

THE FUTURE OF TECHNOLOGY in the field of SUSTAINABLE PRECISION AGRICULTURE

Attachment 1 - Examples of patents

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1. VITICULTURE

1.1 DATA PROCESSING

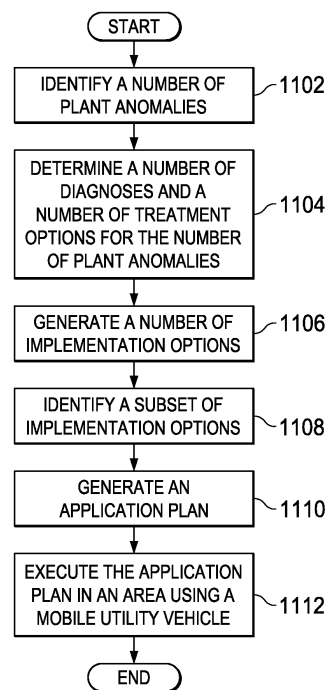
1.1.1 US2012046837_A1 – AUTOMATED PLANT PROBLEM RESOLUTION

Link: US2012046837_A1

Filing Date: 2010-08-20

Assignee: JOHN DEERE

Representative figure:



Abstract:

“The illustrative embodiments provide an apparatus for performing horticultural tasks comprising a number of data storage devices, a diagnostic system, and a processor unit. The number of data storage devices includes a horticultural knowledge base, a logistics database, and a home site database. The processor unit executes the diagnostic system and accesses the horticultural knowledge base, the logistics database, and the home site database on the number of data storage devices to identify a horticultural need for a plurality of plants.”

1.1.2 US6336066_B1 – PROCESS FOR USING LOCALIZED AGRICULTURAL DATA TO OPTIMIZE THE CULTIVATION OF PERENNIAL PLANTS

Link: US6336066_B1

Filing Date: 1999-09-21

Assignee: PELLENC

Representative figure:

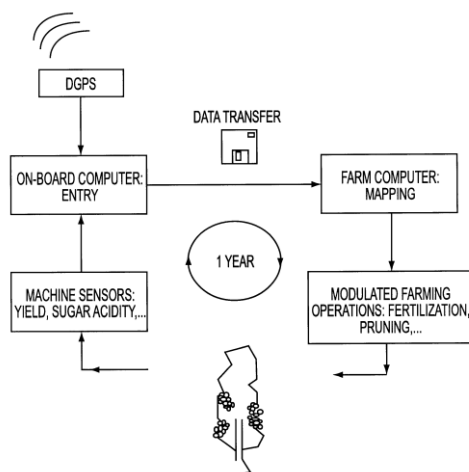


FIG. 1
(PRIOR ART)

Abstract:

“A process for using localized agricultural data to optimize the cultivation of perennial plants, the process including: passage through a parcel of perennial plants by a farm machine; automatic production of positioning signals at several points in the parcel, by means of an absolute positioning sensor, for example, of the differential GPS type installed on board the farm machine; automatic measurement by means of appropriate sensors of one or more pieces of agricultural data at each of these points; recording of the positioning signals and the data measured at these points by a data processing unit; processing of the positioning signals by means of a computer and an appropriate algorithm so as to organize them according to the rows of the parcel, so that the same row can be found again unambiguously during different passes; real-time or deferred representation of the positions passed through and/or the agricultural data in the form of a computer-generated map.”

1.2 MEASUREMENT AND DATA DETECTION

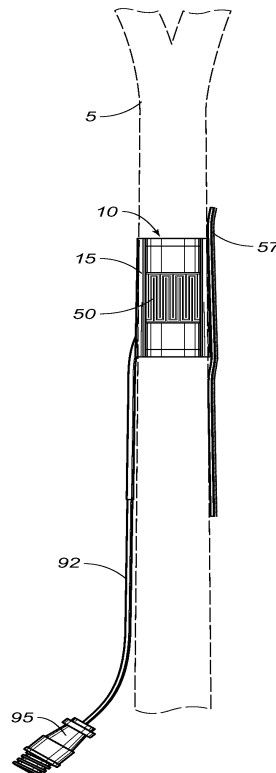
1.2.1 US8590373_B1 – SAP FLOW SENSOR APPARATUS

Link: US8590373_B1

Filing Date: 2011-06-07

Assignee: VAN BAVEL, MICHAEL

Representative figure:



Abstract:

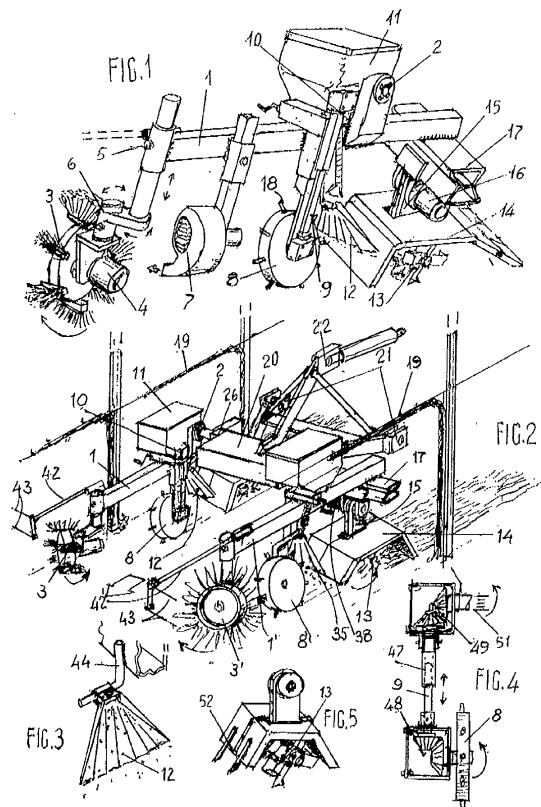
"Sap flow sensor apparatus and concomitant methodology for determining the sap flow within plant stems of herbaceous plants and trees using a simplified Stem Heat Balance methodology. Optimum irrigation and utilization of beneficial plant health statistics are enabled using a sap flow sensor apparatus configured with a flexible, sealed sensor layer and multi-layered insulation including an elastic hook-and-loop attachment for enclosing the flexible, sealed sensor layer, soft-foam insulation, a waterproof membrane cloth permeable to water vapor and impermeable to water drops, and an outermost reflective barrier. Based upon the calculations derived from the simplified Stem Heat Balance formula, embodiments afford operational and economic efficiencies due to reduction of the prerequisite electronics to a 1-Channel dT signal."

