

#### Search history

Search 1: SFT=(fluid and collect\* and network) (Results 95783)  
Search 2: SFT=(fluid and collect\* and network) and IC=(g01v) (Results 2576)  
Search 3: SFT=(fluid and collect\* and network and battery) and IC=(g01v) (Results 543)

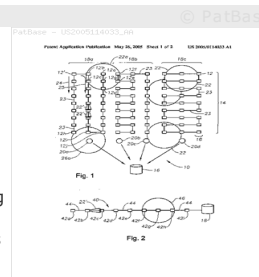
#### 1) Family number: 31953515 (US2005114033A)

##### METHOD AND SYSTEM FOR TRANSMISSION OF SEISMIC DATA

**Abstract:** Source: US2005114033A The transmission method utilizes multiple seismic acquisition units within an array as intermediate short range radio receivers/transmitters to pass **collected** seismic data in relay fashion back to a control station. Any one seismic unit in the array is capable of transmitting radio signals to several other seismic units positioned within radio range of the transmitting unit, thus allowing the system to select an optimal transmission path. Utilizing an array of seismic units permits transmission routes back to a control station to be varied as needed. In transmissions from the most remote seismic unit to the control station, each unit within a string receives seismic data from other units and transmits the received seismic data along with the receiving unit's locally stored seismic data. Preferably, as a transmission is passed along a chain, it is bounced between seismic units so as to be relayed by each unit in the array.

**Probable Assignee:** FAIRFIELD IND INC

**Earliest Publication Date:** 20050526



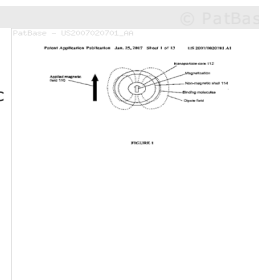
#### 2) Family number: 34118226 (US2007020701A)

##### MAGNETIC RESONANCE SYSTEM AND METHOD TO DETECT AND CONFIRM ANALYTES

**Abstract:** Source: US2007020701A A system and method are provided to detect target analytes based on magnetic resonance measurements. Magnetic structures produce distinct magnetic field regions having a size comparable to the analyte. When the analyte is bound in those regions, magnetic resonance signals from the sample are changed, leading to detection of the analyte.

**Probable Assignee:** MENON BIOSENSORS INC

**Earliest Publication Date:** 20070125



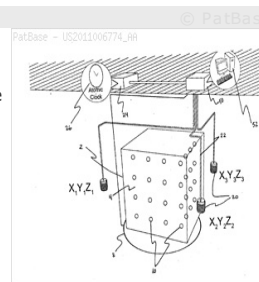
#### 3) Family number: 42574439 (US2011006774A)

##### SUBSURFACE POSITIONING SYSTEM AND METHOD FOR MONITORING MOVEMENT UNDERGROUND

**Abstract:** Source: US2011006774A A system for monitoring movement in a subsurface environment, which may be used to determine flow dynamics within a **fluid** mass such as an ore body, or track subsurface persons or moving assets. A plurality of underground positioning system (UPS) elements in the subsurface environment transmit characteristic signals to a plurality of antennas, which transmit the signals to a data processing apparatus. The system thus determines changes in the positions of the UPS elements to derive an indication of the motion of the **fluid** mass or the locations and movement of subsurface persons or assets.

**Probable Assignee:** PENGUIN AUTOMATED SYSTEMS INC

**Earliest Publication Date:** 20081124



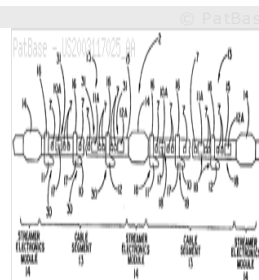
#### 4) Family number: 30455582 (US2003117025A)

##### ELECTRICAL POWER DISTRIBUTION AND COMMUNICATION SYSTEM FOR AN UNDERWATER CABLE

**Abstract:** Source: US2003117025A An underwater cable arrangement includes systems and method for distributing and/or transferring power and/or data to internal devices and external devices disposed along an underwater cable. Under water coupling systems and underwater electrical devices may be used in the distribution and/or transfer of the power and/or data.

**Probable Assignee:** INPUT OUTPUT INC

**Earliest Publication Date:** 19970327



#### 5) Family number: 32845049 (US2006181243A)

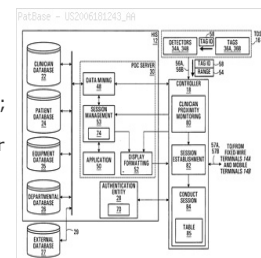
##### USE OF LOCATION AWARENESS TO FACILITATE CLINICIAN-CHARGER INTERACTION IN A

## HEALTHCARE ENVIRONMENT

**Abstract:** Source: US2006181243A A charger for electrically charging a plurality of mobile terminals of a healthcare establishment communications **network**. The charger comprises a plurality of charging stations, each charging station receiving a respective one of the mobile terminals and electrically charging the respective terminal; an input for receiving an indication of potential retrieval of one of the terminals from the charger; and a terminal suggestion unit coupled to said input, said terminal suggestion unit being operative to physically suggest a particular one of the terminals to be retrieved from the charger in response to reception at said input of an indication of potential retrieval of one of the terminals from the charger. In this way, the convenience with which a clinician may pick a terminal from the charger is enhanced. Various additional security features may be provided to prevent information from becoming displayed on the selected terminal until successful authentication by the clinician.

**Probable Assignee:** NORTEL NETWORKS CORP

**Earliest Publication Date:** 20060811



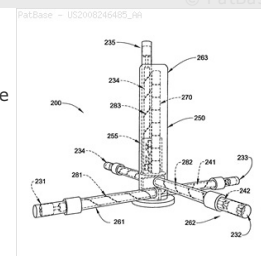
**6) Family number: 41930676** (US2008246485A)

## COMPACT UNDERWATER ELECTROMAGNETIC MEASUREMENT SYSTEM

**Abstract:** Source: US2008246485A An underwater EM measurement system, which is substantially smaller, much simpler to use, and more robust than prior systems, is formed as a sensor package integrated into a single pressure vessel includes two magnetic sensors including induction coils disposed substantially horizontally so as to measure fields in orthogonal directions. The package also includes two electric field sensors including electric potential antennas adapted to couple to a water potential via a capacitive electrode having a conducting material and an electrically insulative layer formed of an insulating material. The capacitive electrode has a capacitance to the medium of greater than 1 mF. Preferably, the insulating material is a metal oxide.

**Probable Assignee:** QUASAR FEDERAL SYSTEMS INC

**Earliest Publication Date:** 20080619



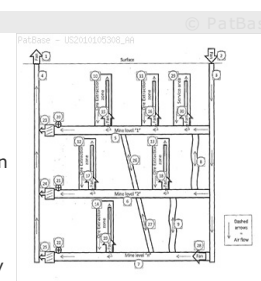
**7) Family number: 42994917** (US2010105308A)

## OPTIMIZED MINE VENTILATION SYSTEM

**Abstract:** Source: US2010105308A The optimized mine ventilation system of this invention supplements mine ventilation basic control systems composed of PLCs (Programmable Logic Controllers with human machine interfaces from vendors such as Allen-Bradley™, Modicon™ and others) or DCSs (Distributed Control System from vendors such as ABB™ and others) with supervisory control establishing a dynamic ventilation demand as a function of real-time tracking of machinery and/or personnel location and where this demand is optimally distributed in the work zones via the mine ventilation **network** and where the energy required to ventilate is minimized while totally satisfying the demand for each work zones. The optimized mine ventilation system operates on the basis of a predictive dynamic simulation model of the mine ventilation **network** along with emulated control equipment such as fans and air flow regulators. The model always reaches an air mass flow balance where the pressure and density is preferably compensated for depth and accounts for the natural ventilation pressure flows due to temperature differences. Model setpoints are checked for safety bounds and sent to real physical control equipment via the basic control system.

**Probable Assignee:** HOWDEN ALPHAIR VENTILATING SYSTEMS INC

**Earliest Publication Date:** 20090228



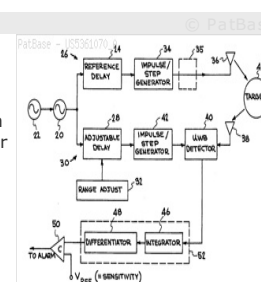
**8) Family number: 51144184** (US5361070A)

## ULTRA-WIDEBAND RADAR MOTION SENSOR

**Abstract:** Source: US5361070A A motion sensor is based on ultra-wideband (UWB) radar. UWB radar range is determined by a pulse-echo interval. For motion detection, the sensors operate by staring at a fixed range and then sensing any change in the averaged radar reflectivity at that range. A sampling gate is opened at a fixed delay after the emission of a transmit pulse. The resultant sampling gate output is averaged over repeated pulses. Changes in the averaged sampling gate output represent changes in the radar reflectivity at a particular range, and thus motion.

**Probable Assignee:** LAWRENCE LIVERMORE NATIONAL SECURITY LLC

**Earliest Publication Date:** 19941027



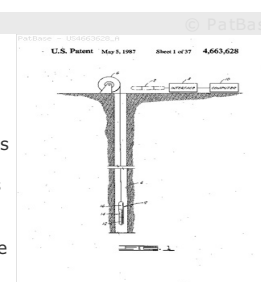
**9) Family number: 10658098** (US4663628A)

## METHOD OF SAMPLING ENVIRONMENTAL CONDITIONS WITH A SELF-CONTAINED DOWNHOLE GAUGE SYSTEM

**Abstract:** Source: US4663628A The method for controlling the rate at which a downhole logging tool samples and records a detected condition obtains three samples of the condition at three consecutive sample times and computes a prediction value for the n-th sample from the first three samples. The method compares the actual n-th sample with the predicted value and records the (n-1)-th sample if the variance between the predicted and actual values is outside a predetermined threshold or difference. The sample rate is changed if the actual values of the samples remain within the predicted value's preselected range for more than a preselected number of samples. The sample rate interval is also increased if the **battery** life or memory capacity decrease below predetermined thresholds. The sample rate interval is decreased to its shortest interval if a pressure change above a predetermined threshold is detected.

**Probable Assignee:** HALLIBURTON CO

**Earliest Publication Date:** 19861107



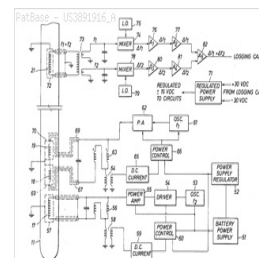
**10) Family number: 1150097** (US3891916A)

## DUAL RADIO FREQUENCY MEASUREMENT OF DIELECTRIC CONSTANT AND RESISTIVITY OF BOREHOLE MEDIA

**Abstract:** Source: US3891916A An illustrative embodiment of the invention discloses methods and apparatus for measuring the resistivity and dielectric constant of earth formations in the vicinity of a well borehole. Radio frequency electromagnetic fields are generated in the borehole at a pair of frequencies of approximately 16 and 30 megahertz. The amplitude of the total field voltage induced in a single receiver coil located a longitudinally spaced distance away is detected at each of the two frequencies and either recorded directly or used to derive from predetermined relationships the resistivity and dielectric characteristics of the earth formation materials.

**Probable Assignee:** TEXACO INC

**Earliest Publication Date:** 19750303



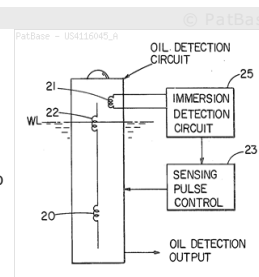
**11) Family number: 1322050 (US4116045A)**

## OIL DETECTOR

**Abstract:** Source: US4116045A Detecting different **fluids**, such as oil at the surface of water, by a heated monitoring element exposed for contact with the **fluid**, the element having a resistance characteristic that changes as a function of temperature, in preferred embodiments being the mere filament of a light bulb. One system employs circuitry for periodically applying a pulse of electrical heating current to the monitoring element, to heat and produce a change in its electrical resistance, and output circuitry responsive to change in electrical resistance to indicate the nature of the **fluid**. In another system the resistance of the monitoring element is controlled by comparison to a constant reference, the heating current required serving to indicate the nature: e.g. oil, water or air, of the **fluid** contacting the element. Features of the invention include positioning the monitoring element at a liquid-air interface by a buoyant member, preferably with means to cause the element to transit the interface prior to a detection cycle; a driver supported on a housing, effective to move the element to produce this motion; circuitry for passing heating current through the monitoring element to clean its exposed surface of oil; and circuitry for limiting the electrical parameters of the cleaning current to prevent ignition of oil.

**Probable Assignee:** POTTER BM

**Earliest Publication Date:** 19780621



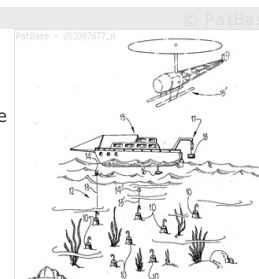
**12) Family number: 1334162 (US3987677A)**

## METHOD AND APPARATUS FOR UNDERGROUND DEPOSIT DETECTION IN WATER COVERED AREAS

**Abstract:** Source: US3987677A A plurality of gas sample **collecting** containers are distributed in a predetermined pattern from a vehicle. The containers are cup shaped but weighted so that the open end sinks first and engages the subaqueous earth laer. Gas migrating upwardly through the earth is caught by the inverted cup. The gas sample may be either **collected** in a separate container or exposed to a detector material located above the expected water level. The sample **collecting** containers may be retrieved by means of marker floats, magnetic grappling devices or self actuated flotation devices.

**Probable Assignee:** TERRADEX CORP

**Earliest Publication Date:** 19761026



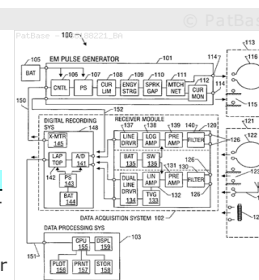
**13) Family number: 14961342 (US6188221B)**

## METHOD AND APPARATUS FOR TRANSMITTING ELECTROMAGNETIC WAVES AND ANALYZING RETURNS TO LOCATE UNDERGROUND FLUID DEPOSITS

**Abstract:** Source: US6188221B An electromagnetic (EM) survey system for determining the presence of liquid or gaseous deposits within the earth's interior. The system includes an EM pulse generator for generating the EM pulses, a data acquisition system for receiving and processing reflected signals from the earth's interior caused by the EM pulses, and a data processing system for analyzing the reflected signals to determine the presence of **fluids** in the earth's interior. Delivery of the EM pulses to the earth's interior can be accomplished either invasively or non-invasively. In an invasive manner, the EM pulse is delivered to the earth's interior via a set of electrodes buried shallow into the ground. In a non-invasive coupling, the EM pulse is delivered to the earth's interior via a wire loop. The reflected signals are received from the earth's interior via one of a wire loop, set of electrodes, wire antenna, or rod antenna array.

**Probable Assignee:** KOP ANDREW R VAN DE

**Earliest Publication Date:** 20000217



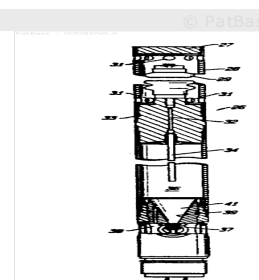
**14) Family number: 15002849 (US5283768A)**

## BOREHOLE LIQUID ACOUSTIC WAVE TRANSDUCER

**Abstract:** Source: US5283768A A transducer is described especially designed for use in providing acoustic transmission in a borehole. The transducer includes a multiple number of magnetic circuit gaps and electrical windings that have been found to provide the power necessary for acoustic operation in a borehole while still meeting the stringent dimensional criteria necessitated by boreholes. Various embodiments conforming to the design are described. Moreover, the invention includes transition and reflector sections, as well as a directional coupler and resonator arrangement particularly adapted for borehole acoustic communication.

**Probable Assignee:** BAKER HUGHES INC

**Earliest Publication Date:** 19921215



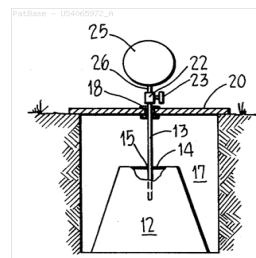
**15) Family number: 1516971 (US4065972A)**

## METHOD AND APPARATUS FOR UNDERGROUND DEPOSIT DETECTION

**Abstract:** Source: US4065972A A method and apparatus for **collecting** gas samples associated with underground minerals. A plurality of small gas sample containers are planted in an inverted position in shallow holes in the surface of the earth in a predetermined pattern, and upwardly migrating gases associated with the underground minerals being sought are **collected** in the containers for a predetermined time period, to obtain a time-integrated representation of the amount of one or more gases of interest migrating to the surface over that time period. Two types of containers are alternately employed: A total gas sample container in which all upwardly migrating gases are admitted into a sealed compartment at a preselected flow rate; and a specific gas sampler container in which strips of detector material which are sensitive to predetermined specific gaseous substances are mounted within the inverted container and exposed to the upwardly migrating gases over the predetermined time interval. The containers are removed from the shallow holes after the lapse of the predetermined time interval, and the detector material alone, or the containers with the detector material still mounted, are subjected to qualitative and quantitative analysis. The gas **collection** period is maintained substantially constant for all containers.

