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(54) Title: SYSTEM FOR AUTOMATIC MANAGING AND CONTROLLING THE USE OF MOORINGS FOR VESSELS, COMPRISING AUTOMATED FLOATING BUOYS AND THE RELATED METHOD

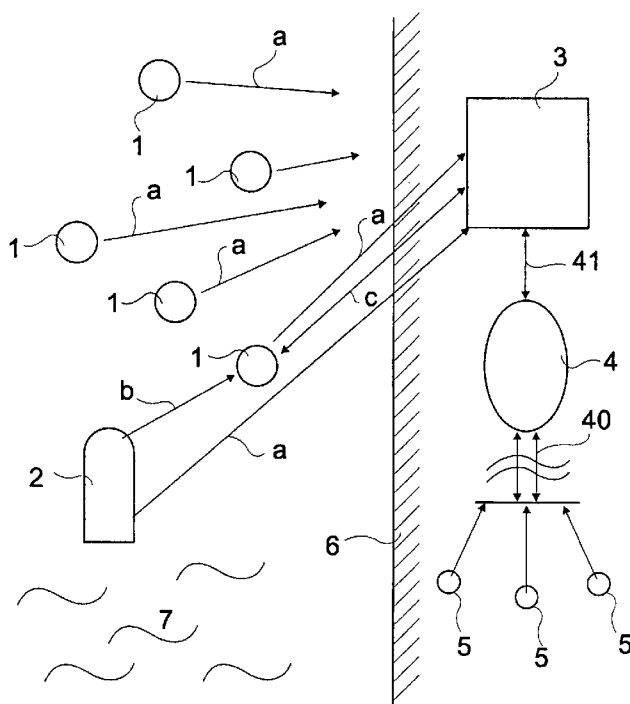


Fig. 1

(57) Abstract: The invention refers to the assembly for automatic supervision and control of the use of moorings for vessels which includes automatic floating buoys and a method associated with is and refers to completely automated buoys (1) with automatic mechanism for payment and fastening of small and large boats and other vessels (2) within the selected water area (7) based on a two-way mutual communication between the buoys (1) and operative control centre (3), between the boat managers (2) and operative control centre (3) and additionally by way of an internet link (40) between them and the potential users (5) without the need for assistance by personnel. The communication is based on broadband data and information transfer by using mobile GSM technology and/or SMS messaging. Each buoy (1) features and integrated central computer (18), a communication module (20) with antenna (36) and an attachment ear (10), an alphanumeric keyboard (44) for entering identification codes and control LED diodes (14, 15) for condition signalling. The buoy (1) features a special mechanism (45) for the payment of the mooring by credit card, money or jetons. Each buoy (1) is attached to the weight (8) via a voltage sensor (9) connected to a cable rope (13), while against using an unpaid mooring it is protected among others by blades (43) at the top (42).



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**SYSTEM FOR AUTOMATIC MANAGING AND CONTROLLING THE USE OF
MOORINGS FOR VESSELS, COMPRISING AUTOMATED FLOATING BUOYS
AND THE RELATED METHOD**

A subject-matter of this invention is a system for automatic managing and controlling the use of moorings for vessels, comprising automated floating buoys and the related method, or more precise: fully automated floating buoy with automatic mechanism for mooring of ships, boats and other waterborne vessels with equipment for direct operation within the system for managing and controlling the mooring, with associated active system for its anchoring to the seafloor.

According to the International Patent Classification the invention is expected to be classified under B63B 22/00, G08G 3/00 and G07B 15/00 and additionally under B63B 22/02, B63B 22/24 and B63B 22/04.

The invention attempts to solve a technical problem – to design such a system for managing and controlling the use of moorings for vessels, that would allow direct communication of a group of buoys with a communication centre, while a buoy structure would allow simple and fully automated managing of moorings and efficient control over them, including, among others, simple and controlled payment method and passing the related information to the communication centre without a human presence. The buoy structure is simple and compact, a small hollow container, designed according to its typical operating manner of the system for managing and controlling the mooring.

The presently known solutions generally comprise plastic hollow buoys, fastened by ropes or chains to a ballast, most frequently concrete. The weakness of such solutions is that chains grow rusty and ropes become overgrown with algae, so their life span is relatively short and their bearing capacity is uncertain, too.

Vessels are usually moored directly to the rope or to a fixed metal ring on the top of a buoy. Such buoys do not provide you with information about the rope bearing capacity, neither about the weight of the ballast. Mooring is usually carried out by two persons, one pulling the buoy to the deck level, the other placing the rope through the ring. It is possible that only one person performs the mooring, providing that the weather is favourable and the person experienced.

In case of such mooring, it is impossible to find out who is the owner of the buoy, and there is always a doubt whether the payment is collected by the right person. Often the government grants concessions for renting buoys, and for this reason the concession levy is the only way to collect taxes. In such case the buoy managers moor vessels on their own responsibility, without knowing the information about the buoy's bearing capacity.

Usually, only one person collects payments, his/her task being also controlling and charging for a number of buoys on the controllable area (a buoy field), for what he/she needs a suitable vessel. It is also very difficult or even impossible to book a buoy in advance.

Usually, at night or off-season there is no-one, who would control and manage the buoys and charge for the mooring, what results in loss of income.

As, according to the above stated, the managing and controlling the buoys requires the presence of at least one person, these buoys are generally placed by the inhabited coasts, whereas they are very rare at more remote places, such as islands, bays, etc.

