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(54) A CONTROL SYSTEM

(57) The present invention relates to a control system, in particular a control system for monitoring the location of at least one fluid storage vessel. A control system (10) for monitoring the location of at least one fluid storage vessel (30), wherein the control system (10) comprises: at least one fluid storage vessel (30), wherein each vessel (30) comprises a first communication means (65); and a computer system (100) comprising a second communication means (105), and a memory (110) for storing vessel data (115); wherein in response to an emergency event, the computer system (100) is configured to:
i) receive location information representing the location of each vessel (30) using the second communications means (105);
ii) update the vessel data (115) in the memory (110) of the computer system (100), with the received location information; and
iii) transmit the updated vessel data (115) from the memory (110) of the computer system to a remote location (200).

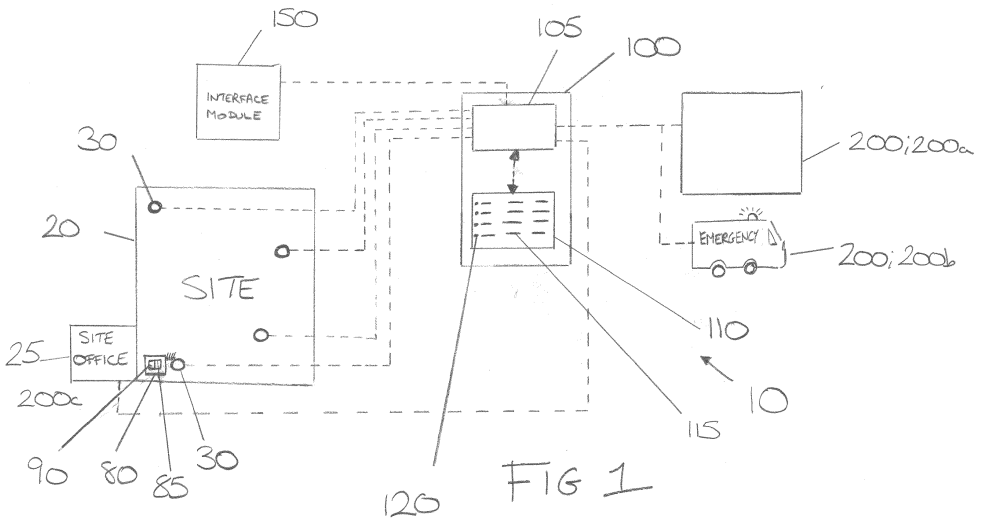

FIG 1

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Description

[0001] The present invention relates to a control system, in particular a control system for monitoring the location of at least one fluid storage vessel.

BACKGROUND RELATING TO THE PRIOR ART

[0002] In an emergency situation, for example a fire, on a site which contains fluid storage vessels, it is important for the emergency services to know approximately where each vessel is located and what fluid is in each vessel (for instance, whether the fluid is flammable, toxic, and/or explosive).

[0003] It is particularly difficult on large or complex sites, such as multi-story buildings to know exactly where each vessel is and as the emergency services have no reference point in understanding locations of vessels it makes their job even more hazardous.

[0004] In addition, if the vessels have been in a fire then the normal methods of identifying the vessel may be removed, i.e. a label or paint on the surface of the vessel.

[0005] The present invention aims to provide a solution to the above mentioned problems.

SUMMARY OF THE INVENTION

[0006] According to a first aspect of the present invention, there is provided a control system for monitoring the location of at least one fluid storage vessel, wherein the control system comprises: at least one fluid storage vessel, wherein each fluid storage vessel comprises a first communication means, and a memory for storing information representing the location of the vessel; and a computer system comprising a second communication means, and preferably a memory for storing vessel data; wherein in response to an emergency event, the computer system is configured to:

i) receive location information representing the location of each vessel using the second communications means;

ii) update the vessel data, stored in the memory of the computer system, with the received location information; and

iii) transmit the updated vessel data from the memory of the computer system to a remote location.

[0007] In the event of an emergency, the present invention provides a system which can update vessel data containing the location of fluid storage vessels, and which can transmit this vessel data to a remote location, such as to the emergency services.

[0008] Exemplary emergency events include, but are not limited to, a fire; a gas leak; an earthquake; and/or a malfunctioning fluid storage vessel.

[0009] Preferably, the control system is for monitoring the location of at least one fluid storage vessel in a predetermined area, and wherein the at least one fluid storage vessel is located in the predetermined area. As examples, the predetermined area may be a building, such as a factory or a hospital, or a site or campus containing several buildings.

[0010] Ideally, the control system is suited for monitoring the location of a plurality of fluid storage vessels.

[0011] In some cases, the control system may further comprise at least one beacon, each beacon comprising a communication unit and a memory for containing information representing the location of the beacon; wherein each vessel comprises a communication module which is configured to communicate with the communication unit from a beacon when the vessel is in the vicinity of the beacon.

[0012] Depending on the intended use of the vessel, the beacon could be representative of a room on a site, a piece of equipment, or a hose which is operable to connect with the vessel.

[0013] The communication module and the communication unit may communicate with each other via Bluetooth, or some other near field form of communication.

[0014] When a vessel is within the vicinity of the beacon, the location information of the beacon is preferably transmitted from the memory of the beacon to the memory of the vessel via the communication unit and the communication module, such that the transmitted location information of the beacon becomes the location information in the memory of the vessel.