**Probable Assignee:** TERRADEX CORP

**Earliest Publication Date:** 19760805



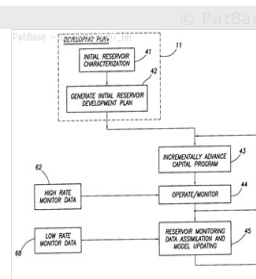
**16) Family number:** 15648860 (US2005149307A)

## INTEGRATED RESERVOIR OPTIMIZATION

**Abstract:** Source: US2005149307A A method of managing a **fluid** or gas reservoir is disclosed which assimilates diverse data having different acquisition time scales and spatial scales of coverage for iteratively producing a reservoir development plan that is used for optimizing an overall performance of a reservoir. The method includes: (a) generating an initial reservoir characterization, (b) from the initial reservoir characterization, generating an initial reservoir development plan, (c) when the reservoir development plan is generated, incrementally advancing and generating a capital spending program, (d) when the capital spending program is generated, monitoring a performance of the reservoir by acquiring high rate monitor data from a first set of data measurements taken in the reservoir and using the high rate monitor data to perform well-regional and field-reservoir evaluations, (e) further monitoring the performance of the reservoir by acquiring low rate monitor data from a second set of data measurements taken in the reservoir, (f) assimilating together the high rate monitor data and the low rate monitor data, (g) from the high rate monitor data and the low rate monitor data, determining when it is necessary to update the initial reservoir development plan to produce a newly updated reservoir development plan, (h) when necessary, updating the initial reservoir development plan to produce the newly updated reservoir development plan, and (i) when the newly updated reservoir development plan is produced, repeating steps (c) through (h). A detailed disclosure is provided herein relating to the step (a) for generating the initial reservoir characterization and the step (b) for generating the initial reservoir development plan.

**Probable Assignee:** SCHLUMBERGER TECHNOLOGY CORP

**Earliest Publication Date:** 20010830



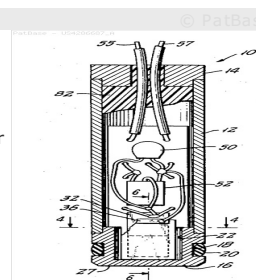
**17) Family number:** 1836594 (US4286687A)

## AIR GUN FIRING SENSOR APPARATUS AND SYSTEM

**Abstract:** Source: US4286687A An air gun firing sensor apparatus and system are provided for determining the instant of firing of an air gun by sensing pressure changes within the air gun when it is being fired. A pressure-change-sensitive transducer assembly is inserted into a socket in the housing of a solenoid-controlled valve of an air gun with a passage from the air gun communicating with the transducer for transmitting to the transducer a pressure surge occurring within the air gun whenever it is fired. The transducer assembly has a cylindrical casing with a head mounted at one end. The head includes a plurality of spaced recesses which are adapted to communicate with the passage leading from the air gun. A pressure-sensitive transducer is mounted in the head wall between and adjacent to these recesses, in effect being sandwiched in the head wall between these recesses with the transducer extending parallel to the recesses, whereby a pressure surge occurring simultaneously in the recesses is transmitted through the head wall to the transducers, being transmitted in a direction transverse to the axes of the respective recesses. Accordingly, a pressure pulse produced by the firing of the air gun squeezes the portions of the head wall between these recesses inwardly applying pressure to the transducer which generates a voltage indicative of the instant of firing of the air gun being monitored.

**Probable Assignee:** BOLT ASSOCIATES INC

**Earliest Publication Date:** 19810427



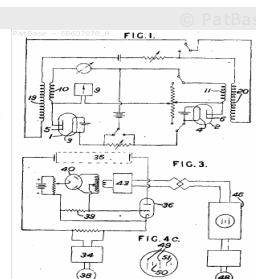
**18) Family number:** 20023386 (GB637878A)

## APPARATUS FOR AND METHOD OF GEOPHYSICAL EXPLORATION

**Abstract:** Source: GB637878A [Class 37] [Also in Groups XXXVIII and XL (c)] Apparatus for geophysical exploration consists of a **fluid**-supported craft, e.g. an aircraft, which carries instruments responsive to variations in the magnetic field or the distance of the deposit, these instruments being stabilized for orientation and level and feeding recorders, so that as the craft traverses the area being investigated records are made to indicate the location of deposits. Magnetic variations.-A stabilized inductor compass may be used. Alternatively a flux gate compass comprising a nickel-iron core in a solenoid fed with A.C. may be used; the permeability of the core is varied by the magnetic field and the variations in impedance of the solenoid are detected by a bridge circuit. Alternatively, magnetrons sensitive to variations in the earth's magnetic field may be used; two diode magnetrons 1, 2, Fig. 1, having their cathodes 3, 4 within cylindrical anodes 5, 6 and positioned within solenoids 19, 10 and 11, 20 respectively are adjusted to be at the critical point of their characteristics; any variation of the earth's field will then produce a variation in anode current which will be recorded at 9; the solenoids 10, 11 oppose the effect of solenoids 19, 20; preferably the anodes of the magnetrons are at right angles so that any diurnal variation effects both equally and is eliminated, but variation in the desired direction affects one only; switches 13, 14 permit magnetron 2 to be disconnected when the measurements are not required to be very sensitive. The magnetrons may have grids, Fig. 2 (not shown). Distance variations.-An ultra-high frequency oscillator 34, Fig. 3, is keyed to supply pulses to aerial 38, the pulses reflected from the earth being received at 48 and delineated on a recording cathode-ray tube 46. As shown in Fig. 4c, reflections 49 are due to the earth's surface and reflections 51, 50 are produced by deposits below the surface. Keying transmitter.-Oscillator 43, Fig. 3, produces the keying frequency which is applied to synchronize the time base of the cathoderay tube 46 and' is also applied to double diode 40 which is biased to produce short pulses in resistance 39 which are applied to valve 36 to render it conducting and energize the oscillator 34 from source 35. Specification 600,546, [Group XL (c)], is referred to.

**Probable Assignee:** HANS TORKEL FREDRIK LUNDBERG

**Earliest Publication Date:** 19500531



**19) Family number:** 21010698 (FR1371851A)

## PERFECTIONNEMENTS APPORTES AUX DISPOSITIFS POUR LA DETERMINATION DES VITESSES DU SON AU TRAVERS D'UNE FORMATION GEOLOGIQUE SOUTERRAINE TRAVERSEE PAR UN TROU DE SONDE

### IMPROVEMENTS TO DEVICES FOR DETERMINING THE SPEED OF SOUND THROUGH TRAINING THROUGH UNDERGROUND GEOLOGICAL BY PROBE HOLE (MACHINE TRANSLATION)

**Abstract:** Source: FR1371851A [Source: Claim 1] RESUME L'invention a pour objet un dispositif pour la determination de la vitesse du son au travers d'une formation geologique souterraine traversee par un trou de sonde, lequel dispositif comprend des moyens pour emettre une impulsion acoustique ou sonore au travers de la formation geologique souterraine a partir d'un premier vers un deuxieme et vers un troisieme points situes dans le trou de sonde, des moyens pour produire une premiere, une deuxieme et une troisieme impulsions electriques selon des relations mutuelles predeterminees dans le temps avec ladite impulsion acoustique aux susdits premier, deuxieme et troisieme points respectivement, et lequel dispositif est caracterise par les particularites suivantes, utilisees separement ou selon toute combinaison techniquement possible 1" Le dispositif comprend essentiellement une unique ligne de transmission a une premiere extre mite de laquelle on applique les premiere, deuxieme et troisieme impulsions electriques, et il comprend aussi des moyens effectivement couples a l'autre, ou deuxieme, extremite de ladite ligne de transmission pour separer selectivement les impulsions electriques en au moins deux paires differentes, l'intervalle de temps entre les impulsions electriques res peotives des differentes paires etant mesure; 2" Le dispositif comprend une sonde allongee comportant trois transducteurs mutuellement espa cespour etablir une communication acoustique avec la formation souterraine, la premiere impulsion eleee- trique etant produite lors de l'apparition de l'une donnee des impulsions acoustiques a hauteur d'un premier transducteur, et les deuxieme et troisieme impulsions electriques etant produites lors de l'arri vee de ladite impulsion acoustique respectivement au niveau du deuxieme et troisieme transducteurs; 3 Le dispositif comprend un transducteur emetteur dans lequel une impulsion acoustique est produite par une impulsion electrique, et trois transducteurs recepteurs dans lesquels des impulsions elec- triques sont produites lors de l'arrivee de ladite impulsion acoustique au niveau desdits transducteurs recepteurs, de breves impulsions de grande puissance derivant des susdites quatre impulsions electriques etant appliquees a la premiere extremite de l'unique ligne de transmission, et la breve impulsion associee au transducteur emetteur etant supprimee a partir de la deuxieme extremite de cette ligne; 4" Deux paires differentes d'impulsions electriques sont appliquees a un premier et a un deuxieme circuit de mesure du temps; 50 Chaque circuit de mesure du temps comporte un circuit a echelle binaire; 60 Chaque circuit de mesure du temps comporte un multivibrateur hi-stable; 7" Le dispositif comprend un circuit d'envoi d'impulsions dans le cable pour appliquer de breves impulsions de grande puissance a la premiere extremite de ladite ligne de transmission, et des moyens pour **collecter** lesdites premiere, deuxieme et troisieme impulsions et pour les appliquer a l'entree dudit circuit d'envoi d'impulsions dans le cable; 8" Le dispositif comporte des susdits moyens separateurs d'impulsions qui comprennent plusieurs circuits pour supprimer une premiere impulsion d'une serie d'impulsions y appliquees, et plusieurs circuits pour ne laisser passer que la premiere impulsion d'une serie d'impulsions y appliquees; 9 Chacune desdits circuits de suppression d'impulsion comporte une diode et un multivibrateur monostable differe dont la sortie est appliquee a ladite diode afin de mettre ladite diode hors d'action pour un laps de temps de duree predeterminee apres qu'il y a ete applique une premiere impulsion d'une serie d'impulsions, et ledit circuit pour ne laisser passer que la premiere impulsion d'une serie d'impulsions comporte un thyatron propre a n'etre decharge qu'une fois lorsqu'y parviennent une serie d'impulsions pendant un laps de temps de duree predeterminee. [Source: Claim 1] SUMMARY The invention relates to a device for the determination of the speed of sound through an underground geological formation crossed by a borehole, which device comprises means to emit an acoustic or sound pulse through the underground geological formation from a first to a second and to a third point situated in the well bore, means for producing a first, a second and a third electrical pulse in predetermined mutual relations in time with said acoustic pulse to the aforesaid first, second and third points, respectively, and which device is characterized by the following peculiarities, used separately or in any technically possible combination 1 "the device essentially comprises a single transmission line has a first extre moth which is applied first, second and third electrical pulses and includes also means effectively couples to the other, or second, said extremity transmission line to separate selectively the electrical impulses c in at least two different pairs, the time interval between electrical pulses res peotives of different pairs being measured; 2 "the device includes an elongated probe having three transducers mutually espa cespour establish a sound communication with the underground formation, the first pulse eleee- cudgel being produced at the onset of a given acoustic pulses has a height first transducer and the second and third electrical pulses being produced at the rear vee said acoustic pulse to level respectively second and third transducers; 3 the device comprises a transmitter transducer in which an acoustic impulse is produced by an electrical pulse, and three receivers transducers in which electrical pulses are generated upon arrival of said acoustic pulse at said receivers transducers of breves pulse high power ARISING of the above four electrical pulses being applied to the first extremity of the single transmission line, and the short pulse associated to the transmitter transducer being suppressed from the second extremity of this line; 4 "Two different pairs of electrical pulses are applied to a first and a second circuit for measuring the time; 50 Each time measuring circuit includes a circuit binary scale; 60 Each time measuring circuit includes a hi-permanent multivibrator; 7 "The device includes a pulse sending circuit in the cable to apply breves pulse high power at the first extremity of said transmission line, and means for **collecting** said first, second and third pulses and to apply them at the entrance of said pulse sending circuit in the cable; 8 "the device comprises means aforesaid separators pulse which include several circuits to remove a first pulse of a series of pulses are applied, and several circuits to pass only the first pulse of a series of pulses are applied; 9 Each of the circuits pulse suppression includes a diode and a one shot differs whose output is applied to said diode to said diode put out of action for a time period of predetermined duration after it has been applied thereto a first pulse of a pulse series, and said circuit for not let the first pulse of a pulse series has a clean thyatron has not be discharge once company when it reached a series of pulses during a period of predetermine length.

**Probable Assignee:** TEXACO DEVELOPMENT CORP

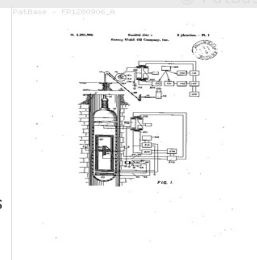
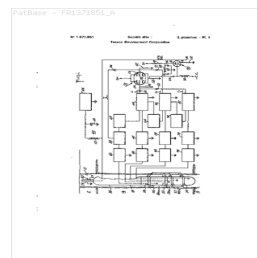
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## PERFECTIONNEMENTS AUX PROCEDES ET APPAREILLAGES DE SONDAGE PAR RESONANCE MAGNETIQUE NUCLEAIRE

### IMPROVEMENTS TO PROCESSES AND EQUIPMENT SURVEY NUCLEAR MAGNETIC RESONANCE (MACHINE TRANSLATION)

**Abstract:** Source: FR1280906A [Source: Claim 1] 1. Cette bobine est commandee, comme cela est represente sur les figures 3 et 4, par la fermeture de l'interrupteur 174, figure 3, qui sert a exciter la bobine-des relais 310 pour deplacer l'armature 311 de la borne de circuit ouvert 312 vers les autres bornes. Un tel fonctionnement provoque le passage d'un courant dans la bobine 23 ayant des intensites variables, de telle sorte que le champ magnetique dans lequel les noyaux precessionnent apres la suppression du champ Ho3 peut etre varie de maniere a simuler un defaut d'homogeneite. Le signal 353 sera ainsi change en amplitude; plus le defaut d'homogeneite sera grand, plus marquee sera la reduction eff ampli- tude de la fonction 353. Un exemple dans ce sens a ete illustre par la courbe en traits interrompus 354 qui represente qualitativement la variation produite simplement par l'excitation de la bobine 23. Ainsi, selon la presente invention, on mesure une caracteristique du temps de relaxation de protons precessionnant dans le champ magnetique terrestre dans un ensemble qui est altere par l'appliW cation d'un champ magnetique alternatif. En outre, selon l'invention, les variations introduites dans l'ensemble precessionnant, par la variation des defauts d'homogeneite du champ dans lequel l'ensemble precessionne, fournissent une information pour la determination de la constante de diffusion. Lorsqu'un ensemble de protons precessionne sous l'influence du champ magnetique terrestre, la presente invention prévoit d'appliquer des champs magnetiques alternatifs ayant la meme frequence que l'ensemble precessionnant a la suite de l'etablissement de chaque ensemble precessionnant. Les champs magnetiques modifient, vers au moins deux differents degres, les relations de phase entre les individus de l'ensemble de tee sorte que les signaux resultants, detectes en reponse a l'ensemble precessionnant apres la