Link: EP2404492_A2

Filing Date: 2010-05-28

Assignee: GUERRIERI GONZAGA ALIANA, GUERRIERI GONZAGA EDOARDO

Representative figure:



Abstract:

"Compact multi-function device composed of a lifting central body (platform) supporting on its sides two side frame members which can be widened/narrowed if needed even when in operation. The side frame members are equipped with several motorized operating units arranged in sequence and suitable to carry out all or part of the operations related to cleaning, weeding, fertilization, soil ploughing in and hoeing on ground strips at the foot of plant rows, particularly vineyards, as well as possible defence operations. The device can be fitted to the lifting groups of tractors driven by operators or of other self-moving vehicles, even with robotized drive, working on the two sides while moving through the plant row. The operating units are driven by motors even of different type, such as oleo-dynamic and/or electric motors. The correct way to be followed by the vehicle is determined by the operator or, in case of more advanced solutions, is controlled automatically thanks to remote controlled or self-driven ways. The positioning of the side frame members is automatic, assured by plant row trunks proximity detectors."

1.3 DATA TRANSFER

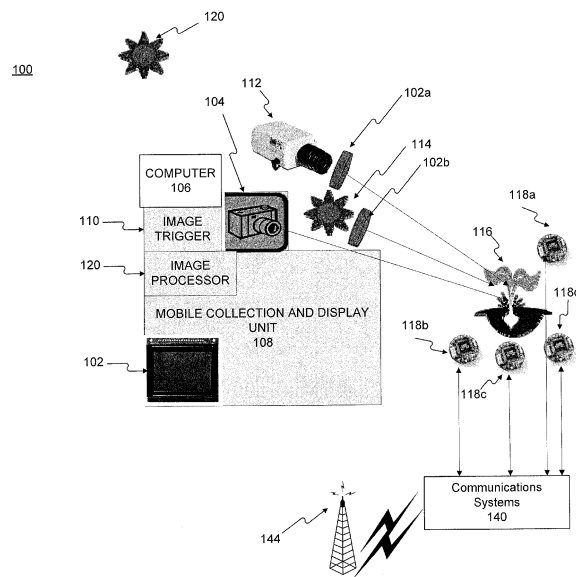
1.3.1 US2014168412_A1 – METHODS AND SYSTEMS FOR AUTOMATED MICRO FARMING

Link: US2014168412_A1

Filing Date: 2013-12-19

Assignee: SCOTT, MILES, SHULMAN, ALAN

Representative figure:



Abstract:

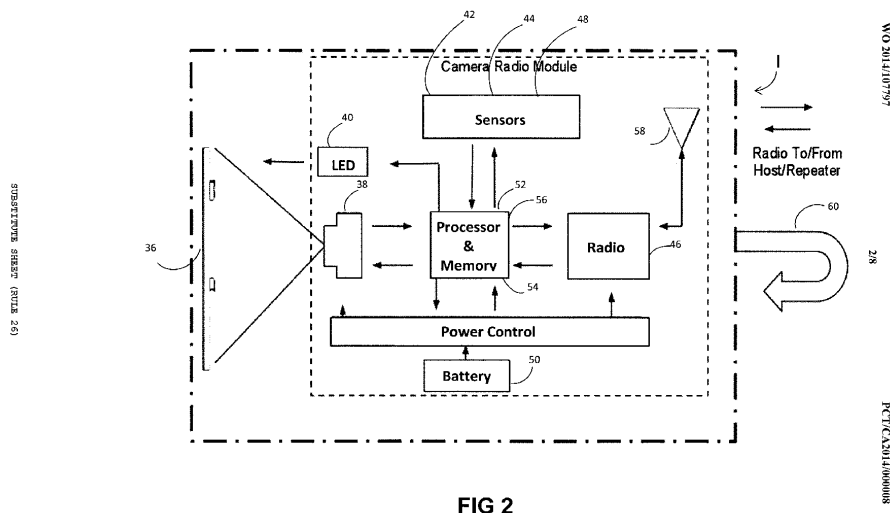
"System and methods for farming of crops on a plant-by-plant basis are disclosed. Plants are imaged and data is acquired on a plant-by-plant basis, which enables the visual micro management of a crop field on a plant-by-plant basis. Past and current images of a plant may be displayed in a manner that allows plants to be diagnosed and maintained. In some embodiments, images of an individual plant and instructions for maintenance are automatically displayed to a field work in real-time as the worker is in the proximity of the plant. Techniques described herein can be used in the field or during the harvest process including sorting tables or sorting conveyor belts. This can be done via signage, bar codes or RFID tags or other unique plant identifier technique. This approach compresses the acquired data and automatically selects and displays relevant information to a specific fruit or plant."

Link: WO2014107797_A1

Filing Date: 2014-01-07

Assignee: GILBERT MICHAEL, METCALFE, LEONARD

Representative figure:



Abstract:

"A mesh-based wireless network (10) of sensor/actuator devices I, D, T for an agricultural production area involves battery-powered sensors and actuators deployed under or within the foliage for broadcast communication with at least one repeater R according to broadcast time slots. The repeaters R are mounted above the vegetation canopy so as to be powered by solar panels. The repeaters R form a mesh network for routing data and commands to and from the sensors and actuators and at least one gateway GW. The gateway communicates over a cellular network with a remote agricultural management server (14) and database (16)."

