



(51) International Patent Classification:

G06Q 10/06 (2012.01) A01C 7/00 (2006.01)
G06Q 50/02 (2012.01) G01C 21/00 (2006.01)

(21) International Application Number:

PCT/IB2016/053765

(22) International Filing Date:

24 June 2016 (24.06.2016)

(25) Filing Language:

Dutch

(26) Publication Language:

English

(30) Priority Data:

BE2015/5382 24 June 2015 (24.06.2015) BE

(71) Applicant: SCHOTS TECHNICS BVBA [BE/BE];
Liebroekstraat 69, 3545 Halen (BE).

(72) Inventor: SCHOTS, Roeland; Liebroekstraat 69, 3545
Halen (BE).

(74) Agent: BRANTS, Johan Philippe Emile; Pauline Van
Pottelsberghelaan 24, 9051 Ghent (BE).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

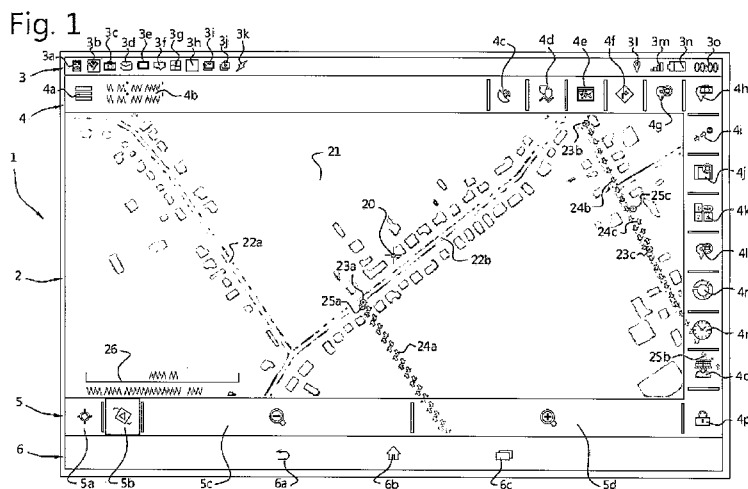
Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

(54) Title: GEOGRAPHIC INFORMATION SYSTEM AND METHOD FOR DIRECTING AGRICULTURAL VEHICLES



(57) Abstract: The present invention relates to a geographic information system for executing an agricultural operation by means of one or more agricultural devices, said system comprising: one or more agricultural devices; one or more user interfaces provided on said agricultural devices; at least a database comprising one or more instruction modules; and at least a processing unit, operating in communicative connection with said user interfaces and with said database comprising one or more Instruction modules.

WO 2016/207841 A1

GEOGRAPHIC INFORMATION SYSTEM AND METHOD FOR DIRECTING AGRICULTURAL VEHICLES

TECHNICAL FIELD

5

The present invention relates to a geographic information system and the use thereof for performing mowing and/or clearing activities, respectively, for roadsides and ditches along a road network. In particular, the invention relates to a geographic information system which is suitable for managing mowing and/or clearing activities, such as, for example, the transmission of an optimized route to an operator, the monitoring of the mowing and/or clearing process, setting temporary storage points for mowing and/or clearing waste, coordinating unloading rounds of different mowing and/or clearing devices and retrieval of and/or storage in a database of location-specific information.

15

BACKGROUND

Geographic information systems, usually abbreviated as "GIS", are systems which are intended to store, manage, edit, analyse, integrate and present information on geographic objects, abbreviated as 'geo-information'. Such geo-information includes not only location coordinates, but also data concerning personnel and organisation (procedural steps, tasks and time). Such geo-information can be shared via geo-services, a web portal in which the geo-information from various sources is combined and made available. In this way, the geo-information technology is applied in planning, traffic analysis, transport, environment, security, geology, defence, economics, marketing, etc.

The use of geographic information systems and computer-implemented methods for performing tasks in the agricultural sector is experiencing a strong increase due to the control and management that is possible by such systems and methods for performing tasks which are essentially spread over a large geographical area.

For example, US 2013/0054654 discloses a computer-implemented GIS and a method for collecting data and identifying, registering and monitoring of agricultural and food-related properties by means of type and usage. Agricultural and food-related properties are identified by cross-references between the immovable property database and various agricultural groups databases, which are maintained by one or more groups of agricultural producers or organisations.

The immovable property database and the various agricultural groups databases are merged into a GIS of agricultural and food-related properties identified by the type and the use, with precise location and the boundaries and all relevant property and contact information. Other systems are directed to improve or partially or completely automate the precision of the execution of tasks. For example, US 6,199,000 discloses a real-time kinematic (RTK) Global Positioning System (GPS) technology that is integrated with precision-farming methods for very accurate sowing, cultivating, planting and/or harvesting. RTK GPS systems are used to control fully or semi-autonomous vehicles in these activities and can ensure the meticulous planting of seeds (for example of a seeder equipped with a RTK GPS receiver and associated equipment) and/or precision-removal of weeds, for example, with the aid of a vehicle with weed eradication mechanisms such as augers and/or herbicide sprayers. Application of crop-specific fertilizer or application of pesticides is possible through the use of techniques with precise positioning on the centimetre level.

However, up to date, no geographic information systems are known yet for guiding agricultural operations for roadsides and ditches along a road network. When performing such operations, a technical operator is faced with specific challenges, such as, for example, determining a suitable route, finding pre-determined loading and unloading points, the presence of water, gas and/or electricity lines in ditches, etc. Such obstacles can interrupt or slow down the agricultural operation with considerable loss of time as a result. However, such agricultural operations can lead to considerable damage to the roadside or ditch infrastructure as well as to the agricultural machines used because the operator does not possess sufficient or complete information concerning the roadsides or ditches to be processed. The present invention seeks to provide a solution to one or more of the aforementioned problems or shortcomings.

30

SUMMARY

To this aim, the invention provides a geographic information system according to claim 1.

35

To this aim, the invention provides in a second aspect, a geographic information system for performing agricultural tasks by means of one or more agricultural

devices, wherein each agricultural device is driven by a technical operator, said system comprising:

- one or more agricultural devices;
- one or more user interfaces provided on said agricultural devices;
- 5 – at least a database comprising one or more instruction modules; and
- at least a processing unit, operating in communicative connection with said user interfaces and with said database comprising one or more instruction modules;

wherein at least an instruction module is configured for managing one or more sub-tasks of an agricultural operation.

This offers the advantage that the various sub-tasks of an agricultural operation can be accurately monitored and planned. For example, the instruction module may be configured to minimize the total time and/or distance of an agricultural process. In this, the operator himself does not need to make decisions concerning the optimum performance of tasks, creating a less stressful work situation. In addition, the specific instruction module can take into account, when minimizing the route distance, limitations inherent in agricultural transport devices, such as speed limits, limitations with respect to returning in a street, etc.

20

In a third aspect, the invention provides a computer-implemented method for performing an agricultural operation by a technical operator, comprising the steps of:

- determining geo-location information of at least an agricultural device;
- 25 – calculating an agricultural route to go through for said agricultural device;
- displaying driving instructions onto a user interface provided on said agricultural device;
- displaying operation instructions onto a user interface provided on said agricultural device.