suppression des champs magnetiques, permettent la determination du temps de relaxation des protons se trouvant dans le trou de sondage, ou au voisinage de celui-ci. Ainsi, la presente invention est relative a un procede et un systeme pour l'etude de protons precessionnant dans le champ magnetique terrestre, cette precession etant alteree par l'action d'un champ magnetique alternatif. RESUME La presente invention a pour objet I. Un procede de sondage presentant, seules ou combinees, les caracteristiques suivantes 10 On etablit et l'on interrompt de maniere repetitive une condition de polarisation des **fluides** contenus a l'interieur du trou de sondage et au voisinage de celui-ci pour permettre aux protons de precessionner en un ensemble sous l'influence du champ magnetique terrestre; 20 On applique aux protons precessionnant des champs magnetiques alternatifs - apres l'etablissement de chaque condition de polarisation de maniere a alterer vers au moins deux degres differents les relations de phase entre les individus dudit ensemble; 30 On mesure une caracteristique du temps de relaxation des protons a l'interieur du trou de sondage et au voisinage de celui-ci apres la suppression des champs magnetiques alternatifs precites; 40 La frequence de chaque champ magnetique alternatif correspond a la frequence dudit ensemble, 50 On engendre des signaux representatifs de la décroissance libre dudit ensemble immediatement apres la suppression des champs magnetiques alternatifs precites pour determiner un temps de relaxation des protons dans le trou de sondage et au voisinage de celui-ci; 60 Les champs magnetiques alternatifs alterent d'abord a un premier degre, puis ensuite a un second degre, les relations de phase entre les individus dudit ensemble; 70 On engendre des signaux representatifs de la precession dudit ensemble en des instants ou les individus sont en phase, ces instants se presentant a des intervalles de temps predeterminees apres la suppression de chacun des champs magnetiques alternatifs precites; 80 On applique a un premier ensemble de protons precessionnant un premier champ magnetique alternatif apres un premier intervalle de temps predetermine apres l'interruption d'une premiere condition de polarisation, de maniere a alterer les relations de phase entre les individus dudit premier ensemble; 90 On engendre un premier signal representatif d'une caracteristique du temps de relaxation des protons dudit premier ensemble apres la suppression dudit premier champ magnetique alternatif; 100 On applique a un second ensemble de protons precessionnant un second champ magnetique alternatif apres l'interruption d'une seconde condition de polarisation apres un intervalle de temps different du premier intervalle de temps precite, de maniere a alterer les relations de phase entre les individus dudit second ensemble; 110 On engendre un second signal representatif d'une caracteristique du temps de relaxation des protons dudit second ensemble apres la suppression du second champ magnetique alternatif precite; 120 On engendre les premier et second signaux precites en fonction de la profondeur de la sonde dans le trou de sondage pour determiner les variations avec la profondeur du caractere des **fluides** hydrogenes se trouvant dans les formations terrestres traversees par le sondage; 130 Le premier signal est representatif de la décroissance libre dudit premier ensemble apres la suppression du premier champ magnetique alternatif precite; et le second signal est representatif de la décroissance libre dudit second ensemble apres la suppression du second champ magnetique alternatif precite; 140 On engendre un premier signal representatif dudit premier ensemble lorsque celui-ci est tel que ses individus soient en phase apres un delai qui est de l'ordre dudit intervalle de temps suivant la suppression du premier champ magnetique alternatif - natif precite; 150 On applique a un second ensemble de protons precessionnant un second champ magnetique alternatif apres un intervalle de temps predetermine different apres l'interruption d'une seconde condition de polarisation, de maniere a alterer les relations entre les individus dudit second ensemble de protons. 160 On engendre un second signal representatif dudit second ensemble lorsque celui-ci est tel que ses individus soient en phase apres un delai qui est de l'ordre dudit second intervalle de temps apres la suppression du second champ magnetique alternatif precite; 170 On applique un champ magnetique de polarisation d'orientation horizontale dans les formations qui sont au voisinage des parois du trou de sondage pour etabliir une condition de polarisation les protons; 180 On interrompt brusquement ledit champ magnetique de polarisation pour permettre aux protons de precessionner sous l'influence du champ magnetique terrestre; 190 On applique un champ magnetique alternatif a la frequence de precession desdits protons dans le champ magnetique terrestre, ce champ magnetique alternatif apparaissant a l'expiration d'un intervalle de temps apres la suppression dudit champ magnetique de polarisation, cet intervalle de temps etant de l'ordre du temps de relaxation transversale de l'eau; 200 On engendre un signal representatif de l'amplitude de precession dans le champ magnetique terrestre a l'expiration d'un meme intervalle de temps apres l'application dudit champ magnetique alternatif; 210 On reitere les stades precites du procede pour au moins une autre valeur dudit intervalle de temps en chacun de plusieurs emplacements le long du trou de sondage, et l'on enregistre les signaux resultant tant comme fonction de la profondeur desdits emplacements; 220 On applique pendant un premier intervalle de temps un champ magnetique de polarisation pour etabliir une condition de polarisation des **fluides** dans le trou de sondage et au voisinage de celui-ci; 230 On modifie brusquement ledit champ magnetique de polarisation a la fin dudit premier intervalle de temps pour permettre aux protons de precessionner en un ensemble sous l'influence du champ magnetique terrestre; 240 On applique aux protons precessionnant un champ magnetique alternatif pendant un troisieme intervalle de temps qui commence apres un second intervalle de temps apres la fin dudit premier intervalle de temps; 250 Au cours de la periode qui suit ledit troisieme intervalle de temps, on detecte la precession dudit ensemble pour engendrer un signal qui en est representatif, et l'on enregistre ce signal comme fonction de la profondeur et de la sonde dans le trou de sondage; 260 On repete, pour la meme profondeur dans le sondage, les stades mentionnes ci-dessus en modifiant la valeur dudit premier intervalle de temps; 270 On repete les stades mentionnes ci-dessus en modifiant la valeur dudit second intervalle de temps. 280 On detecte, dans la periode qui suit ledit troisieme intervalle de temps, un echo spin du a la precession dudit ensemble pour engendrer un signal qui en est representatif; 290 On detecte, environ a la fin d'une periode suivant ledit troisieme intervalle de temps qui est egal audit second intervalle de temps, un echo spin du a la precession dudit ensemble pour engendrer un signal qui en est representatif; 300 Apres ledit troisieme intervalle de temps, on detecte la precession dudit ensemble, et l'on engendre un signal qui est representatif de l'amplitude maximale de ladite precession; 310 On repete, pour la meme profondeur dans le sondage, les stades mentionnes ci-dessus en modifiant l'un desdits premier et second intervalles de temps; 320 On applique, pour la meme profondeur dans le sondage, un champ magnetique unidirectionnel localise pour alterer le defaut d'homogeneite du champ magnetique total a cette profondeur; 330 On repete les stades mentionnes ci-dessus pour enregistrer un second signal representatif dudit ensemble precessionnant dans un champ magnetique d'un caractere different; 34 On repete les stades mentionnes ci-dessus pour enregistrer un second signal representatif dudit echo spin dans un champ magnetique de caractere different; 350 On engendre et l'on detecte des signaux de precession nucleaire dans le champ magnetique terrestre en chacun de plusieurs emplacements dans le trou de sondage; 360 On modifie le champ magnetique terrestre en chacun desdits emplacements en appliquant un champ magnetique localise de caractere non uniforme de maniere a engendrer effectivement un gradient dans le champ magnetique terrestre; 370 On engendre et l'on detecte des signaux de precession nucleaire dans le champ magnetique terrestre modifie; 380 On enregistre lesdits signaux en fonction des profondeurs desdits emplacements dans le trou de sondage. II. Un appareillage de sondage, dans lequel des noyaux sont initialement polarises dans un champ magnetique puis, lors d'une variation brusque de ce champ magnetique, sont brusquement laisses libres de precessionner dans le champ magnetique terrestre, et qui presente les caracteristiques suivantes, seules ou combinees: 10 Des moyens engendrent une fonction de commande, apres un intervalle de temps predetermine suivant la variation brusque precitee dudit champ magnetique, pour appliquer un champ magnetique alternatif a la frequence de precession desdits noyaux dans le champ magnetique terrestre pendant une periode de temps au moins suffisante pour alterer sensiblement le systeme precessionnant desdits noyaux; 20 Des moyens mesurent l'amplitude du champ precessionnant apres la suppression dudit champ magnetique alternatif; 30 Une unite d'exploration est susceptible d'occuper differentes positions en profondeur a l'interieur du trou de sondage; 40 Une bobine de champ de ladite unite et des moyens pour appliquer du courant relativement intense a cette bobine de champ produisent un champ magnetique de polarisation dans une direction sensiblement horizontale vers les et au-dela des parois du trou de sondage; 50 Des moyens font decroitre brusquement ledit courant intense et maintiennent pour une periode predeterminee la grandeur dudit champ magnetique de polarisation a un niveau qui est de l'ordre de dix fois le champ magnetique terrestre; 60 Des moyens excitent ladite bobine de champ en courant alternatif pour produire un champ magnetique qui commence a l'expiration d'un intervalle de temps suivant la brusque décroissance dudit courant intense, cet intervalle etant sensiblement egal au temps de relaxation transversale de l'eau; 70 Des moyens mesurent l'amplitude de la precession de Larmor dans le champ magnetique terrestre qui commence apres un meme intervalle de temps apres l'application dudit champ magnetique alternatif 80 Des moyens appliquent un gradient de champ dans la direction du champ magnetique terrestre pour faire varier l'amplitude de ladite precession de Larmor; 90 Des moyens comportant une bobine de champ appliquent aux protons precessionnant, a l'expiration d'un intervalle de temps, des champs magnetiques alternatifs de frequence correspondant a la frequence dudit ensemble dans le champ magnetique terrestre; 100 Des moyens excitent ladite bobine de champ, apres l'etablissement de chacune des conditions de polarisation successives, lorsque ledit intervalle de temps a

apres l'etablissement de chacune des conditions de polarisation successives, lorsque leur intervalle de temps a au moins deux valeurs de maniere a alterer, d'abord vers un premier degre, puis vers un autre degre, les relations de phase entre les individus dudit ensemble; 110 Des moyens, comprenant des bobines detectrices situees dans la region d'influence dudit ensemble, engendrent des signaux representatifs de la precession dudit ensemble apres la suppression de chacun desdits champs magnetiques alternatifs; 120 Des moyens enregistrent lesdits signaux en fonction de la profondeur dans le sondage, grace a quoi on peut determiner un temps de relaxation desdits protons dans le trou de sondage et au voisinage de celui-ci; 130 Une bobine de champ primaire est orientee avec son axe perpendiculaire a sa longueur; 140 Les moyens comprenant des bobines detectrices sont disposes de sorte que ces bobines sont orientees perpendiculairement par rapport a l'axe de ladite bobine de champ primaire; 150 Des sources de courant unidirectionnel et de courant alternatif sont prevues; 160 Des moyens appliquent selectivement ledit courant unidirectionnel et ledit courant alternatif a ladite bobine de champ primaire sequentiellement dans le temps, de maniere a engendrer une precession nucleaire des protons dans les formations terrestres adjacentes; 170 Des moyens, connectes aux moyens precites comprenant des bobines detectrices, appliquent selectivement des signaux de precession induits dans lesdites bobines detectrices pour identifier le caractere des **fluides** traversees par le sondage; 180 Une unite d'exploration, comprenant des bobines, etablit et detecte des champs magnetiques dans les formations voisines du trou de sondage; 190 Un cable supporte et deplace ladite unite dans le trou de sondage; 200 Il est prevu une source de courant continu ainsi que des moyens d'enregistrement; 210 Un systeme de commande etablit des connexions entre lesdites sources de courant, lesdits moyens d'enregistrement, et lesdites bobines, et ce systeme est susceptible d'etre actionne, en une premiere sequence predeterminee, pour connecter ladite source de courant continu auxdites bobines pendant un premier intervalle predetermine, puis, alors, pendant un troisieme intervalle predetermine suivant la suppression dudit courant continu apres un second intervalle de temps predetermine, pour connecter ladite source de courant alternatif auxdites bobines et, au cours de l'intervalle suivant ledit troisieme intervalle, pour connecter lesdits moyens d'enregistrement auxdites bobines; 220 Des elements de circuit, comprenant des interrupteurs normalement ouverts, servent a interconnecter lesdites sources de courant; 230 Les bobines comprennent une bobine de champ et une bobine detectrice, et ledit systeme de commande interconnecte lesdites sources de courant et ladite bobine de champ, et interconnecte ladite bobine detectrice et lesdits moyens d'enregistrement, et est susceptible d'etre actionne, selon une premiere sequence predeterminee, pour connecter ladite source de courant continu a ladite bobine de champ pendant un premier intervalle predetermine, et, alors, pendant un troisieme intervalle predetermine suivant la suppression dudit courant continu apres un second intervalle de temps predetermine, pour connecter ladite source de courant alternatif a ladite bobine de champ, et, au cours de l'intervalle suivant ledit troisieme intervalle predetermine, pour connecter ladite bobine detectrice auxdits moyens d'enregistrement; 240 Des moyens sont prevus dans le systeme de commande pour modifier la grandeur de fun desdits premier et second intervalles de temps; 250 Un systeme de commande, susceptible d'etre actionne avec une relation de temps predeterminee par rapport a l'abaissement de la valeur dudit champ magnetique, etablit pour un intervalle de temps predetermine un champ magnetique alternatif destine a modifier la precession desdits noyaux; 260 Un circuit de detection, comprenant une bobine detectrice dans le champ d'influence desdits noyaux precessionnant et susceptible d'etre actionnee par ledit systeme de commande, transmet vers la surface du sol au cours de l'intervalle suivant ledit champ magnetique alternatif des signaux representatifs de ladite precession; 270 Un systeme de mesure, comprenant des moyens d'enregistrement a la surface du sol connectes audit circuit de detection et sensible auxdits signaux, enregistre ces signaux en fonction des profondeurs dans le trou de sondage auxquelles lesdits champs magnetiques sont etablis pour permettre l'identification du caractere des **fluides** qui comprennent lesdits noyaux; 280 Une bobine de champ secondaire est orientee de maniere que son axe fasse un angle sensible par rapport a l'axe de ladite bobine de champ primaire; 290 Des moyens excitent selectivement lesdites bobines de champ primaire et secondaire pour polariser les protons contenus dans les **fluides** se trouvant dans le trou de sondage ou au voisinage de celui-ci, et pour commander la precession de ces protons, respectivement; 300 Des moyens appliquent selectivement les signaux induits dans les bobines detectrices pour identifier le caractere desdits **fluides**; 310 La bobine de champ secondaire et la bobine detectrice sont disposes au voisinage de ladite bobine de champ primaire; 320 L'unite de sondage a une forme tubulaire allongee, et la bobine de champ primaire a son axe perpendiculaire a l'axe de ladite unite de sondage; 330 La bobine de champ secondaire a son axe parallele a l'axe de ladite bobine de champ primaire; 340 Des moyens appliquent selectivement un courant unidirectionnel a la fois auxdites bobines de champ primaire et secondaire pour etabli une condition de polarisation des **fluides** dans le trou de sondage et au voisinage de celui-ci pour controler la precession dans le champ magnetique terrestre; 350 Des moyens appliquent un courant alternatif a ladite bobine de champ primaire avec une relation de temps espace par rapport a l'excitation de cette bobine par ledit courant unidirectionnel de maniere a modifier la precession desdits protons; 360 Des moyens sont connectes a ladite bobine de detection pour enregistrer en fonction de la profondeur dans le sondage les signaux induits dans la bobine detectrice apres l'application dudit courant alternatif a ladite bobine de champ primaire. [Source: Claim 1] 1. This coil is controlled, as is represented in Figures 3 and 4, by the closing of switch 174, Figure 3, which is used to excite the relay coil 310 to move the armature 311 of the open circuit terminal 312 to other terminals. Such operation causes the passage of a current in the coil 23 with varying intensities, so that the magnetic field in which the nuclei precess after the removal of Ho3 field can be varied in a manner simulating a default of homogeneity. The signal 353 will thus changes in amplitude; over the default of homogeneity is, the more marked is the rms amplitude reduction function 353. An example in this direction has been illustrated by the curve in dotted lines 354 which qualitatively represents the change simply produced by the excitement the coil 23. Thus, according to the present invention, measuring a characteristic precessionnant proton relaxation times in the terrestre magnetic field in an assembly which is altered by the appliW cation of an alternating magnetic field. In addition, according to the invention, the variations introduced throughout precessionnant, by varying the homogeneity defects of the field in which all precesses, provide information for the determination of the diffusion constant. When a set of precesses protons under the influence of Earth's magnetic field, the present invention provides for applying alternating magnetic fields having the same frequency as all precessionnant a result of the establishment of each precessionnant together. The changing magnetic fields, to at least two different degrees, the phase relationships between individuals of all t so that the resulting signals in response detected at all precessionnant after removing magnetic fields, allow the determination of relaxation times of the protons present in the borehole or in the vicinity thereof. Thus, the present invention relates to a method and a system for the study of precessionnant protons in the Earth's magnetic field, this precession being weathered by the action of an alternating magnetic field. SUMMARY The present invention relates to I.A survey method with alone or in combination, the following features 10 It establishes and it interrupts repetitive manner a bias condition of the **fluids** contained in the interior of the borehole and in the vicinity thereof to allow proton precession in a series under the influence of Earth's magnetic field; 20 is applied to precessionnant alternative proton magnetic fields - after the establishment of each way of polarization condition taint to at least two degrees different phase relationships between individuals said set; 30 We measure a characteristic relaxation time of protons inside the borehole and in the vicinity thereof after the removal of alternative magnetic fields cited above; 40 The frequency of each alternating magnetic field corresponds to the frequency of said set 50 It generates signals representative of the free decay of said set immediately after the removal of alternative magnetic fields ABOVE to determine a relaxation time of protons in the borehole and in the vicinity thereof; 60 Alternative magnetic field first ADVERSELY has a first level, then a second level, the phase relationships between individuals of said set; 70 It generates signals representative of the precession of said assembly in moments or individuals are in phase, these moments is presenting a PREDETERMINED time intervals after the removal of each alternative magnetic fields cited above; 80 is applied to a first set of protons precessionnant a first alternating magnetic field after a first time interval predetermine after interrupting a first bias condition, a way to taint the phase relationships between individuals of said first set; 90 It generates a first signal representative of a characteristic of the relaxation times of the protons of said first set after the removal of said first alternating magnetic field; 100 is applied to a second set of protons precessionnant a second alternating magnetic field after the interruption of a second bias condition after a different time interval of the first time interval cited above, of a way taint the phase relationships between individuals said second set; 110 It generates a second signal representative of a characteristic relaxation time of protons said second set after the removal of the second alternating magnetic field cited above; 120 It generates said first and second signals based on the depth of the probe in the borehole to determine the variations with depth of character of **fluids** hydrogens present in the earth formations traversees by the survey; 130 The first signal is representative of the free decay of said first set after striking out the first magnetic field alternating cited above, and the second signal is representative of the free decay of said second set after the removal of the second alternating magnetic field cited above; 140 It generates a first signal representative of said first set when eluiei is such that its people are in phase after a period which is of the