[0015] By using location information from the beacon in the vicinity of the vessel, this removes the need for the vessel to determine the location information by itself, for instance by using a locating means, such as a global positioning system (GPS), located on the vessel.

[0016] In response to an emergency event, the computer system may be configured at step i) to:

i) receive the location information from the memory of each vessel using the first communication means from each vessel, and the second communications means.

[0017] In cases where the control system comprises the at least one beacon, when a vessel is within the vicinity of the beacon, the information representing the location of the beacon may be determined as being the location information representing the location of the vessel (30), such that in response to an emergency event, the computer system (100) is configured at step i) to:

a) receive the location information from each vessel which is not within the vicinity of a beacon using the first communication means from the vessel, and the second communications means; and

b) receive the location information from each vessel which is within the vicinity of a beacon using the communication module from the beacon, and the second

communications means.

[0018] In this way, when a vessel is within the vicinity of a beacon, information from the vessel may be transmitted via the beacon to the computer system. When not paired with a beacon, information from the vessel may be transmitted directly to the computer system using the first communication means from the vessel

[0019] In some cases, the emergency event may be communicated to the second communication means from the computer system by a command from an interface module. The command from the interface module may be actioned manually by an operator of the module, or may be actioned automatically (for example in response to a fire/smoke alarm being sounded).

[0020] Preferably, each fluid storage vessel comprises a sensor for determining a parameter relating to the vessel and/or the surroundings of the vessel. The parameter may include the composition/pressure/quantity/temperature of the fluid inside the vessel, and/or similar characteristics of the environment surrounding the vessel. The parameter may include the level of vibrations in the vicinity of the vessel, which are detected by virtue of the sensor being a vibration sensor.

[0021] In cases where a sensor is present, the emergency event may be communicated to the second communication means from the computer system by the first communication means of the vessel based on the parameter from the sensor. As an example, if the parameter exceeds or falls below a predetermined threshold, and/or falls outside a predetermined range, the vessel may interpret this as an emergency event, which requires communicating to the computer system.

[0022] In some cases, each vessel may comprise a fire/smoke detector for determining the presence of fire/smoke surrounding the vessel. In this case, the emergency event may be communicated to the second communication means from the computer system by the first communication means of the vessel upon the fire/smoke detector determining the presence of fire/smoke surrounding the vessel.

[0023] Preferably, each fluid storage vessel is configured such that outside of an emergency event it periodically transmits the location information from its memory to the computer system via the second communication means; and wherein the computer system is configured to update the vessel data with the received location information from each vessel.

[0024] In the event of an emergency, preferably the control system is configured in response to location information not being received from a vessel in step i), to maintain the vessel data in step ii) with any existing location information for the vessel. In such instances, it is envisaged that the control system might flag any entries in the vessel data whose location information is based on existing location information, as opposed to location information received from the vessel in step i).

[0025] Preferably, the memory of each fluid storage vessel is operable to store information representing the contents of the fluid storage vessel.

[0026] In this case each vessel is preferably configured such that outside of an emergency event it periodically transmits the information representing the contents of the vessel from its memory to the computer system via the the second communication means; and wherein the computer system is configured to update the vessel data with the received information representing the contents of each vessel.

[0027] In cases where the memory of each vessel is operable to store information representing the contents of the vessel, step i) may further comprise receiving the information representing the contents of each vessel using the the second communications means; and step ii) comprise updating the vessel data with the information representing the contents of each vessel.

[0028] In the above cases, the vessel data provides not only information representing the location of each fluid storage vessel, but also provides an indication representing the contents of each vessel. In this way, particularly where a vessel(s) contains a hazardous fluid, for instance a fluid which is flammable/toxic/explosive, the vessel data can be used to identify where such hazardous fluid is located.

[0029] To help prioritize which fluid storage vessels require the most pressing action in the event of an emergency, the vessel data may be categorized by the computer system based on the information representing the contents of each vessel. For instance, vessels which contain an explosive fluid may be categorised in a first category, whilst vessels containing a toxic fluid may be categorised in a different category.

[0030] Preferably, the remote location is a building or vehicle relating to the emergency services, such as a police station/car/helicopter, a fire station/car, or a hospital/ambulance/air ambulance. The remote location may alternatively be an office associated with the predetermined area.

[0031] According to a second aspect of the invention, there is provided a method for monitoring the location of at least one fluid storage vessel, wherein the method is part of a control system which comprises: at least one fluid storage vessel, wherein each fluid storage vessel comprises a first communication means; and a computer system comprising a second communication means, and a memory for storing vessel data; wherein the method comprises the following steps in response to an emergency event:

i) receive location information representing the location of each vessel the second communications means;

ii) update the vessel data, stored in the memory of the computer system, with the received location information; and

iii) transmit the updated vessel data from the memory of the computer system to a remote location.

[0032] It will be appreciated that the method according to a second aspect of the invention may comprise any/all of the other features/functionality described in relation to the system according to the first aspect of the invention.

[0033] The method may further comprise displaying a representation of the information representing the location of each vessel on a display device.

[0034] In some cases, the display device may be located at the remote location, such that the representation displayed on the display device is based on the information contained in the received vessel data from step iii).

[0035] In other cases, the display device may form part of the computer system, such that the information contained in the vessel data stored in the memory of the computer system is continually represented on the display device.

