the specification of the ‘425 Patent, would understand that the claimed invention is directed to an amphibious vehicle specially adapted for the particular purpose of breaking up the crust that forms on the surface of manure lagoons and recirculating the manure in manure lagoons. It is also my opinion, as described herein, that a POSITA would understand “liquid manure” to be

“animal manure contained in a farm lagoon, which includes suspended solids.” It is my opinion that a POSITA would **not** understand that the term a “liquid manure pump” to be merely a water pump as Dr. Winkel and Petitioner suggest. In its institution decision, the Board indicated that it was construing the term “fluid pump for pumping liquid manure” to “require a pump with a structure that is capable of pumping liquid with suspended solids.” Paper 12 at 12. It is my opinion that a POSITA, in view of the specification of the ‘425 Patent, would understand those suspended solids to include any solids in the liquid manure, including bedding material and the crust, and that a POSITA would understand that the crust can be very hard, very thick, and very large. Therefore, it is my opinion that Petitioner and Dr. Winkel are wrong in ignoring the existence of and the need to break up the crust in manure lagoons.

A. “liquid manure”

1. SOLIDS CONTENT OF LIQUID MANURE

69. Dr. Winkel asserts that “liquid manure contains the lowest level of solids and generally has very similar characteristics and physical properties to water” and that liquid manure “generally does not present any special pumping problems.” EX1004, ¶ 83. He also states that a “POSA would have understood the solids concentration in the liquid volume of a typical liquid manure lagoon is on the order of a few percent or less.” *Id.* at ¶ 87. Specifically, Petitioner and Dr. Winkel place an artificial 5 percent suspended solids upper limit on their definition of “liquid manure.” *See, e.g.*, EX1004, ¶ 101. Dr. Winkel’s purely academic view of what the percent total solids content of liquid manure and liquid manure lagoons is betrayed by the reality of what POSITAs encounter in real-world manure lagoons, many of which are not always properly managed. Variations of management can result in real-world variations of total solids content of liquid manure and liquid manure lagoons.

70. Petitioner’s definition for “liquid manure” comes from a waste management handbook that appears to be extrinsic evidence because the handbook was not referenced in the ‘425 Patent specification, on the face of the ‘425 Patent, or during prosecution.

71. Moreover, the classifications found in this handbook are simply a suggested guideline with which to classify manure consistencies as either liquid, slurry, semisolid or solid from a handling characteristic for different livestock categories. In fact, Chapter 4 from the Agricultural Waste Management Field Handbook states that while the handbook provides a single value for a certain waste characteristic, “[w]aste characteristics are subject to wide variation; both greater and lesser values than those presented can be expected”:

(b) Variations and ranges of data values

In most cases, a single value is presented for a specific waste characteristic. This value is presented as a reasonable value for facility design and equipment selection for situations where site-specific data are not available. Waste characteristics are subject to wide variation; both greater and lesser values than those presented can be expected. Therefore, much attention is given in this chapter to describing the reasons for data variation and to giving planners and designers a basis for seeking and establishing more appropriate values where justified by the situation.

U.S. DEP’T AGRIC., *Agricultural Waste Characteristics*, in AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK, 4-2, ch. 4 (2008) (“AWMFH”) (EX1062 at 10). Dr. Winkel points to this handbook to argue that “[w]astes that have a moisture content of 95% or more [(%TS of 5% or less)] exhibit qualities very much like water are called liquid waste or liquid manure.” EX1004, ¶ 91. However, the very same paragraph from which Dr. Winkel cites provides that “the moisture content and range indicated above *must be considered generalizations subject to variation and interpretation*”:

Wastes are often given descriptive names that reflect their moisture content such as liquid, slurry, semisolid and solid. Wastes that have a moisture content of 95 percent or more exhibit qualities very much like water are called liquid waste or liquid manure. Wastes that have moisture content of about 75 percent or less exhibit the properties of a solid and can be stacked and hold a definite angle of repose. These are called solid manure or solid waste. Wastes that are between about 75 and 95 percent moisture content (25 and 5 percent solids) are semiliquid (slurry) or semisolid (chapter 9). **Because wastes are heterogeneous and inconsistent in their physical properties, the moisture content and range indicated above must be considered generalizations subject to variation and interpretation.**

EX1062 at 13 (AWMFH at 4-5) (emphasis added). Chapter 4 of the AWMFH goes on to state that “[w]hen compared to other types of manure data, the data given for as excreted manure characteristics is the most reliable. ***The properties of manure and other wastes will vary widely when modified by management actions.***” EX1062 at 17 (AWMFH at 4-9) (emphasis added).

72. The *Liquid Manure Application Systems Design Manual* (“LMASD Manual”) [EX1040] cited by Dr. Winkel, describes that “[l]iquid manures can vary from dilute, colored water from feedlots ***to thick ‘milk shake’ slurries*** containing solids.” EX1040 at 11 (emphasis added). A POSITA that has ever attempted to drink a milk shake through a straw knows that it is not just like drinking water through a straw. Not only recognizing a wide variance in liquid manure composition, the LMASD Manual also recognizes that there is no “universally accepted” limit on the percent solid content. *See id.* at 15 (“Because of the wide variability between animal management systems, there is no universally accepted set of values defining the volume and nutrient composition of farm manures.”). Nonetheless, the LMASD Manual acknowledges that liquid manure can have a much higher total solids content than Petitioner and Dr. Winkel assert. Specifically, the LMASD Manual states that “[l]iquid manure is sometimes defined as a mixture having less than ***8 to 10% solids***, but ***this range is arbitrary and no industry standard exists***. The categories solid, semisolid, and liquid (figure 1.1) merely provide a convenient way to discuss manure handling.” EX1040 at 17 (emphasis added); *see also id.* at 16 (“***When the total solids***

content is between 4% and 12%, special chopper pumps and sprinklers *must be used* to avoid equipment clogging problems.”) (emphasis added); *id.* at 18 (“For example, a mixture containing 115 pounds of *liquid manure (13% TS)* and 55 pounds of inorganic sand bedding (95% TS) will remain an unstackable semisolid even though the mixture has an actual total solids content of approximately 40%.”) (emphasis added); *id.* at 28 (Table 1.5 showing liquid manures with total solids of up to 14%). As such a POSITA would have understood that liquid manure could have total solids content significantly higher than 5% and importantly, is not limited to liquids having 5% or less total solids.

73. Additionally, a POSITA would not understand there to be a meaningful difference between the terms “liquid manure” and “slurry.” For example, the LMASD Manual treats them the same, indicating that “[t]he two terms ‘liquid manure’ and ‘slurry’ will be used *interchangeably* throughout this manual.” EX1040 at 16 (emphasis added); *see also* EX1041 at 3 (equating liquid and slurry manure, noting under the heading “Liquid (slurry) manure” that “[a]gitation of the manure storage before and during pumping is recommended to reduce the buildup of solids and for a consistent application of sampled nutrients.”); *id.* at 2 (“a liquid (such as a slurry or lagoon effluent)”). Even Puck uses the terms “liquid manure” and “slurry” interchangeably. *See* EX1014 at ¶ [0025] (“[A] liquid manure pump such as a slurry pump (38).”); *id.* at ¶ [0026] (“[A] liquid manure intake, such as a slurry intake.”).

74. Chapter 12 of the AWMFH, also cited to by Dr. Winkel, shows that in real-world scenarios, stored liquid manure has a high solids content. *See* EX1066 at 43 (“A closed impeller is efficient with liquid waste, but plugging with tough, stringy solids and chunks can be troublesome.”); *id.* at 42 (“The solids and liquids in liquid, slurry, and semisolid wastes need to be thoroughly mixed so the solids are not left behind when these wastes enter the pump.”).

75. Therefore, the intrinsic and extrinsic evidence does **not** support Dr. Winkel’s statement a “POSA would have understood the solids concentration in the liquid volume of a typical liquid manure lagoon is on the order of a few percent or less.” EX1004, Winkel Decl. ¶ 87.

76. Several prior art patents cited on the face of the ‘425 Patent also use the term “liquid manure” in describing their inventions. These patents use the term “liquid manure” to broadly refer to the contents of a manure lagoon as opposed to narrower formulations based on the percentage of total solids (%TS) like in the Petitioner’s construction. *See, e.g.*, US9462741B2 to Puck [EX2013]; US9572297B2 to Puck [EX2014]; DE2364962A1 to Kronseder [EX2015]¹; DE3431345A1 to Lüllmann [EX2016]². Nor do the other patents cited on the face of the ‘425 Patent that describe manure agitation equipment limit the scope of their inventions based on the percentage of total solids (%TS). *See* US4594006A to Depeault [EX2003]; CA2002619A1 to Depeault [EX2017]; US4406413A to Houle [EX2010]; US10118138B2 to Tews [EX2018]. Therefore, I do not see any evidence that anyone in the art has limited their manure agitation inventions in the way Petitioner is suggesting.

77. Chapter 12 of the AWMFH [EX1066] referenced by the Petitioner discusses handling characteristics of different categories of manure. What the referenced figure (Figure 12-92) does not fully reflect is that manure agitation equipment must be capable of pumping all of the different classes of manure shown in Figure 12-92, because they may all be present in a manure lagoon when agitation is needed. This is due to the fact that manure typically becomes **stratified and settled out** over time. When agitation begins, the manure in the manure lagoon is not yet mixed and can consist of pure liquid, solids at the bottom, localized solid buildup, and a grassy field-like crust on the top. The intent of manure agitation equipment such as that shown in the ‘425 Patent specification is to be able to break up and agitate all manure categories from liquid through solids, where they are all mixed together during the agitation process. The well-mixed contents of the manure lagoon is then pumped out. As a result, manure agitation equipment must be capable

¹ EX2015 is from the file history of the ‘425 Patent and corresponds to pp. 170-188 of EX1002.

² EX2016 is from the file history of the ‘425 Patent and corresponds to pp. 155-169 of EX1002.

of handling greater solids than manure pump-out equipment.

2. SOLID PARTICULATE SIZE IN LIQUID MANURE

78. Dr. Winkel goes on to argue that particle sizes of liquid are sufficiently small such that they would not plug a water pump. *See* EX1004, Winkel Decl. ¶ 92. Dr. Winkel’s opinion is flawed. Specifically, Dr. Winkel alleges that manure particle size “is dominated” in the 1 to 6 mm range. *Id.* at ¶ 93 (citing EX1043 at 9). The portion of Wright [EX1043] quoted by Dr. Winkel refers to the particle size dimension (PSD) of fresh “[r]aw manure sample, provided by a Holstein milk cow that was 2-years, 4-months old, was collected within 60-seconds of its deposition on the impervious floor surface at the free-stall area.” EX1043 at 6. Additionally, the images included by Dr. Winkel were manure particles collected from “flush water and feed-alley drainage streams.” *Id.*; *see also id.* at 9. Neither of these represent the solid particle size in liquid manure in a manure lagoon. Therefore, both of these cited sections of Wright [EX1043] and the dimensions are completely divorced from what a POSITA would understand to be liquid manure in a manure lagoon. Therefore, Dr. Winkel’s statements are inapplicable.

79. Dr. Winkel ignores that some of the other exhibits he cites to reference liquid manure as having a much larger particle size. For example, Pfof I [EX1041] describes that “[a]n open-impeller centrifugal pump capable of handling large solids **up to 1 inch in diameter** may be selected for pumping livestock slurry to minimize clogging problems. Open impeller pumps may handle **liquids with solids content up to 15 percent**.” EX1041 at 4 (emphasis added). Pfof I [EX1041] further describes that “long, fibrous solids” may be present in the liquid manure. *See id.* at 6.

80. Dr. Winkel also ignores that, as described in the ‘425 Patent, the liquid manure in liquid manure lagoons often have crusts suspended thereon. *See* EX1001, ‘425 Patent, 1:36-41. 8:18-20. A POSITA would have understood that these crusts are solids that have sizes much larger than the 1 to 6 mm range asserted by Dr. Winkel. Again, Depault notes that this thick solid crust “can become relatively hard and can reach six feet in thickness.” EX2003, col. 1, ln. 46-47.

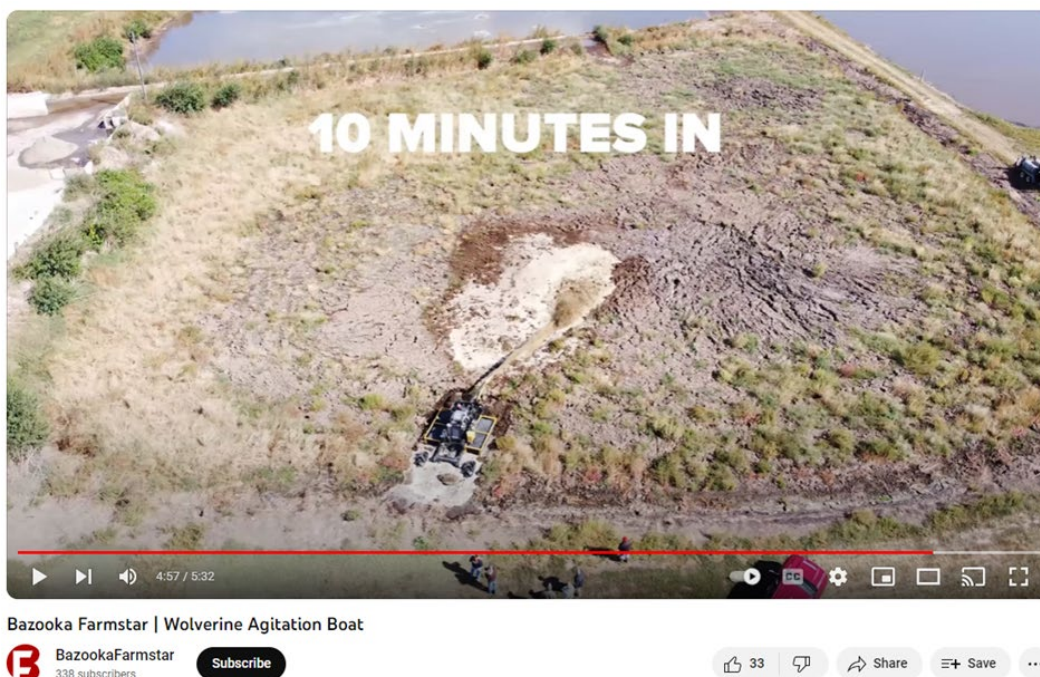
Moreover, this crust has a “consistency of dry peat moss and must therefore be broken up before it can be mixed with the liquid into a slurry.” *Id.* at col. 1, ln. 26-30. A POSITA would have understood that a hard crust reaching six feet in thickness is larger than 1 to 6 mm in size. Moreover, Houle recognizes that the solid matter in liquid manure—be it in the crust or the solids that settle on the bottom of the manure lagoon—tend to clog liquid manure pumps, noting that “clogging of the pump’s impeller and consequential loss of pump efficiency remains a serious shortcoming.” EX2010, U.S. Pat. No. 4,406,413, col. 1, ln. 24-63.

81. The LMASD Manual also recognizes the common occurrence of crusts in liquid manure, which again illustrates that the solid particle size is not 1 to 6 mm as asserted by Dr. Winkel. “In many dairy storages, liquid manure is deposited directly into the top by mechanical or tractor scrapers. With beef and dairy manure, *a floating mat or crust often forms on the surface*. Before a storage can be completely emptied, the crust should be broken up and settled solids agitated to obtain a homogeneous mix.” EX1040 at 57 (emphasis added). The LMASD Manual describes that “[a]gitation is usually required before emptying storages with liquid manures over 4% total solids.” *Id.* If solid particulate size were 1 to 6 mm as Dr. Winkel incorrectly suggests, it is not clear why agitation would be “usually required” before pumping out liquid manure from the lagoon.

82. Other references also illustrate that the size of solid particles in liquid manure are not limited to 1 to 6 mm. For example, “[a]t the farm-scale, slurry crusting was found to be commonplace across a large proportion (ca 80%) of slurry storage facilities, despite the fact that regular store mixing and agitation was found to be carried out on 68% of farms.” EX2030, K. Smith et al., *Natural Crusting Of Slurry Storage As An Abatement Measure For Ammonia Emissions On Dairy Farms*, 97 BIOSYSTEMS ENGINEERING 464 (2007); *see also id.* at 466 (noting “[a] slurry crust was found in 39 (78%) of the 50 stores initially inspected”). These commonly-forming crusts, can “become colonized by vegetation including small trees and may become *very difficult to break up*.” *Id.* at 465 (emphasis added). It is hard to imagine vegetation and small trees

growing on solid particles only 1 to 6 mm in size.

83. I include here again the below screenshot from a video of Bazooka's Wolverine Agitation Boat breaking up the surface crust formed on a manure lagoon:



EX2007, p. 3. As can be clearly seen, the crust in the liquid manure covers the entire manure lagoon and has vegetation growing on it, giving it the appearance of solid ground. Prior to agitation, this crust has solid particles much larger than the 1 to 6 mm alleged by Dr. Winkel.

84. Beyond just the crust in the liquid manure, a POSITA would have understood that liquid manure often has other solids therein, including for example “bedding and other solid additions to manure [that] tend to limit handling options for the resulting liquid manure or slurry mixture.” EX1040 at 16. Dr. Winkel does not mention or acknowledge the existence of bedding in liquid manure. His failure to account for bedding further shows that his opinions on the consistency of liquid manure and the solid particle size therein are not in line with what a POSITA would understand liquid manure to be. The LMASD Manual describes the use of bedding in animal stalls and pens and the impact that bedding has on the flowability and pumpability of liquid manure:

Bedding Additions

Bedding is spread in stalls and pens to keep animals clean, dry, and comfortable while resting. Because of the wide variety of organic and inorganic bedding materials that may be used (sand, paper, straw, etc.), moisture/solids content alone cannot be used to describe all the handling properties of a manure mixture. Animal species, bedding decisions, and dilutions all affect the way a particular liquid manure mixture flows (its “flowability”), as well as its ability to be pumped (its “pumpability”).

EX1040 at 17. A POSITA would have readily understood that bedding can have a significant impact on pumping liquid manure, an impact that Dr. Winkel ignores:

Several of the more common organic bedding materials, such as wood shavings, sawdust, and chopped hay or straw, absorb two and a half to three times their initial weight (when the bedding is at an initial moisture content of about 10%). Newspaper and tanbark (tanning bark) absorb four times their weight, while peat moss holds as much as ten times its weight in water. Use of such organic bedding materials has the following negative effects on the flowability and pumpability of a liquid manure mixture:

- absorbs free liquids and so reduces the manure’s flowability
- makes it more difficult to pump and agitate the manure (e.g., because of wood chunks in sawdust)
- contributes to blocked pipes and channels
- forms stratified layers in liquid and slurry manure storages
- clogs irrigation nozzles
- alters the chemical and biological makeup of the manure.

Id. This too illustrates the error of Dr. Winkel’s view that the solid size of liquid manure is 1 to 6 mm.

85. Other inorganic bedding materials are often found in liquid manure as well, “such as sand, ground limestone, or calcite,” but “sand and other inorganic bedding materials significantly increase abrasive wear on pumps and handling equipment, often voiding manufacturer’s warranties.” EX1040 at 17. The LMASD Manual notes that the inclusion of

organic or inorganic bedding “can strongly affect manure handling ability” and that “[t]he physical characteristics of a liquid manure mixed with inorganic sand bedding are quite different than those of a liquid manure mixed with an organic bedding such as sawdust, wood shavings, peanut hulls, etc., even if the moisture/ solids contents of the two manures are identical.” *Id.* at 18. Therefore, a POSITA would have understood that liquid manure—in addition to the crust—often includes solid bedding materials, that greatly impact the size and composition of solids in the liquid manure as well as the equipment needed to pump the liquid manure. Dr. Winkel does not take any of this into consideration.

86. Accordingly, Dr. Winkel’s categorical statement that liquid manure solids are between 1 and 6 mm in size is entirely at odds with what a POSITA would have understood.

3. VISCOSITY OF LIQUID MANURE

87. Viscosity is the resistance that a fluid (e.g., a gas or a liquid) system offers to flow when it is subjected to a shear stress. It can also be referred to as flow resistance. *See* EX1040 at 72 (referring to “viscosity” as “resistance due to internal cohesion”).

88. Dr. Winkel asserts that the “viscosity of liquid manure is generally accepted to be between 10 and 60 times that of water.” EX1004, Winkel Decl. ¶ 94. Dr. Winkel provides no support for this statement that there is a “generally accepted” viscosity of liquid manure or that it varies “between 10 and 60 times that of water.” The LMASD Manual relied upon by Dr. Winkel throughout his report in fact refutes this contention, instead stating that: “Viscosity values for liquid manures are *not* readily available. All variations in manure viscosities are not strictly attributable to moisture content.” EX1040 at 72 (emphasis added). The LMASD Manual goes on to describe that “[p]rior to agitation, higher-solids liquid manures (over 4% TS) may exhibit initial viscosities similar to industrial or municipal wastewater sludges.” *Id.* Importantly, the LMASD Manual describes that “High viscosity fluids like sludges (over 12% TS) usually require positive displacement type pumps (such as piston, diaphragm, or screw pumps) to push material through a pipeline at lower flow rates.” *Id.* As described above, liquid manure can have total solids content

over 12%. *See supra* at Section IX.A.1; *see also* EX1040 at 16 (referring to liquid manure with 12% TS), 18 (referring to liquid manure with 13% TS), 28 (referring to liquid manure with 14% TS). Again, this demonstrates that “conventional water pumps” as referred to by Dr. Winkel are not capable of pumping liquid manure. Although the LMASD Manual does indicate that “[o]nce these liquid manures are agitated, however, viscosity decreases and the pumped liquid has friction characteristics similar to water. Consequently, higher viscosity liquid manures (over 4% TS) should be agitated each time prior to pumping.” *Id.* at 72. Again, as described above, it is my opinion that Petitioner and Dr. Winkel are incorrectly restricting their view of liquid manure to *after* it has been agitated and mixed. In view of the description of the ‘425 Patent, a POSITA would not have understood liquid manure to be limited to the consistency of liquid manure after agitation.

89. Not only does the LMASD Manual recognize that liquid manure can include and behave like a sludge before agitation, Puck cited by Petitioner does as well. Specifically, Puck describes the formation of “sludge that rests on the bottom of the manure lagoon” and that to “prevent an undesirable buildup of sludge at the bottom of the lagoon, it is known in the art to place an agitator within the lagoon to create a slurry by moving solids in sludge into suspension with the supernatant.” EX1014 at ¶¶ [0003], [0004]. As noted above, both the LMASD Manual and Puck show that a POSITA would understand that liquid manure and slurry can be used interchangeably. *See* Section IX.A.1. Puck describes that during agitation, the solids from the sludge become suspended in the liquid manure. Puck also describes drawbacks of attempting to agitate manure lagoons from the edge of the manure lagoon. Namely that “it is difficult to mix sludge at the center of the lagoon, which leads to a buildup of sludge at the center of the lagoon.” *Id.* at ¶ [0005]. A POSITA would have understood that if the sludge is allowed to build up over time that an agitation boat, like Puck’s, could run aground on the sludge and get stuck. Petitioner’s own website for its Wolverine Agitation Boat describes that its agitation boat can move “even in the thickest sludge *where most pumps cannot operate;*”

Dual propellers are the secret sauce to moving large volumes of liquid manure and having extreme control over your agitation boat. Our ragless, high-speed propellers can move a whopping 24,000+ GPM every minute you agitate. (Yes...you read that right.)

The propellers create 4,000 pounds of thrust for agitation and maneuvering functions directly below the boat, establishing a solid center of gravity for stability. That means this well-balanced machine can move in any direction, even in the thickest sludge where most pumps cannot operate.

EX2031 at 9.³ This shows that Petitioner knows that “conventional water pumps” cannot pump liquid manure.

90. Dr. Winkel attempts to bolster his argument that a “conventional water pump” can pump liquid manure by stating that a “conventional water pump” can pump “fluids with viscosities more than one-thousand times that of water.” EX1004, Winkel Decl. ¶ 94 (citing EX1044). He specifically asserts that “[o]ne study provides empirical relationships for predicting pump performance for fluid viscosities as much as 3000 times the viscosity of water and at pump flow rates up to 1800 GPM.” EX1004, Winkel Decl. ¶ 94 (citing EX1044 at 11). Dr. Winkel overlooks the qualifiers included in ANSI Viscosity [EX1044] that severely undercut his high-level, blanket assertion about the capabilities of so-called “conventional water pumps.” ANSI Viscosity [EX1044] describes “a generalized method for predicting performance of rotodynamic pumps on Newtonian liquids of viscosity greater than that of water” developed by the Hydraulic Institute (HI), but notes that “[p]erformance estimates using the HI method are only approximate” and that “[t]here are many factors for particular pump geometries and flow conditions that the method does not take into account.” EX1044 at 9. Additionally, ANSI Viscosity [EX1044] explains that pump performance decreases with increasing fluid viscosity:

³ On March 20, 2024, I personally accessed and viewed Bazooka’s webpage for its Wolverine Agitation Boat at: <https://www.bazookafarmstar.com/equipment/wolverine-agitation-boat/>. On March 30, 2024, I printed this webpage and it is referenced herein as EX2031. On March 20, 2024, I also personally downloaded Bazooka’s brochure for the Bazooka Wolverine Agitation Boat from: <https://www.bazookafarmstar.com/wp-content/uploads/2023/01/Cutsheet-Wolverine-1.pdf>. On March 30, 2024, I saved that brochure and it is referenced herein as EX2032.

9.6.7.2 Introduction

The performance (head, flow, efficiency $[\eta]$, and power) of a rotodynamic pump is obtained from the pump's characteristic curves, which are generated from test data using water. When a more viscous liquid is pumped, the performance of the pump is reduced. Absorbed power will increase and head, rate of flow, and efficiency will decrease.

EX1044 at 9.

91. Importantly, ANSI Viscosity [EX1044] explicitly states that “[t]he data used to develop the correction factors are based on tests of Newtonian liquids. *Gels, slurries, paper stock, and other non-Newtonian liquids may produce widely varying results, depending on the particular characteristics of the liquids.*” EX1044 at 12 (emphasis added). Dr. Winkel entirely ignores that cattle manure—even at 1 to 2% total solids content—has been found to act as a *non-Newtonian* fluid. See, e.g., EX2033 at 2, H. Landry et al., *Physical and Rheological Properties of Manure Products*, APPLIED ENGINEERING IN AGRICULTURE, at 278 (2004) (discussing study by Chen (1982) that “included rheological properties for TS ranging from 1% to 14%. Beef cattle slurries were described as non-Newtonian pseudoplastic fluids, the deviation from Newtonian behavior increasing with TS”); *id.* at 2 (“Achkari-Begdouri and Goodrich (1992) studied the rheological properties of Moroccan dairy cattle manure with total solids concentrations ranging from 2.5% to 12% at temperatures between 20°C and 60°C. Their results showed that in the ranges of total solids and temperature of the study, Moroccan dairy cattle manure behaved as a pseudoplastic fluid.”); see also *id.* at 11 (“The animal manures studied were non-Newtonian pseudoplastic fluids and the power law could be used to relate shear stress and shear rate. The value of the consistency coefficient increased with the total solids concentration. The apparent viscosity was well correlated to TS for dairy cattle, poultry, and pig manure.”).

92. When liquid manure acts like a non-Newtonian fluid, Dr. Winkel’s discussion of viscosity is entirely irrelevant because his basis improperly assumes that liquid manure exclusively acts like water (which is a Newtonian fluid).

93. Accordingly, in my opinion, a POSITA would not apply the Petitioner’s narrow definition of “liquid manure” to the ‘425 Patent, but instead would interpret the references to

“liquid manure” in the ‘425 Patent claims as the “animal manure contained in a farm lagoon, which includes suspended solids.” It is my opinion that the suspended solids of liquid manure includes the hard, thick crust, solid chunks of the crust, bedding material, any vegetation growing in the crust, and any sludge that has been stirred up from the bottom of the lagoon.

94. A POSITA would arrive at this interpretation after seeing that the Patent Owner equates “liquid manure” to “animal manure contained in a farm lagoon” in the TECHNICAL FIELD section of the ‘425 Patent:

TECHNICAL FIELD

The invention relates to pumps and vehicles equipped for ²⁵ pumping. In particular, the invention relates to manure pumps and amphibious vehicles equipped for pumping liquid manure, such as animal manure contained in a farm lagoon.

30

EX1001, ‘425 Patent, col. 1, ln. 25-29.

95. The ‘425 Patent specification also explains that liquid manure stored in a manure lagoon has a crust formed on its surface and includes solid materials that can clog traditional pumps:

BACKGROUND

Manure produced during animal husbandry, particularly hog and cattle manure, is transferred by washing to a pit or lagoon for storage prior to removal for land application or further processing. During storage, a crust can develop on the surface of the pit or lagoon that must be disrupted prior to or during removal of the manure. Pumps are employed for this purpose with jets that return a percentage of the manure back to the pit or lagoon in the form of a high volume spray to disrupt the crust and recirculate the manure. Pumps for use in recirculating manure from smaller pits are known; however, these pumps are typically suitable for accessing the pit or lagoon from its edge and are connected to a tractor or similar land vehicle for operational power. They are therefore limited in their ability to recirculate manure to the middle of large lagoons, which are becoming increasingly common as the size of animal husbandry operations increases.

Accordingly, there is a need for improved pumps and vehicles equipped for pumping, particularly pumps and vehicles suitable for use with large manure lagoons.

EX1001, '425 Patent, col. 1, ln. 33-53.

telescoping connections to the single fluid conduit. Lowering the fluid pump for immersion into the fluid obviates the need for priming the fluid pump, which can be problematic when the fluid is manure comprising solid materials that can plug the pump or priming structure. Immersion of the pump also simplifies intermittent operation of the pump, due to eliminating potential loss of prime, and reduces the need for pump maintenance.

EX1001, '425 Patent, col. 3, ln. 14-21.

5 In operation, an operator uses the remote controls to maneuver the vehicle to the lagoon entrance, drive the vehicle into the lagoon, raise the ground engaging propulsion structure (wheels), lower the fluid pump, begin pumping fluid with the fluid pump through the fluid conduits and
10 selectively open at least the second fluid nozzles to cause the vehicle to move out on to the surface of the lagoon. The valves associated with the side fluid nozzles may also be opened or closed to provide directional control of the vehicle on the lagoon. Once the vehicle is in the desired position, the
15 valves associated with the first fluid nozzle are opened and the first articulation structure is used to position the first fluid nozzle at a desired angular orientation relative to the vehicle body. This is generally an upward orientation so that the
20 the fluid is sprayed widely to break crusts of material floating on the surface of the lagoon. In this manner, fluid is recirculated and directed to desired locations in the lagoon. As fluid is emptied from the lagoon, the floating vehicle is permitted to lower with the fluid level. When the lagoon has been sufficiently emptied, the operator is able to reverse the
25 foregoing process in order to maneuver the vehicle to the lagoon exit, lower the wheels, and drive the vehicle up the muddy bank out of the lagoon.

EX1001, '425 Patent, col. 8, ln. 5-27. These statements in the '425 Patent directly conflict with Petitioner's attempt to define "liquid manure" as having an extremely low percentage of solids. As such, POSITA would understand that the "liquid manure" described in the '425 Patent, includes solids and a surface crust.

B. "liquid manure pump"

96. The Substitute Claims of the '425 Patent use the term "liquid manure pump."

97. The Institution Decision suggested that the Parties need to further develop "what specific structure is required to pump liquid manure," but in my opinion that attempts to apply a bright-line rule to a question that is not clear cut. For example, the "Liquid Manure Application Systems Design Manual" (EX1034 at pp. 51-52) cited by Petitioner identifies a number of different types of pumps including closed impeller, semi-open impeller, open impeller, elevator, helical screw, piston, and air-driven pumps. There is no bright line rule delineating these various pump types where one type is universally considered a liquid manure pump and another type is not. Most

likely any one of these types of pumps could be designed to pump liquid manure if provided with an appropriate size, tolerances/clearances, flow rate, pump head, power requirements, and appropriate housing, impeller, inlet, outlet, and bearing design.

98. Because there are no bright-line rules, a POSITA would look at the following pieces of evidence to understand if a pump is a “liquid manure pump” (i.e., a “pump that pumps liquid manure” or a “pump with a structure that is capable of pumping liquid manure with suspended solids”):

- (1) was the pump designed to pump liquid manure;
- (2) was the pump marketed as a liquid manure pump;
- (3) has the pump been tested and validated (i.e., proven) for liquid manure pumping applications; and
- (4) does the pump have structure that would become clogged and/or damaged by pumping liquid manure.

99. The ‘425 Patent discloses an exemplary liquid manure pump, which is described as a “fluid pump 9 [that] comprises a pump housing 18 with three tangential fluid outlets 19 that are combined into a single fluid conduit 20” (EX1001 at 5:43-45) and further states that an “example of pump 9 suitable for use with the vehicle is disclosed in co-pending U.S. Patent Application Ser. No. 13/038,189. . . .” (EX1001 at 7:43-45). The ‘835 Patent defines non-limiting embodiments of a liquid manure pump that a POSITA would understand as sufficient structure for pumping liquid manure or a liquid with suspended solids. If a pump departed from this exemplary design, then in my opinion, a POSITA would look to evidence of the enumerated factors above to determine if the pump could accurately be characterized as a “liquid manure pump.”

100. Suspended solids in liquid manure include the hard, thick crust, solid chunks of the crust, bedding material, any vegetation growing in the crust, and any sludge that has been stirred up from the bottom of the lagoon.

101. Dr. Winkel alleges that “[c]onventional water pumps were known for pumping

liquid manure and manure slurries” and “[c]onventional water pumps were regularly used for this purpose because liquid manure has a similar consistency to water.” EX1004, Winkel Decl. ¶ 97. But Dr. Winkel also goes on to admit that “[o]ne potential concern associated with pumping liquid manures is the presence of larger solids and/or fibrous materials which can reduce efficiency or even plug/clog pump impellers and pumping systems, depending on the manure properties and the specific application.” *Id.* at ¶ 107. He then admits that there is a limit to the size of solids that water pumps can handle, stating: “Water pumps are typically capable of handling solid matter up to a specific size.” *Id.* As I describe herein, liquid manure does not have a similar consistency to water.

102. Like many of the exhibits that Dr. Winkel cites, they tend to refute his arguments that a water pump is capable of pumping liquid manure. For example, rather than stating that any “conventional water pump” can be used to pump animal waste, Chapter 12 of the AWMFH states that “[p]ump selection and rating depend on the amount and type of solids in the waste (see chs. 4 [EX1062], 9 [EX2023], and 11 [EX1064, EX1065] of this handbook), capacity desired, head or operating pressure needs, and available power.” EX1066 at 42. Acknowledging that manure is not like water, Chapter 12 of the AWMFH further describes the severe conditions that manure pumps are subjected when pumping manure:

The wear on most pump bearings and seals is rapid when pumping waste. The severe pumping conditions also damage controls and valves. Regular lubrication and cleanup extend pump life and performance. A spare pump should be readily available to replace essential pumps in a waste system when they break down.

Id.

103. Dr. Winkel cites to the LMASD Manual to argue that “pumps designed for conventional water irrigation” can be used to pump liquid manure. EX1004, Winkel Decl. 103. However, the sentence he quotes specifically limits its statements to “liquid manures with less than approximately 4% total solids.” *See* EX1040 at 54. Elsewhere in the LMASD manual, it makes

clear that liquid manure can include solids content much higher than 4%. *See id.* at 17 (“Liquid manure is *sometimes* defined as a mixture having less than **8 to 10% solids**, but **this range is arbitrary and no industry standard exists**. The categories solid, semisolid, and liquid (figure 1.1) merely provide a convenient way to discuss manure handling.”) (emphasis added); *see also id.* at 18 (“For example, a mixture containing 115 pounds of **liquid manure (13% TS)** and 55 pounds of inorganic sand bedding (95% TS) will remain an unstackable semisolid even though the mixture has an actual total solids content of approximately 40%.”) (emphasis added); *id.* at 28 (Table 1.5 showing liquid manures with total solids of up to 14%). Thus, as described above, a POSITA would understand that liquid manure is not limited to 5% total solids as Petitioner suggests and that a “conventional water” pump would not be able to pump liquid manure.

104. When properly evaluated and as understood by a POSITA, the LMASD Manual describes that “[w]**hen the total solids content is between 4% and 12%, special chopper pumps and sprinklers must be used** to avoid equipment clogging problems.” *Id.* at 16 (emphasis added). Contrary to Dr. Winkel’s assertion that “conventional water pumps” can be used to pump liquid manure, the LMASD Manual clearly describes that specialized pumps are best for agitating and pumping: “**High volume, chopper-type, liquid manure pumps are best for agitation and pumping.**” *Id.* at 57 (emphasis added). Furthermore, a POSITA would have understood that lengthy agitation was required to completely mix the liquid manure prior to pump out and that special liquid manure pumps are **required** in order to accomplish the job:

Generally, a six-month accumulation of slurry in a large earthen storage requires about four to twelve hours of agitation for complete mixing. Propeller-type agitator or agitation pumps with large capacities are required. Most inclined shaft choppers have an effective radius of agitation of about 75 feet (table 3.2, page 42). For agitation, the discharge stream of a chopper-agitator pump is first directed over the surface of the storage to break up any floating matter or crust. Next, the stream is directed below the liquid surface to re-suspend settled bottom solids. A pump equipped with a chopper or rotating auger section at the inlet is better able to break up the surface crust and draw solids into the pump. A typical inclined-shaft chopper pump discharges between 3,000 gallons per minute and 5,000 gallons per minute.

EX1040 at 61. Even in the irrigation context—after agitation—the LMASD Manual’s indication that a chopper pump be positioned ahead of an irrigation pump illustrates that “conventional water pumps” will not work for pumping liquid manure:

In high-pressure pumping of liquid manure for irrigation, it is critical that the slurry be well mixed and free of large foreign material. High-pressure pumping of dairy manure works best if a chopper is positioned ahead of the pump. In some storages, a PTO-driven chopper-agitator pump is used in addition to a closed impeller irrigation pump rather than attaching a cutter or beater blade to the closed impeller. Pumping liquid manure for irrigation requires pumps specially designed to fit the pressure and flow requirements of the application system (see “High-Head Pumps,” page 54). Irrigation systems should also have a source of clean water or compressed air to flush lines and wash any growing vegetation after liquid manure irrigation to prevent possible ammonia burn.

Id.

105. I acknowledge that when liquid manure does have low solids content, specialized agitation or liquid manure pumps may not be required. However, as described herein, a POSITA would not understand liquid manure to be limited to fluid with 5% or less total solids; rather, a

POSITA would have understood that liquid manure can and often does have total solids content well above 5%. *See supra* Section IX.A.1. And the LMASD Manual recognizes—rather than ignores—the variability of the total solids content of liquid manure and that at total solids content above 4%, “conventional water pumps” simply will not work to pump liquid manure, but that specialized pumping equipment is *required*:

The decision of whether to haul manure or to pump it through pipes depends on several factors. One of the most important factors is the solids content of the manure. Manure slurries with up to about 4% total solids can be handled with essentially the same equipment as water, with some precautions. Slurries with solids over 4% generally require special equipment to be pumped (see “Storage Agitation and Emptying,” page 47). With proper separation, dilution,

EX1040 at 61. The LMASD Manual also explains that manure pump manufacturers publish pump curves to assist POSITAs in determining the proper pump for the needs of the pumping system. *See id.* at 66-67. Importantly, it explicitly states that “[p]ump curves are based on actual pump tests. Since pump tests are done with clean water, care must be used when applying manufacturer’s performance data to manure.” *Id.* at 66. This also teaches that mere “conventional water pumps” are not suited for pumping liquid manure. Thus, the LMASD Manual clearly illustrates that a POSITA would have understood that a fluid pump for pumping liquid manure would not be a mere “conventional water pump” but would be a pump specifically designed to pump liquid manure, one that could pump the crust and the other solids suspended therein.