order of said time interval after removal of the first magnetic alternating field - native cited above; 150 is applied to a second set of protons precessionnant a second alternating magnetic field after a predetermined time interval after the interruption different ends of a second bias condition, a way to taint relations between individuals of said second set of protons. It 160 generates a second signal representative of said second set when it is such that its people are in phase after a period which is of the order of said second time interval after the removal of the second alternating magnetic field cited above; 170 applying a magnetic field of horizontal orientation polalisation in Wui formations are in the vicinity of the borehole walls to establish a bias condition protons; 180 is interrupted suddenly said magnetic bias field to allow rotons to precess under the influence of terrestrial magnetique field; 190 is applied an alternating magnetic field to the frequency of precession of said protons in the Earth's magnetic field, the alternating magnetic field appearing at the expiration of a period of time after the removal of that tick ny polarization field, this time interval being agenda transverse relaxation time of water; 200 It generates a signal representative of the amplitude of precession in the Earth's magnetic field has ny the expiration of a time interval even after the application of alternating magnetic field; 210 is the reitire ABOVE stages of the process for at least another value of said time interval in each of several locations along the borehole, and it records the signals as resul as a function of depth of said locations; 220 is applied during a first time interval of a magnetic bias field to establish a **fluid** bias condition in the borehole and in the vicinity thereof; 230 is abruptly modifies said field my bias magnetic at the end of said first time interval to enable the protons precess in a set under the influence of the earth magnetic field; 240 is applied to the protons precessionnant an alternating magnetic field for a third time interval starts after a second time interval after the end of said first jingle will dregs of time; 250 During the period following said third time interval, detecting the precession of said set to generate a signal which is repre sentative, and it receives this signal as a function of depth and of the probe into the hole - survey; 260 is repeated to the same depth in the poll, the stages mentioned above by changing trusting the value of said first time interval; 270 is repeated stages mentioned above by changing the value of said second time interval. 280 is detected in the period following said third time interval, an echo of spin precession in the said set to generate a signal that is representative; 290 is detected, approximately at the end of a period fol lowing said third time interval is equal to said second time interval, an echo of spin precession in the said set to generate a signal that is representative; 300 After said third time interval, detecting the precession of said assembly, and is engen dre a signal which is representative of the maximum amplitude of said precession; 310 is repeated to the same depth in the goldenrod, stadiums mentioned above by modifying one of said first and second time intervals; 320 is applied to the same depth in the survey, a unidirectional magnetic field localizes to taint the default of homogeneity of the total magnetic field n that depth; 330 is repeated stages mentioned above to record a second signal representative of said set precessionnant in a magnetic field of a different character; 34 is repeated stages mentioned above to register a signal representative of said echo sccond spin in a magnetic field of different character; It generates 350 and it detects the nuclear precession signals in the terrestrial magnetic field in each of several locations in the borehole; 360 We modify the Earth's magnetic field in each of said locations by applying a magnetic field to locate character not um- form of way actually create a gradient in the Earth's magnetic field; It generates 370 and it detects the nuclear precession signals in the terrestrial magnetic field changes; 380 is recorded said signals depending on the depths of said locations in the borehole. II.A survey apparatus, in which the core is initially polarized in a magnetic field and, in a sudden change of the magnetic field, are suddenly let free to precess in the Earth's magnetic field, and which present the following characteristics, only or combined: 10 means generate a control function, after a predetermine time interval following the sudden variation cited above said magnetic field, for applying an alternating magnetic field to the frequency of precession of said cores in the earth magnetic field for a period of time at least sufficient to alter the system substantially precessionnant said cores; 20 Ways measure the amplitude of precessionnant field after the removal of said alternating magnetic field; 30 A unit of exploration may occouper different depth positions in the interior of the borehole; 4 A field coil unit and said means for applying the relatively high current in this field coil produces a magnetic bias field in a substantially horizontal diree- tion to and beyond the walls of the borehole; Means 30 are sharply decreasing said high current and maintain for a period PREDETERMINED the magnitude of said bias magnetic field at a level that is about ten times the magnetic field be land; 60 Ways excite said AC field coil to produce a magnetic field that begins at the expiration of a time interval following the sudden decay of said high current, this interval being substantially equal to the relaxation time transervale water; 70 Ways measure the amplitude of the precession of Larmor in the terrestrial magnetic field that begins after a time interval even after the application of alternating magnetic field 80 Means apply a gradient field in the direction of Earth's magnetic field to varying the amplitude of said Larmor precession; 90 Means comprising a field coil precessionnant apply to protons, a Pexpi- ration of a time interval, alternating magnetic fields of frequency corresponding to the frequency of said assembly in the terrestrial magnetic field; 100 Means excite said field coil after the erablissezment each successive bias conditions when said time interval at least two values of a taint way, first to a first degree, and then to another degree, phase relationships between individuals of said set; 110 Means comprising coils detector LOCATED IN influence of that whole area, generate signals representative of the precession of said assembly after the removal of each of the alternative magnetic fields; 120 Means record said signals as a function of depth into the sample, whereby one can determine a relaxation time of said protons in the borehole and in the vicinity thereof; 130 A primary field coil is oriented with its axis perpendicular to its length; 140 means comprising sensor coils are arranged so that these coils are oriented perpendicularly to the axis of said primary field coil; 150 Sources of unidirectional current and alternating current are planned; 160 Means selectively apply said unidirectional current and said alternating current to said primary field coil sequentially in time, a way of generating a pre nuclear transfer protons in adjacent earth formations; 170 means, connected to said means including sensing coils, selectively apply precession induced signals in said coil assembly to identify the nature of **fluid** traverses by the survey; 180 One unit of exploration, including the coils, establishes and detects the magnetic fields in neighboring formations borehole; 190 A cable supports and moves the said unit in the borehole; 200 It is expected a DC power source and recording means; 210 A control system establishes connections between said current sources, said recording means and said coils, and this system may be actuated in a first sequence predetermined for connecting said DC source said coils during a first predetermined interval and then for a third predetermined interval after removal of said DC after a second predetermined time interval for connecting said AC source to said coils and, during the interval following said third interval, said coils for connecting said recording means; The ele 220Circuit ments, comprising normally open switches, are used to interconnect said current sources; 230 The coils comprise a field coil and a detection coil, and said control system interconnecting said current source and said field coil, etinterconnecte said detection coil and said recording means, and is operable, according to a first sequence predetermined for connecting said DC source to said field coil during a first interval predeter- mine, and then for a third predetermined interval after removal of said DC after a second predetermined time interval for connecting said alternating current source to said field coil, and, during the interval following said third predetermined interval for connecting said sensor coil to said recording means; 240 Means are planned in the control system to change the fun of magnitude of said first and second time intervals; 250 A control system, which can be actuated with a time relation is predetermined by report lowering the value of the magnetic field, establishes for a time interval predetermine an alternating magnetic field indicated to modify the precession said cores; 260 a detection circuit comprising a detection coil in the field of influence of said precessionnant nuclei and operable by said control system transmits to the ground surface during the next interval repeats alternating magnetic field signals representative of that precession; 270 A measurement system, comprising recording means to the surface connected to said detection circuit and responsive to said signals, registers these signals according to the depths in the survey which said magnetic fields hole are established to enable identification I the character of the **fluids** that comprise said cores; 280 A secondary field coil is oriented in such a manner that its axis makes a substantial angle to the axis of said primary field coil; 290 Means selectively excite said primary and secondary field coils to the riser polarized protons in the **fluid** present in the borehole or in the vicinity of the latter, and to control the precession of the protons, respectively; 300 Means selectively apply the signals induced in the sensor coils to identify the character of said **fluids**; 310 The secondary field coil and the detecting coil are arranged adjacent to said primary field coil; The survey of 320 units has a tubular shape elongated, and the primary field coil has its axis perpendicular to the axis of said probe unit; 330 The secondary field coil has its axis parallel to the axis of said primary field coil; 340 Means selectively apply a unidirectional current to both said primary and secondary field coils to establish a **fluid** bias condition in the borehole and in the vicinity thereof to control the precession in the Earth's magnetic field; 350 Means apply an alternating current to said primary field coil with a space-time relationship with respect to the excitement of this coil by said unidirectional current way to modify the precession said protons; Means 360 are connected to said detection coil to record a function of depth in the survey the signals induced in the detector coil after the application of alternating current to said primary field coil.

**Probable Assignee:** SOCONY MOBIL OIL CO

**Earliest Publication Date:** 19620108

**21) Family number:** 21423262 (FR1411657A)

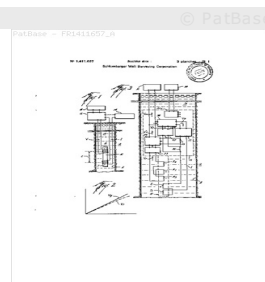
**PROCEDES ET APPAREILS POUR L'ETUDE DES FORMATIONS GEOLOGIQUES TRAVERSEES PAR UN SONDAGE**  
**METHODS AND APPARATUS FOR THE STUDY OF GEOLOGICAL FORMATIONS CROSSINGS BY POLL**  
**(MACHINE TRANSLATION)**

**Abstract:** Source: FR1411657A (Claim 1) 1 Procèdes et appareils pour l'etude des propriétés des formations géologiques traversées par un sondage, d'après la méthode dite de carot- tage par induction greater than, suivant laquelle une ou plusieurs bobines émettrices plongées dans le sondage et parcourues par un courant alternatif, induisent dans les formations des courants de Foucault, qui à leur tour induisent dans des bobines réceptrices disposées à distance constante des bobines émettrices, des signaux de voltage que l'on mesure et qui servent à déterminer la conductivité des formations, caractérisées par le fait qu'après l'élimination le cas échéant des perturbations apportées par le couplage direct entre les bobines émettrices et réceptrices, on élimine tout au moins partiellement les perturbations dues à l'effet de peau en faisant varier la fréquence d'excitation des bobines émettrices en raison inverse de la conductivité des couches. 20 Procèdes et dispositifs d'après 1<sup>er</sup>, dans lequel les indications de conductivité sont obtenues en mesurant une composante de phase donnée du champ électro-magnétique, produit par le passage du courant alternatif induit dans la substance de la formation par le système de bobines, et en combinant avec le résultat de cette mesure, d'une manière convenable, une fonction de la composante en quadrature de phase de ce champ électro-magnétique. 3<sup>o</sup> Procèdes et dispositifs d'après 1<sup>er</sup>, suivant lequel on ne recueille que les indications de la valeur représentative de la conductivité d'un signal de phase donnée, les non-linéarités indésirées, dues à l'effet de peau étant diminuées en augmentant la grandeur de ce signal de phase donnée comme fonction non linéaire de la valeur de la conductivité de la formation.

**Machine translation:** (Claim 1) 1 Processes and apparatus for the study of the properties of geological formations traversed by a survey, after the method called carot-tage induction Greater Than, after which one or more transmitter coils dives in Poll and traversed by an alternating current, induced in the formations of the eddy currents, which in turn induce the receiver coils arranged at a distance constant transmitter coils, voltage signals that are measured and used to determine the conductivity formations, characterized by the fact that after elimination if any of disturbances caused by the direct coupling between the transmitting and receiving coils, we eliminate at least partially disturbance has the effect of varying the skin excitation frequency transmitter coils in the inverse of the conductivity of the layers. 20 Processes and devices after 1<sup>st</sup>, wherein the indications of conductivity are obtained by measuring a phase component given electro-magnetic field produced by the passage of alternating current induced in the substance of the training system of coils, and combining with the result of this measure, in a manner suitable one according to the phase quadrature component of the electromagnetic field. 3 "Processes and devices after 1<sup>st</sup>", according to which only **collects** information representative of the value of the conductivity of a phase signal gives the non-linearities unwanted due to the skin effect being reduced in increasing the magnitude of this signal as a function of phase nonlinear gives the value of the conductivity of the formation.

**Probable Assignee:** SCHLUMBERGER WELL SURV CORP

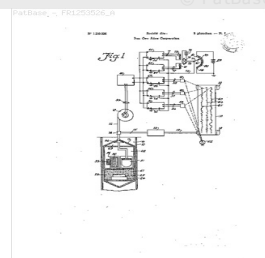
**Earliest Publication Date:** 19650924



**22) Family number:** 21682369 (FR1253526A)

**PROCEDE ET APPAREIL D'EXPLORATION DES FORAGES ET TERRAINS PAR MESURE DE LA RADIOACTIVITE**  
**METHOD AND APPARATUS FOR EXPLORATION DRILLING AND LANDS MEASUREMENT**  
**RADIOACTIVITY (MACHINE TRANSLATION)**

**Abstract:** Source: FR1253526A [Source: Claim 1] \*\*ATTENTION\*\* debut du champ CLMS peut contenir fin de DESC \*\*. Bien que l'invention ait été décrite en se référant à des modes de réalisation particuliers, il est bien entendu que l'invention n'est pas limitée à ces exemples, et que des modifications peuvent être apportées, par exemple suivant les applications envisagées sans sortir de l'esprit ni du cadre de l'invention. RESUME La présente invention a pour objet un appareil et un procédé pour l'exploration des forages ou du sol par la radio-activité naturelle ou artificielle des formations de terrains, remarquable particulièrement par les points suivants considérés isolement ou en combinaisons: 10 L'appareil comprend un bloc explorateur pouvant être descendu et remonte dans le forage à l'aide d'un câble, une source de neutrons rapides incorporée dans l'explorateur, un détecteur de neutrons rapides incorporé lui aussi dans l'explorateur et qui, en réponse aux neutrons rapides entrants émanant de la source et ayant traversé les formations, produit des impulsions d'une amplitude proportionnelle à l'énergie des neutrons rapides correspondants, un dispositif de blindage incorporé dans l'explorateur entre la source et le détecteur pour protéger celui-ci des radiations directes de la source, des moyens pour la transmission des impulsions du détecteur à travers le câble vers la surface du sol, des organes comprenant un circuit sélectif électrique pour sélectionner les impulsions d'une gamme prédéterminée d'amplitudes en éliminant à la fois les impulsions dont l'amplitude est supérieure ou inférieure aux amplitudes de la gamme prédéterminée, afin que l'amplitude des impulsions sélectionnées ne varie que pour les changements des sections efficaces neutroniques des formations correspondant à la présence de carbone,,et des moyens pour enregistrer les impulsions sélectionnées en fonction de la profondeur; 2<sup>o</sup> La source de neutrons rapides est agencée de façon à bombarder de neutrons les formations de terrain traversées pendant le déplacement de l'explorateur et la gamme d'amplitudes des impulsions du détecteur est en corrélation avec la gamme des énergies des neutrons rapides afin de produire une variation maximum de l'amplitude des impulsions comprises dans cette gamme en présence d'un élément particulier dans une formation adjacente à l'explorateur; 30 L'appareil permet l'établissement d'une courbe de la section efficace pour des neutrons rapides pour les formations traversées dans une gamme prédéterminée d'énergies de neutrons rapides, et l'explorateur comprend un cristal de scintillation pouvant interagir avec les neutrons rapides entrants et les atténuer substantiellement en produisant des impulsions lumineuses d'une intensité proportionnelle à l'énergie des neutrons rapides correspondants, des organes pour la transformation des impulsions lumineuses en impulsions de courant d'amplitude proportionnelle à l'intensité des impulsions lumineuses, un blindage protégeant le cristal contre l'action directe des radiations de la source; 4<sup>o</sup> L'appareil permet l'établissement d'un graphique sélectif des sections efficaces pour des neutrons rapides pour les -formations traversées, le détecteur de radiations comprenant un matériau sensible aux neutrons rapides d'une densité suffisante pour intercepter et atténuer substantiellement dans le forage un nombre relativement important de neutrons rapides, les impulsions du détecteur représentant les neutrons interceptés et des moyens situés à la surface du sol permettant l'enregistrement de la fréquence de formation des impulsions; 50 L'appareil permettant de déterminer la présence d'un élément particulier dans une formation comprend. un premier circuit sélectif électrique permettant de sélectionner les impulsions comprises dans une première gamme étroite d'amplitudes correspondant à une crête de la caractéristique des sections efficaces pour des neutrons rapides de l'élément considéré, un second circuit sélectif électrique permettant de sélectionner les impulsions comprises dans une seconde gamme étroite d'amplitudes correspondant à un creux de la caractéristique des sections efficaces de l'élément, de façon que les impulsions de la première gamme croissent et que les impulsions de la seconde gamme décroissent lorsque l'élément est présent dans les formations au passage de l'explorateur, et des dispositifs indiquant les changements de fréquence de formation des impulsions sélectionnées des deux gammes; 60 Des dispositifs permettent l'indication du rapport de fréquence de formation des impulsions de la première gamme de fréquence à la seconde gamme de fréquence; 70 L'appareil comprend un premier appareil pour la mesure des fréquences fournissant une première tension proportionnelle à la fréquence de



