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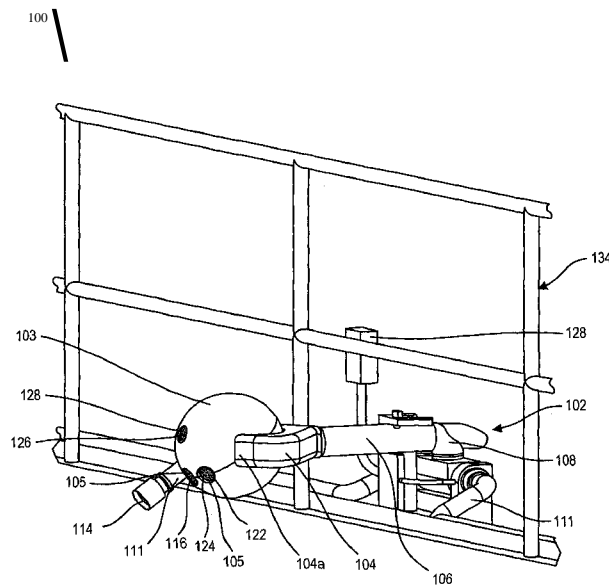


FIG. 1

(57) **Abstract:** The present invention discloses a method and system for detecting fire, man overboard, and deterring theft and prevents pirates entering into water-borne vessels. The system combines electro-mechanical systems and artificial intelligent software to prevent and deter threats at sea. The electro mechanical systems comprises a robotic nozzle that have various camera's and motion detectors, detecting and providing the crew onboard the asset with life video feed and warnings. Once a threat is detected the artificial intelligence will act or the crew can manually intervene. The movement and multi liquid abilities make this system with the above a unique solution to the maritime market. The present invention can also detect fire and can be used for firefighting while protecting human lives. The system of the present invention further alerts the crew if any person falls overboard while automatically launching life saving appliances like life raft, buoy, pain marker, flare, and the like.



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ROBOTIC SAFETY SYSTEM FOR MARINE VESSELS

Field of the Invention

[0001] The present invention relates generally to a method and system for deterring theft and prevents pirates entering into water vessels while detecting fire and man overboard, more particularly the invention relates to a theft deterrence security system comprising a robotic safety system for protecting ships or the like.

Background of The Invention

[0002] With the development of the times and the progress of science and technology, more and more marine resources have been excavated and utilized by mankind, and at the same time human beings have realized more about the importance of the oceans. Therefore, protection of marine resources by at least providing their own security is essential. Nowadays marine vessels are equipped with marine foreign water cannon, for example a lot of fishing boats are also equipped with this water cannon, because these fishing boats in the sea operations, sometimes encounter pirates hijacking. So that with the water cannon can effectively prevent the pirate ship near, thus ensuring the safety of life on board the people.

[0003] Piracy is a growing problem for modern shipping. The defense capabilities are so far insufficient or too dangerous for the crew. There is also a lack of armaments, which are not practiced in most cases, and a firefight caused by dangerous charges (oil, fuels or chemicals, LNG) could cause devastating environmental pollution. But use of only manual water cannon structure is relatively inefficient and needs at least one full-time staff standing next to the water cannon, through the mechanical handle to control the rotation of the water cannon. , the target attack accuracy and response speed is relatively poor in manual operation.

[0004] Thus there is need for a theft deterrence security system that combines electro-mechanical and artificial intelligent software to prevent and deter threats at sea. The electro mechanical consists of a robotic nozzle that have various cameras and motion detectors, detecting and providing the crew onboard the asset with live video feed and warnings for

protecting water vessels in an efficient manner.

[0005] Numerous innovations have been provided in prior art that are adapted to prevent and deter threats at sea. Even though these innovations may be suitable for the specific purposes to which they address, however, they would not be as suitable for the purposes of the present invention.

[0006] Chinese Patent Application No. CN,106,428,489 to Xiaoyong et al. discloses about a foreign water cannon control system for a ship for automatic driving a water cannon to rotate in desired orientations and speed to aim at a target.

[0007] U.S. Patent Application No. US201 50254952 to Chao et al. discloses about a smart security protection integrated system that includes a fire extinguishing device, a security notifying device, a communication transmission device, an automatic moving device, and a detecting device to achieve the functions of automatic controlling and monitoring, automatic fire extinguishing, automatic reporting, so as to improve the efficiency of fire reporting and responding.

[0008] U.S. Patent Application No. US201 10277619 to Blumenthal discloses about a systems for repelling a potential pirate boarding of a commercial ship. Electrification of metal surfaces around the sides of a commercial ship allows for providing an electric shock to a pirate attempting to scale a large commercial vessel from a small power boat. Further it allows firing of a water cannon to thwart pirate penetration.

[0009] U.S. Patent Application No. US20040208499 to Grober discloses about a stabilized buoy platform. Affixed to the stabilized platform are sensors and tools which include cameras and sensor systems integrated with the appropriate illumination technology for ease of tracking, identification and monitoring of targets.

[0010] U.S. Patent Application No. US20120031998 to finback discloses about an anti-pirate system to prevent boarding of a vessel includes a number of spray devices each with at least one nozzle to spray out a liquid via a liquid-bearing arrangement. The liquid being sprayed in a direction to prevent boarding of pirates into the vessel.

[0011] PCT Patent Application No. WO/2010/128846 to Vriesinga discloses about an anti-boarding system and method for protecting a ship against pirates. The anti-boarding system comprises a plurality of fluid dispensing nozzles to dispense jets of fluid to prevent pirates from climbing up along the outer skin of the ship's hull or may prevent persons to enter a deck house.

[0012] Japanese Published Patent Application No. JP2011-184014 to Shoji et al. discloses about a device and a method of defending a vessel at sea by using a camera and a spraying nozzle to use sea water and mixing the sea water and an agent to spray the mixture at the target such as a pirate ship.

[0013] Taiwanese Published Patent Application No. TW2010-1621832 to Kheng discloses about a waterborne vessel configured to monitor the security of a plurality of offshore properties, wherein the waterborne vessel includes a monitoring system configured to monitor and receive an alert signal from the at least one of the plurality of offshore properties through a control centre in communication with the vessels.

[0014] Korean Patent Application No. KR2010-0073698 to YougSik discloses about a water cannon device in a water vessel to target an enemy. The water cannon device includes a camera and a monitor to displaying the image data of the enemy; a water cannon module capable of electrically controlling a direction of a water cannon and a water pressure; and a control module controlling the water cannon module in order for the water cannon to hit the target based on user input based on the image data displayed on the monitor.

[0015] Korean Patent Application No. KR2010-137876 to Jung Kyu discloses about a device and method for transmitting ship image data includes a monitoring unit and an integrated management unit to monitor, calculate several parameters and judge the degree of danger for each of the neighboring ships.

[0016] Italian Patent Application No. ITPI 20090085 to Adriano discloses about an anti-pirates method and apparatus arranged on a ship. The apparatus comprises at least one detection device to detect suspicious watercrafts. On the basis of the detection, the device generates, through a control unit, an alarm signal, thereby launching a floating biodegradable blocking material contained in a projectile to block the approaching unidentified watercrafts.

[0017] German Patent Application No. DE 202009012332 to Alexander discloses about a system for the automatic detection and defense of pirate attacks by means of tilttable infrared cameras, a central control unit, one or more control terminals and electrically adjustable water jets for protecting ships.

[0018] United Kingdom Patent No. GB2462339 to Owens discloses about a water jet deterrent device for mounting to a maritime vessel comprises a plurality of water jet nozzles rotatably mounted with respect to a fluid distribution chamber to receive the water under pressure. A drive mechanism drives the rotation of the nozzle head with respect to the fluid distribution chamber.

[0019] It is apparent now that numerous innovations for protecting a ship or the like against pirates have been developed in the prior art that are adequate for various purposes. Furthermore, even though these innovations may be suitable for the specific purposes to which they address, accordingly, they would not be suitable for the purposes of the present invention as heretofore described. Thus a theft deterrence security system for protecting water vessels in an efficient manner by using a rotating multi-liquid spray cannon system comprising a rotatable robotic unit is needed.

Summary Of The Invention

[0020] The present invention discloses about a method and system for detecting fire and man overboard while deterring theft and prevents pirates entering into water vessels at sea. The system combines electro-mechanical systems and artificial intelligent software to prevent and deter threats at sea. The electro mechanical systems comprises a robotic nozzle that have various camera's and motion detectors, detecting and providing the crew onboard the asset with life video feed and warnings. Once a threat is detected the artificial intelligence will act or the crew can manually intervene. The movement and multi liquid abilities make this with the above a unique solution to the maritime market. The present invention can also detect fire and can be used for firefighting while protecting human lives. Further the present invention can detect man overboard. The system of the present invention mark on the radar, track with its camera's and warn the crew if any person falls overboard while automatically launching life-saving appliances

like life raft, buoy, pain marker, flare, and the like.

