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PTO/SB/28 (03-08)
Approved for use through 05/31/2008. OMB 0651-0031
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PETITION TO MAKE SPECIAL UNDER ACCELERATED EXAMINATION PROGRAM

Attorney Docket Number	AST-003	First Named Inventor	Jeffrey Campbell
Application Number (if Known)			
Title of Invention	Sensor For Measuring Moisture And Salinity		

APPLICANT HEREBY PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE REVISED ACCELERATED EXAMINATION PROGRAM. See Instruction sheet on page 3.

1. **Claims of the application:**
   a. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims.

   b. **Applicant hereby agrees not to separately argue the patentability of any dependent claim during any appeal** in the application. Specifically, the applicant agrees that the dependent claims will be grouped together with and not argued separately from the independent claim from which they depend in any appeal brief filed in the application (37 CFR 41.37(c)(1)(vii)).

   c. The claims must be directed to **a single invention**.

2. **Interviews:**
   Applicant hereby agrees to have (if requested by examiner):
   a. An interview (including an interview before a first Office action) to discuss the prior art and any potential rejections or objections with the intention of clarifying and possibly resolving all issues with respect to patentability at that time, and

   b. A telephonic interview to make an election without traverse if the Office determines that the claims are not obviously directed to a single invention.

3. **Preexamination Search Statement and Accelerated Examination Support Document:**
   With this petition, applicant is providing: a **preexamination search statement**, in compliance with the requirements set forth in item 8 of the instruction sheet, and an **"accelerated examination support document"** that includes:
   a. An **information disclosure statement** in compliance with 37 CFR 1.98 citing each reference deemed most closely related to the subject matter of each of the claims;

   b. For each reference cited, **an identification of all the limitations of the claims** that are disclosed by the reference specifying where the limitation is disclosed in the cited reference;

   c. A **detailed explanation of how each of the claims are patentable** over the references cited with the particularity required by 37 CFR 1.111(b) and (c);

   d. A concise **statement of the utility** of the invention as defined in each of the independent claims (unless the application is a design application);

   e. An identification of any cited references that may be disqualified as prior art under 35 U.S.C. 103(c) as amended by the CREATE act; and

   f. **A showing of where each limitation of the claims finds support under the first paragraph of 35 U.S.C. 112** in the written description of the specification. If applicable, the showing must also identify: (1) each means- (or step-) plus-function claim element that invokes consideration under 35 U.S.C. 112, ¶6; and (2) the structure, material, or acts that correspond to any means- (or step-) plus-function claim element that invokes consideration under 35 U.S.C. 112, ¶6. If the application claims the benefit of one or more applications under title 35, United St ates Code, the showing must also include where each limitation of the claims finds support under the first paragraph of 35 U.S.C. 112 in each such application in which such support exists.

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PETITION TO MAKE SPECIAL UNDER ACCELERATED EXAMINATION PROGRAM (Continued)

Attorney Docket Number	AST-003	First Named Inventor	Jeffrey Campbell

Attachments:

a.		Accelerated Examination Support Document (see item 3 above).
b.		A statement, in compliance with the requirements set forth in item 8 of the instruction sheet, detailing the preexamination search which was conducted.
c.		Information Disclosure Statement.
d.	☐	Other (*e.g.*, a statement that the claimed subject matter is directed to environmental quality, energy, or countering terrorism (37 CFR 1.102(c)(2)).

Fees: The following fees must be filed electronically via EFS or EFS-Web:

a.	The basic filing fee, search fee, examination fee, and application size fee (if required) under 37 CFR 1.16.
b.	Petition fee under 37 CFR 1.17(h) - unless the petition is filed with a showing under 37 CFR 1.102(c)(2).

Signature:

Click Remove if you wish to remove this signatory — Remove

Signature	/Michael Catania/	Date	2008-05-20
Name (Print/Typed)	Michael Catania	Registration Number	36474

Click Add if you wish to add additional signatory — Add

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.*

PTO/SB/28 (03-08)
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U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE

Instruction Sheet Petition to Make Special Under the Accelerated Examination

A grantable petition must meet the following conditions:

1. The petition to make special under the accelerated examination program must be filed with the application and accompanied by the fee set forth in 37 CFR 1.17(h) or a statement that the claimed subject matter is directed to environmental quality, energy, or countering terrorism.