[0036] In the above cases, a category of contents may be indicated on the representation, which may include information on the contents of each vessel displayed on the display device.

BRIEF DESCRIPTION OF THE FIGURES

[0037] The invention will now be described by way of example only with reference to the accompany Figures in which:

Figure 1 shows a schematic of a control system for monitoring the location of at least one fluid storage vessel;

Figure 2 shows a schematic representation of a fluid storage vessel from Figure 1;

Figure 3 shows a flowchart outlining an operation of the control system from Figure 1; and

Figure 4 shows a display device comprising a representation which shows the position of at least one fluid storage vessel on a site.

DETAILED DESCRIPTION

[0038] With reference to the Figure 1, there is shown a control system 10 comprising a predetermined area in the form of a site 20. The site 20 has a site office 25, or some other office from which oversight/management of the site 20 can occur.

[0039] Located on the site 20 are a number of fluid storage vessels 30. As shown in Figure 2, each fluid storage vessel 30 on the site 20 contains a fluid 35, which is typically pressurised, and comprises at least one sensor for determining a parameter relating to the vessel and/or the surroundings of the vessel 30. The sensors used will vary depending on the application and/or the environment in which the vessel 30 is located. Preferably, the fluid storage vessel comprises a sensor 40 which monitors the composition of the fluid inside the vessel. Other sensors which may be present include a sensor(s) 45 which monitors the pressure/quantity/temperature of the fluid inside the vessel 30, and/or a sensor(s) 50 which monitors similar characteristics of the environment surrounding the vessel 30, and/or a fire detector, and/or a smoke detector.

[0040] Each fluid storage vessel 30 additionally comprises a locating means 55, such as a global positioning system (GPS), for determining the geographical location of the vessel 30.

[0041] A memory 60 is provided on each fluid storage vessel 30 for storing information collected from the sensor(s) 40;45;50 and the locating means 55. The memory 60 may store data indicating the composition of the fluid in vessel 30. In ordinary operation, the vessel 30 is configured to periodically collect information from the sensor(s) 40;45;50 and the locating means 55, and is configured to store this information in the memory 60. A first communication means 65 in the form of a wireless transmitter is provided on each vessel 30 to allow the information stored in the memory 60 to be transmitted from the vessel 30 to a computer system 100, as shown in Figure 1.

[0042] The computer system 100, which is not necessarily on the site 20 (it may be remote from the site 20), comprises a second communication means 105 for receiving the information transmitted from each of the first communication means 65. The second communication means 105 is operatively connected to a memory 110 which is configured to receive the information from the second communication means 105 and store this information as vessel data 115 (for example, in a list).

[0043] An interface module 150 is provided in the control system 10 for allowing control of the computer system 100. The interface module 150 may be physically connected, or remotely connected via a wireless connection, to the computer system 100. Possible locations for the interface module 150 include on the computer system 100 or in the site office 25.

[0044] Information contained in vessel data 115 from the memory 110 of the computer system 100 can be wirelessly transmitted using the second communication means 105 to a remote location 200. In Figure 1, the remote location 200 is shown as a building 200a, which might be a police station, fire station, or hospital. The remote location 200 may alternatively be an emergency services vehicle 200b, such as a fire engine, ambulance, or police car; or may be the site office 25;200c.

[0045] With reference to the flowchart in Figure 3, the operation of the control system 10 from Figure 1 will now be described.

[0046] Except during an emergency event, the fluid storage vessels 30 distributed across the site 20 each periodically wirelessly transmit information collected from the sensors 40;45;50 and the locating means 55 to the second communication means 105 from the computer system 100. The information received by the second communication means 105 is fed to the memory 110

where it is used to update vessel data 115.

[0047] Vessel data 115 contains an entry 120 for each fluid storage vessel 30 present on the site 20. Each entry comprises information representing the current location of the vessel 30 in the site, and a time stamp which indicates when the entry was last updated. Each entry 120 in vessel data 115 may also comprise additional information regarding each vessel 30, such as the composition of the fluid stored therein. The additional information may be derived from the sensors 40;45;50 which are present on each vessel 30 or from the memory 60 on each vessel 30, which may be transmitted to the second communication means 105 from each of the first communication means 65. In the situation of each vessel 30 comprising solely a sensor 40 which monitors the composition of the fluid inside the vessel, and a locating means 55, each entry 120 in vessel data 115 contains information representing the location of each vessel 30, information representing the contents of each vessel 30, and a time stamp which indicates when the entry 120 was last updated.

[0048] In the case of an emergency (step 300) occurring on the site 20, this may be detected in one or both of two ways.

[0049] The first way is via a command from the interface module 150 (step 301) which is transmitted to the computer system 100. In one mode of operation, the command from the interface module 150 may be triggered manually (such as by personnel from the site office 25). In a second mode of operation, the command from the interface module 150 may be triggered automatically, for instance the interface module 150 may be a fire and/or smoke alarm on the site 20 being sounded.

[0050] The second way to detect an emergency is using a vessel 30. For example, a vessel 30 may determine that a parameter from one of its sensors 40;45;50 exceeds or falls below a predetermined threshold, and/or falls outside a predetermined range (step 302). Alternatively, a fire detector and/or smoke detector on the vessel 30 may detect fire and/or smoke. In this case, the vessel 30 interprets this as an emergency event, and communicates this to the computer system 100 via the first communication means 65 of the vessel 30 and the second communication means 105.