106. Even Puck (EX1014) relied upon by Petitioner describes that its liquid manure or slurry pump 38 is “most preferably” designed to move “about sixteen thousand liters of material per minute” and “is capable of handling manure crust, supernatant, sludge, and the combined slurry.” *See* EX1014 at ¶¶ [0025], [0026]. As such a POSITA would have understood that in order to pump the liquid manure—including the solids and crust suspended therein—more than just a mere “conventional water pump” would be required.

107. Dr. Winkel further alleges that the LMASD Manual “similarly describes the use of

water pumps for pumping and irrigation. *See* EX1004, Winkel Decl. ¶ 104. But Dr. Winkel’s arguments—likely due to his complete lack of inexperience in manure lagoon agitation and pumping—are focused on the pumping of liquid manure *after* it has been agitated and the surface crust has been disrupted. Specifically, his citation to the statement in the LMASD Manual that “Semi-open impeller centrifugal pumps are often used for pumping and irrigation of liquid manure slurries with solids contents up to 10%” (EX1040 at 65-67) refers not to agitating and pumping within a manure lagoon, but refers to pumping for irrigation after the liquid manure lagoon is agitated. Additionally, this statement does not support Dr. Winkel’s argument that water pumps are used; rather it states that liquid manure pumps can be used for irrigation. Simply, that a liquid manure pump can be used for irrigation does not mean that water pumps can be used for pumping liquid manure.

108. Therefore, the LMASD Manual demonstrates that pumping liquid manure—and not just liquid manure with Petitioner’s artificially imposed 5% total solid content limit—requires the use of special pumps; not mere water pumps. Accordingly, a POSITA would understand that “conventional water pumps” would not be capable of agitating and pumping liquid manure.

109. In summary, it is my opinion that a POSITA would not have understood a “liquid manure pump” to be a mere conventional water pump as suggested by Dr. Winkel. Rather it would have been understood by a POSITA to be a pump that is specifically designed, tested, or validated to pump liquid manure and the solids therein.

C. “fluid mover”

110. Substitute Claims 28 and 40 recite that “wherein the at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” It is my understanding that this claim limitation follows a format that may be construed as a means-plus-function limitation under 35 U.S.C. § 112(f).

111. It is my understanding that the issue of whether or not 35 U.S.C. § 112(f) applies to this claim limitation is a legal question that is based on the following underlying factual

determinations: (1) whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure, and (2) what structure is disclosed in the specification for performing the claimed function. I am not providing an opinion on the overall legal question of whether this phrase is a means-plus-function limitation, but I have provided my opinion below on underlying factual determinations (1) and (2).

112. With respect to point (1), the term “fluid mover” by itself does not connote any particular structure. Standing alone, a “fluid mover” is any component or system capable of moving fluid, which may be a wide variety of different structures.

113. As a result, it is my opinion that a POSITA would not appreciate any discernable difference between the claim term “wherein the at least one of speed and direction of the vehicle when the vehicle is floating is controlled by a fluid mover” and the term “wherein the at least one of speed and direction of the vehicle when the vehicle is floating is controlled by a means for moving fluid.” In other words, both phrases would mean the same thing to a POSITA.

114. With respect to point (2), it is my opinion that a POSITA would consider the “valve(s) and fluid nozzle(s)” as the corresponding structure for performing the claimed function of moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating. In particular, the ‘425 Patent describes that “[c]ooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating”:

Valve structure comprising a valve **15** corresponding to each fluid nozzle **11, 13, 16, 17** is also provided. The valves **15** are powered and operable to open or close. The valves **15** 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves **15** and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles **17** to the left side fluid nozzles **16** 5 causes the vehicle to turn to the right will floating. Similarly, fluid flow may be proportioned between the first fluid nozzle **11** and the second fluid nozzles **13** to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, '425 Patent, col 5, ln. 63 – col. 6, ln. 8.

115. In view of the above excerpt, it is my opinion that a POSITA would identify the following structure as the structure the specification describes for moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating: “valve(s) and fluid nozzle(s).”

X. PATENT OWNER’S SUBSTITUTE CLAIMS ARE PATENTABLE OVER THE CITED ART

116. I have received the Substitute Claims submitted with Patent Owner’s Motion to Amend. I have reviewed the prior art cited in the Grounds of invalidity asserted by Petitioner in its Opposition to Patent Owner’s Motion to Amend. It is my opinion that the prior art I have reviewed, and have personal knowledge of, does not anticipate or render obvious the Substitute Claims.

117. The prior art known to me fails to disclose each and every limitation of Substitute Claim 22:

An amphibious vehicle, comprising:
a floatable vehicle body with a front, a rear, and an underside;
ground engaging propulsion structure comprising a plurality of ground engaging elements powered by a hydraulic motor;

a liquid manure pump for pumping liquid manure, the liquid manure pump including a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body and such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating;

a power source connected to a hydraulic pump, the power source configured to provide power to both the ground engaging propulsion structure and the liquid manure pump; and

a wireless remote control configured to enable an operator who is remote from the vehicle to: (1) control the ground engaging propulsion structure; (2) control a flow of liquid manure from the liquid manure pump; (3) control at least one of the speed and direction of the vehicle when the vehicle is ground engaging; and (4) control at least one of the speed and direction of the vehicle when the vehicle is floating.

118. As compared to Claim 1 of the '425 Patent, which I have previously opined on, the paragraph of Substitute Claim 22 highlighted above set forth a number of new requirements for the liquid manure pump by specifying that the liquid manure pump is mounted in such a way that the housing and an impeller are:

- (1) positioned along the underside of the floatable vehicle body, AND
- (2) positioned between at least two of the ground engaging elements, AND
- (3) positioned rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body, AND
- (4) the impeller must be positioned such that it is immersed in the liquid manure when the vehicle is floating.

119. Notably to Petitioner's Opposition, if the pump is mounted to structure (like a boom arm) such that it is spaced away from the underside of the floatable vehicle body and positioned at the front or back of the floatable vehicle body, it does not satisfy this claim language.

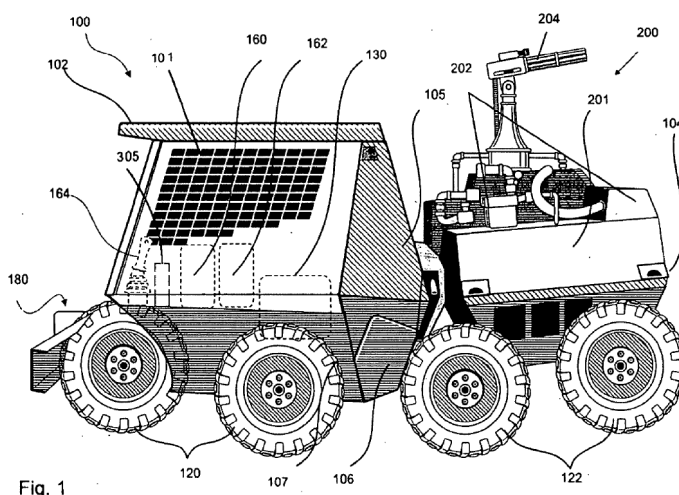
120. Substitute Claims 23-42 depend from Substitute Claim 22 and are patentable because of their dependency from Substitute Claim 22, as well as for additional reasons, as discussed below.

XI. OVERVIEW OF THE PRIOR ART

121. In this section I describe the references cited as pertinent prior art.

A. Carrier [EX1005]

122. Carrier teaches a general-purpose amphibious vehicle having various objectives, none of which are agricultural in nature. For example, Carrier describes one “objective is to provide a multi-purpose vehicle for National Security issues such as Sneek [sic] and Peek operations and Silent Search and Destroy Missions.” EX1005, Carrier, ¶ [0015]. “Another objective is to provide a multi-purpose vehicle for Military and National Security issues such as Explosive Energy Defeat and Ballistic Armor Capabilities.” EX1005, Carrier, ¶ [0016]. Carrier goes on to describe that its general-purpose amphibious vehicle can optionally be equipped with a water pump and water cannon for firefighting. EX1005, Carrier, ¶¶ [0060]-[0061]. In particular, Carrier states that an important feature of its vehicle is that “the tank, hoses, and pump may be readily removed from the vehicle through the use of quick-release devices.” EX1005, Carrier, ¶ [0060].



123. Carrier describes that its vehicle has an “ability to transport a pump or other device to direct the water, foam and dry chemicals at the fire, as well as decontamination solutions for decon missions.” See EX1005, Carrier, ¶ [0059]. The optional pump in Carrier is further described

as “capable of pumping water from a lake or stream,” not liquid manure from a farm lagoon. *See* EX1005, Carrier, ¶ [0061]. Carrier does not include any description that the pump has any capabilities beyond pumping water, foam, dry chemicals at a fire, or decontamination solutions. Carrier does not state that its pump is capable of pumping liquid manure. And Carrier includes no description of the structure of its optional pump. Carrier makes no reference to manure, farm lagoons, or animal husbandry (livestock farming). In summary, a POSITA would have understood Carrier to describe an amphibious emergency or combat vehicle. It is not an amphibious vehicle for pumping liquid manure in a manure lagoon. Carrier does not describe a pump that can pump solids as contained in liquid manure of a manure lagoon.

B. Truxor [EX1006]

124. Truxor describes an amphibious vehicle that is designed to carry an onboard operator and a number of different tool attachments. EX1006, Truxor, pp. 6-15. In particular, the tool attachments of Truxor includes aquatic weed cutters (EX1006, Truxor, pp. 6-7), rakes (EX1006, Truxor, pp. 8-9), buckets and log grabbers (EX1006, Truxor, p. 9), dredge pumps (EX1006, Truxor, pp. 10-11), excavators (EX1006, Truxor, p. 12), cultivators (EX1006, Truxor, p. 13), and oil decontamination tools (EX1006, Truxor, pp. 14-15). Truxor does not describe that its vehicle or its dredge pumps are used to pump manure or are even capable of pumping manure.



125. The vehicle in Truxor is advertised as being designed for weed removal and dredging. EX1006, Truxor, p. 1. Additionally, Truxor states: “Driven with care and with its

minimal ground pressure, damage to river banks and sensitive areas can be minimised [, sic] making the *Truxor* ideal for working on golf courses, nature reserves and public parks where larger, heavier machines have difficulty operating.” EX1006, *Truxor*, p. 2. *Truxor* is a minimal ground pressure vehicle that is designed to travel over sensitive ground, rather than break through ground, such as the thick, heavy crust of manure lagoons. *Truxor* makes no reference to manure, farm lagoons, or animal husbandry (livestock farming). *Truxor* also does not describe that any of its onboard controls can be operated by remote control. *Truxor* does not describe a pump that can pump solids as contained in liquid manure of a manure lagoon.

C. SenwaTec [EX1012]

126. Like *Truxor*, *SenwaTec* discloses an amphibious vehicle that is designed to carry an onboard operator and a number of different tool attachments. EX1012, *SenwaTec*, p. 2. For example, *SenwaTec*’s tool attachments include hydraulic augers, tree cutters, clearing and collecting rakes, t-cutter bars, mowing buckets, excavating buckets, suction augers, and centrifugal pumps. EX1012, *SenwaTec*, pp. 2-3. *SenwaTec*’s marketing material does not describe that its vehicle or its centrifugal pumps are used to pump manure or are even capable of pumping manure.



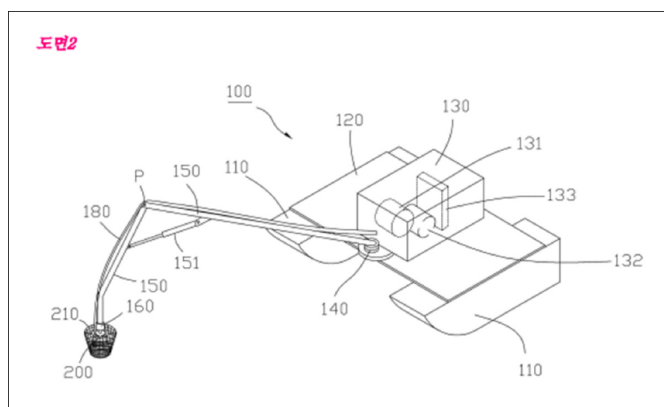
EX1012, *SenwaTec*, p. 2.

127. The vehicle in *SenwaTec* is advertised as being designed for weed removal and dredging. EX1012, *SenwaTec*, p. 1. *SenwaTec* shows that it has at least 8 different control

interfaces. EX1012, SenwaTec, p. 1. However, SenwaTec does not describe that any of its onboard control interfaces can be operated by remote control. Instead, SenwaTec describes that its cockpit has: “Conveniently and comfortably arranged operational control levers for easy operator’s reach as well as monitoring instruments in clear view to the operator’s position.” EX1012, SenwaTec, p. 3. SenwaTec is a “low ground pressure” [EX1012 at 1] vehicle that is designed to travel over sensitive ground, rather than break through ground, such as the thick, heavy crust of manure lagoons. SenwaTec makes no reference to manure, farm lagoons, or animal husbandry (livestock farming). Dr. Winkel asserts that other publications [EX1027 and EX1028] describe that “SenwaTec was used for pumping liquid manure in, for example, manure lagoons as the image shows the Amphi-King vehicle in a ‘sewage pond.’” EX1004, Winkel Decl. ¶ 294. As I describe herein, a “sewage pond” is *not* a manure lagoon. *See* Section IV. Dr. Winkel again cites to EX1027 for his assertion that the SenwaTec is “being used in manure pumping applications.” *See* EX1004, Winkel Decl. ¶ 294. Dr. Winkel goes on to quote the article saying that the SenwaTec “drives through the sewage pond.” *Id.* (quoting EX1027 at 2) (emphasis added). Again, neither of these publications show that the SenwaTec was ever used in a liquid manure lagoon or that its pump is capable of pumping liquid manure. SenwaTec does not describe a pump that can pump solids as contained in liquid manure of a manure lagoon.

D. Yoon [EX1010 and EX1011]

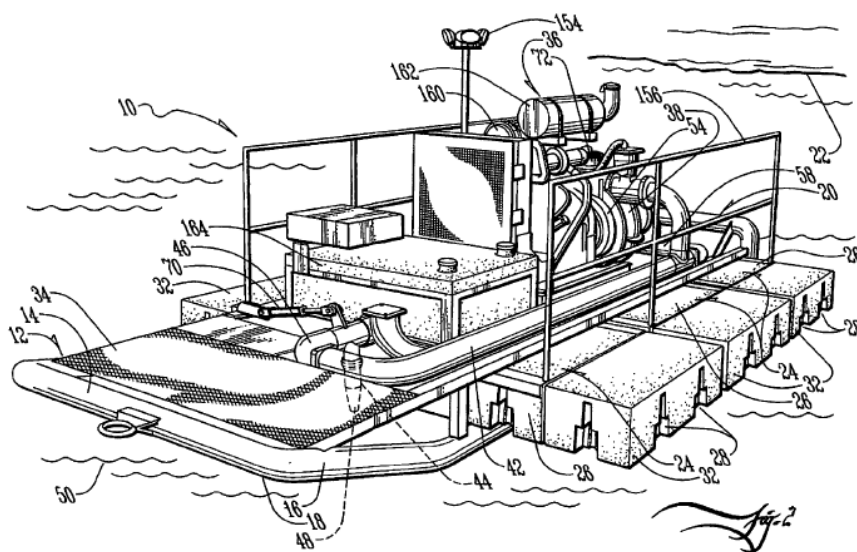
128. Yoon describes a remote-controlled vehicle with an onboard water pump 131:



129. Yoon describes that its “invention is about an amphibious water treatment device that is installed at streams or on storage tanks, reservoirs, and so on, into which waste materials are dumped in order to treat industrial waste materials.” EX1011, Yoon, ¶ [0001]. Yoon includes a main body 130 in which a water pump 131 is installed. EX1011, Yoon, ¶ [0047]. The water pump 131 of Yoon is not immersed in the storage tank or reservoir. Yoon’s water pump 131 pumps wastewater and sludge from the storage tank or reservoir and into a water collection device 300, where it is “separated into wastewater and sludge.” EX1011, Yoon, ¶ [0070]. Then, “the sludge separated from the stored water is collected by a sludge transportation car, which is not illustrated, and then treated.” EX1011, Yoon, ¶ [0077]. Yoon only includes a generalized statement that “a remote receptor (not illustrated) is installed on the controller (133) installed on the main body (130) in order for the operator to control work using a remote controller from the land.” EX1011, Yoon, ¶ [0048]. However, other than this generalized statement, Yoon provides no details as to how its remote control is designed or implemented.

E. Puck [EX1014]

130. Puck teaches a traditional manure agitation boat that must be launched and retrieved using a trailer:

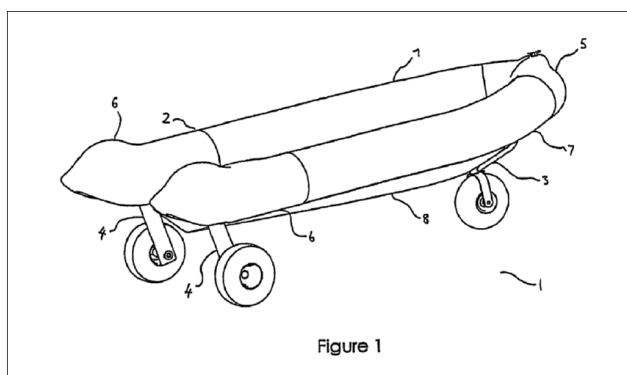


EX1014, Puck, p. 3, FIG. 2.

131. Puck describes that its vessel 12 includes modular dock sections 26. EX1014, Puck, Paras. [0022]-[0023]. Puck describes that it includes a slurry pump 38, which is a Cornell Redi-Prime centrifugal pump. EX1014, Puck, ¶ [0025]. Puck describes that the “slurry pump (38) is coupled to a liquid manure intake, such as a slurry intake, which is a downwardly directed intake pipe (40)” and that the “intake pipe (40) is constructed to extend about twenty-four inches below the surface of the lagoon (22).” EX1014, Puck, ¶ [0026]. Figures 1, 2, 6, and 8 of Puck show the slurry pump 38 with only a single inlet and a single outlet. EX1014, Puck, pp. 2, 3, 7, and 9. Figure 4 of Puck shows the slurry pump 38 above the manure lagoon 22 and above the crust 126. EX1014, Puck, p. 5. Puck does not include any ground engaging propulsion structure. Instead, Puck’s agitation boat is “transported to the manure lagoon (22) using a trailer (132) and pulling vehicle (134).” EX1014, Puck, ¶ [0034]. Puck includes a remote control system 64, but because Puck lacks a ground engaging propulsion structure, Puck does not include any description that its remote control system 64 can control a ground engaging propulsion structure.

F. Bryham [EX1015]

132. Bryham describes a three-wheeled land propulsion and steering system that retracts into and extends out from a boat hull:



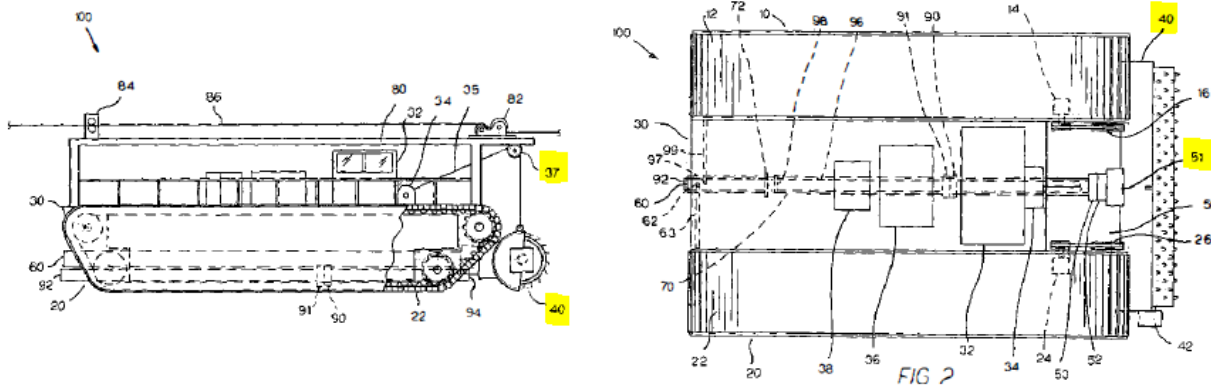
EX1015, Bryham, p. 2.

133. Bryham describes a vee-boat hull with three wheels (one at the bow and two at the

stern). In one embodiment, Bryham describes its boat as an “inflatable craft 2, fitted with a single nose undercarriage assembly 3 and two aft undercarriage assemblies 4, providing means for the craft to travel over land.” EX1015, Bryham, p. 22, col. 11, ln. 56-59. Bryham also states that its craft includes fiberglass cowlings “towards the front of the craft and towards the rear 6,” that the “cowlings are shaped to conform to the lines of the inflatable tubes 7,” and that the undercarriage assemblies 3 and 4 can be “retracted and stowed within the cowlings 5 & 6.” EX1015, Bryham, p. 22, col. 11, ln. 59 – col. 12, ln. 4. Bryham does not describe any sort of remote control. Nor does Bryham make any reference to manure, farm lagoons, or animal husbandry (livestock farming).

G. Cheramie [EX1087]

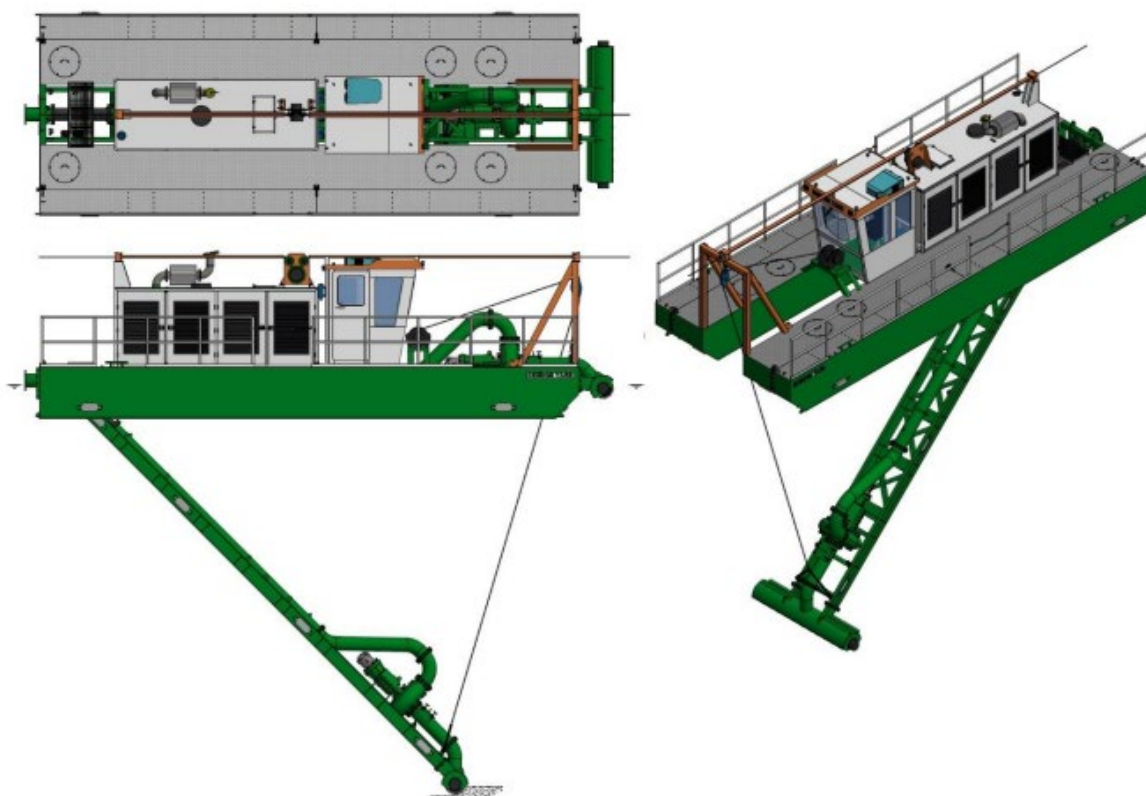
134. U.S. Patent No. 6,922,922 to Cheramie (EX1087) discloses a large, manned amphibious dredging vehicle. The vehicle has a “cutterhead dredge system,” which includes an impeller housing (51) that is positioned immediately behind the cutterhead (40):



EX1087 at p. 1.

135. The impeller housing (51) and cutterhead (40) in Cheramie are positioned at the forward end of a long boom arm that is lowered to the lake bottom on a cable using an overhead crane/winch (37). The Figures of Cheramie only illustrate the boom arm in the fully raised position (i.e., the transport position, not the operating position), but a POSITA would have understood the crane (37), impeller housing (51), and cutterhead (40) structure in Cheramie to be consistent with other “cutterhead” / “auger” dredge vehicles of this type.

136. For example, in the deployed position, the crane (37), impeller housing (51), and cutterhead (40) in Cheramie would look something like that shown below, which depicts the pump, cutterhead, and boom arm of another “cutterhead” / “auger” dredge vehicle in the operating position:

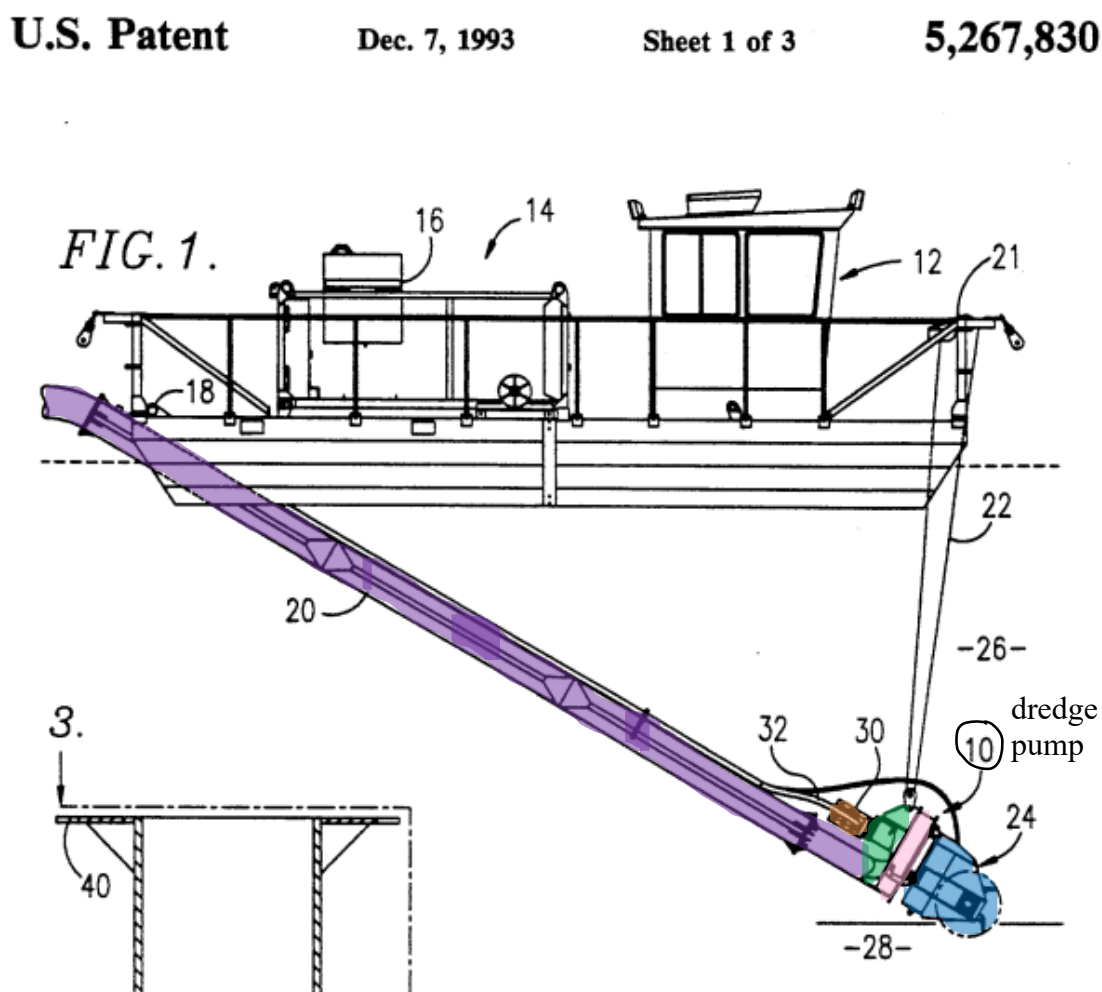


EX2091 at 4; *see also* EX2092 at 1. The above photograph was taken from the Dredge Yard Auger Dredger ECO200 Brochure, which I downloaded from <https://dredgeyard.com/wp-content/uploads/2021/01/ECO200-A8-brochure.pdf> (EX2091). It illustrates a typical horizontal auger (i.e., cutterhead) dredge and shows how the cutterhead is at the end of a long boom arm that is lowered to the lake bottom using an overhead crane/winch. The construction illustrated above shows the standard layout that has been utilized for horizontal auger/cutterhead dredges of this type for over 20 years. For example, I located a number of used horizontal auger/cutterhead dredges on Dredge Brokers LLC (<https://dredgebrokers.com/equipment/hydraulic-dredgers/dt->

[horizontal-cutter/](#)) (EX2092) that were manufactured well before the August 2013 priority date of the '835 Patent. They all have this same basic design layout (i.e., a horizontal auger/cutterhead at the front end of a long boom arm that is lowered to the lake bottom using an overhead crane/winch). Thus, a POSITA would have understood the “cutterhead” dredge disclosed in Cheramie to have this same basic design layout.

H. Wickoren [EX2100]

137. Another example of a traditional cutterhead dredge is found in US 5,267,830 (“Wickoren”) (EX2100), which discloses the pump, cutterhead, and boom arm in the operating (deployed/lowered position):



EX2100 at p. 2. A POSITA would understand that the cutterhead dredge disclosed in Cheramie

generally follows the same overall layout as Wickoren and that the focus of what Cheramie adds to the art is ground engaging tracks and a water propulsion system (water jet).

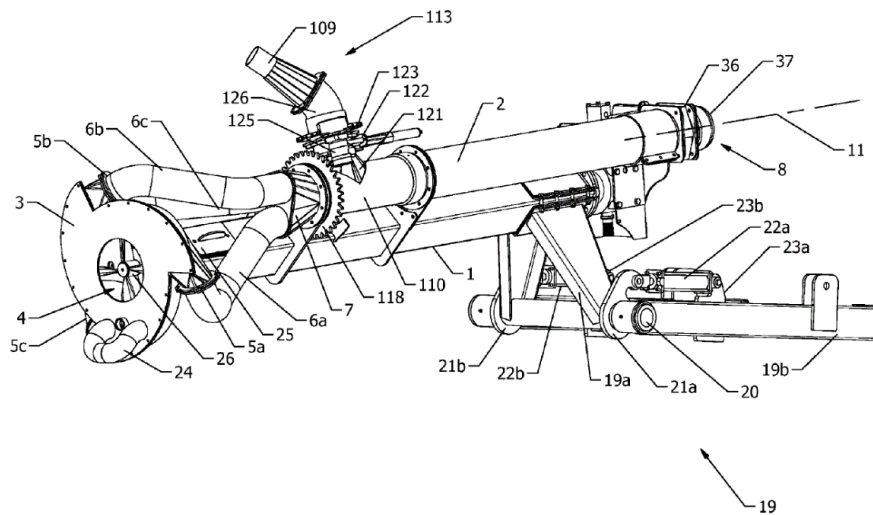
I. Manure Manager [EX1088]

138. Manure Manager (EX1088) is an industry publication (i.e., a trade magazine) from January/February 2011 that includes an advertisement for Nuhn’s “G-Force” a tractor mounted / tractor powered manure lagoon agitation pump assembly, which includes an impeller and pump housing located on the far end of the boom arm while the other end of the boom arm is connected to the rear hitch of a farm tractor. This boom arm is about 10 feet in length and the pump impeller is driven by the PTO of the tractor through a gearbox assembly in the boom arm:



EX1088, p. 27.

139. Nuhn's G-Force Vertical Pit Pump is depicted in another one of Nuhn's patents – US 8,944,758 ("the '758 Patent") (EX2101) – which issued from the patent application incorporated by reference (Application Serial No. 13/038,189) in the '425 Patent. Figure 1 of the '758 Patent is copied below:



EX2101 at p. 2.

J. Houle [EX2010]

140. US 4,406,413 to Houle (EX2010) also discloses a tractor mounted / tractor powered manure lagoon agitation pump 20 that is mounted on the end of a boom arm. The manure agitation

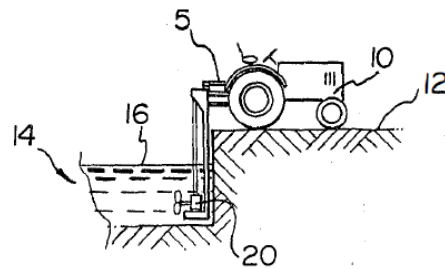


FIG. 1

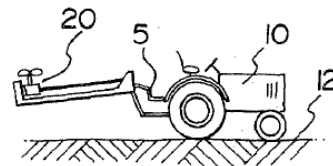


FIG. 2

pump 20 is located on the far end of the boom arm while the other end of the boom arm is connected to the rear hitch 5 of a farm tractor 10:

EX2010, FIGS. 1-2. This pump/agitator is designed for use in vertical manure pits, like Nuhn's G-Force Vertical Pit Pump.

K. Manure Manager [EX1089]

141. Manure Manager (EX1089) is a July/August 2011 publication of the Manure Manager magazine that includes an advertisement for Nuhn's "Hearer Series Lagoon Pump," which is a different a tractor mounted / tractor powered manure lagoon agitation pump assembly. This piece of equipment also includes an impeller and pump housing located on the far end of the boom arm while the other end of the boom arm is connected to the rear hitch of a farm tractor. This manure agitation pump is driven by the PTO of the tractor through a gearbox assembly in the boom arm:

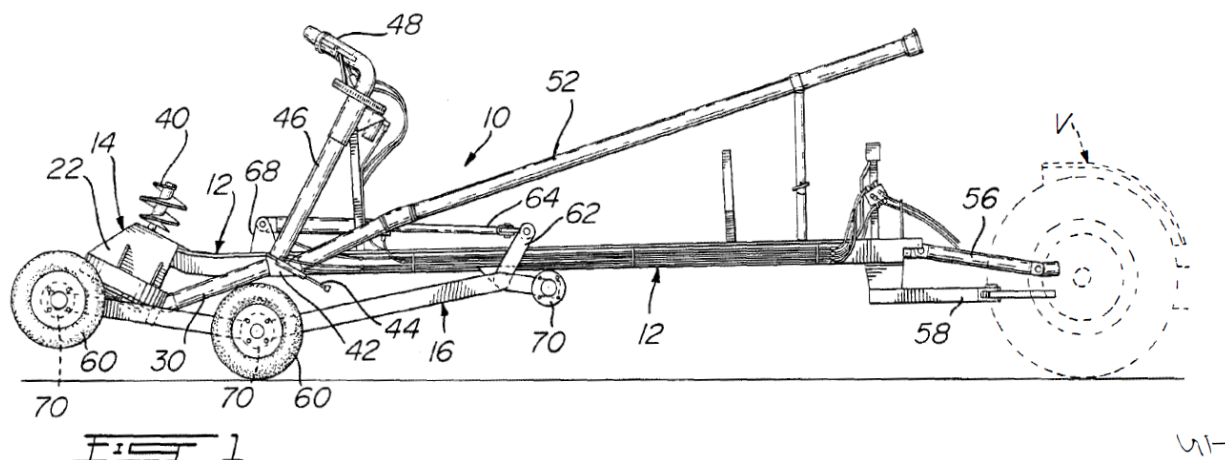


EX1089, p. 23. This manure lagoon pump is designed for manure lagoons with sloped banks (as

opposed to vertical pits) and therefore has an even longer boom arm compared to Nuhn's G-Force Vertical Pit Pump.

L. Depault [EX2017]

142. CA2002619A1 to Depault (EX2017) discloses a tractor mounted / tractor powered manure lagoon agitation pump 14 that is mounted on the end of a boom arm 12. The manure agitation pump 14 is located on the far end of the boom arm 12 while the other end of the boom arm is connected to the rear hitch of a tractor V:



EX2017, FIG. 1. This pump/agitator is designed for use in manure lagoons with sloped banks, like Nuhn's "Hearer Series Lagoon Pump."

143. Both Houle and Depault were cited during prosecution and are listed on the face of the '425 Patent.

M. Overall Summary of What the Prior Art Teaches A POSITA and What it Does Not Teach

144. The ubiquitous teachings of the prior art suggest locating the pump high and dry inside or on top of the vehicle body (like in Carrier, Yoon, and Puck) or placing a submersible pump at the front of the vehicle on the end of a boom arm (like in Truxor, SenwaTec, Cheramie, Wickoren, Manure Manager, Houle, and Depault). The prior art does not teach or suggest the

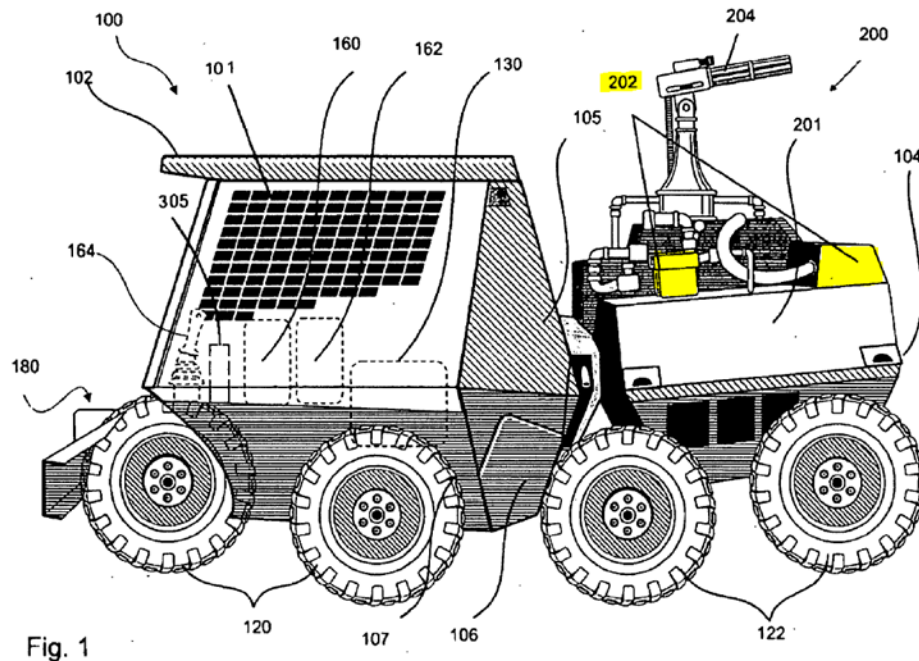
claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

145. The differences between the prior art and the Substitute Claims are not immaterial. The particular arrangements claimed where the liquid manure pump is positioned along the underside of the floatable vehicle body directly contributes to the new and unexpected results and commercial success experienced by Nuhn's invention. These particular claimed arrangements, which discussion the position of the liquid manure pump along the underside of the floatable vehicle body, provide a vehicle where the displacement of the vehicle body and the churning action of the ground engaging elements work together in synergy to breakup thick crust around the vehicle, generating a working pocket or opening within which the liquid manure pump can operate without clogging. Placing these elements elsewhere would destroy this synergy, which depends on the specific location of the liquid manure pump as claimed.