[0021] Further the system of the present invention allows the installed detection apparatus to feed information and images through satellite communication to a security center where a team of specialist can advise the best actions taken and at the same time warn the owner, international fire brigade, military forces and or security firms to assist if possible or required. For an example when a person falls overboard the detectors send a signal to the bridge and radar while simultaneously launching life rafts and life buoys with paint spraying together with a flare being launched. The robotic nozzle continuously sprays a paint to mark the location based on the camera feed.

[0022] According to one aspect of the present invention a robotic safety system, wherein the system comprising a rotatable robotic unit comprising a spherical housing with pluralities of slots, whereby the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate to a predetermined angle, whereby the fork is mounted on a support arm that is connected to a base hinge allowing upright movement of the fork along with the spherical housing, further a base plate supports the base hinge and allows the base hinge along with the support arm, the fork and the spherical housing to turn outward or inward, wherein the robotic unit further comprising pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray; a set of input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector enclosed in the slots of the spherical housing; a set of output devices including at least one rotatable nozzle to act as a multi-liquid spray cannon to spray desired liquids, at least one stroboscope, a control unit to flare launching unit, a control unit for the safety equipment launching unit, a flash light mounted on the slots of the spherical housing; at least one pump, wherein the at least one pump supplies desired flow of the desired liquids to the at least one nozzle; at least one wireless transmitter to transmit live input signals received from the input devices to a security center comprising at least one human machine interface, whereby the interface further comprising at least one tactile input device; a control unit, wherein control unit is associated with the interface, the control unit further embedded with an artificial intelligence software program to analyze the input signals received from the input

devices to measure and detect possible threats, track the target and further send command to the output devices enabling a solenoid valve to open, thereby allowing various liquids to be used; at least one DC step motor, wherein the motor rotate the robotic unit to enable accurate aiming and fire at the target; at least one power supply unit supplying power to the system; and at least one weather proof enclosure to enclose at least electrical components of the input devices, output devices and the at least one motor.

[0023] In view of the foregoing, it is therefore an object of the present invention is to provide a safety system and method for protecting a marine vessel and floating assets, or the like in an efficient and effective manner.

[0024] Another objective is to provide firefighting, man overboard detection and theft deterrence at sea by using a rotating multi-liquid spray cannon system comprising electro-mechanical system and artificial intelligent software program.

[0025] Yet another objective is to provide a rotatable multi-liquid spray robotic cannon unit comprising a spherical housing, whereby the spherical housing is rotatable to a predetermined angle along the horizontal axis of the unit, whereby the robotic cannon unit has a base hinge allowing the spherical housing rotatable to a predetermined angle along the vertical axis of the robotic cannon unit, wherein the robotic cannon unit further comprises pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray.

[0026] Yet another objective is to provide a marine vessel and or floating asset a safety system comprising of a control unit, wherein control unit comprising an artificial intelligence software program to facilitate analyzing the input signals received from the input devices to identify at least one target, thereby enabling a solenoid valve to open, thereby allowing various liquids to be used through the at least one nozzle aiming towards the at least one target.

[0027] Yet another objective is to provide a marine vessel safety system comprising input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector.

[0028] Yet another objective is to provide a safety system comprising at least one

stroboscope.

[0029] Yet another objective is to provide a safety system comprising at least one 22000 lumen flash light.

[0030] Yet another objective is to provide a safety system that protects the electrical connection, electrical equipment's, camera lens from moisture, atmosphere and the external weather conditions.

[0031] Yet another objective is to provide a safety system that uses power supply unit in the range of 110V to 440V

[0032] Yet another objective is to provide a safety system that allows the live input signals comprising live videos and images are transmitted to the at least one human machine interface on board or to one or more external service providers or security firms.

[0033] Yet another objective is to provide a safety system that uses spherical housing, fork, support arm, base hinge, base plate and pipes made of corrosion resistant material including stainless steel.

[0034] Yet another objective is to provide a safety system that allows wireless transmission of feed information and images to a security centre to provide help as well as warn the owner, international fire brigade, military forces and or security firms.

[0035] Yet another objective is to provide a safety system comprising a robotic unit can be mounted on a rail, thereby allowing the robotic unit to move along the hull of a ship.

[0036] Yet another objective is to provide a safety system to provide alert signal in case of fire, piracy, oil leak or man overboard.

[0037] Yet another objective is to provide a safety system allows detection of a man overboard, thereby sending a signal to warn the members at danger, then automatically launch a life raft, flare and spray a paint that can mark and track the location of the victim.

[0038] Other objectives and aspects of the invention will become apparent from the

following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the features in accordance with embodiments of the invention. The summary is not intended to limit the scope of the invention, which is defined solely by the claims attached hereto.

Brief Description of the Drawings

[0039] The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

[0040] FIG. 1 illustrates a robotic safety system turned outward from a ship for detecting man overboard and deterring theft and prevents pirates entering into water vessels at sea, in accordance with an embodiment of the present invention;

[0041] FIG. 2 illustrates a robotic safety system turned inward to the deck 130 of the ship for fire fighting, in accordance with an embodiment of the present invention;

[0042] FIG. 3 illustrates a front view of the robotic unit of the system, in accordance with an embodiment of the present invention;

[0043] FIG. 4 illustrates a left side view of the robotic unit of the system, in accordance with an embodiment of the present invention; and

[0044] FIG. 5 illustrates a right side view of the robotic unit of the system, in accordance with an embodiment of the present invention

[0045] FIG. 6 illustrates a back side view of the robotic unit of the system, in accordance with an embodiment of the present invention

[0046] FIG. 7 illustrates a top view of the robotic unit of the system, in accordance with an embodiment of the present invention

[0047] FIG. 8 illustrates an exemplary orientation of the robotic unit of the system at a desired angle to aim at a target, in accordance with an embodiment of the present invention; and

[0048] FIG. 9 illustrates a flow chart illustrating a method for using a robotic safety system to provide safety to marine vessels.

[0049] Like reference numerals refer to like parts throughout the various views of the drawings.

Detailed Description of the Invention

[0050] The following detailed description is merely exemplary in nature and is not intended to limit the described embodiments or the application and uses of the described embodiments. As used herein, the word “exemplary” or “illustrative” means “serving as an example, instance, or illustration.” Any implementation described herein as “exemplary” or “illustrative” is not necessarily to be construed as preferred or advantageous over other implementations. All of the implementations described below are exemplary implementations provided to enable persons skilled in the art to make or use the embodiments of the disclosure and are not intended to limit the scope of the disclosure, which is defined by the claims. For purposes of description herein, the terms “side,” “top,” “perspective,” “top perspective,” and derivatives thereof shall relate to the invention as oriented in FIG. 1-9. Furthermore, there is no intention to be bound by any expressed or implied theory presented in the preceding technical field, background, brief summary or the following detailed description. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Specific dimensions and other physical characteristics relating to the embodiments disclosed herein are therefore not to be considered as limiting, unless the claims expressly state otherwise.

[0051] According to an embodiment of the present invention as shown in FIGs. 1-9, a robotic safety system 100 that acts as a marine vessel safety system for deterring theft and prevents pirates entering into water vessels at sea. The robotic safety system 100 comprises, an enclosure 103 that houses a robotic unit 102 and electrical/electronic components. Wherein the robotic unit comprises a stainless steel or bronze nozzle 111, a support fork 104, a support arm 106, a base hinge 108, a base plate 110, stainless steel piping 111, swivel joints 112, quick

closing valves (not shown). The electrical/electronic components comprise of at least one camera 118, 122, 124, electrical cables, DC step motors, at least one pump, at least one transmitter, at least one control unit embedded with a software program. These components are connected with a human interface module (not shown) and a PLC control unit on a 110 AC 50/60Hzs up to 440V AC 50/60Hz power supply.

[0052] The unit 102 is supplied with a power supply of 110 AC 50/60Hzs up to 440V AC 50/60Hz, this power source (not shown) is enclosed with a weather proof enclosure. The power supply unit supplies the necessary power requirements for the drive motors of the robotic safety system 100 and the video driver/output module of the system 100. Each robotic safety system's power and video control enclosure will be designed to be used either in single installation mode or in multiple installation mode.

[0053] The robotic safety system 100 further comprises at least one night vision camera 124, at least one motion detector 120, at least one infrared camera 122, at least one visual laser range finder 116 to deter the possible pirates coming closer, at least one flare launching signal (not shown), at least one safety equipment launching signal (not shown), at least one maritime protective glass 132, at least one stroboscope 126, at least one high intensity light 128. The robotic safety system 100 provides fire fighting, anti piracy and detection of man overboard, platform security, life feed to satellite, centralized response center services to enhance safety and security to the marine vessel.

[0054] The robotic safety system 100 functions automatically on its own to act independently, wherein the system 100 has (1) a solenoid valve (not shown) that allows for multi liquid substances; (2) different cameras 118, 122, 124 and input devices that will determine the liquid required; and (3) a robotic unit 102 that is able to turn inboard and outboard to act to various threats to an asset. Thereby the robotic safety system 100 provides detection of possible threats by tracking and locking on threats, then warns the crew on the asset; and acts accordingly to minimize and/or deter the threat.