2. The application must be a non-reissue utility or design application filed under 35 U.S.C. 111(a).

3. The application must be **filed electronically** using the Office electronic filing system (EFS) or EFS-Web.

4. The application must be complete under 37 CFR 1.51 and in condition for examination on filing. For example, the application must be filed together with the basic filing fee, search fee, examination fee, and application size fee (if applicable), and an oath or declaration under 37 CFR 1.63.

5. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims. The petition must include a statement that **applicant will agree not to separately argue the patentability of any dependent claim during any appeal** in the application. Specifically, the applicant is agreeing that the dependent claims will be grouped together with and not argued separately from the independent claim from which they depend in any appeal brief filed in the application (37 CFR 41.37(c)(1)(vii)).

6. The claims must be directed to a **single invention**. The petition must include a statement that applicant will agree to have a telephonic interview to make an election without traverse in a telephonic interview if the Office determines that all the claims are not directed to a single invention.

7. The petition must include a statement that **applicant will agree** to have an interview (including an interview before a first Office action) to discuss the prior art and any potential rejections or objections with the intention of clarifying and possibly resolving all issues with respect to patentability at that time.

8. At the time of filing, applicant must provide a statement that a **preexamination search was conducted**, including an identification of the field of search by United States class and subclass and the date of the search, where applicable, and, for database searches, the search logic or chemical structure or sequence used as a query, the name of the file or files searched and the database service, and the date of the search.
   a. This preexamination search must involve U.S. patents and patent application publications, foreign patent documents, and nonpatent literature, unless the applicant can justify with reasonable certainty that no references more pertinent than those already identified are likely to be found in the eliminated source and includes such a justification with this statement.
   b. This preexamination search must be directed to the claimed invention and encompass all of the features of the independent claims, giving the claims the broadest reasonable interpretation.
   c. The preexamination search must also encompass the disclosed features that may be claimed, in that an amendment to the claims (including any new claim) that is not encompassed by the preexamination search will be treated as non-responsive and will not be entered.
   d. A search report from a foreign patent office will not be accepted unless the search report satisfies the requirements set forth above.
   e. Any statement in support of a petition to make special must be based on a good faith belief that the preexamination search was conducted in compliance with these requirement. See 37 CFR 1.56 and 10.18.

9. At the time of filing, applicant must provide in support of the petition an **accelerated examination support document that includes:**
   a. An **information disclosure statement** in compliance with 37 CFR 1.98 citing each reference deemed most closely related to the subject matter of each of the claims;
   b. For each reference cited, **an identification of all the limitations of the claims** that are disclosed by the reference specifying where the limitation is disclosed in the cited reference;
   c. A **detailed explanation of how each of the claims are patentable** over the references cited with the particularity required by 37 CFR 1.111(b) and (c);
   d. A concise **statement of the utility** of the invention as defined in each of the independent claims (unless the application is a design application);
   e. An identification of any cited references that may be disqualified as prior art under 35 U.S.C. 103(c) as am ende d by the CREATE act; and
   f. A **showing of where each limitation of the claims finds support under the first paragraph of 35 U.S.C. 112** in the written description of the specification. If applicable, the showing must also identify: (1) each means- (or step-) plus-function claim element that invokes consideration under 35 U.S.C. 112, ¶6; and (2) the structure, material, or acts that correspond to any means- (or step-) plus-function claim element that invokes consideration under 35 U.S.C. 112, ¶6. If the application claims the benefit of one or more applications under title 35, United States Code, the showing must also include where each limitation of the claims finds support under the first paragraph of 35 U.S.C. 112 in each such application in which such support exists.

   For more information, see notice "Changes to Practice for Petitions in Patent Applications to Make Special and for Accelerated Examination" available on the USPTO web site at http://www.uspto.gov/web/office s/pac/dapp/ogsheet.html

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Fr eedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about indivi duals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	**Jeffrey Campbell**	**Docket No.:**	**AST-0003**
Serial No.:		**Art Unit:**	**Unassigned**
Filing Date:	**Herewith**	**Examiner:**	**Unassigned**
Title:	**Sensor For Measuring Moisture And Salinity**		

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Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 222350-1450

Pre-Examination Support Document

Dear Sir:

This pre-examination search statement is provided in support of the petition for accelerated examination filed herewith.