1.4 HARVESTING AND PRUNING

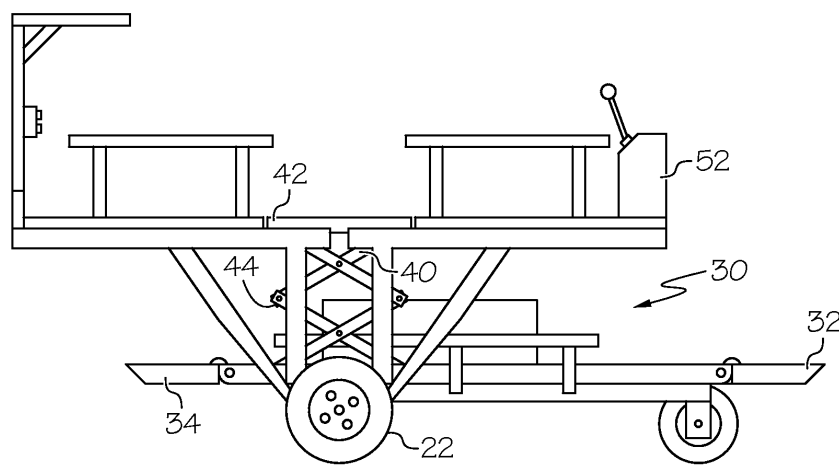
1.4.1 US2014331629_A1 – FRUIT HARVESTING MACHINE AND METHOD

Link: US2014331629_A1

Filing Date: 2014-05-06

Assignee: AUTOMATED SYSTEMS

Representative figure:



Abstract:

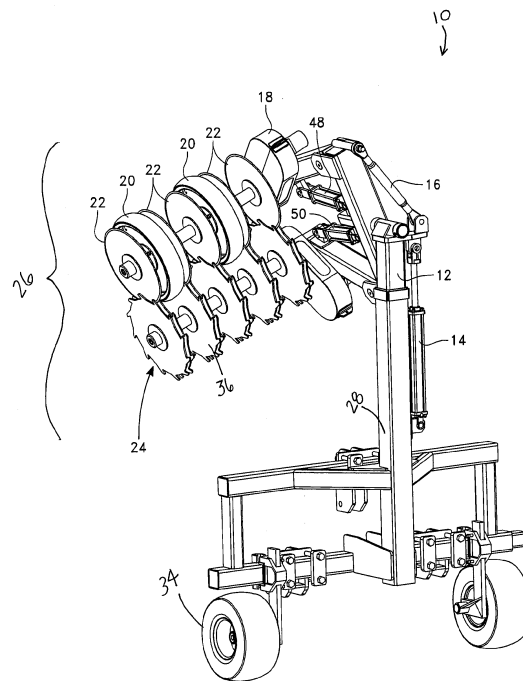
"A fruit harvesting machine that includes a bin storage compartment into which multiple produce bins can be received and collected for transport out of an orchard or field. Bins may be moved about the storage compartment via rollers and lifted via a bin lift system. Filled bins may be replaced by new bins with minimal interruption to the harvesting operation. The machine may also include drive components, hydraulics, an operating console, and other systems."

Link: US2014000232_A1

Filing Date: 2012-06-27

Assignee: ANDROS, MATTHEW JAMES, STAPP, GARETT JOHN, SUNVIEW VINEYARDS OF CALIFORNIA

Representative figure:



Abstract:

"A device for pruning plant material includes a frame, a vertical arm extending from the frame, and an angled pruning head extending from the vertical arm. The angled pruning head includes at least one cutting disk attached to a first shaft, and an anvil assembly having at least one anvil pair attached to a second shaft. The first and second shafts are substantially parallel to one another. The at least one cutting disk is aligned to be selectively positionable between the anvils of the at least one anvil pair."

1.5 VINEYARD CARE

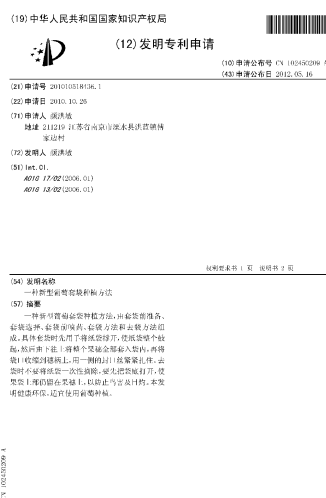
1.5.1 CN102450209_A – NOVEL GRAPE BAGGING PLANTATION METHOD

Link: CN102450209_A

Filing Date: 2010-10-26

Assignee: YAN HONGMIN

Representative figure:



Abstract:

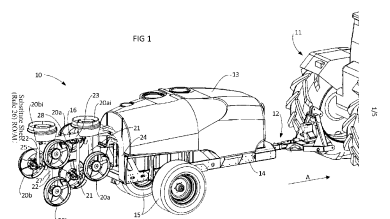
"The invention discloses a novel grape bagging plantation method, which is composed of preparation before bagging, bagging selection, pesticide spraying before bagging, bagging method and debagging method. Bagging is specifically as follows: a paper bag is firstly unfolded by hand to inflate the entire paper bag, a grape ear is completed bagged from the bottom upwards, and the mouth of the bag is then shrunk to ear stem and is then tightly tied by a sealing thread at one side. When debagging is needed, removal of the paper bag in one step is undesirable, instead, the bottom of the paper bag needs to be opened at first so that the upper part of the bag still remains on the grape ear to prevent bird damage and sunburn. The novel grape bagging plantation method is healthy, environment-friendly and suitable for grape plantation."