[0051] When an emergency event is communicated to the computer system 100, the computer system 100 sends an emergency signal requesting information from each of the vessels 30 on the site 20 via the first and second communication means 65;105. In response to this signal, each vessel 30 retrieves from its memory 60 the most up-to-date information from the locating means 55 and, optionally, the sensors 40;45;50, and transmits this information back to the second communication means 105 from the computer system 100 (step 303).

[0052] Information received by the second communication means 105 is fed to the memory 110 of the computer system 100 where it is used to update the entries 120 in vessel data 115 (step 304).

[0053] Upon receipt of the information from all of the vessels 30 on the site 20, and once the entries 120 in vessel data 115 are updated, the computer system 100 wirelessly transmits vessel data 115 containing the updated information to the remote location 200 (step 306).

[0054] After sending the emergency signal by the computer system 100 to each of the vessels 30, in the case of information not being received from a vessel 30 after a predetermined period of time (for instance 30 seconds), rather than continue to wait until the information is received from the vessel 30, the computer system 100 may be configured to transmit vessel data 115 to the remote location 200 without this received information (step 305).

[0055] In this situation, prior to sending vessel data 115 to the remote location 200, the computer system 100 may flag any entry(ies) on vessel data 115 which does not contain up-to-date information. In this way, it can be more easily discerned whether any entry 120 from vessel data 115 does not contain up-to-date information.

[0056] At the remote location 200, the received vessel data 115 is then processed and/or displayed as required.

[0057] It will be appreciated that many modifications could be made to the control system 10 described above.

[0058] In one embodiment, depending on the emergency event which is communicated to the computer system 100, the computer system may be configured to run a program stored in its memory 110 to decide the most appropriate remote location 200 to send the updated vessel data to. As an example, in the case of the emergency event being automatically triggered in response to a fire on the site 20 being detected, the program stored in the memory 110 may determine that the updated vessel data 115 should be sent to the fire brigade.

[0059] It will be appreciated that the control system 10 will have a process for registering/deregistering a vessel 30 as it enters/exits the site 20. This process may be automatic, such that when a vessel 30 enters/exits the site 20, the vessel 30 automatically sends a signal to the computer system 100 instructing it to create a new entry 120 for the vessel 30, or remove the current entry 120 for the vessel 30, from vessel data 115. This automatic process may be achieved in a number of ways, for instance via the use of geo-fencing software stored in the memory of each vessel 30 and the memory of the computer system 100. Alternatively, the registration/deregistration process may be manual, such that the registration/deregistration signal to the computer system 100 is only sent in response to the vessel 30 being manually scanned/logged by personnel as it enters/exits the site 20.

[0060] At any given time outside of an emergency event, vessel data 115 may be accessed on request by the interface module 150 or by the remote location 200. In one embodiment, vessel data 115 may be used to create a representation 405, in the form of a report or map, of the vessels 30 present on the site 20. In one example, the request may be made via an App located on a portable device having a display device 400, such

as a tablet, a laptop, an iPad® or a mobile phone, as shown in Figure 4. In this case, vessel data 115 would be transmitted to the portable device, where the information in the vessel data 115 would then be processed to create the representation 405 for displaying on the display device 400.

[0061] The display device 400 could be separately provided as part of the computer system 100, such to allow the representation 405 of the information from the vessel data 115 to be displayed at any time directly at the computer system 100.

[0062] During an emergency event, any of the above display devices 400 could be used to display the representation 405 of the information contained in the updated vessel data 115.

[0063] Preferably, the representation 405 comprises a category of contents 415, or some other index, which allows the information displayed on the representation 405 to be more easily understood. In one example, the representation 405 may take the form of a map 410 which shows the location of each vessel 30 on the site 20. Depending on the information stored in the vessel data 115, the category of contents 415 might recite the information representing the contents of each vessel 30, and/or recite the time stamp associated with the information for each vessel 30.

[0064] Outside of an emergency event, it will be appreciated that the periodicity in which information is transmitted from each vessel 30 to the computer system 100 may be changed as necessary, for example, depending on power usage requirements and depending on how up-to-date the information from vessel data 120 needs to be at any given time.

[0065] In some situations, to help prioritize which fluid storage vessels require the most pressing action in the event of an emergency, entries 120 in vessel data 115 may be categorised by the computer system 100 based on the information representing the contents of each vessel 30. Preferably, entries 120 on vessel data 115 which relate to vessels 30 containing an explosive fluid may be categorised in a first category. More preferably entries 120 on vessel data 115 relating to vessels 30 containing a toxic fluid may be categorised in a different category. Even more preferably, entries 120 relating to vessels 30 containing inert or stable fluids may be categorised in a further category.

[0066] With reference to Figures 1 and 2, each vessel 30 may be provided with an additional or alternative communication module 75, such as a Bluetooth device, for transferring information, such as location information, between a communication unit 85 located on a beacon 80 in the vicinity of the vessel 30. The communication module 75 may form the first communication means 65 or may form part of the first communication means 65.

[0067] Depending on the site 20 in which the vessel 30 is located, the beacon 80 could be mounted for example in a room on the site 20, on a piece of equipment, or on a hose which is operable to connect with the vessel 30.