[0055] Similarly, the associated method allows (1) the detectors or the input devices are used to determine the threat; (2) the solenoid valve (not shown) allows various liquids to be used

depending on the situation; (3) commands can be given from the bridge/citadel/operation center to monitor and adjust targeting the threat, if required; (4) sends live video feed through a satellite to a shore based security center to allow further processing, analyzing and accessing the situation so as to suggest or provide the best possible solution to tackle with the situation; and (5) works independently or allows for human interface.

[0056] According to one aspect of the present invention a marine vessel safety system 100, wherein the system 100 comprising: a rotatable multi-liquid spray robotic cannon unit 102 comprising a spherical housing 103, whereby the spherical housing 103 is rotatable to a predetermined angle along the horizontal axis of the unit 102, whereby the robotic cannon unit 102 has a base hinge 108 allowing the spherical housing 103 rotatable to a predetermined angle along the vertical axis of the robotic cannon unit 102, wherein the robotic cannon unit 102 further comprises pipes 111 with swift joints 112 and quick closing valves (not shown) facilitating multi liquid usage and burst spray; a set of input devices enclosed on the spherical housing 103; at least one rotatable nozzle 114 mounted on the spherical housing 103, wherein the at least one nozzle 114 acts as a multi-liquid spray cannon to spray desired liquids at a desired flow rate by at least one pump (not shown); at least one wireless transmitter (not shown) to transmit live input signals received from the input devices to a security centre comprising at least one human machine interface (not shown); a control unit (not shown), wherein control unit comprising an artificial intelligence software program to facilitate analyzing the input signals received from the input devices to identify at least one target, thereby enabling a solenoid valve (not shown) to open, thereby allowing various liquids to be used through the at least one nozzle 114 aiming towards the at least one target; at least one DC step motor (not shown), wherein the motor rotate the robotic unit 102 at a desired orientation; and at least one power supply unit (not shown) supplying power to the system 100.

[0057] In another aspect, a robotic safety system 100, wherein the system comprises a rotatable robotic unit 102 comprising a spherical housing 103 with pluralities of slots 105, whereby the spherical housing 103 is supported on a fork 104 at diametrically opposite ends (104a, 104 b) allowing the housing 103 to rotate to a predetermined angle, whereby the fork 104 is mounted on a support arm 106 that is connected to a base hinge 108 allowing upright

movement of the fork 104 along with the spherical housing 103, further a base plate 110 supports the base hinge 108 and allows the base hinge 108 along with the support arm 106, the fork 104 and the spherical housing 103 to turn outward (as shown in FIG. 1) or inward (as shown in FIG. 2), wherein the robotic unit 102 further comprising pipes 111 with swift joints 112 and quick closing valves (not shown) facilitating multi liquid usage and burst spray; a set of input devices including at least one infrared camera 122, at least one laser range finder 116, at least one CCTV camera 118, at least one night vision camera 124 and at least one motion detector 120 enclosed in the slots 105 of the spherical housing 103; a set of output devices including at least one rotatable nozzle 114 to act as a multi-liquid spray cannon to spray desired liquids, at least one stroboscope 126, a flare launching unit (not shown), a safety equipment launching unit (not shown), a flash light 128 mounted on the slots 105 of the spherical housing 103; at least one pump (not shown), wherein the at least one pump supplies desired flow of the desired liquids to the at least one nozzle 114; at least one wireless transmitter (not shown) to transmit live input signals received from the input devices to a security center comprising at least one human machine interface (not shown), whereby the interface further comprising at least one tactile input device (not shown); a control unit (not shown), wherein control unit is associated with the interface, the control unit further embedded with an artificial intelligence software program to analyze the input signals received from the input devices to measure and detect possible threats and track the target (not shown) and further send command to the output devices enabling a solenoid valve (not shown) to open, thereby allowing various liquids to be used; at least one DC step motor (not shown), wherein the motor rotate the robotic unit 102 to enable accurate aiming and fire at the target; at least one power supply unit (not shown) supplying power to the system 100; and at least one weather proof enclosure (not shown) to enclose at least electrical components of the input devices, output devices and the at least one motor (not shown).

[0058] In another aspect, the predetermined angle of rotation of the spherical housing 103 is up to 270 degrees.

[0059] In another aspect, the system further comprises at least one maritime protective glass 132 on each of the camera lenses.

[0060] In another aspect, the power supply unit (not shown) is capable of supplying power in

the range of 110V to 440V.

[0061] *In another aspect, the weather proof enclosure (not shown) encloses electrical cables connecting the electrical or electronic components of the input devices, output devices and the motors (not shown).*

[0062] *In another aspect, the flash light is a 22000 lumen flash light, although any configuration flash light can be used without departing from the scope and spirit of the present invention.*

[0063] *In another aspect, the live input signals comprising live videos and images are transmitted to the at least one human machine interface (not shown) on board or to one or more external service providers or security firms.*

[0064] *In another aspect, the pipes of the robotic unit is at least 2 inch, although any size of pipes can be used without departing from the scope and spirit of the present invention.*

[0065] *In another aspect, the spherical housing 103, the fork 104, support arm 106, base hinge 108, the base plate 110 and the pipes 111 are made of corrosion resistant material including stainless steel, bronze, 3D printed material or the like.*

[0066] *In another aspect, the at least one nozzle 114 is separated with a membrane from the electrical components of the system 100.*

[0067] *In another aspect, the motor ensures up and down movement of the spherical housing 103.*

[0068] *In another aspect, the motor ensures left and right movement of the fork 104.*

[0069] *In another aspect, the fork 104 holds electrical cables and pipes 111 of the system 100.*

[0070] *In another aspect, the base hinge 108 enables the spherical housing 103, the fork 104 and the support arm 106 are moved up and down 90 degrees with respect to the vertical axis of the system 100.*

[0071] In another aspect, the system allows the at least one nozzle 114 to be separated from the spherical housing 103.

[0072] In another aspect, the system 100 allows wireless transmission of feed information and images to a security centre to provide help as well as warn the owner, international fire brigade, military forces and or security firms.

[0073] In another aspect, the rotatable robotic unit 102 can be mounted on a rail 128, thereby allowing the robotic unit 102 to move along the hull 134 of a ship.

[0074] In another aspect, the system 100 provides alert signal in case of fire, piracy, oil leak, chemical spill, LNG leak or man overboard. The system 100 allows to switch to a medium having foam that is able to limit the spread of oil, functions as a oil boom or a foam that dissolves the oil. The system 100 further allows to release life boat and buoy upon detection of man overboard by pressing button on human machine interface screen, thereby allowing spray heads to turn outboard and spray emergency color with UV component.

[0075] In another aspect, upon detection of a man overboard a signal is sent to warn the members at danger, then automatically launch a life raft, flare and spray a paint that can mark and track the location of the victim.

[0076] In another aspect, a method 200 for using a robotic safety system to provide safety to marine and floating assets/vessels, wherein the method 200 comprising: the first step 202 of mounting a rotatable robotic unit on a deck surface, wherein the robotic unit comprising a spherical housing with pluralities of slots, whereby the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate to a predetermined angle, whereby the fork is mounted on a support arm that is connected to a base hinge allowing upright movement of the fork along with the spherical housing, further a base plate supports the base hinge and allows the base hinge along with the support arm, the fork and the spherical housing to turn outward or inward, wherein the robotic unit further comprising pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray; the second step 204 of continuous or on demand capturing live feed, images and input signal from a set of input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV

camera, at least one night vision camera and at least one motion detector enclosed in the slots of the spherical housing; the third step 206 of transmitting the live feed, images and input signal received from the input devices to a security centre by a wireless transmitter, wherein the security centre further comprising at least one human machine interface, whereby the interface further comprising at least one tactile input device; the fourth step 208 of analyzing the feed, images and input signal by a control unit by an artificial intelligence software program to identify a target; the fifth step 210 of aiming at the target by rotating the robotic unit to a desired angle by at least one DC step motor; and the sixth step 212 of firing at the target by actuating at least one rotatable nozzle mounted on the spherical housing when the target is at a predetermined distance, wherein the at least one nozzle acts as a multi-liquid spray cannon to spray desired liquids by at least one pump, thereby allowing various liquids to be sprayed through the at least one nozzle at a desired flow rate.