Link: WO2017015707_A1

Filing Date: 2016-07-25

Assignee: TOOLEYTECH

Representative figure:



Abstract:

"A mobile spraying apparatus (10) for spraying agricultural crops that are planted in adjacent rows, whereby in use, the spraying apparatus (10) travels between a generally parallel pair of rows in a direction parallel to the rows. The spraying apparatus (10) includes a frame (16) and at least two spray fans (20), the frame (16) having a front mount (21) and a rear mount (22) which are spaced apart in the direction of travel of the spraying apparatus (16). The spray fans (20) are mounted to the respective front and rear mounts (21, 22) and with each fan (20) being mounted to spray in a direction away from the other and onto a respective row of a pair of adjacent rows."

2.1 DATA PROCESSING

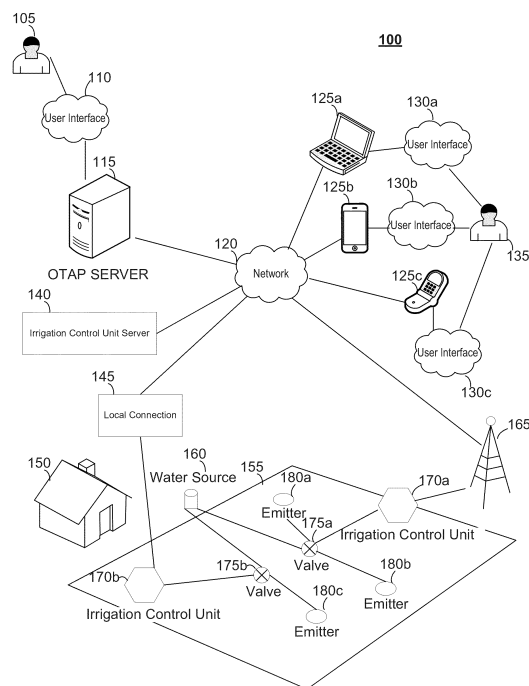
2.1.1 US2015057818_A1 – IRRIGATION SMART CONTROLLERS WITH PROGRAMMING AND FIRMWARE UPDATING

Link: US2015057818_A1

Filing Date: 2014-08-26

Assignee: ET WATER SYSTEMS

Representative figure:



Abstract:

"Embodiments of the present disclosure include systems and methods for downloading and installing software updates upon an irrigation control unit (ICU). Some of the disclosed embodiments include error checking and integrity verification procedures which help ensure that the new software is properly installed. In some embodiments the update is coordinated in conjunction with the ICU's regular contact with a control server."

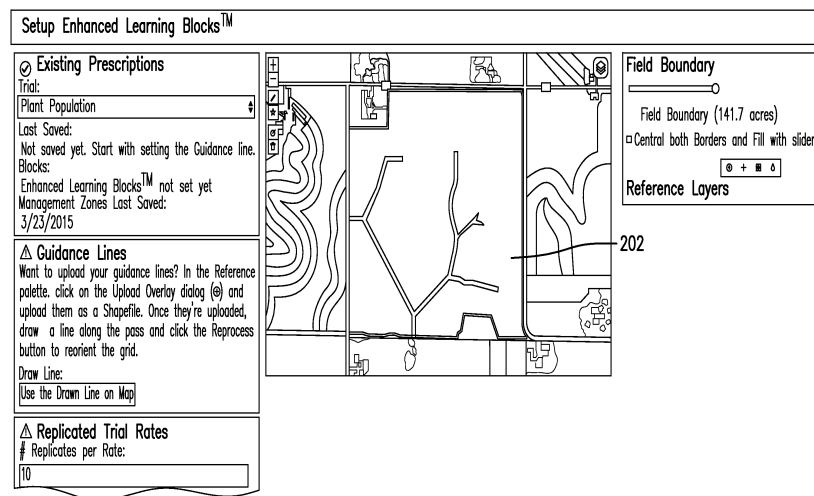
2.1.2 US2016057922_A1 - SYSTEM AND METHOD FOR CONTROLLING MACHINERY FOR RANDOMIZING AND REPLICATING PREDETERMINED AGRONOMIC INPUT LEVELS

Link: US2016057922_A1

Filing Date: 2015-08-24

Assignee: PREMIER CROP SYSTEMS

Representative figure:



Abstract:

"A controller is operatively connected to a dispensing system and configured to change the dispensement of an agricultural input from the dispensing system in different predetermined locations within at least one predefined test plot in a management zone of an agricultural field. The predetermined locations have been randomized and replicated for quantifying the agronomic response in a statistically valid manner."

2.2 MEASUREMENT AND DATA DETECTION

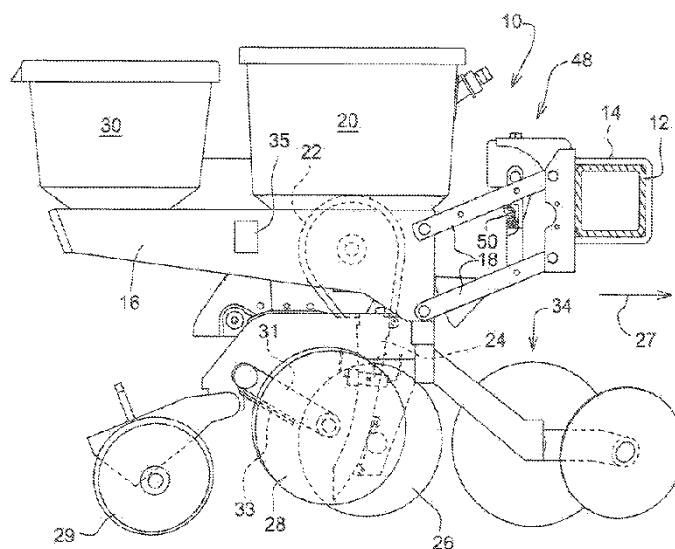
2.2.1 US2011303137_A1 – SEED SENSOR SYSTEM AND METHOD FOR IMPROVED SEED COUNT AND SEED SPACING

Link: US2011303137_A1

Filing Date: 2011-08-25

Assignee: ANDERSON NOEL W., JOHN DEERE, LIU, JAMES, Z., TEVS, NIKOLAI, R.