As nautical tourism is in bloom, the above mentioned weaknesses became disruptive. Also, due to increasing frequency of storms and adverse weather conditions, anchoring outside the regulated area (sea parks) is less safe for the crew, as well as for the vessels.

The recent solution is known for its system for controlling and managing docking in a sea area, according to the document EP 1 550 086 or WO 2004/032064. According to this solution, the buoys are apt to one-way communication with a local control station, which performs reverse communication with an operative centre. The buoy is a hollow

plastic container, housing electronic unit, connected to an antenna, radio-communication device with an antenna and a solar panel, connected to a battery, all-together forming an autonomous electric power supply unit. At the bottom edge of the buoy there is a hook for a chain, by which the buoy is anchored to the seafloor. The communication between the buoy and the local control station is based on the Wi-fi communication standard. Responding and transmitting device on the buoy comprises transmitter/responder and antenna – a structure, placed on the top of the buoy, having the shape of a ring. This transponder is programmed in such a way, that it communicates with the vessel by using the user identification code, saved in the operation centre. The association between the transponder and the corresponding vessel enables, at the moment of docking, to verify the compliance with the administrative requirements, controlling the related credit, memorised in the operative centre. This means that mooring of a vessel to a free buoy is possible only if the vessel's operator, prior or after the mooring, goes to the operation centre and pays the defined credit fee. Failing to do that, a worker in the operation centre, whose presence is obligatory in the operation centre, sends a warning to the vessel's operator.

In so far as the vessel leaves the mooring prematurely, the worker in the operation centre pays back the reminder of a credit, whereas if it stays longer than planned, additional payment is required.

The housing of the buoy is comprised of diametrically opposed and joint upright cylinders, forming a unified hollow body of a deltoid or upright rhombus shape. Accordingly, this solution is a system for controlling and managing docking of vessels and their mooring to the buoy, operating so as to inform the control centre about a vessel being moored to a buoy. After that, there are two possibilities – one is that the worker from the operation centre goes to the vessel and charges the vessel's operator for the mooring, the other is that the vessel's operator goes to the operation centre and there pays for the mooring. The main weakness of this solution is that, in spite of all the devices in the system and due to one-way communication, there is still a human presence required for controlling the payment for mooring, 24 hours a day, every day. Its another weakness is that the vessel's operator can moor the vessel to

the buoy without paying for the mooring, and this is another reason for the constant presence of a human. The communication between the buoys and the operation centre requires at least one or even more intermediate control centres, what makes the system complex and expensive.

The unsolved problem is, above all, the complexity of the system for managing and controlling the moorings of vessels, which requires additional local controlling centres for communication between the buoys and the operation centre. Another problem is, that the presence of a human to collect payments is required, as well as the shape of the buoy and its manner of anchoring to the seafloor, which, on one hand, allows unauthorised, thus unpaid moorings, while on the other hand, it doesn't provide efficient control over the unpaid moorings.

According to the present invention, the problem is solved by the system of automatic managing and controlling the use of moorings for vessels, comprising automated floating buoys and the related method, which may enable direct two-way communication with the communication centre and which, due to its structure and shape, may prevent from mooring without payment, with the possibility of remote payment, without the presence of a human in the operation centre, while also the controlling and managing of buoys on one or more areas may be automated.

The invention shall be described by way of illustration:

Figure 1 flow chart of operation of the system of automatic managing and controlling the use of moorings within the area with automated floating buoys

Figure 2 anchoring of the buoy to the ballast on the seafloor

Figure 3 automated buoy in a longitudinal vertical cross section

The system for automatic managing and controlling the use of moorings for vessels, comprising automated floating buoys and the related method, according to the recorded invention, consists of the main operation-controlling centre 3, with the server 4, preferably located on shore 6, and of optional number of automated buoys 1, located within the individual sea area 7. The operation-controlling centre 3 and the server 4 are connected via the communication cable 41, and are through the internet connection 40 accessible to the potential customers 5. The above described is illustrated in Figure 1.

The operation-controlling centre 3 is wireless and fully automatic, it communicates with the automated buoys 1 and, in the same manner, with the server 4, and through it with the customers 5. All the described communications are carried out in both directions, while it is important that the communication between the buoys 1 and the operation-controlling centre 3 is through the broadband data transmission, accordingly using the GSM telephony and/or SMS messages, what is enabled by the buoy 1 structure, according to the invention.

The vessel's 2 operator, arriving to the sea area 7, first selects a free buoy 1, than carries out the payment, what is a condition for mooring the vessel 2 to the selected buoy 1. Without previous payment only temporarily mooring is possible, that is in case of cash, token or card payment method.

There are two payment methods possible – payment with tokens, cash or cards directly at the buoy 1, marked by the line b, or payment by sending SMS message or by using GSM telephony system through the operation-controlling centre 3, marked by the line a in Figure 1. The price-list is available on each buoy 1. The amount to be paid depends on the estimated mooring duration, and is determined by the vessel's 2 operator. Following is more detailed description of manners and methods of payment for mooring at the buoy 1, according to the invention.

The payment by means of GSM telephony system is carried out via the selected domestic or foreign mobile network operator. For this purpose each buoy 1 has a code, for example *19*090800#, the number 19 meaning the number of the selected buoy 1, and the number 090800 meaning the number of the calling centre or the number of the mobile network operator. As the vessel's 2 operator sends a corresponding SMS message or calls the calling centre, the defined amount in the defined currency is transferred from the caller's account to the account of the owner or the manager of the sea parking area. After the money is transferred, the controlling centre 3 via the line d sends to the buoy 1 the order to lock the mooring of the vessel 2 for the defined period of time. Empirically, it takes 5 to 25 seconds to lock the mooring since receiving the order for locking.