[0077] In an embodiment of the system of the present invention is referenced in FIGs. 1-7 showing a robotic safety system 100, wherein the system comprises a rotatable robotic unit 102 comprising a spherical housing 103 with pluralities of slots 105, thereby the spherical housing 103 acts as an enclosure for electronic components and adjustable water nozzle 114. The ball will be able to turn 270 degrees and aim at various targets as required. The spherical housing 103 is supported on a fork 104 of generally “U” shaped, wherein the fork 104 functions as a support for the spherical housing 103 at diametrically opposite ends (104a, 104 b) allowing the housing 103 to rotate to a predetermined angle upto 270 degrees along the horizontal axis of the robotic cannon unit 102. The fork 104 is mounted on a support arm 106 that is connected to a base hinge 108 allowing upright movement of the fork 104 along with the spherical housing 103, further a base plate 110 supports the base hinge 108 and allows the base hinge 108 along with the support arm 106, the fork 104 and the spherical housing 103 to turn outward (as shown in FIG. 1) or inward (as shown in FIG. 2). The fork 104 holds electrical cables and pipes of the system 100. The base hinge 108 enables the spherical housing 103, the fork 104 and the support arm 106 are moved up and down 90 degrees with respect to the vertical axis of the system 100. The base plate 110 supports the complete robotic unit 102, thereby allowing it to turn outwards from the hull 134 of a ship during use of the system 100 as shown in FIG. 1, and allows the complete robotic unit 102 to turn inwards to the deck 130 of the ship the system 100 is not in use as shown

in FIG. 2. The robotic unit 102 further comprising pipes 111 with swift joints 112 and quick closing valves (not shown) facilitating multi liquid usage and burst spray. Further the base plate 110 allows the robotic unit 102 to be attached to a deck surface 130. Further the rotatable robotic unit 102 can be mounted on a rail 128, thereby allowing the robotic unit 102 to move along the hull 134 of a ship. The front view of the robotic unit 102 of the system 100 is shown in the FIG. 3. FIG. 4-5 shows left and right-side views of the robotic unit 102 of the system 100. FIG. 6 shows the back view of the robotic unit 102 of the system 100. FIG. 7 shows the top view of the robotic unit 102 of the system 100.

[0078] As illustrated in FIGs. 1-3 and FIG. 7, a set of input devices including at least one infrared camera 122, at least one laser range finder 116, at least one CCTV camera 118, at least one night vision camera 124 and at least one motion detector 120 enclosed in the slots 105 of the spherical housing 103; a set of output devices including at least one rotatable nozzle 114 to act as a multi-liquid spray cannon to spray desired liquids, at least one stroboscope 126, a flare control launching unit (not shown), a safety equipment launching control unit (not shown) provides signal to launch flare and/or safety equipments, a flash light 128 mounted on the slots 105 of the spherical housing 103.

[0079] At least one infrared camera 122 to detect fire and people, at least one CCTV camera 118 for usage by crew, at least one and night vision camera 124 to detect and see threats at night, wherein the cameras are enclosed in the slots 105 of the spherical housing 103 and are protected from at least sand and sea salt by at least one maritime protective glass 132 on each of the camera lenses. The cameras 122, 118 and 124 allow to provide images and video feed of the target. The images and video feed focused on target are zoomed and are analyzed by an artificial intelligence software program to track and identify the target. The laser range finder 116 determines the range and position of the target such as man overboard, pirates and fire. At least one motion detector 120 detects man overboard and targets at short distance during heavy fog or similar conditions.

[0080] The stroboscope 126 enables photosynthetic epilepsy and imbalance of boarding person while the multi liquid is in use. Once pirates are climbing on the side of the vessel and are within efficient range the stroboscope will commence. The flash light 128 is a 22000-lumen

flash light that is used to provide emergency signal as well as illuminate the area around the ship or the marine vessel.

[0081] The system 100 of the present invention further comprises at least one pump (not shown), wherein the at least one pump supplies desired flow of the desired liquids to the at least one nozzle 114 of the robotic cannon unit 102.

[0082] The system 100 of the present invention further comprises at least one wireless transmitter(not shown) to transmit live input signals received from the input devices to electrical equipments of the system as well as to a security center comprising at least one human machine interface (not shown). The live input signals comprising live videos and images are transmitted to the at least one human machine interface on board or to one or more external service providers or security firms, whereby the interface further comprising at least one tactile input device (not shown) that is used for the crew to control the system 100 or look through the various camera's 122, 118 and 124 installed on the robotic unit 102. The human machine interface allows manual input as well or selection of the various emergency situations like fire, piracy attack and man overboard confirmation. The system 100 further allows wireless transmission of feed information and images to a security centre to provide help as well as warn the owner, international fire brigade, military forces and or security firms for their external support or advisory services.

[0083] The system 100 of the present invention further comprises a control unit (not shown), wherein control unit is associated with the interface, the control unit further embedded with an artificial intelligence software program to analyze the input signals received from the input devices to measure and detect possible threats and track the target (not shown) and further send command to the output devices enabling a solenoid valve (not shown) to open, thereby allowing various liquids to be used. In an exemplary embodiment, when the target is at 100 meter range, the laser gets activated and functions as a first warning and deterrence, further the system 100 commences oscillating spray sequence by spraying water. When the target is at 50 meter range, the system 100 targets the pirates and their vessel with a water spray by using multiple nozzles. When the target is within 25-50 meter range, the system 100 targets the pirates and their vessel with a water spray and coloring chemical. When the target is within 5-25 meter range, the system

100 targets the pirates and their vessel with a water spray, color chemical, pepper and foam additive. When the target is within 5 meter range, the system 100 targets the pirates and their vessel with a water spray and color chemical and pepper, foam spray and stroboscope flash light (22000 lumen) sequence to enables photosynthetic epilepsy and imbalance of boarding person while the multi liquid is in use. Further steam can be used as well to deter the pirates when they try boarding the asset, further heating the water to 85degree Celsius while the pirates approach the asset if positive identification of pirates are made from a long distance, the hot water can be used instead of steam to deter the pirates.

[0084] The system 100 of the present invention further comprises at least one DC step motor (not shown), wherein the motor rotates the robotic unit 102 to a desired angle and position the nozzle to enable accurate aiming and fire at the target. The motor ensures at least up and down movement of the spherical housing 103 and left and right movement of the fork 104. Further the system 100 comprises at least one power supply unit (not shown) supplying power 110 AC 50/60Hzs up to 440V AC 50/60Hz to the system 100, thereby enabling the robotic unit 102, pump, motor, input devices, output devices, transmitter, controller and the human machine interface to work automatically aiming at the target as and when required. The system further allows emergency power backup, wind power or solar power systems or UPS to provide continuous power to the system.

[0085] The electrical and electronic components of the system such as at least the input devices, the output devices and the at least one motor (not shown) are enclosed by at least one weather proof enclosure (not shown). Further the at least one nozzle 114 is separated with a membrane (not shown) from the electrical and electronic components of the system 100.

[0086] According to another exemplary embodiment of the present invention the system 100 as shown in FIG. 8 illustrating the orientation of the robotic unit at a desired angle to aim at a target.

[0087] According to another exemplary embodiment of the present invention as shown FIG. 9 in a flow chart illustrating a method 200 for using a robotic safety system to provide safety to marine vessels, wherein the method comprising: the first step 202 of mounting a rotatable

robotic unit on a deck surface, wherein the robotic unit comprising a spherical housing with pluralities of slots, whereby the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate to a predetermined angle, whereby the fork is mounted on a support arm that is connected to a base hinge allowing upright movement of the fork along with the spherical housing, further a base plate supports the base hinge and allows the base hinge along with the support arm, the fork and the spherical housing to turn outward or inward, wherein the robotic unit further comprising pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray; the second step 204 of continuous or on demand capturing live feed, images and input signal from a set of input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector enclosed in the slots of the spherical housing; the third step 206 of transmitting the live feed, images and input signal received from the input devices to a security center by a wireless transmitter, wherein the security center further comprising at least one human machine interface, whereby the interface further comprising at least one tactile input device; the fourth step 208 of analyzing the feed, images and input signal by a control unit by an artificial intelligence software program to identify a target; the fifth step 210 of aiming at the target by rotating the robotic unit to a desired angle by at least one DC step motor; and the sixth step 212 of firing at the target by actuating at least one rotatable and adjustable nozzle mounted on the spherical housing when the target is at a predetermined distance, wherein the at least one nozzle acts as a multi-liquid spray cannon to spray desired liquids by at least one pump, wherein the other liquids can be fed into the system by vessels under pressure using the solenoid valve to allow integration into the main line resulting in mixing two or more liquids to be sprayed through the at least one nozzle at a desired flow rate.

[0088] These and other advantages of the invention will be further understood and appreciated by those skilled in the art by reference to the following written specification, claims and appended drawings. Because many modifications, variations, and changes in detail can be made to the described preferred embodiments of the invention, it is intended that all matters in the foregoing description and shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense. Thus, the scope of the invention should be determined by the appended claims and their legal equivalence.

What is claimed is:

1. A marine vessel or floating asset safety system, wherein the system comprises:

a rotatable multi-liquid spray robotic cannon unit comprising a spherical housing, whereby the spherical housing is rotatable to a predetermined angle along the horizontal axis of the unit and the robotic cannon unit has a base hinge allowing the spherical housing to be rotatable to a predetermined angle along the vertical axis of the robotic cannon unit, wherein the robotic cannon unit further comprises pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray;

a set of input devices enclosed on the spherical housing;

at least one rotatable nozzle is mounted on the spherical housing, wherein the at least one nozzle acts as a multi-liquid spray cannon to spray desired liquids at a desired flow rate by at least one pump;

at least one wireless transmitter to transmit live input signals received from the input devices to a security center comprising at least one human machine interface;

a control unit, wherein the control unit comprises an artificial intelligence software program to facilitate analyzing the input signals received from the input devices to identify at least one target, thereby enabling a solenoid valve to open, thereby allowing various liquids to be used through the at least one nozzle aiming towards the at least one target;

at least one DC step motor, wherein the motor rotates the robotic unit; and

at least one power supply unit supplying power to the system.