A pre-examination search was conducted involving U.S. Patents and Patent Application Publications, foreign patent documents and non-patent literature as indicated below. The most pertinent results of the search are provided on an Information Disclosure Statement filed concurrently herewith.

8 (A) Pre-examination Search

US Field of Search:

Class(es)/Subclass(es) Searched:
73/74;
137/78.3;
324/442, 664, 666, 667, 696;
700/284;
702/62

Date Conducted: January 31, 2008.

Database Searches:

1) Database Service: USPTO EAST

Files Searched:

US Patent Document Databases: US-PGPUB, USPAT
Foreign Patent Document Databases: EPO, JPO, DERWENT, FPRS
Default operator = "or"; Plurals activated.

Search Logic:

L1 humid$6 moistur$6 (water near3 content)

L2 salinity (salt near3 (content concentration)) ((clay earth grain ground sand silt soil turf) near3 conductivity)

L3 detect$6 gaug$6 measur$6 sens$6

L4 clay earth grain ground sand silt soil turf

L5 (another different double dual pair two second$4) near3 oscillator (((high near3 frequency) hf) same ((low near3 frequency) lf) same oscillator)

L6 73/73,74.ccls. 137/1,78.3.ccls. 239/64.ccls. 324/439,442-450,640,663-668,674,681,686-696,707.ccls. 338/34,35.ccls. 340/602.ccls. 700/284.ccls. 702/62.ccls

L7 E02D001/00.epc,ipc. G01N022/04.epc,ipc. G01N027/04epc,ipc. G01N027/22epc,ipc. G01N027/27epc,ipc. G01N033/24.epc,ipc. G01R027/22.epc,ipc. G01R027/26.epc,ipc.

L8 (another different double dual pair two second$4) near3 (AC DC voltage) near3 meter

L9 (receiver with transmitter) remot$6 telemet$8 wireless$6

L10 (L1 same L2 same L3 same L4).ti,ab.

L11 L1 same L2 same L3 same L5

L12 L6 and L1 same L2 same L3

L13 L6 and L2 and oscillator

L14 (L1 same L2 same L4 same L9).ti,ab.

L15 L1 same L2 same L3 same L9

L16 L7 and L1 same L2 same L3

L17 L7 and L2 and oscillator

L18 L1 same L2 same L3 same L8

L19 L1 same L2 same L3 same probe same coaxial

L20 L1 same L2 and ((voltage near3 meter) same (DC direct current) same diode same resistor)

L21 L1 same L2 and ((voltage near3 meter) same (bias near3 resistor) same capacitor)

L22 L1 same L2 and (diode same resistor same capacitor)

L23 L1 same L2 and (diode same cathode same anode)

L24 L1 same L2 and ((oscillator with (turn$4 near2 (off on))) same (L3 near4 voltage))

L25 L1 same L2 and (probe same base same conductor)

Date Conducted: January 31, 2008.

2) Database Service: Google

File Searched: Google Scholar (Non Patent Literature)

Search Logic: moisture salinity sensor soil oscillator;
moisture salinity sensor circuit frequency;
moisture salinity probe resistor capacitor;

Date Conducted: January 31, 2008.

8(B) Search Directed to the Invention

The pre-examination search was directed to the claimed invention, encompassing all the features of the claims and giving the claims their broadest reasonable interpretation.

8(C) Search Directed to the Disclosure

No disclosed features that are unclaimed at this time are currently seen as features that may be claimed later.

8(D) Search Report from a Foreign Patent Office

No search report from a foreign patent office is provided here as the pre-examination search.

8(E) Statement of Good Faith

All statements above in support of the petition to make special are based on a good faith belief that the search was conducted in compliance with the requirements of this rule.

Respectfully submitted,

/Michael Catania/ **May 19, 2008**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	**Jeffrey Campbell**	**Docket No.:**	**AST-0003**
Serial No.:		**Art Unit:**	**Unassigned**
Filing Date:	**Herewith**	**Examiner:**	**Unassigned**
Title:	**Sensor For Measuring Moisture And Salinity**		

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Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 222350-1450

Accelerated Examination Support Document

Dear Sir:

This accelerated examination support document is provided in support of the petition for accelerated examination filed herewith.