146. The relevant art can be grouped into four general categories or groups: Group 1 – Amphibious Water Pumping Vehicles (Carrier and Yoon), Group 2 – Manned Amphibious Dredging Vehicles (Truxor, SenwaTec, Cheramie, Wickoren), Group 3 – Manure Agitation Boats (Puck), and Group 4 – Tractor Mounted/Powered Manure Agitation Pumps (Manure Manager, Houle, and Depault). Of note, only Groups 3 and 4 deal with the problem of manure lagoon agitation and the claimed invention (an unmanned amphibious manure agitation vehicle) does not fall within any of these groups, it started its own category.

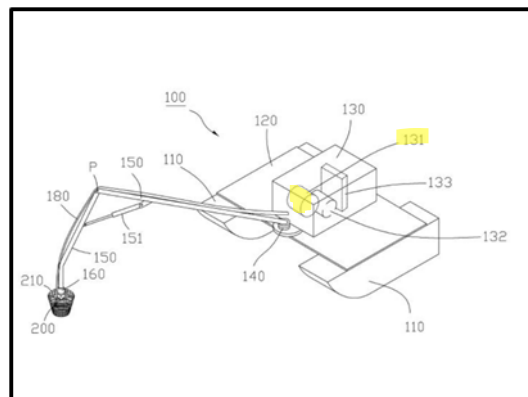
147. Group 1 – Amphibious Water Pumping Vehicles (Carrier and Yoon) teach a POSITA to locate a non-submersible water pump high and dry inside the vehicle body or on top of the vehicle body.

148. The **water pumps** 202 of Carrier are illustrated as being located at the top of the vehicle where it would be high and dry and not immersible when the vehicle is floating:



EX1005, at 2.

149. Yoon discloses “an amphibious water treatment device that is installed at streams or on storage tanks, reservoirs.” EX1011, Yoon, ¶ [0001]. Yoon includes a main body 130 in which a water pump 131 is installed. EX1011, Yoon, ¶ [0047]. Thus, the water pump 131 of Yoon is not immersed in the storage tank or reservoir.



EX1011, at 2.

150. It is my opinion that a POSITA would not have even looked to the teachings of the Group 1 prior art (Carrier and Yoon) when attempting to design a manure lagoon agitation vehicle because these references relate to water pumping vehicles as opposed to manure lagoon agitation

equipment, but even they were considered relevant to a POSITA, the logically result of following these teachings would be to place an non-submersible pump high and dry on top of the vehicle body (like in Carrier) or inside the vehicle body (like in Yoon). The Group 1 prior art does not teach or suggest the claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

151. Group 2 – Manned Amphibious Dredging Vehicles (Truxor, SenwaTec, Cheramie, and Wickoren) teach a POSITA to locate a submersible dredge pump at the front of the vehicle on the end of a boom arm that is configured to lower the submersible dredge pump to the lake bottom for dredging operations.

152. Truxor is a multi-role, manned, light duty (i.e., “low ground pressure”) amphibious vehicle with various *quick-connect* attachments. The Truxor amphibious vehicle includes a boom arm configured to accommodate quick-connect aquatic weed cutters [EX1006, at 6-7], rakes [EX1006, at 8-9], buckets and log grabbers [EX1006, at 9], dredge pumps [EX1006, at 10-11], excavators [EX1006, at 12], cultivators [EX1006, at 13], and oil decontamination tools [EX1006, at 14-15].

153. As noted above, one of the *quick-connect* attachments is disclosed as being a *pump* and the pump is designed to be a quick-connect pump for dredging a lake or stream, **not for pumping liquid manure** (or animal manure contained in a farm lagoon, which includes suspended solids) **within and out of an agricultural manure lagoon**. The pump of Truxor is located forward of the front end of the vehicle at the end of a boom arm:



EX1006, at 11.

Like Truxor, SenwaTec is a multi-role, manned, light duty (i.e., “low ground pressure”) amphibious vehicle with various *quick-connect* attachments. The SenwaTec amphibious vehicle includes a boom arm configured to accommodate *quick-connect* aquatic weed cutters, rakes, buckets tree cutter and dredge pumps. EX1012, at 2.

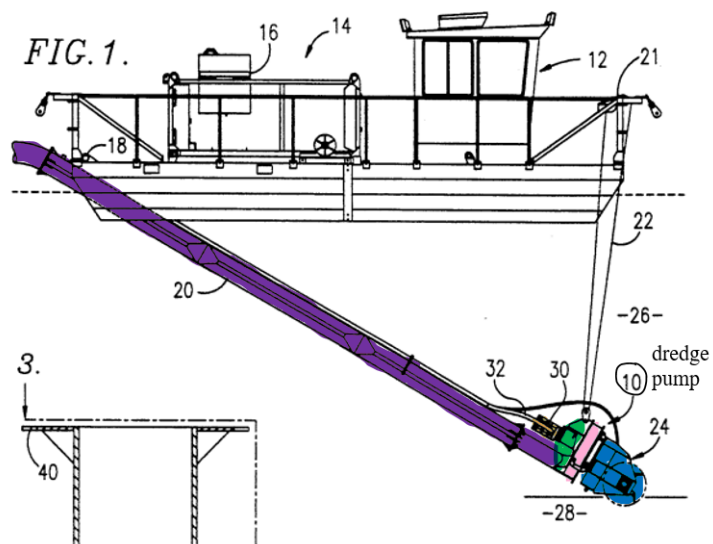
154. As noted above, one of the *quick-connect* attachments is disclosed as being a *pump* and the *pump* is designed to be a quick-connect pump for dredging a lake or stream, ***not for pumping liquid manure*** (or animal manure contained in a farm lagoon, which includes suspended solids) ***within and out of an agricultural manure lagoon***. The pump of SenwaTec is located

forward of the front end of the vehicle at the end of a boom arm:

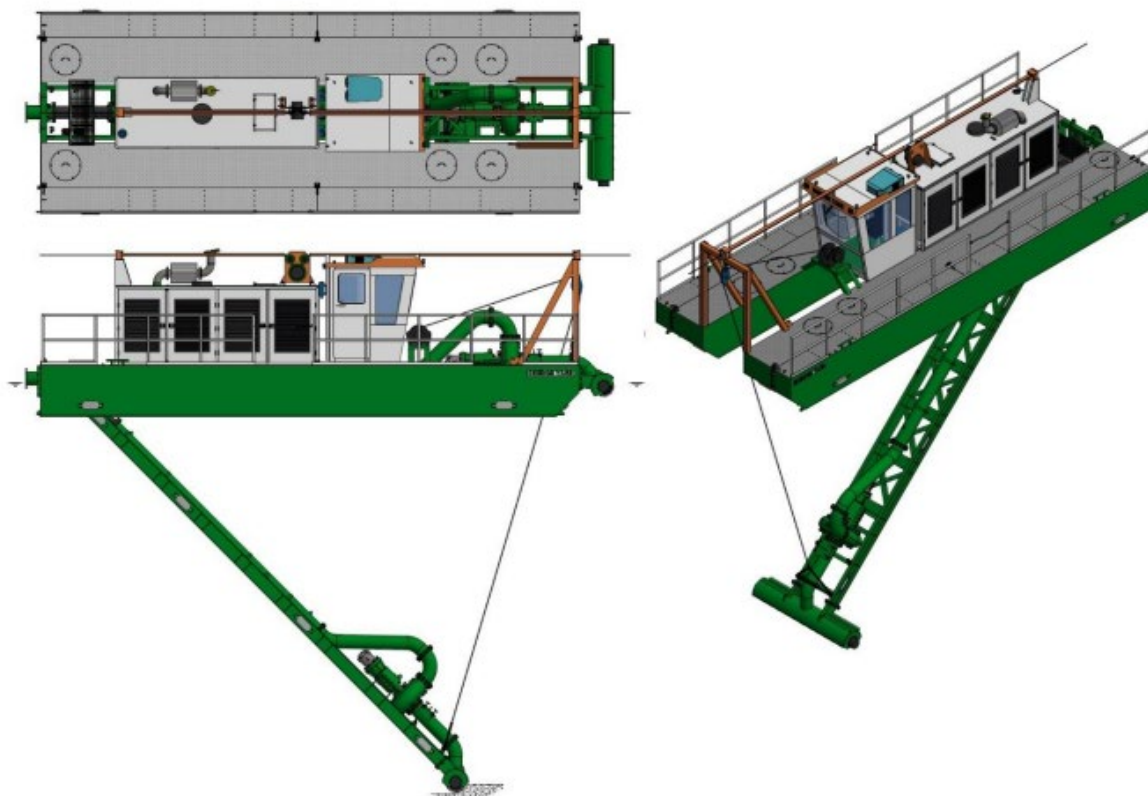


EX1012, at 1.

155. Wickoren (EX2100) discloses what a POSITA would have understood to be a conventional cutterhead dredging vehicle at the time of Nuhn's invention. As shown below, the cutterhead dredging vehicle in Wickoren includes a pump 10 and cutterhead 24 at the far end of a boom arm 20 that is lowered to the lake bottom in an operating/deployed/lowered position using an overhead crane 22 and cable 21:

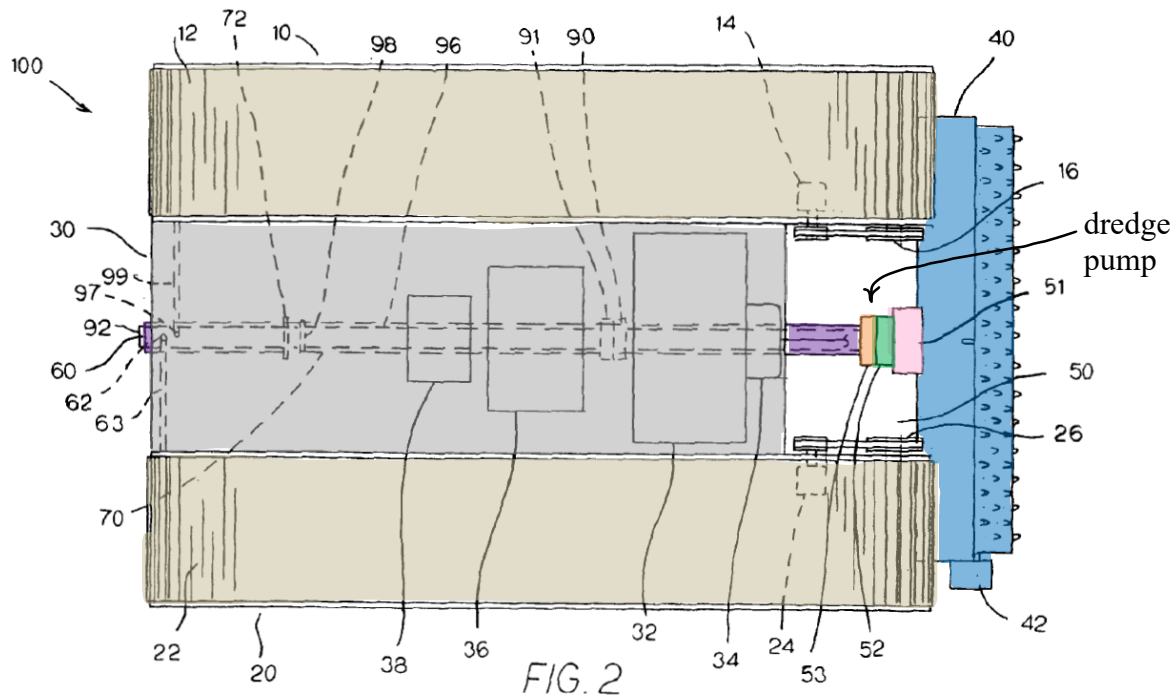


EX2100 at p. 2. A three-dimensional view of this type of dredging vehicle is shown below:



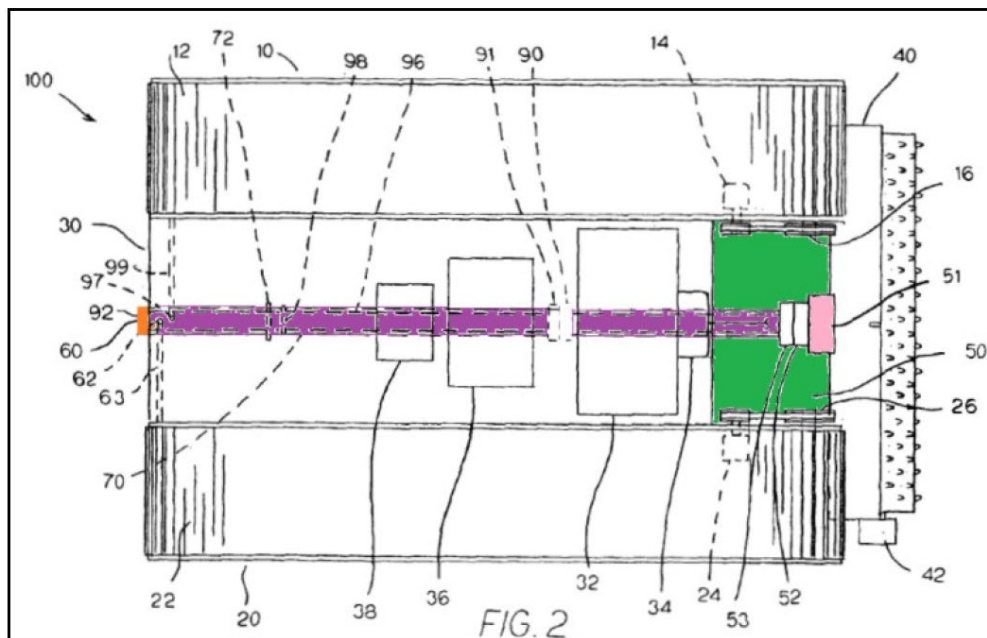
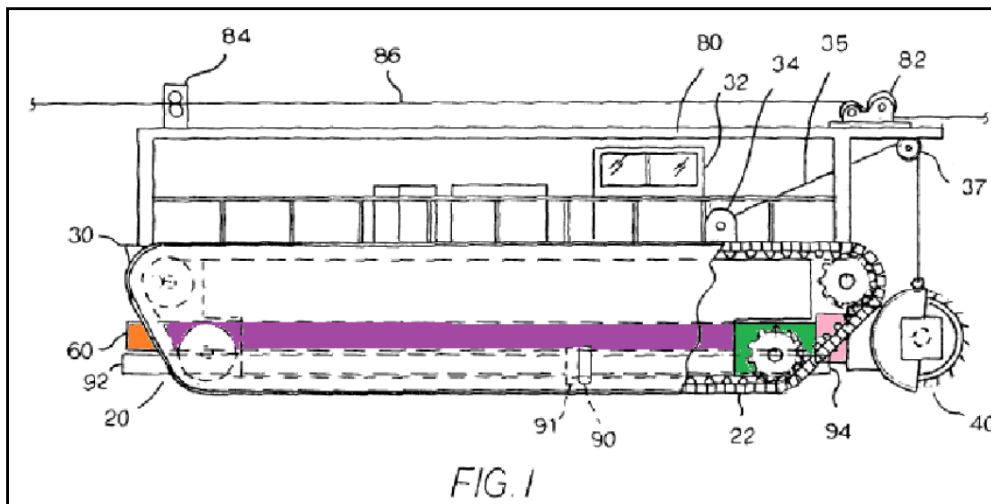
EX2091 at p. 4.

156. A POSITA would understand Cheramie's disclosure to follow the traditional layout of cutterhead dredges, which include a cutout/open area at the front end of the vehicle between the pontoons and forward of the control house 32 that allows the on-board operator to observe the position and operation of the cutterhead 40. A POSITA would therefore understand the deck 30 to cover the area identified in grey below:



EX1087, 3. The tracks 12, 22 are shown in light brown. The cutterhead 40 is shown in blue, the impeller housing 51 of dredge pump 50 is shown in pink, the hydraulic pump 52 of dredge pump 50 is shown in green, the hydraulic drive motor 53 that is adjacent to and powers the dredge pump 50 is shown in orange, and the discharge pipe 60 is shown in purple.

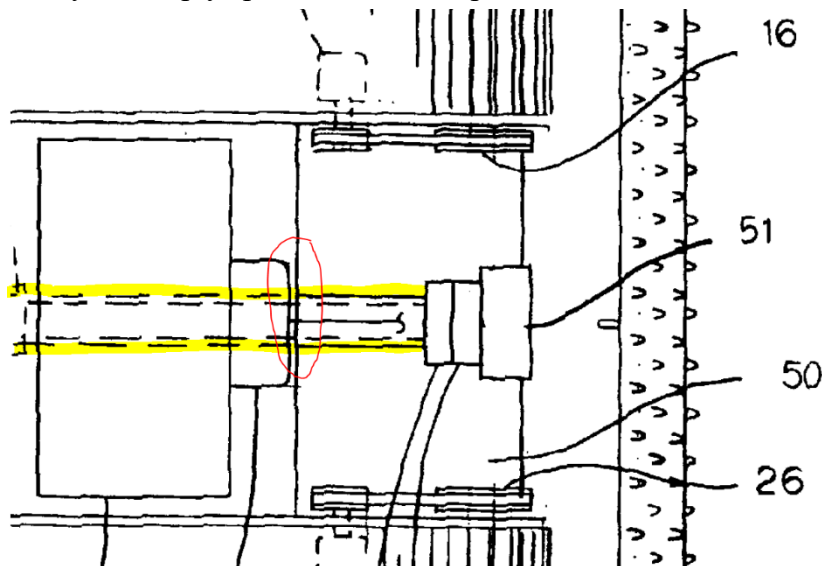
157. I disagree with Winkel's interpretation of Cheramie, shown below, where it is argued that the rectangular cutout/open area at the front end of the vehicle between the pontoons and forward of the control house 32 is a rectangular/box shaped pump.



EX1109, pp. 34-35. The back line of Winkel’s imaginary box-like pump (green box in Fig. 2) is actually the front edge of the deck 30 just ahead of the winch 34 and the front line of Winkel’s imaginary box-like pump (green box in Fig. 2) is actually the back side of the cutterhead 40. Similar

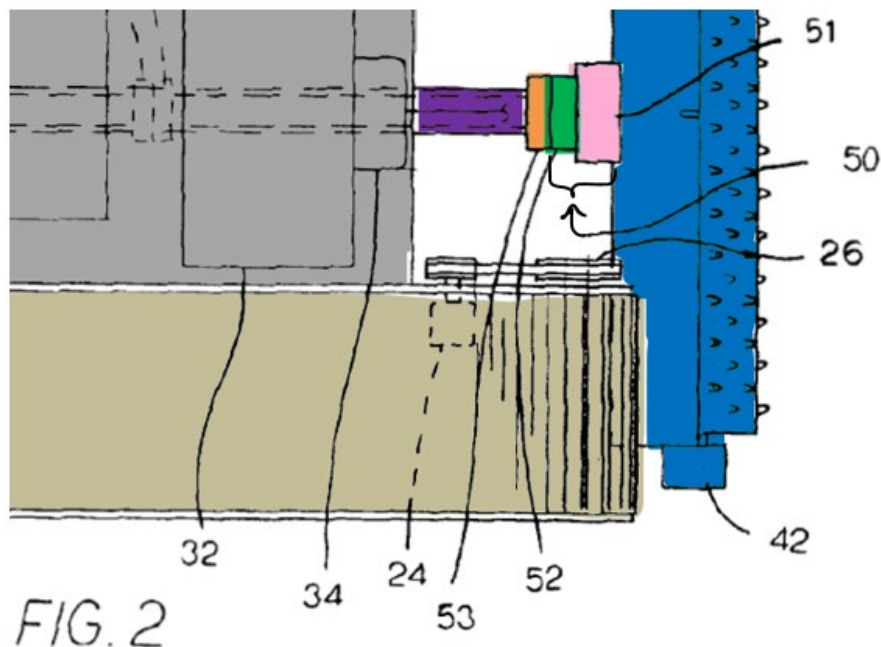
158. A POSITA would not understand Cheramie to disclose Winkel’s imaginary box-like pump (green box) in view of the drawing conventions used in the Cheramie application. In particular, Cheramie describes FIG. 2 as a “top view” and uses a drawing convention where

elements that are visible from above the vehicle are depicted in solid lines, while elements that are hidden when viewing the vehicle from above are depicted in dashed lines. The transition between the solid line segments and dashed line segments defining the discharge pipe 60, which occurs just ahead of the winch 34, clearly demonstrates that area Winkel calls out in green as the “dredge pump” is actually the empty space between the pontoons and forward of the control house 32.



X1087, 3. If Winkel’s interpretation of Cheramie were correct, the solid line segments depicting the front end of the discharge pipe 60, impeller housing 51, hydraulic pump 52, and hydraulic drive motor 53 would all be in dashed lines.

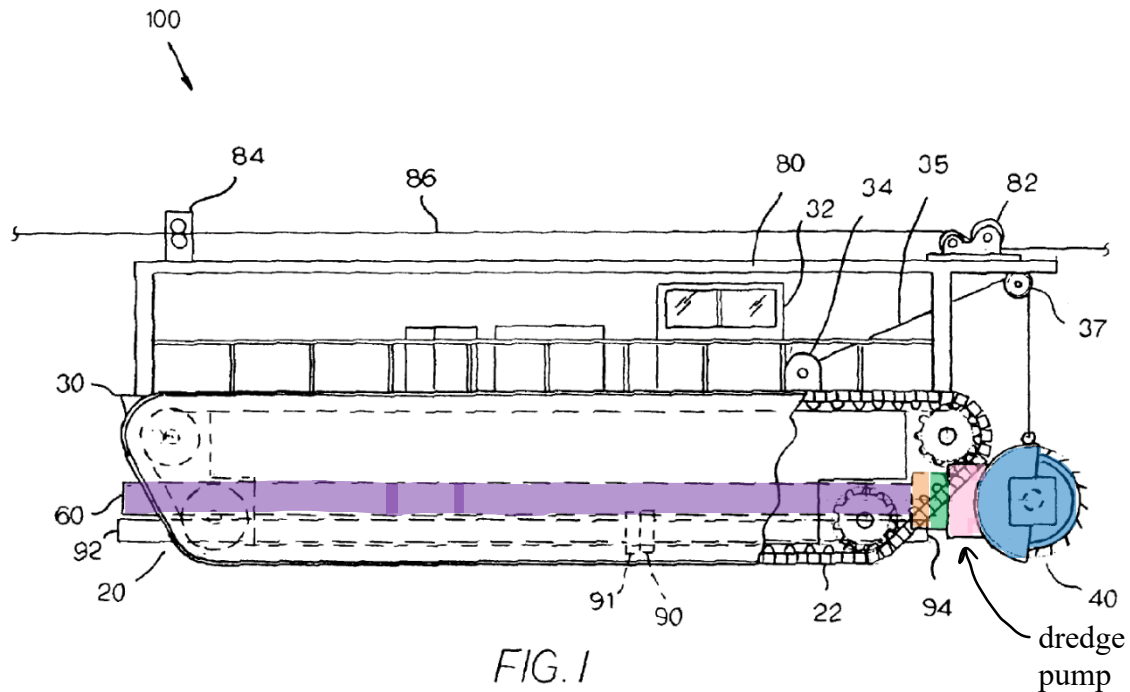
159. Column 4, lines 26-27 of Cheramie states that “Dredge pump 50 includes both impeller housing 51 and ten-inch hydraulic pump 52” and column 4, lines 43-44 explain that there is a “hydraulic drive motor 53 mounted adjacent to dredge pump 50.” In view of this disclosure, a POSITA would understand that the lead line in Fig. 2 of Cheramie for element 50 is imprecise and would more appropriately have included an arrowhead pointing to the impeller housing 51 and hydraulic pump 52 as shown below:



In view of the disclosure, a POSITA would also understand that the dredge pump 50 comprises two components – the impeller housing 51 (in pink) and the hydraulic pump 52 (in green) and that the hydraulic drive motor 53 (in orange) is next to the dredge pump 50, but is not part of the dredge pump itself since Cheramie describes the hydraulic drive motor 53 as being “adjacent to dredge pump 50” rather than saying that the dredge pump 50 includes hydraulic drive motor 53, which is how elements 51 and 52 were described. Winkel’s imaginary green box encompasses the hydraulic drive motor 53 and the front segment of the discharge pipe 60 and is therefore inconsistent with the language in Cheramie explaining that there is a “hydraulic drive motor 53 mounted adjacent to dredge pump 50.” EX1087, col. 4, ln. 43-44. Winkel’s reading of Cheramie is simply erroneous.

160. When the teachings of Cheramie are correctly understood, it is clear that this reference discloses a dredge pump with a housing and impeller 51 that are located at the far end of the discharge pipe 52, immediately behind the cutterhead 40, which is designed to be lowered to

the lake bottom using the over-head crane and pulley 37, winch 34, and cable 35.



EX1087, 2.

161. In view of the above analysis, Cheramie does not teach an arrangement where “the liquid manure pump includ[es] a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body” as required by Substitute Claim 22.

162. A POSITA would not consider Cheramie's impeller housing 51, which is mounted on the backside of the cutterhead 40, at the far end of a boom arm 60 that is lowered to the lake bottom, to be positioned "along the underside of the floatable vehicle body" as required by Substitute Claim 22. And even if the impeller housing 51 were considered to be "along the underside of the floatable vehicle body" when the cutterhead 40 is raised, which is not how a POSITA would understand the teachings of Cheramie, the impeller housing 51 is at or in front of the vehicle body in this position rather than "rearward of the front of the vehicle body" as required by Substitute Claim 22. Indeed, as shown below, the impeller housing 51 (pink) in Cheramie is located in front of the floatable pontoons 10, 20 (yellow) and the deck 30 (grey).

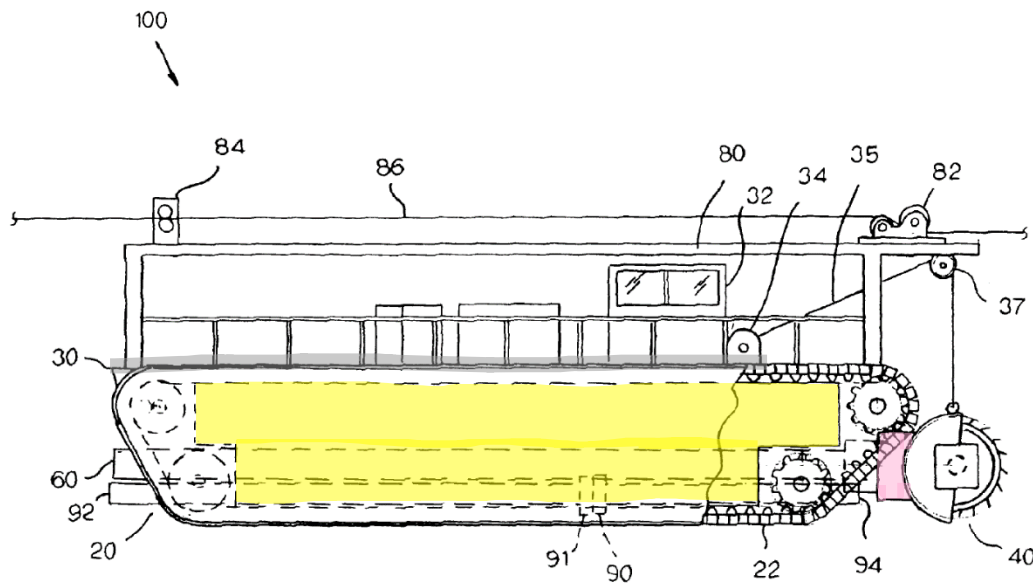


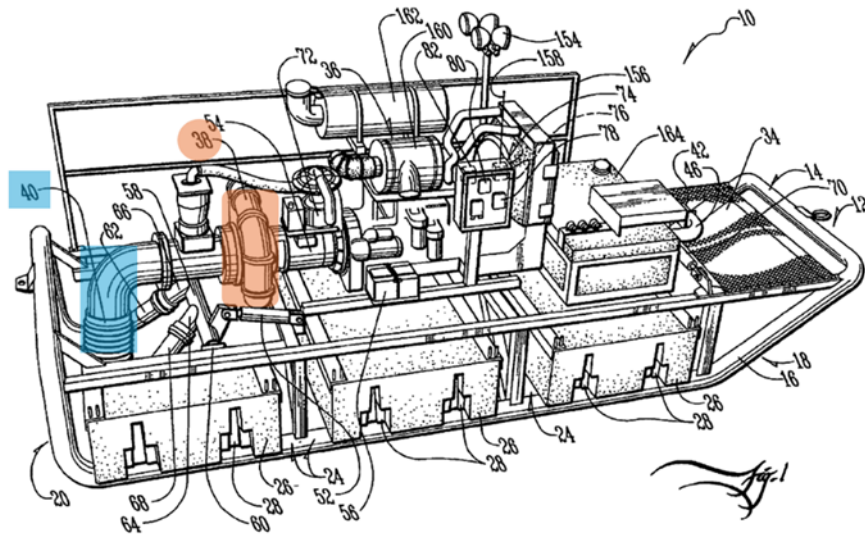
FIG. 1

163. It is my opinion that a POSITA would not have even looked to the teachings of the Group 2 prior art (Truxor, SenwaTec, Cheramie, and Wickoren) when attempting to design a manure lagoon agitation vehicle because these references relate to weed clearing and dredging vehicles as opposed to manure lagoon agitation equipment, but even they were considered relevant to a POSITA, the logically result of following these teachings would be to place a submersible pump on the forward end of a long boom arm. The Group 2 prior art does not teach or suggest the

claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

164. Group 3 – Manure Agitation Boats (Puck) teach a POSITA to locate a non-submersible water pump high and dry on top of the floatable vehicle body above the surface of the manure lagoon.

165. Puck discloses a manure agitation boat including a slurry pump (38) that is located well above the floating dock sections (26) and thus the surface (126) of the manure lagoon (22) and a number of nozzles 48, 66, 68 that are positioned below the surface (126) of the manure lagoon (22):



EX1014 at 2 (annotated).



EX1014 at 5, 7 (annotated).



166. A liquid manure intake (40) extends towards a reward end of the boat, with a ninety-

degree bend downward towards the bottom of the boat. The housing and impeller of the pump (38) are separate and distinct from the intake pipe (40) and are not located on the underside of the boat. Non-immersible liquid manure pumps (like the one disclosed in Puck), require different inlet/housing configurations with pump priming structures compared to submersible pumps. EX1014 at [0031].

167. A POSITA looking to the teachings of the Group 3 prior art (Puck) when attempting to design a new manure lagoon agitation vehicle would logically follow the disclosure in Puck, which teaches placing a non-submersible pump high and dry on top of the floatable vehicle body. The Group 3 prior art does not teach or suggest the claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

168. Group 4 – Manure Agitation Pumps (Manure Manager, Houle, and Depault) teach a POSITA to locate a submersible manure pump at the lower end of a boom arm. The upper end of the boom arm opposite the manure pump is configured to be attached to the three-point mount on a tractor and the manure pump is powered/driven by the power-take-off (PTO) of the tractor.

169. Manure Manager (EX1088) discloses Nuhn's "G-Force" a tractor mounted / tractor powered manure lagoon agitation pump assembly, which includes one of Nuhn's manure agitation pumps located on the far end of the boom arm while the other end of the boom arm is connected to the rear hitch of a farm tractor:



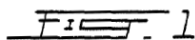
EX1088, p. 27.

5 of a farm tractor 10:

EX2010, FIGS. 1-2.



hitch of a tractor V:



EX2017, FIG. 1.

follow the disclosure in these references, which teaches placing a submersible manure pump on

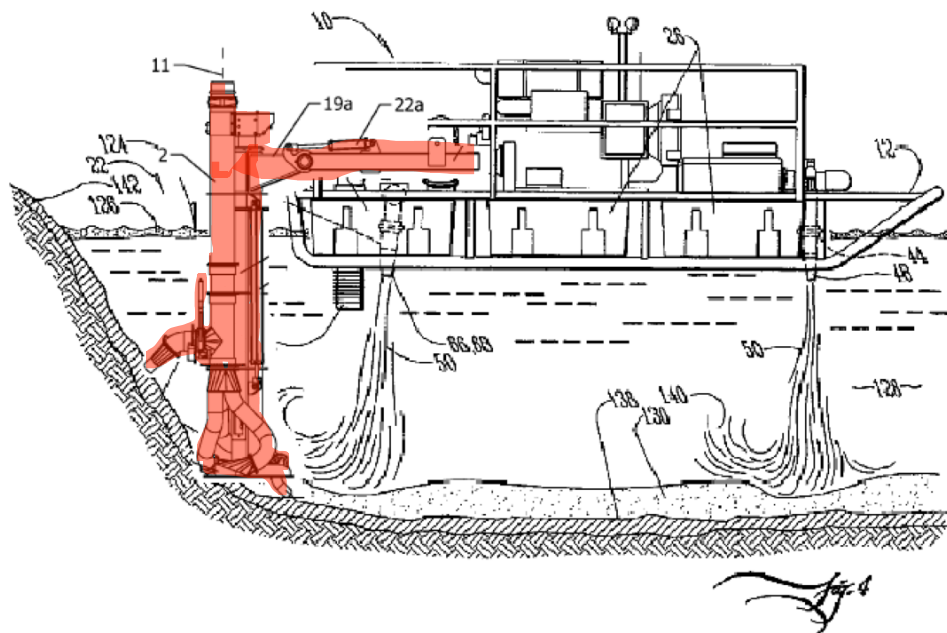
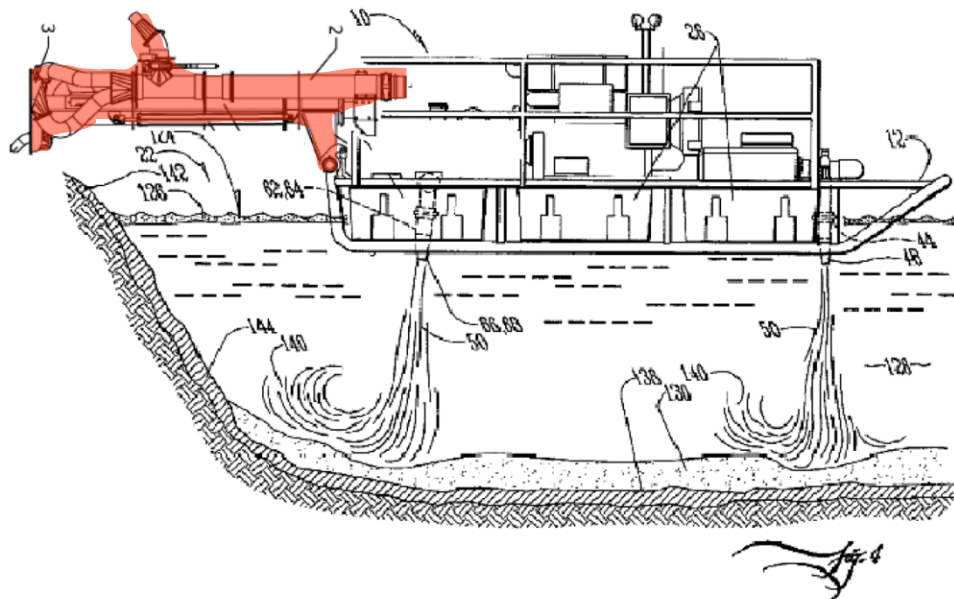
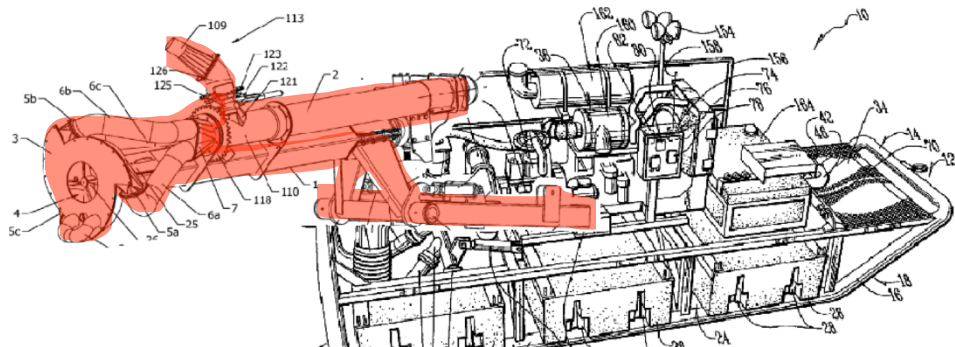
the end of a long boom arm that mounts to the rear of a vehicle body. The Group 3 prior art does not teach or suggest the claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

173. Putting this all together, if a POSITA set out to design a new amphibious manure agitation vehicle utilizing a fluid pump, and had the knowledge and motivation to combine the art identified above (for arguments sake), they would have placed the pump either high and drying in the floatable vehicle body based on the teachings of the Group 1 prior art (Carrier and Yoon) and the Group 3 prior art (Puck) or they would have placed the pump on the end of a boom arm at the front or back of the vehicle based on the teachings of the Group 2 prior art (Truxor, SenwaTec, Cheramie, and Wickoren) and the Group 4 prior art (Manure-Manager, Houle, and Depault). The prior art does not teach or suggest the claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

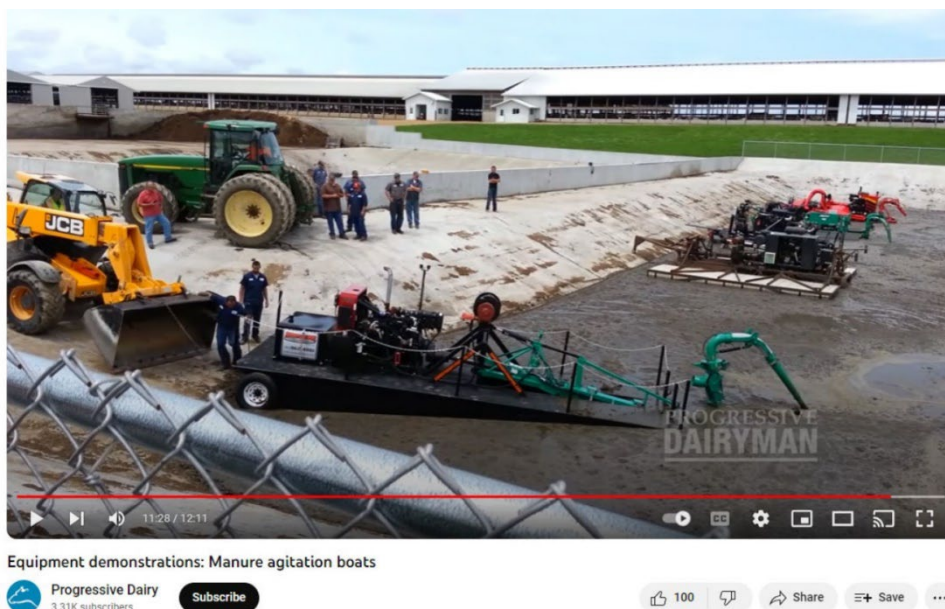
174. I disagree that a POSITA would look to the Group 1 references when designing a manure lagoon agitation vehicle, but regardless of that dispute, neither the Group 1 references (Carrier and Yoon) nor the Group 3 references (Puck) teach an liquid manure pump with “a housing and an impeller that are positioned along the underside of the floatable vehicle body” as required by Substitute Claim 22. The only references that disclose an immersible liquid manure pump are the Group 4 references (Manure Manager, Houle, and Depault). All of these references teach placing the liquid manure pump at the far end of a boom arm. The only other prior art that teaches immersible pumps are the Group 2 references (Truxor, SenwaTec, Cheramie, and Wickoren), which disclose dredge pumps on the far end of a boom arm. I disagree that a POSITA would look to the Group 2 references when designing a manure lagoon agitation vehicle, but regardless of that dispute, if a POSITA were motivated to select an immersible pump, the prior art teaches placing the immersible pump at the far end of a boom arm rather than along the underside of the floatable vehicle as required by Substitute Claim 22. The submersible pump arrangements disclosed in the prior art (i.e., submersible pumps on the end of a boom arm) would also result in

a vehicle where the pump can be tilted upwards out of the manure. As a result, it is my opinion that the prior art does not anticipate the subject matter of Substitute Claims 22-42 or render them obvious.