2. A marine vessel or floating asset safety system as claimed in claim 1, wherein the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate up to 270 degrees along the horizontal axis of the robotic cannon unit.

3. A marine vessel or floating asset safety system as claimed in claim 1 or 2, wherein the system further comprises a base plate allowing the robotic unit to be attached to a surface.
4. A marine vessel or floating asset safety system as claimed in claim 1, 2 or 3, wherein the input devices comprise at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector.
5. A marine vessel or floating asset safety system as claimed in claim 1, 2, 3 or 4, wherein the system further comprises at least one stroboscope.
6. A marine vessel or floating asset safety system as claimed in claim 1, 2, 3, 4 or 5, wherein the system further comprises at least one 22000 lumen flash light.
7. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein the live input signals comprising live videos and images are transmitted to the at least one human machine interface on board or to one or more external service providers.
8. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein the human machine interface further comprises at least one tactile input device.
9. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein the system further comprises at least one weather proof enclosure to enclose at least electrical components of the input devices, control unit and the at least one motor.
10. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein the at least one nozzle is separated with a membrane from the electrical components of the system.
11. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein the system allows the at least one nozzle to be separated from the spherical housing.
12. A marine vessel or floating asset safety system as claimed in any preceding claim, wherein upon detection of a man overboard a signal is sent to warn the members to

automatically launch a life raft, flare, stroboscope and/or multi-liquid spray and burst spray including to spray water, hot water, steam, paint, pepper spray, a foam additive or the like.

13. A robotic safety system, wherein the system comprises:

a rotatable robotic unit comprising a spherical housing with pluralities of slots, whereby the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate to a predetermined angle, whereby the fork is mounted on a support arm that is connected to a base hinge allowing upright movement of the fork along with the spherical housing, further a base plate supports the base hinge and allows the base hinge along with the support arm, the fork and the spherical housing to turn outward or inward, wherein the robotic unit further comprising pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray;

a set of input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector enclosed in the slots of the spherical housing;

a set of output devices including at least one rotatable nozzle to act as a multi-liquid spray cannon to spray desired liquids, at least one stroboscope, a flare launching control unit, a safety equipment launching control unit, a flash light/stroboscope mounted on the slots of the spherical housing;

at least one pump, wherein the at least one pump supplies desired flow of the desired liquids to the at least one nozzle;

at least one wireless transmitter to transmit live input signals received from the input devices to a security centre comprising at least one human machine interface, whereby the interface further comprising at least one tactile input device;

a control unit, wherein control unit is associated with the interface, the control unit further embedded with an artificial intelligence software program to analyze the

input signals received from the input devices to measure and detect possible threats and track the target and further send command to the output devices enabling a solenoid valve to open, thereby allowing various liquids to be used;

at least one DC step motor, wherein the motor rotates the robotic unit to enable accurate aiming and firing at the target;

at least one power supply unit supplying power to the system; and

at least one weather proof enclosure to enclose at least electrical components of the input devices, output devices and the at least one motor.

14. A robotic safety system according to claim 13, wherein the predetermined angle of rotation of the spherical housing is up to 270 degrees.
15. A robotic safety system according to claim 13 or 14, wherein the system allows multi liquid usage and burst spray to spray water, hot water, steam, paint, a pepper spray, a foam additive or the like.
16. A robotic safety system according to claim 13, 14 or 15, wherein the system further comprises at least one maritime protective glass on each of the camera lenses.
17. A robotic safety system according to any of claims 13 to 16, wherein the power supply unit is capable of supplying power in the range of 110V to 440V.
18. A robotic safety system according to any of claims 13 to 17, wherein the weather proof enclosure encloses electrical cables connecting the electrical components of the input devices, output devices and the motors.
19. A robotic safety system according to any of claims 13 to 18, wherein the flash light is a 22,000-lumen flash light.
20. A robotic safety system according to any of claims 13 to 19, wherein the live input signals comprising live videos and images are transmitted to the at least one human machine interface on board or to one or more external service providers or security firms.

21. A robotic safety system according to any of claims 13 to 20, wherein diameter of the pipes of the robotic unit is at least 2 inches (5cm).
22. A robotic safety system according to any of claims 13 to 21, wherein the spherical housing, the fork, support arm, base hinge, the base plate and the pipes are made of corrosion resistant material including stainless steel.
23. A robotic safety system according to any of claims 13 to 22, wherein the at least one nozzle is separated with a membrane from the electrical components of the system.
24. A robotic safety system according to any of claims 13 to 23, wherein the motor ensures up and down movement of the spherical housing.
25. A robotic safety system according to any of claims 13 to 24, wherein the motor ensures left and right movement of the fork.
26. A robotic safety system according to any of claims 13 to 25, wherein the fork holds electrical cables and pipes of the system.
27. A robotic safety system according to any of claims 13 to 26, wherein the base hinge enables the spherical housing, the fork and the support arm are moved up and down 90 degrees with respect to the vertical axis of the system.
28. A robotic safety system according to any of claims 13 to 27, wherein the system allows wireless transmission of feed information and images to a security centre to provide help as well as warn the owner, international fire brigade, military forces and or security firms.
29. A robotic safety system according to any of claims 13 to 28, wherein the system provides an alert signal in case of fire, piracy or man overboard.
30. A robotic safety system according to claim 29, wherein upon detection of a man overboard a signal is sent to warn the members to automatically launch a life raft, flare, , stroboscope and/or multi-liquid spray and burst spray including to spray water, hot water, steam, paint, pepper spray, a foam additive or the like.

31. A method for using a robotic safety system to provide safety to marine vessels, wherein the method comprises the steps of:

mounting a rotatable robotic unit on a deck surface, wherein the robotic unit comprises a spherical housing with pluralities of slots, the spherical housing is supported on a fork at diametrically opposite ends allowing the housing to rotate to a predetermined angle, the fork is mounted on a support arm that is connected to a base hinge allowing upright movement of the fork along with the spherical housing, further a base plate supports the base hinge and allows the base hinge along with the support arm, the fork and the spherical housing to turn outward or inward, wherein the robotic unit further comprising pipes with swift joints and quick closing valves facilitating multi liquid usage and burst spray;

continuous or on demand capturing live feed, images and input signal from a set of input devices including at least one infrared camera, at least one Laser range finder, at least one CCTV camera, at least one night vision camera and at least one motion detector enclosed in the slots of the spherical housing;

transmitting the live feed, images and input signal received from the input devices to a security centre by a wireless transmitter, wherein the security centre further comprising at least one human machine interface, whereby the interface further comprising at least one tactile input device;

analyzing the feed, images and input signal by a control unit by an artificial intelligence software program to identify a the target(s);

aiming at the target by rotating the robotic unit to a desired angle by at least one DC step motor; and

firing at the target by actuating at least one rotatable nozzle mounted on the spherical housing when the target is at a predetermined distance, wherein the at least one nozzle acts as a multi-liquid spray cannon to spray desired liquids by at least one pump,

thereby allowing various liquids to be sprayed through the at least one nozzle at a desired flow rate.

32. A method according claim 31, wherein the predetermined angle of rotation of the spherical housing is up to 270 degrees.
33. A method according claim 31 or 32, wherein each of the camera lenses are covered with at least one maritime protective glass.
34. A method according claim 31, 32 or 33, wherein electrical cables connecting the electrical components of the input devices and the motors are enclosed by at least one weather proof enclosure.
35. A method according claim 31, 32, 33 or 34, wherein the spherical housing, the fork, support arm, base hinge, the base plate and the pipes are made of corrosion resistant material including stainless steel.
36. A method according to any of claims 31 to 35, wherein live feed, images and input signal are transmitted to the at least one human machine interface on board or to one or more external service providers or security firms.
37. A method according to any of claims 31 to 36, wherein the at least one nozzle is separated with a membrane from the electrical components of the system.
38. A method according to any of claims 31 to 37, wherein the motor ensures up and down movement of the spherical housing.
39. A method according to any of claims 31 to 38, wherein the motor ensures left and right movement of the fork.
40. A method according to any of claims 31 to 39, wherein the fork holds electrical cables and pipes of the system.

41. A method according to any of claims 31 to 40, wherein the base hinge enables the spherical housing, the fork and the support arm are moved up and down 90 degrees with respect to the vertical axis of the system.
42. A method according to any of claims 31 to 41, wherein the method allows wireless transmission of feed information and images to a security centre to provide help as well as warn the owner, international fire brigade, military forces and or security firms.
43. A method according to any of claims 31 to 42, wherein the method allows to provide alert signal in case of fire, piracy or man overboard.
44. A method according to claim 43, wherein upon detection of a man overboard a signal is send to warn the members to automatically launch a life raft, flare, stroboscope and/or multi-liquid spray and burst spray including to spray water, hot water, steam, paint, pepper spray, a foam additive or the like.