[0068] Each beacon 80 on the site 20 comprises a memory 90 for storing information, and the communication unit 85 of the beacon 80 is operable to communicate with the second communication means 105 from the computer system 100, as well as any communication module 75 relating to a nearby vessel 30.

[0069] Information may be transferred either way between the vessel 30 and the beacon 80.

[0070] In one possible mode of operation, when a vessel 30 is in the vicinity of a beacon 80 on the site 20, information such as location information of the beacon 80 may be transferred from the memory 90 of the beacon 80 into the memory 60 of the vessel 30, such that the transmitted location information of the beacon becomes the location information in the memory of the vessel 30. In this operation, whilst the vessel 30 is in the vicinity of the beacon 80, the vessel 30 does not need to utilise its locating means 55 to create locate information for the vessel 30, since the location information is already available from the beacon 80.

[0071] In an alternative mode of operation, when a vessel 30 is in the vicinity of a beacon 80 on the site 20, information from the memory 60 of the vessel 30 may be relayed to the memory 90 of the beacon 80 via the communication module 75 and the communication unit 85. In this way, the information representing the location of the beacon 80 would be determined as being the location information representing the location of the vessel 30 which is in the vicinity of the beacon 80. Either during or outside of an emergency event, information transmitted from the vessel to the beacon 80 may be relayed via the communication unit 85 to the second communication means 105 from the computer system 100.

[0072] As used herein, the term fluid storage vessel covers any container which can store a liquid and/or a gas. For the avoidance of any doubt, the term includes, but is not limited to, a gas cylinder and/or a gas bottle. The term gas cylinder has a conventional meaning and is not necessarily limited to a gas container which has a cylindrical shape.

Claims

1. A control system (10) for monitoring the location of at least one fluid storage vessel (30), wherein the control system (10) comprises:

   at least one fluid storage vessel (30), wherein each vessel (30) comprises a first communication means (65); and
   a computer system (100) comprising a second communication means (105), and a memory (110) for storing vessel data (115);
   wherein in response to an emergency event, the computer system (100) is configured to:

i) receive location information representing the location of each vessel (30) using the second communications means (105);
ii) update the vessel data (115) in the memory (110) of the computer system (100), with the received location information; and
iii) transmit the updated vessel data (115) from the memory (110) of the computer system to a remote location (200).

2. A control system (10) according to claim 1, wherein the control system (10) further comprises at least one beacon (80), each beacon (80) comprising a communication unit and a memory (90) for containing information representing the location of the beacon (80);
wherein each vessel (30) is configured to communicate with the communication unit (85) from a beacon (80) when the vessel (30) is in the vicinity of the beacon (80).

3. A control system (10) according to claim 2, wherein when a vessel (30) is within the vicinity of the beacon (80), the information representing the location of the beacon (80) is determined as being the location information representing the location of the vessel (30), such that in response to an emergency event, the computer system (100) is configured at step i) to:

a) receive the location information from each vessel (30) which is not within the vicinity of a beacon (80) using the first communication means (65) from the vessel (30), and the second communications means (105); and/or
b) receive the location information from each vessel (30) which is within the vicinity of a beacon (80) using the communication unit (85) of the beacon (80), and the second communications means (105).

4. A control system (10) according to claim 2, wherein when a vessel (30) is within the vicinity of the beacon (80), the location information of the beacon (80) is transmitted from the memory (90) of the beacon (80) to a memory (60) of the vessel (30) via the communication unit such that the transmitted location information of the beacon (80) becomes the location information in the memory (60) of the vessel (30).

5. A control system (10) according to any preceding claim, wherein in response to an emergency event, the computer system (100) is configured at step i) to:

i) receive the location information from the memory (60) of each vessel (30) using the first communication means (65) from each vessel (30), and the second communications means (105).

6. A control system according to any preceding claim, wherein each vessel (30) comprises a sensor (40;45;50) for determining a parameter relating to the vessel (30) and/or the surroundings of the vessel (30).

7. A control system according to claim 6, wherein the emergency event is communicated to the second communication means (105) from the computer system (100) by the first communication means (65) of the vessel (30) based on the parameter from the sensor (40;45;50).

8. A control system according to any preceding claim, wherein each vessel (30) comprises a fire/smoke detector for determining the presence of fire/smoke surrounding the vessel (30).

9. A control system according to claim 8, wherein the emergency event is communicated to the second communication means (105) from the computer system (100) by the first communication means (65) of the vessel (30) upon the fire/smoke detector determining the presence of fire/smoke surrounding the vessel (30).

10. A control system according to any preceding claim, wherein each fluid storage vessel is configured such that outside of an emergency event it periodically transmits the location information from its memory (60) to the computer system (100) via the second communication means (105), and
wherein the computer system (100) is configured to update the vessel data (115) with the received location information from each vessel (30).

11. A control system according to any preceding claim, wherein the computer system (100) is configured in response to location information not being received from a vessel (30) in step i), to maintain the vessel data (115) in step ii) with any existing location information for the vessel (30).

12. A control system according to any preceding claim, wherein the memory (60) of each vessel (30) is operable to store information representing the contents of the vessel (30).

13. A control system according to claim 12, wherein each fluid storage vessel (30) is configured such that outside of an emergency event it periodically transmits the information representing the contents of the vessel (30) from its memory (60) to the computer system (100) via the second communication means (105), and
wherein the computer system (100) is configured to update vessel data (115) with the received information representing the contents of each vessel (30).