175. I disagree that a POSITA would add Bryham's wheels to Puck or a combination of Puck and Manure-Manager for the reasons discussed in my previous Declarations (EX2004, EX2029), but if a POSITA were to make the Petitioner's combination where the pump 34 in Puck were replaced by Nuhn's G-Force Vertical Pit Pump (which is advertised in Manaure-Manager), then the resulting combination would look like this:



176. My opinion in this regard is not based on speculation, but rather evidence of what others in the industry actually did in June of 2014, less than a year after the '425 Patent's August 19, 2013 priority date. For example, in June of 2014 Sundstrom Bros. Custom Fabrication LLC hung a manure pump that was designed to be mounted to and powered by a tractor off the end of a floating barge such that it could be tilted up and down.



EX2008, 8-9.

177. In view of the above analysis, if a POSITA were to add Nuhn's G-Force Vertical

Pit Pump to Puck's boat, that combination would result in a pump at the far end of an articulating boom arm hanging off the rear of Puck's boat so that it could swing up and down in the same manner as when Nuhn's G-Force Vertical Pit Pump is attached to a tractor. Thus, the combination of Manure Manager and Puck would not result in a vehicle where "the liquid manure pump [es] a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body" as required by Substitute Claim 22.

178. A POSITA would not consider the impeller and housing of Nuhn's G-Force Vertical Pit Pump to be positioned "along the underside of the floatable vehicle body" in Puck, which is required by Substitute Claim 22. And even if the impeller and housing were considered to be "along the underside of the floatable vehicle body" when Nuhn's G-Force Vertical Pit Pump is raised, which is not how a POSITA would understand the prior art's teachings, the impeller and housing would be several feet behind the rear of the floatable vehicle body in this position rather than "forward of the rear of the floatable vehicle body" as required by Substitute Claim 22.

XII. A POSITA WOULD NOT HAVE BEEN MOTIVATED TO ARRIVE AT THE COMBINATION OF REFERENCES PETITIONER ASSERTS

179. The '425 Patent describes that during storage of liquid manure "a crust can develop on the surface of the pit or lagoon that must be disrupted prior to or during removal of the manure." EX1001, '425 Patent at col. 1, ln.36-38. The '425 Patent describes that "[p]umps are employed for this purpose with jets that return a percentage of the manure back to the pit or lagoon in the form of a high volume spray to disrupt the crust and recirculate the manure." *Id.* at col. 1, ln. 38-41. Additionally, the '425 Patent acknowledges that "[p]umps for use in recirculating manure from *smaller* pits are known." *Id.* at col. 1, ln. 41-42 (emphasis added). But it recognizes that there are problems with these pumps. Namely, "these pumps are typically suitable for accessing the pit or

lagoon from its edge and are connected to a tractor or similar land vehicle for operational power.” *Id.* at col. 1, ln. 43-45. Because such pumps are only at the edge of the pit or lagoon, “[t]hey are therefore limited in their ability to recirculate manure to the middle of **large** lagoons, which are becoming increasing common as the size of animal husbandry operations increases.” *Id.* at col. 1, ln. 45-49 (emphasis added). The ‘425 Patent therefore identifies that “there is a need for improved pumps and vehicles equipped for pumping, particularly pumps and vehicles suitable for use with large manure lagoons.” *Id.* at col. 1, ln. 50-52.

180. Thus, it is my opinion, that a POSITA would have understood from the teachings of the ‘425 Patent that there are shortcomings with pumps for recirculating smaller pits and that such pumps have difficulties in breaking up the crust suspended on liquid manure and recirculating and agitating the liquid manure of large manure lagoons or pits. Moreover, as described herein, a POSITA would have known that the crust suspended in the liquid manure can be hard, thick, and pose clogging problems if fluid pumps that are not for pumping liquid manure are attempted to be used to for agitating the liquid manure.

181. Therefore, it is my opinion that a POSITA who would have been attempting to solve the same problems at the same time of the invention of the ‘425 Patent would have never looked to Truxor, SenwaTec, or Cheramie in the first instance and therefore would have never modified Truxor, SenwaTec, or Cheramie as suggested by Petitioner and Dr. Winkel. Again, Truxor describes a vehicle with “minimal ground pressure” that can be “driven with care” to minimize “damages to river banks and sensitive areas.” EX1006 at 2. Truxor goes so far to state that its vehicle is “ideal for working on golf courses, nature reserves and public parks where larger, heavier machines have difficulty operating.” *Id.* A POSITA that was particularly interested in breaking up, agitating and recirculating the hard, thick crusts in liquid manure of large manure lagoons would have never looked to a Truxor’s lightweight vehicle with “minimal ground pressure” that is “sensitive” to the ground on which it is drive. The same goes for SenwaTec, which describes a “light” vehicle with “low ground pressure.” EX1012 at 1. While the vehicle disclosed

in Cheramie appears to be larger than those disclosed in Truxor and SenwaTec, so is the surface area of its tracks. Cheramie explains that it adopted tracks like those disclosed in U.S. Pat. No. 5,984,032 (“Gremillion”) which talks about “spreading and decreasing ground pressure while maintaining maximum tractions. *See* EX1087, 1:37-46; EX20XX, 3:19-39. This is not what a POSITA would have been looking for in a piece of manure lagoon agitation equipment where the idea is to disrupt the crust on the surface of a farm lagoon.

182. A POSITA would also have been keenly aware that Truxor’s and SenwaTec’s vehicles with their low power, light weight, and low flow rate pumps would be insufficient and outright incapable of solving the problem that they faced. These small pump would be unable to pump the liquid manure considering the total solids content, the size of the solids, the viscosity of the liquid manure, and the hard, thick crust that it must also pump.

183. Moreover as asserted by Petitioner and Dr. Winkel, a POSITA would have understood that liquid manure lagoon is highly corrosive. *See* EX1004, Winkel Decl. ¶ 120. Dr. Winkel asserts that “[a] POSA would have been motivated to avoid exposing certain types of metal equipment, such as vehicle trailers, to corrosive lagoon liquids.” *Id.* He’s entirely correct on this point, and for that very reason a POSITA would have never looked to using an amphibious vehicle in a liquid manure lagoon. Thus a POSITA would not have utilized an amphibious vehicle with wheels or tracks that would be in the liquid manure during long periods of agitation and recirculation as they would have believed that such equipment would have been damaged by the corrosive environment. The POSITA would have understood that the ground engaging propulsion structure of the amphibious vehicle would be immersed and remain in the corrosive manure lagoon for the entire period of time during regular agitation sessions, which often take multiple hours. The repeated and prolonged exposure to the corrosive liquid manure would have quickly corroded the costly components of the ground engaging propulsion structure, such as hydraulic motors, spindles, hydraulic fittings, wheels, etc. A POSITA would have understood that this would lead to significant downtime and costly repairs of the manure lagoon agitator.

184. Additionally, it is my opinion that a POSITA would **not** have modified Truxor or SenwaTec, both of which describe the use of quick-connect attachments, to incorporate remote control systems because a POSITA would have needed a direct line of sight of the terrain ahead of and around the vehicle to avoid getting stuck, rolling, or tipping and to use the particular tool that was attached to the vehicle.

185. For these reasons, a POSITA would have never looked to Truxor, SenwaTec, or Cheramie and despite knowing of the existence of amphibious vehicles they would have never thought to modify or use one for agitation and recirculation of liquid manure. If it was so obvious as Dr. Winkel asserts, for a POSITA to have created an amphibious manure lagoon agitation vehicle, then why did a POSITA never do it before Nuhn. The reasons I give are why. Rather than an amphibious vehicle, Puck—filed less than two years before the priority date of the ‘425 Patent—exemplifies what a POSITA would have done. Rather than subject an amphibious vehicle with its complex and costly components to the corrosive environment of liquid manure, with Puck only the frame 14 of welded tubular steel pipes 16, modular dock sections 26, releasably coupled tapered nozzles 48, 66, 68, and intake pipe 40 are in the liquid manure when Puck’s boat is floating in the liquid manure lagoon. *See* EX1014, Fig. 4. No part of the power source 36, liquid manure pump 38, or hydraulic system (e.g., hydraulic cylinder 52 or hydraulic pump 54) are shown as being in the liquid manure when Puck’s boat is floating. *See id.* That is because a POSITA would have understood, and did understand, that one would want to keep these complex, costly components out of the liquid manure. Importantly, Puck describes that the modular dock sections 32 and the tapered nozzles 48, 66, 68 are removable. As such, these comparatively cheaper components could be removed and replaced much easier and cheaper after prolonged exposure to the liquid manure.

186. In summary, it is my opinion that no POSITA would have ever looked to an amphibious vehicle, including Truxor or SenwaTec, for use in agitating and recirculating liquid manure in a liquid manure lagoon, nor would a POSITA have looked to modify Puck to be

amphibious. As such, it is my opinion that Petitioner’s combinations of references fail to show that the claims of the ‘425 Patent are obvious.

XIII. GROUND 1: CLAIMS 22-25, 27, 28, AND 33-40 ARE NOT OBVIOUS BASED ON CHERAMIE IN VIEW OF YOON OR CARRIER

187. In the following sections I examine various elements of the ‘425 Patent and explain why at least Claim 22 is not rendered obvious by Cheramie in view of Yoon or Carrier (“the Cheramie Combination”). Claims 23-25, 27, 28, and 33-40 depend from Claim 22 and are not rendered obvious by the Cheramie Combination at least the same reasons.

A. Claim 22

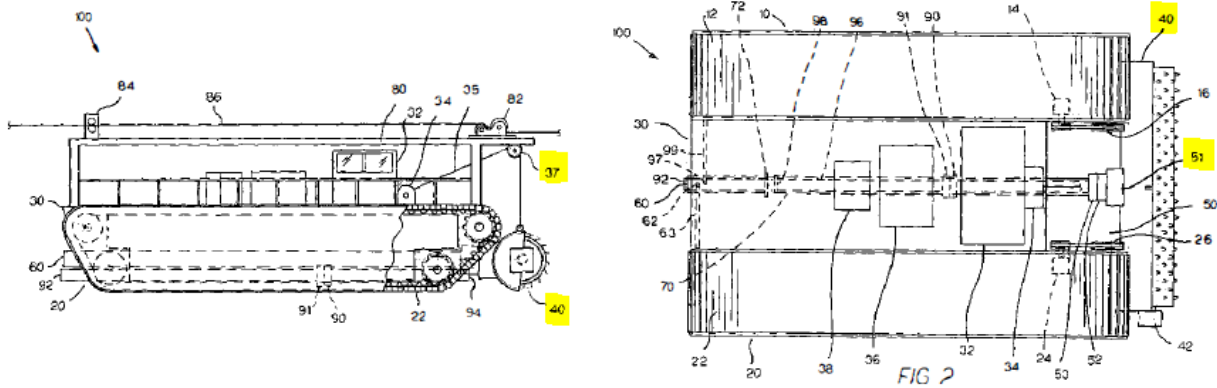
1. THE CHERAMIE COMBINATION FAILS TO DISCLOSE THE CLAIMED POSITION OF THE LIQUID MANURE PUMP

188. The Cheramie Combination fails to teach or suggesting the position of the impeller and housing of the liquid manure pump recited in Substitute Claim 22, which is set forth below:

“a liquid manure pump for pumping liquid manure, the liquid manure pump including a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body and such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating”

Because Claim 22 is independent, none of the Substitute Claims are rendered obvious by the Cheramie Combination in view of this deficiency.

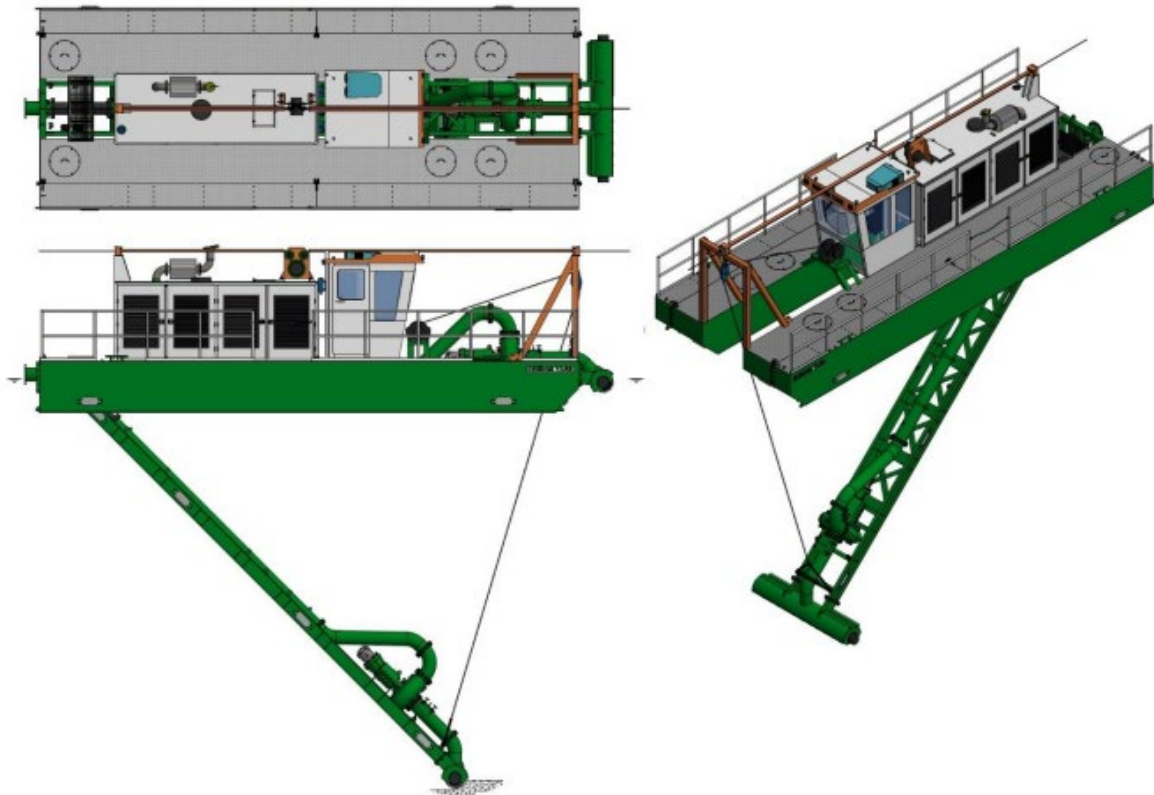
189. Cheramie (EX1087) discloses a large, manned amphibious dredging vehicle. The vehicle has a “cutterhead dredge system,” which includes an impeller housing (51) that is positioned immediately behind the cutterhead (40):



EX1087, 1.

190. The impeller housing (51) and cutterhead (40) in Cheramie are positioned at the forward end of a long boom arm that is lowered to the lake bottom on a cable using an overhead crane/winch (37). The Figures of Cheramie only illustrate the boom arm in the fully raised position (i.e., the transport position, not the operating position), but a POSITA would have understood the crane (37), impeller housing (51), and cutterhead (40) structure in Cheramie to be consistent with other “cutterhead” / “auger” dredge vehicles of this type.

191. For example, in the deployed position, the crane (37), impeller housing (51), and cutterhead (40) in Cheramie would look something like that shown below, which depicts the pump, cutterhead, and boom arm of another “cutterhead” / “auger” dredge vehicle in the operating position:

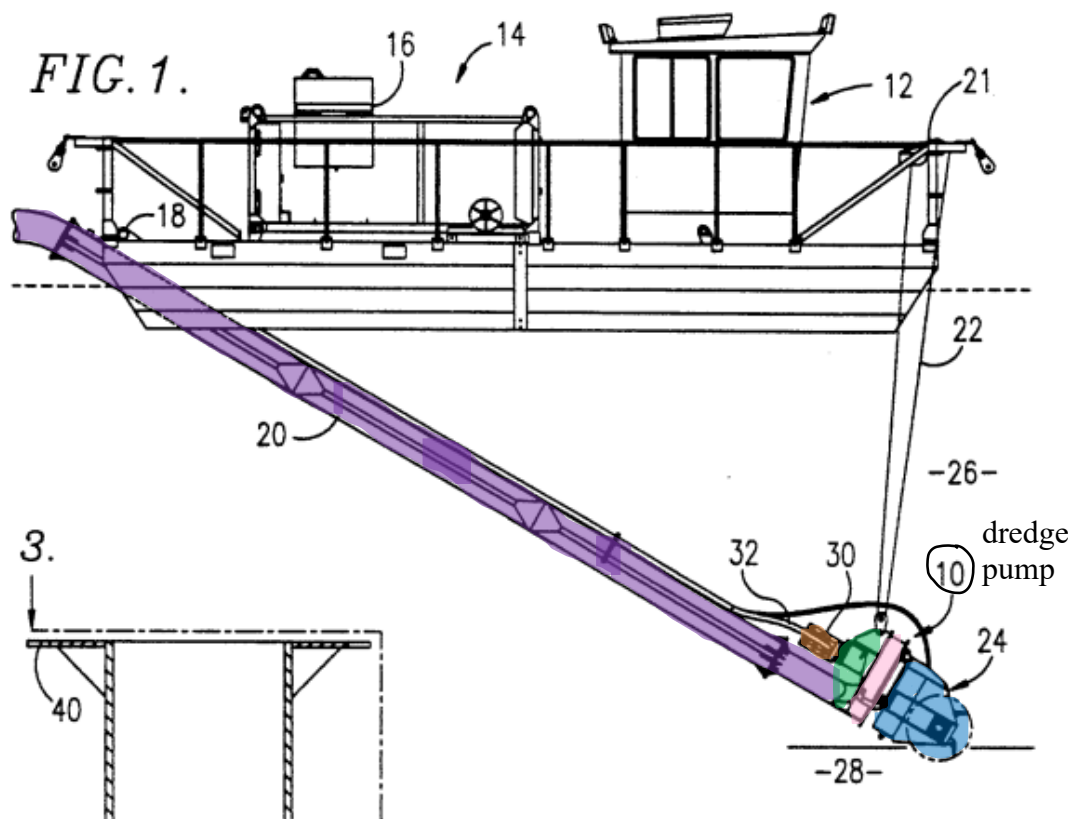


EX2091 at 4; *see also* EX2092 at 1. The above photograph was taken from the Dredge Yard Auger Dredger ECO200 Brochure, which I downloaded from <https://dredgeyard.com/wp-content/uploads/2021/01/ECO200-A8-brochure.pdf> (EX2091). It illustrates a typical horizontal auger (i.e., cutterhead) dredge and shows how the cutterhead is at the end of a long boom arm that is lowered to the lake bottom using an overhead crane/winch. The construction illustrated above shows the standard layout that has been utilized for horizontal auger/cutterhead dredges of this type for over 20 years. For example, I located a number of used horizontal auger/cutterhead dredges on Dredge Brokers LLC (<https://dredgebrokers.com/equipment/hydraulic-dredgers/dt-horizontal-cutter/>) (EX2092) that were manufactured well before the August 2013 priority date of the '835 Patent. They all have this same basic design layout (i.e., a horizontal auger/cutterhead at the front end of a long boom arm that is lowered to the lake bottom using an overhead crane/winch). Thus, a POSITA would have understood the “cutterhead” dredge disclosed in

Cheramie to have this same basic design layout.

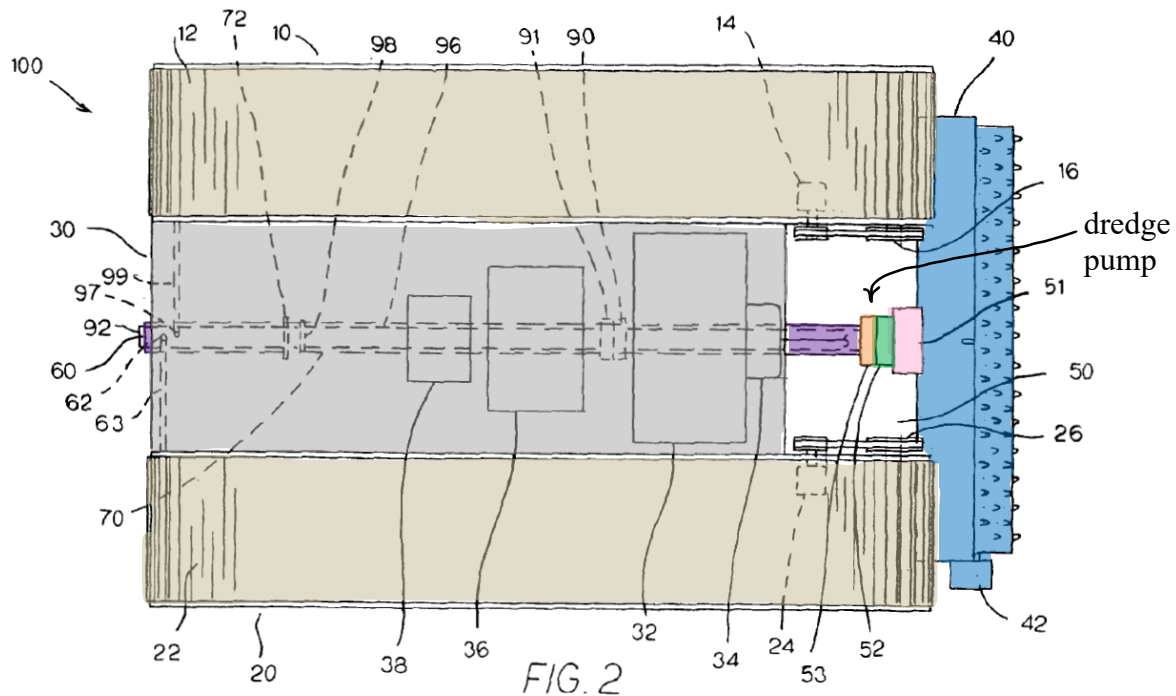
192. Another example is found in US5267830 (“Wickoren”) (EX2100), which discloses the pump, cutterhead, and boom arm of another “cutterhead” / “auger” dredge vehicle in the operating (deployed/lowered position):

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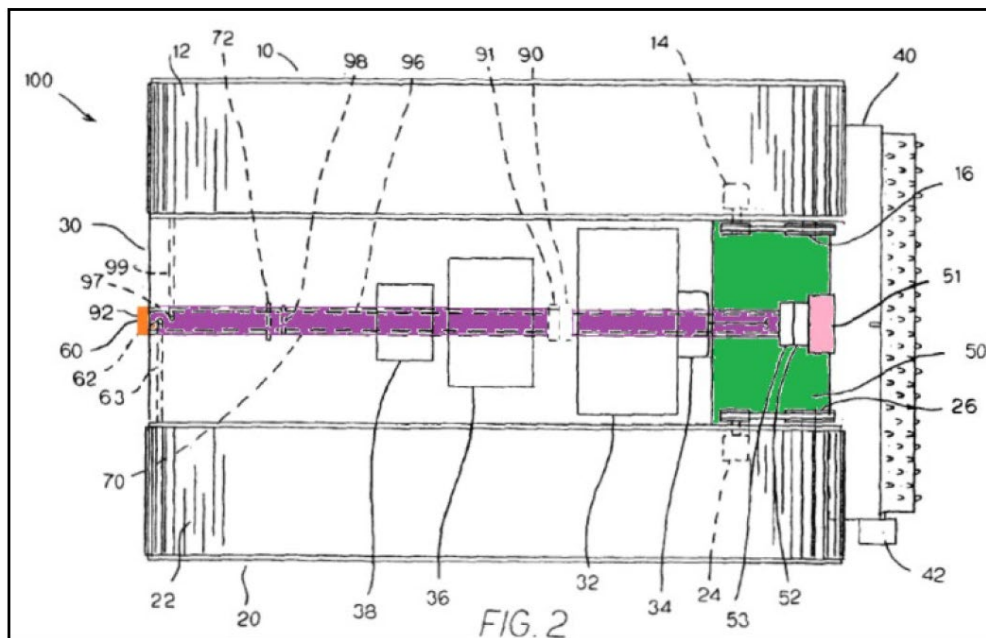
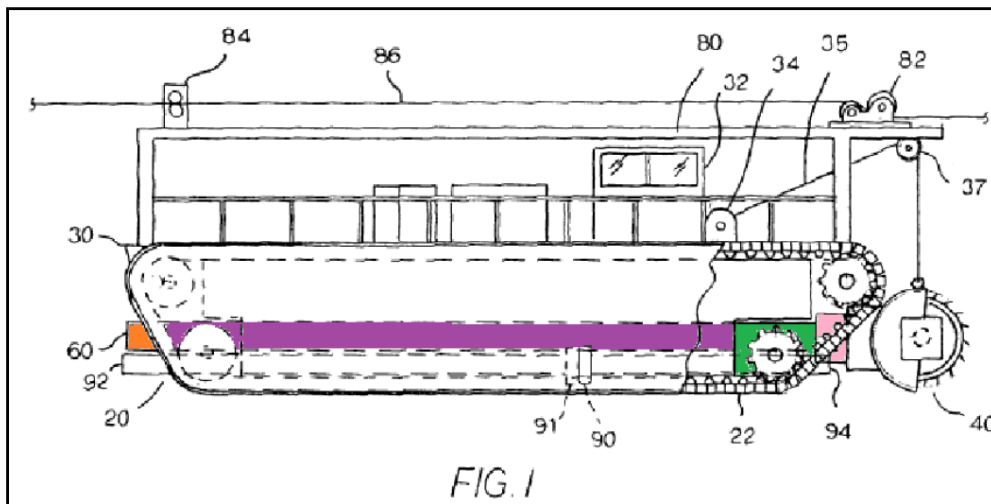
EX2100 at p. 2.

193. A POSITA would understand Cheramie's disclosure to follow the traditional layout of cutterhead dredges, which include a cutout/open area at the front end of the vehicle between the pontoons and forward of the control house 32 that allows the on-board operator to observe the position and operation of the cutterhead 40. A POSITA would therefore understand the deck 30 to cover the area identified in grey below:



EX1087, 3. The tracks 12, 22 are shown in light brown. The cutterhead 40 is shown in blue, the impeller housing 51 of dredge pump 50 is shown in pink, the hydraulic pump 52 of dredge pump 50 is shown in green, the hydraulic drive motor 53 that is adjacent to and that powers the dredge pump 50 is shown in orange, and the discharge pipe 60 is shown in purple.

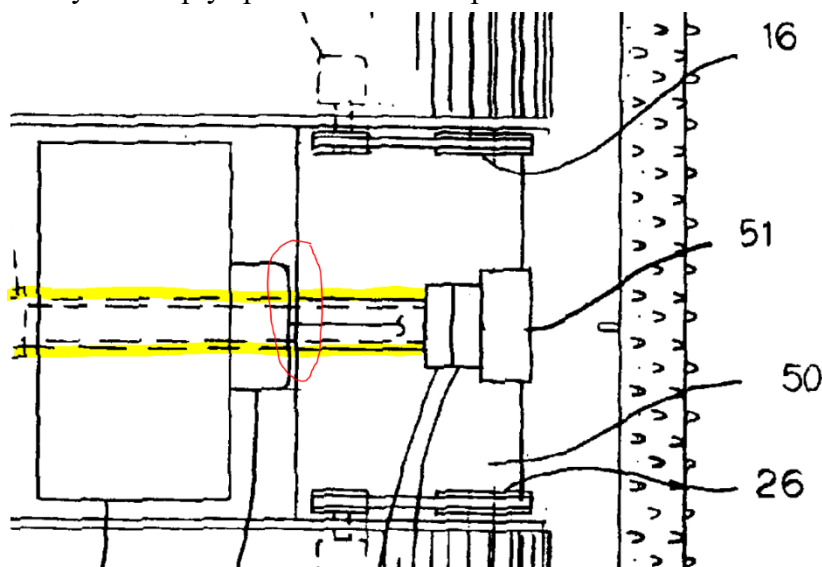
194. I disagree with Winkel's interpretation of Cheramie, shown below, where it is argued that the rectangular cutout/open area at the front end of the vehicle between the pontoons and forward of the control house 32 is a rectangular/box shaped pump.



EX1109, pp. 34-35. The back line of Winkel’s imaginary box-like pump (green box in Fig. 2) is actually the front edge of the deck 30 just ahead of the winch 34 and the front line of Winkel’s imaginary box-like pump (green box in Fig. 2) is actually the back side of the cutterhead 40.

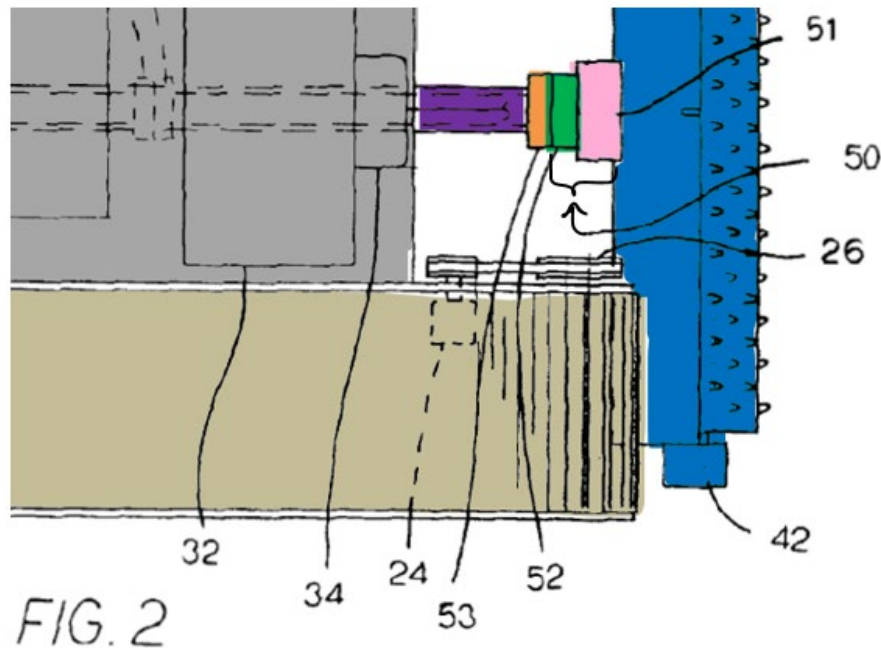
195. A POSITA would not understand Cheramie to disclose Winkel’s imaginary box-like pump (green box) in view of the drawing conventions used in the Cheramie application. In particular, Cheramie describes FIG. 2 as a “top view” and uses a drawing convention where elements that are visible from above the vehicle are depicted in solid lines, while elements that are

hidden when viewing the vehicle from above are depicted in dashed lines. The transition between the solid line segments and dashed line segments defining the discharge pipe 60, which occurs just ahead of the winch 34, clearly demonstrates that area Winkel calls out in green as the “dredge pump” is actually the empty space between the pontoons and forward of the control house 32.



EX1087, 3. If Winkel’s interpretation of Cheramie were correct, the solid line segments depicting the front end of the discharge pipe 60, impeller housing 51, hydraulic pump 52, and hydraulic drive motor 53 would all be in dashed lines.

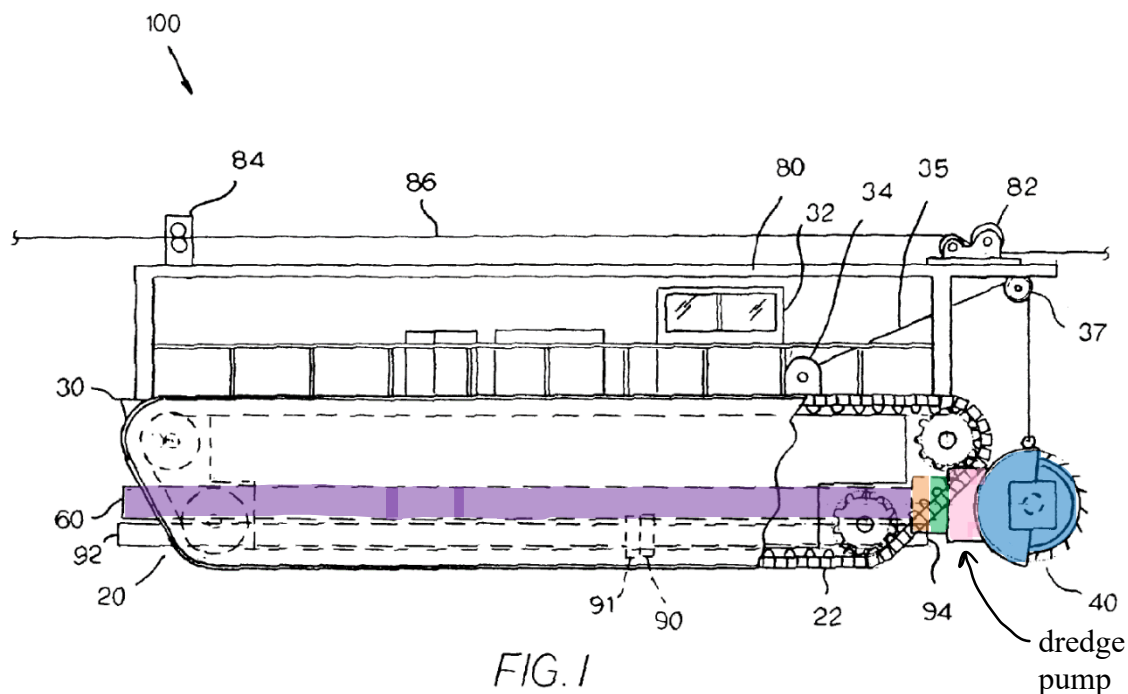
196. Column 4, lines 26-27 of Cheramie states that “Dredge pump 50 includes both impeller housing 51 and ten-inch hydraulic pump 52” and column 4, lines 43-44 explain that there is a “hydraulic drive motor 53 mounted adjacent to dredge pump 50.” In view of this disclosure, a POSITA would understand that the lead line in Fig. 2 of Cheramie for element 50 is imprecise and would more appropriately have included an arrowhead pointing to the impeller housing 51 and hydraulic pump 52 as shown below:



In view of the disclosure, a POSITA would also understand that the dredge pump 50 comprises two components – the impeller housing 51 (in pink) and the hydraulic pump 52 (in green) and that the hydraulic drive motor 53 (in orange) is next to the dredge pump 50, but is not part of the dredge pump itself since Cheramie describes the hydraulic drive motor 53 as being “adjacent to dredge pump 50” rather than saying that the dredge pump 50 includes hydraulic drive motor 53, which is how elements 51 and 52 were described. Winkel’s imaginary green box encompasses the hydraulic drive motor 53 and the front segment of the discharge pipe 60 and is therefore inconsistent with the language in Cheramie explaining that there is a “hydraulic drive motor 53 mounted adjacent to dredge pump 50.” EX1087, col. 4, ln. 43-44. Winkel’s reading of Cheramie is simply erroneous.

197. When the teachings of Cheramie are correctly understood, it is clear that this reference discloses a dredge pump with a housing and impeller 51 that are located at the far end of the discharge pipe 52, immediately behind the cutterhead 40, which is designed to be lowered to

the lake bottom using the over-head crane and pulley 37, winch 34, and cable 35.



EX1087, 2.

198. A POSITA would not consider Cheramie's impeller housing 51, which is mounted on the backside of the cutterhead 40, at the far end of a boom arm 60 that is lowered to the lake bottom, to be positioned "along the underside of the floatable vehicle body" as required by Substitute Claim 22. And even if the impeller housing 51 were considered to be "along the underside of the floatable vehicle body" when the cutterhead 40 is raised, which is not how a POSITA would understand the teachings of Cheramie, the impeller housing 51 is at or in front of the vehicle body in this position rather than "rearward of the front of the vehicle body" as required by Substitute Claim 22. Indeed, as shown below, the impeller housing 51 (pink) in Cheramie is located in front of the floatable pontoons 10, 20 (yellow) and the deck 30 (grey).

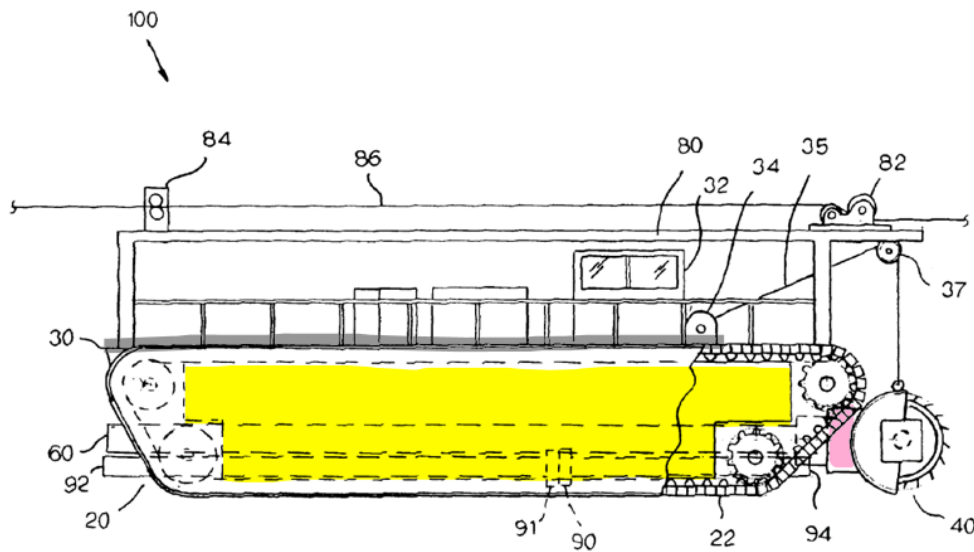
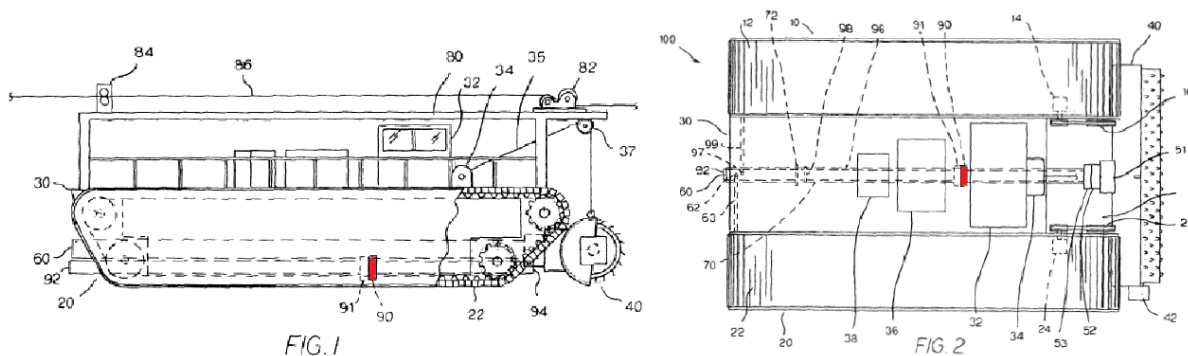


FIG. 1

199. I also disagree Dr. Winkel’s alternative argument that Cheramie’s water pump 90 is a “liquid manure pump” with “a housing and an impeller that are positioned along the underside of the floatable vehicle body ... such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating,” as required by Claim 22.