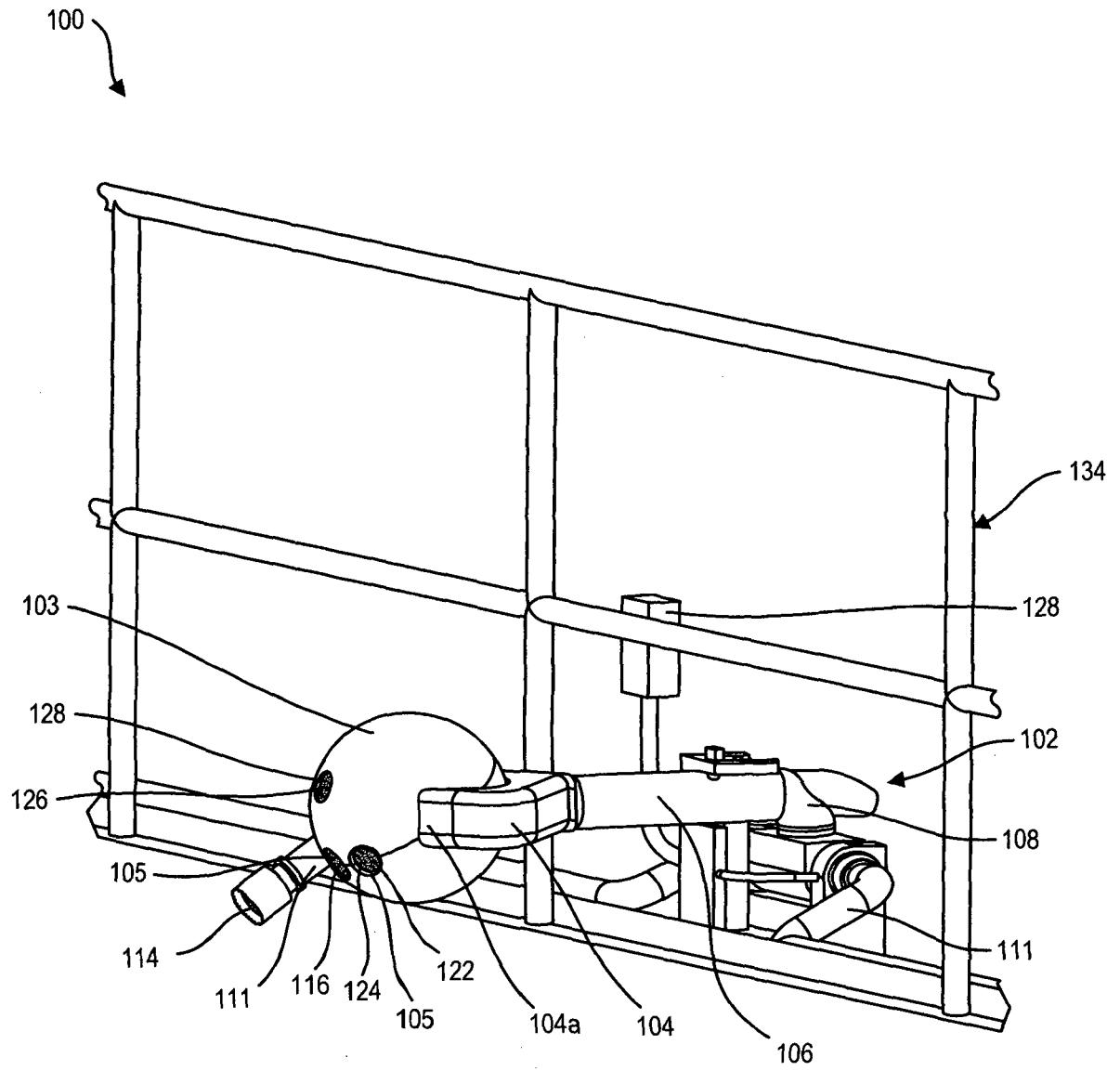


FIG. 1

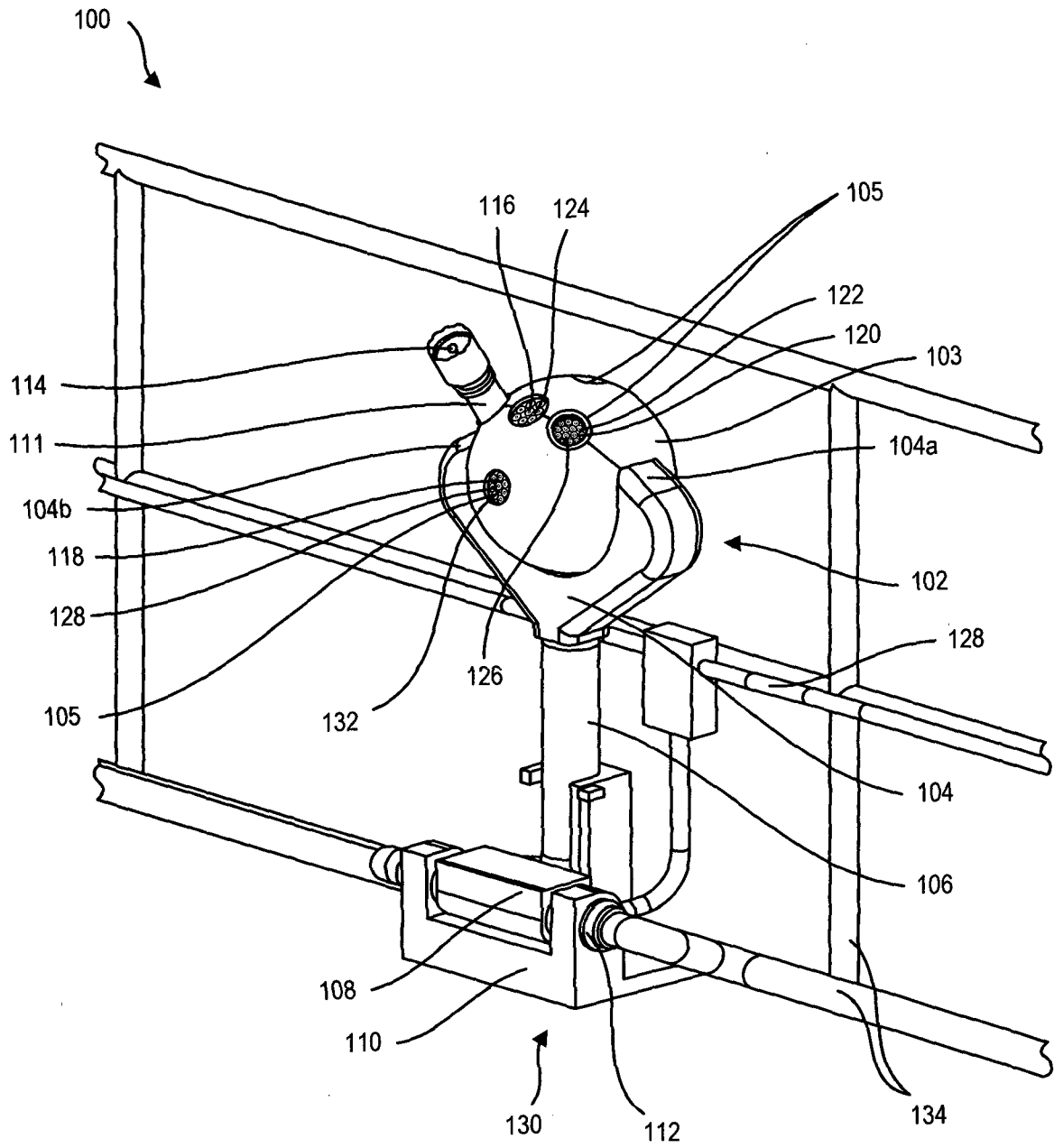
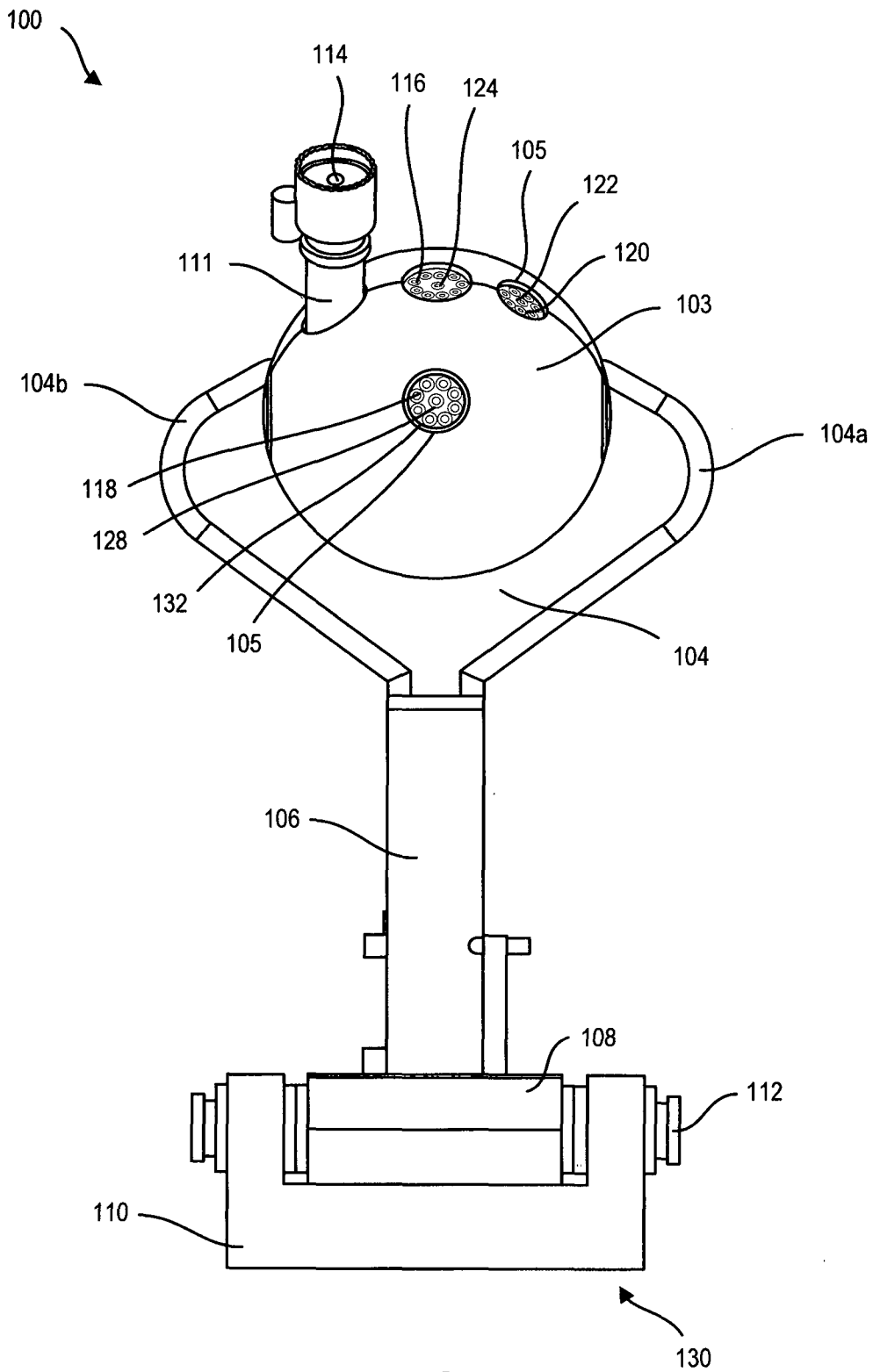