30

This offers the advantage that the technical operator can simply follow instructions, without having to make choices himself concerning the optimal approach direction or the most optimal route. Also, the operator does not have to manually check what the specifications of the agricultural route are. In this way, material and personnel are optimally deployed for executing agricultural operations.

35

In a fourth aspect, the invention provides a use of a geographic information system for performing an agricultural operation by means of one or more agricultural devices.

5 DESCRIPTION OF THE FIGURES

The explicit characteristics, advantages and objectives of the present invention will further become apparent to the skilled person in the technical field of the invention after reading the following detailed description of the embodiment of the invention
10 and of the figures enclosed herein. The figures serve to further illustrate the invention, without thereby limiting the scope of the invention.

Figures 1 to 3 represent a simplified representation of a user interface 1 of a geographic information system for mowing roadsides and/or clearing ditches.

15

Figure 1 is a graphical representation of a user interface 1 of a geographic information system according to the invention.

Figure 2 is a representation of the user interface 1, wherein different agricultural activities which still have to be executed within a region are displayed by means of an icon 7a, 7b, 7c, 7d, 7e, ...

20

Figure 3 is a detail view of the user interface 1, wherein start 23 and end points 25 of several mowing and/or clearing activities are graphically displayed, together
25 with the approach direction 24.

DETAILED DESCRIPTION OF THE INVENTION

Unless defined otherwise, all terms used in the description of the invention, including technical and scientific terms, have the meaning as they are commonly understood by the skilled person in the technical field of the invention. For a better assessment of the description of the invention, the following terms are explicitly explained.

35 "A", "an" and "the" refer in this document to both the singular and the plural, unless the context clearly implies otherwise. For example, "a segment" means one or more than one segment.

When "about" or "around" is used in this document with a measurable quantity, a parameter, a time period or moment in time, and the like, then variations are meant of +/-20% or less, preferably +/-10% or less, more preferably +/-5% or less, even more preferably +/-1% or less, and even more preferably +/- 0.1% or less than and of the cited value, to the extent that such variations apply to the described invention. However, it should be understood here that the value of the quantity in which the term "about" or "around" is used, is itself specifically disclosed.

10 The terms "comprise", "comprising", "consist of", "consisting of", "provided with", "include", "including", "contain", "containing", "encompass", "encompassing" are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, features, elements, members, steps, known from or described in the prior art.

15 Quoting numerical intervals by the endpoints comprises all integers, fractions and/or real numbers between the endpoints, these endpoints included.

In a first aspect, the present invention provides a method for performing geographically spread tasks, comprising the steps of:

- 20
- assigning geographic projection coordinates to geographic object data in one or more geographical areas;
 - collecting said geographic object data with corresponding geographic projection coordinates in a database;
 - assigning one or more geographically spread tasks to one or more

25

 - geographic object data with corresponding geographic projection coordinates;
 - displaying geographic object data onto a user interface and displaying one or more geographically spread tasks.

30 The term "geographic projection coordinate" is to be understood as a coordinate for use in a coordinate reference system (CRS), in which each place on earth can be indicated on the basis of two or more coordinates. CRS systems comprise projected coordinate reference systems (also referred to as Cartesian or rectangular coordinate reference systems) and geographic coordinate reference

35

systems. Specific examples are latitude and longitude; GPS coordinates, geodetic coordinates; Cartesian coordinates, Lambert coordinates (Belgium) and Rijksdriehoek-coordinates (The Netherlands).

6

The term "geographic object data" is to be understood as the collection of data concerning the nature of objects which occupy a geographically fixed position. Examples of such data are, but not limited to, roads, ditches, roadsides, waterways, viaducts, bridges, house numbers, electricity, gas and water pipes, etc.

5

The term "geographical area" is to be understood as an arbitrary or well-chosen demarcated area with a geographical spread. The zone can e.g. be demarcated in accordance with national or municipal or regional or provincial boundaries.

- 10 The term "geographically spread task" is to be understood as a task which must be performed on a geographical route; by this is meant on a route between a first and a second geographic location. In a preferred embodiment, such geographic route is displayed as a series of two or more geographic projection coordinates.
- 15 Preferably, said geographic object data with corresponding geographic projection coordinates are collected from one or more electronic databases, such as for example online databases. Such databases are amongst others made available by National Geographic Institute (Belgium), Cadastre Geo-Information (The Netherlands), and others. This offers the advantage that use can be made at any
- 20 time of the most accurate geographic data which show a detailed picture of the actual local situation. In this way, for example, a newly constructed road or gas pipeline will not be visible on conventional geographic maps, but usually displayed relatively quickly on digital or electronic cards.
- 25 Assigning one or more geographically spread tasks to one or more geographic object data with corresponding geographic projection coordinates can be done by adding a task list comprising one or more geographically spread tasks in said database. Such task list is generally comprised of a series of tasks, such as for example mowing, clearing of ditches, etc., which tasks should be performed along
- 30 a geographic route. In the database the various tasks with the predetermined geographic route can thus be linked to the geographic projection coordinates. In this way, the tasks can then be visually displayed onto a user interface by means of the geographic projection coordinates. On one and the same user interface, geographic object data and one or more geographically spread tasks can thus be
- 35 displayed. This allows the operator to oversee the tasks to be performed in a simple way.

Preferably, geographic object data and/or geographically spread tasks are displayed onto a user interface with the aid of a symbol or color. More preferably, a geographically spread task and a completed geographically spread task is displayed onto said user interface by means of a distinctive color and/or a distinctive symbol.

5 In this way, the operator can easily visually keep track of which tasks are finished and unfinished.

In a preferred embodiment, the present invention provides a method according to the first aspect of the invention, wherein said geographic tasks are executed with the aid of one or more agricultural devices and wherein at least an agricultural device is provided with a registration module for registering a progress in a task and wherein said agricultural device is provided with a location module for registering a location, such as for example a GPS module.

15 With the aid of such an embodiment, the execution of a predetermined, geographically spread task or of a series of predetermined, geographically spread tasks can be monitored. Moreover, in this way, the thus collected data can be entered online or offline in the afore-mentioned database. In this way, the progression and/or the completion of one or more tasks in afore-mentioned database can be tracked. This is referred to by the general term "completion data".
20 The partially or completely finished tasks can be indicated via the corresponding geographic projection coordinates as 'executed'. In this way, an overview of tasks to be executed and already executed can be obtained from said database at any time, for example in the form of an e-mail communication, a Microsoft Excel or PDF
25 document, or similar reports.

In the context of the first aspect, the present invention further provides a system comprising a central processing unit and one or more databases or databanks and one or more modules configured for managing, editing, analysing, arranging, at least temporarily storing and sending data relating to geographically spread tasks.
30

The term "geographic information system" is to be understood as an information system with which (spatial) data or information about geographic objects, so-called geo-information can be stored, managed, edited, analysed, integrated and presented. More specifically, the geographic information system concerns a system in which data are linked in a database to a geographic location. The geographical information system is in operating condition preferably in communicative connection with a user interface for displaying geographic information and
35

information concerning one or more agricultural operations, such as, for example, mowing and/or clearing operations.