Representative figure:



Abstract:

"A seed sensor system determines the position of the seed relative to the seed tube as the seed passes the sensor. The position of the seed as well as the speed of the planter and the position of the seed tube above the planting furrow are used to calculate trajectory of the seed into the furrow from which the seed spacing is predicated. By sensing the seed in both X and Y directions in the seed tube, the sensor is better able to determine multiple seeds as well providing more precision to the seed population."

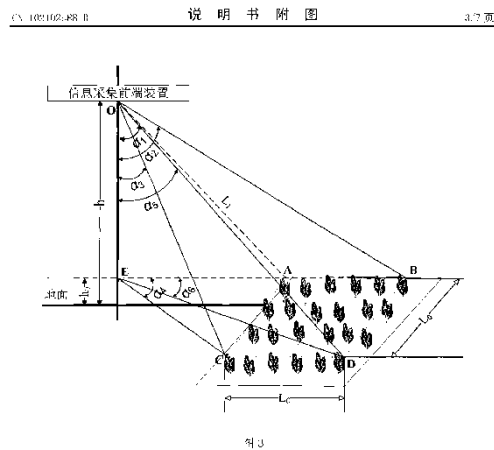
2.2.2 CN102102988_B – METHOD, SYSTEM AND DEVICE FOR MEASURING CROP YIELD INFORMATION IN REAL TIME.

Link: CN102102988_B

Filing Date: 2009-12-22

Assignee: INSTITUTE OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN AGRICULTURE, CHINESE ACADEMY OF AGRICULTURAL SCIENCES

Representative figure:



Abstract:

"The invention discloses a method, a system and a device for measuring crop yield information in real time, relates to a signal acquisition front-end device and a data processing device which are arranged in a crop field, and also relates to a remote server and/or a client. The method comprises the following steps that: the signal acquisition front-end device is controlled by the remote server and/or the client through a centralized control command; a trigger tripod head, and a video sensor and a distance-measuring sensor which are integrated on the tripod head coordinately work; and the distance of a crop object measured by the distance-measuring sensor, the angle of the crop object measured and calculated by the tripod head, and a video image per unit area shot by the video sensor are packaged into a yield information packet through the data processing device and the yield information packet is remotely transmitted to the remote server and/or the client. By hardware highly integration, the measuring accuracy of yield information such as crop height, the planting distance, density and the like is improved, and particularly the yield of high-density crops can be accurately measured and calculated."

2.3 DATA TRANSFER

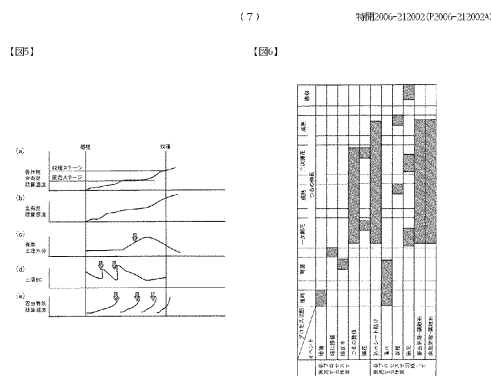
2.3.1 JP2006212002_1 – FIELD CROP PRODUCTION MANAGEMENT SYSTEM AND FIELD CROP PRODUCTION MANAGEMENT PROGRAM

Link: JP2006212002_A

Filing Date: 2005-02-07

Assignee: PANASONIC ELECTRIC WORKS

Representative figure:



Abstract:

PROBLEM TO BE SOLVED: To provide a field crop production management system for greatly improving the productivity, stability and quality stability of field crops.

SOLUTION: This field crop production management system comprises a farm house computer 2 set on a worker side of a farm house, a detector 3 set on a farmland for growing farm crops, detecting the information of the farmland and farm crops in the farmland and transmitting the detected information through a telecommunication line 6, and an analysis server 5 receiving the information detected with the detector 3 through the telecommunication line 6, judging the execution timing of farm work necessary for growing farm crops through analyzing the received information and transmitting the information of the judged execution timing to the farmhouse computer 2. As a result of this, the workers of the farmhouse can know appropriate timing of farm work necessary for growing farm crops so as to perform farm work at appropriate timing and greatly improve the productivity, stability and quality stability of field crops.

2.3.2 CN101052147_A – INTELLIGENT EARLY WARNING SYSTEM FOR FIELD CROP PEST AND DISEASE DISASTERS.

Link: CN101052147_A

Filing Date: 2007-05-24

Assignee: HEFEI INST OF SUBSTANCE SCIENCES, C.A.S

Representative figure:

200710107214.9 说明书附图 第3/2页

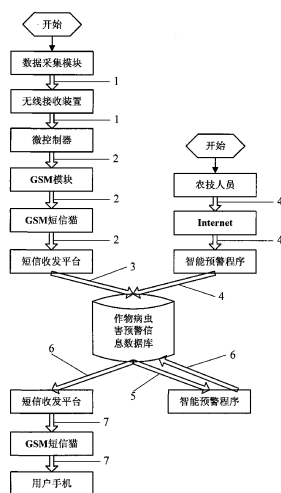


图 3

13

Abstract:

"The system comprises: data collection module; convergence node and computer sub-system. The data collection module wirelessly sends the collected the ambient temperature, moisture, light strength data to the convergence node; the convergence node sends the data to the computer sub-system through GSM module; the intelligent forecast program in the computer sub-system gathers all received data, and calls the relevant forecast model to calculate the level of crop pest, and sends the alarm information and the prevention strategy to the user's phone through the GSM short message."