14. A control system according to claim 12 or 13, wherein step i) further comprises receiving the information representing the contents of each vessel (30) using the second communications means (105); and step ii) comprises updating the vessel data (115) with the information representing the contents of each vessel (30).

15. A control system according to claim 13 or 14, wherein the vessel data is categorized by the computer system based on the information representing the contents of each vessel (30).

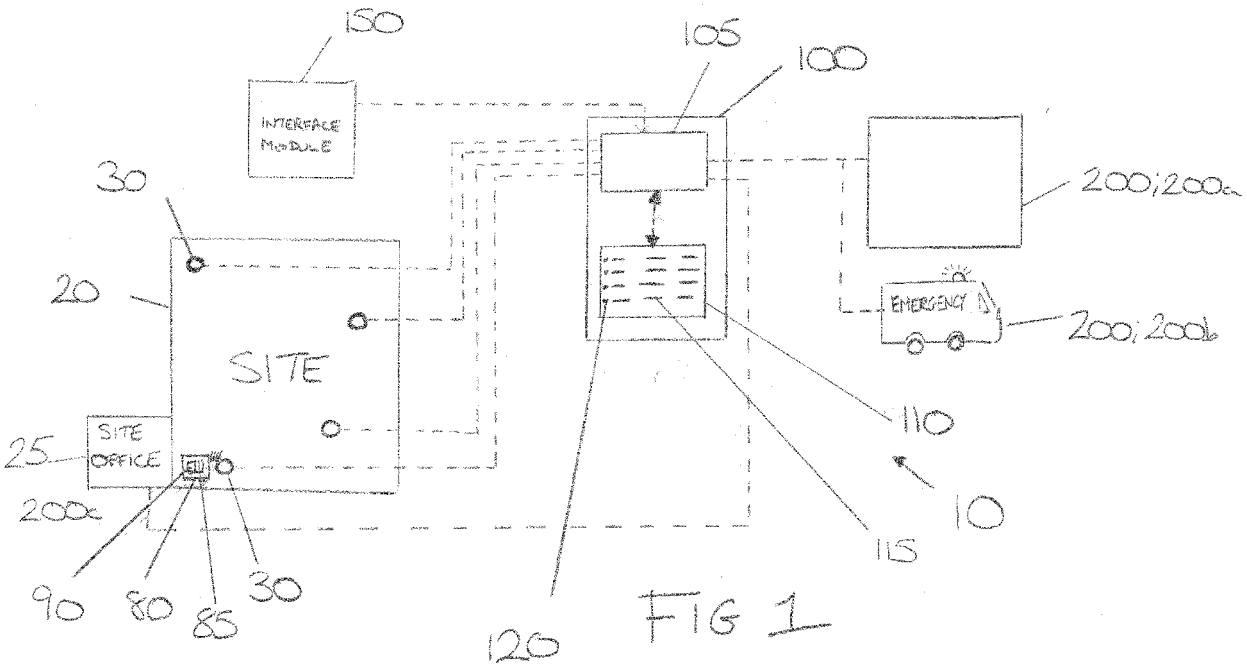
16. A method for monitoring the location of at least one fluid storage vessel, wherein the method is part of a control system which comprises:

at least one fluid storage vessel (30), wherein each vessel (30) comprises a first communication means (65); and
a computer system (100) comprising a second communication means (105), and a memory (110) for storing vessel data (115);
wherein the method comprises the following steps in response to an emergency event:

i) receive location information representing the location of each vessel (30) using the second communications means (105);
ii) update the vessel data, stored in the memory (110) of the computer system (100), with the received location information; and
iii) transmit the updated vessel data (115) from the memory (110) of the computer system (100) to a remote location (200).

17. A method according to claim 16, wherein the method further comprises displaying a representation (405) of the information representing the location of each vessel (30) on a display device (400).

18. A method according to claim 15, wherein the method further comprises indicating a category of contents (415) on the representation (405).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INTERFACE MODULE
30
200; 200a
20
SITE
EMERGENCY
200; 200b
110
SITE OFFICE
25
EU
10
200c
115
90
80
85
30
120