The Claim of the Present Application is found at Section I, pages 2-3.

A list of references Deemed Most Closely Related is found at Section II, page 4.

Identification of Limitations Disclosed by the References is found at Section III, pages 5-19.

A Detailed Explanation of Patentability is found at Section IV, pages 20-33.

A Concise Statement of Utility is found at Section V, page 34.

A Showing of Support under 35 U.S.C. 112, first paragraph, is found at Section VI, pages 35-43.

An identification of References Disqualified as Prior Art under 35 USC 103(c) is found at Section VII, page 44.

A conclusion is found at Section VIII, page 45.

SECTION I

CLAIM

1. A method of determining a moisture content value and a salinity value of a soil, the method comprising:

providing a sensor, the sensor comprising

a probe conducting structure to be placed in the soil to form a capacitor,

a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor, and

a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator,

wherein the soil salinity circuit and the soil moisture circuit connect between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter;

measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive;

measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive;

measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active;

calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value; and

calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

SECTION II

9(A) References Deemed Most Closely Related:

An information Disclosure Statement in compliance with 37 CFR §1.98 has been filed herewith citing each of the following references which are deemed most closely related to the subject matter of the claim.

1. Martin et al., U.S. Patent Number 3323047
2. Walsh, U.S. Patent Number 4540936
3. Watson et al., U.S. Patent Number 5418466
4. Feuer, U.S. Patent Number 5445178
5. Cambell, U.S. Patent Number 5479104
6. Buss, U.S. Patent Number 7042234
7. Katz, U.S. Patent Number 7129713

SECTION III

9(B) Identification Of Limitations Disclosed By References:

Martin et al., U.S. Patent Number 3323047

With respect to claim 1, Martin et al., U.S. Patent Number 3323047 ("Martin") discloses a method of determining a moisture content value (see abstract) but does not disclose a method for determining a salinity value of a soil.

With respect to claim 1, Martin discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 7, lines 25-33).

With respect to claim 1, Martin discloses a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor (See column 7, lines 12-33 and lines 59-71).

With respect to claim 1, Martin does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Martin does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor,

at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Martin does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Martin does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Martin does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Martin does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value.

With respect to claim 1, Martin does NOT disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Martin does not anticipate claim 1.

Walsh, U.S. Patent Number 4540936

With respect to claim 1, Walsh, U.S. Patent Number 4540936 ("Walsh") discloses a method of determining a moisture content value (see abstract) but does not disclose a method for determining a salinity value of a soil.

With respect to claim 1, Walsh discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 4, lines 20-25 and FIGS. 5 and 6).

With respect to claim 1, Walsh discloses a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor (See column 4, lines 53-62 and FIG. 10).

With respect to claim 1, Walsh does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Walsh does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Walsh does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Walsh does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Walsh does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Walsh does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Walsh disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Walsh does not anticipate claim 1.

Watson et al., U.S. Patent Number 5418466

With respect to claim 1, Watson et al., U.S. Patent Number 5418466 ("Watson") discloses a method of determining a moisture content value and a salinity value of a soil (see abstract).

With respect to claim 1, Watson discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 10, lines 17-42 and FIG. 1).

With respect to claim 1, Watson discloses a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor (See column 11, lines 7-65 and FIG. 2).

With respect to claim 1, Watson does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Watson does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Watson does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Watson does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Watson does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Watson does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Watson disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Watson does not anticipate claim 1.

Feuer, U.S. Patent Number 5445178

With respect to claim 1, Feuer, U.S. Patent Number 5445178 ("Feuer") discloses a method of determining a moisture content value (See column 4, lines 61-63) but does not disclose a method for determining a salinity value of a soil.

With respect to claim 1, Feuer discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 4, lines 61-68).

With respect to claim 1, Feuer does NOT disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor.

With respect to claim 1, Feuer does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Feuer does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Feuer does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Feuer does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Feuer does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Feuer does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Feuer disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Feuer does not anticipate claim 1.

Cambell, U.S. Patent Number 5479104

With respect to claim 1, Cambell, U.S. Patent Number 5479104 ("Cambell") discloses a method of determining a moisture content value (See Abstract) but does not disclose a method for determining a salinity value of a soil.