5 The term "agricultural device" refers to a device, usually provided on a driving device, for performing one or more agricultural tasks, such as for example, but not limited to, the mowing of roadsides, the clearing of ditches, the shearing of hedges, the collecting of agricultural waste material, the emptying of locally spread baskets, the spraying of agricultural parcels, the sowing of crops, the harvesting of crops, etc.

10

The term "mowing device" refers to the whole of a driving device, such as for example a tractor, having a mowing arm which can be manipulated or directed at the level of a roadside or ditch for the mowing of grasses, weeds, etc. Preferably, said mowing arm is connected to a reservoir so that the grass clippings can be transferred from said mowing arm to said reservoir. The reservoir serves as a temporary storage place for the clippings.

15

The term "clearing device" refers to the whole of a reservoir device on a driving device and a reservoir, wherein said reservoir can be directed in a ditch and is connected to said reservoir and wherein said reservoir device and said reservoir are preferably coupled to one another during the clearing operation. Preferably, said reservoir device is connected to said reservoir so that the clearing material is transferred from said reservoir device to said reservoir. The reservoir serves as a temporary storage place for the cleared clearing material.

25

The term "technical operator", in the context of the present invention, is to be understood as a driver, trained and/or qualified for performing an agricultural operation, such as for example, but not limited to, steering a mowing and/or clearing device and performing mowing and/ or clearing operations. The technical operator is trained and/or qualified for following driving and agricultural instructions, such as mowing and/or clearing instructions, on a screen and for manipulating a user interface for entering new data via a user interface.

30

The term "user interface" is to be understood as synonym for the term "user environment" and preferably indicates a graphical user interface, and refers to all software and hardware of a computer intended to carry and send communication between a user and the system, such as for example, but not limited to, a monitor, a tablet, a smartphone, etc.

35

The term "database comprising one or more instruction modules" refers to a data carrier, preferably an electronic data carrier, which is provided for managing, storing and sending data relating to one or more parameters of an agricultural operation, such as a mowing and/or clearing operation, and for storing said data as a result of which a history is obtained.

The term "processing unit" is to be understood as a synonym for the term "central server," or "central processing unit" and indicates a physical computer on which one or more computer modules or instruction modules are provided, each module comprising instructions for executing a specific set of tasks. The processing unit is provided with means for communicatively connecting different modules.

In a second aspect, the present invention provides a geographic information system for performing agricultural tasks by means of one or more agricultural devices, wherein each agricultural device is controlled by a technical operator, said system comprising:

- one or more agricultural devices;
- one or more user interfaces provided on said agricultural devices;
- at least a database comprising one or more instruction modules; and
- at least a processing unit, operating in communicative connection with said user interfaces and with said database comprising one or more instruction modules;

wherein at least an instruction module is configured for managing one or more sub-tasks of an agricultural operation.

Preferably, at least one instruction module is configured for calculating an optimal approach route and for displaying approach instructions onto a user interface provided on said agricultural device. This offers the advantage that the instruction module can minimize the total distance of an agricultural route. In this, the operator does not have to make decisions himself concerning the optimal route choice, creating a less stressful work situation. In addition, the specific instruction module can, when minimizing the route distance, take into account limitations inherent in agricultural transport devices, such as speed limits, limitations with respect to returning in a street, etc. The instruction module is preferably configured to display road disruptions caused by road works and/or to display traffic congestion. Even more preferably, said instruction module takes the aforementioned road disruptions and traffic congestion into account when calculating an

agricultural route to go through, so that loss of time as a result of standstill is avoided. The accompanying geographic information system helps the operator to execute the agricultural operations more efficiently, and the providing of additional information during the execution of agricultural operations by means of a user interface allows to significantly reduce process interruptions and the risk of material damage.

Figure 1 is a graphical representation of a user interface 1 of a geographic information system according to the invention.

10

The user interface 1 comprises several sections: a map and navigation section 2, a system information section 3, an operating section 4, a map manipulation section 5 and a system navigation section 6. The figure shows in the map and navigation section 2 a navigation cursor 20, a map 21 with several streets 22a, 22b and mowing and/or clearing sections with a start 23a, 23b, 23c, and end point 25a, 25b, 25c. The driving direction is indicated by means of arrows 24a, 24b, 24c. In addition, the map section shows a scale indicator 26.

The system information section 3 comprises a series of information figures 3a-3o, in which information is displayed as: the presence of a network connection 3b, the entry of a new message such as an e-mail 3d, the battery life 3e, the quality of the network connection 3m and point in time 3o. The operating section 4 comprises multiple navigation nodes 4a-4q, such as a menu navigation 4a, a position indication 4b on the basis of latitude and longitude, network quality 4c, map information 4d, 4e, requesting driving instructions 4f, entering location information 4g, taking a picture 4h, entering and requesting a mowing and/or clearing route 4i, starting and/or stopping of time recording 4n, passing on project schedules with activity and time information 4o and a locking function 4p.

The map manipulation section 5 allows to select a new centre point 5a, and provides zooming in 5c and out 5d functions. The system navigation section 6 makes it possible to return to a previous screen 6a, to return to the home screen 6b or to choose between several open screens 6c.

Figure 2 provides a representation of the user interface 1, wherein different agricultural activities still to be executed within a region are displayed by means of an icon 7a, 7b, 7c, 7d, 7e, ... The respective agricultural activities may relate to a series of storage containers (7a-e) of agricultural waste which should be emptied

by an operator. The system is configured for calculating the most optimal approach route and for displaying the corresponding driving instructions to the technical operator, depending on the current position of the operator with agricultural device, taking into account factors such as shortest route, avoiding traffic jam, the inability to turn in a street with the agricultural device, etc.

Figure 3A provides a detailed view of the user interface 1, wherein start 23 and end points 25 of several mowing and/or clearing activities are being graphically displayed, together with the approach direction 24. This is illustrated in further detail in Figure 3B.

Preferably, the geographic information system for performing agricultural tasks according to the second aspect of the invention is used for executing a method according to the first aspect of the invention.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein at least an instruction module is configured for displaying driving instructions on said user interface. Such driving instructions can be displayed by means of a clear traffic plan as shown in Figure 3, using concrete driving instructions such as 'continue direction', 'turn left', 'turn right', etc. When drawing up the driving instructions, the system preferably calculates including the current position, as determined with the aid of a GPS coordination system, traffic congestions, road disruptions and approach direction. The approach direction is determined by the side of the road where an agricultural operation is to be performed, such as, for example, where the roadside or ditch needs to be mowed and/or cleared, where a temporary storage container of agricultural waste should be emptied, etc.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein at least an instruction module is configured to display agricultural instructions on said user interface. By displaying such instructions, the operator does not have to check himself in which position he/she should start and stop the agricultural operation, respectively. Consequently, the risk of a wrongly executed agricultural operation can be reduced, which entails less agricultural waste material less and which avoids execution inefficiencies. For example, the instruction module may be configured to display the position where the spraying, sowing, or harvesting of a part of an agricultural parcel is to be started and/or stopped. When stopping the agricultural activity, for example at the

end of a working day, the operator can enter an end point in the system via the user interface. In this way, the same or another operator, when resuming the agricultural activity, will be informed in an accurate way concerning the previous end point, and will know to choose this position as a new starting point for the further execution of the agricultural operation. In an analogous way, the shearing of a hedge, the mowing of a roadside or the clearing of a ditch can be followed up.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said user interface is configured to store time information in said database, in accordance with a predefined task. The time information may include data such as start and stop times of the agricultural operation and duration of the operation. The predefined task can be monitored easily in this way to document process inefficiencies for analysis. In this way, it can be avoided in a subsequent agricultural operation that a predictable process interruption occurs again.