When the payment is carried out through the line a or b, the operative-controlling centre 3 sends a signal or the order for locking to the selected buoy 1. Mechanism, mounted on or inside the buoy 1, not shown, closes the ring eye 10, where the rope is placed, and the vessel 2 is securely moored. If payment is not carried out or the operation has not been successful, the controlling centre 3 does not send any order for closing the above mentioned ring eye 10, so the vessel 2 is not moored, as the rope automatically falls off the buoy 1, or could not be placed into the ring eye 10.

Buoys 1 are linked with the operation-controlling centre 3 through the GSM signal. Through the data transmission via the line c each buoy 1 regularly informs the operation-controlling centre 3 about the occupancy, about the voltage state, about the payment operations, carried out at the buoy 1, about the amount of the collected cash, tokens or cards inside the buoy 1, about eventual errors, damages, etc. In other way around, the operation-controlling centre 3 via the line d sends to the buoy 1 information about eventual reservations, about the activation code, and places the order for locking or unlocking the mooring.

Via the internet connection 40 the potential customers 5 have access to information on the status of buoys 1 on a selected sea area 7 anywhere in the world, provided by

the server 4 of the sea park manager. The server 4 acquires the mentioned information from the operation-controlling centre 3, via the communication cable 41. While the operation-controlling centre 3, as described above, receives information from the buoys 1. This way the potential users may acquire information about the occupancy of the moorings or buoys 1 at the selected location and about the mooring price. By paying in advance they may also book a free buoy 1 at the selected location for the previously defined period of time.

As it is illustrated in Fig. 2, the buoy 1, according to the invention, is in the cylinder shape with a conical-shaped point 42. The buoy 1 body may also be made in other forms, as long as they are functional, for example in a cut-cone shape, with the point 42 at the bottom edge. The point 42 is equipped with blades 43.

At the upper front surface the buoy 1 has a mechanism 45 for payment in cash, with tokens or cards, with alphanumeric keyboard 44 for code entering and led diodes 14 and 15. The mechanism 45 may be mounted on any other location, for example on the sidewall of the housing 23, providing that it is mounted above the water surface. The above described is not necessary if the buoy 1 operates through the GSM network. Code entering is obligatory if the buoy 1, which has been previously booked by the customer 5 via the internet connection 40 and the server 4, is activated and if the operating process and payment are not carried out via the GSM network. The mechanism 45 is forming a cap, watertight closing the opening 48, over which it is mounted, as illustrated in Fig. 3. On the outer surface of the cylindrical part of the buoy 1 displays 11 and 12 are mounted. Display 11 is meant for displaying the security diagram for the buoy 1, based on the ratio between the vessel-weight information and the wind velocity information. This way the vessel's 2 operator learns about the bearing capacity of the weight 8 and to that end of the buoy 1, considering the wind force. At the same time the display 11 displays buoy 1 handling instructions and, in case of need, also any other instructions. The display 11 has also an informative role, as it is equipped with the handling instructions, including the manners and methods of payment for mooring. The display 12 indicates the mooring

duration and/or time remaining before the pre-paid mooring expires. It is counting down the remaining time. On or inside the buoy 1, beneath its upper edge and through the opening 37, a flexible ring eye 10 with the operating mechanism is mounted for mooring the vessel 2, not shown. The ring eye 10 is linearly moving through the opening 37 from inside of the buoy 1 housing 23 out, and backwards inside the buoy 1. This is possible due to the previously mentioned mechanism. As illustrated in Fig. 3, the ring eye 10 is in the shape of a ring with a groove 35. If the buoy 1 is free, the ring eye 10 is inside the buoy 1 housing 23, or in the other embodiment of the invention, the ring 10 is closed. After the mooring is being paid, the operation-controlling centre 3 submits the information to the selected buoy 1 and places the order for unlocking. The ring eye 10 moves out, or the ring opens. The vessel's 2 operator inserts the rope into the loop ring eye 10 or through the groove 35 in the ring 10. After some time the mechanism pulls the ring eye 10 inside the buoy 1 housing 23, or closes the ring 10. The buoy 1 is locked and the vessel 2 is securely moored. When the mooring period expires and if it is not prolonged, the mechanism pushes the ring eye 10 with the rope out or opens the ring and the rope falls from the ring 10, the vessel 2 is released, and the mooring completed. In the first embodiment of the invention the ring eye 10 is movable, as the mechanism may be driven into the buoy 1 or out from it. In the other embodiment of the invention, the ring 10 is fixed to the outer sidewall of the buoy 1 housing 23. In this case, the ring 10 could be a one-piece or two-piece ring, which may be possible to open or close. An appropriate mechanism closes the ring after the vessel's 2 rope is inserted, and it opens again when the pre-paid mooring period expires. The ring eye 10 remains opened as long as the mooring isn't paid, so the mooring of the vessel 2 to the buoy 1 is not possible. However, in case of payment with tokens, cash or cards, the ring eye 10 is closed upon the vessel's 2 arrival. First the vessel 2 may be moored, and then the payment carried out. If the customer 5 does not pay for the mooring within the defined period, for instance in 10 minutes, the ring eye 10 opens and the rope falls out. After a definite period of time the ring eye 10 closes, and the buoy 1 is ready for mooring the next vessel 2.