With respect to claim 1, Cambell discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 5, lines 6-51 and FIG. 1).

With respect to claim 1, Cambell discloses a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor (See column 3, lines 45-55 and FIG. 2).

With respect to claim 1, Cambell does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Cambell does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Cambell does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Cambell does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Cambell does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Cambell does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Cambell disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Cambell does not anticipate claim 1.

Buss, U.S. Patent Number 7042234

With respect to claim 1, Buss, U.S. Patent Number 7042234 ("Buss") discloses a method of determining a moisture content value and a salinity value of a soil (See abstract).

With respect to claim 1, Buss discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 9, lines 6-28 and FIG. 1).

With respect to claim 1, Buss does NOT disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor.

With respect to claim 1, Buss does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Buss does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Buss does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Buss does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Buss does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Buss does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Buss disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Buss does not anticipate claim 1.

Katz, U.S. Patent Number 7129713

With respect to claim 1, Katz, U.S. Patent Number 7129713 ("Katz") discloses a method of determining a moisture content value (See abstract) but does not disclose a method for determining a salinity value of a soil.

With respect to claim 1, Katz discloses a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor (See column 3, lines 20-35 and FIG. 1).

With respect to claim 1, Katz does NOT disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor.

With respect to claim 1, Katz does NOT disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator.

With respect to claim 1, Katz does NOT disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter.

With respect to claim 1, Katz does NOT disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive.

With respect to claim 1, Katz does NOT disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive.

With respect to claim 1, Katz does NOT disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active.

With respect to claim 1, Katz does NOT disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Katz disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Katz does not anticipate claim 1.

SECTION IV

9(C) Detailed Explanation Of Patentability:

The Present Invention is directed at a method for determining a moisture content value and a salinity value of soil, and it is believed that the one claim of the Present Invention is limited to such a method. The one claim of the Present Invention is believed to be patentable over all of the references identified above since the references fail to disclose the claimed novel invention either alone or in combination.

SECTION IV(a)

A. 35 U.S.C. §102

The Applicants respectfully submit that for at least the reasons set forth below, the references deemed most closely related (Martin et al., U.S. Patent Number 3323047; Walsh, U.S. Patent Number 4540936; Watson et al., U.S. Patent Number 5418466; Feuer, U.S. Patent Number 5445178; Cambell, U.S. Patent Number 5479104; Buss, U.S. Patent Number 7042234; Katz, U.S. Patent Number 7129713), fail to anticipate the claim of the Present Application under 35 U.S.C. Section 102(a)-(g) at least because none of these references discloses each and every limitation of claim 1 of the Present Application. (MPEP 2131).

Specifically, Martin (U.S. Patent Number 3323047) does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Martin does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Martin does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low

frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Martin does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Martin does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Martin does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value. Martin does NOT disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Martin does not anticipate claim 1.

Specifically, with respect to claim 1, Walsh (U.S. Patent Number 4540936) does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Walsh does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil

salinity circuit are connected to the probe structure and a third voltage meter. Walsh does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Walsh does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Walsh does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Walsh does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Walsh disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Walsh does not anticipate claim 1 of the Present Application.

Specifically, Watson (U.S. Patent Number 5418466) does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency

oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Watson does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Watson does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Watson does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Watson does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Watson does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Walsh disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Thus, Watson does not anticipate claim 1 of the Present Application.

Specifically, Feuer (U.S. Patent Number 5445178) does not disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor. Feuer does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Feuer does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Feuer does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Feuer does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Feuer does not disclose measuring

voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Feuer does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Feuer disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Feuer does not anticipate claim 1 of the Present Application.

Specifically, Cambell (U.S. Patent Number 5479104) does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Cambell does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Cambell does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Cambell does not disclose measuring voltages V2'

and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Cambell does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Cambell does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Cambell disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Cambell does not anticipate claim 1 of the Present Application.

Specifically, Buss (U.S. Patent Number 7042234) does not disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor. Buss does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Buss does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which

point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Buss does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Buss does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Buss does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. Buss does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Buss disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Buss does not anticipate claim 1 of the Present Application.