Figure 3C shows a user interface for the monitoring of time information for a mowing and/or clearing operation. Figure 3C shows a multiple instruction fields for indicating the beginning of a recording, English term 'record', 26, for pausing a recording, English term 'pause', 27, and for stopping a recording, English term 'stop', 28. Such recording may include both a time registration for the registration of the total length of time, and start and end times of the mowing and/or clearing operation. This allows for better monitoring of any possible problems during the operation. In addition, the recording can also record video images of the mowing and/or clearing operation so that any occurring problems in the execution of the operation can be registered and analysed afterwards. Also shown in Figure 3C is a display field 29 for displaying the distance covered of the mowing and/or clearing operation.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said user interface is configured to store information according to a selected location. The information can then be stored in the database together with the location data for later reference. This offers the advantage that the database is updated during the activities. Factors which lead to process interruptions or which can potentially lead to process interruptions can be recorded in this way. Preferably, the system is configured to display a number of frequently occurring possible process interruptions, such as for example the presence of a pole, a TV cabinet, a pipe or a blockage. In an analogous way, said

system may be configured for inputting and/or displaying local, specific information such as, for example, information relating to the most advantageous access to an agricultural parcel. In this way, such frequently occurring points can quickly be added to the database. Other important points of locations can then be entered on the user interface using a conventional keypad or can be recorded as a video or audio clip.

This is illustrated by means of Figure 3D. Figure 3D shows an instruction field 8 which is displayed after clicking the location information field 4h, marked with the English term 'quick new point'. Instruction field 8 makes it possible to store location-bound information in a temporary or a central database, wherein the information is correlated with a specific location. For example, it can be entered if in a specific location, a physical obstacle is present, such as a pole 8a, a TV cabinet 8b, a pipe 8c, or a blockage 8d. It can also be indicated whether a particular action is performed 8e or is still ongoing 8f. Non-standard objects or problems can be entered into the database via node 8g. Node 8h allows to close the location information field 8.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said system is further configured for automatically displaying information which is stored in the database onto a user interface for an operator during the execution of an agricultural operation. This is especially advantageous in cases where the operator must pay special attention to factors which may possibly lead to a process interruption, such as the presence of a conduit, or other physical objects.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said user interface is configured to retrieve location data from said database. In this way, an operator can do searches related to facilities located in the neighbourhood. This is especially advantageous when the operator for instance has to contact an assistance service. Other searches can be aimed at a fuel station and similar technical or non-technical facilities, such as for example sanitary facilities.

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, further comprising one or more storage containers, arranged geographically spread, for the unloading of a container of an agricultural device. This offers the advantage that the load of the agricultural device, which

was temporarily stored in the load container can be unloaded locally. As a result, it is avoided that the agricultural device has to completely drive back to a permanent unloading place, such as, for example, an environmental container park, for unloading the load. Also preferably, said system is configured to calculate optimal unloading times for a plurality of agricultural devices over a limited number of storage containers which have been placed. This offers the advantage that two or more agricultural devices do not drive to the same local storage container at the same time for unloading agricultural waste material, such as grass clippings and/or clearing material.

10

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, further comprising video equipment for the recording of images of the agricultural operation. This offers the advantage that the images can later be analysed in the case of process interruption or damage to infrastructure in the ditch or roadside and/or damage to the mowing and/or clearing device.

15

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said system is configured to display one or more other operators on the map and navigation section of the user interface. In a more preferred embodiment, the invention provides a system according to the second aspect of the invention, wherein said user interface is configured for retrieving the geo-position of one or more technical co-operators, and for displaying the real-time position of one or more co-operators.

25

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, further comprising communication equipment for the transmission of information. Such communication equipment can be comprised of transmitting and receiving equipment, and can make use of a wireless internet signal and/or GPS communication. This offers the advantage that the operator can easily make contact with one or more fellow operators which perform activities in the neighbourhood. Such contact may be desirable for project consultation, for breakdown assistance, in emergency situations, etc.

30

In a preferred embodiment, the invention provides a system according to the second aspect of the invention, further comprising a transmitting module for the transmission of location information to a central server. This offers the advantage

35

that the geo-information can be passed in direct connection and can be stored in a central database.

5 In a preferred embodiment, the invention provides a system according to the second aspect of the invention, further comprising an instruction module which is configured for calculating an agricultural route to go through.

10 This offers the advantage that the instruction module can minimize the total time and/or distance of an agricultural route. In this, the operator himself does not have to make decisions concerning the optimal route choice, creating a less stressful work situation. In addition, the specific instruction module can take into account, when minimizing the route distance, limitations inherent in agricultural transport devices, such as speed limits, limitations concerning returning in a street, etc.

15 In a specific aspect, the invention provides a geographic information system according to the second aspect of the invention, wherein said agricultural operation comprises a mowing and/or clearing operation.

20 In a specific aspect, the invention provides a geographic information system for the mowing of roadsides and/or clearing of ditches by means of one or several mowing and/or clearing devices, wherein each mowing and/or clearing device is driven by a technical operator, said system comprising:

- one or more mowing and/or clearing devices;
- one or more user interfaces provided on said mowing and/or clearing devices;
- 25 – at least one database comprising one or more instruction modules; and
- at least a processing unit, operating in communicative connection with said user interfaces and with said database comprising one or more instruction modules.

30 In a third aspect, the invention provides a computer-implemented method for performing an agricultural operation by a technical operator, comprising the steps of:

- determining geo-location information of at least an agricultural device;
- 35 – calculating an agriculture route to go through for said device;
- displaying driving instructions onto a user interface provided on said agricultural device;

- displaying operation instructions onto a user interface provided on said agricultural device.

This offers the advantage that the technical operator can easily follow instructions, without thereby having to make choices himself concerning the optimal approach route or the most optimal route. Also, the operator does not have to manually check what the specifications of the agricultural process are. In this way, material and personnel can be optimally deployed for executing agricultural operations.

10 Preferably, the computer-implemented method according to the third aspect of the invention is used for executing a method according to the first aspect of the invention.

In a specific aspect, the invention provides a computer-implemented method according to the third aspect of the invention for the mowing of roadsides and/or the clearing of ditches by a technical operator, comprising the steps of:

- determining geo-location information of at least a mowing and/or clearing device;
- calculating a mowing and/or clearing route to go through for said mowing and/or clearing device;
- 20 - displaying driving instructions onto a user interface provided on a mowing and/or clearing device;
- displaying mowing and/or clearing instructions onto a user interface provided on a mowing and/or clearing device.

25

In a preferred embodiment, the invention provides a method according to the third aspect of the invention, wherein said geo-location information of a first mowing and/or clearing device is displayed onto a user interface of one or more mowing and/or clearing devices. This offers the advantage that a plurality of technical operators can monitor the mutual positions and make contact in case of a route or process interruption. Preferably, the operators can also make contact with a central contact point for calling technical assistance or information.