FIG 1

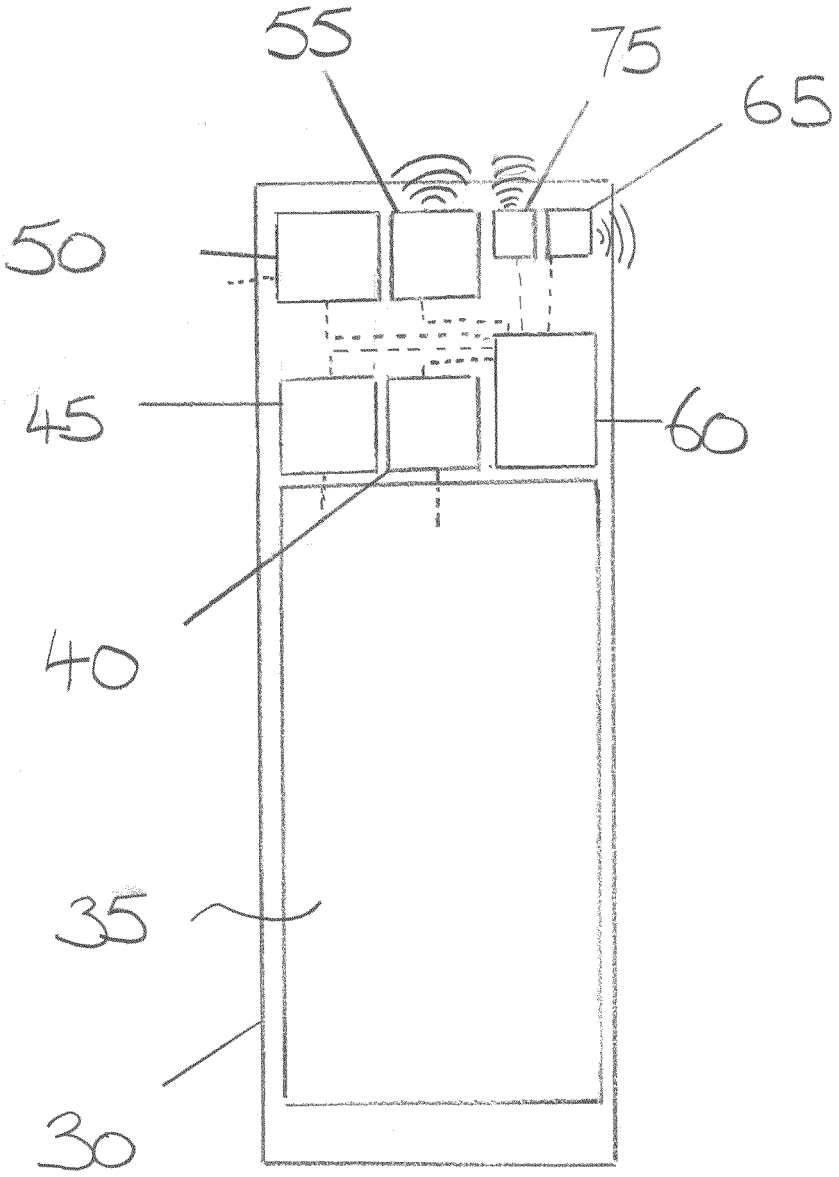

FIG 2

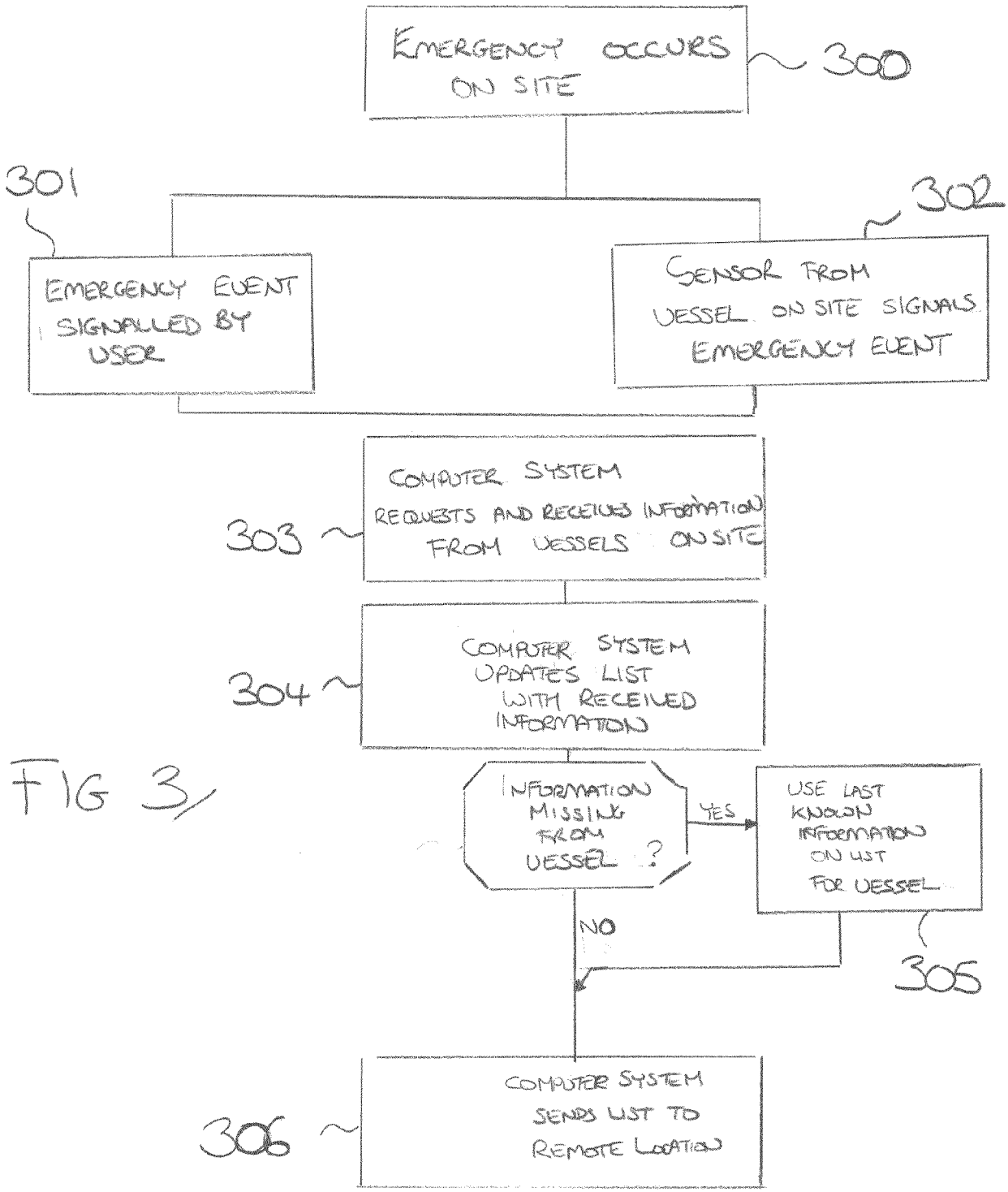
EMERGENCY OCCURS ON SITE
300
301
302
EMERGENCY EVENT SIGNALLED BY USER
SENSOR FROM VESSEL ON SITE SIGNALS EMERGENCY EVENT
COMPUTER SYSTEM REQUESTS AND RECEIVES INFORMATION FROM VESSELS ON SITE
303
COMPUTER SYSTEM UPDATES LIST WITH RECEIVED INFORMATION
304
INFORMATION MISSING FROM VESSEL ?
YES
USE LAST KNOWN INFORMATION ON LIST FOR VESSEL
305
NO
COMPUTER SYSTEM SENDS LIST TO REMOTE LOCATION
306