Specifically, Katz (U.S. Patent Number 7129713) does not disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high

frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor. Katz does not disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. Katz does not disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. Katz does not disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. Katz does not disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. Katz does not disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is

inactive and the high frequency oscillator is active. Katz does not disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Katz disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value. Thus, Katz does not anticipate claim 1 of the Present Application.

The Applicants respectfully submit that for at least the reasons set forth above, the references deemed most closely related (Martin et al., U.S. Patent Number 3323047; Walsh, U.S. Patent Number 4540936; Watson et al., U.S. Patent Number 5418466; Feuer, U.S. Patent Number 5445178; Cambell, U.S. Patent Number 5479104; Buss, U.S. Patent Number 7042234; Katz, U.S. Patent Number 7129713) all fail to anticipate the claim of the Present Application under 35 U.S.C. §102(a)-(g) at least because none of these references discloses each and every limitation of the claim of the Present Application. (MPEP 2131).

SECTION IV(b)

B. 35 U.S.C. §103(a)

The Applicants respectfully submit that the references deemed most closely related (Martin et al., U.S. Patent Number 3323047; Walsh, U.S. Patent Number 4540936; Watson et al., U.S. Patent Number 5418466; Feuer, U.S. Patent Number 5445178; Cambell, U.S. Patent Number 5479104; Buss, U.S. Patent Number 7042234; Katz, U.S. Patent Number 7129713), alone or in combination with each other, fail to render claim 1 of the Present Application obvious under 35 U.S.C. §103(a) for the reasons set forth below.

In order to establish a *prima facie* case of obviousness, at least three requirements must be met. First, there must be some suggestion, motivation or teaching, either in the references themselves or in the knowledge generally available to those of ordinary skill in the art to modify the primary reference to achieve the claimed invention. Second, there must be a reasonable expectation o success. Third, the prior art references must disclose all of the claim limitations. MPEP 2143. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently known in the prior art. *KSR Int'l CO. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (U.S. 2007).

The Prior Art References (Martin et al., U.S. Patent Number 3323047; Walsh, U.S. Patent Number 4540936; Watson et al., U.S. Patent Number 5418466; Feuer, U.S. Patent Number 5445178; Cambell, U.S. Patent Number 5479104; Buss, U.S. Patent Number 7042234; and Katz, U.S. Patent Number 7129713) all fail to disclose a soil moisture circuit comprising a high frequency oscillator for applying a first electrical

stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor. The Prior Art References all fail to disclose a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator. The Prior Art References all fail to disclose a soil salinity circuit and a soil moisture circuit connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter. The Prior Art References all fail to disclose measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive. The Prior Art References all fail to disclose measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive. The Prior Art References all fail to disclose measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter

when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active. The Prior Art References all fail to disclose calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value nor does Katz disclose calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Therefore, claim 1 is not rendered obvious by the combination of either Martin Walsh, Watson, Feuer, Cambell, Buss, and/or Katz, since any combination fails to disclose the claimed novel invention since the prior art fails to disclose all of the elements of the claim. Thus, a *prima facie* case of obviousness cannot be established for claim 1 of the Present Application.

SECTION V

9(D) Concise Statement Of Utility:

The invention as claimed has utility as a method for measuring the moisture and salinity of soil.

SECTION VI

9(E) Showing Of Support Under 35 U.S.C. §112, First Paragraph:

1. A method of determining a moisture content value and a salinity value of a soil, the method comprising:

providing a sensor, the sensor comprising

a probe conducting structure to be placed in the soil to form a capacitor,

a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor, and

a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator,

wherein the soil salinity circuit and the soil moisture circuit connect between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter;

measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive;

measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive;

measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active;

calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value; and

calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value.

Support in the disclosure under 35 U.S.C. 112, first paragraph, for claim 1 is found in the present application as follows with the bolded sections indicating the support for each of the clauses of the claim (in *italics*):

With respect to claim 1, a *method of determining a moisture content value and a salinity value of a soil* is described at least at paragraph [00012].