2.4 HARVESTING AND MANIPULATING

2.4.1 EP3111743_A1 – COMBINE HARVESTER WITH ADJUSTABLE INCLINATION OF STRAW WALKERS

Link: EP3111743_A1

Filing Date: 2016-06-29

Assignee: CNH (CASE NEW HOLLAND) BELGIUM

Representative figure:

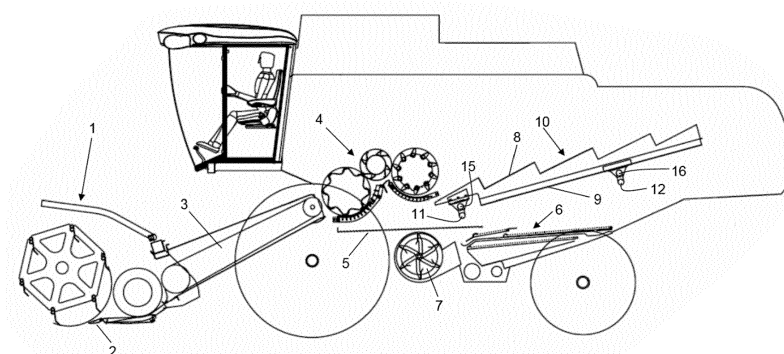


FIG. 1

Abstract:

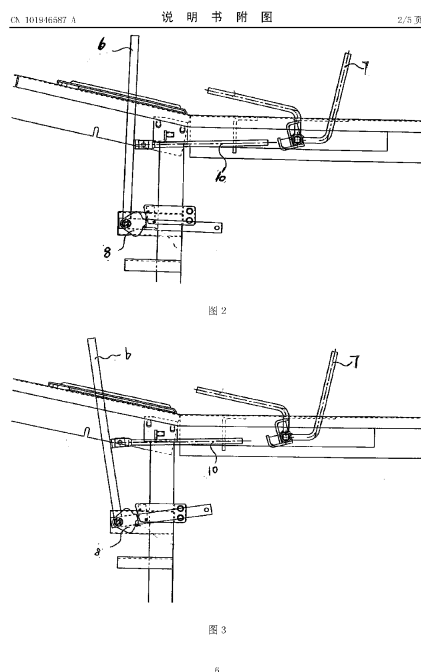
"The present invention is related to a combine harvester comprising at least one straw walker (10) extending in a longitudinal direction of the harvester and supported by a front and rear shaft (11,12), said shafts being rotatable about respective rotation axes (13,14), each shaft provided with one or more eccentric portions (15,16), wherein the straw walker is rotatably mounted on an eccentric portion of the respective front and rear shafts, so that the simultaneous rotation of the shafts actuates a reciprocating motion of the straw walker, wherein the combine is further provided with a pivot frame (20) and one or more actuators (22), configured to adjust the angular position of the frame by pivoting the frame about a pivot axis (21) oriented transversally to said longitudinal direction, and wherein the front and rear shafts (11,12) are configured to rotate with respect to the pivot frame, so that the straw walker's angular position is adjustable while the straw walker executes said reciprocating motion."

Link: CN101946587_A

Filing Date: 2010-08-19

Assignee: DATONG AGRICULTURAL MACHINERY (ANHUI) COMPANY

Representative figure:



Abstract:

"The invention provides a combine harvester which comprises a harvesting table part (1), a threshing part (2), a straw cutting part (3), a granary part (4), a traveling part (5), a gearbox and an auxiliary gearbox lever (6) arranged on the gearbox, wherein, the gearbox comprises a standard gear, a reverse gear, a travel gear and a neutral gear; the threshing part comprises a threshing lever; a lever hinge of the auxiliary gearbox lever (6) is equipped with a sensor (8) for detecting the position of the auxiliary gearbox lever (6); the harvesting table part (1) is equipped with a sensor (13) for detecting feeding conditions of grains; and the threshing part is equipped with a sensor for detecting threshing operation. The combine harvester of the invention has the following technical effects: 1) the combine harvester can automatically stop harvesting or threshing operation through the sensors under a travel gear status, thus avoiding the damage of components, prolonging the service life and improving the operating security; and 2) the combine harvester has simple structure and convenient use."

2.5 PLANTING AND SOIL WORKING

2.5.1 CN102939811_A – AUTOMATIC CORN PLANTER

Link: CN102939811_A

Filing Date: 2012-11-29

Assignee: SHENYANG XINDA INFORMATION SCIENCE & TECHNOLOGY COMPANY

Representative figure:

CN 102939811 A 说明书附图 1/1 页

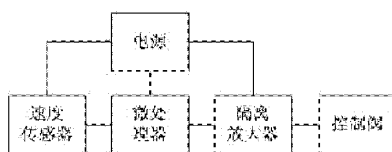


图 1

Abstract:

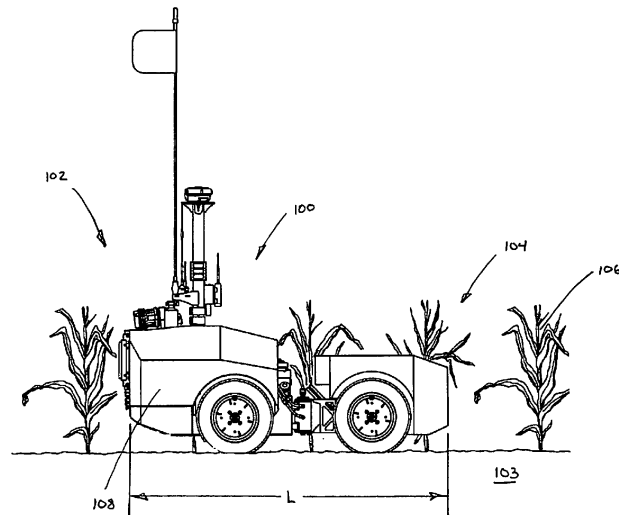
"The invention discloses an automatic corn planter and belongs to the technical field of agricultural machinery. The automatic corn planter comprises a power supply, a microprocessor, a speed sensor, an isolated driver and a control valve, a positive end and a negative end of the power supply are connected with positive ports and negative ports of the microprocessor, the speed sensor and an isolated amplifier respectively, an output end of the speed sensor is connected with an input end of the microprocessor, an output end of the microprocessor is connected with an input end of the isolated driver, and an output end of the isolated driver is connected with the control valve. The automatic corn planter has the advantages of simple structure, high reliability, high stability and the like."