premier appareil pour la mesure des frequences fournissant un premiere tension proportionnelle a la frequence de formation des impulsions selectionnees par le premier circuit selectif, un second appareil pour la mesure des frequences fournissant une seconde tension proportionnelle a la frequence de formation des impulsions selectionnees par le second circuit selectif et un appareil pour la mesure du rapport de la premiere et de la seconde tension et connecte au premier et au second appareil de mesure de frequence; 8" Les impulsions selectionnees par une premiere paire de circuits selectifs sont comprises dans la gamme d'amplitudes d'impulsions correspondant a des parties predeterminees des caracteristiques des sections efficaces neutroniques pour le carbone, les impulsions selectionnees par une seconde paire de circuits selectifs sont comprises dans la gamme d'amplitudes d'impulsions correspondant a une troisieme et une quatrieme bande etroite d'amplitudes correspondant a des parties predeterminees correspondantes de la caracteristique de section efficace neutronique pour l'oxygene et l'appareil comprend un premier circuit de proportionnalite fournissant une premiere tension proportionnelle au rapport des signaux de sortie de la premiere paire de circuits selectifs, un second circuit de proportionnalite fournissant une seconde tension proportionnelle au rapport des signaux de sortie de la seconde paire de circuits selectifs, et un troisieme circuit de proportionnalite fournissant une indication proportionnelle au rapport de la premiere et de la seconde tension afin de permettre la detection de l'interface huile-eau dans une formation; 9" L'appareil comprend un detecteur sensible a des particules entrantes ayant une energie caracteristique, de facon a fournir une succession d'impulsions representant la frequence d'arrivee des particules, l'amplitude de ces impulsions representant ladite energie, une source de particules de reference d'un niveau d'energie connu, un dispositif de blindage empechant les particules de reference d'exciter le detecteur, des moyens permettant de deplacer ce blindage pour permettre aux particules d'exciter le detecteur, afin que celui-ci fournisse des impulsions de reference dont l'amplitude indique la sensibilite du detecteur, et des moyens pour commander l'amplitude des impulsions nommees en premier; 100 Le detecteur est un detecteur a atmosphere gazeuse et la source de particules de reference est placee a l'interieur du detecteur, les dispositifs de blindage etant places a l'interieur du detecteur et commandes de l'exterieur du detecteur pour provoquer l'excitation ou la non-excitation du detecteur par l'emission de la source; 11" La source de particules de reference comprend une membrane mince mince placee entre la source et le detecteur pour reduire l'energie des particules de reference emises par la source vers le detecteur; 12" La source de particules de reference est une source de-particules alpha de-niveau d'energie relativement eleve; 13 La commande du fonctionnement du blindage de la source de particules de reference est effectuee a travers le cable de descente; 140 L'appareil permet la detection directe de la presence d'huile et comprend une source de neutrons logee dans le bloc d'exploration, cette source emettant relativement peu de radiations gamma, un detecteur loge dans le bloc d'exploration pour detecter sensiblement a la meme profondeur dans le forage les rayons gamma de capture emis par les formations par suite du bombardement par les neutrons de la source, et les neutrons de la source ralentis dans des formations hydrogenees adjacentes au forage, le detecteur fournissant une premiere serie d'impulsions d'une premiere gamme d'amplitudes en reponse aux rayons gamma de capture detectes et une seconde serie d'impulsions d'une seconde gamme d'amplitudes en reponse aux neutrons lents detectes, les premieres et secondes serie d'impulsions etant enregistrees separement a l'exterieur du forage, en fonction de la profondeur des formations; 150 Le bloc explorateur comprend une source de neutrons rapides emettant relativement peu de radiations gamma, le detecteur de l'explorateur detectant pratiquement a la meme profondeur dans le forage les rayons gamma de capture produits par les formations par suite du bombardement par les neutrons de la source, les neutrons rapides d'une gamme d'energie predeterminee qui reviennent dans le trou de forage et les neutrons emis par cette source et ralentis dans des formations de terrain hydrogenees adjacentes au forage, ladite gamme d'energie des neutrons rapides correspondant a un point d'inflexion de la caracteristique des sections efficaces neutroniques pour le carbone, le detecteur fournissant trois series d'impulsions dans trois gammes d'amplitudes en reponse a ces detections, ces trois series d'impulsions etant enregistrees separement au-dessus du forage; 16G Le detecteur detecte les rayons gamma naturels emis par les formations du fait de leur radioactivite naturelle et fournit en reponse une serie d'impulsions d'une gamme d'amplitude determinee; 17 Les dispositifs enregistreurs n'enregistrent que les impulsions selectionnees variant avec le changement des sections efficaces neutroniques des formations provoque par la presence d'un element predetermine dans une formation; 180 Le bloc explorateur comprend un cristal pouvant scintiller sous l'action des radiations, des moyens pour amplifier et detecter l'effet de la scintillation du cristal et des moyens de surface permettant de discriminer et d'indiquer les amplitudes des impulsions de scintillation, afin de permettre l'analyse du spectre d'energie des radiations; 19 Le cable de descente du bloc explorateur comprend des conducteurs incorpores pour relier les organes du bloc explorateur et les organes de surface ceux-ci comprenant un discriminateur differentiel permettant de determiner et d'enregistrer les caracteristiques des radiations; 20 Le bloc d'exploration comprend des dispositifs pour stabiliser la temperature du cristal et du detecteur; 210 L'explorateur comprend un organe commun pour la detection et la mesure du rayonnement, un cristal monobloc d'une masse egale au moins a 10 grammes, scintillant sous le choc des rayons - gamma, cet organe comportant une surface photo sensible pouvant etre eclairee par les scintillations du cristal afin de transformer celles-ci en emission electronique, des moyens associes a la surface photosensible pour l'amplification de cette emission electronique, un indicateur connecte electroniquement a ces organes signalant les caracteristiques des radiations bombardant le cristal; 22 L'organe photosensible comprend un tube photomultiplicateur comprenant une surface photosensible, un multiplicateur d'electrons et une plaque **collectrice**, le cristal etant fixe contre la surface photosensible; 23 Un blindage entoure le cristal pour eviter qu'il ne soit deteriore par l'humidite et pour regler les scintillations vers l'interieur; 24 Le cristal est fixe contre une extremite du tube photomultiplicateur; 25 L'appareil comprend un circuit de mise en forme des impulsions sous forme de circuit univibrateur et un compteur de rapport associe au circuit de mise en forme, ce compteur de rapport comprenant un circuit filtre et un indicateur pour signaler les caracteristiques des radiations bombardant le cristal, de facon a permettre de determiner la nature des sources de radiation; 260 Le circuit de mise en forme des impulsions est un circuit basculeur monostable et le circuit filtre et l'indicateur sont connectes electroniquement au tube photomultiplicateur a travers le circuit de mise en forme; 27 Le compteur de rapport specifie au paragraphe 25 est connecte electroniquement de facon amovible; 28 L'organe scintillant sous l'action du bombardement est un organe transparent; 29 L'appareil permet la recherche des caracteristiques d'energie des radiations penetrantes, il permet la production de particules secondaires et il comprend en combinaison des moyens permettant de produire des scintillations sous l'action d'un - bombardement, ces moyens englobant un corps transparent a ses propres scintillations et d'une epaisseur superieure au rang des particules secondaires produites par la radiation dans le corps, un amplificateur recevant ces scintillations et en multipliant l'effet, et des moyens electroniques commandes par le signal de sortie de cet amplificateur et comprenant des moyens pour indiquer les caracteristiques d'energie des radiations bombardant l'organe de scintillation; 30 L'appareil permet l'exploration des caracteristiques d'energie des photons gamma, ces photons gamma pouvant produire des photoelectrons dans l'organe de scintillation qui comprend un corps transparent a ses propres scintillations et qui absorbe entierement l'energie de ces photoelectrons; 31 L'appareil d'exploration comprend des moyens repondant au bombardement par neutrons rapides en scintillant sous l'action de protons de recul, un amplificateur recevant les scintillations et delivrant des impulsions de sortie fonction de l'amplitude des scintillations, des moyens discriminateurs integreurs actionnes par le signal de sortie de l'amplificateur et pouvant laisser passer toutes les impulsions d'un niveau d'energie superieur a un niveau predetermine, et des moyens indicateurs actionnes par le signal de sortie du discriminateur integreur pour donner les caracteristiques de l'espace explore; 32 L'appareil permet la detection et la mesure des rayons gamma 33 Les rayons gamma font scintiller le cristal; 340 L'appareil permet la mesure des rayons gamma emis par l'huile dans un forage d'un puits de petrole; 35 Les impulsions parvenant a la surface du sol sont divisees en groupes d'apres l'amplitude des impulsions; 360 La frequence de formation des impulsions de chaque groupe est transformee en signaux de courant continu 370 Le groupe explorateur a des dimensions lui permettant la descente dans un forage de petrole etroit et profond; 38 Le dispositif peut etre adapte sur un avion ou appareil volant pour la detection, la mesure et l'enregistrement en vol de l'intensite des radiations gamma de la surface du sol; 39 Le procede d'exploration des puits par recherche de leur radio-activite comprend les operations suivantes: on fait traverser les formations a travers lesquelles a ete etabli le forage par une source de neutrons de facon a irradier de neutrons les formations, on detecte simultanement au cours de la meme descente de l'explorateur les radiations gamma en un point suffisamment rapproche de la source pour que les neutrons rapides puissent l'atteindre en provoquant systematiquement des impulsions electriques correspondantes, on transmet ces impulsions electriques a la surface du sol, on les divise en groupes en fonction de leurs amplitudes, on derive separement les signaux en courant continu, proportionnels a la frequence des impulsions, de chaque groupe, et on enregistre separement ces signaux en fonction de la profondeur a laquelle la detection a ete effectuee dans le forage; 400 Suivant une forme de mise en oeuvre du procede, on utilise un detecteur de neutrons comprenant une substance qui interagit avec les neutrons et emit des particules lourdes du fait de cette interaction et on agence des

organes cristallins de façon à les faire scintiller sous l'action des particules lourdes émises, de façon à convertir les photons de lumière engendrés dans le cristal en impulsions électriques proportionnelles et on mesure ces impulsions électriques pour obtenir une indication sur les propriétés physiques des formations. [Source: Claim 1] \*\* WARNING \*\* start of CLMS field may contain late <br /> While the invention has been described by referring to particular modes of realization, it is understood that the invention is not limited to these examples, and modifications which have been made can be, for example according to the envisaged applications without departing from the spirit and scope of the invention. SUMMARY the present invention for an object apparatus and a method for exploration drilling and ground by natural or artificial radio-activity of land formations, particularly remarkable by the following regarded isolation or in combination: 10 the apparatus comprises a block explorer can be down and back in the drilling using a cable, a neutron source INCORPORATED fast in the browser, a fast neutron detector also incorporates it in the explorer who, in response to incoming fast neutrons emanating the source and having cross training, produces pulses of a magnitude proportional to the energy of the corresponding fast neutron shielding device incorporates in explorer between the source and the detector to protect celui-ci direct radiation from the source, means for transmitting pulses of the detector around the cable to the ground surface, organs comprising an electric selective circuit for selecting pulses from a range of magnitudes PREDETERMINED in eliminating both the pulses whose amplitude is above or below the amplitude of the range predetermined in order that the amplitude of selected pulses varies only for changes in effective neutron cross-sections of corresponding formations carbon presence,, and means for recording the selected pulses as a function of depth; 2 " the fast neutron source is arranged to bombard the neutron field training traversees during the displacement of the explorer and the range of amplitudes of pulses the detector is correlated with the range of energies of fast neutrons to produce a maximum variation of the amplitude of pulses included in this range in the presence of a particular element in an adjacent training explorer; 30 the device allows the establishment of a curve of the cross section for fast neutrons for traversees formations within a predetermined range of energies of fast neutrons, and the browser includes a scintillation crystal that can interact with incoming fast neutrons and mitigate the substantially producing light pulses of an intensity proportional to the energy of the corresponding fast neutron organs for processing light pulses in amplitude current pulses proportional to the intensity of the light pulses, a shield PROTECTION the crystal against the direct action of radiation from the source; 4 " the device allows the establishment of a graphic selective cross sections for fast neutrons for -Training traversees the detector includes a radiation sensitive material to fast neutrons of sufficient density to intercept and mitigate substantially in drilling relatively important number of fast neutrons, the pulses of the detector intercepts representing the neutrons and means situated in the surface allowing recording of the pulse frequency of training; 50 the apparatus for determining the pre. presence of a particular element in a training includes. First selective electrical circuit to select the pulses included in a first narrow range of amplitudes corresponding to a ridge of the characteristic cross sections for fast neutrons of the element considered, a second electric circuit for selective select pulses included in a second narrow range of amplitudes corresponding to a recess of the characteristic element of effective sections of way that the pulses of the first range grow and the pulses of the second range decrease when the element is present in the training to the passage of the explorer, and devices indicating the formation of frequency changes of selected pulses of both ranges; 60 devices allow the indication of the training frequency ratio pulses of the first frequency range a second frequency range; 70 the apparatus includes a first device for measuring frequencies providing a first voltage proportional to the formation of frequency pulses selected by the first selective circuit, a second device for measuring frequencies providing a second voltage proportional to the pulse forming frequency selected by the second selective circuit and a device for measuring the ratio of the first and second voltage and connects the first and second frequency meter; 8 " the pulses selected by a first pair of selective circuits are within the range of pulse amplitude corresponding to predetermined portions of the features sections neutron effective for carbon, the pulses selected by a second pair of selective circuits are within the range of pulse amplitudes corresponding to a third and a fourth narrow band of amplitudes corresponding to the corresponding predetermined portions of the section feature effective neutron to the oxygen and the apparatus comprises a first proportionality circuit providing a first voltage proportionnelle the ratio of the output signals of the first pair of selective circuits, a second proportionality circuit providing a second voltage proportional to the ratio of the signals Release of the second pair of selective circuit, and a third proportionality circuit providing an indication proportional to the ratio of the first and second voltage to enable the detection of the oil-water interface in training; 9 " the apparatus comprises a detector sensitive to incoming particles have a characteristic energy of way to provide a succession of pulses representing the frequency of particle arrival, amplitude. Of these pulses representative said energy, a source of reference particles of known energy level, a shielding device empêchant the reference particles excite the detector, the means to move the shield to allow the particles to excite the detector so that it provides the reference pulses whose amplitude indicates the sensitivity of the detector, and means for controlling the amplitude of first; the detector 100 is a detector gas atmosphere and a source of reference particles is placed on the inside of the detector, the shielding devices being has the seats 'inside the detector and orders from outside the detector to cause excitation or non-excitation of the detector by the issuance of the source; 11 " the source of particles Reference includes a thin thin membrane placed between the source and the detector to reduce the energy of the particle reference issued by the source to the detector; 12 " the source of particles reference is a source of alpha-level of relatively high energy; 13 control of the operation of the shielding of the source of particles Reference is performed through the descent cable; 140 the device enables the direct detection of the presence of oil and includes a neutron source housed in the exploration block, this source emitting relatively little gamma radiation, a detector housed in the exploration block to detect substantially the same depth in the drilling capture gamma rays emitted by training as a result of bombardment by neutrons from the source, and neutron source slowed in adjacent formations hydrogenated drilling, ~ the detector providing a first series of pulses of a first amplitude range in response to the capture gamma rays detected and a second series of pulses a second amplitude range in response to slow neutrons detected and the first few seconds pulse series being recorded separately on the outside of the drilling, depending on the depth of training; 150 the explorer block includes a neutron source emitting relatively rapid little gamma radiation, the detector explorer DETECTING practically has the same depth in the drilling capture gamma rays produced by the formations as a result of bombardment by neutrons from the source, fast neutrons from a range of predetermined energy returning to the borehole and the neutrons emitted by this source and slow down in hydrogenated adjacent earth formations drilling, said range corresponding to energy of fast neutrons is a point inflection characteristic of the neutron cross sections for carbon, the detector providing three series of pulses in three ranges of amplitudes in response to these detections, these three series of pulses being recorded separately above the borehole; 16G the detector detects the gamma rays emitted by natural formations because of their natural radioactivity and in response provides a series of pulses with a range of determined amplitude; 17 devices recorders record only selected pulses varying with the change of neutron cross sections training causes by the presence of an element in a predetermine training 180 the explorer block includes a crystal that could sparkle under the action of radiation, means to amplify and detect the effect of the scintillation crystal and surface means to discriminate and indicate the amplitudes scintillation pulse to permettre the analysis of the energy spectrum of radiation; 19 the cable down the block explorer incorporated includes drivers to connect explorer block the bodies and organs of area thereof comprising a discriminator dif tial to determine and eiregis Trer the characteristics of radiation; 20 the exploration block comprises available positive persons into stabilizing the temperature of the crystal and of the detector; the explorer 210 includes a joint body for the detection and measurement of radiation a piece of crystal at least equal mass 10 grams, glittering under the impact of radiation - gamma, this body with a photo area sensitive that can be illuminated by scintillation crystal to transform these into issued electronic sion of the partners has the means areaPhotosensitive for amplification of this issuance electronics, electronic indicator connects ment has these bodies indicating the characteristics radiation bombarding the crystal; 22 the photosensitive member comprises a photomultiplier tube comprising a surface photosensible, an electron multiplier and a collector plate, the crystal being fixed against the surface of photosensitive; 23 A shield surrounds the crystal to avoid it is deteriorated by moisture and rule chir scintillation inwards; 24 the crystal is fixed against one end of the photomultiplier tube; 25 the apparatus comprises a pulse shaping circuit as circuit univri brateur and report meter combines the circuit formatting, report meter/> <BR picture; 31 the scanning apparatus includes rapids glittering under the action of protons hindsight, an amplifier receiving the scintillation and providing output pulses based amplitude scintillation of discrimi means mineateurs integrators sets in action by the signal output of the amplifier and can pass all pulses of energy level supe laughing a predetermine level and indi means ers sets in action by the integrator discriminator output signal to give FEATURES tick explores space; 32 the instrument allows the detection and measurement gamma rays 33 gamma rays are the crystal sparkle; 340 the device allows -the measuring gamma rays emitted by oil in drilling a well petroleum: 35 pulses reaching the surface of the ground are DIVIDED in after the magnitude pulse groups; 360 the

training frequency of pulses of each group is transformed into DC signals 370 the explorer group dimension him to the descent into a drilled oil narrow and deep; 38 the device can be adapted on an airplane or flying machine for the detection, measuring and recording flight of the intensity of gamma radiation from the soil surface; 39 the PROCESS exploration wells by looking for their radio-activity includes the following operations: is passed through the formations through which drilling has been established by a source of neutrons way to radiate neutrons training, we detected simultaneously in the same descent explorer gamma radiation at a point close to the source for fast neutrons can reach it by systematically causing corresponding electrical impulses are transmitted these electrical pulses to the surface, it divides into groups according to their amplitudes, is derived separately the DC signal, proportional to the frequency of the pulses of each group, separately we record these signals depending on the depth at which the detection has been effected in the borehole; 400 in one form of implementation of the process, using a neutron detector comprising a substance that interacts with neutrons and emits heavy particles due to this interaction and agency crystalline bodies of way to do the flicker under the action of heavy particles issued from the way a convert light photons in the crystal begetttest proportional electrical pulses and measuring these electric pulses to obtain an indication of the physical properties of the formations.