Specifically, paragraph [00012] of the present application states: "One aspect of the present invention is **a method of determining a moisture content value and a salinity value of a soil**, the method begins with providing a sensor. The sensor includes a probe conducting structure to be placed in the soil to form a capacitor, a soil moisture circuit and a soil salinity circuit. The soil moisture circuit includes a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor. The soil salinity circuit includes a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor. The low frequency oscillator is substantially lower in frequency than the high frequency oscillator. The soil salinity circuit and the soil moisture circuit are connected between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter."

With respect to claim 1, *providing a sensor comprising a probe conducting structure to be placed in the soil to form a capacitor, a soil moisture circuit comprising a high frequency oscillator for applying a first electrical stimulus to the probe structure, a reference capacitor connected in series to the high frequency oscillator, and a first voltage meter located between the high frequency oscillator and the reference capacitor, and a soil salinity circuit comprising a low frequency oscillator for applying second electrical stimulus to the probe structure, a reference resistor connected in series to the low frequency oscillator, and a second voltage meter located between the low frequency oscillator and the reference resistor, wherein the low frequency oscillator is substantially lower in frequency than the high frequency oscillator, wherein the soil salinity circuit and the soil moisture circuit connect between the reference capacitor and the reference resistor, at which point the soil moisture circuit and the soil salinity circuit are connected to the probe structure and a third voltage meter*, is described at least at paragraphs [00062], [00065], [00066] and [00070], and FIG. 10 of the present application.

Specifically, paragraph [00062] states: "The probe structure 21 connects electrically to the circuit 40 and preferably includes at least two electrically conducting surfaces or structures. **The probe structure 21 is inserted into the media to form a capacitor**. The probe structure 21 is preferably composed of metal, printed circuit board material (with copper layer), or other materials."

Specifically, paragraph [00065] of the present application states: "The **circuit 40 preferably employs two oscillators, a high frequency oscillator 24 (125 MHz for example) and a low frequency oscillator 25** (10 MHz for example) powered by +V (a DC voltage), and which can be controlled (turned off and on) by a capacitor

C_{HI} and a capacitor C_{LO}, respectively. Those skilled in the pertinent art will recognize that oscillators with a wide range of operating frequencies can be used with the present invention without departing from the scope and spirit of the present invention. **The oscillating electrical outputs appear at "OUT**." A filter 57, which is connected to high frequency oscillator 24 is preferably a bandpass filter centered at the primary frequency of the high frequency oscillator 24 and removes higher order harmonics to preferably produce a nearly sinusoidal output. Capacitor C2 69 and **resistor R4 70** are connected to the low frequency oscillator 25 to form a low pass filter 55 (designated by dotted lines) which removes any higher order harmonics, specifically if the low frequency oscillator 25 is a square wave oscillator.

Specifically, paragraph [00066] of the present application states: "**A plurality of voltage meters 26, 27 and 28** are used to measure the AC level present at various points 26a, 27a and 28a in the circuit 40. As shown in FIG. 10A, each of the plurality of meters 26, 27 and 28 preferably comprise a diode 93 connected with a capacitor 95 and resistor 97 in parallel (FIG. 10A only shows a voltage meter 26). The output "O" of each of the plurality of meters 26, 27 and 28 is preferably a direct current ("DC") voltage (measured between the diode and the capacitor and resistor) and is indicative of the amplitude of the AC stimulus present at the point26a, 27a or 28a in the circuit 40 to which the other end of the diode 93 is connected."

Specifically, paragraph [00070] of the present application states: "The sensor 20

preferably has two main paths through which the electrical measurements are made. **First, the high frequency path or the soil moisture circuit 22 (used to measure the dielectric permittivity) is through the high frequency oscillator 24, the filter 57, the capacitor CB 61, by the first voltage meter 26, the capacitor CR 63, by the second voltage meter 27, the capacitor CB 68 and into the probe structure 21. Second, the low frequency path, or the soil salinity circuit 23, is through low frequency oscillator 25, the resistor R4 70, the capacitor C2 69, by the third voltage meter 28, resistor R2 64, by the second voltage meter 27, capacitor CB 68 and into the probe structure 21.** By judicious choice of the elements of the circuit 40, the high and low frequency paths can share many elements of the circuit 40 as well as the probe structure 21, while having very little effect on the other pathway."