FIG. 2



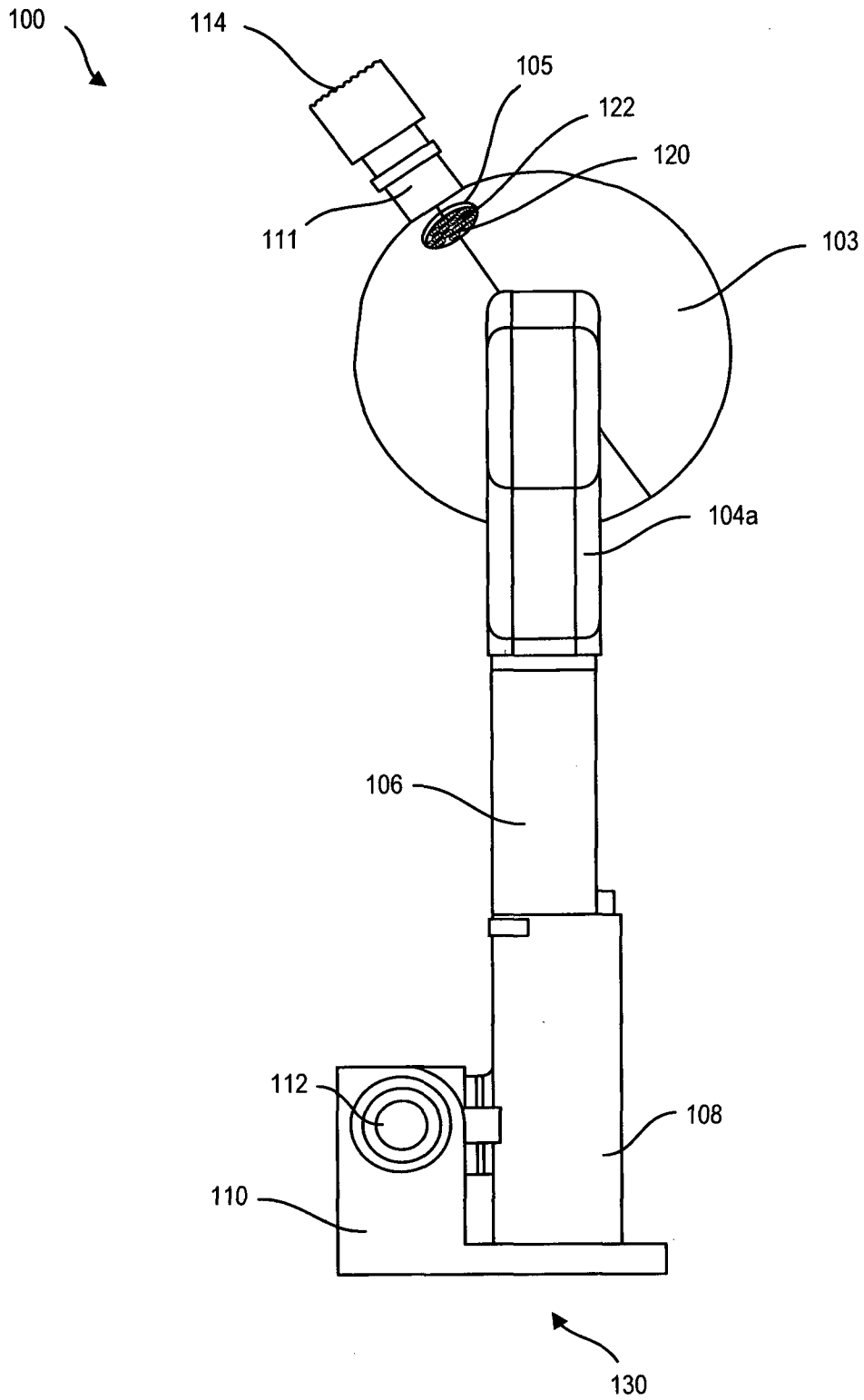


FIG. 4

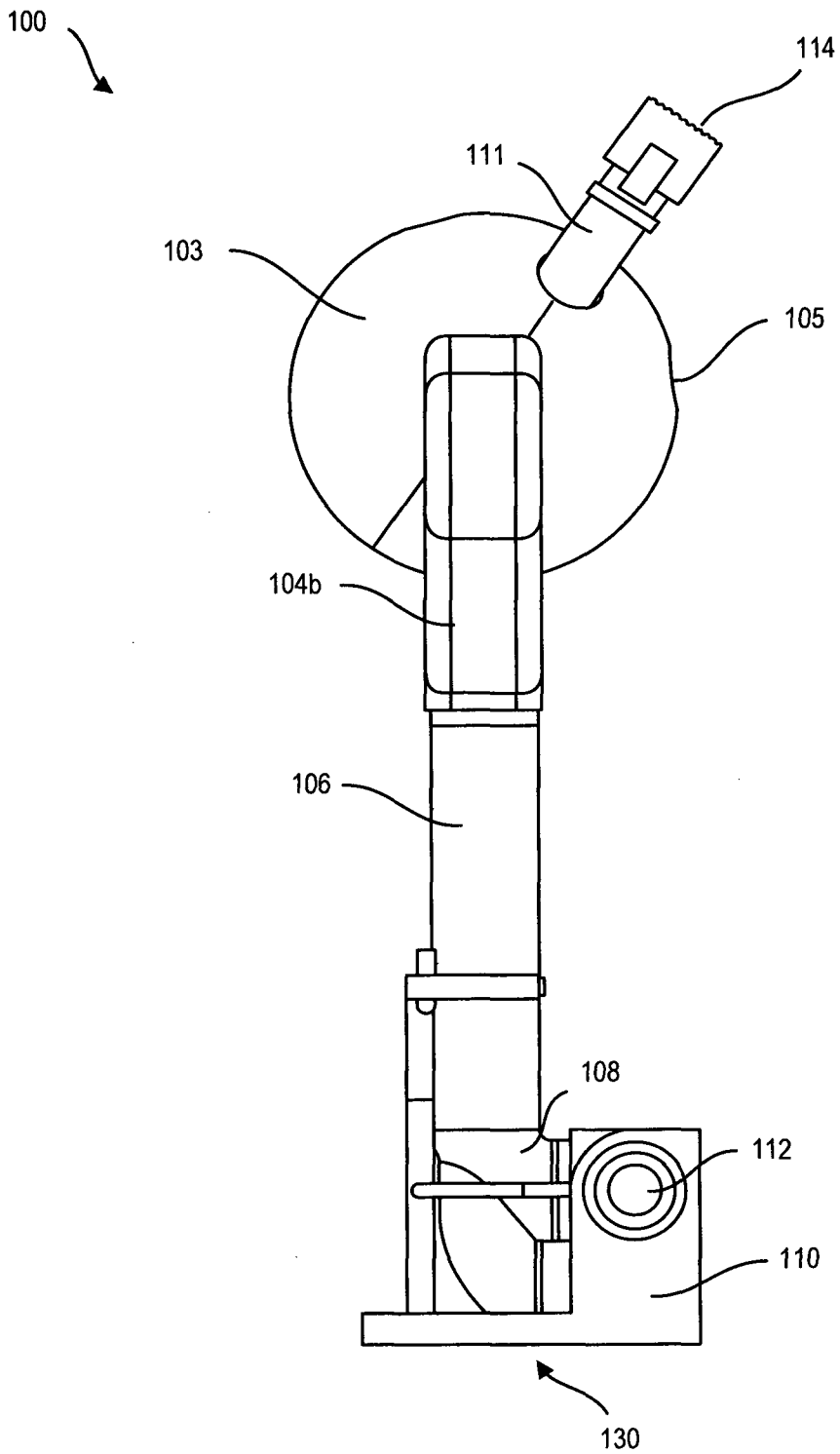


FIG. 5