In a preferred embodiment, the invention provides a method according to the third aspect of the invention, wherein the route information can be stored in a database by said technical operator. This offers the advantage that the information can be analysed in order to avoid project interruptions in future repetition of the mowing

35

and/or clearing route. Also, the information can be used to optimize the execution of the mowing and/or clearing route.

5 In a fourth aspect, the invention provides a use of a geographic information system, preferably according to the second aspect of the invention, for performing an agricultural operation by means of one or more agricultural devices, more specifically for the mowing of roadsides and/or the clearing of ditches by means of one or more mowing and/or clearing devices.

CLAIMS

1. Method for executing geographically spread tasks, comprising the steps of:
 - 5 – assigning geographic projection coordinates to geographic object data in one or more geographical areas;
 - collecting said geographic object data with corresponding geographic projection coordinates in a database;
 - 10 – assigning one or more geographically spread tasks to one or more geographic object data with corresponding geographic projection coordinates;
 - displaying geographic object data onto a user interface and displaying one or more geographically spread tasks.

2. Method according to claim 1, wherein said geographic tasks are executed by
15 means of one or more agricultural devices and wherein at least an agricultural device is provided with a registration module for registering the execution of a task and wherein said agricultural device is provided with a location module for registering a location.

- 20 3. Method according to claim 2, wherein data collected by means of said registration module and said location module are entered in said database.

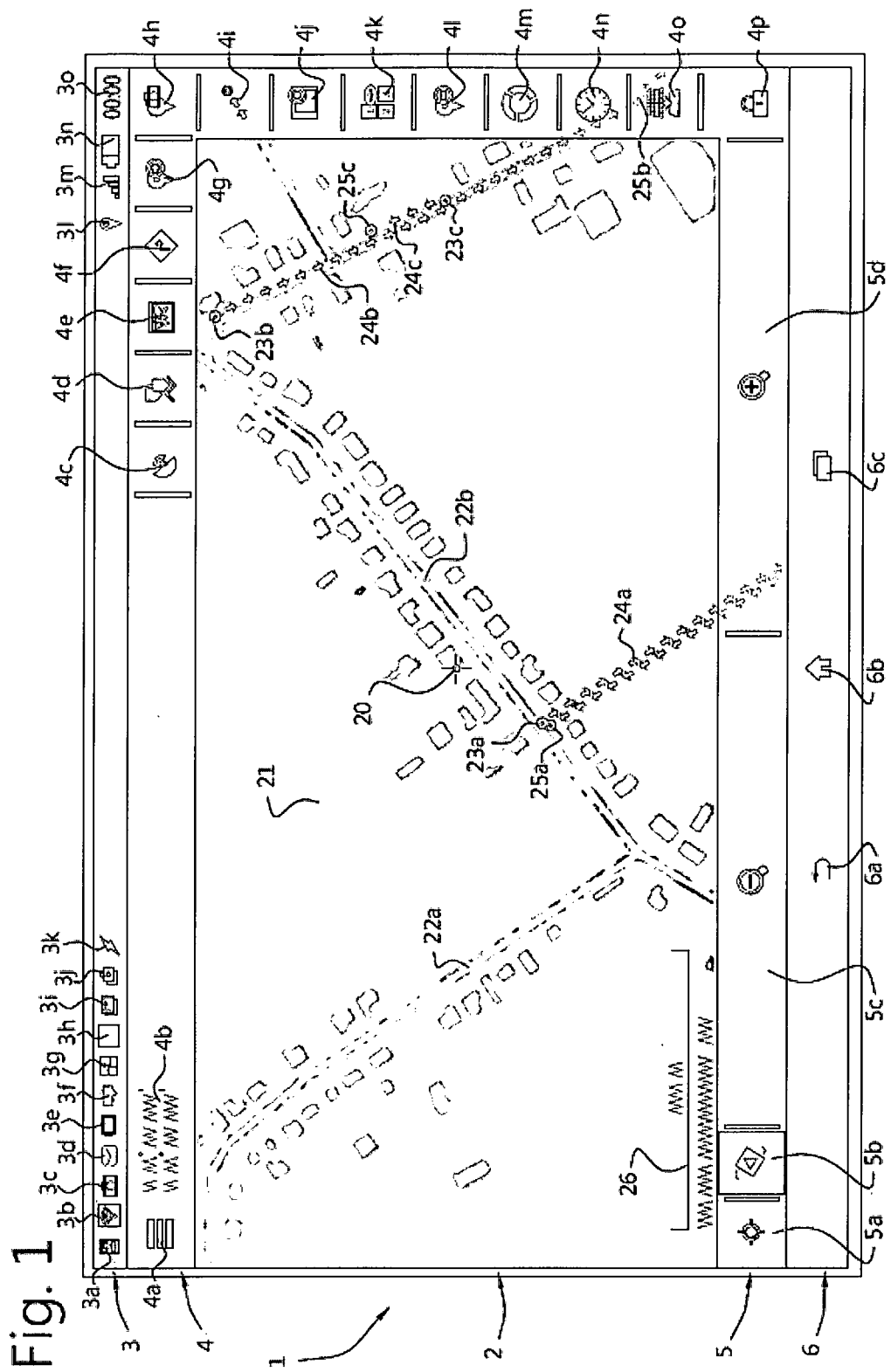
4. Method according to claim 3, wherein completion data concerning geographically spread tasks from said database are graphically displayed
25 and/or displayed in a database.

5. Geographic information system for executing agricultural tasks by one or more agricultural devices, wherein each agricultural device is driven by a technical operator, said system comprising:
 - 30 – one or more agricultural devices;
 - one or more user interfaces provided on said agricultural devices;
 - at least a data base comprising one or more instruction modules; and
 - at least a processing unit, operating in communicative connection with said user interfaces and said database comprising one or more
35 instruction modules;

characterized in that at least an instruction module is configured for managing one or more sub-tasks of an agricultural operation.

6. System according to claim 5, wherein at least an instruction module is configured to display driving instructions on said user interface.
7. System according to claim 5 or 6, wherein at least an instruction module is configured to display agricultural instructions on said user interface.
8. System according to at least one of the preceding claims 5 to 7, wherein said user interface is configured to store time information in said database, according to a predefined task.
9. System according to at least one of the preceding claims 5 to 8, wherein said user interface is configured to store information according to a selected location.
10. System according to at least one of the preceding claims 5 to 9, wherein said user interface is configured to retrieve location data from said database.
11. System according to at least one of preceding claims 5 to 10, further comprising one or more storage containers, arranged geographically spread, for the unloading of a container of an agricultural device.
12. System according to at least one of preceding claims 5 to 11, further comprising video equipment for the recording of images of the agricultural operation.
13. System according to at least one of preceding claims 5 to 12, further comprising communication equipment for the transmission of information.
14. System according to at least one of preceding claims 5 to 12, further comprising a transmission module for the transmission of location information to a central server.
15. System according to claim 14, wherein said user interface is configured for retrieving the geo-position of one or more technical co-operators and for displaying the real-time position of one or more co-operators.