According to the invention, the eye 10 is in a form of a ring or a flexible ring with the possibility of opening and closing, or a ring with a groove 35. In other embodiments of the invention, the eye 10 is mounted on the outer sidewall of the housing 23, it is movable, thus possible to open and close.

Regardless the aspect of the invention, the ring eye 10, mounted inside or on the buoy 1, may be of any type or size, as long as the suitable mechanism is used.

The buoy 1 is attached to the weight 8 on the seafloor through the intermediate voltage sensor 9, by the cable rope 13. On the buoy 1, at the fixation point, there is the end 22 of the point 42, of thickness, tailored to the rope diameter, thus enabling the rope to slide towards the upper edge and out from the buoy 1 in case of forbidden or unpaid mooring of the vessel 2. A cable 13 is an electric cable 39, in a jacket of plaited wire rope 38, in other words, inside the wire rope 38, there is an electric cable 39, transmitting tensile-strength signal from the sensor 9 to the buoy 1. The plaited rope 38 protects the electric cable 39 and at the same time provides the buoy 1 with an appropriate tensile strength, required to assure the secure mooring.

The tensile-strength sensor 9 is in the form of a torque or a tensile switch, which, in case of unpaid mooring, transmits to the buoy 1 the information about the forbidden mooring and activates the alarm 19 signal.

Blades 43 at the point 42 of the buoy 1 serve for damaging and cutting the rope in case of forbidden or unpaid mooring, in case the vessel's 2 operator would only slip the rope over the buoy 1 with the purpose to avoid the payment. The blades 43 may be of different types. At least one blade 43, or at least one place between the two blades 43, has a zinc anode 50 (the Galvanic cell), with the purpose of protecting the part of the buoy 1, sunk into the water, against corrosion.

The buoy 1, according to the invention, may be of any suitable size, however, there exist some useful empirical data, which may or may not be considered in practice. According to this data, the optimal length of the buoy 1 is about 250 cm, approximately half of it being above the water surface, meaning that its upper edge

reaches the level of the deck of the vessel 2. This makes the buoy 1 managing very simple. Also, according to this data, the optimal radius of the buoy 1 is about 30 cm. The outer sidewall of the buoy 1 is preferably smooth; its hollow housing is made of stainless steel or any other suitable material. The buoy 1 may be any of any type, made of any metal and/or non-metal material, as long as it suits its purpose.

As illustrated in Fig. 3, the buoy 1 is made of the hollow housing 23 with a point 42 at the bottom edge. The housing 23 is a watertight container of cylindrical shape, with its integral elements mounted on it and inside it.

Inside the housing 23, there is a central computer 18, through the cable 26 connected to a power supply charger 17 and through it to at least one solar panel 16, while the power supply charger 17 being connected to the positive pole of the battery 21 through the cable 25, while through the cable 24 to at least one solar panel 16, further, it is through the cable 30 connected to the communication module 20, which is further through the cable 31 connected to the negative pole of the battery 21 and through the cable 32 to the outer antenna 36, further, it is through the cable 29 connected to the ring eye 10 or its mechanism for mooring, and through the cable 28 to at least two displays 11 and 12, further, through the cable 49 to the printer 47 for printing payment receipts, and through the cable 27 to the alarm 19, further, through the cables 33 and 34 directly to the battery 21. The digital countdown is integrated into the display 12, but it could be mounted somewhere else on the housing 23 of the buoy 1.

Inside the housing 23, there is also a tokens and coins collector 46, which is filled through the slot 48 on the front side of the housing 23 and is watertight covered by a mechanism 45 for paying for the mooring directly at the buoy 1. Next to the mechanism 45, there are mounted the alphanumeric keyboard 44 for entering the code and the controlling or signalling light-emitting led diodes 14 and 15, one red and the other green. When the green diode 14 lights up, it means that the buoy 1 is free, and that the mooring is possible upon the prior payment. When the red diode lights

up, it means that the mooring is not possible, as the buoy 1 is either occupied, booked or damaged.

Solar panels 16 are solar photo cells for the production of electric energy, necessary for operation of the integral elements of the buoy 1, inside or outside of the housing 23. The solar panels 16 provide electric energy to the power supply charger 17, which charges the battery 21 and via the battery all the elements inside the buoy 1 housing 23. The battery, at the same time, stores electric energy for the time, when its production by solar panels 16 is not possible. The charging of the buoy's 1 integral elements may also be performed in any other way, suitable to the function, this having no impact on the object of the invention.

Methods and manners of payment for the mooring at the buoy 1, according to the invention, have already been mentioned above, following is more detailed description. When paying by means of GSM telephony, the vessel 2 approaches the buoy 1, with the green diode 14 lighting up, indicating that the buoy 1 is available for mooring. The vessel's 2 operator, being at the same time the customer 5, reads the telephone number on the buoy 1, enters it into the device and presses the call key or sends an SMS message. The operation-controlling centre 3 detects the number of the GSM user and charges his/her account for the defined sum – the price for mooring on the buoy 1 for a definite period of time. After that, the operation-controlling centre 3 sends a signal to the buoy 1 for locking up. The mechanism, not shown, places the ring eye 10 to the position, enabling the vessel's 2 operator, the customer 5, to insert the rope. The vessel 2 is securely moored to the selected buoy 1, the red diode 15 lights up. The customer 5 or the vessel's 2 operator may see the exact time of the pre-paid mooring duration, indicated on the display 12. Before the expiration of this period, the alarm 19 with a sound signal warns the customer 5, that the time is running out and that the ring eye 10 shall open and release the rope and the vessel 2. If the customer 5 does not prolong the mooring, the vessel 2 is released and it may sail off, while the buoy 1 is free again and ready for another vessel to moor, what is indicated by the green diode 14 lighting up.