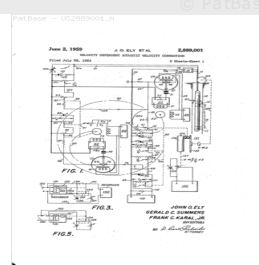
**Probable Assignee:** PAN GEO ATLAS CORP

**Earliest Publication Date:** 19610210

**23) Family number: 22750718 (US2889001A)**

#### VELOCITY DEPENDENT ACOUSTIC VELOCITY CORRECTION

**Abstract:** Source: US2889001A (Claim 1) 1. In a logging system in which there is produced a signal proportional to time of travel of acoustic pulses primarily through earth formations between two spaced apart points Within a liquid filled borehole and wherein said points are moved with the same spacing to different depth locations along said borehole, the combination which comprises a measuring system to which said signal is applied, means in said system for generating a second signal which is representative of the time of travel of an acoustic pulse over paths extending from said points through the liquids in said borehole to the adjacent borehole wall 'at one of said locations, means for modifying said second signal in dependence upon the ratio of the Velocity of sound in said liquids to the velocity of 2,ss9,oo1 sound in the formations adjacent said points as the depth of said locations is changed, and means for \_registering the difference between the iirst mentioned signal and the modihed second signal as a function of the depths of said locations in said borehole.



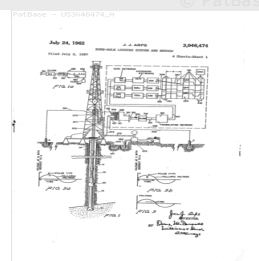
**Probable Assignee:** SOCONY MOBIL OIL CO INC

**Earliest Publication Date:** 19590602

**24) Family number: 22769806 (US3046474A)**

#### BORE-HOLE LOGGING SYSTEM AND METHOD

**Abstract:** Source: US3046474A (Claim 1) claim: 1. A method of signaling from the bottom of a bore hole during drihling which comprises the steps of gencratin.- electrical energy loeegly in said bore hole, capacitively storing said ener.\_y, and then suddenly discharging said stored energy th-rough the formations adjoining said bore hole between two spaced zones in said bore hole, radiating thereby a powerful electromagnetic pulse through such adjoining formations, repeating said aforementioned steps at controlled intervals responsively to the varying valties of a physical condition existing in said bore hole tO ptoduce a train of such radiated pilses, and detectin, the radiated pulses at the surface of the earth.



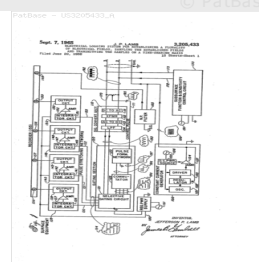
**Probable Assignee:** ARPS CORP

**Earliest Publication Date:** 19620724

**25) Family number: 22797796 (US3205433A)**

#### ELECTRICAL LOGGING SYSTEM FOR ESTABLISHING A PLURALITY OF ELECTRICAL FIELDS, SAMPLING THE ESTABLISHED FIELDS AND TRANSMITTING THE SAMPLES ON A TIMESHARING BASIS

**Abstract:** Source: US3205433A (Claim 1) 1. An electrical log.-ing system for log.ain,a an extent of earth borehole comprising: first means to \_enerate an alternating current of constant intensity; movable means for traversal along the extent of borehole; cable means including insulated electric conductors interconnecting said first means and said movable means for traversing the latter along the extent of borehole and for current and signal transmission therebetween; said movable means comprising current-commutating and electrode means for causing alternating current supplied by said first means to pass successively throu.-h each of a plurality of paths in the borehole-encircling earth to produce therein successively existent alternating electrical fields; said movable means further comprisin.- means to secure alternating current samples each representing the intensity of a respective one of said fields to provide A.C. signals each representing the intensity of a respective one of said fields; and means in said movable means including a common amplifier to amplify the A.C. si.\_nals each in its turn; rectifier means in said movable means for rectifying said A.C. signals to direct-curr.ent pulses and applying the direct-current pulses to conductors of said cable for transmission to a location outside the borehole; and means outside the borehole for utilizing the transmitted directcurrent pulses to produce graphical log representations of respective alternating current samples; said means outside the borehole includin.- a synchronous converterrectifier unit for chopping the transmitted direct-current pulses into respective bursts of pulses of shorter duration and converting the bursts of pulses into respective bursts of alternating current of the chopping frequency and for synchronously with the chopping rectifying the bursts of alternating current into reconstituted directcurrent pulses each representing a respective transmitted direct-current pulse, and further including in said means outside the bore- hole a filter for removing alternatin.- current components from the reconstituted direct-current pulses.



**Probable Assignee:** DRESSER IND

**Earliest Publication Date:** 19650907

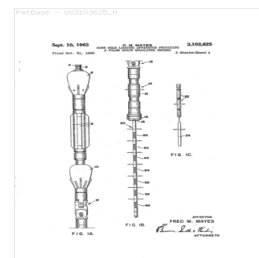
**26) Family number: 22817405 (US3103625A)**

#### BORE HOLE LOGGING APPARATUS PROVIDING A PULSE SPACE MODULATED RECORD

**Abstract:** Source: US3103625A (Claim 1) 1. Bore hole logging apparatus comprising a housing adapted to be moved lengthwise in a bore hole, electrode means secured to said housing to be lowered therewith, means providing a ground connection to the earth surrounding the hole being logged, said electrode means including first and second current electrodes and including potential electrodes responsive to the potential difference between predetermined points in the bore hole, means within said housing providing current to the earth through said first current electrode and said means providing a ground connection, means within said housing responsive to said potential difference to provide current flow to said second current electrode to reduce approximately to zero said potential difference, means in said housing advancing a record member at a rate independent of the rate of movement of the housing in a bore hole, and means in said housing responsive to the potential of at least one of said potential electrodes to provide within said housing a pulse space modulated record of that potential on said record member, the cycles of which record have a substantially constant length along the record member.

**Probable Assignee:** SUN OIL CO

**Earliest Publication Date:** 19630910



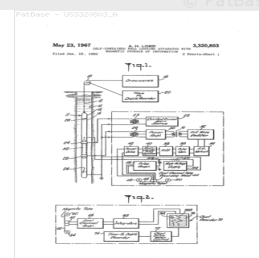
**27) Family number: 22932458** (US3320803A)

## SELF-CONTAINED WELL LOGGING APPARATUS WITH MAGNETIC STORAGE OF INFORMATION

**Abstract:** Source: US3320803A (Claim 1) 1. In the method of logging a borehole penetrating the earth wherein self-contained logging apparatus is caused to be moved continuously therethrough at a predetermined uniform speed to obtain an analog type electrical signal indicative of a characteristic of earth formation surrounding said borehole as a function of depth of said apparatus in said borehole and simultaneously making a time-depth record of the location of said apparatus in said borehole as a function of time, the improvement comprising converting said analog type electrical signal to a digital type electrical signal, recording said digital signal on magnetic tape at a predetermined uniform tape transport speed, subsequently playing back said magnetic tape at a predetermined faster tape transport speed than said recording tape transport speed, reconvertng said recorded digital signal to an analog type electrical signal, and recording said analog signal on a chart recorder at a predetermined chart speed, said chart speed being controlled by said time-depth record made during the logging operation to produce a chart record of said earth characteristic as a linear function of depth of said logging apparatus in said borehole.

**Probable Assignee:** TEXACO INC

**Earliest Publication Date:** 19670523



**28) Family number: 22963521** (FR1349958A)

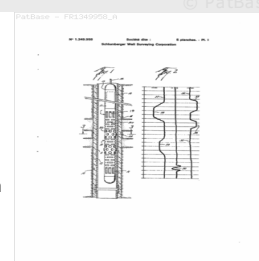
## APPAREIL POUR L'EXPLORATION DES SONDAGES, NOTAMMENT PAR PROCEDES ACOUSTIQUES APPARATUS FOR EXPLORATION DRILL, ESPECIALLY BY ACOUSTIC METHODS (MACHINE TRANSLATION)

**Abstract:** Source: FR1349958A (Claim 1) \*\*ATTENTION\*\* debut du champ CLMS peut contenir fin de DESC \*\*. d'alimentation 72a est applicable a n'importe quel type de circuit dispose dans le sondage, pour remplacer le commutateur pas a pas et le solenoide 78, et qui est actionne selectivement par un signal qui n'actionne pas la source d'alimentation 72a. En meme temps que les dispositifs de sondage acoustiques ci-dessus decrits explorent la matiere entourant le sondage par des impulsions acoustiques, et fournissent des impulsions de polarite donnee au conducteur commun 44 du cable, un compteur a scintillation 140, qui detecte la radioactivite dans les formations adjacentes fournit des impulsions positives par rapport a une valeur de reference.

**Machine translation:** (Claim 1) CAUTION \*\* start of CLMS field may contain end of DESC \*\*. Supply 72a is applicable to any type of circuit features in the survey, to replace the switch has not and not the solenoid 78, which is selectively actuated by a signal which does not activate the power source 72a. At the same time as the acoustic harassment devices described above explore the matter surrounding the survey by acoustic pulses, and provide pulses of a given polarity to the common conductor 44 of cable, a scintillation counter 140, which detects the radioactivity in the adjacent formations provides positive pulses with respect to a reference value.

**Probable Assignee:** SCHLUMBERGER WELL SURV CORP

**Earliest Publication Date:** 19640124



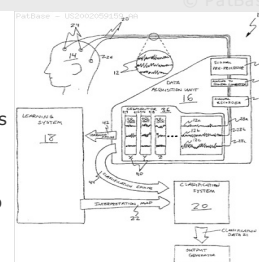
**29) Family number: 23133766** (US2002059159A)

## DRUG PROFILING APPARATUS AND METHOD

**Abstract:** Source: US2002059159A A method for assessing a condition of an organism having body waves corresponding to states of the organism. The method may include the step of recording signals corresponding to a body wave, output by a portion of the organism in a first state, to provide a first record. In a similar manner, signals may be recorded during a time period in which the organism is in a second state, to provide a second record. The first and second records, may be processed by applying feature expansion procedures thereto. The results of the feature expansion procedures may be evaluated to identify first selected feature expansion procedures effective to distinguish values of the first signals corresponding to the first state from values of the first signals corresponding to the second state.

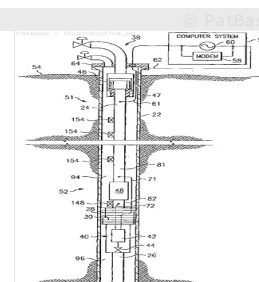
**Probable Assignee:** BRIGHT IDEAS LLC

**Earliest Publication Date:** 20020516



**30) Family number: 28044317** (US2003024704A)

## USE OF DOWNHOLE HIGH PRESSURE GAS IN A GAS-LIFT WELL



**Abstract:** Source: US2003024704A A gas-lift petroleum well (38, 98, 150) and method for producing petroleum products using downhole pressurized gas to provide lift. The gas-lift well (38, 98, 150) comprises a well casing (22), a production tubing (24), a packer (40), and a gas-lift valve (148). The well casing (22) extends within a wellbore of the well (38), and the wellbore extends through oil and gas zones. The production tubing (24) extends within the casing (22). The tubing (24) comprises an opening formed therein, which is in **fluid** communication with an oil zone. The packer (40) is located downhole in the casing (22) and coupled to the tubing (24). The packer (40) can comprise an electrically controllable packer valve (44), which is adapted to control a flow of downhole pressurized gas from one side of the packer to another. The downhole pressurized gas is provided by a gas zone that the wellbore passes through. The downhole gas-lift valve (148) is coupled to the tubing (24) and is adapted to control a flow of downhole pressurized gas into oil in the tubing for lifting the oil. The gas-lift valve (148) can be an electrically controllable valve. The tubing (24) and casing (22) are used as electrical conductors for supplying power and/or communications downhole. The current in the tubing (24) is routed using a ferromagnetic induction choke (48) to create a voltage potential, which provides electrical power to downhole electrical devices. Also, there may be a bypass passageway (146) to route downhole gas to gas-lift valves (148, 154). There may also be downhole sensors to measure physical quantities (e.g., pressure). Such measurements can be used for feedback control of downhole electrically controllable valves.