16. System according to at least one of the preceding claims 5 to 15, for the mowing of roadsides and/or the clearing of ditches by means of one or more mowing and/or clearing devices, said system comprising:
- one or more mowing and/or clearing devices;
 - 5 – one or more user interfaces provided on said mowing and/or clearing device.
17. Computer-implemented method for executing an agricultural operation by a technical operator, comprising the steps of:
- 10 – determining geo-location information of at least an agricultural device;
 - calculating an agriculture route to go through for said device;
 - displaying driving instructions onto a user interface provided on said agricultural device;
 - displaying operation instructions onto a user interface provided on
 - 15 said agricultural device.
18. Method according to claim 17, wherein said geo-location information of a first agricultural device is displayed on a user interface of one or more agricultural devices.
- 20
19. Method according to claim 17 or 18, wherein the route information is stored in a database by said technical operator.
20. Use of a geographic information system for executing an agricultural
- 25 operation by means of one or more agricultural devices.



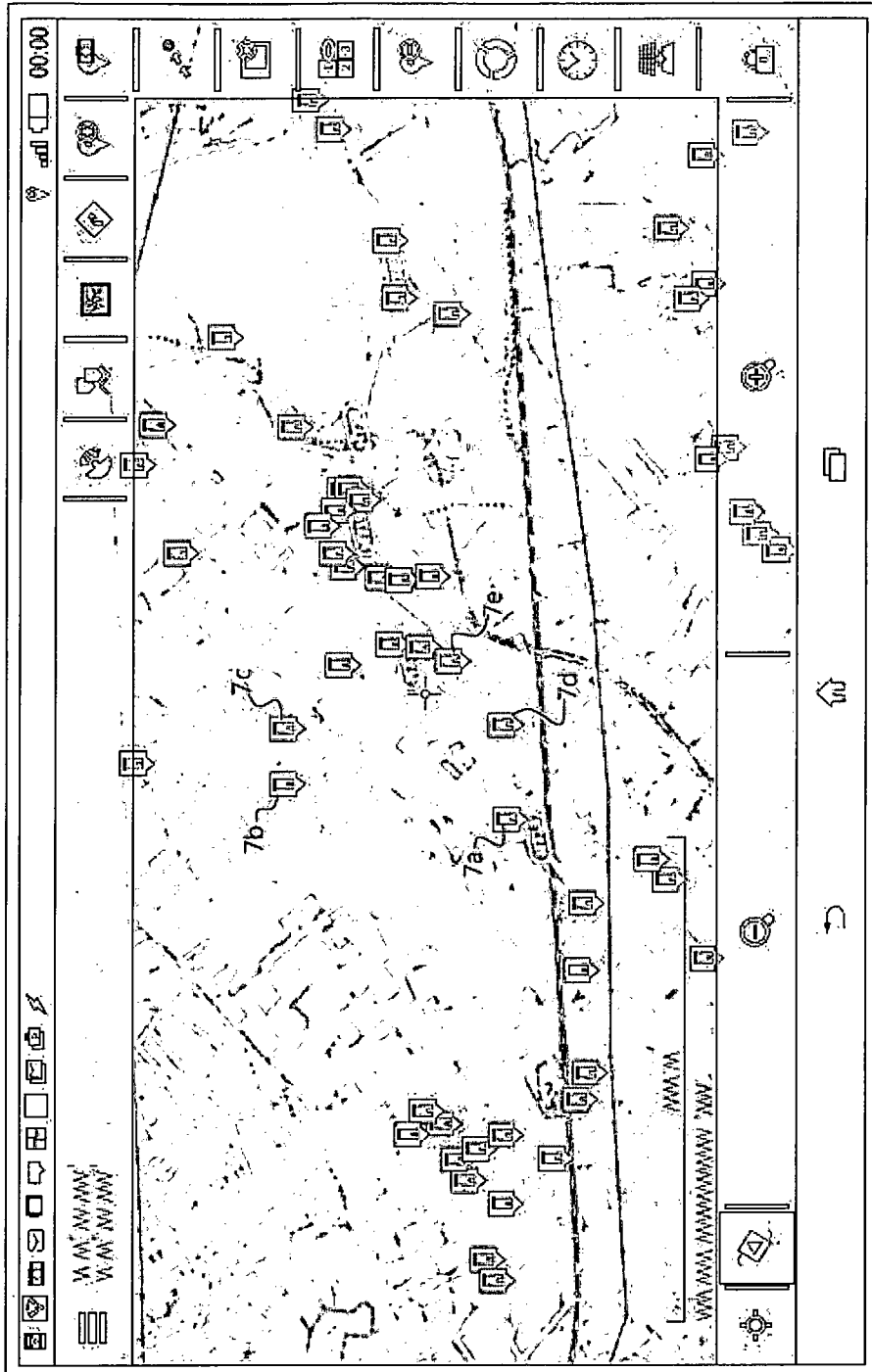


Fig. 2

Fig. 3A

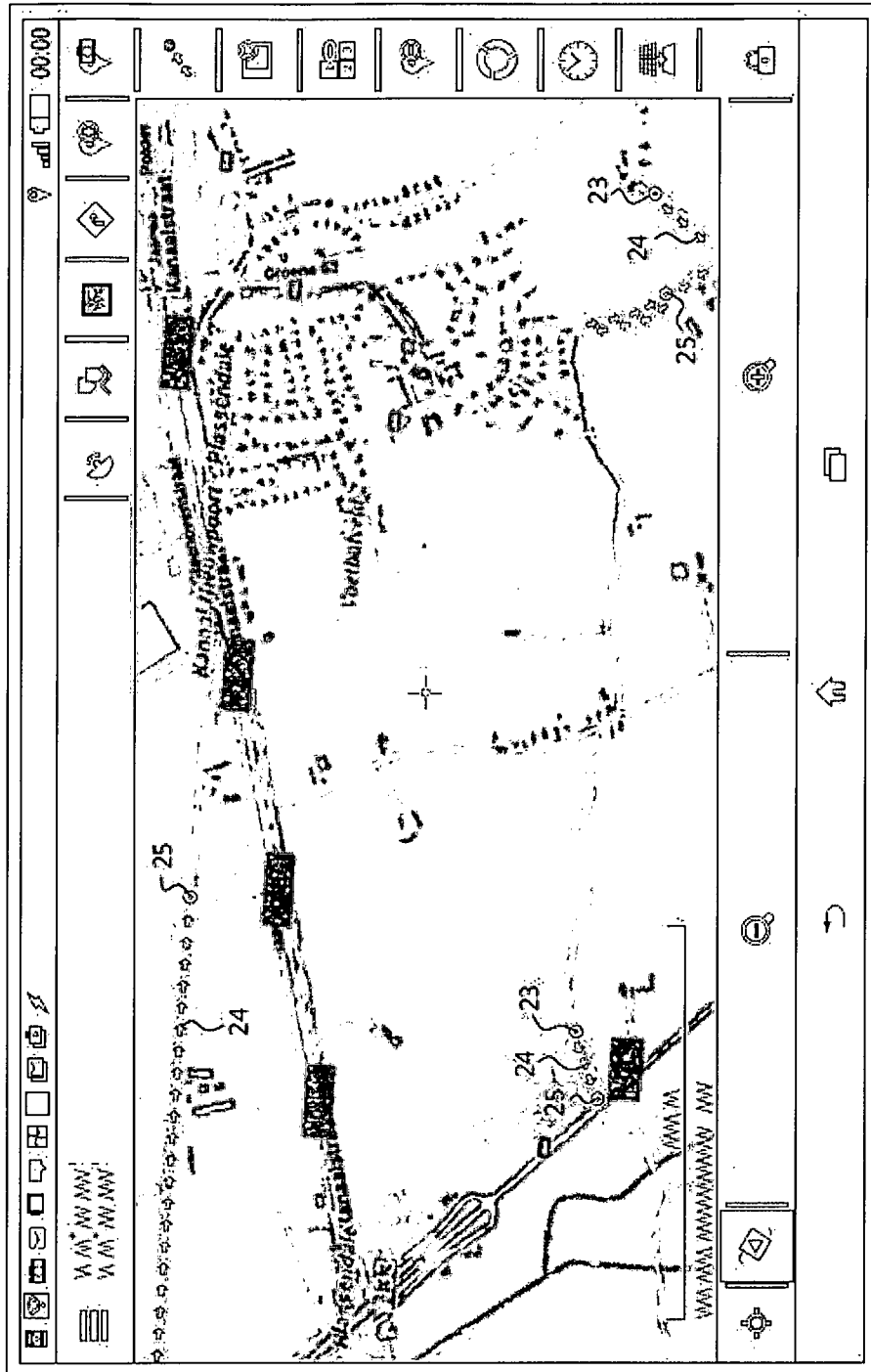
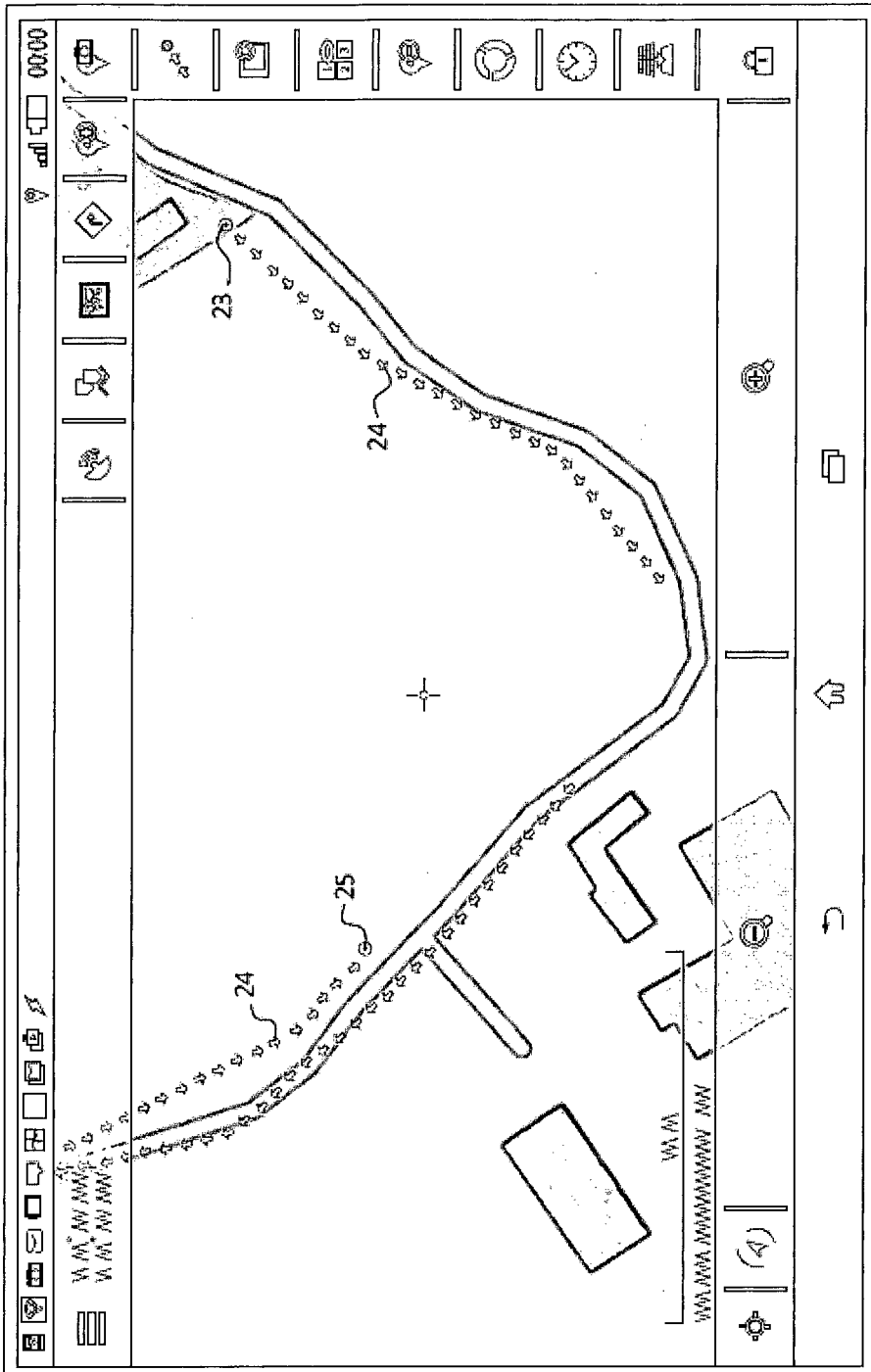