When paying by means of GSM telephony, in case the buoy 1 is booked in advance via the internet connection 40, the customer 5 via internet selects the buoy 1 on the individual sea area 7, defines the time of arrival and estimated time of departure and pays for the mooring according to the price-list. Then the customer 5 receives a special number for her/his GSM device from the competent operation-controlling centre 3 via the server 4. When the customer 5 approaches the booked buoy 1 at the announced time with his/her vessel 2, she/he may notice the red led diode light 15. The vessel's 2 operator or the customer 5 enters a special number, received upon booking via the internet, into her/his GSM device and presses the call key. The operation-controlling centre 3 detects the number of the customer 5, who previously booked the buoy 1, and sends to the buoy 1 the order for opening the ring eye 10. The mechanism opens the ring eye 10 and enables the customer 5 to moor the vessel 2 to the buoy 1. The vessel 2 is now securely moored to the buoy 1. On the buoy 1, the red diode 15 lights up. On the display 12, the customer 5 or the vessel's 2 operator may see the indicated duration of the pre-paid mooring. Before the expiration of this period, the alarm 19 with a sound signal warns the customer 5, that the time is running out and that the ring eye 10 shall open and release the rope and the vessel 2. If the customer 5 does not prolong the mooring, the vessel 2 is released and it may sail off, while the buoy 1 is free again and ready for another vessel to moor, what is indicated by the green diode 14 lighting up.

In case, when the mooring is to be paid with a bank or magnet card, token or cash, the vessel 2 approaches the buoy 1 with the green light 14, meaning that the buoy 1 is available. The vessel's 2 operator or the customer 5 moors the vessel 2 to the buoy 1 by placing the rope into the closed ring eye 10. The not shown sensor on the buoy 1 detects the rope of the vessel 2 and on the display 12 a due amount is displayed. The customer 5 pays the amount by inserting a bank or magnetic card or by inserting a token or cash into the mechanism 45 through the slot 48 to the collecting vessel 46. The buoy 1 detects the payment and on the display 12 the duration of the mooring or time till the expiry of the mooring is indicated. If the communication system allows, the

buoy 1 informs the operation-controlling centre 3 about the payment. As already said, the system moves the ring eye 10 into the closed position and the vessel's operator may insert the rope. This is done by either pulling the ring 10 inside the housing 23 or by closing the ring eye 10. During the mooring the red diode 15 is on. On the display 12, the customer 5 or the vessel's 2 operator may see the indicated duration of the pre-paid mooring. Before the expiration of this period, the alarm 19 with a sound signal warns the customer 5, that the time is running out and that the ring eye 10 shall open and release the rope and the vessel 2. If the customer 5 does not prolong the mooring, the vessel 2 is released and it may sail off, while the buoy 1 is free again and ready for another vessel to moor, what is indicated by the green diode 14 lighting up.

In some aspects of the invention, with the buoy 1, which enables also the payment with cash of one or more selected currencies, the process is similar to that of payment with tokens. Tokens and coins are collected in the collecting vessel 46 and may be removed manually or by a special device.

In case of all the previously mentioned and described methods and manners of payments for mooring on the buoy 1 via GSM devices, the ring eye 10 remains opened or unlocked if the payment is not completed, or if the mooring period has expired and the mooring of a vessel 2 to the buoy 1 is not possible. With all other payment methods the ring eye 10 opens if the mooring to the buoy 1 has not been paid. If the buoy enables payment with money, a printer 47 is placed inside the buoy 1. In other cases, the printer 47 is not necessary. In case of payment via GSM device, printing of a receipt is not necessary, as the amount paid is indicated on the monthly bill of the customer 5 or the subscriber on GSM telephony devices.

The buoy 1 is attached to the weight 8 in a manner that enables its maintenance and servicing at the end point 22 or at the tensile strength sensor 9.

PATENT CLAIMS

1. System for automatic managing and controlling the use of moorings for vessels, comprising automated floating buoys and the related method, including one or more sea areas with the optional number of buoys, capable of communication with the controlling centre or operative centre and which are attached to the weights by the rope, **characterised in** that between the buoys (1) and at least one operation-controlling centre (3), direct communication is carried out in both directions (a, c), via the broadband data transmission, generally via SMS messages and/or by using the means of GSM telephony, for this reason each buoy (1) is equipped with a central computer (18) and at least one communication module (20) with antenna (26), and that the operation-controlling centre (3), on the other hand, is via the communication cable (41) and through at least one server (4) via the internet connection (40) is directly accessible to the optional number of customers (5); that each buoy (1) comprises at least one movable or fixed ring (10), with or without a groove (35), mounted on the hollow housing (23) and/or inside it, anywhere on the upper half-part of the buoy (1), which is through the not shown mechanism and cable (29) operated by the central computer (18) according to the orders from the communication module (20), received and formed on the base of intercommunication between the buoy (1) with the antenna (36) and the operation-controlling centre (3); that the hollow housing (23) of the buoy (1) is preferably of the cylindrical or of the cut-conical shape with light inclination of the longer side, with cone-shaped point (42) and is via the cable rope (13) and intermediate tensile strength sensor (9) attached to the weight (8) in such a manner, that it can be taken down.
2. System according to the claim 1, **characterised in** that a central computer (18), placed inside the buoy (1) housing (23), is via the cable (26) connected to the power supply charger (17) and further through the cable (24) to the solar panel (16) and through the cable (25), to the positive pole of the battery (21),

further through the cable (27) to the alarm (19), through the cable (28) to two displays (11, 12), through the cable (30) to the communication module (20), which is through the cable (31) connected to the negative pole of the battery (21) and through the cable (32) to the outer antenna (36), the central computer (18) being directly connected to the battery (21), namely via the cable (34) and the cable (33), to its negative pole and is also directly, via the cable (49), connected to the printer (47), which is integrated into the buoy (1) housing (23) only if the buoy (1) is made so as to enable the payment with cards and/or tokens.