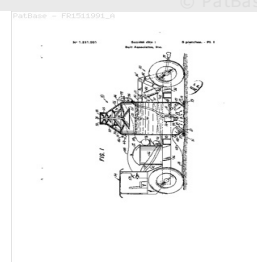
**Probable Assignee:** SHELL OIL CO

**Earliest Publication Date:** 20010907

**31) Family number: 29715586** (FR1511991A)

## **PROCEDE ET APPAREIL DE PROSPECTION SISMIQUE** **METHOD AND APPARATUS FOR SEISMIC (MACHINE TRANSLATION)**

**Abstract:** Source: FR1511991A [Source: Claim 1] **\*\*ATTENTION\*\*** debut du champ CLMS peut contenir fin de DESC **\*\*.** sous haute pression dans la chambre 93 quand cette chambre est remplie d'air comprime et pour bruler ce carburant de facon a realiser une notable augmentation de la pression interieure avant de faire tirer le repetiteur en ouvrant la valve 89. On comprendra que le repetiteur assure une liberation brusque de la haute pression du gaz dans le reservoir 12. Ainsi on obtient cet avantage que l'impulsion puissante 25 est intense et se propage dans l'eau 20 a une vitesse qui est si grande qu'elle approche la frequence de vibration naturelle des materiaux terrestres et de ce fait, cette impulsion sismique intense est appliquee efficacement au sol De plus, le diaphragme 16 couvre une large surface du sol, de preference superieure a 56 cm2 de facon a realiser une grande surface d'accouplement sur le sol. Les differents repetiteurs acoustiques 14 que l'on montre ici representent des illustrations de dispositifs de detente de gaz pour liberer des gaz comprimes que l'on peut utiliser pour les methodes et systemes de prospection sismique executant la presente invention mais il doit etre bien entendu que l'on peut utiliser d'autres modeles de dispositifs pour la liberation soudaine de gaz sous pression dans l'eau 20. On comprendra que le reservoir rigide 12 et l'eau 20 cooperent pour realiser un accouplement efficace de l'impulsion de pression intense par le diaphragme 16 avec la terre 18. La liberation soudaine du gaz dans l'eau produit une intense impulsion de pression. Le reservoir rigide 12 evite que l'eau ne soit soufflee horizontalement a l'ecart du dispositif de liberation du gaz 14 et la reaction de la grande masse d'eau qui se trouve au-dessus du dispositif 14 aide a diriger l'intensite d'impulsion de pression vers le bas dans le sol, de facon a realiser un transfert efficace d'energie dans le sol pour y produire les secousses voulues. Il est possible d'utiliser des liquides autres que l'eau s'ils ont une densite specifique suffisante pour realiser l'accouplement recherche de l'energie dans le sol, par exemple les liquides tels que les **fluides** pour appareils hydrauliques, les huiles de graissage, le fuel huile et autres. Cependant, dans beaucoup de cas, on utilisera l'eau du fait qu'elle est suffisamment dense, relativement non compressible et que sa manipulation est sans risque en meme temps qu'elle est peu couteuse. Bien entendu, l'invention n'est pas limitee aux exemples de realisation ci-dessus decrits et representes, a partir desquels on pourra prevoir d'autres variantes de realisation, sans pour cela sortir du cadre de l'invention. RESUME L'invention s'etend notamment aux caracteristiques ci-apres et a leurs combinaisons possibles. 10 Procédé pour l'exploration sismique de formations géologiques au-dessous de la surface du sol, procede caracterise par ce qu'on enferme un volume de liquide a densite elevee, tel que l'eau, dans un recipient, dont le fond est place en relation de transmission d'impulsions avec le sol, on immerge un conteneur rigide dans ce volume confine de liquide, on comprime de l'air dans le conteneur et on detend brusquement l'air comprime en une impulsion unique du conteneur dans le volume de liquide en creant des ondes acoustiques puissantes qui sont transmises au sol a travers le fond pour creer des ondes sismiques dans le sol, on repete cette emission d'ondes sismiques a des intervalles en observant les secousses sismiques dans le sol pour obtenir des informations sur les formations géologiques, procede permettant des operations rapides et precises. 20 On place le conteneur dans le volume confine de liquide au-dessous du centre de gravite de ce volume et on detend brusquement l'air comprime dans le liquide au-dessous du centre de gravite pour transmettre une forte impulsion sismique du fond du volume de liquide dans le sol. 3 On prevoit au-dessus du niveau du liquide un espace permettant au liquide d'etre souffle vers le haut par l'air comprime et on capte ce liquide refoule pour le ramener a son volume initial. 4 On enferme plusieurs volumes de liquide de densite elevee tels que de l'eau au-dessus du sol avec le fond de ces volumes en relation de transmission d'impulsions avec le sol en plusieurs points espaces. 50 On introduit un combustible dans l'air comprime enferme dans le conteneur immerge, on allume et brule le combustible pour elever la pression de l'air confine, et on detend brusquement les gaz dans le liquide confine pour creer des secousses sismiques puissantes dans le sol. 6" Appareil d'exploration sismique pour l'application du procede precedent ou similaire. 7" L'appareil d'exploration sismique est un vehicule comprenant un reservoir en materiau solide flexible pour s'adapter a la surface du sol, des moyens pour deplacer le reservoir et des moyens pour y introduire un liquide a densite elevee tel que l'eau, un dispositif repetiteur a l'interieur du reservoir, entoure par le liquide, des moyens pour alimenter de l'air comprime dans le reservoir dans le dispositif repetiteur, lequel presente un organe de detente qui maintient l'air comprime a haute pression dans le dispositif et dans le liquide, cet organe de detente etant deplace rapidement et relachant brusquement, a repetition, de l'air comprime dans le liquide en creant des ondes acoustiques puissantes dans le liquide, lequel transmet des secousses sismiques dans les formations souterraines. 8" Des moyens sont prevus qui permettent le chappement de grandes quantites d'air ou de gaz rapidement hors du reservoir, ainsi que des moyens pour separer le liquide de l'air ou du gaz et le ramener dans le reservoir. 9" Des moyens sont montes a l'interieur du reservoir pour permettre au dispositif repetiteur de se deplacer pour absorber le recul de la detente brusque d'air comprime dans le liquide. 10 Un hydrophone est positionne dans le liquide dans le reservoir, pour enregistrer l'instant auquel les ondes acoustiques sont creees dans le reservoir. 11" Des moyens sont prevus pour introduire du combustible dans le dispositif repetiteur pour etre melange avec l'air comprime contenu et des moyens pour enflammer et bruler le combustible et engendrer une pression elevee dans le repetiteur en vue de creer des ondes acoustiques en detendant cette pression dans le liquide du reservoir. 12" Le reservoir est supporte par un chassis et des moyens sont prevus pour déposer le reservoir sur le sol et pour le soulever du sol. 13 Le chassis presente une ouverture de cadre et le reservoir de grande taille s'etend au-dessus et au-dessous de cette ouverture. 14" Des moyens sont prevus pour retirer le liquide du reservoir lorsqu'on le desire. 15 Le vehicule est pourvu de roues avant et arriere et le reservoir s'engage avec le sol entre les roues avant et les roues arriere. 16 Le reservoir possede des parois laterales rigides, un diaphragme flexible solide s'etendant a travers une extremite du reservoir pour s'engager avec le sol, les parois laterales rigides comprenant une surface de pousse vers le bas sur laquelle le liquide agit pour pousser le reservoir contre le sol lorsqu'on cree les ondes acoustiques dans le reservoir. 17 L'appareil comprend une source de vibrations sismiques pour creer de maniere repetitive des secousses sismiques a intervalles frequents dans le sol, un recipient contenant un liquide dense tel que de l'eau et engage avec le sol, un dispositif repetiteur monte dans le reservoir au-dessous du niveau du liquide, des moyens pour approvisionner de l'air comprime sous haute pression dans le reservoir dans ce dispositif immerge, ce repetiteur ayant un organe de detente maintenant l'air a haute pression dans le dispositif dans le liquide et etant deplace rapidement pour detendre l'air, un circuit de controle electrique pour declencher ce repetiteur a des intervalles frequents pour detendre l'air dans le liquide en engendrant des ondes acoustiques dans le liquide pour transmettre des secousses sismiques dans le sol, plusieurs geophones montes sur le sol en des points espaces pour enregistrer la suite des secousses sismiques resultant du declenchement repete du repetiteur, un circuit connectant chaque geophone a un appareil enregistreur pour



permettre l'analyse et la corrélation entre les enregistrements recus et en deduire les caracteristiques des formations geologiques. 18 Un hydrophone est positionne dans le liquide du reservoir et un circuit connecte cet hydrophone a l'equipement enregistreur. 19 L'installation comprend plusieurs reservoirs contenant un liquide dense tel que de l'eau, reservoirs positionnes sur le sol en des points espaces un dispositif repetiteur monte dans chaque reservoir au-dessous du niveau du liquide et un circuit etant prevu pour declencher les dispositifs repetiteurs respectifs suivant une sequence predeterminee. [Source: Claim 1] \*\* WARNING \*\* start of CLMS field may contain end of DESC \*\*. High pressure in the chamber 93 when the chamber is filled with compressed air and fuel to burn this way to achieve a significant increase in domestic pressure before making the repeater by opening the valve 89. It is understood that the repeater ensures a sudden release of high pressure gas in the tank 12. Thus is obtained the advantage that powerful impulse 25 is intense and spreads in water 20 has a speed that is so great that the approach frequency of natural vibration of terrestrial material and therefore this intense seismic pulse is applied effectively on the ground in addition, the diaphragm 16 covers a large area of soil, preferably superior to 56 cm2 way to achieve a large coupling surface On the ground. The different acoustic repeaters 14 that is shown here represent gas detente devices illustrations of tablets to liberate gas that can be used for methods and systems for seismic executant the present invention but it should be understood that you can use other models of devices for the sudden release of pressurized gas in water 20. it is understood that the rigid tank water 12 and 20 cooperate to achieve an efficient coupling of the intense pressure pulse by the diaphragm 16 with the land 18. the sudden release of gases in water produces a pressure pulse intense. The rigid tank 12 avoids that the water is blown horizontally in the gap of the release device 14 and the gas reaction of the large body of water located above the device 14 helps to direct the intensity of pressure pulse down into the soil, a way achieve an efficient energy transfer into the ground to produce the desired shaking. It is possible to use liquids other than water if they have a specific density sufficient to realize the search coupling of energy into the ground, for example, **fluids** such as **fluids** for hydraulic devices, oils Grease, oil and other fuel. However, in many cases, use water since it is sufficiently dense, relatively non-compressible and that its manipulation is safe at the same time it is inexpensive. Of course, the invention is not limited to the examples of realization described above and represented, from which we can predict other realization variants, without departing from the scope of the invention. SUMMARY The invention extends in particular to the characteristics below and after leurs combinations. 10 Method for seismic exploration of geological formations below the ground surface, characterized by this that encloses a volume of liquid with a high density, such as water, in a container, whose bottom is placed in pulse transmitting relation with the soil, immersed in a rigid container that confine volume of liquid, it compresses air in the container is suddenly relaxes and the compressed air in a single pulse of the container in the volume liquid by creating powerful sound waves that are transmitted to the ground through the bottom to create seismic waves in the ground, we repeated this issuance of seismic waves at intervals by observing earthquakes in the ground to get information on geological formations, METHOD rapid and precise operations. 20 the container is placed in the confined liquid volume below the volume of the center of gravity and the air is suddenly relaxes compresses into the liquid below the center of gravity to transmit a pulse of high seismic hinge volume liquid into the ground. 3 It is expected above the liquid level a space for the liquid to be blowing up by the compressed air and liquid discharges are picked to bring it to its original volume. 4 was sealed density of several volumes of liquid HIGH teils that water above the ground with the bottom of these volumes pulse transmitting relation with the soil in several areas points. 50 introduced a fuel in compressed air trapped in the submerged container, it lights up and burns the fuel to elevate the pressure of the air borders, and the gas is suddenly relaxes in the confines liquid to create powerful tremors in the ground. 6 "seismic device for the application of precedent or similar process.7 "The seismic device is a vehicle comprising a reservoir of flexible solid material to adapt to the ground surface, means to move the tank and means for introducing a liquid high density such that water, a repeater device in the interior of the reservoir surrounds the liquid, means for supplying compressed air into the reservoir in the repeater device, which presents an expansion member which maintains the compressed air at high pressure in the device and in the liquid, this body being detente moves quickly and releasing suddenly, a repetition of the compressed air into the liquid by creating powerful acoustic waves in the liquid, which transmits seismic in the subsurface. 8 "means are planned that allow e exhaust large quantities of air or gas quickly out of the tank, and means to separate the air or liquid gas and bring it back into the tank. 9 "Means are mounted on the inside of the tank to allow the repeater device to move to absorb the decline in air sudden detente compresses in the liquid. 10 A hydrophone is positioned in the liquid in the tank, to save the time at which the sound waves are created in the tank. 11 "means are provided for introducing fuel into the repeater device to be mixed with compressed air content and means to ignite and burn the fuel and generate high pressure the repeater to create acoustic waves by relaxing the pressure in the liquid of the tank. 12 "The tank is supported by a frame and means are planned to post the tank on the ground and to lift it from the ground. The frame 13 presents a framework of openness and large tank extends above and -Dessous of this opening. 14 "means are provided for removing the liquid from the tank when the desire. 15 The vehicle is equipped with front and rear wheels and the tank engages the floor between the front and rear wheels. The tank 16 possesses rigid side walls, a solid flexible diaphragm extending across one end of the tank to engage with the ground, rigid sidewalls including a thrust surface down onto which the liquid is to push the tank against the floor when the sound waves created in the tank. The apparatus 17 comprises a source of seismic vibrations to create repetitive manner of earthquakes has frequent intervals in the ground, a container containing a dense liquid such as water and engages with the ground, a repeater device mounted in the reservoir below the level of the liquid, means for supply of compressed air under high pressure into the reservoir in this device immerses this repeater having a relaxing body now has high air pressure in the system in the liquid and being quickly moves to relax the air, an electrical control circuit to trigger the repeater has frequent intervals to relax air into the liquid by generating acoustic waves in the **fluid** to transmit tremors in the ground, mounted on the plusieurs geophones floor spaces point to record the following seismic tremors resulting from repeated triggering of the repeater, a circuit connecting each geophone has a recorder for analysis and correlation between records receipts and deduce the characteristics of geological formations. 18 A hydrophone is positioned in the liquid of the tank and a circuit that connects the equipment has hydrophone recorder. 19 The installation comprises several tanks containing a dense liquid such as water reservoirs positioned on the ground at points spaced a repeater device mounted in each tank below the liquid level and a trigger circuit being provided for the devices respective repeaters in a predetermined sequence.

**Probable Assignee:** BOLT ASSOCIATES INC

**Earliest Publication Date:** 19670814

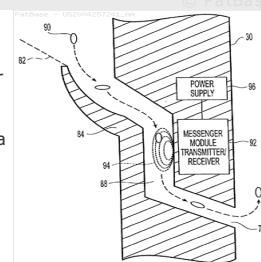
**32) Family number:** 29788198 (US2004257241A)

## METHOD AND APPARATUS FOR TRANSPORTING DATA

**Abstract:** Source: US2004257241A A method and system for data transmission where data is encoded in a number of messenger modules that are physically transported by a natural or artificially created **fluid** flow or in a slurry stream from one location to one or more other locations to transmit the data. In a specific embodiment, the invention is directed to the use of such messenger modules for continuous, quasi-continuous or time-dependent data transmission between surface-based equipment and a logging tool placed in a borehole and vice versa, or between various locations in the borehole.

**Probable Assignee:** HALLIBURTON CO

**Earliest Publication Date:** 20031120



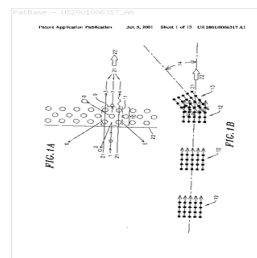
**33) Family number:** 30082270 (US2001006317A)

## GRAVITATIONAL WAVE GENERATOR UTILIZING SUBMICROSCOPIC ENERGIZABLE ELEMENTS

**Abstract:** Source: US2001006317A A gravitational wave generating device comprising an energizing means which act upon energizable elements such as molecules, atoms, nuclei or nuclear particles in order to create nuclear reactions or collisions, the products of which can move in a single preferred direction with an attendant impulse (jerk or harmonic oscillation) of an ensemble of target nuclei or other energizable elements over a very brief time period. The target nuclei or energizable elements acting in concert generate a gravitational wave. A preferred embodiment involves the use of a pulsed particle beam moving at the local gravitational wave speed in a target mass, which is comprised of target nuclei, to trigger a nuclear reaction and build up a coherent gravitational wave as the particles of the beam move through the target mass and impact target nuclei over very short time spans. An information-processing device connected to a computer, controls the particle beam's high-frequency, (GHz to THz) pulse rate and the number of particles in each bunch comprising the pulse in order to produce modulated gravitational waves that can carry information. A gravitational wave generation device that exhibits directivity. A gravitational wave detection device that exhibits directivity and can be tuned. The utilization of a medium in which the gravitational wave speed is reduced in order to effect refraction of the gravitational wave.

**Probable Assignee:** GRAVWAVE LLC

**Earliest Publication Date:** 20001212



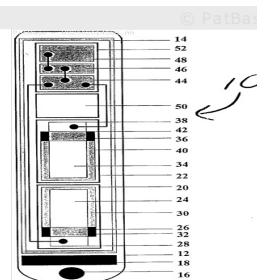
**34) Family number: 30111342** (US2002014583A)

## DUAL COMPENSATED CHLORINE LOGGING TOOL

**Abstract:** Source: US2002014583A A well logging tool has a neutron source for irradiating formation surrounding a borehole. Two detectors are mounted in a spaced-apart vertical relationship within the tool pressure-resistant housing. Each detector detects capture gamma radiation across the entire gamma ray energy spectrum, windows are set in this spectrum to separate two distinct energy ranges, thereby generating a total of four independent sets of signals, two for each detector. One set of signals is indicative of the hydrogen content and insensitive to the chlorine content of the irradiated formation. The second set of signals is indicative of the hydrogen plus the chlorine content of the irradiated formation. By comparing the sets of signals in two proportional energy ranges, the logging tool allows to generate a log that helps determine the presence or absence of hydrocarbon or salt water in the formation.

**Probable Assignee:** WEATHERFORD TECHNOLOGY HOLDINGS LLC

**Earliest Publication Date:** 20020207



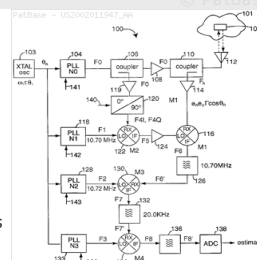
**35) Family number: 30129869** (US2002011947A)

## GROUND-PENETRATING IMAGING AND DETECTING RADAR

**Abstract:** Source: US2002011947A A ground-penetrating radar comprises a single resonant microstrip patch antenna (RMPA) that is driven by a three-port directional coupler. A reflected-wave output port is buffered by a wideband isolation amplifier and a reflected-wave sample is analyzed to extract measured values of the real and imaginary parts of the load impedance-the driving point impedance of RMPA. Each such port will vary in a predictable way according to how deeply an object is buried in the soil. Calibration tables can be empirically derived. Reflections also occur at the interfaces of homogeneous layers of material in the soil. The reflected-wave signals are prevented from adversely affecting transmitted-signal sampling by putting another wideband isolation amplifier in front of the input port of the directional coupler. A suppressed-carrier version of the transmitted signal is mixed with the reflected-wave sample, and the carrier is removed. Several stages of filtering result in a DC output that corresponds to the values of the real and imaginary parts of the load impedance. The suppressed-carrier version of the transmitted signal is phase shifted 0 degrees or 90 degrees to select which part is to be measured at any one instant.

**Probable Assignee:** STOLAR HORIZON

**Earliest Publication Date:** 20020131



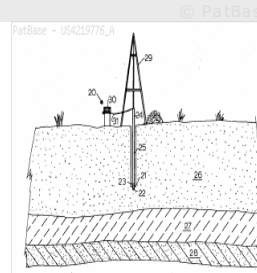
**36) Family number: 31147022** (US4219776A)

## METHOD AND APPARATUS FOR MEASURING IN SITU DENSITY AND FABRIC OF SOILS

**Abstract:** Source: US4219776A A method and implementing apparatus for measuring in situ the electrical capacitance and resistance of soils and determining therefrom the density and fabric thereof. The apparatus includes a self-contained probe adapted to be driven into the soil to be measured. The probe has a soil sensor element and a measuring circuit such as a capacitance and resistance bridge. The measuring circuit employs radiofrequency current to enable direct measurement at the probe of the resistance and capacitance of the soil sample and of the pore liquid. A remote indicator and control unit in communication with the probe is provided with indicators such as meters or displays which provide direct readout of measured resistance and capacitance, and which may also enable the bridge in the probe to become readout. Alternatively, the probe may include a computer for automatically balancing the bridge and calculating critical soil properties. The apparatus can automatically register such engineering properties as density, porosity, friction angle, elastic and secant modulus, coefficient of dynamic settlement, stress ratio required to cause liquefaction, and permeability coefficient. The probe and measuring equipment can, alternatively, be manually balanced and the engineering properties and related properties can be hand calculated. The concept outlined and apparatus can be extended or modified for a wide variety of other uses also.