EX1109, p. 37. Like the dredge pump 50, the water pump 90 is positioned along boom arm, but is separate from and is positioned below discharge pipe 60. A POSITA would therefore consider the water pump 90 to be positioned along Cheramie’s boom arm rather than along the underside of the floatable vehicle body. There is also zero evidence that the water pump 90, which is disclosed as being designed for water propulsion as opposed to dredging, teaches a “liquid manure

pump” or that it even has “an impeller,” much less an impeller that “is immersed in and configured to pump the liquid manure when the vehicle is floating,” as required by Claim 22.

200. To the contrary, a POSITA would understand that the water pump 90 in Cheramie is not designed to handle the suspended solids in liquid manure and that the long and narrow intake tube 94. For starters, Cheramie describes element 90 as a “water pump” and provides no other description of its structure or components. There is zero disclosure as to what structure the water pump 90 has other than it being a pump for pumping “water” and the intake 94 is positioned too far away from the water pump 90 for the water pump 90 to break-up solid materials entering the intake 94. Anyone who has attempted to drive a personal watercraft (PWC or jet ski) through a weedy area would be quick to point out that water pumps are easily clogged by weeds and other solid materials. The solid content and vegetation in manure lagoons is much worse and would easily clog Cheramie’s water pump 90 and intake pipe 94. Indeed, Cheramie explains that the water pump 90 system is for propulsion in deep water.

“Applicant's invention provides **an amphibious dredging vehicle with improved mobility in deeper water**. In embodiments of applicant's invention in which only a single directable discharge is present, the amphibious dredging vehicle has this advantage when the vehicle is being moved from one dredging area to a second dredging area—with no dredging performed during the trip from the first dredging area to the second. **When a single-directable-discharge embodiment of the amphibious dredging vehicle is dredging (actually removing material), the directable discharge normally will be unavailable for propulsion. The directable discharge cannot normally be used for propulsion during material removal because normally the dredging plan will require the dredged material to be deposited in a particular area by means of piping connected to the dredge discharge.** When piping is connected to the directable discharge of an amphibious dredging vehicle that has a single directable discharge, the directable discharge cannot provide propulsion to the amphibious dredging vehicle.

On the other hand, **if the amphibious dredging vehicle is equipped with a second directable discharge that is not connected to the dredge cutterhead so as to discharge dredged material, then the second directable discharge may be used for propulsion while the cutterhead is being used to remove and deposit dredged material.”**

EX1087, col. 2, ln. 60 – col. 3, ln. 17. Solids and weeds would not be a problem in deep water operation, where the water pump 90 is designed to operate, but that is a far cry from a manure

lagoon environment, as a POSITA would readily appreciate. The above language of Cheramie also makes it clear that the second directable discharge, which is connected to the water pump 90, is separate and isolated from the pumping system that handles the dredging, and that the water pump 90 is NOT intended to pump dredged materials (suspended solids) because it is “not connected to the dredge cutterhead.” As a result, a POSITA would not understand the water pump 90 disclosed in Cheramie to be a “liquid manure pump,” as recited in the Substitute Claims, because the description of the water pump 90 in Cheramie would not lead a POSITA to conclude that the water pump 90 is capable of pumping liquid manure with suspended solids.

201. In view of the above analysis, Cheramie does not teach an arrangement where “the liquid manure pump includ[es] a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body” as required by Substitute Claim 22.

2. A POSITA WOULD NOT HAVE HAD A REASONABLE EXPECTATION OF SUCCESS IN COMBINING CHERAMIE WITH YOON OR CARRIER

202. The amphibious dredging vehicle disclosed in Cheramie is designed to be operated by an on-board operator. As a result, Cheramie fails to teach the limitations of Substitute Claim 22 that recite “a wireless remote control configured to enable an operator who is remote from the vehicle to: (1) control the ground engaging propulsion structure; (2) control a flow of liquid manure from the liquid manure pump; (3) control at least one of the speed and direction of the vehicle when the vehicle is ground engaging; and, (4) control at least one of the speed and direction of the vehicle when the vehicle is floating.”

203. With respect to Ground 1, Dr. Winkel asserts that a POSITA would **add** wireless remote-control functionality to the amphibious dredging vehicle disclosed in Cheramie in view of the remote-control teachings of Yoon or Carrier; however, in my opinion a POSITA would not have been motivated to combine the remote-control teachings of Yoon or Carrier with Cheramie,

and even if so, would not have had a reasonable expectation of success in making this combination and achieving the claimed invention.

204. It is my opinion that a POSITA would not have been motivated to combine the remote-control teachings of Yoon or Carrier with Cheramie to arrive at the claimed invention. Cheramie is described as able to be configured as a dredging vehicle with a dredging pump. *See* EX1006 at 10. A POSITA would understand that dredge pumps are used to clean out the bottom of a pond, river, lake or other body of water by removing material from the bottom of the body of water. This is usually done to increase the depth of a particular of the body of water. A POSITA would not have been motivated to remove the human on-board operator from Cheramie because in doing so, the ability of the human on-board operator to observe progress of dredging operations in-person. Removing the on-board operator from Cheramie and replacing that on-board operator with a remote control system would entirely remove that tactile feel provided by being physically on the vehicle of Cheramie.

205. In particular, a POSITA would expect that remotely controlling the positioning and operation of a submerged cutterhead 40 of Cheramie to be problematic given the difficulty observing its operation from a remote location.

206. As shown below, Cheramie's elevated control house 32 (bright blue) near the front end portion of the deck 30 (grey) demonstrates the importance of visual observation of the cutterhead 40 (navy blue) located at the end of Cheramie's boom arm 60 (purple):



207. Tracked vehicles are also prone to tilting and this tilting risk would dissuade a

POSITA from adding remote control functionality to Cheramie because remote control is less precise, has greater delay (latency), and it is much more difficult for the operator to perceive and counter tipping (i.e., remote control operators lack tactile feedback through the controls and or an on-board perception of sliding and tipping). While the operator might not get hurt if a remote control vehicle tips, tipping creates a considerable set back as the remote control vehicle can become damaged by tipping and manned heavy equipment would likely be necessary to extract the vehicle from the manure lagoon and/or right the vehicle.

208. Manure lagoons typically have steep embankments that can be covered in manure, mud, sand, and/or ice and are therefore extremely slippery. EX1004, Winkel Decl., ¶¶334, 336. A POSITA would recognize that instability issues would be exacerbated by remote control. As a result, a POSITA would not have had a reasonable expectation that adding remote control functionality to Cheramie would be successful in producing an amphibious remote-controlled vehicle that could operate in a manure lagoon environment without tipping.

209. A POSITA would understand that just because *some* vehicles can be remote controlled does not mean that *all* vehicles can be remote controlled. Thus, in my opinion, a POSITA would not have had a reasonable expectation of successfully adding remote-control functionality to Cheramie to produce an amphibious remote-controlled vehicle that could operate in a manure lagoon environment without tipping.

B. Claim 23

210. Claim 23 depends from Claim 22 and recites: “The vehicle of claim 22, wherein the vehicle further comprises a conduit fluidly connected to the liquid manure pump.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claim 22 obvious. Claim 23 is not obvious at least because of its dependence on Claim 22.

C. Claim 24

211. Claim 24 depends from Claim 23 and recites: “The vehicle of claim 23, wherein

the conduit comprises an opening at an end thereof.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 24 is not obvious at least because of its dependence on Claims 22 and 23.

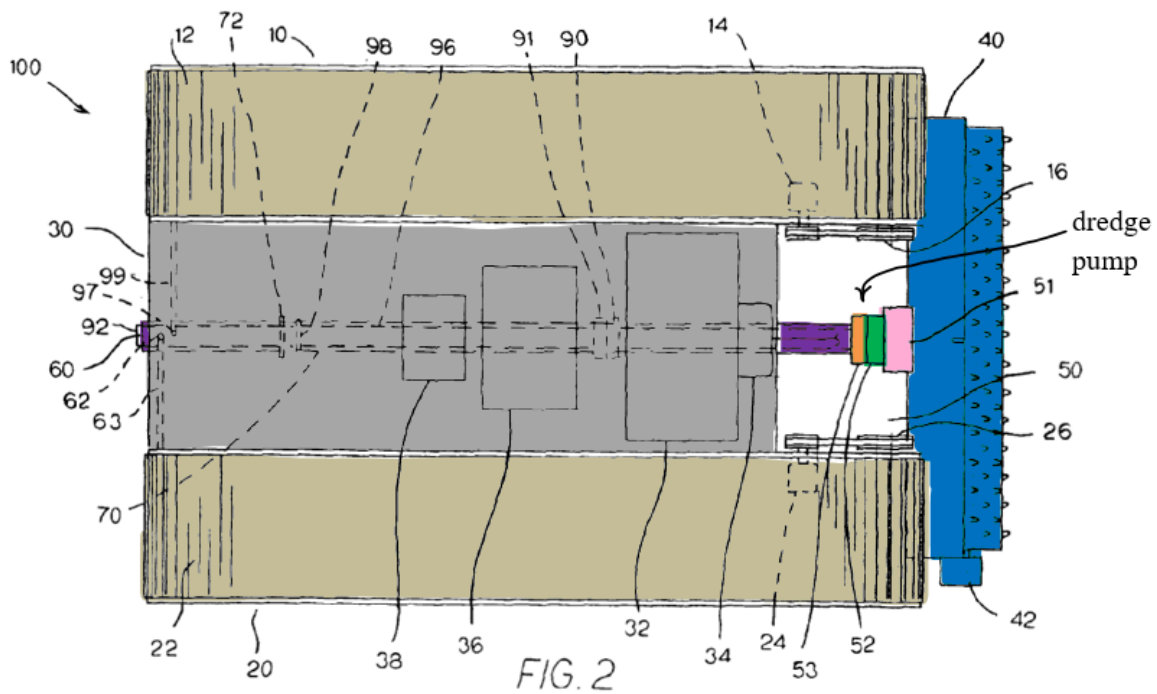
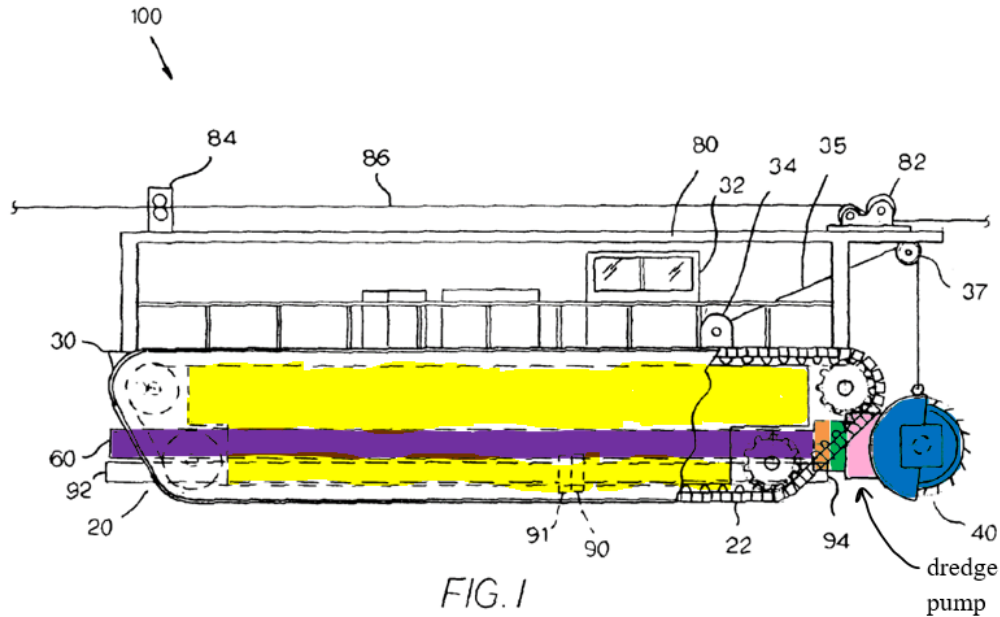
D. Claim 25

212. Claim 25 depends from Claim 24 and recites: “The vehicle of claim 24, wherein the wireless remote control is configured to control an orientation of the opening.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, and 24 obvious. Claim 25 is not obvious at least because of its dependence on Claims 22, 23, and 24.

E. Claim 27

213. Claim 27 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the vehicle further comprises a nozzle at the end of the conduit, wherein the ground engaging propulsion structure comprises a front set of ground engaging wheels that are rotatably attached to a front set of spindles and a rear set of ground engaging wheels that are rotatably attached to a rear set of spindles, and wherein the liquid manure pump is positioned rearward of the front set of spindles and forward of the rear set of spindles.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 27 is not obvious at least because of its dependence on Claims 22 and 23. Claim 27 is also allowable for the additional reason that the dredge pump 50 in Cheramie, which is comprised of the impeller housing 51 (in pink) and the hydraulic pump 52 (in green) are positioned along the forward end of the boom arm (60) in purple and therefore are not positioned along the underside of the floatable vehicle body

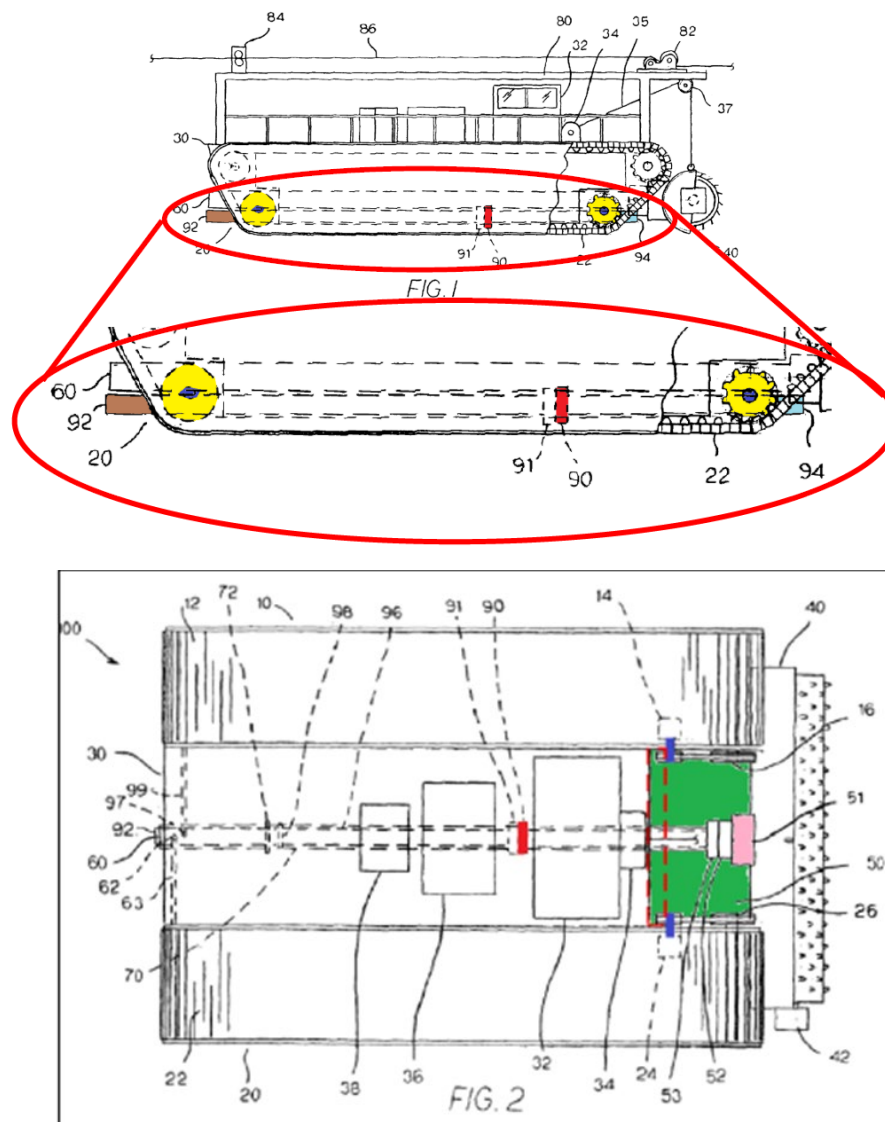
(in yellow) nor are they rearward of the structure Dr. Winkel identifies as the front spindles 14, 24 as the language of Claim 27 requires.



EX1087, 2. Instead, the components forming Cheramie's dredge pump are forward of the front

spindles 14, 24. As a result, Cheramie does not disclose a liquid manure pump that is both “positioned along the underside of the floatable vehicle body” and positioned “rearward of the front set of spindles” as required by Substitute Claim 27.

214. I also disagree Dr. Winkel’s alternative argument that Cheramie’s water pump 90 satisfies Claim 27, but the water pump 90 is also positioned along boom arm 60 instead of along the underside of the floatable vehicle body and there is zero evidence that the water pump 90 (designed for water propulsion vs. dredging) qualifies as a “liquid manure pump” or that it even has “an impeller.”



EX1109, pp. 46, 48.

215. A POSITA would understand that this water pump 90 is not designed to handle the suspended solids in liquid manure and that the long and narrow intake tube 94. For starters, Cheramie describes element 90 as a “water pump” and provides no other description of its structure or components. There is zero disclosure as to what structure the water pump 90 has other than it being a pump for pumping “water” and the intake 94 is positioned too far away from the water pump 90 for the water pump 90 to break-up solid materials entering the intake 94. Anyone who has attempted to drive a personal watercraft (PWC or jet ski) through a weedy area would be quick to point out that water pumps are easily clogged by weeds and other solid materials. The solid content and vegetation in manure lagoons is much worse and would easily clog Cheramie’s water pump 90 and intake pipe 94. Indeed, Cheramie explains that the water pump 90 system is for propulsion in deep water.

“Applicant's invention provides **an amphibious dredging vehicle with improved mobility in deeper water**. In embodiments of applicant's invention in which only a single directable discharge is present, the amphibious dredging vehicle has this advantage when the vehicle is being moved from one dredging area to a second dredging area—with no dredging performed during the trip from the first dredging area to the second. **When a single-directable-discharge embodiment of the amphibious dredging vehicle is dredging (actually removing material), the directable discharge normally will be unavailable for propulsion. The directable discharge cannot normally be used for propulsion during material removal because normally the dredging plan will require the dredged material to be deposited in a particular area by means of piping connected to the dredge discharge.** When piping is connected to the directable discharge of an amphibious dredging vehicle that has a single directable discharge, the directable discharge cannot provide propulsion to the amphibious dredging vehicle.

On the other hand, **if the amphibious dredging vehicle is equipped with a second directable discharge that is not connected to the dredge cutterhead so as to discharge dredged material, then the second directable discharge may be used for propulsion while the cutterhead is being used to remove and deposit dredged material.”**

EX1087, col. 2, ln. 60 – col. 3, ln. 17. Solids and weeds would not be a problem in deep water operation, where the water pump 90 is designed to operate, but that is a far cry from a manure

lagoon environment, as a POSITA would readily appreciate. The above language of Cheramie also makes it clear that the second directable discharge, which is connected to the water pump 90, is separate and isolated from the pumping system that handles the dredging, and that the water pump 90 is NOT intended to pump dredged materials (suspended solids) because it is “not connected to the dredge cutterhead.” As a result, a POSITA would not understand the water pump 90 disclosed in Cheramie to be a “liquid manure pump,” as recited in the Substitute Claims, because the description of the water pump 90 in Cheramie would not lead a POSITA to conclude that the water pump 90 is capable of pumping liquid manure with suspended solids.

216. For all of the foregoing reasons, the combination of Cheramie and Yoon or Carrier does not teach the position of the liquid manure pump set forth in Claim 27, which states that “the liquid manure pump is positioned rearward of the front set of spindles and forward of the rear set of spindles.”

F. Claim 28

217. Claim 28 depends from Claim 22 and recites: “The vehicle of claim 22, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claim 22 obvious. Claim 28 is not obvious at least because of its dependence on Claim 22.

218. I have also considered whether the combination of Cheramie and Yoon or Carrier meets all of the limitations of Claim 29 if the language reciting “fluid mover” is construed as a means-plus-function claim limitation. Under that construction, it is my opinion that the Cheramie Combination fails to disclose the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.”

219. As explained above, the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating” is: “valve(s) and fluid nozzle(s).” Specifically, the ‘425 Patent

describes that proportioning the fluid flow from the nozzles can be used to control movement of the vehicle while floating:

Valve structure comprising a valve 15 corresponding to each fluid nozzle 11, 13, 16, 17 is also provided. The valves 15 are powered and operable to open or close. The valves 15 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles 17 to the left side fluid nozzles 16 5 causes the vehicle to turn to the right while floating. Similarly, fluid flow may be proportioned between the first fluid nozzle 11 and the second fluid nozzles 13 to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, '425 Patent, col 5, ln. 63 – col. 6, ln. 8.

220. Cheramie neither describes nor shows any valve connected to its nozzle. And Dr. Winkel does not assert that what he points to as the nozzle of Cheramie is capable of performing the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” To the Contrary, Cheramie explains that the outlet of the dredge pump has to be positioned to direct solids to a desired location or barge, so it cannot be used to control the speed and direction of the vehicle when the vehicle is floating. This is the reason why Cheramie provides a secondary water pump system. As explained above, there is no teaching or suggesting that would lead a POSITA to conclude the Cheramie’s water pump 90 could successfully pump liquid manure without clogging and Cheramie also fails to disclose a valve connected to the water pump 90. Carrier and Yoon do not remedy this deficiency of Cheramie. *See* Section XII.G. Cheramie, Yoon, and Carrier do not describe any control of valves to provide proportional flow between nozzles to control the vehicle.

221. Thus, it is my opinion that the Cheramie Combination does not render Claim 28 obvious.

G. Claim 33

222. Claim 33 depends from Claim 25 and recites: “The vehicle of claim 25, wherein the power source is connected to the hydraulic pump by a mechanical drive and is connected to the liquid manure pump by the mechanical drive.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, and 25 obvious. Claim 33 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

223. Additionally, Cheramie does not describe “wherein the power source is . . . connected to the fluid pump by the *mechanical drive*.” Instead, Cheramie’s hydraulic pump 52 is operated by a hydraulic motor 53.

224. Therefore, the combination of Cheramie and Yoon or Carrier fails to render Claim 33 obvious.

H. Claim 34

225. Claim 34 depends from Claim 33 and recites: “The vehicle of claim 33, wherein the wireless remote control is configured to operate the hydraulic motor to operate the ground engaging propulsion structure at variable speed.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, and 33 obvious. Claim 34 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, and 33.

I. Claim 35

226. Claim 35 depends from Claim 34 and recites: “The vehicle of claim 34, wherein the ground engaging elements consist of a set of ground engaging wheels.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, and 34 obvious. Claim 35 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, and 34.

J. Claim 36

227. Claim 36 depends from Claim 35 and recites: “The vehicle of claim 35, wherein

the set of ground engaging wheels consists of two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 36 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

K. Claim 37

228. Claim 37 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of four powered ground engaging wheels and wherein each powered ground engaging wheel is independently powered and is operable at variable speed.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 37 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

L. Claim 38

229. Claim 38 depends from Claim 37 and recites: “The vehicle of claim 37, wherein the four powered ground engaging wheels are operable at variable speed by the hydraulic motor.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, and 37 obvious. Claim 38 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, and 37.

M. Claim 39

230. Claim 39 depends from Claim 38 and recites: “The vehicle of claim 38, wherein the vehicle further comprises a nozzle at the end of the conduit.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 39 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

N. Claim 40

231. Claim 40 depends from Claim 38 and recites: “The vehicle of claim 38, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Cheramie and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 40 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

XIV. GROUND 2: CLAIMS 22-25, 27, 28, AND 33-40 ARE NOT OBVIOUS BASED ON SENWATEC IN VIEW OF YOON OR CARRIER

232. In the following sections I examine various elements of the ‘425 Patent and explain why at least Claim 22 is not rendered obvious by SenwaTec in view of Yoon or Carrier (“the SenwaTec Combination”). Claims 22-25, 27, 28, and 33-40 depend from Claim 22 and are not rendered obvious by the SenwaTec Combination for at least the same reasons.

A. Claim 22

1. THE SENWATEC COMBINATION FAILS TO DISCLOSE OR SUGGEST THE CLAIMED POSITION OF THE LIQUID MANURE PUMP

233. The SenwaTec Combination fails to teach or suggesting the position of the impeller and housing of the liquid manure pump recited in Substitute Claim 22, which is set forth below:

“a liquid manure pump for pumping liquid manure, the liquid manure pump including a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body and such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating”

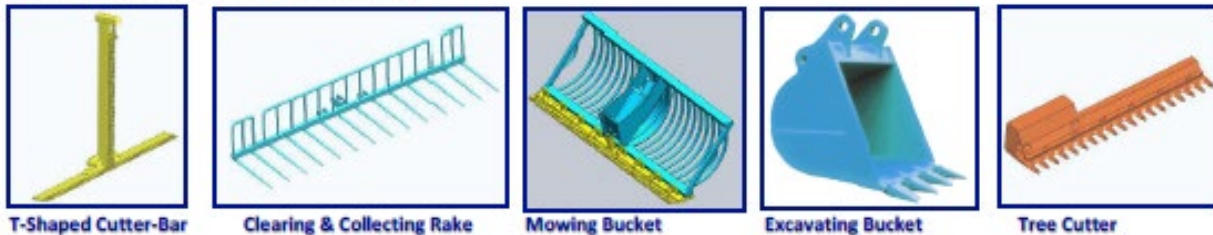
Because Claim 22 is independent, none of the Substitute Claims are rendered obvious by the SenwaTec Combination in view of this deficiency.

234. SenwaTec does not disclose a “liquid manure pump” where “the impeller is immersed in a configured to pump the liquid manure” as required by Claim 22. Furthermore, even

if the light-duty dredge pump disclosed in SenwaTec were considered to be “a liquid manure pump,” which it isn’t, SenwaTec still fails to disclose or suggest the position of the housing and impeller required by Claim 22.

235. SenwaTec discloses an amphibious vehicle that is designed to carry an onboard operator and a number of different tool attachments. In particular, SenwaTec’s marketing brochure [EX1012] advertises a number of different attachments that can be installed on the end of its vehicle’s excavator arm (boom arm), including weed cutter-bars, rakes, mowing buckets, excavating buckets, tree cutters, and dredge pumps:

Available working tools and attachment units:



Equipped with suction auger for sludge



Suction an pumping of swimming algae and weeds

Working units:	❖ T-Cutter bar, Clearing & collecting – rake (also available with fine screen) Excavating bucket, Centrifugal pump with HARDOX inner casing, 6" suction x 6" discharge, Tree cutter, Tree saw (check with factory), Mowing bucket
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EX1012, SenwaTec, pp. 2-3.

236. I disagree with Dr. Winkel assertion that a POSITA would consider SenwaTec’s dredge pump attachment to be a “liquid manure pump.” Dr. Winkel cites to EX1027 and EX1028 in an attempt to support this assertion. I note that the Board has stated that “Exhibits 1026-1028 ‘do not on their face, demonstrate that UD Umweltdienste used the SenwaTec vehicle for pumping

manure.” Paper 12 at 25. The Board also stated “that Exhibit 1027, the English translation of Exhibit 1026, discusses a ‘sewage pond’ which it infers is processed from ‘toilet waste,’ but does not talk about manure.” *Id.* I also note that the Board found that my Declaration dated October 10, 2023 [EX2004] supports Patent Owner’s argument that “‘sewage ponds and manure lagoons are very different.’” *Id.* I also note that the Board stated that “Patent Owner also correctly notes that Exhibit 1027 does not even discuss pumping or show which tool is attached to the SenwaTec vehicle.” *Id.* I further note that the Board “agree[s] with Patent Owner that Exhibits 1026 and 1027 do not clearly show that the SenwaTec vehicle was used for pumping manure.” *Id.* Finally, I understand that the Board agrees with the Patent Owner “that ‘there is simply no verifiable information in the record proving that the video [in Exhibit 1028] informs a POSITA that the SenwaTec vehicle was used to pump manure as opposed to mud, human sewage, or something else.’” *Id.* at 26. Simply, SenwaTec does not teach or even suggest that the SenwaTec vehicle and one of its pump attachments is capable of pumping liquid manure.

237. Nor would a POSITA consider the centrifugal pumps disclosed in SenwaTec to be suitable for manure pumping applications. Indeed, the Houle reference explains that even powerful centrifugal pumps are prone to clogging when used to pump manure and explains that “[s]uch devices however provide limited efficiency when the reservoir contains a thick floating crust or heavy bottom sediments”:

Farm animal manure consists of solid particles in a liquid, and the solid particles either settle on the bottom 25
of the container (as in the case of pig manure) or form a
crust over the liquid (as in the case of cow manure)
depending on the density of the solid matter and, in
some cases, both conditions obtain. Thus, the mass of
manure in the container must be thoroughly mixed prior 30
to pumping in order to maintain the solid particles in
suspension, otherwise only the liquid matter will be
pumped out while the solid matter accumulates in the
container. Moreover, such solid matter tends to clog the
pump. 35

Hitherto, manure handling pumps consisted of a powerful centrifugal pump disposed near the bottom of the container, the impeller turning about a vertical axis, and a conduit system coupled to the outlet of the pump for either circulating manure within the container or away 40 therefrom into a manure spreader or a different container. The conduit system therefore has a first branch leading out of the container toward another container or toward a tank spreader, and a second branch leading to a suitable nozzle pipe for returning into the container 45 the slurry being mixed. A gate controls the selection of conduit branch in order to either agitate the slurry or pump same out of the reservoir. Examples of such centrifugal systems of which many different designs are currently available from farm equipment manufacturers, are described in U.S. Pat. Nos. 3,905,725 dated Sept. 16, 1975 (R. L. Johnson), 3,446,151, May 27, 1969 (H. G. V. Anderson), 3,456,592, July 22, 1969 (L. L. Nelsen) and 3,966,361, June 29, 1976 (B. L. House). Such devices however provide limited efficiency when 55 the reservoir contains a thick floating crust or heavy bottom sediments. Indeed, the mixing capabilities of centrifugal pump systems are at best limited and time consuming, and no agitation takes place during transfer of the slurry to a different container into a tank 60 spreader. Furthermore, clogging of the pump's impeller and consequential loss of pump efficiency remains a serious shortcoming.

EX2010, U.S. Pat. No. 4,406,413, col. 1, ln. 24-63.

238. While Dr. Winkel states that dredging pumps have been used for pumping liquid manure and cites to EX1058, he provides no analysis or opinion that the pump shown in SenwaTec [EX1012] is a dredging pump like that referred to in EX1058. For example, he does not conduct any analysis of the tolerances, pumping head, pumping capacity, power capacities, or other characteristics of the pump of SenwaTec nor does he make any comparison of such characteristics to manure pumps or the dredging pump referred to in EX1058. Without providing any analysis of whether the pump of SenwaTec [EX1012] is structurally similar to the dredging pump referred to in EX1058 or any other manure pump, Dr. Winkel has failed to support his assertion that the pump shown in SenwaTec is capable of pumping liquid manure.

239. As described herein, a POSITA would understand that liquid manure has high total solids content, behaves like a non-Newtonian fluid, and, prior to being agitated, often has large,

hard, and thick crust floating thereon, as well as abrasive bedding solids therein. *See supra* Section IX.A. There is nothing in SenwaTec [EX1012] that describes or suggests that its pump is capable of pumping the hard thick crusts that a POSITA would have understood to be in the liquid manure prior to agitation. For these reasons, it is my opinion that a POSITA would not have understood SenwaTec to describe a pump that is capable of pumping liquid manure with the suspended solids that are routinely encountered therein.

240. In view of this background knowledge and the fact that the SenwaTec reference itself does not teach that its centrifugal pumps are designed and used to pump manure, a POSITA would not consider these pumps to be “a liquid manure pump” as required by the Substitute Claims.

241. The SenwaTec combination also fails to disclose or suggest the claimed position of the housing and impeller of the liquid manure pump. A POSITA would understand SenwaTec as teaching a dredge pump that hangs off the front of the floatable vehicle body with a housing and impeller that are forward of the front end of the floatable vehicle body and positioned along the far end / forward end of a boom arm rather than being positioned “along the underside of the floatable vehicle body.”

242. Dr. Winkel appears to suggest that SenwaTec’s teaching of its dredge positioned several feet in front of the sloped front-end of the SenwaTec vehicle satisfies the claimed position of the liquid manure pump.



EX1109, p. 59. In my opinion, Dr. Winkel’s position is not credible and is not what a POSITA would understand SenwaTec as teaching. In my opinion, a POSITA would understand this photograph to show a dredge pump positioned along the far/forward end of a boom arm at a location that is spaced in front of the front end of the vehicle body.

243. As a result, the housing and impeller of SenwaTec’s dredge pump are NOT “positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body,” as required by Claim 22.

244. For all of the foregoing reasons, a POSITA would not understand SenwaTec, Yoon, and/or Carrier as rendering obvious Substitute Claim 22, and specifically, the Pump Limitation. A POSITA would not have understood SenwaTec, Yoon, or Carrier as rendering the Substitute Claims obvious because the pumps of SenwaTec, Yoon, and/or Carrier are not liquid manure pumps and are not mounted in such a way that the housing and an impeller are:

- (1) positioned along the underside of the floatable vehicle body, AND
- (2) positioned between at least two of the ground engaging elements, AND
- (3) positioned rearward of the front of the vehicle body and forward of the rear of the

floatable vehicle body, AND

(4) such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating.

2. A POSITA WOULD NOT HAVE HAD A REASONABLE EXPECTATION OF SUCCESS IN COMBINING SENWATEC WITH YOON OR CARRIER

245. The amphibious vehicle disclosed in SenwaTec and its tool attachments are designed to be operated by an on-board operator. As a result, SenwaTec fails to teach the limitations of Claim 1 that recite “a wireless remote control configured to enable an operator who is remote from the vehicle to: (1) control the ground engaging propulsion structure; (2) control a flow of liquid manure from the fluid pump; (3) control at least one of the speed and direction of the vehicle when the vehicle is ground engaging; and, (4) control at least one of the speed and direction of the vehicle when the vehicle is floating.”

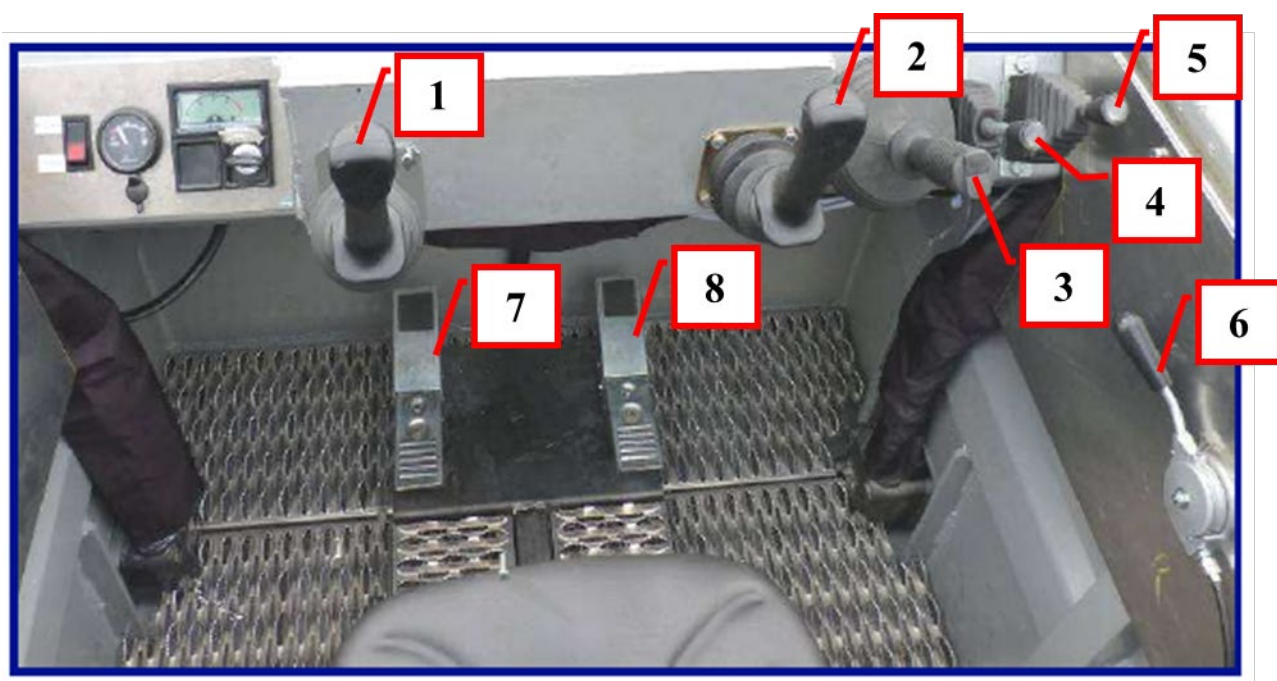
246. With respect to Ground 2, Dr. Winkel asserts that a POSITA would **add** wireless remote-control functionality to the amphibious vehicle disclosed in SenwaTec in view of the remote-control teachings of Yoon or Carrier; however, in my opinion a POSITA would not have had a reasonable expectation of success in making this combination and achieving the claimed invention.

247. It is my opinion that a POSITA would not have been motivated to combine the remote-control teachings of Yoon or Carrier with SenwaTec to arrive at the claimed invention. SenwaTec is described as having a front crane onto which different working tools and attachment units can be attached. *See* EX1012 at 2, 3. A POSITA would not have been motivated to remove the human on-board operator from SenwaTec because in doing so, the ability of the human on-board operator to sense or feel the location of the tool attached to SenwaTec’s crane would have been severely hindered. When an operator is on-board the vehicle of Truxor, they would be able to feel whether the attached tool is in the desired location to use the tool. Removing the on-board operator from SenwaTec and replacing that on-board operator with a remote control system would

entirely remove that tactile feel provided by being physically on the vehicle of SenwaTec.

248. Moreover, it is my opinion that a POSITA would not have had a reasonable expectation of success in combining the remote-control teachings of Yoon or Carrier with SenwaTec. Dr. Winkel has not shown or even attempted to explain whether SenwaTec's manual controls lend themselves to remote control, how remote control over the various functions could be implemented, or that the resulting combination would actually work in the manure lagoon environment.