Link: US2015051779_A1

Filing Date: 2014-08-14

Assignee: ROWBOT SYSTEMS

Representative figure:



Abstract:

"An autonomous vehicle platform and system for selectively performing an in-season management task in an agricultural field while self-navigating between rows of planted crops, the autonomous vehicle platform having a vehicle base with a width so dimensioned as to be insertable through the space between two rows of planted crops, the vehicle base having a first portion and a second portion, wherein the first portion is pivotably coupled to the second portion, and each of portion is operably coupled to at least one ground engaging wheel."

2.6 AGRICULTURAL VEHICLE

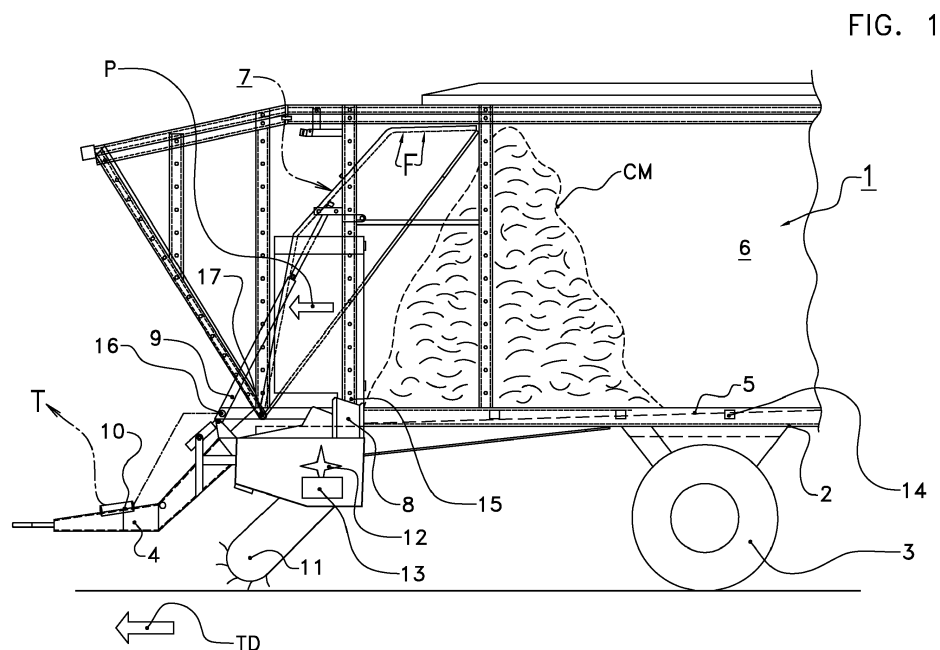
2.6.1 EP3202248_A1 – AGRICULTURAL VEHICLE WITH A LOADING CHAMBER AND STORING METHOD WITH A CROP MATERIEAL PROPERTY SENSOR

Link: EP3202248_A1

Filing Date: 2017-01-30

Assignee: FORAGE INNOVATIONS

Representative figure:



Abstract:

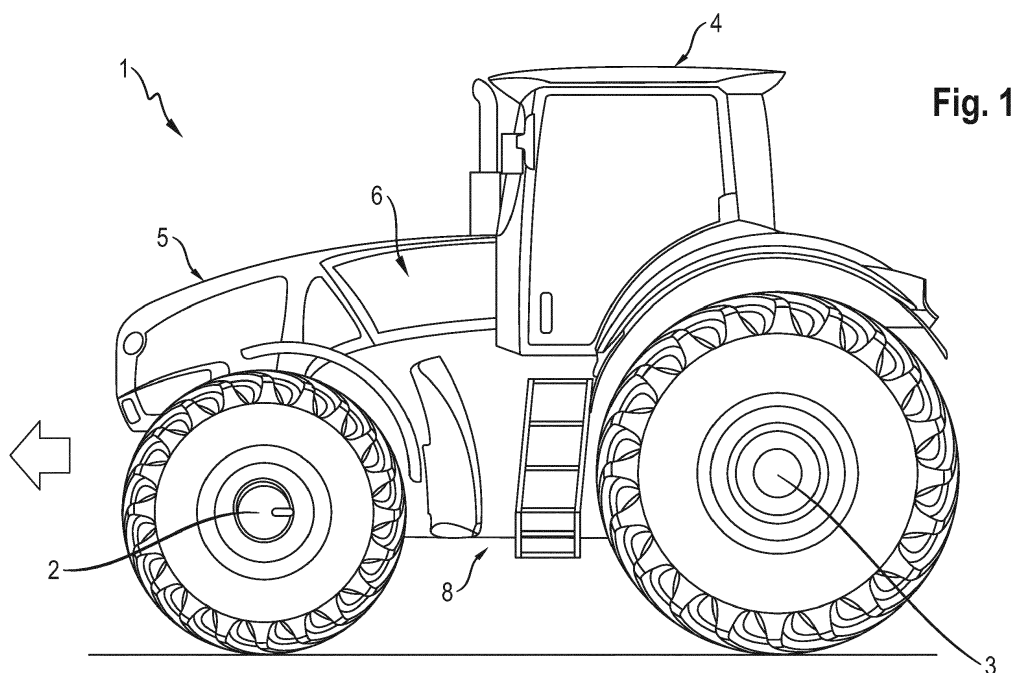
"The invention refers to an agricultural vehicle (1) comprising a loading chamber (6), a pivotal wall (7), a movable conveyor (5), a wall actuator (9), a conveyor drive (14), and a crop material property sensor (13). The invention further refers to a method for injecting crop material (CM) into the loading chamber (6). The sensor (13) measures a value indicative of a property of the crop material (CM). The wall actuator (9, 14) moves the wall (7) and/or the conveyor (5) moves crop material (CM) away from an inlet (15). Thereby the pressure (P) which is applied onto the crop material (CM) in the loading chamber (6) is reduced. This pressure-reducing step is performed depending on the measured crop material property."