With respect to claim 1, *measuring voltages V1, V2, and V3, wherein V1 is the output voltage measured by the first voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, V2 is the output voltage measured by the second voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, and V3 is the output voltage measured by the third voltage meter when the low frequency oscillator and the high frequency oscillator are inactive, measuring voltages V2' and V3', wherein V2' is the output voltage measured by the second voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, and V3' is the output voltage measured by the third voltage meter when the low frequency oscillator is active and the high frequency oscillator is inactive, measuring voltages V1' and V3'', wherein V1' is the output voltage measured by the first voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, and V3'' is the output voltage measured by the third voltage meter when the low frequency oscillator is inactive and the high frequency oscillator is active, calculating a capacitance of the soil as a function of (V3''-V3)/(V1'-V1) to obtain a soil moisture content value, and calculating a resistance of the soil as a function of (V3'-V3)/V2'-V2) to obtain a soil salinity value*, is described at least at paragraphs [00071], [00072], [00084] and [00085], and FIGS. 4-8 of the present application.

Specifically, paragraph [0071] of the present application states: "A preferred measurement can be made in the following manner and the tables of FIGS. 4 and 6 list the measurement values. Those skilled in the pertinent art will recognize that different procedures are possible without departing from the scope and spirit of the present invention. **First, with both the high frequency oscillator 24and the low**

frequency oscillator 25 deactivated, the outputs of the first voltage meter 26, the second voltage meter 27, and the third voltage meter 28 are measured, at points 26a, 27a and 28a respectively, and referred to respectively as O1, O2, O3. The high frequency oscillator 24 is then activated and the first voltage meter 26 and the second voltage meter 27 are measured, at points 26a and 27a respectively, and referred to respectively as O1' and O2'. The high frequency oscillator 24 is then deactivated and the low frequency oscillator 25 is activated and the second voltage meter 27 and the third voltage meter 28 are measured, at points 27a and 28a respectively, and referred to respectively as O2" and O3". In the case where an oscillator24 or 25 is deactivated, the voltage meter output is indicative of a "baseline" voltage meter output. When an oscillator 24 or 25 is activated, the voltage meter is indicative of the baseline level plus the AC stimulus amplitude present at the measurement point 26a, 27a and/or 28a."

Specifically, paragraph [00072] of the present application states: "**The measured voltages can then be used to calculate the following ratios: RP = (O2' – O2)/(O1' – O1) and RC = (O2" – O2)/(O3" – O3).**"

Specifically, paragraph [00084] of the present application states: "As shown in FIG. 4, a table 200 lists values for voltage meter measurements O1, O2, O3, O1', O2', O2" and O3". Also listed are values for the calculations RP and RC as well as a percentage of moisture (water %) in the media. **FIG. 5 illustrates a graph 202 with a calibration curve of the water % (Y axis) as a function of RP (X axis). RP is used to calculate capacitance and is correlated to soil moisture**.

Specifically, paragraph [00085] of the present application states: "As shown in FIGS. 6, a table 300 lists values for voltage meter measurements O2, O3, O2" and O3". Table 300 also lists values for RC and the type of media sensors for four different sensors. The type of media is aqueous saline solutions of known conductivity spanning 0.1 to 4.96 dS/m. Each sensor set is for a different type of media. Each sensor set includes values for each of the four different sensors designated 3, 5, 8 and 11 in the table 300. As shown in FIG. 7, a table 301 lists the average RC value and the standard deviation value from the values in table 300 of FIG. 6. **FIG. 8 illustrates a graph 302 showing a calibration curve of the variation in 1/RC (X axis) with increasing sample conductivity (Y axis).**"

The claim does not invoke 35 U.S.C. § 112, sixth paragraph. There are no means-plus-function (or step-plus function) claim elements.

SECTION VII

9(F) Identification of References Disqualified As Prior Art Under 35 U.S.C. §103(C):

None of the cited references is disqualified as prior art under 35 U.S.C. §103(C).

SECTION VIII

CONCLUSION

It is believed that this accelerated examination support document has satisfied all of the requirements to grant a petition to make special under 37 C.F.R. Section 1.102(d) and "Change to Practice For Petitions In Patent Applications to Make Special and for Accelerated Examination" published in the Federal Register on June 26, 2006 (71 Fed. Reg. 36323). Therefore, the Applicant requests that the petition be granted.

Respectfully submitted,

/Michael Catania/ **May 19, 2008**

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