249. In my opinion, SenwaTec's manual controls depend on an onboard operator and close proximity observation of the submersed pump. As shown in the photograph below, the vehicle disclosed in SenwaTec has at least 8 different control interfaces – 5 separate joysticks, 2 foot pedals, and 1 hand-lever:



EX1012, SenwaTec, p. 1.

250. The difficulties with converting hydraulic controls of this type to wireless remote control would be known to a POSITA. Teleoperation is a term often used when a machine or robot is operated from a distance (aka remote control). The difficulties of operating an excavator-like

machine system in a teleoperation type environment lie from delay (latency) in controls, lack of tactile feedback (which is provided through onboard hydraulic controls), and an overload of visual information. EX2028, pp. 1, 4-6. The human machine interface (HMI) of hydraulic excavator controls has not evolved much in the last couple of decades and therefore does not lend itself to easily being converted to teleoperation. EX2025, p. 3. In the 2013-2014 time period, commentators explained that further studies and development was needed to convert these types of manual excavator-like controls to wireless remote-control. EX2025, p. 8. Further, ASME papers show this was still an area requiring further development and new control systems in 2022. EX2028, pp. 1-2, 4-6.

251. Dr. Winkel has not shown or even attempted to explain how remote control over the various functions could be implemented, how a POSITA could overcome these difficulties when making the SenwaTec combination, or that the resulting combination would actually work in the manure lagoon environment.

252. Even today, some ten years later, there is no evidence that a remote-control option has been added to the SenwaTec vehicle. On October 4, 2023, I visited the Berky website at <https://www.berky.de/en>. I understand from the Declaration of Ansgar Lonnemann [EX1013] that Berky purchased SenwaTec. In particular, the Berky Nereus 240 AMPHI appears to correspond to the SenwaTec amphibious vehicle depicted in EX1012. I was unable to find any reference to any features or options that indicated remote control of Berky's vehicles is available as an option for their products.

253. On October 4, 2023, I took screenshots from the Berky website and compiled them as EX2027. I therefore certify that the screenshots shown in EX2027 are true and correct images of the Berky website identified in the paragraph above. The fact that SenwaTec/Berky has not, to this day, added a remote control option to its vehicles provides evidence that this would not be a simple feat that could be accomplished by routine experimentation.

254. For these reasons, it is my opinion that a POSITA would not expect SenwaTec's

controls to easily lend themselves to remote control.

255. It is also my opinion, that a POSITA would not reasonably expect success in operating the SenwaTec vehicle from a remote location where the positioning and operation of the submerged pump would be difficult to observe.

256. Photographs in SenwaTec's marketing brochure [EX1012] suggest to a POSITA that remote control of SenwaTec's pumping functionality from a distance would be a major problem given that the operators in the photographs are STANDING UP to get a better view of the submerged pump even though the operator's seat can't be more than 10 feet from the pump in these photographs:





EX1012, SenwaTec, p. 2. This reinforces what a POSITA would readily appreciate – it would be difficult if not impossible to control and operate this type of vehicle and pump from a remote location.

257. Dr. Winkel also fails to address another problem that a POSITA would expect if they attempted to add remote control functionality to SenwaTec – remote control increases the likelihood of a rollover.

258. One of the video screenshots in Exhibit B to the Lonnemann Declaration illustrates that SenwaTec's vehicle has a rollover risk, much like the Truxor vehicle:



EX1013, Lonnemann Decl., p. 14.

259. Manure lagoons typically have steep embankments that can be covered in manure, mud, sand, and/or ice and are therefore extremely slippery. EX1004, Winkel Decl., ¶¶334, 336. In my opinion, a POSITA would expect the instability issues with the SenwaTec vehicle to be exacerbated if remote control were added because remote control is less precise, has greater delay (latency), and it is much more difficult for the operator to perceive and counter tipping (i.e., remote control operators lack tactile feedback through the controls and or an on-board perception of sliding and tipping). While the operator might not get hurt if a remote control vehicle tips, tipping creates a considerable set back as the remote control vehicle can become damaged by tipping and manned heavy equipment would likely be necessary to extract the vehicle from the manure lagoon and/or right the vehicle. This tilting risk would dissuade a POSITA from adding remote control functionality to SenwaTec.

260. As a result, a POSITA would not have had a reasonable expectation that adding remote control functionality to SenwaTec would be successful in achieving the claimed invention - an amphibious remote-controlled manure agitation vehicle that has to traverse steep and slippery

embankments while entering and exiting manure lagoons.

B. Claim 23

261. Claim 23 depends from Claim 22 and recites: “The vehicle of claim 22, wherein the vehicle further comprises a conduit fluidly connected to the liquid manure pump.” As described above the combination of SenwaTec and Yoon or Carrier does not render Claim 22 obvious. Claim 23 is not obvious at least because of its dependence on Claim 22.

C. Claim 24

262. Claim 24 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the conduit comprises an opening at an end thereof.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 24 is not obvious at least because of its dependence on Claims 22 and 23.

D. Claim 25

263. Claim 25 depends from Claim 24 and recites: “The vehicle of claim 24, wherein the wireless remote control is configured to control an orientation of the opening.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, and 24 obvious. Claim 25 is not obvious at least because of its dependence on Claims 22, 23, and 24.

E. Claim 27

264. Claim 27 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the vehicle further comprises a nozzle at the end of the conduit, wherein the ground engaging propulsion structure comprises a front set of ground engaging wheels that are rotatably attached to a front set of spindles and a rear set of ground engaging wheels that are rotatably attached to a rear set of spindles, and wherein the liquid manure pump is positioned rearward of the front set of spindles and forward of the rear set of spindles.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 27 is not obvious

at least because of its dependence on Claims 22 and 23.

265. The SenwaTec Combination also fails to render Claim 27 obvious because it fails to teach or suggest positioning the pump rearward of the front set of spindles as required by Claim 27.

266. As shown in the photograph below, a POSITA would understand SenwaTec as teaching a dredge pump that hangs off the front of the floatable vehicle body at a position that is spaced several feet in front of the front end of the floatable vehicle body.”



EX1109, p. 59. In my opinion, a POSITA would NOT understand SenwaTec to disclose or suggest positioning its pump rearward of the front set of spindles supporting its front wheels, as required by the language of Claim 27. Indeed, a POSITA would find such a position counterintuitive given that doing so place the pump out of the operator’s line of sight, which appears necessary or at least highly desirable for the operation of SenwaTec’s dredge pump based on the photographs below.



EX1012, SenwaTec, P. 2.

F. Claim 28

267. Claim 28 depends from Claim 22 and recites: “The vehicle of claim 22, wherein at

least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claim 22 obvious. Claim 28 is not obvious at least because of its dependence on Claim 22.

268. Dr. Winkel asserts that the pump of SenwaTec could be used to propel and steer the SenwaTec vehicle. EX1004, Winkel Decl. ¶ 314. This statement is unsupported by SenwaTec. SenwaTec does not teach that the output from its pump can be used to control the speed and/or direction of the vehicle while it is floating. There is no disclosure in SenwaTec is powerful enough to overcome drag to propel or maneuver the SenwaTec vehicle while it is in water. As I describe above in Section XII.G, Carrier does not provide this functionality. Nor has Dr. Winkel pointed to any description of Yoon to provide this functionality.

269. Dr. Winkel also asserts that rotation of SenwaTec’s “wheels while floating would cause the vehicle to move and would vary the speed or direction of the vehicle.” EX1004, Winkel Decl. ¶ 315. SenwaTec does not support this assertion and Dr. Winkel points to nothing in SenwaTec in support of this assertion.

270. I have also considered whether the combination of SenwaTec and Yoon or Carrier meets all of the limitations of Claim 28 if the language reciting “fluid mover” is construed as a means-plus-function claim limitation. Under that construction, it is my opinion that the SenwaTec Combination fails to disclose the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.”

271. As explained above, the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating” is: “valve(s) and fluid nozzle(s).” Specifically, the ‘425 Patent describes that proportioning the fluid flow from the nozzles can be used to control movement of the vehicle while floating:

Valve structure comprising a valve 15 corresponding to each fluid nozzle 11, 13, 16, 17 is also provided. The valves 15 are powered and operable to open or close. The valves 15 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles 17 to the left side fluid nozzles 16 5 causes the vehicle to turn to the right while floating. Similarly, fluid flow may be proportioned between the first fluid nozzle 11 and the second fluid nozzles 13 to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, '425 Patent, col 5, ln. 63 – col. 6, ln. 8.

272. SenwaTec neither describes nor shows any valve connected to its nozzle. And Dr. Winkel does not assert that what he points to as the nozzle of SenwaTec is capable of performing the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” Carrier does not remedy this deficiency of SenwaTec. *See* Section XII.G. Yoon also fails to remedy this deficiency of SenwaTec. Yoon does not describe any valve(s) or fluid nozzle(s) that perform the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” SenwaTec, Yoon, and Carrier do not describe any control of valves to provide proportional flow between nozzles to control the vehicle.

273. Thus, it is my opinion that the SenwaTec Combination does not render Claim 28 obvious.

G. Claim 33

274. Claim 33 depends from Claim 25 and recites: “The vehicle of claim 25, wherein the power source is connected to the hydraulic pump by a mechanical drive and is connected to the liquid manure pump by the mechanical drive.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, and 25 obvious. Claim 33 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

275. Additionally, SenwaTec does not describe “wherein the power source is . . . connected to the fluid pump by the *mechanical drive*.” Dr. Winkel asserts that SenwaTec’s pump is operated by a hydraulic motor, which is powered by the diesel engine. *See* EX1004, Winkel Decl. ¶ 319. He then attempts to assert that a mechanical drive connects the diesel engine and the Doro pump:

319. SenwaTec also discloses that the centrifugal (fluid) pump is hydraulically powered by the diesel engine. *Id.* A hydraulic system operates by transferring mechanical energy through the pressurized hydraulic system, which powers a hydraulic motor. A hydraulic motor includes an output shaft to transmit power from the hydraulic motor. Centrifugal fluid pumps include an input shaft to drive the pump mechanism and move the fluid. Thus, SenwaTec discloses a mechanical drive connection operably connecting the diesel engine and the fluid pump.

Id. Dr. Winkel is incorrect in his analysis. That the diesel engine includes an output shaft connected to a hydraulic pump and a hydraulic motor has an output shaft that is connected to a pump mechanism, does not mean that there is a “mechanical drive connection” between the diesel engine and SenwaTec’s pump. Instead, it is a *hydraulic* connection. In particular, the hydraulic pump is hydraulically connected to the hydraulic motor by hydraulic lines; there is no “mechanical drive” between the hydraulic pump and hydraulic motor. Other than this convoluted argument, Dr. Winkel points to no other description in SenwaTec that “the power source is . . . connected to the fluid pump by the mechanical drive” as recited in Claim 33.

276. Dr. Winkel also asserts that “a POSA would have understood that there were limited drive systems available and that there would have been a high likelihood of success in using a mechanical drive to connect these pumps to the power source.” EX1004, Winkel Decl. ¶ 320. However, Dr. Winkel does not provide any support for this statement; nor does he provide any analysis as to why a POSITA would have been motivated to modified SenwaTec to utilize “a mechanical drive to connect these pumps to the power source” or how such modification would have been made without a substantial reconstruction of SenwaTec.

277. Therefore, the combination of SenwaTec and Yoon or Carrier fails to render Claim 33 obvious.

H. Claim 34

278. Claim 34 depends from Claim 33 and recites: “The vehicle of claim 33, wherein the wireless remote control is configured to operate the hydraulic motor to operate the ground engaging propulsion structure at variable speed.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, and 33 obvious. Claim 34 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, and 33.

I. Claim 35

279. Claim 35 depends from Claim 34 and recites: “The vehicle of claim 34, wherein the ground engaging elements consist of a set of ground engaging wheels.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, and 34 obvious. Claim 14 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, and 34.

J. Claim 36

280. Claim 36 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 36 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

281. The combination of SenwaTec and Yoon or Carrier also fails to render Claim 36 obvious because Claim 36 requires *exactly four* ground engaging wheels, which is different from the number of wheels disclosed in SenwaTec and Yoon or Carrier. SenwaTec has a track equipped configuration and a configuration with 6 wheels. Carrier discloses 8 wheels. Yoon teaches a 2-

wheeled trailer-like configuration. Both SenwaTec and Carrier mention that they are designed to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Nuhn's 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings of the low ground-pressure vehicles described in the prior art.

282. As a result, the combination of SenwaTec and Yoon or Carrier does not teach or suggest a vehicle where “the set of ground engaging wheels *consists of* two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body,” as required by Claim 36.

K. Claim 37

283. Claim 37 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of four powered ground engaging wheels and wherein each powered ground engaging wheel is independently powered and is operable at variable speed.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 37 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

284. The combination of SenwaTec and Yoon or Carrier also fails to render Claim 37 obvious because Claim 37 requires *exactly four* ground engaging wheels, which is different from the number of wheels disclosed in SenwaTec and Yoon or Carrier. SenwaTec has a track equipped configuration and a configuration with 6 wheels. Carrier discloses 8 wheels. Yoon teaches a 2-wheeled trailer-like configuration. Both SenwaTec and Carrier mention that they are designed to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Nuhn's 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings

of the low ground-pressure vehicles described in the prior art.

285. As a result, the combination of SenwaTec and Yoon or Carrier does not teach or suggest a vehicle where “the set of ground engaging wheels *consists of* four powered ground engaging wheels,” as required by Claim 37.

L. Claim 38

286. Claim 38 depends from Claim 37 and recites: “The vehicle of claim 37, wherein the four powered ground engaging wheels are operable at variable speed by the hydraulic motor.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, and 37 obvious. Claim 38 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, and 37.

M. Claim 39

287. Claim 39 depends from Claim 38 and recites: “The vehicle of claim 38, wherein the vehicle further comprises a nozzle at the end of the conduit.” As described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 39 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

N. Claim 40

288. Claim 40 depends from Claim 38 and recites: “The vehicle of claim 38, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” At least the same reasons as described with respect to Claim 28, the combination of SenwaTec and Yoon or Carrier does not describe “wherein the at least one of speed and direction of the vehicle when the vehicle is floating is controlled by a fluid mover.” Additionally, as described above, the combination of SenwaTec and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, or 38 obvious. Claim 40 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, or 38.

289. I have also considered whether the combination of SenwaTec and Yoon or Carrier meets all of the limitations of Claim 40 if the language reciting “fluid mover” is construed as a means-plus-function claim limitation. Under that construction, it is my opinion that the SenwaTec Combination fails to disclose the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.”

290. As explained above, the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating” is: “valve(s) and fluid nozzle(s).” Specifically, the ‘425 Patent describes that proportioning the fluid flow from the nozzles can be used to control movement of the vehicle while floating:

Valve structure comprising a valve 15 corresponding to each fluid nozzle 11, 13, 16, 17 is also provided. The valves 15 are powered and operable to open or close. The valves 15 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles 17 to the left side fluid nozzles 16 5 causes the vehicle to turn to the right while floating. Similarly, fluid flow may be proportioned between the first fluid nozzle 11 and the second fluid nozzles 13 to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, ‘425 Patent, col 5, ln. 63 – col. 6, ln. 8.

291. SenwaTec neither describes nor shows any valve connected to its nozzle. And Dr. Winkel does not assert that what he points to as the nozzle of SenwaTec is capable of performing the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” Carrier does not remedy this deficiency of SenwaTec. *See* Section XII.G. Yoon also fails to remedy this deficiency of SenwaTec. Yoon does not describe any valve(s) or fluid nozzle(s) that perform the function of “moving fluid to control at least one of the speed and

direction of the vehicle when the vehicle is floating.” SenwaTec, Yoon, and Carrier do not describe any control of valves to provide proportional flow between nozzles to control the vehicle.

292. Thus, it is my opinion that the Truxor Combination does not render Claim 40 obvious.

XV. GROUND 3: CLAIMS 22-25, 27, 28, AND 33-40 ARE NOT OBVIOUS BASED ON TRUXOR IN VIEW OF YOON OR CARRIER

293. In the following sections I examine various elements of the ‘425 Patent and explain why at least Claim 22 is not rendered obvious by Truxor in view of Yoon or Carrier (“the Truxor Combination”). Claims 22-25, 27, 28, and 33-40 depend from Claim 22 and are not rendered obvious by the Truxor Combination at least the same reasons.

A. Claim 22

3. THE TRUXOR COMBINATION FAILS TO DISCLOSE OR SUGGEST THE CLAIMED POSITION OF THE LIQUID MANURE PUMP

294. The Truxor Combination fails to teach or suggesting the position of the impeller and housing of the liquid manure pump recited in Substitute Claim 22, which is set forth below:

“a liquid manure pump for pumping liquid manure, the liquid manure pump including a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body and such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating”

Because Claim 22 is independent, none of the Substitute Claims are rendered obvious by the Truxor Combination in view of this deficiency.

295. Truxor discloses an amphibious vehicle that is designed to carry an onboard operator and a number of different tool attachments, including aquatic weed cutters [EX1006, pp. 6-7], rakes [EX1006, pp. 8-9], buckets and log grabbers [EX1006, p. 9], dredge pumps [EX1006, pp. 10-11], excavators [EX1006, p. 12], cultivators [EX1006, p. 13], and oil decontamination tools

[EX1006, pp. 14-15].

296. Truxor does not teach or even suggest that the Truxor vehicle and one of its pump attachments are used to pump manure.

297. Instead, Truxor’s documentation clearly states that the Doro pump is designed for pumping light sediments and volatile sand:

The Doro Pump

Page 18

The Doro pump is designed for pumping light sediments and volatile sand. The Doro pump is supplied with a screw feed. The intake can be equipped with a suction nozzle when pumping sand or light floating sediments.

EX1007, Arnoldsson, p. 123.

298. A POSITA would not take this statement that “[t]he Doro pump is designed for pumping light sediments and volatile sand” to mean that the Doro pump would not be prone to clogging in manure pumping applications. Indeed, the Houle reference explains that even powerful centrifugal pumps are prone to clogging when used to pump manure and explains that “[s]uch devices ... provide limited efficiency when the reservoir contains a thick floating crust or heavy bottom sediments”:

Farm animal manure consists of solid particles in a liquid, and the solid particles either settle on the bottom 25 of the container (as in the case of pig manure) or form a crust over the liquid (as in the case of cow manure) depending on the density of the solid matter and, in some cases, both conditions obtain. Thus, the mass of manure in the container must be thoroughly mixed prior 30 to pumping in order to maintain the solid particles in suspension, otherwise only the liquid matter will be pumped out while the solid matter accumulates in the container. Moreover, such solid matter tends to clog the pump. 35

Hitherto, manure handling pumps consisted of a powerful centrifugal pump disposed near the bottom of the container, the impeller turning about a vertical axis, and a conduit system coupled to the outlet of the pump for either circulating manure within the container or away 40 therefrom into a manure spreader or a different container. The conduit system therefore has a first branch leading out of the container toward another container or toward a tank spreader, and a second branch leading to a suitable nozzle pipe for returning into the container 45 the slurry being mixed. A gate controls the selection of conduit branch in order to either agitate the slurry or pump same out of the reservoir. Examples of such centrifugal systems of which many different designs are currently available from farm equipment manufacturers, are described in U.S. Pat. Nos. 3,905,725 dated Sept. 16, 1975 (R. L. Johnson), 3,446,151, May 27, 1969 (H. G. V. Anderson), 3,456,592, July 22, 1969 (L. L. Nelsen) and 3,966,361, June 29, 1976 (B. L. House). Such devices however provide limited efficiency when 55 the reservoir contains a thick floating crust or heavy bottom sediments. Indeed, the mixing capabilities of centrifugal pump systems are at best limited and time consuming, and no agitation takes place during transfer of the slurry to a different container into a tank 60 spreader. Furthermore, clogging of the pump's impeller and consequential loss of pump efficiency remains a serious shortcoming.

EX2010, U.S. Pat. No. 4,406,413, col. 1, ln. 24-63.

299. Dr. Winkel asserts that the Doro pump described in Truxor [EX1006] is capable of pumping liquid manure and that it has capabilities that are “far greater than those necessary for pumping liquid manure.” However, Dr. Winkel provides no analysis of the Doro pump beyond this conclusory statement. And while Dr. Winkel states that dredging pumps have been used for pumping liquid manure and cites to EX1058, he provides no analysis or opinion that the Doro pump shown in Truxor [EX1006] is a dredging pump like that referred to in EX1058. For example, he does not conduct any analysis of the tolerances, pumping head, pumping capacity, power capacities, or other characteristics of the Duro pump nor does he make any comparison of such characteristics to manure pumps or the dredging pump referred to in EX1058. Without providing any analysis of whether the Duro pump of Truxor [EX1006] is structurally similar to the dredging pump referred to in EX1058 or any other manure pump, Dr. Winkel has failed to support his

assertion that the Doro pump is capable of pumping liquid manure.

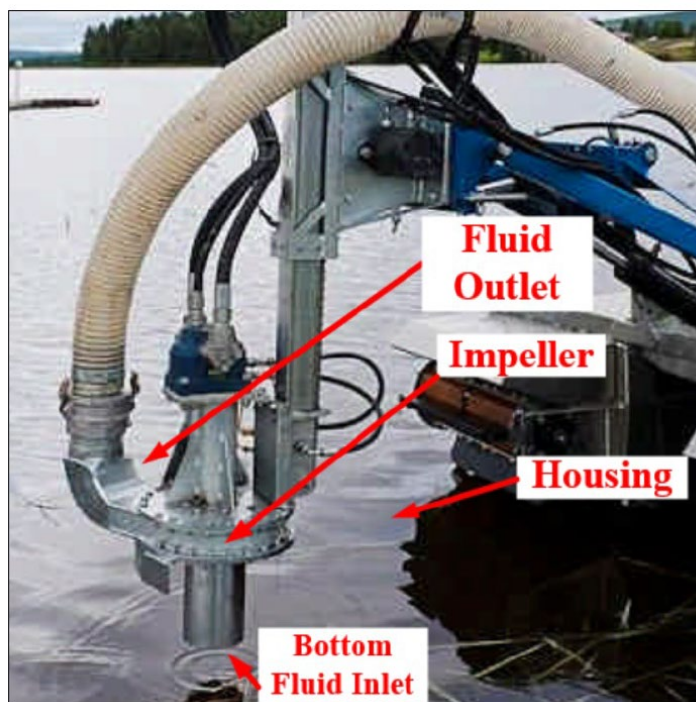
300. As described herein, a POSITA would understand that liquid manure has high total solids content, behaves like a non-Newtonian fluid, and, prior to being agitated, often has large, hard, and thick crust floating thereon, as well as abrasive bedding solids therein. *See supra* Section IX.A. There is nothing in Truxor [EX1006] that describes or suggests that its pump is capable of pumping the hard thick crusts that a POSITA would have understood to be in the liquid manure prior to agitation. For these reasons, it is my opinion that a POSITA would not have understood Truxor to describe a pump that is capable of pumping liquid manure with the suspended solids that are routinely encountered therein.

301. In view of this background knowledge and the fact that the Truxor reference itself does not teach that the Doro pump is designed and used to pump manure, a POSITA would not consider the Doro pump to be a “liquid manure pump” as required by the Substitute Claims.

302. The Truxor Combination also fails to disclose or suggest the claimed position of the housing and impeller of the liquid manure pump. A POSITA would understand Truxor as teaching a dredge pump that hangs off the front of the floatable vehicle body with a housing and impeller that are forward of the front end of the floatable vehicle body and positioned along the far end / forward end of a boom arm rather than being positioned “along the underside of the floatable vehicle body.”

303. Dr. Winkel appears to suggest that Truxor’s teaching of its dredge positioned several feet in front of the front-end of the SenwaTec vehicle satisfies the claimed position of the

liquid manure pump.



EX1109, p. 66.

304. In my opinion, a POSITA would understand this photograph to show a dredge pump positioned along the far/forward end of a boom arm at a location that is spaced in front of the front end of the vehicle body. A POSITA would NOT consider the housing and impeller of Truxor's dredge pump to be "positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body," as required by Claim 22. A POSITA would not have understood Truxor, Yoon, and/or Carrier as rendering obvious Substitute Claim 22, and specifically, the Pump Limitation. A POSITA would not have understood Truxor, Yoon, and/or Carrier as rendering obvious the Substitute Claims because the pumps of Truxor, Yoon, or Carrier are not liquid manure pumps and are not mounted in such a way that the housing and an impeller are:

- (1) positioned along the underside of the floatable vehicle body, AND
- (2) positioned between at least two of the ground engaging elements, AND

(3) positioned rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body, AND

(4) such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating.

4. A POSITA WOULD NOT HAVE HAD A REASONABLE EXPECTATION OF SUCCESS IN COMBINING TRUXOR WITH YOON OR CARRIER

305. The amphibious vehicle disclosed in Truxor and its tool attachments are designed to be operated by an on-board operator. As a result, Truxor fails to teach the limitations of Claim 1 that recite “a wireless remote control configured to enable an operator who is remote from the vehicle to: (1) control the ground engaging propulsion structure; (2) control a flow of liquid manure from the fluid pump; (3) control at least one of the speed and direction of the vehicle when the vehicle is ground engaging; and, (4) control at least one of the speed and direction of the vehicle when the vehicle is floating.”

306. With respect to Ground 3, Dr. Winkel asserts that a POSITA would **add** wireless remote-control functionality to the amphibious vehicle disclosed in Truxor in view of the remote-control teachings of Yoon or Carrier; however, in my opinion a POSITA would not have been motivated to combine the remote-control teachings of Yoon or Carrier with Truxor, and even if so, would not have had a reasonable expectation of success in making this combination and achieving the claimed invention.

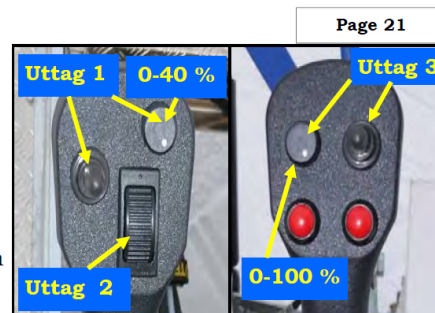
307. It is my opinion that a POSITA would not have been motivated to combine the remote-control teachings of Yoon or Carrier with Truxor to arrive at the claimed invention. Truxor is described as able to be configured as a dredging vehicle with a dredging pump. *See* EX1006 at 10. A POSITA would understand that dredge pumps are used to clean out the bottom of a pond, river, lake or other body of water by removing material from the bottom of the body of water. This is usually done to increase the depth of a particular of the body of water. A POSITA would not have been motivated to remove the human on-board operator from Truxor because in doing so, the

ability of the human on-board operator to sense or feel that the bottom of the body of water was sufficiently dredged would have been severely hindered. When an operator is on-board the vehicle of Truxor, they would be able to feel whether the impediment that they are trying to remove by dredging has been sufficiently removed by resistance to movement of the dredge pump or the vehicle of Truxor as a whole. Removing the on-board operator from Truxor and replacing that on-board operator with a remote control system would entirely remove that tactile feel provided by being physically on the vehicle of Truxor.

308. Moreover, it is my opinion that a POSITA would not have had a reasonable expectation of success in combining the remote-control teachings of Yoon or Carrier with Truxor. Truxor discloses two multi-function joysticks that are used to control the positioning and operation of the submersed pump:

The Doro Pump

The Doro pump is regulated with the help of crossbar switches. The left joystick adjusts the screw feed = socket 1. The rotation can be max. 40 %. The upward and downward movement of the telescope extension is controlled using socket 2 (accessory). The right joystick with socket 3 regulates the rotation speed of the pump, which can be 100 % in most cases.

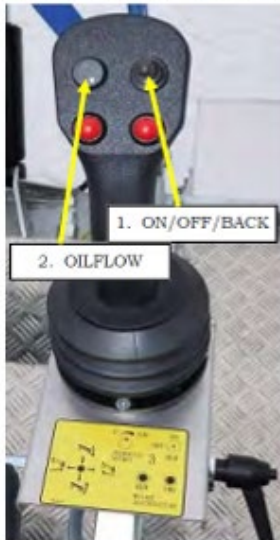


EX1007, Arnoldsson Decl., p. 126.



The digging arm may only be moved laterally when the outriggers touch the bottom. The lateral scope of the digging arm with a mounted Doro pump is 4 metres but for safety reasons only a 2-metre range can be used. This means that the permissible working width from the centre is 2 metres in each direction.

Warning! There is a tilting risk if the maximum range is used.



Hydraulic-driven tools mounted on Doro Digger require different oil flows.

Socket 3 that determines the oil flow/pressure to the tools is regulated using the right joystick. The switch (1) controls on/off/back.

The knob (2) adjusts the oil flow. Turn the control clockwise to end position for maximum oil flow (100%).

The rotation speed of the diesel motor also affects the maximum flow of the hydraulic pump. Higher rotation speed is required when many hydraulic functions are running at the same time.

Recommended oil flows for the different tools (2):

Doro Pump V380-100 %

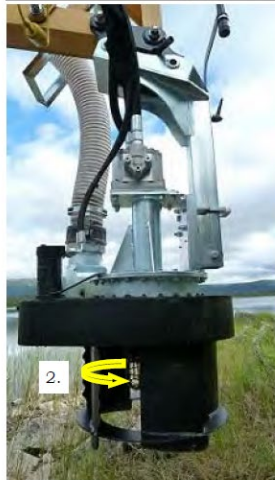
Slaghack Orsi 80-100 %

Doro Cutter ESM 1900 40-60 %

Doro Mill 50-70 %



The controls on the left joystick regulates the oil flow to Doro Digger. The toggle switch activates the oil supply and the knob regulates the oil flow. Turning the control counter-clockwise reduces the oil flow so that the speed of the swing cylinders decreases (1). Recommended setting (60-100%)



Socket 2 adjusts the feed to the pump intake (2). When socket 2 is used, the switch (4) on the panel must be in ON position to achieve the hold function. When the roll switch (3) is moved upwards, the feed wheel will start (2). To stop the wheel, pull the roll switch downwards.



EX1007, Arnoldsson Decl., pp. 128-129.

309. The difficulties with converting hydraulic controls of this type to wireless remote control would be known to a POSITA. Teleoperation is a term often used when a machine or robot is operated from a distance (aka remote control). The difficulties of operating an excavator-like machine system in a teleoperation type environment lie from delay (latency) in controls, lack of tactile feedback (which is provided through onboard hydraulic controls), and an overload of visual information. EX2028, pp. 1, 4-6. The human machine interface (HMI) of hydraulic excavator controls has not evolved much in the last couple of decades and therefore does not lend itself to easily being converted to teleoperation. EX2025, p. 3. In the 2013-2014 time period, commentators explained that further studies and development was needed to convert these types of manual excavator-like controls to wireless remote-control. EX2025, p. 8. Further, ASME papers show this was still an area requiring further development and new control systems in 2022. EX2028, pp. 1-2, 4-6.

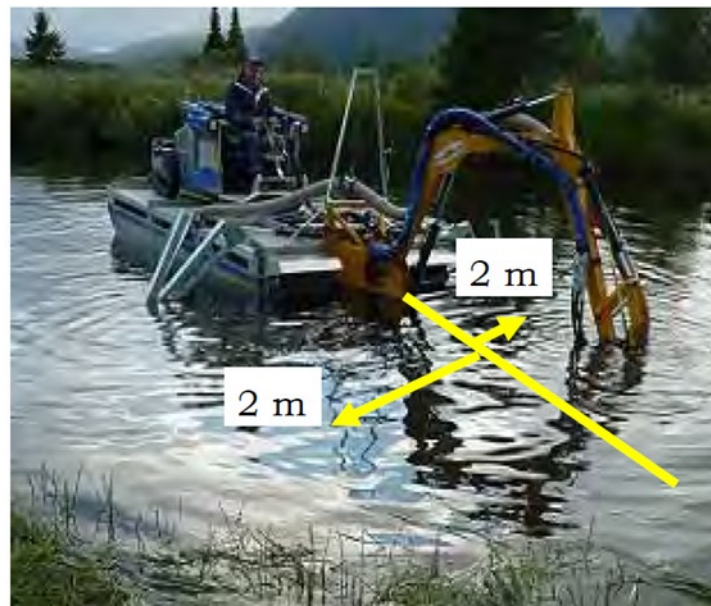
310. Dr. Winkel has not shown or even attempted to explain how remote control over the various functions of the Truxor vehicle and Doro Pump could be implemented, how a POSITA could overcome these difficulties when making the Truxor Combination, or that the resulting combination would actually work in the manure lagoon environment.

311. Even today, some ten years later, there is no evidence that a remote-control option has been added to the Truxor vehicle. On October 1, 2023, I visited the Truxor website at <https://truxor.com>. I was unable to find any reference to any features or options that indicated remote control of their vehicles is available as an option for their products.

312. On October 2, 2023, I took screenshots from the Truxor website and compiled them as EX2026. I therefore certify that the screenshots shown in EX2026 are true and correct images of the Truxor website identified in the paragraph above. The fact that Truxor has not, to this day, added a remote control option to its vehicles provides evidence that this would not be a simple feat that could be accomplished by routine experimentation.

313. A POSITA would also expect that remotely controlling the positioning and operation of a submerged pump to be problematic given the difficulty observing its operation from a remote location.

314. Truxor's elevated seating position demonstrates the importance of visual observation of the pump located at the end of Truxor's boom arm:



EX1007, Arnoldsson Decl., pp. 60, 128.

315. The vehicle disclosed in SenwaTec is similar to the vehicle disclosed in Truxor, but has a seating position that is below the top deck of the vehicle. As a result, operators of the SenwaTec vehicle were forced to stand to get a better view of the submersed pump:





EX1012, SenwaTec, p. 2. This reinforces what a POSITA would readily appreciate – it would be difficult if not impossible to control and operate this type of vehicle and pump from a remote location.

316. Truxor's operator's manual also warns of known "a tilting risk." EX1007, Arnoldsson Decl., p. 128. Dr. Winkel even acknowledges that the vehicle disclosed in Truxor has a tilting (i.e., rollover) risk:

Potential Rollover Risk EX1006, 5; <i>see also</i> EX1021-EX1022, 1; EX1023, 8.	Cold Weather/Hypothermia EX1006, 6.
	

EX1004, Winkel Decl., p. 142.

317. This tilting risk would dissuade a POSITA from adding remote control functionality to Truxor because remote control is less precise, has greater delay (latency), and it is much more difficult for the operator to perceive and counter tipping (i.e., remote control operators lack tactile feedback through the controls and or an on-board perception of sliding and tipping). While the operator might not get hurt if a remote control vehicle tips, tipping creates a considerable set back as the remote control vehicle can become damaged by tipping and manned heavy equipment would likely be necessary to extract the vehicle from the manure lagoon and/or right the vehicle. Dr. Winkel completely overlooks Truxor's known instability problem from a reasonable expectation of success standpoint.

318. Manure lagoons typically have steep embankments that can be covered in manure, mud, sand, and/or ice and are therefore extremely slippery. EX1004, Winkel Decl., ¶¶334, 336. A POSITA would recognize that Truxor's known instability issues would be exacerbated by remote control. As a result, a POSITA would not have had a reasonable expectation that adding remote control functionality to Truxor would be successful in producing an amphibious remote-

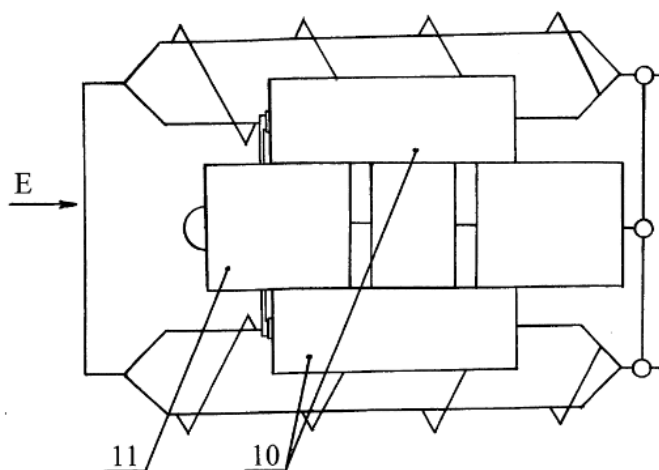
controlled vehicle that could operate in a manure lagoon environment without tipping.

319. The reliance on Melnikov by Dr. Winkel is also misplaced. Melnikov actually supports my opinion that a POSITA would not have had a reasonable expectation of success in adding wireless remote-control functionality to Truxor because that is not what Melnikov did.

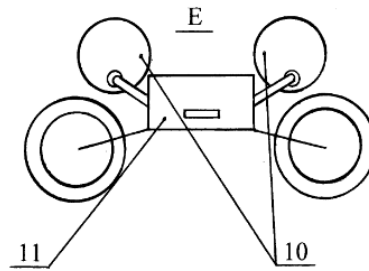
320. Melnikov discusses Truxor in its “Background” section as prior art and notes the drawback that it requires an onboard operator:

Truxor — a multifunctional amphibian machine manufactured by the Swedish company *Dorotea Mekaniska AB* is known (www.doroteamekaniska.se). The amphibian is a pontoon machine on caterpillar tracks operated by one operator. On the machine, an oil skimmer, cultivator, excavator, rakes may be quickly mounted as hydraulic attachments. The machine is easily placed on a trailer, which makes it mobile and reduces transport costs. However, **the disadvantages of the machine may include the presence of an operator located on the machine itself**, which limits the use thereof in conditions dangerous for humans.

EX1025, Melnikov Trans., p. 4. Significantly, Melnikov does not suggest adding remote control to Truxor. Instead of doing that, Melnikov designed a radically different remote-controlled vehicle with a dual-screw propulsion system that looks nothing like Truxor:



Фиг. 11



Фиг. 12

EX1024, Melnikov, p 7.

321. These major differences continue with Melnikov's pump, which is illustrated as an **onboard** pump for pumping liquid biopreparations and mineral fertilizers from the containers 10 to the spray system 11:

The machine for applying liquid biopreparations and liquid mineral fertilizers includes containers 10 and a pump with a spray system 11 (Fig. 11) mounted on the carrier vehicle.

EX1025, Melnikov Trans., p. 5.

322. The device in Melnikov does not pose the same problem as the Truxor Combination, where controlling the positioning and operation of a submerged pump would be problematic given the complexity of the controls and difficulty observing its operation from a remote location.

323. Melnikov clearly knew of the Truxor vehicle and clearly knew that its requirement for an onboard operator was a drawback. If it were both obvious and reasonably feasible to add remote control functionality to Truxor, that is precisely what Melnikov would have done. But Melnikov didn't do that and instead created a device that would be far simpler to operate as a remote-control vehicle.

324. A POSITA would understand that just because *some* vehicles can be remote controlled does not mean that *all* vehicles can be remote controlled. Thus, in my opinion, a POSITA would not have had a reasonable expectation of successfully adding remote-control functionality to Truxor to produce an amphibious remote-controlled vehicle that could operate in a manure lagoon environment without tipping.

B. Claim 23

325. Claim 23 depends from Claim 22 and recites: “The vehicle of claim 22, wherein the vehicle further comprises a conduit fluidly connected to the liquid manure pump.” As described above, the combination of Truxor and Yoon or Carrier does not render Claim 23 obvious. Claim 23 is not obvious at least because of its dependence on Claim 22.