Fig. 3B



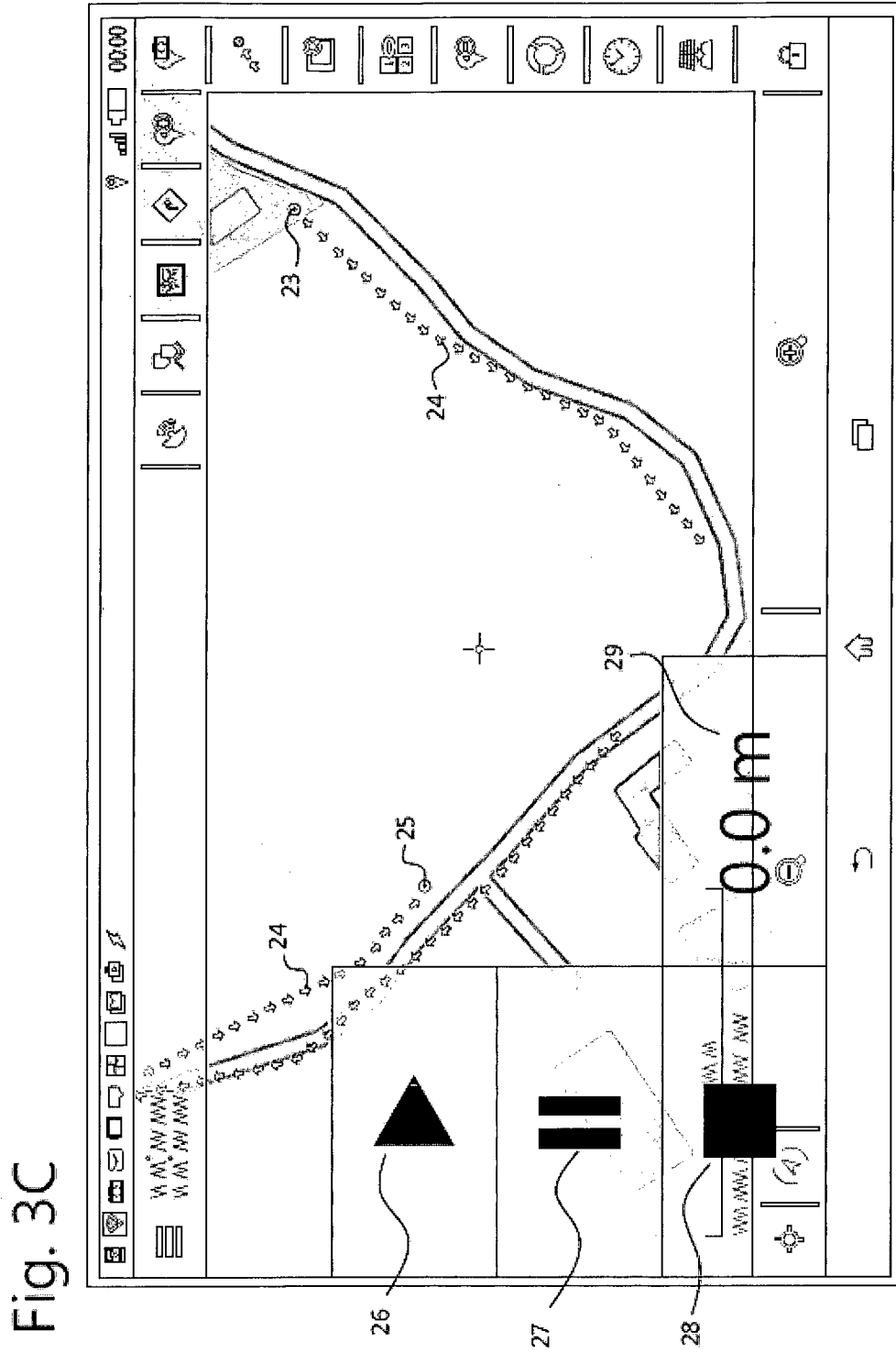
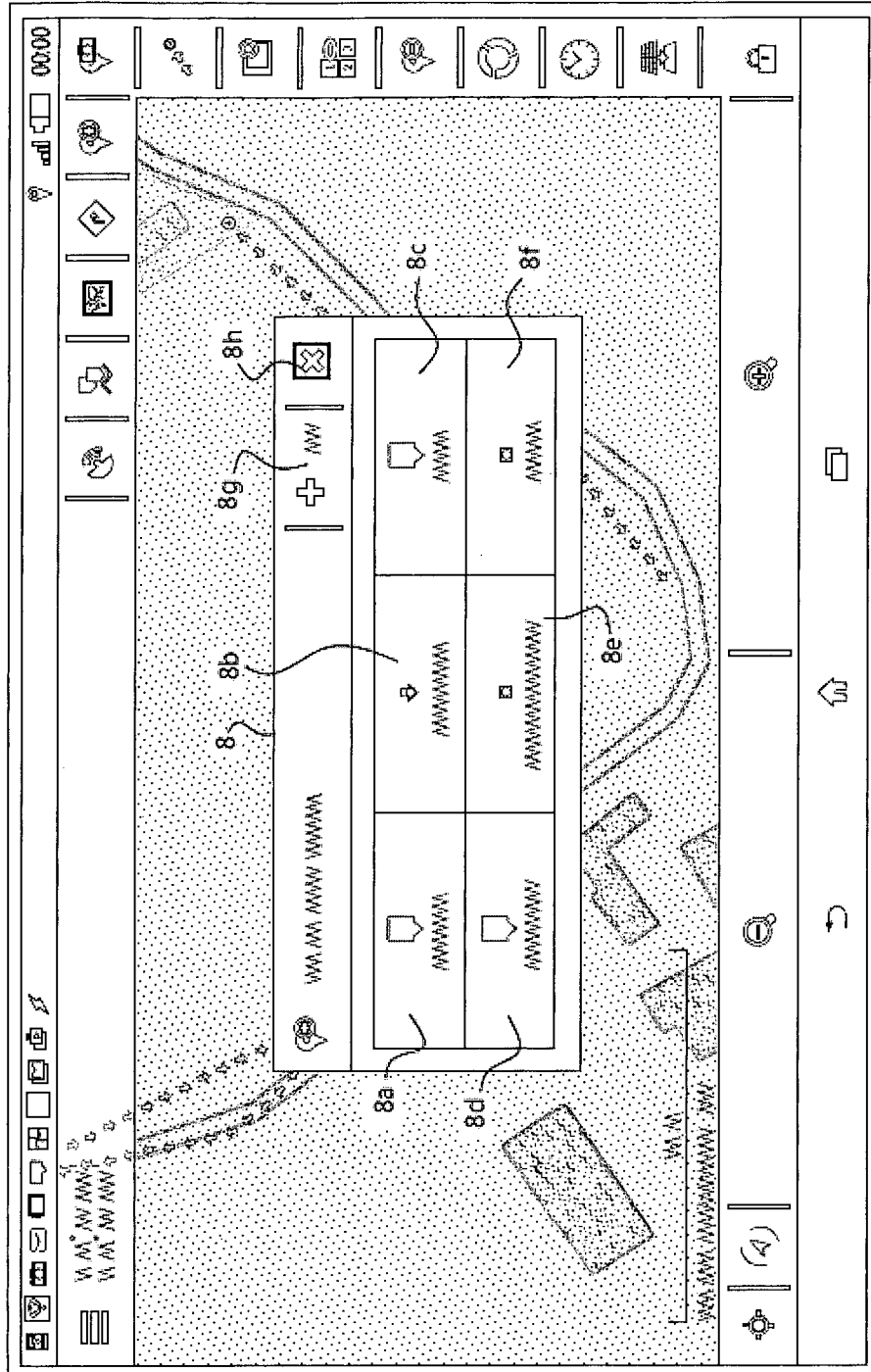


Fig. 3D



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/053765

A. CLASSIFICATION OF SUBJECT MATTER INV. G06Q10/06 G06Q50/02 A01C7/00 G01C21/00 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) G06Q A01C G01C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 266 595 B1 (GREATLINE MARTIN W [US] ET AL) 24 July 2001 (2001-07-24) abstract column 2, line 48 - column 4, line 13 column 8, line 12 - line 46 figures 1,5 -----	1-20
X	JP 2005 160423 A (NAT AGRIC & BIO ORIENTED RES) 23 June 2005 (2005-06-23) abstract -----	1-20
X	US 2006/178825 A1 (EGLINGTON MICHAEL L [US] ET AL) 10 August 2006 (2006-08-10) the whole document -----	1-20
X	JP 2005 176741 A (YANMAR CO LTD) 7 July 2005 (2005-07-07) abstract -----	1-20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 9 September 2016	Date of mailing of the international search report 23/09/2016	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer van der Weiden, Ad	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2016/053765

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6266595	B1	24-07-2001	NONE
JP 2005160423	A	23-06-2005	JP 4572417 B2 04-11-2010 JP 2005160423 A 23-06-2005
US 2006178825	A1	10-08-2006	NONE
JP 2005176741	A	07-07-2005	NONE