FIG 3

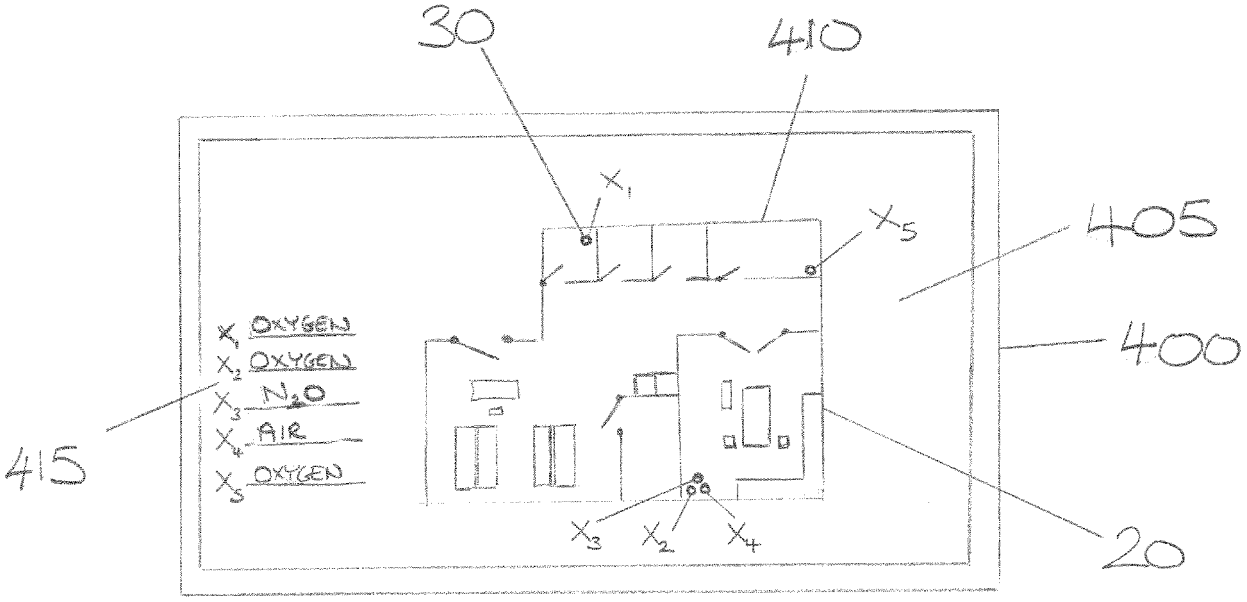
30
410
405
400
415
20
X1
X5
X3
X2
X4
X1 OXYGEN
X2 OXYGEN
X3 N2O
X4 AIR
X5 OXYGEN

FIG 4.

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Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 16 0168

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 9 399 150 B1 (ALMUTAIRI SALEM [SA]) 26 July 2016 (2016-07-26)	1,5-9,17	INV. G08B21/14
Y	* column 2, lines 55-60 * * column 3, lines 48-56 * * column 6, line 50 - column 7, line 5 * * column 7, lines 9-22 * * column 8, lines 62-67 * * column 9, lines 38-40 * * figures 1,2,4,5,7,8a,8b *	2-4, 10-15,18	G08B21/16 G08B25/00
Y	WO 2016/146765 A1 (LINDE AG [DE]) 22 September 2016 (2016-09-22) * page 3, line 13 - page 4, line 6 * * page 5, line 27 - page 6, line 2 * * page 6, lines 18-23 * * page 7, line 8 - page 8, line 2 * * page 9, lines 10-27 * * page 10, line 7 - page 11, line 5 * * page 11, line 11 - page 12, line 17 * * page 14, line 28 - page 16, line 2 * * figure 2 *	2-4, 10-15,18	

TECHNICAL FIELDS SEARCHED (IPC)

G08B
F17C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 September 2017	Meister, Mark

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 16 0168

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14-09-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82