C. Claim 24

326. Claim 24 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the conduit comprises an opening at an end thereof.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 24 is not obvious at least because of its dependence on Claims 22 and 23.

D. Claim 25

327. Claim 25 depends from Claim 24 and recites: “The vehicle of claim 24, wherein the wireless remote control is configured to control an orientation of the opening.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, and 24 obvious. Claim 25 is not obvious at least because of its dependence on Claims 22, 23, and 24.

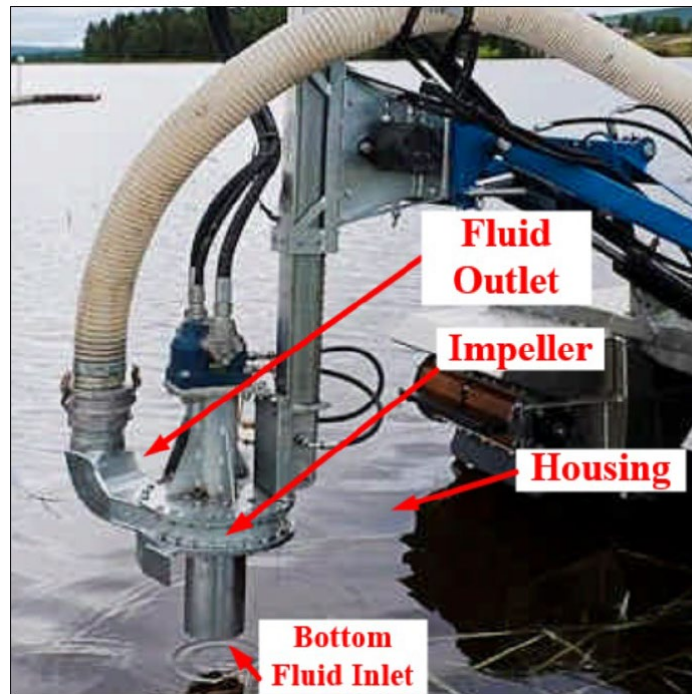
E. Claim 27

328. Claim 27 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the vehicle further comprises a nozzle at the end of the conduit, wherein the ground engaging propulsion structure comprises a front set of ground engaging wheels that are rotatably attached to a front set of spindles and a rear set of ground engaging wheels that are rotatably attached to a rear set of spindles, and wherein the liquid manure pump is positioned rearward of the front set of spindles and forward of the rear set of spindles.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22 and 23 obvious. Claim 27 is not obvious at least because of its dependence on Claims 22 and 23.

329. The Truxor Combination also fails to render Claim 27 obvious because it fails to

teach or suggest positioning the pump rearward of the front set of spindles as required by Claim 27.

330. As shown in the photograph below, a POSITA would understand Truxor as teaching a dredge pump that hangs off the front of the floatable vehicle body with a housing and impeller that are forward of the front end of the floatable vehicle body at a position that is spaced several feet forward of Truxor's tracks.



EX1109, p. 59. In my opinion, a POSITA would NOT understand Truxor to disclose or suggest positioning its pump rearward of a front set of spindles that support a front set of ground engaging wheels, as required by the language of Claim 27.

F. Claim 28

331. Claim 28 depends from Claim 22 and recites: “The vehicle of claim 22, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Truxor and Yoon or Carrier does not render Claim 22 obvious. Claim 28 is not obvious at least because of its dependence on Claim 22.

332. I have also considered whether the combination of Truxor and Yoon or Carrier meets all of the limitations of Claim 28 if the language reciting “fluid mover” is construed as a means-plus-function claim limitation. Under that construction, it is my opinion that the Truxor Combination fails to disclose the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.”

333. As explained above, the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating” is: “valve(s) and fluid nozzle(s).” Specifically, the ‘425 Patent describes that proportioning the fluid flow from the nozzles can be used to control movement of the vehicle while floating:

Valve structure comprising a valve 15 corresponding to each fluid nozzle 11, 13, 16, 17 is also provided. The valves 15 are powered and operable to open or close. The valves 15 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles 17 to the left side fluid nozzles 16 5 causes the vehicle to turn to the right while floating. Similarly, fluid flow may be proportioned between the first fluid nozzle 11 and the second fluid nozzles 13 to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, ‘425 Patent, col 5, ln. 63 – col. 6, ln. 8.

334. Truxor neither describes nor shows any valve connected to its nozzle. And Dr. Winkel does not assert that what he points to as the nozzle of Truxor is capable of performing the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” Carrier does not remedy this deficiency of Truxor. *See* Section XII.G. Yoon also fails to remedy this deficiency of Truxor. Yoon does not describe any valve(s) or fluid nozzle(s) that perform the function of “moving fluid to control at least one of the speed and

direction of the vehicle when the vehicle is floating.” Truxor, Yoon, and Carrier do not describe any control of valves to provide proportional flow between nozzles to control the vehicle.

335. Thus, it is my opinion that the Truxor Combination does not render Claim 28 obvious.

G. Claim 33

336. Claim 33 depends from Claim 25 and recites: “The vehicle of claim 25, wherein the power source is connected to the hydraulic pump by a mechanical drive and is connected to the liquid manure pump by the mechanical drive.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, and 25 obvious. Claim 33 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

337. Additionally, Truxor does not describe “wherein the power source is . . . connected to the fluid pump by the *mechanical drive*.” Dr. Winkel asserts that Truxor’s Doro pump is operated by a hydraulic motor, “which is powered by the power source (the diesel engine).” EX1004, Winkel Decl. ¶ 279. He then attempts to assert that a mechanical drive connects the diesel engine and the Doro pump:

279. “The Doro Pump [(the fluid pump)] is operated by a hydraulic motor”
which is powered by the power source (the diesel engine). EX1006, 10; *see also*
EX1021-EX1022, 13; EX1023, 11. A hydraulic motor includes an output shaft to
transmit power from the hydraulic motor. Fluid pumps include an input shaft to drive
the pump mechanism and move fluid. Thus, Truxor discloses a mechanical drive
connection operably connecting the diesel engine and the fluid pump.

Id. Dr. Winkel is incorrect in his analysis. That a diesel engine includes an output shaft connected to a hydraulic pump and a hydraulic motor has an output shaft that is connected to a pump mechanism, does not mean that there is a “mechanical drive connection” between the diesel engine and the Doro pump. Instead, it is a *hydraulic* connection. In particular, the hydraulic pump is hydraulically connected to the hydraulic motor by hydraulic lines; there is no “mechanical drive”

between the hydraulic pump and hydraulic motor. Other than this convoluted argument, Dr. Winkel points to no other description in Truxor that “the power source is . . . connected to the fluid pump by the mechanical drive” as recited in Claim 33.

338. Dr. Winkel also asserts that “a POSA would have understood that there were limited drive systems available and that there would have been a high likelihood of success in using a mechanical drive to connect these pumps to the power source.” EX1004, Winkel Decl. ¶ 280. However, Dr. Winkel does not provide any support for this statement; nor does he provide any analysis as to why a POSITA would have been motivated to modified Truxor to utilize “a mechanical drive to connect these pumps to the power source” or how such modification would have been made without a substantial reconstruction of Truxor.

339. Therefore, the combination of Truxor and Yoon or Carrier fails to render Claim 33 obvious.

H. Claim 34

340. Claim 34 depends from Claim 33 and recites: “The vehicle of claim 33, wherein the wireless remote control is configured to operate the hydraulic motor to operate the ground engaging propulsion structure at variable speed.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, and 33 obvious. Claim 34 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, and 33.

I. Claim 35

341. Claim 35 depends from Claim 34 and recites: “The vehicle of claim 34, wherein the ground engaging elements consist of a set of ground engaging wheels.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, and 34 obvious. Claim 14 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, and 34.

J. Claim 36

342. Claim 36 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 36 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

343. The combination of Truxor and Yoon or Carrier also fails to render Claim 36 obvious because Claim 36 requires *exactly four* ground engaging wheels, which is different from the number of wheels disclosed in Yoon or Carrier. Truxor discloses a track equipped vehicle. Petitioner argues that a POSITA would replace Truxor’s tracks with four ground engaging wheels to arrive at the subject matter of Claim 36. But the prior art, including Carrier, teaches replacing tracks with 8 wheels to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Yoon teaches a 2-wheeled trailer-like configuration. Nuhn’s 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings of the low ground-pressure vehicles described in the prior art.

344. As a result, the combination of Truxor and Yoon or Carrier does not teach or suggest a vehicle where “the set of ground engaging wheels *consists of* two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body,” as required by Claim 36.

K. Claim 37

345. Claim 37 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of four powered ground engaging wheels and wherein each powered ground engaging wheel is independently powered and is operable at variable speed.”

As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 37 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

346. The combination of Truxor and Yoon or Carrier also fails to render Claim 37 obvious because Claim 37 requires *exactly four* ground engaging wheels, which is different from the number of wheels disclosed in Yoon or Carrier. Truxor discloses a track equipped vehicle. Petitioner argues that a POSITA would replace Truxor's tracks with four ground engaging wheels to arrive at the subject matter of Claim 37. But the prior art, including Carrier, teaches replacing tracks with 8 wheels to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Yoon teaches a 2-wheeled trailer-like configuration. Nuhn's 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings of the low ground-pressure vehicles described in the prior art.

347. As a result, the combination of Truxor and Yoon or Carrier does not teach or suggest a vehicle where "the set of ground engaging wheels *consists of* four powered ground engaging wheels," as required by Claim 37.

L. Claim 38

348. Claim 38 depends from Claim 35 and recites: "The vehicle of claim 37, wherein the four powered ground engaging wheels are operable at variable speed by the hydraulic motor." As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 38 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

M. Claim 39

349. Claim 39 depends from Claim 38 and recites: "The vehicle of claim 38, wherein

the vehicle further comprises a nozzle at the end of the conduit.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 39 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

N. Claim 40

350. Claim 40 depends from Claim 38 and recites: “The vehicle of claim 38, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Truxor and Yoon or Carrier does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 40 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

351. Dr. Winkel alleges that “the Doro Pump and the nozzle of Truxor could be used to propel the vehicle and control the speed and direction of the vehicle while floating.” EX1004, Winkel Decl. ¶ 289. This statement is unsupported by Truxor. Truxor does not teach that the output from the Doro pump can be used to control the speed and/or direction of the vehicle while it is floating. There is no disclosure in Truxor that its Doro pump is powerful enough to overcome drag to propel or maneuver the Truxor vehicle while it is in water. Moreover, Dr. Winkel includes a photograph of the Truxor in support of this argument; however, the Truxor vehicle is shown partially on land and not moving. *See* EX1004, Winkel Decl. ¶ 289. Additionally, Dr. Winkel asserts that “operation of the Doro Pump with the nozzle, and variation of the direction of the nozzle, would move fluid and control the speed and direction of the vehicle while it is floating.” EX1004, Winkel Decl. ¶ 290. Dr. Winkel provides no support for this argument. He points to nothing in Truxor as providing the capability of “variation of the direction of the nozzle” as controlling speed or direction of the vehicle of Truxor. As I describe above in Section XII.G, Carrier does not provide this functionality. Nor has Dr. Winkel pointed to any description of Yoon to provide this functionality.

352. I have also considered whether the combination of Truxor and Yoon or Carrier

meets all of the limitations of Claim 40 if the language reciting “fluid mover” is construed as a means-plus-function claim limitation. Under that construction, it is my opinion that the Truxor Combination fails to disclose the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.”

353. As explained above, the structure described in the ‘425 Patent specification that performs the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating” is: “valve(s) and fluid nozzle(s).” Specifically, the ‘425 Patent describes that proportioning the fluid flow from the nozzles can be used to control movement of the vehicle while floating:

Valve structure comprising a valve 15 corresponding to each fluid nozzle 11, 13, 16, 17 is also provided. The valves 15 are powered and operable to open or close. The valves 15 65 may be opened fully or partially to proportion flow between the plurality of fluid nozzles. Cooperation between the valves 15 and the plurality of fluid nozzles is used to provide directional control and motive power for the vehicle while floating. For example, proportioning fluid flow from the right side fluid nozzles 17 to the left side fluid nozzles 16 5 causes the vehicle to turn to the right while floating. Similarly, fluid flow may be proportioned between the first fluid nozzle 11 and the second fluid nozzles 13 to cause the vehicle to move forward or backward. By rotating the second fluid

EX1001, ‘425 Patent, col 5, ln. 63 – col. 6, ln. 8.

354. Truxor neither describes nor shows any valve connected to its nozzle. And Dr. Winkel does not assert that what he points to as the nozzle of Truxor is capable of performing the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” Carrier does not remedy this deficiency of Truxor. *See* Section XII.G. Yoon also fails to remedy this deficiency of Truxor. Yoon does not describe any valve(s) or fluid nozzle(s) that perform the function of “moving fluid to control at least one of the speed and direction of the vehicle when the vehicle is floating.” Truxor, Yoon, and Carrier do not describe

any control of valves to provide proportional flow between nozzles to control the vehicle.

355. Thus, it is my opinion that the Truxor Combination does not render Claim 40 obvious.

XVI. GROUND 4: CLAIMS 22-42 ARE NOT OBVIOUS BASED ON PUCK IN VIEW OF BRYHAM AND MANURE MANAGER

356. In the following sections I examine various elements of the '425 Patent and explain why at least Claim 22 is not rendered obvious by Puck in view of Bryham and Manure Manager ("the Puck-Bryham-Manure Manager Combination"). Claims 23-42 depend from Claim 22 and are not rendered obvious by the Puck-Bryham-Manure Manager Combination for at least the same reasons.

A. Claim 22

1. THE PUCK-BRYHAM-MANURE MANAGER COMBINATION FAILS TO DISCLOSE OR SUGGEST THE CLAIMED POSITION OF THE LIQUID MANURE PUMP

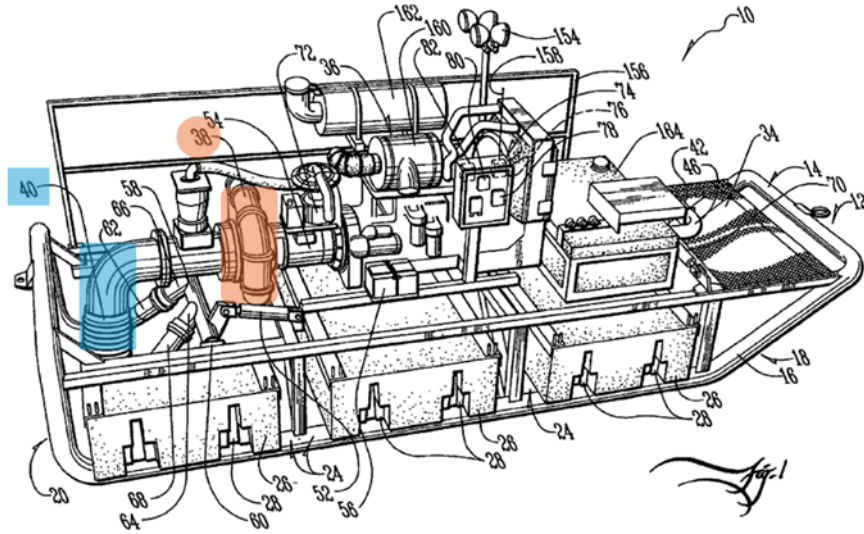
357. The Puck-Bryham-Manure Manager Combination fails to teach or suggesting the position of the impeller and housing of the liquid manure pump recited in Substitute Claim 22, which is set forth below:

“a liquid manure pump for pumping liquid manure, the liquid manure pump including a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body and such that the impeller is immersed in and configured to pump the liquid manure when the vehicle is floating”

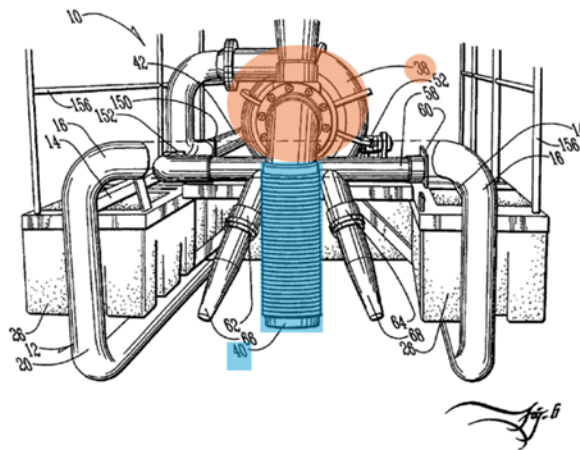
Because Claim 22 is independent, none of the Substitute Claims are rendered obvious by the Puck-Bryham-Manure Manager Combination in view of this deficiency.

358. Puck discloses a manure agitation boat including a slurry pump (38) that is located well above the floating dock sections (26) and thus the surface (126) of the manure lagoon (22)

lagoon (22):



EX1014 at 2 (annotated).



EX1014 at 5, 7 (annotated).

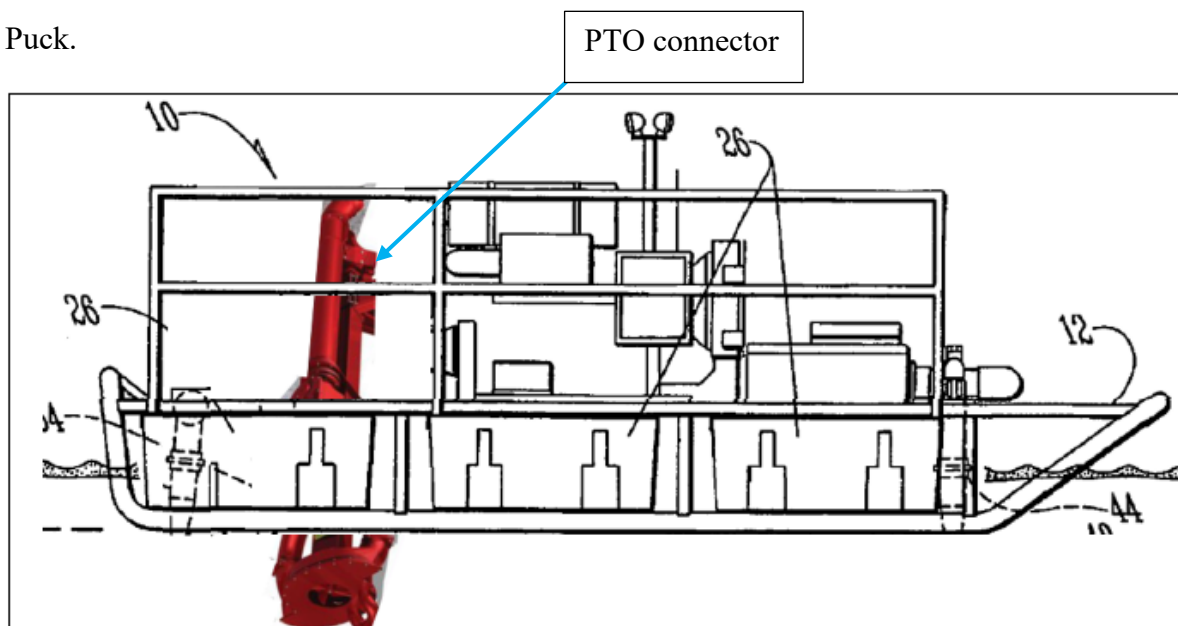


359. A liquid manure intake (40) extends towards a reward end of the boat, with a ninety-degree bend downward towards the bottom of the boat. The housing and impeller of the pump (38) are separate and distinct from the intake pipe (40) and are not located on the underside of the boat. Non-immersible liquid manure pumps (like the one disclosed in Puck), require different inlet/housing configurations with pump priming structures compared to submersible pumps.

EX1014 at [0031].

360. A POSITA looking to the teachings of Puck when attempting to design a new manure lagoon agitation vehicle would logically follow its disclosure, which teaches placing a non-submersible pump high and dry on top of the floatable vehicle body. Puck does not teach or suggest the claimed arrangements where the liquid manure pump is positioned along the underside of the floatable vehicle body.

361. I disagree with Dr. Winkel's combination of Manure Manager with Puck and Bryham because, as shown below, Dr. Winkel advocates mounting Nuhn's G-Force Vertical Pit Pump in a location that would be illogical to a POSITA based on the teachings of Manure Manager and Puck.



EX1109, p. 82. The scale in Dr. Winkel's combination shown above is way off. The boom arm of Nuhn's G-Force Vertical Pit pump is approximately 10 feet long and is therefore much larger than what is shown above. But, as will be explained in greater detail below, this arrangement is illogical because it would not permit Nuhn's G-Force Vertical Pit Pump to pivot/swing up and down so it would get in the way upon entry and exit of a manure lagoon and this arrangement also places the PTO connector at the upper end of the boom arm high up far away from the crankshaft of Puck's power source. A POSITA would not think to make such an arrangement. Indeed, Manure Manager does not teach or suggest the claimed arrangement where the liquid manure pump is positioned along the underside of the floatable vehicle body.

362. Manure Manager teaches a POSITA to locate a submersible manure pump at the lower end of a boom arm. The upper end of the boom arm opposite the manure pump is configured to be attached to the three-point mount on a tractor and the manure pump is powered/driven by the power-take-off (PTO) of the tractor, which couples to a driveshaft located at the upper end of the

boom arm:



EX1088, p. 27.

363. Fig. 2 of Nuhn's '758 Patent clearly depicts the PTO connector 29 at the upper end of the boom arm 1 where the driveshaft couples the PTO of the tractor to the gearbox of Nuhn's G-Force Vertical Pit Pump:

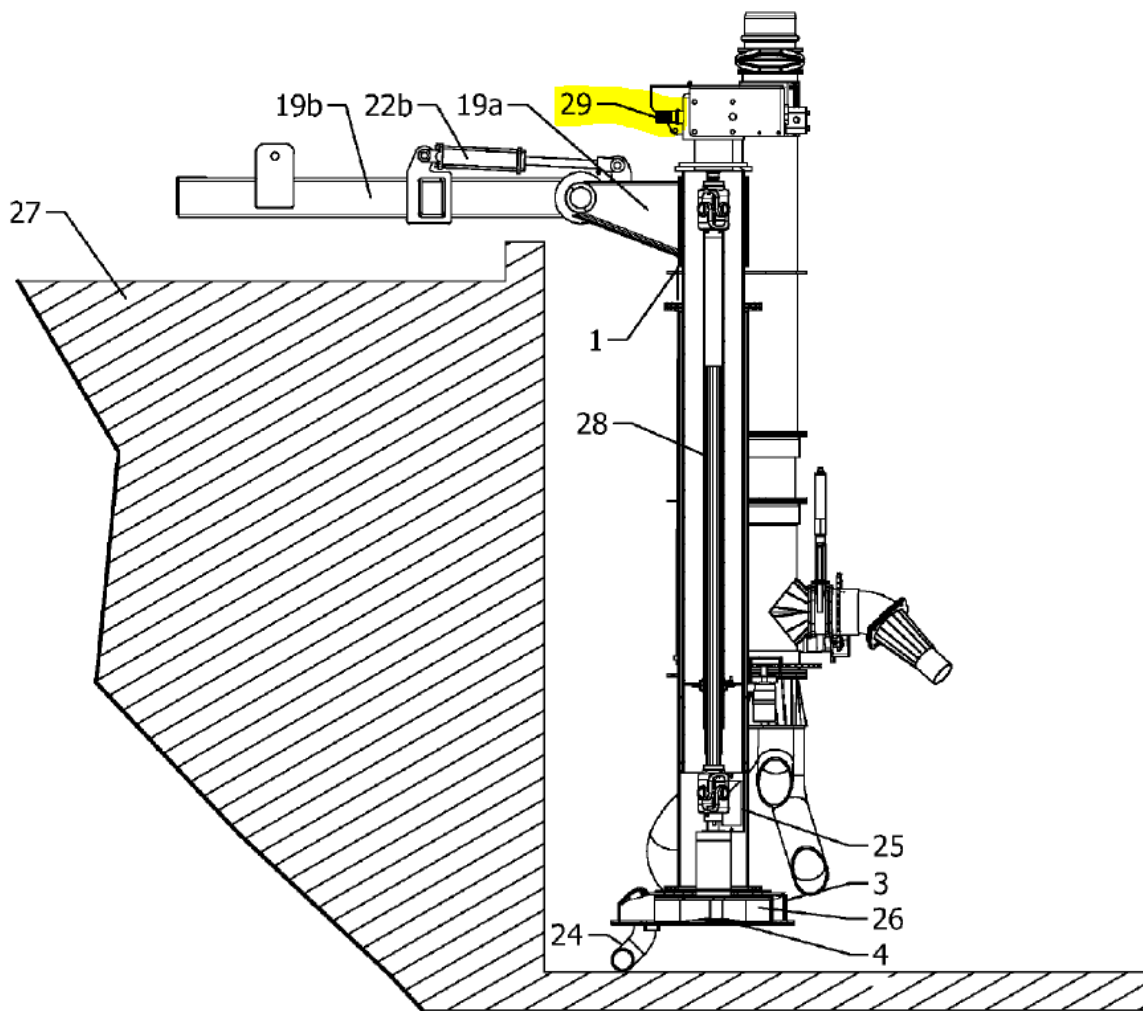


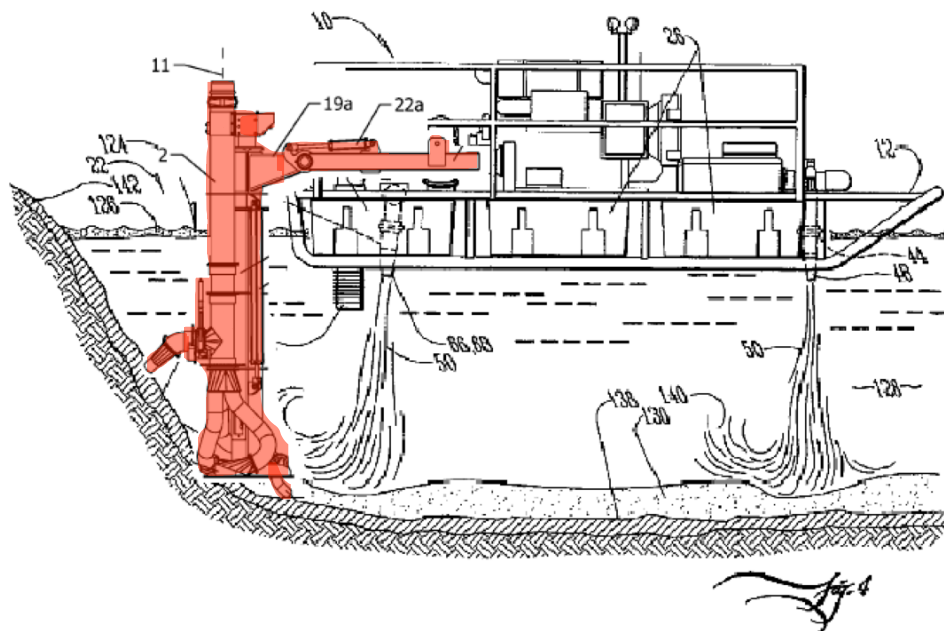
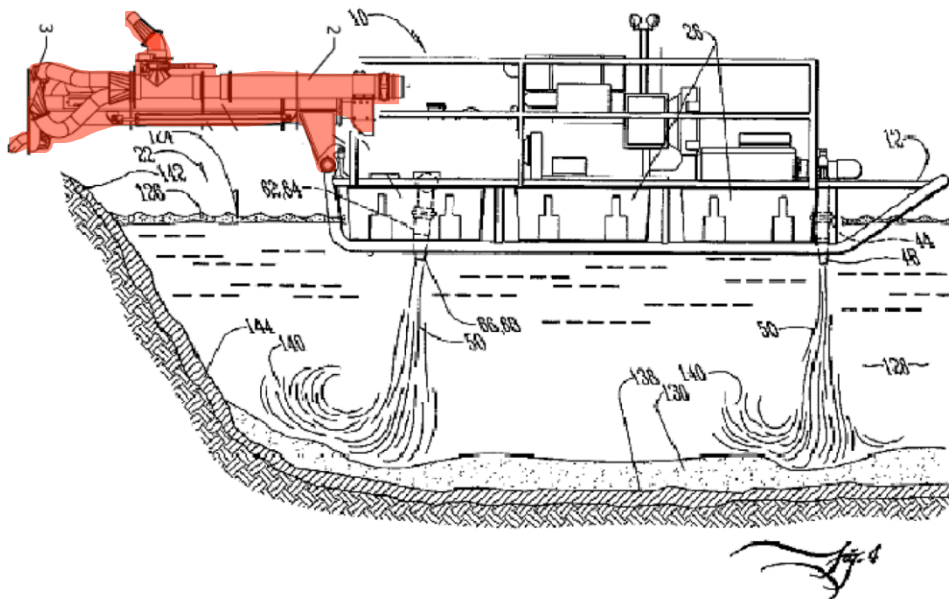
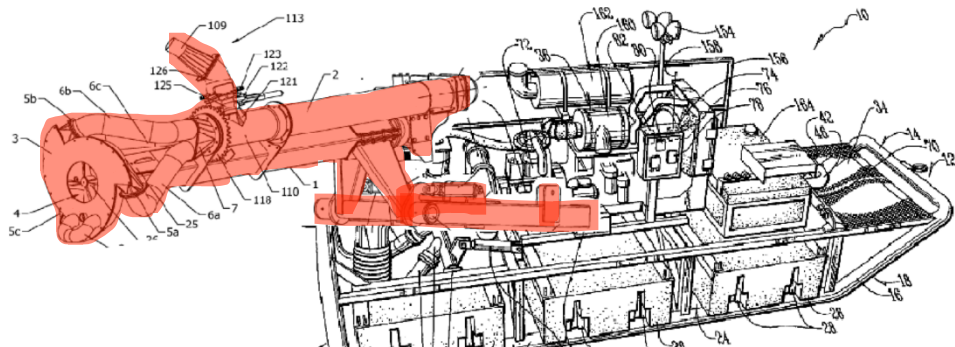
FIG. 2

EX2101, Fig. 2.

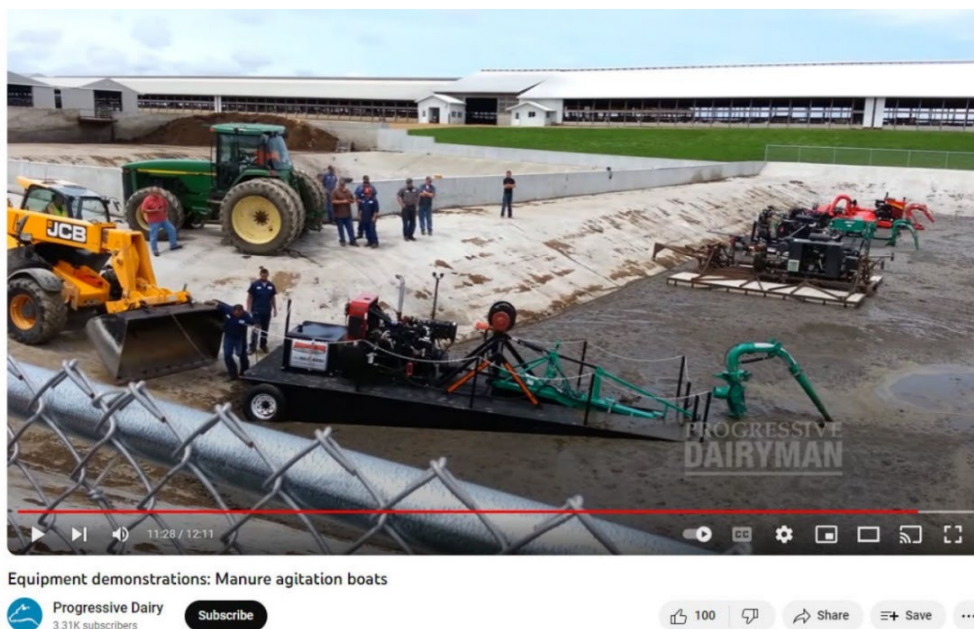
364. A POSITA looking to the teachings Manure Manager when attempting to design a manure lagoon agitation vehicle would logically attach the boom arm to the rear of a vehicle body in such a way that the boom arm could pivot so the lower end is immersed in the manure and the upper end can mate with a drive shaft to receive power. As will be shown below, what would have been logical to a POSITA is to attach the pivot of arm 19a to the rear crossbar 16, 20 in Puck so that Nuhn's G-Force Vertical Pit Pump could pivot up and down in a similar manner to the way it operates when attached to the rear hitch of a tractor and so that the PTO connector 29 on the upper

end of the boom arm 1 of Nuhn's G-Force Vertical Pit Pump would be in near horizontal alignment with the crankshaft of Nuhn's power source.

365. I disagree that a POSITA would add Bryham's wheels to Puck or a combination of Puck and Manure-Manager for the reasons discussed in my previous Declarations (EX2004, EX2029), but if a POSITA were to make the Petitioner's combination where the pump 34 in Puck were replaced by Nuhn's G-Force Vertical Pit Pump (which is advertised in Manaure-Manager), then the resulting combination would look like this:



366. My opinion in this regard is not based on speculation, but rather evidence of what others in the industry actually did in June of 2014, less than a year after the '425 Patent's August 19, 2013 priority date. For example, in June of 2014 Sundstrom Bros. Custom Fabrication LLC hung a manure pump that was designed to be mounted to and powered by a tractor off the end of a floating barge such that it could be tilted up and down.



EX2008, 8-9.

367. In view of the above analysis, if a POSITA were to add Nuhn's G-Force Vertical

Pit Pump to Puck's boat, that combination would result in a pump at the far end of an articulating boom arm hanging off the rear of Puck's boat so that it could swing up and down in the same manner as when Nuhn's G-Force Vertical Pit Pump is attached to a tractor. Thus, the combination of Manure Manager and Puck would not result in a vehicle where "the liquid manure pump includ[es] a housing and an impeller that are positioned along the underside of the floatable vehicle body between at least two of the ground engaging elements such that the housing and the impeller are rearward of the front of the vehicle body and forward of the rear of the floatable vehicle body" as required by Substitute Claim 22.

368. A POSITA would not consider the impeller and housing of Nuhn's G-Force Vertical Pit Pump to be positioned "along the underside of the floatable vehicle body" in Puck, which is required by Substitute Claim 22. And even if the impeller and housing were considered to be "along the underside of the floatable vehicle body" when Nuhn's G-Force Vertical Pit Pump is raised, which is not how a POSITA would understand the prior art's teachings, the impeller and housing would be several feet behind the rear of the floatable vehicle body in this position rather than "forward of the rear of the floatable vehicle body" as required by Substitute Claim 22.

2. THE PUCK-BRYHAM-MANURE MANAGER COMBINATION FAILS TO DISCLOSE OR SUGGEST A "POWER SOURCE CONFIGURED TO PROVIDE POWER TO BOTH THE GROUND ENGAGING PROPULSION STRUCTURE AND THE FLUID PUMP"

369. Neither Puck nor Bryham disclose "a power source that provides power to both a manure pump and a ground engaging propulsion structure" as required by the language of Claim 22.

370. Dr. Winkel argues that a POSITA would be motivated to use Puck's power source to also power the wheels being added by Bryham:

348. A POSA would have been motivated to use the same internal combustion engine of Puck to power the land-based propulsion system of Bryham because it would be less expensive, more efficient, take up less space, and weigh less than providing two separate engines, one for the fluid pump and one for the hydraulic pump for land-propulsion. Further, the diesel engine of Puck would be more than sufficient to power the land-based propulsion, which Puck teaches could be as high as 2000 HP. EX1014, ¶[0024].

EX1004, Winkel Decl., p. 194; *see also* Petition, p. 77. But Dr. Winkel does not actually show or explain why the claimed arrangement “would be less expensive, more efficient, take up less space, and weigh less.”

371. In my opinion, a POSITA would not find the claimed arrangement, where the power source powers both a manure pump and a hydraulic pump that powers the hydraulic motors of the ground engaging propulsion structure to be obviously “less expensive, more efficient, take up less space, and weigh less” than the other potential options disclosed in Bryham. For example, one of the preferred embodiments disclosed in Bryham utilizes separate electric motors to power Bryham’s wheels. EX1015, Bryham, col. 16, ln. 13-27. Dr. Winkel appears to be relying on hindsight bias rather than the teachings in the prior art references themselves to conclude that the claimed arrangement is obviously the best.

3. THE PUCK-BRYHAM COMBINATION FAILS TO DISCLOSE “WIRELESS REMOTE CONTROL CONFIGURED TO ... (1) CONTROL THE GROUND ENGAGING PROPULSION STRUCTURE”

372. Puck’s remote-control system is limited to turning the engine on and off, controlling engine speed, turning the nozzles on and off, and controlling nozzle direction. *See* EX1014, Puck, ¶¶ [0032]-[0033]. Puck also lacks any sort of ground engaging propulsion structure. As a result, Puck’s remote-control system does not provide “wireless remote control configured to enable an operator who is remote from the vehicle to ... (1) control the ground engaging propulsion

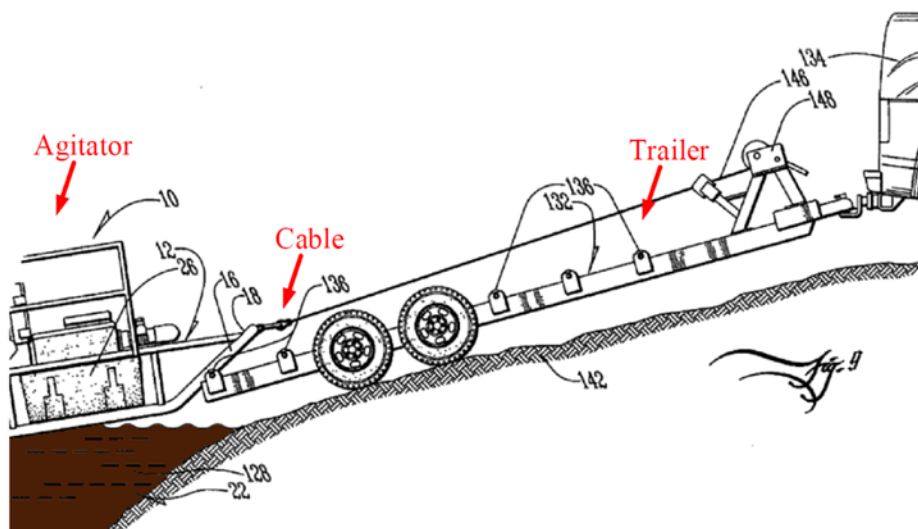
structure” as required by the language of Claim 22. And Bryham lacks any discussion of remote control and therefore fails to supply this element missing from Puck.

373. Dr. Winkel argues that a POSITA would have been motivated to configure the remote-control steering system of Puck (used while the boat of Puck is floating) to control the speed and direction of Bryham’s wheels while the vehicle is ground engaging. EX1004, Winkel Decl., ¶¶349-350. But this argument fails to address whether a POSITA would have a reasonable expectation that Puck’s remote-control system for controlling movement while floating in the manure lagoon could be successfully modified and used for control over Bryham’s steering and propulsion system (i.e., Bryham’s wheels) while Puck’s boat is on the ground. Again, POSITA would understand that just because *some* vehicles can be remote controlled does not mean that *all* vehicles can be remote controlled.