3. System according to the claim 1, **characterised in** that on the upper part of the buoy (1), anywhere on its upper half and on, or inside the housing (23) the controlling led diodes (14, 15) are placed, alphanumeric keyboard (44) and the payment mechanism (45) with the collecting vessel (46), this being so only if the buoy (1) is made so as to enable the payment with cards, money and/or tokens.
4. System according to the claim 1, **characterised in** that the ring eye (10) is fixed or movable and could be linearly or in any other way moved through the opening (37) in the sidewall of the buoy (1) housing (23).
5. System according to the claim 1, **characterised in** that on the point (42) at least one blade (44) of any type is mounted, with at least one Zn anode (50), and that the upper end (22) of the point (42) is preferably of the width, equal to the diameter of the cable rope (33).
6. System according to the claim 2, **characterised in** that the displays (11, 12), mounted on the upper half of the buoy (1), may be of any type and placed anywhere, on or inside the hollow housing (23), what applies also to the solar panel (16).
7. System according to the claim 1, **characterised in** that the cable rope (13) consists of an electric cable (9) in the middle, closely wrapped in a steel plaited rope (38) of suitable mechanical, mainly strength and tensile characteristics.
8. System according to the claim 1, **characterised in** that broadband communication between the vessel's (2) operators or the system users

(customers) (5) and the buoy (1) in the direction (b) on one hand, and with the operation-controlling centre (3) in the direction (a), on the other hand, is possible.

9. Method of automatic managing, controlling and handling of moorings for waterborne vessels, including the automated floating buoys (1), **characterised in** that the operation-controlling centre (3) on shore (6) automatically, wireless and directly communicates with the buoys (1) within the sea area (7) in directions (a, c), and further communicates via the communication cable (41), the server (4) and internet connection (40) with the customers (5) in such a manner that a human presence is not necessary; that booking of the buoy (1) in advance is possible on the individual sea area (7), and is carried out by the customer (5) via internet connection (40), the server (4), and the communication cable (41), in the operation-controlling centre (3); that, in case of communication with the operation-controlling centre (3) via the GSM device or via internet connection (40) and the server (4), the mooring of a vessel (2) to the buoy (1) is not possible without previous payment; that the mooring of a vessel (2) to the buoy (1) without previous payment is possible only in case of payment with cash, tokens of bank cards; that the buoy (1) is available if the green led diode is on, and that it is occupied, booked or damaged if the red led diode 15 is on.
10. Method according to the claim 9, **characterised in** that by the means of GSM calls and/or SMS messages, sent by the vessel's (2) operators or customers (5), a direct communication is possible in the direction (a) with the operation-controlling centre (3), and in the direction (b) with each buoy (1).
11. Method according to the claim 9, **characterised in** that the customer (5) may book the buoy (1) in advance and carry out the advance payment via internet connection (40) and the server (4) in the operation-controlling centre (3), which in the direction (c) sends the occupancy information to the buoy (1), and identification code to the customer (5).
12. Method according to the claim 11, **characterised in** that the vessel's operator or the customer (5) upon arrival to the buoy (1), booked in advance, by the

means of alphanumeric keyboard (44) enters identification code, the ring eye (10) opens and the vessel's (2) rope could be inserted, than the ring eye (10) closes again and the mooring is completed.

13. Method according to the claim 9, **characterised in** that in case the payment is carried out by means of GSM device, via the selected network operator, the customer (5) enters identification code, composed of the number of the buoy (1) and the number of the operator, the defined amount is transferred from the customer's (5) account to the account of the sea area (7) manager, and informs about this the operation-controlling centre (3), which in the direction (c) sends to the buoy (1) the order to lock up the ring eye (10), after that the mooring is completed, and on the display (12) the mooring period is displayed.
14. Method according to the claim 9, **characterised in** that payment with cash, tokens or cards is carried out so as the vessel's (2) rope is inserted through the closed ring eye (10) on the buoy (1), the display (12) displays the mooring price, which is to be paid by the customer (5) by inserting a card, cash or tokens to the slot in the mechanism (45), and the buoy (1) detects the payment, the mechanism sets the ring eye (10) into the closed position, the display (12) displays the time until the expiry of the pre-paid mooring and the red led diode (15) lights up.
15. Method according to the claims 9 to 14, **characterised in** that before the expiration of the period of mooring of the vessel (2) to the buoy (1), the alarm (19) with a sound signal warns the customer (5), that the time is running out and that, if the mooring is not prolonged by carrying out the payment, the ring eye (10) shall open and release the rope and the vessel (2). Then the buoy (1) prepares for a new mooring and the green led diode (14) lights up.