Link: EP2703227_B1

Filing Date: 2013-06-20

Assignee: CLAAS TRACTOR

Representative figure:



Abstract:

"The machine e.g. tractor, has a set of mutually spaced-apart functional elements (10) that serves for the provision of technical features of the agricultural working machine. A set of lines (11) is arranged for connecting each of the set of functional elements with each other. A dimensionally stable tubular housing assembly (20) is arranged for partially accommodating the set of lines for bundling purposes. The housing assembly with line sections takes an essentially outwardly closed structure."

2.7 IRRIGATION AND FERTIGATION

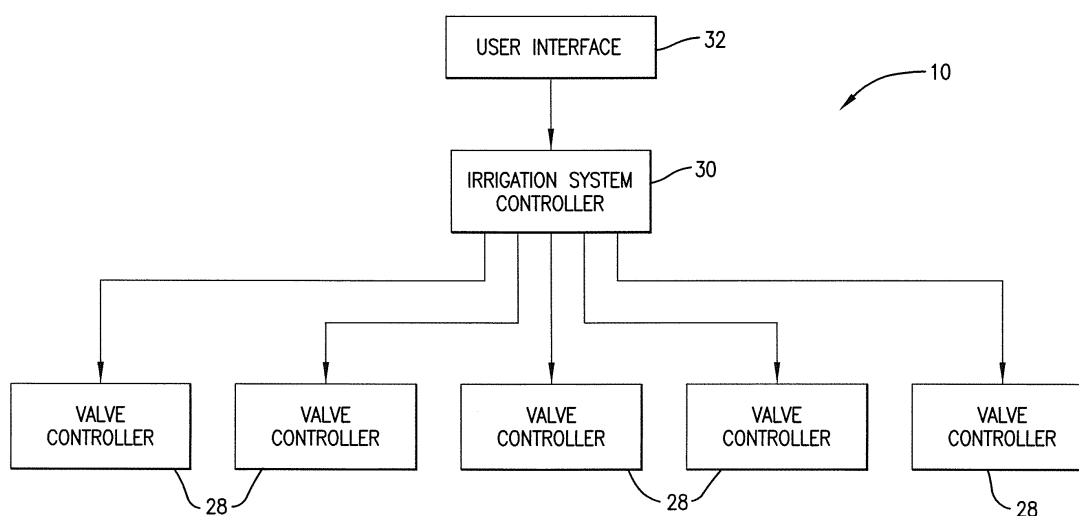
2.7.1 US2015032272_A1 - CONTROL SYSTEM FOR AN IRRIGATION SYSTEM

Link: US2015032272_A1

Filing date: 2013-07-23

Assignee: LINDSAY CORPORATION

Representative figure:



Abstract:

"A control system for a low-volume irrigation system includes a plurality of valve controllers for opening and closing valves; an irrigation system controller for controlling the valve controllers in accordance with an irrigation plan; and a graphical user interface for allowing a user to interact with the irrigation controller and to create the irrigation plan. The graphical user interface displays an irrigation zone list, an irrigation set list, and an irrigation plan field. The user interface has drag and drop functionality that permits an irrigation zone listing from the irrigation zone list to be dragged and dropped into any of the irrigation set listings in the irrigation set list and that permits an irrigation zone listing or an irrigation set listing to be dragged and dropped into the irrigation plan to create irrigation steps within the irrigation plan."

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Representative figure:

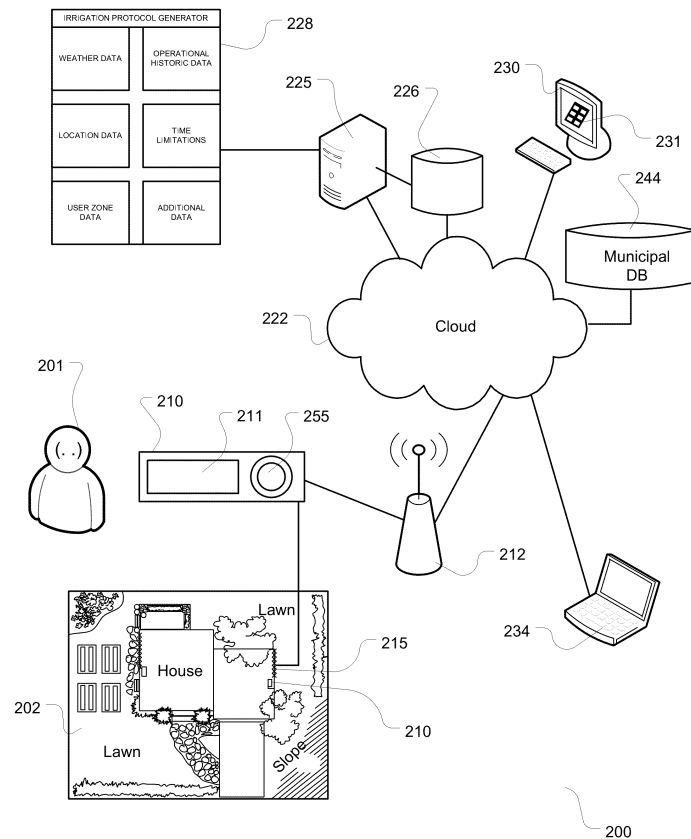


FIG. 3

Abstract:

"The disclosure extends to apparatuses, methods, systems, and computer program products for generating and optimizing irrigation protocols. The disclosure extends to a controller using methods, systems, and computer program products for optimizing water usage in growing plants for yard and crops."



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