4. A POSITA WOULD NOT HAVE POSSESSED A MOTIVATION TO COMBINE BRYHAM WITH PUCK AND MANURE MANAGER

374. For the reasons I state in Section XI above, and for the reasons I give in this Section, it is my opinion that a POSITA would not have been motivated to combine Bryham with Puck and Manure Manager. Dr. Winkel incorrectly asserts that a POSITA would have been motivated to combine the teachings of Puck with the teachings of Bryham “to make the process of launching and retrieving the Puck boat from the manure lagoon safer and easier without having to place a trailer or one’s feet into the hazardous and corrosive manure lagoon.” EX1004, Winkel Decl., ¶331. Neither of these reasons/flaws in Puck’s design are actually supported by Puck’s disclosure.

375. As shown in the annotated image below from Paragraph 332 of the Winkel Declaration, Puck actually discloses a system where the manure agitation boat can be launched and retrieved without backing the trailer into the manure lagoon:



(*Id.*, FIG. 9 (annotated).)

EX1004, Winkel Decl., ¶332.

376. A POSITA would recognize that the process of launching and retrieving Puck’s boat does not require placing “a trailer or one’s feet into the hazardous and corrosive manure lagoon” as Dr. Winkel incorrectly argues. Indeed, nothing of the sort is shown or described in Puck’s disclosure. Rather Puck describes that “the agitator (10) may roll off the trailer (132) by the force of gravity or may be manually pushed from the trailer (132) into the lagoon” and that the “trailer (132) may be fitted with a plurality of rollers (136) to facilitate the removal of the agitator (10) from the trailer (132). EX1014 at ¶ [0034]. At no point does Puck describe a person needing to go near the lagoon to launch or retrieve Puck’s boat.

377. My opinion in this regard is further informed by the manure boat demonstration video published by Progressive Dairyman (EX2008), where neither the trailer nor the operator is shown entering the lagoon when Puck’s boat is launched in the video:



Equipment demonstrations: Manure agitation boats



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EX2008, p. 7.

378. In my opinion, POSITA would not have seen any problem with Puck’s design in the first place that would have led them to look for the Bryham reference.

379. Dr. Winkel points to Bryham as identifying alleged difficulties and problems with launching and retrieving boats that would have led a POSITA to combine Bryham with Puck. In particular, Dr. Winkel asserts that “Bryham explains ‘that when there is no jetty or wharf in the area in which the boat is to be landed, then at least one of the occupants of the boat usually needs to get their feet wet.’” EX1004, Winkel Decl. ¶ 333 (citing EX1015 at col. 1, ln. 18-21). Dr. Winkel alleges that this is pertinent to manure lagoon applications. *Id.* But Dr. Winkel ignores that Bryham refers to an “occupant of the boat” that must exit the boat, get into the water, and assist the boat out of the water. In Puck’s boat, *there is no occupant*. Without an occupant on Puck’s boat, that non-existent occupant does not have to get into the manure lagoon to assist Puck’s boat out of the manure lagoon. Likewise, without needing to have an occupant on Puck’s boat once it is launched

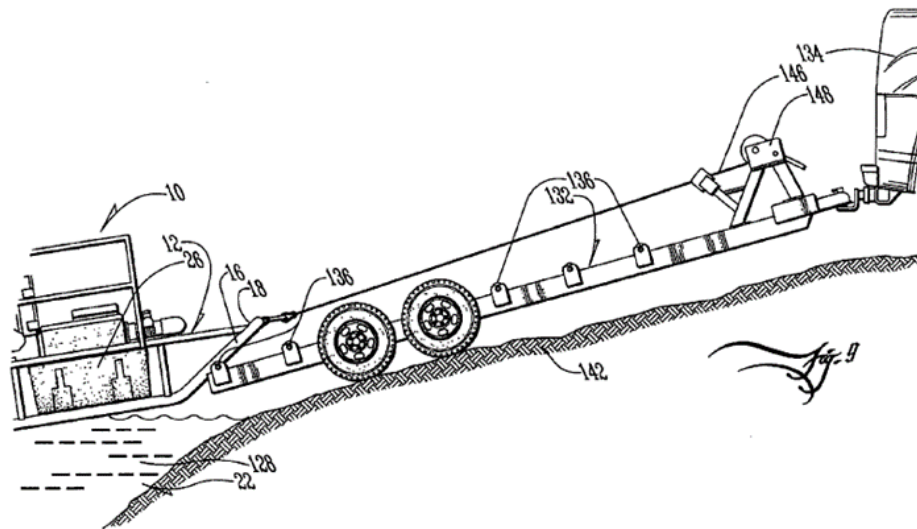
into the manure lagoon, a user does not have to enter the manure lagoon to get onto Puck's boat. Therefore, the problems attempted to be solved by Bryham do not exist for Puck's boat. As such, without such problems existing for Puck, no POSITA would have combined Bryham with Puck.

380. Furthermore, if a POSITA were concerned about “exposing a towing vehicle and trailer to highly corrosive environments” as Dr. Winkel argues (*see* EX1004, Winkel Decl., ¶335), they certainly would not have looked to substitute Puck's trailer, which did not need to be submersed in a manure lagoon, for a ground engaging propulsion structure that would be submersed in a manure lagoon the entire time the manure agitation vehicle was operating in the lagoon. In other words, if a POSITA were concerned that the “corrosive” environment of a manure lagoon might damage Puck's trailer and trailer wheels/bearings, that concern would lead them away from adding Bryham's wheels to Puck's manure lagoon agitation boat because the wheels, bearings, etc. of Bryham's ground engaging propulsion structure would be immersed and remain in the corrosive manure lagoon for the entire period of time during regular agitation sessions, which often take multiple hours. It is entirely illogical to believe that a POSITA that would be concerned about corrosion to trailers and components of trailers such as wheels, would then put those components on the vehicle that would be in the corrosive environment.

381. As a result, it is my opinion that Petitioner's combination of Puck and Bryham would not actually solve the alleged problem of equipment exposure to the corrosive manure lagoon environment. In fact, the opposite is true. A POSITA would expect corrosion problems to be worse if Bryham's wheels and associated steering, support, and propulsion structure were added to Puck's manure agitation boat.

5. A POSITA WOULD NOT HAVE HAD A REASONABLE EXPECTATION OF SUCCESS IN COMBINING BRYHAM WITH PUCK AND MANURE MANAGER

382. The manure agitation boat disclosed in Puck is designed to be launched and retrieved using a trailer:



EX1014, Puck, Figs. 8 and 9. As a result, Puck fails to teach the limitation of Claim 22 reciting “ground engaging propulsion structure comprising a plurality of ground engaging elements powered by a hydraulic motor.”

383. With respect to Ground 4, Dr. Winkel asserts that a POSITA would **add** Bryham’s wheels to the manure agitation boat disclosed in Puck; however, in my opinion a POSITA would not have had a reasonable expectation of success in making this combination and achieving the claimed invention.

384. Bryham discloses a vee-hull boat with three wheels (one at the bow and two at the stern) that can retract and extend into and out of the boat hull:

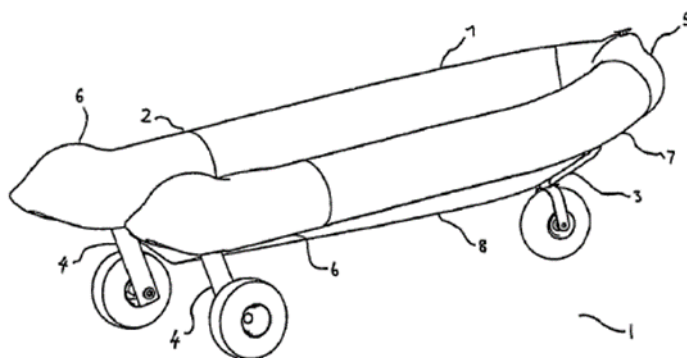


Figure 1

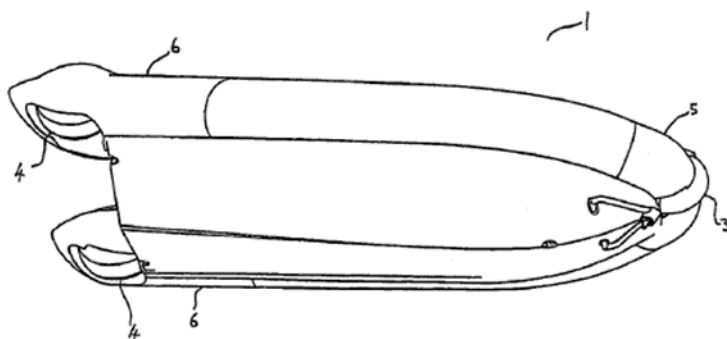


Figure 2

EX1015, Bryham, p. 2.

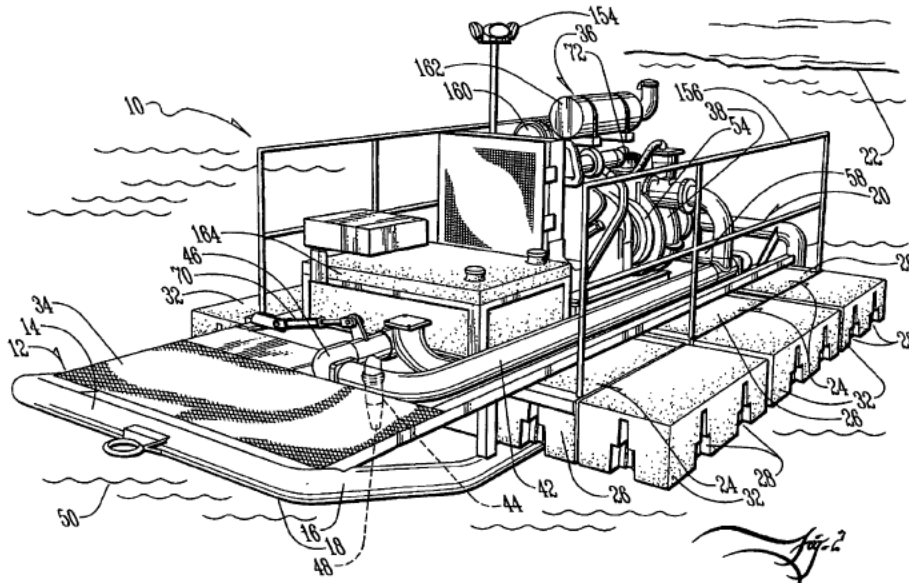
385. Unlike Bryham, Puck is more of a barge compared to a traditional boat and is constructed from modular floating dock sections 26 that are placed in a plurality of receiver slots 24 in a ladder-like frame 14:

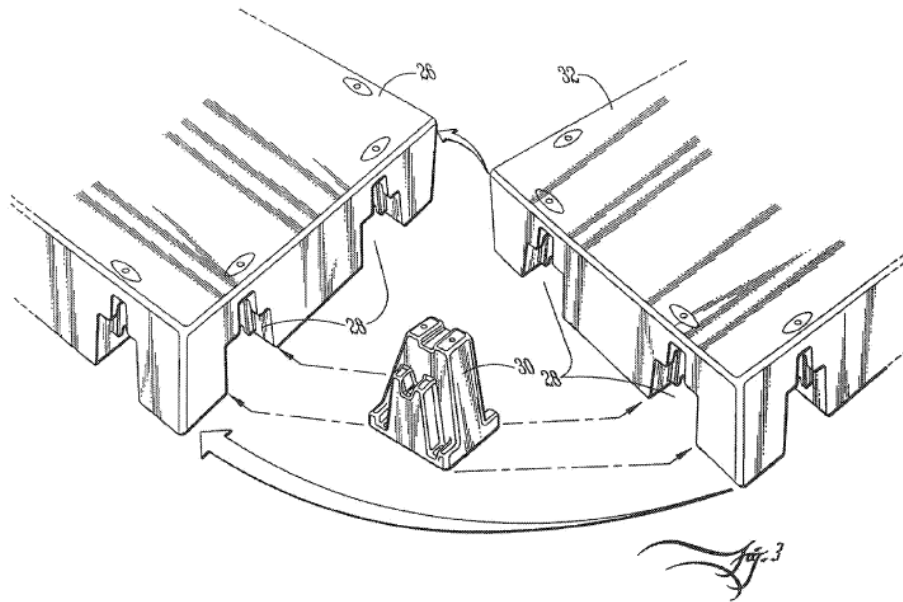
(10) from a manure lagoon (22). (FIGS. 1-2). The frame (14) defines a plurality of receiver slots (24) into which are provided modular dock sections (26), such as those known in the art. In the preferred embodiment, the dock sections (26) are 1000 series dock components manufactured by Connect-A-Dock, Inc. of Atlantic, Iowa.

[0023] The modular dock sections (26) are provided with connector slots (28) to fit into interlocking mating engagement with connector pins (30). The connector pins (30) allow the modular dock sections (26) to connect to additional dock sections (32) in a manner such as that known in the art. (FIGS. 1 and 3). The use of interlocking additional dock sections (32) allows for the buoyancy of the vessel (12) to be increased and allows the additional dock sections (32) to be removed to reduce the overall width of the agitator (10) for transport and storage. If desired, pontoons, inflatable components or any

EX1014, Puck, ¶¶22-23.

386. The modular dock sections 26 in Puck are held together with connector pins 30:





EX1014, Puck, pp. 3-4.

387. In view of this disclosure, a POSITA would not reasonably expect that Bryham's wheels could be successfully added to Puck's vessel. A POSITA would understand that adding Bryham's wheels would interfere with the modular dock sections required in Puck for floatation as the two could not occupy the same space.

388. In my opinion, a POSITA would also understand that Puck's vessel is not designed so that its entire weight can be carried at 3 discrete points (one in the front and two in the rear) as it would be if Bryham's wheels were added.

389. Puck's vessel is designed so that its weight is evenly distributed when it is on shore and on the trailer. The connector pins that hold the modular dock sections together slide into slots in the modular dock sections from the bottom and the connector pins are wider at the bottom than they are at the top. A POSITA would understand that this design gives the connection between the modular dock sections good weight carrying ability when they are floating, but it is not designed to hold the modular dock sections together when they are suspended above the ground, as they would be if Bryham's wheels were added.

390. Finally, Dr. Winkel readily acknowledges that manure lagoons – the environment

in which Puck's vessel operates – often have steep and slippery embankments:

A POSA would have understood that manure lagoons often do not have a designated paved ramp for launching and retrieving vehicles and that the embankments surrounding lagoons are often steep and may be muddy or covered in vegetation. EX1040, 55. The Northeast Regional Agricultural Engineering Service notes that outside bank slopes may be as steep as 3:1.

EX1004, Winkel Decl., ¶¶334, 336. But Dr. Winkel does not explain why a POSITA would have expected the 3-wheel design disclosed in Bryham to provide Puck's vessel with the capability of traversing these steep and slippery embankments.

391. In my opinion, a POSITA would not reasonably expect that Puck's vessel could successfully drive into and out of manure lagoons even if Bryham's wheels could be added. A POSITA would expect Bryham's 3-wheel design to be inherently unstable, i.e., prone to tipping if used on steep and uneven terrain. A POSITA would also expect the one small steerable front wheel in Bryham to be prone to sliding in this operating environment and would be ineffective in turning the vehicle. Finally, a POSITA would not expect Bryham's 3-wheel design, with only two powered wheels at the stern, to provide sufficient traction through mud and manure. As a result, Dr. Winkel has failed to demonstrate that a POSITA would reasonably expect that Puck's vessel could successfully traverse the steep and slippery embankments when entering and exiting manure lagoons if Bryham's wheels were added to Puck's vessel.

392. In my opinion, a POSITA would recognize that the instability, steering, and traction issues with Bryham's ground engaging wheels would be exacerbated if remote control were added because remote control is less precise, has greater delay (latency), and it is much more difficult for the operator to perceive and counter tipping (i.e., remote control operators lack tactile feedback through the controls and or an on-board perception of sliding and tipping). While the operator might not get hurt if a remote-control vehicle tips, tipping creates a considerable set back as the remote control vehicle can become damaged by tipping and manned heavy equipment would likely

be necessary to extract the vehicle from the manure lagoon and/or right the vehicle. This tilting risk would dissuade a POSITA from adding Bryham's wheels to the remote-controlled manure agitation boat disclosed in Puck.

B. Claim 23

393. Claim 23 depends from Claim 22 and recites: "The vehicle of claim 22, wherein the vehicle further comprises a conduit fluidly connected to the liquid manure pump." As described above, the combination of Puck, Bryham, and Manure Manager does not render Claim 22 obvious. Claim 23 is not obvious at least because of its dependence on Claim 22.

C. Claim 24

394. Claim 24 depends from Claim 23 and recites: "The vehicle of claim 23, wherein the conduit comprises an opening at an end thereof." As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22 and 23 obvious. Claim 24 is not obvious at least because of its dependence on Claims 22 and 23.

D. Claim 25

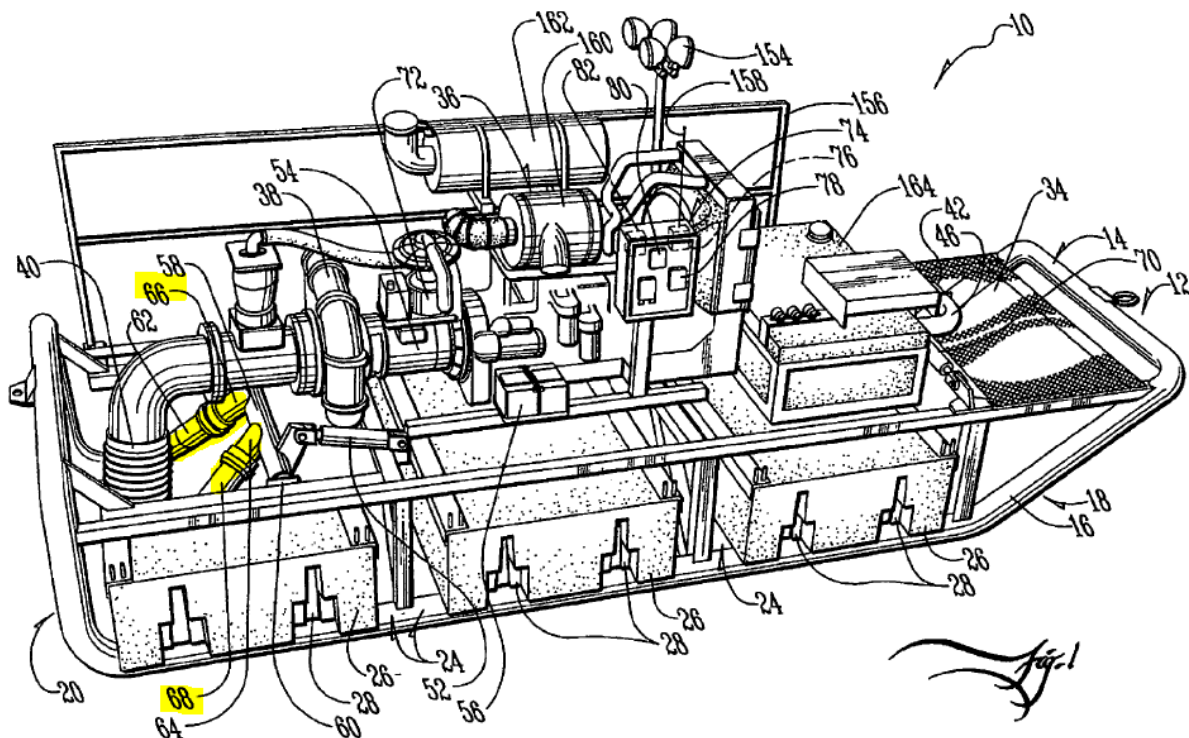
395. Claim 25 depends from Claim 24 and recites: "The vehicle of claim 24, wherein the wireless remote control is configured to control an orientation of the opening." As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, and 24 obvious. Claim 25 is not obvious at least because of its dependence on Claims 22, 23, and 24.

E. Claim 26

396. Claim 26 depends from Claim 25 and recites: "The vehicle of claim 25, wherein the vehicle further comprises a first fluid nozzle at the end of the conduit that is positioned at the front of the floatable vehicle body, a pair of second fluid nozzles at the rear of the floatable vehicle body, and side fluid nozzles on opposite sides of the floatable vehicle body." As described above,

the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, and 25 obvious. Claim 26 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

397. The Puck, Bryham, and Manure Manager combination also fails to render Claim 26 obvious because Puck fails to disclose Puck fails to disclose *side* fluid nozzles on *opposite sides* of the floatable vehicle body in addition to the front and rear nozzles 48, 66, 68.



EX1014, p. 2.

398. Petitioner cannot point to the rear nozzles 66, 68 in Puck to satisfy both the “a pair of second fluid nozzles at the rear of the floatable vehicle body” and “side fluid nozzles on opposite sides of the floatable vehicle body,” as required by Claim 26.

F. Claim 27

399. Claim 27 depends from Claim 23 and recites: “The vehicle of claim 23, wherein the vehicle further comprises a nozzle at the end of the conduit, wherein the ground engaging

propulsion structure comprises a front set of ground engaging wheels that are rotatably attached to a front set of spindles and a rear set of ground engaging wheels that are rotatably attached to a rear set of spindles, and wherein the liquid manure pump is positioned rearward of the front set of spindles and forward of the rear set of spindles.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22 and 23 obvious. Claim 27 is not obvious at least because of its dependence on Claims 22 and 23.

400. The Puck-Bryham-Manure Manager Combination also fails to render Claim 27 obvious because it fails to teach or suggest positioning the pump forward of the rear set of spindles as required by Claim 27.

401. As explained above, if a POSITA were to add Nuhn’s G-Force Vertical Pit Pump to Puck’s boat, that combination would result in a pump at the far end of an articulating boom arm hanging off the rear of Puck’s boat so that it could swing up and down in the same manner as when Nuhn’s G-Force Vertical Pit Pump is attached to a tractor. Thus, the combination of Manure Manager with Puck and Bryham would not result in a vehicle where the liquid manure pump is “forward of the rear set of spindles” as required by Substitute Claim 27.

G. Claim 28

402. Claim 28 depends from Claim 22 and recites: “The vehicle of claim 22, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claim 22 obvious. Claim 28 is not obvious at least because of its dependence on Claim 22.

H. Claim 29

403. Claim 29 depends from Claim 22 and recites: “The vehicle of claim 22, further comprising a plurality of fluid nozzles fluidly connected to the liquid manure pump, the plurality of fluid nozzles including side fluid nozzles on opposite sides of the floatable vehicle body.” As

described above, the combination of Puck, Bryham, and Manure Manager does not render Claim 22 obvious. Claim 29 is not obvious at least because of its dependence on Claim 22.

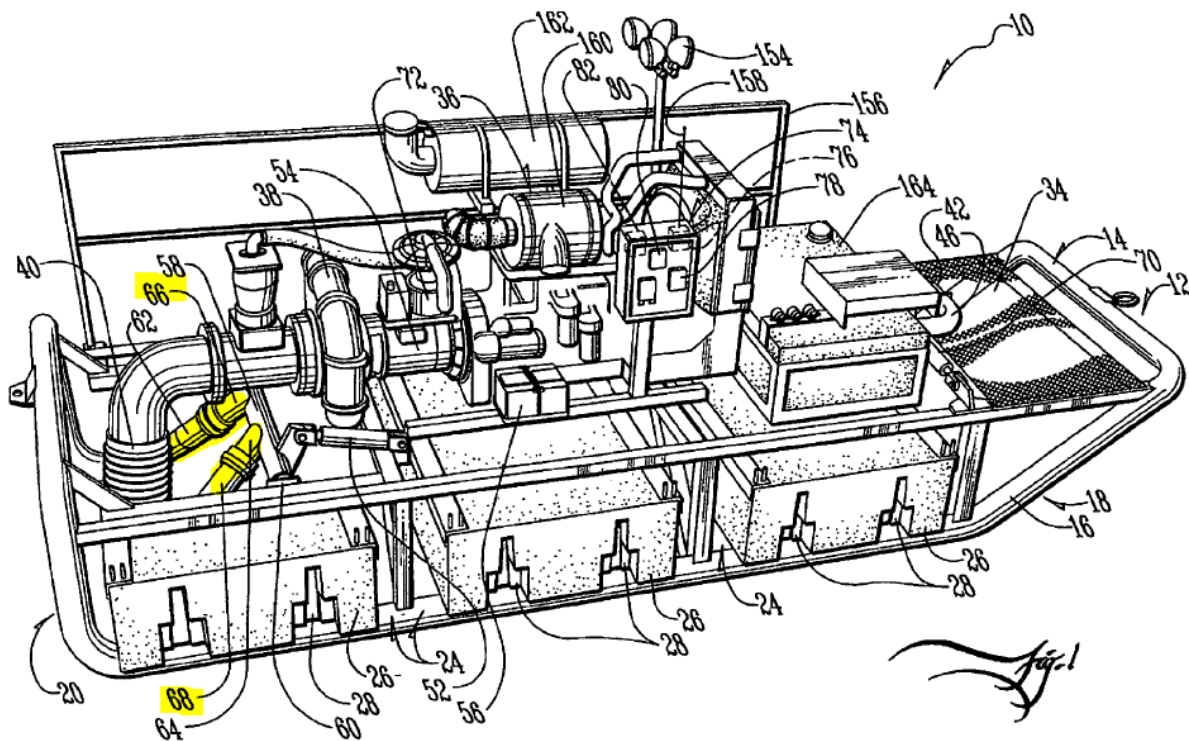
I. Claim 30

404. Claim 30 depends from Claim 29 and recites: “The vehicle of claim 29, wherein the wireless remote control is configured to control the plurality of fluid nozzles to control at least one of the speed and direction of the vehicle when the vehicle is floating.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22 and 29 obvious. Claim 30 is not obvious at least because of its dependence on Claims 22 and 29.

J. Claim 31

405. Claim 31 depends from Claim 25 and recites: “The vehicle of claim 25, further comprising a plurality of fluid nozzles fluidly connected to the liquid manure pump, the plurality of fluid nozzles including a pair of left side fluid nozzles provided on a left side of the floatable vehicle body and a pair of right side fluid nozzles provided on a right side of the floatable vehicle body.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, and 25 obvious. Claim 31 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

406. The Puck, Bryham, and Manure Manager combination also fails to render Claim 31 obvious because Puck fails to disclose Puck fails to disclose *a pair of side* fluid nozzles on *each side* of the floatable vehicle body. Even if the rear nozzles 66, 68 were considered side nozzles, which they aren't, you still end up with just one right nozzle and just one left nozzle.



EX1014, p. 2.

407. The rear nozzles 66, 68 in Puck therefore fail to satisfy “a pair of left side fluid nozzles provided on a left side of the floatable vehicle body” and “a pair of right side fluid nozzles provided on a right side of the floatable vehicle body,” as required by Claim 31.

K. Claim 32

408. Claim 32 depends from Claim 31 and recites: “The vehicle of claim 31, wherein the wireless remote control is configured to control opening and closing of a valve structure to proportion flow between the plurality of fluid nozzles to control at least one of the speed and direction of the vehicle when the vehicle is floating.” As described above, the combination of

Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25 and 31 obvious. Claim 32 is not obvious at least because of its dependence on Claims 22, 23, 24, 25 and 31.

L. Claim 33

409. Claim 33 depends from Claim 25 and recites: “The vehicle of claim 25, wherein the power source is connected to the hydraulic pump by a mechanical drive and is connected to the liquid manure pump by the mechanical drive.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, and 25 obvious. Claim 33 is not obvious at least because of its dependence on Claims 22, 23, 24, and 25.

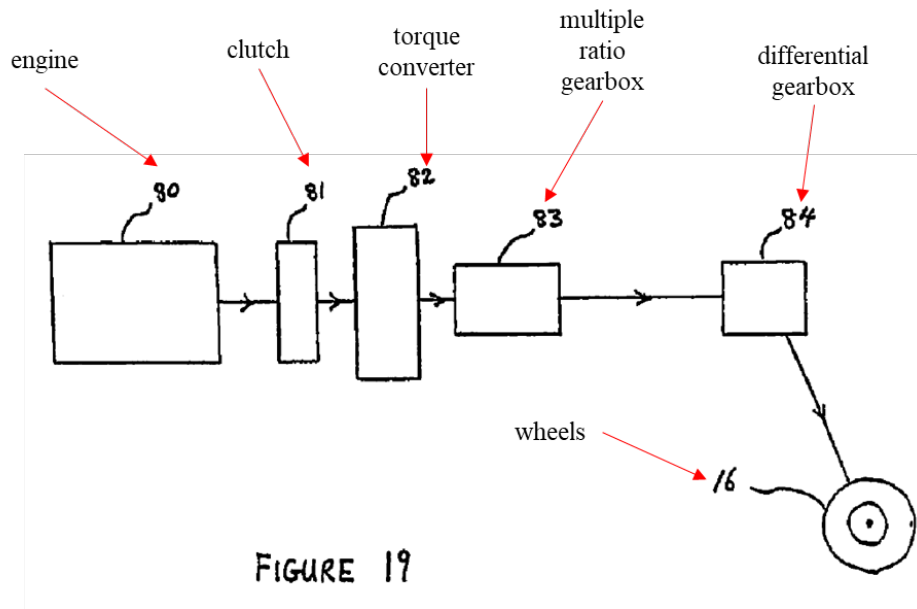
M. Claim 34

410. Claim 34 depends from Claim 33 and recites: “The vehicle of claim 33, wherein the wireless remote control is configured to operate the hydraulic motor to operate the ground engaging propulsion structure at variable speed.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, and 33 obvious. Claim 34 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, and 33.

411. Puck lacks a ground engaging propulsion structure and a hydraulic motor. Puck also does not describe that its wireless remote control can control a hydraulic motor. Dr. Winkel asserts that the “land-based propulsion system of Bryham can be driven with hydraulic motors and can be operated at variable speed.” EX1004, Winkel Decl. ¶ 367. Yet, his citations to Bryham do not support this statement.

412. Dr. Winkel references the “clutch and torque converter or gearing system” of Bryham. *Id.* (quoting EX1015, col. 6, ln. 66-col. 7, ln. 2). However, a clutch, torque converter, or gearing system are in no way a hydraulic motor as claimed. And Dr. Winkel provides no explanation as to how a POSITA would consider them to be a hydraulic motor. He goes on to assert that “[o]peration of the clutch and torque converter or gearing system would result in a variation of the speed of the hydraulic motor and ground engaging propulsion structure.” *Id.* But

this statement is also entirely unsupported by Bryham. There is nothing in Bryham that describes a clutch, torque converter, or gearing system as even being connected to a hydraulic motor. In fact, Figure 19 of Bryham is the only figure that illustrates a clutch 81 and a torque converter 82:



EX1015, Fig. 19, col. 15, ln. 25-32. Absent from this from this Figure 19 and the description of Bryham is the inclusion of a hydraulic motor in this arrangement.

413. Dr. Winkel then points to the description of Bryham with respect to Figure 23 as reciting that “hydraulic energy is used to drive an [sic] hydraulic motor 108, via valves 107, which can either drive the ground engagement means 16 directly, or via a transmission 83.” EX1004, Winkel Decl. ¶ 367 (quoting EX1015 at col. 16, ln. 1-6); however, this does not advance his position. He states without support that “[o]peration of the valves would also result in a variation of the speed of the hydraulic motor(s) and ground engaging propulsion structure(s).” *Id.* But Bryham provides no description that its valves 107 are proportional or can vary the flow of hydraulic fluid to the hydraulic motor 108 such that hydraulic motor 108 could be operated at variable speed. Instead, the valves 107 could simply be valves to turn ON or turn OFF the flow of hydraulic fluid (thus fully OPEN or fully CLOSED).

414. Therefore for at least these additional reasons, the combination of Puck, Bryham,

and Manure Manager does not render Claim 34 obvious.

N. Claim 35

415. Claim 35 depends from Claim 34 and recites: “The vehicle of claim 34, wherein the ground engaging elements consist of a set of ground engaging wheels.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, and 34 obvious. Claim 35 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, and 34.

O. Claim 36

416. Claim 36 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 36 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

417. The combination of Puck, Bryham, and Manure Manager also fails to render Claim 36 obvious because Claim 36 requires *exactly four* ground engaging wheels, which is different from the 3-wheel arrangement disclosed in Bryham. If a POSITA were to choose a different number of wheels than the number disclosed in Bryham, the prior art would lead them to select 12 folding wheels, which is disclosed in Carrier II (EX1020, 4) in order to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Nuhn’s 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings of the low ground-pressure vehicles described in the prior art.

418. As a result, the combination of Puck, Bryham, and Manure Manager does not teach

or suggest a vehicle where “the set of ground engaging wheels *consists of* two powered ground engaging wheels at the front of the floatable vehicle body and two powered ground engaging wheels at the rear of the floatable vehicle body,” as required by Claim 36.

P. Claim 37

419. Claim 37 depends from Claim 35 and recites: “The vehicle of claim 35, wherein the set of ground engaging wheels consists of four powered ground engaging wheels and wherein each powered ground engaging wheel is independently powered and is operable at variable speed.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, and 35 obvious. Claim 37 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, and 35.

420. The combination of Puck, Bryham, and Manure Manager also fails to render Claim 37 obvious because Claim 37 requires *exactly four* ground engaging wheels, which is different from the 3-wheel arrangement disclosed in Bryham. If a POSITA were to choose a different number of wheels than the number disclosed in Bryham, the prior art would lead them to select 12 folding wheels, which is disclosed in Carrier II (EX1020, 4) in order to maintain low ground-pressure, which is the opposite of what the claimed 4-wheel arrangement provides. Nuhn’s 4-wheel arrangement provides added stability when traversing steep banks of manure lagoons because all 4 wheels remain on the ground during breakover and are designed to allow the vehicle to sink into the crust/muck, going against the teachings of the low ground-pressure vehicles described in the prior art.

421. As a result, the combination of Puck, Bryham, and Manure Manager does not teach or suggest a vehicle where “the set of ground engaging wheels *consists of* four powered ground engaging wheels,” as required by Claim 37.

Q. Claim 38

422. Claim 38 depends from Claim 37 and recites: “The vehicle of claim 37, wherein

the four powered ground engaging wheels are operable at variable speed by the hydraulic motor.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, 35, and 37 obvious. Claim 38 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, and 37.

R. Claim 39

423. Claim 39 depends from Claim 38 and recites: “The vehicle of claim 38, wherein the vehicle further comprises a nozzle at the end of the conduit.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 39 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

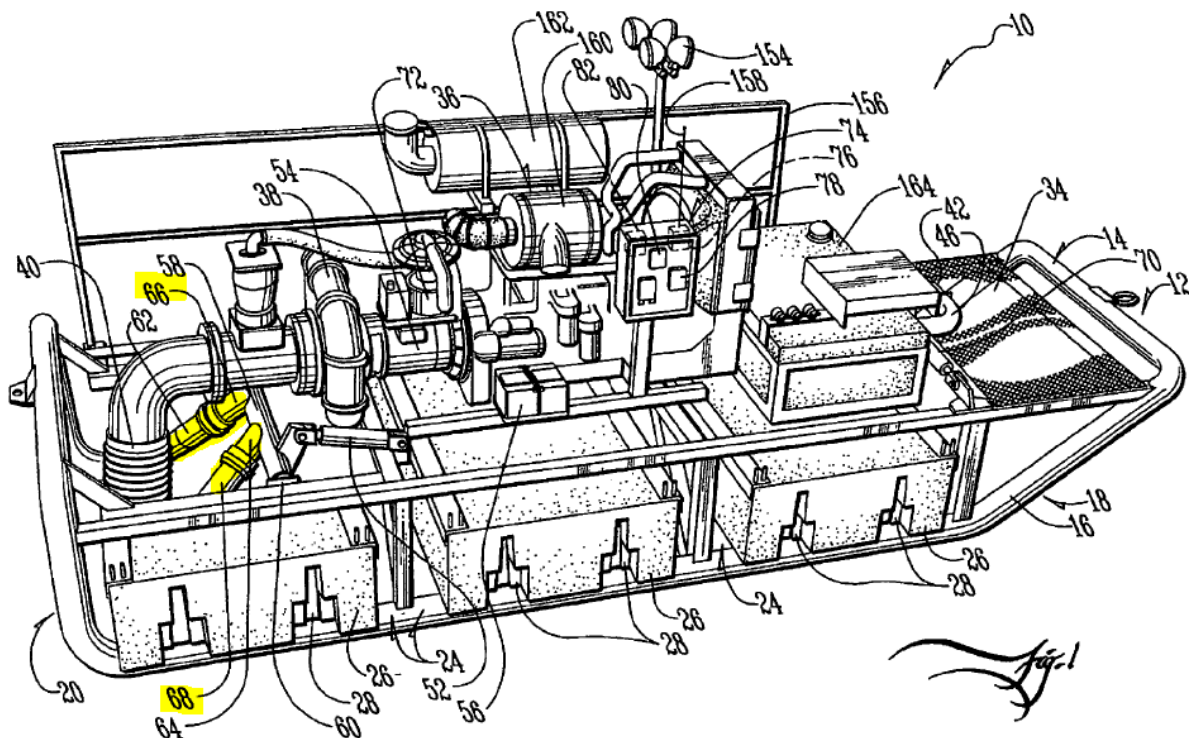
S. Claim 40

424. Claim 40 depends from Claim 38 and recites: “The vehicle of claim 38, wherein at least one of the speed and direction of the vehicle is controlled by a fluid mover when the vehicle is floating.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 40 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

T. Claim 41

425. Claim 41 depends from Claim 38 and recites: “The vehicle of claim 38, further comprising a plurality of fluid nozzles fluidly connected to the fluid pump, the plurality of fluid nozzles including a first fluid nozzle at the front of the floatable vehicle body, a pair of second fluid nozzles at the rear of the floatable vehicle body, a pair of left side fluid nozzles provided on a left side of the floatable vehicle body, and a pair of right side fluid nozzles provided on a right side of the floatable vehicle body.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38 obvious. Claim 41 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, and 38.

426. The Puck, Bryham, and Manure Manager combination also fails to render Claim 41 obvious because Puck fails to disclose Puck fails to disclose *side* fluid nozzles on *opposite sides* of the floatable vehicle body in addition to the front and rear nozzles 48, 66, 68.



EX1014, p. 2.

427. Petitioner cannot point to the rear nozzles 66, 68 in Puck to satisfy both the “a pair of second fluid nozzles at the rear of the floatable vehicle body” and “a pair of left side fluid nozzles provided on a left side of the floatable vehicle body, and a pair of right side fluid nozzles provided on a right side of the floatable vehicle body,” as required by Claim 41.

U. Claim 42

428. Claim 42 depends from Claim 41 and recites: “The vehicle of claim 41, wherein the wireless remote control is configured to control the plurality of fluid nozzles to control at least one of the speed and direction of the vehicle when the vehicle is floating.” As described above, the combination of Puck, Bryham, and Manure Manager does not render Claims 22, 23, 24, 25,

33, 34, 35, 37, 38, and 39 obvious. Claim 42 is not obvious at least because of its dependence on Claims 22, 23, 24, 25, 33, 34, 35, 37, 38, and 39.

XVII. CONCLUSION

429. Based on my analysis, it is my opinion that the cited art does not anticipate or render obvious any of the Substitute Claims (Claims 22-42) presented in Patent Owner's Motion to Amend the '425 Patent.

430. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: August 6, 2024



Douglas S. Prairie