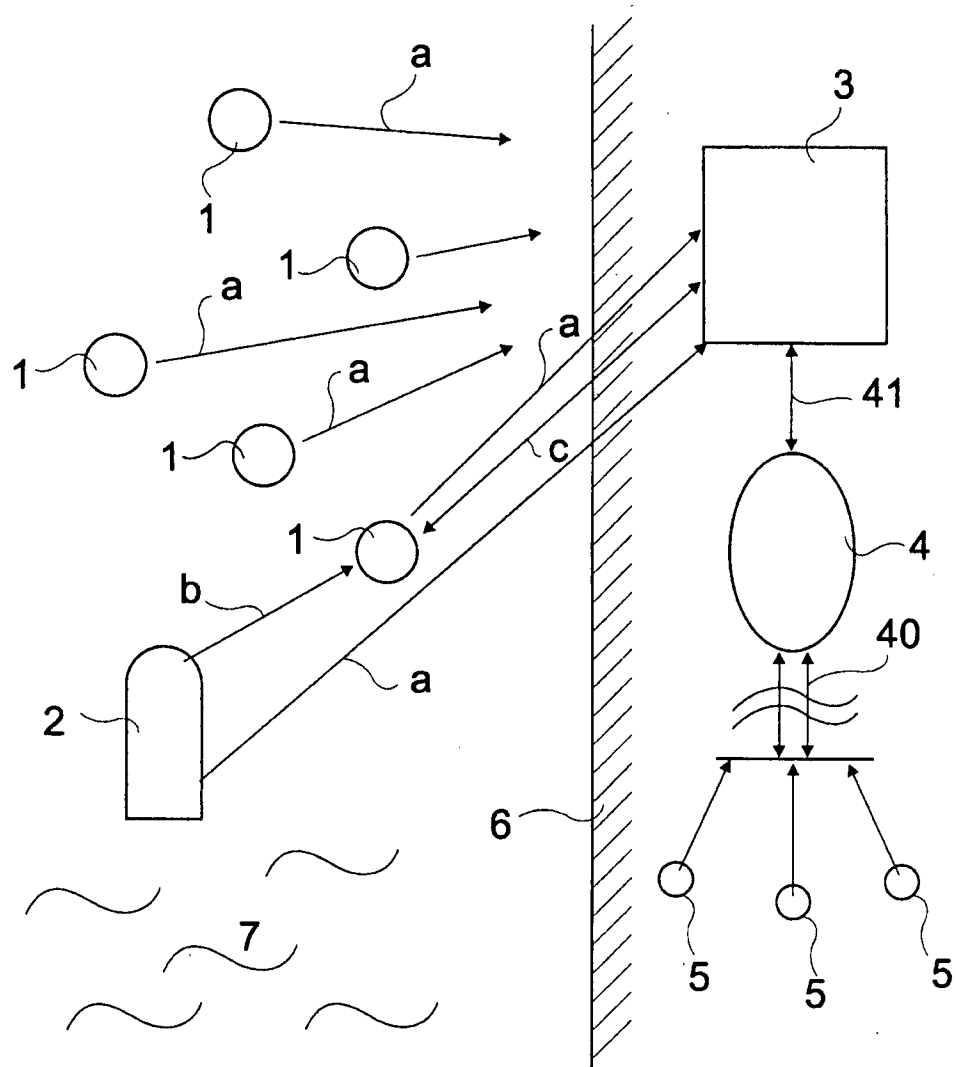


Fig. 1

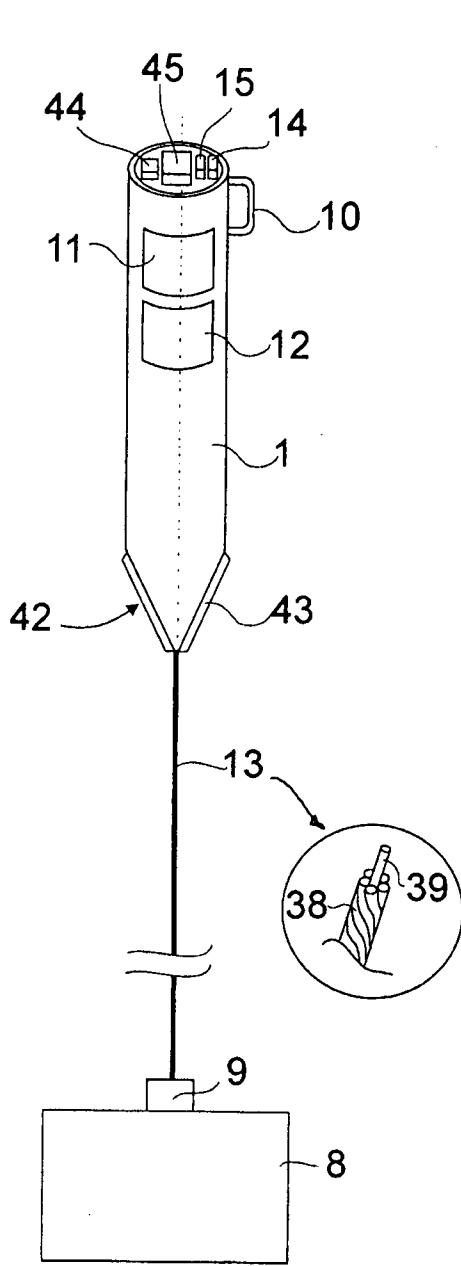


Fig. 2

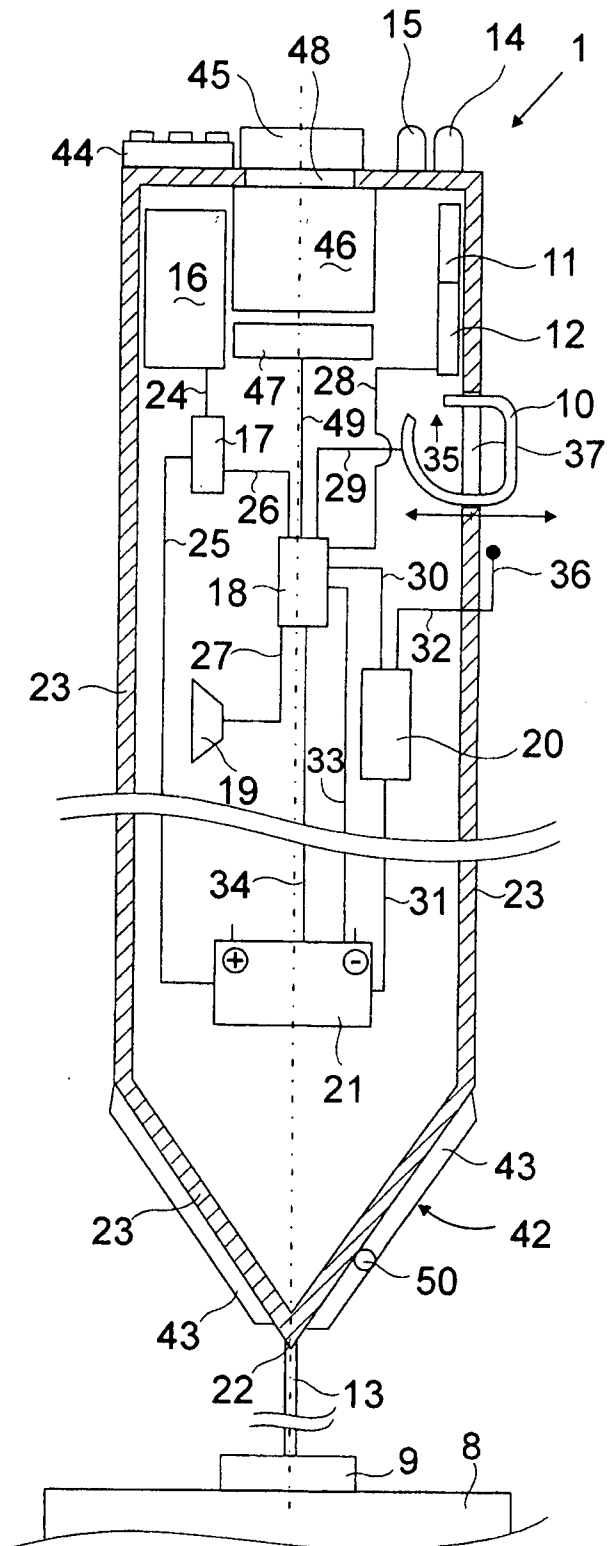


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/SI2011/000003

A. CLASSIFICATION OF SUBJECT MATTER

INV. G07B15/02 B63B22/02
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)

G07B B63B

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 practical, 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.
Y	WO 2004/032064 A1 (ITALGEST INFORMATION TECHNOLOG [IT]; LOMBARDI VALERIO [IT]; DE MASI IV) 15 April 2004 (2004-04-15)	9,10
A	page 8, line 4 - page 11, line 24 page 12, line 9 - page 13, line 9 page 13, line 23 - page 14 figures	1
Y	US 2009/228349 A1 (DYHRBERG ROGER WAYNE RICHARD [AU] ET AL) 10 September 2009 (2009-09-10)	9,10
A	paragraph [0034] - paragraph [0045] figure 1	1
A	GB 2 332 946 A (SWANSON MICHAEL [GB]) 7 July 1999 (1999-07-07) page 10, line 27 - page 13, line 6 figures 1,2	1
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Further documents are listed in the continuation of Box C.



See patent family annex.

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"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.