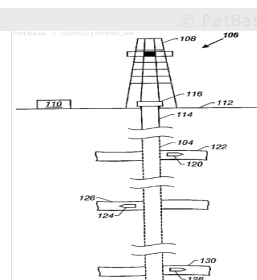
**Probable Assignee:** UNIV CALIFORNIA

**Earliest Publication Date:** 19800826



**37) Family number: 32122238** (US2002149498A)

## RESERVOIR MONITORING THROUGH WINDOWED CASING JOINT



**Abstract:** Source: US2002149498A An apparatus and a method for controlling oilfield production to improve efficiency includes a remote sensing unit that is placed within a subsurface formation, an antenna structure for communicating with the remote sensing unit, a casing joint having nonconductive "windows" for allowing an internally located antenna to communicate with the remote sensing unit, and a system for obtaining subsurface formation data and for producing the formation data to a central location for subsequent analysis. The remote sensing unit is placed sufficiently far from the wellbore to reduce or eliminate effects that the wellbore might have on formation data samples taken by the remote sensing unit. The remote sensing unit is an active device with the capability of responding to control commands by determining certain subsurface formation characteristics such as pressure or temperature, and transmitting corresponding data values to a wellbore tool. Some embodiments of the remote sensing unit include a **battery** within its power supply. Other embodiments include a capacitor for storing charge. In order for a communication link to be established with the remote sensing unit through a wireline tool in a cased well, a casing joint includes at least one electromagnetic window that is formed of a non-conductive material that will allow electromagnetic signals to pass through it. In the preferred embodiment, the electromagnetic windows are formed to substantially circumscribe the casing joint to render it largely rotationally invariant. The electromagnetic windows are formed of any rigid and durable non-conductive material including, by way of example, either ceramics or fiberglass.

**Probable Assignee:** SCHLUMBERGER TECHNOLOGY CORP

**Earliest Publication Date:** 19981202

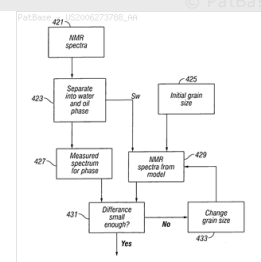
**38) Family number: 33976757 (US2006273788A)**

## PORE-SCALE GEOMETRIC MODELS FOR INTERPRETATION OF DOWNHOLE FORMATION EVALUATION DATA

**Abstract:** Source: US2006273788A The grain size of a pore-scale geometric model of a clastic earth formation are adjusted so that the NMR relaxation time distribution output of the model matches a measured NMR distribution. **Fluid** drainage and imbibing can be simulated. Additional properties of the earth formation are predicted using the pore-scale model. The additional properties may be based on additional measurements of properties of a **fluid** in the formation.

**Probable Assignee:** BAKER HUGHES INC

**Earliest Publication Date:** 20061207



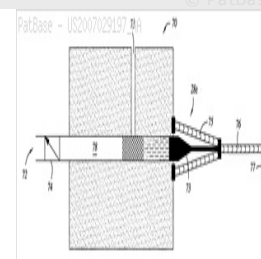
**39) Family number: 34195034 (US2007029197A)**

## DOWNHOLE USES OF ELECTROACTIVE POLYMERS

**Abstract:** Source: US2007029197A A downhole actuator comprising an electroactive polymer, an advancement device, and an electrical source for stimulating the electroactive polymer. The advancement device is motivated by stimulation of the electroactive polymer. The electroactive polymer can be stimulated by the electrical source. The embodiments of the actuator can be utilized in subterranean downhole environments. Alternatively, the device can comprise a downhole acoustic source comprising an electroactive polymer.

**Probable Assignee:** BAKER HUGHES INC

**Earliest Publication Date:** 20070208



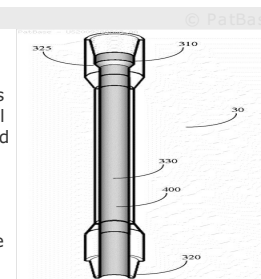
**40) Family number: 44043517 (US2009289808A)**

## RELIABLE DOWNHOLE DATA TRANSMISSION SYSTEM

**Abstract:** Source: US2009289808A A downhole signal transmission system provides electric radiofrequency signals that are coupled to electrically conductive or non-conductive **fluids** through electrical insulators. A plurality of signal repeaters are tuned to the frequencies of the radiofrequency signals, and a plurality of transmission lines terminated by resonance circuits are also provided such that the terminating resonance circuits resonate on the frequencies of the electric radiofrequency signals. The plurality of signal repeaters and plurality of transmission elements are arranged to be redundant such that a failure of one or more of the signal repeaters or a failure of one or more of the transmission elements does not substantially affect the operation of the data transmission system. The signal repeaters and transmission elements also are arranged such that a failure of any of the signal repeaters or a failure of any of the transmission elements is communicated to the surface. During operation, the signal repeaters receive and transmit radiofrequency signals and the transmission elements transport radiofrequency signals between the repeaters. The downhole pipe section in which the downhole data transmission system is implemented includes rotary connections and a tubular pipe section arranged to transport radiofrequency signals over transmission elements wherein the inner cross section of the pipe section is approximately circular and the transmission elements take up approximately less than 5 percent of the cross sectional area around the periphery of the pipe.

**Probable Assignee:** BAKER HUGHES INC

**Earliest Publication Date:** 20091126



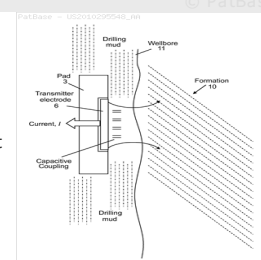
**41) Family number: 47677589 (US2010295548A)**

## METHODS AND APPARATUS FOR PROVIDING COMPLIMENTARY RESISTIVITY AND STANDOFF IMAGE

**Abstract:** Source: US2010295548A A method for presenting a formation property to a user includes estimating an initial property of the formation using a tool conveyed in a borehole and estimating a relationship between the tool and the formation based on information received from the tool. The method also includes presenting the user a first output based at least in part on the initial property and presenting a second output based at least in part on the relationship proximate the first output.

**Probable Assignee:** BAKER HUGHES INC

**Earliest Publication Date:** 20101125



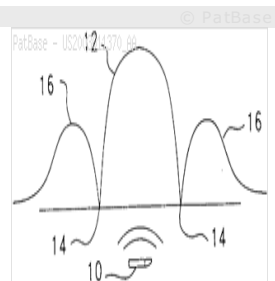
42) Family number: 49557979 (US2003011370A)

#### FLUX ORIENTATION LOCATING IN A DRILLING SYSTEM

**Abstract:** Source: US2003011370A An above ground locator includes an apparatus for determining the strength of the locating signal at a selected point relative to the boring tool. The apparatus includes an antenna arrangement configured for measuring the strength of the locating signal at the selected point along first and second orthogonally opposed receiving axes to produce first and second received signals. A phase shifting arrangement phase shifts the first and second received signals in a predetermined way to generate first and second phase shifted signals, respectively. Thereafter, a summing arrangement adds the first and second phase shifted received signals to generate an output signal which is a vector sum of the first and second received signals. In one feature, third and fourth signals derived from the first and second signals are used to eliminate balance point ambiguity which is present using the first and second signals alone. In another feature, signals corresponding to first, second, third and fourth axes are compared in a way which confines the possible locations of an above ground point to one particular type of region out of a plurality of different types of regions. Tracking of the boring tool may be accomplished in a number of described ways since the regions occur in a specific sequence along the intended path with respect to the location of the boring tool.

**Probable Assignee:** MERLIN TECHNOLOGY INC

**Earliest Publication Date:** 19921013



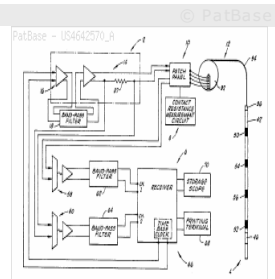
43) Family number: 5214872 (US4642570A)

#### METHOD AND APPARATUS FOR COMPLEX RESISTIVITY MEASUREMENTS WITH ELIMINATION OF ELECTROMAGNETIC COUPLING EFFECTS

**Abstract:** Source: US4642570A An apparatus includes a logging tool having electrodes for introducing a current into a downhole formation and for detecting a voltage produced in the formation by the current. The current is provided by a transmitter circuit, and the voltage is received and processed by a receiver circuit including a computer programmed to provide induced polarization and resistivity measurements based on the detected voltage. The electrodes are equidistantly spaced but are adjustable (either on a single logging tool or as between different logging tools) so that various logging runs can be made to obtain different measurements whereby the intrinsic complex resistivity (induced polarization) of formation layers can be suitably resolved. The apparatus also includes a contact resistance measurement circuit for making measurements used by another computer means to determine the contact resistance of each of the electrodes. The contact resistance measurements are used to compute the coupling phase angles for correcting the data at the output of the initial computer means. The logging tool is constructed to reduce water, and therefore electrical, leakage.

**Probable Assignee:** CONOCO INC

**Earliest Publication Date:** 19870210



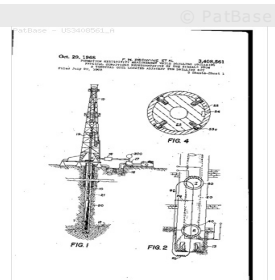
44) Family number: 841526 (US3408561A)

#### FORMATION RESISTIVITY MEASUREMENT WHILE DRILLING, UTILIZING PHYSICAL CONDITIONS REPRESENTATIVE OF THE SIGNALS FROM A TOROIDAL COIL LOCATED ADJACENT THE DRILLING BIT

**Abstract:** Source: US3408561A (Claim 1) 1. In a well drilling system having means in a drill sub and bit at the bottom of said sub and a pressure pulse generator in the stream of drilling mud flowing to said bit, the combination which comprises: (a) a transmitting toroid mounted in the outer wall of said sub at a point spaced above said bit, (b) a receiving toroid mounted in the outer wall of said sub immediately adjacent to said bit, (c) an alternating current source mounted in said sub connected to said transmitting toroid for applying alternating current at a predetermined level thereto to induce alternating current flow longitudinally through said sub and said bit and into the formation at the bit-formation contact, (d) means housed within said sub for translating the voltage induced in said receiving toroid by said alternating current flow into time modulated electrical pulses, and (e) means for applying said time modulated electrical pulses to said pressure pulse generator for transmission of time modulated pressure pulses to the earth's surface through said stream which are representative of the resistivity of the formations at the contact thereof with said bit.

**Probable Assignee:** ARPS CORP

**Earliest Publication Date:** 19650820



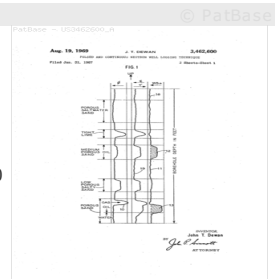
45) Family number: 878642 (US3462600A)

#### PULSED AND CONTINUOUS NEUTRON WELL LOGGING TECHNIQUE

**Abstract:** Source: US3462600A ABSTRACT OF THE DISCLOSURE The invention measures the porosity of an earth formation and the chlorine concentration of the water within the formation to identify oil producing horizons that are concealed by borehole casing. Porosity is measured through two axially spaced neutron detector tubes that observe neutron diffusion within the formation. Chlorine concentration is measured through another detector that observes the decay time of the thermal neutron population within the formation. Cross-references to related applications B

**Probable Assignee:** SCHLUMBERGER TECHNOLOGY CORP

**Earliest Publication Date:** 19690819

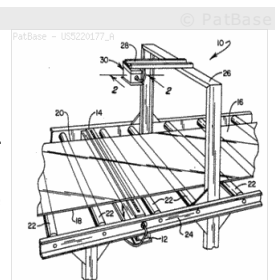


46) Family number: 11676707 (US5220177A)

#### METHOD AND APPARATUS FOR EDGE DETECTION AND LOCATION

**Abstract:** Source: US5220177A Method and apparatus are provided of a variety wherein a linear array of light emitting diodes (LEDs) are positioned at one side of a material having an edge to be detected. A photoresponsive receiver is positioned on the opposite side of the material at a predetermined stand-off distance from the LED array. The visual LEDs of the array are energized by a drive current which is pre-selected such that light emitting from each exhibits substantially uniform intensity at the photodetecting receiver when non-attenuated by the material. Additionally, the photodetector at the receiver is configured having a length of at least 6 cm to substantially improve edge related data collection. The improvements provide for substantially enhanced measurement accuracy and permit the detection of edges of transparent and semi-transparent materials.

**Probable Assignee:** HARRIS INSTRUMENT CORP



**Earliest Publication Date:** 19930615

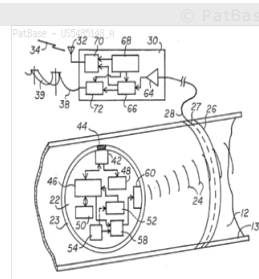
**47) Family number:** 12348691 (US5485148A)

#### PIPELINE **FLUID** TRAVEL MONITORING SYSTEM

**Abstract:** Source: US5485148A In a pipeline **fluid** tagging system, an RF transmitter enclosed within a sealed housing is immersed in one or more of the **fluids** being transported, and transmits information pertaining to that **fluid**, such as its type, destination and quantity. One or more receivers, preferably located around the joints between lengths of the pipeline receives the RF signals and communicates them to a data **collection** facility either by a separate RF transmitter or along land lines. To avoid damage and wear, the transmitter housing is formed into a shape that minimizes contact with the inner wall of the pipeline. This shape is used in conjunction with passive and active mechanical stabilization techniques to further ensure that the transmitter maintains its orientation along the longitudinal center line of the pipe.

**Probable Assignee:** TSENG LING YUAN

**Earliest Publication Date:** 19960116



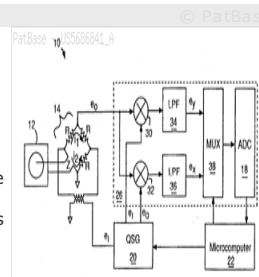
**48) Family number:** 13307516 (US5686841A)

#### APPARATUS AND METHOD FOR THE DETECTION AND MEASUREMENT OF LIQUID WATER AND ICE LAYERS ON THE SURFACES OF SOLID MATERIALS

**Abstract:** Source: US5686841A An embodiment of the present invention is a roadway sensor for surface installation in a hole such that a thin ceramic contact sensor may be used to measure and cross-compare fundamental physical antenna parameters of the space immediately above a roadway or bridge surface. Measurements are combined by a microprocessor to discriminate between dry pavement, water (rain), snow and ice above the sensor head. Ambient surface temperature, water depth and ice/slush conditions are determined to estimate any hydroplaning hazard and ice/antifreeze/water mixtures. The sensor comprises an antenna that exhibits a resonant frequency and an input admittance including a real term; a Maxwell bridge coupled to the antenna for detecting the resonant frequency, input admittance and real term; and a frequency sweeping oscillator for driving the antenna at a plurality of frequencies proximate in frequency to the resonant frequency. A phase sensitive detector determines an attenuation rate and phase and thereby is able to extract a conductivity (sigma) and a dielectric (epsilon) measurement. The microprocessor relates the conductivity and dielectric measurements to yield, for example, a pair of estimates for ice and water content and layer thickness.

**Probable Assignee:** STOLAR INC

**Earliest Publication Date:** 19940531



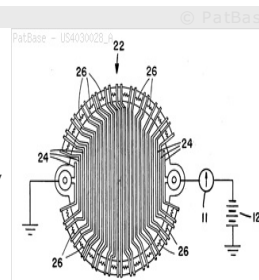
**49) Family number:** 1406424 (US4030028A)

#### METHOD OF AND APPARATUS FOR DETECTING CONDUCTIVE PARTICLES IN AN OIL FLOW SYSTEM

**Abstract:** Source: US4030028A A method and apparatus for sensing the presence and quantity of conductive particles in an oil flow system is disclosed which method and apparatus is based on a novel sensor element comprising a planar array of a plurality of electrically conductive surfaces interconnected with a plurality of series connected resistor elements. Electronic circuitry for use in combination with the sensor element is described. Preferred embodiments of the sensor element and preferred combinations of sensor element and electronic circuitry are disclosed.

**Probable Assignee:** PACIFIC RESEARCH AND DEV INC

**Earliest Publication Date:** 19770214



**50) Family number:** 15022786 (US6216543B)

#### METHOD AND DEVICE FOR CONTROLLING LIQUID FLUXES IN PIPES LINES

**Abstract:** Source: US6216543B A flow monitoring method and device including introducing at at least a point in a pipeline at least one detectable body carried by the flow of liquid. A stationary detector for detecting the passage of the detectable body, wherein, the detectable body contains an electronic chip associated with an antenna, for being detected by electromagnetic method. The antenna at least transmits a signal to and receives a signal from the stationary detector. An interceptor for intercepting the detectable body at at least a point in the pipeline.

**Probable Assignee:** BIO MERIEUX

**Earliest Publication Date:** 19981002