"&" document member of the same patent family

Date of the actual completion of the international search

25 May 2011

Date of mailing of the international search report

07/06/2011

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INTERNATIONAL SEARCH REPORT

International application No

PCT/SI2011/000003

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 397 471 A (STOCK PAUL RONALD [GB]) 21 July 2004 (2004-07-21) page 1, paragraph 4 - paragraph 7 page 2, paragraph 1 - paragraph 3 figures -----	1,9
A	US 2004/236615 A1 (MSNDY DAMIEN [FR]) 25 November 2004 (2004-11-25) the whole document -----	1,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/SI2011/000003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004032064 A1	15-04-2004	AT 381080 T AU 2003274723 A1 DE 60318087 T2 DK 1550086 T3 EP 1550086 A1 ES 2297212 T3 HR 20050302 A2 PT 1550086 E	15-12-2007 23-04-2004 27-11-2008 05-05-2008 06-07-2005 01-05-2008 31-10-2005 19-03-2008
US 2009228349 A1	10-09-2009	WO 2005101274 A1	27-10-2005
GB 2332946 A	07-07-1999	AU 1776499 A WO 9935513 A2	26-07-1999 15-07-1999
GB 2397471 A	21-07-2004	NONE	
US 2004236615 A1	25-11-2004	AU 2002314250 B2 EP 1390920 A1 FR 2825544 A1 WO 02097736 A1	20-03-2008 25-02-2004 06-12-2002 05-12-2002