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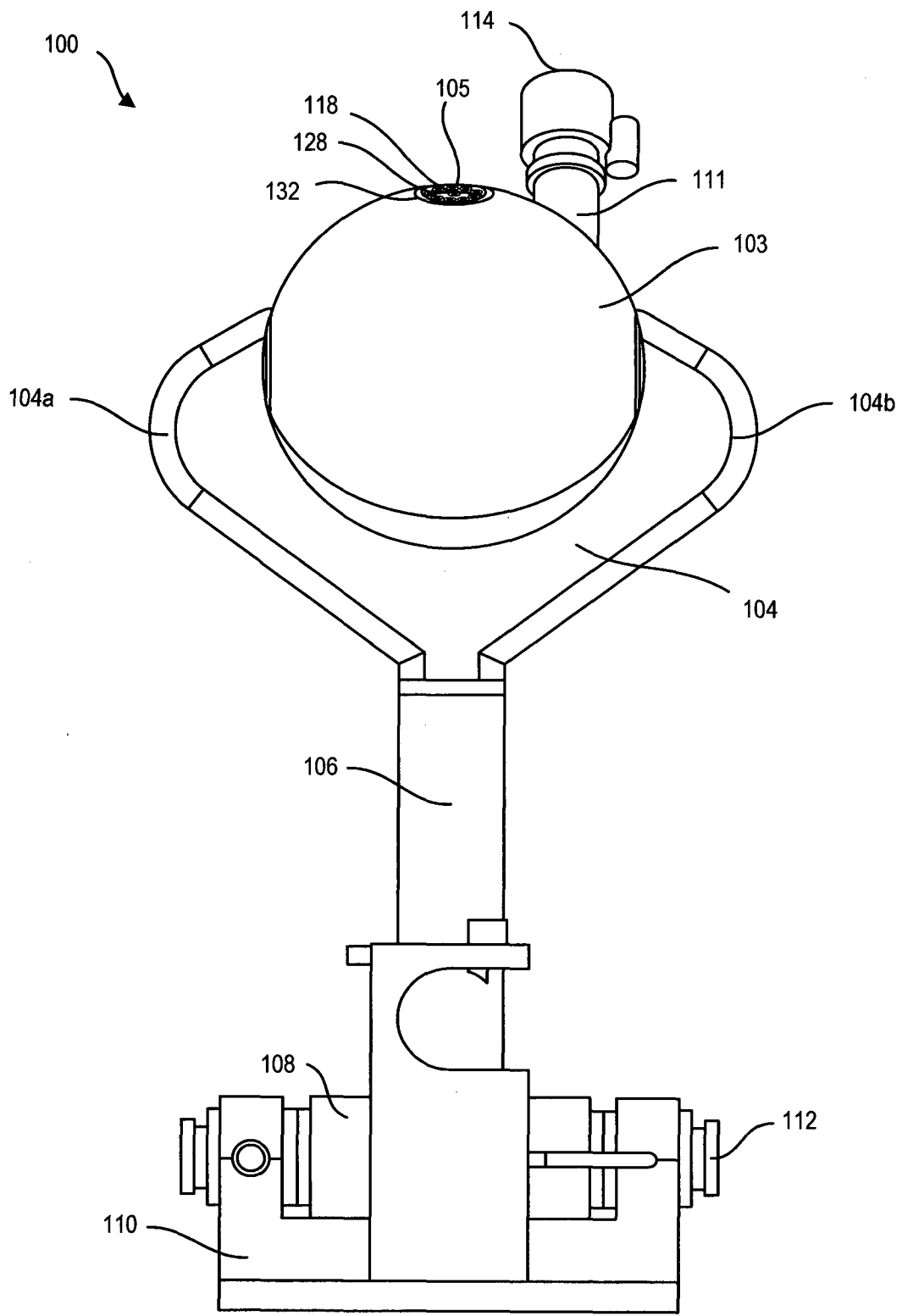


FIG. 6

130

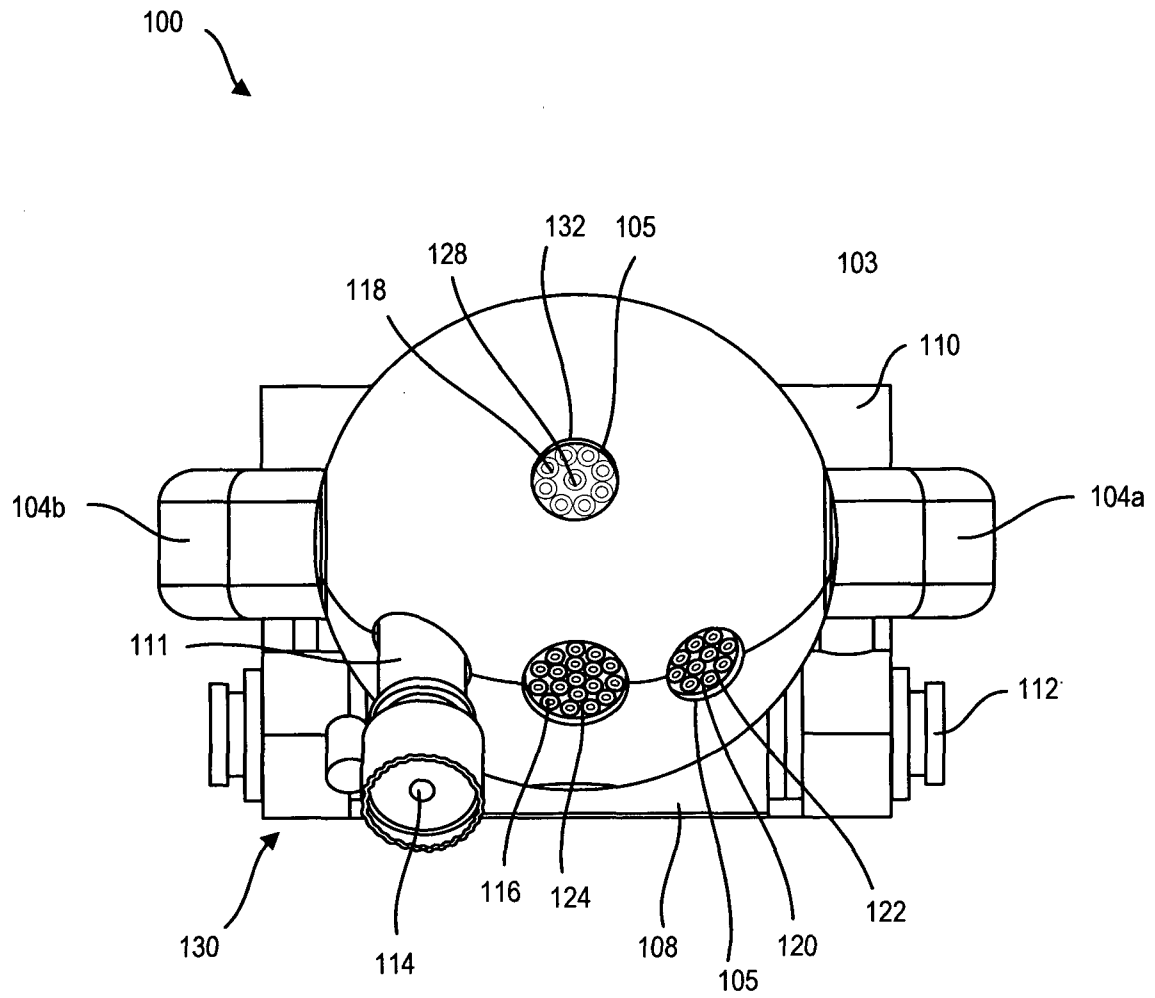


FIG. 7

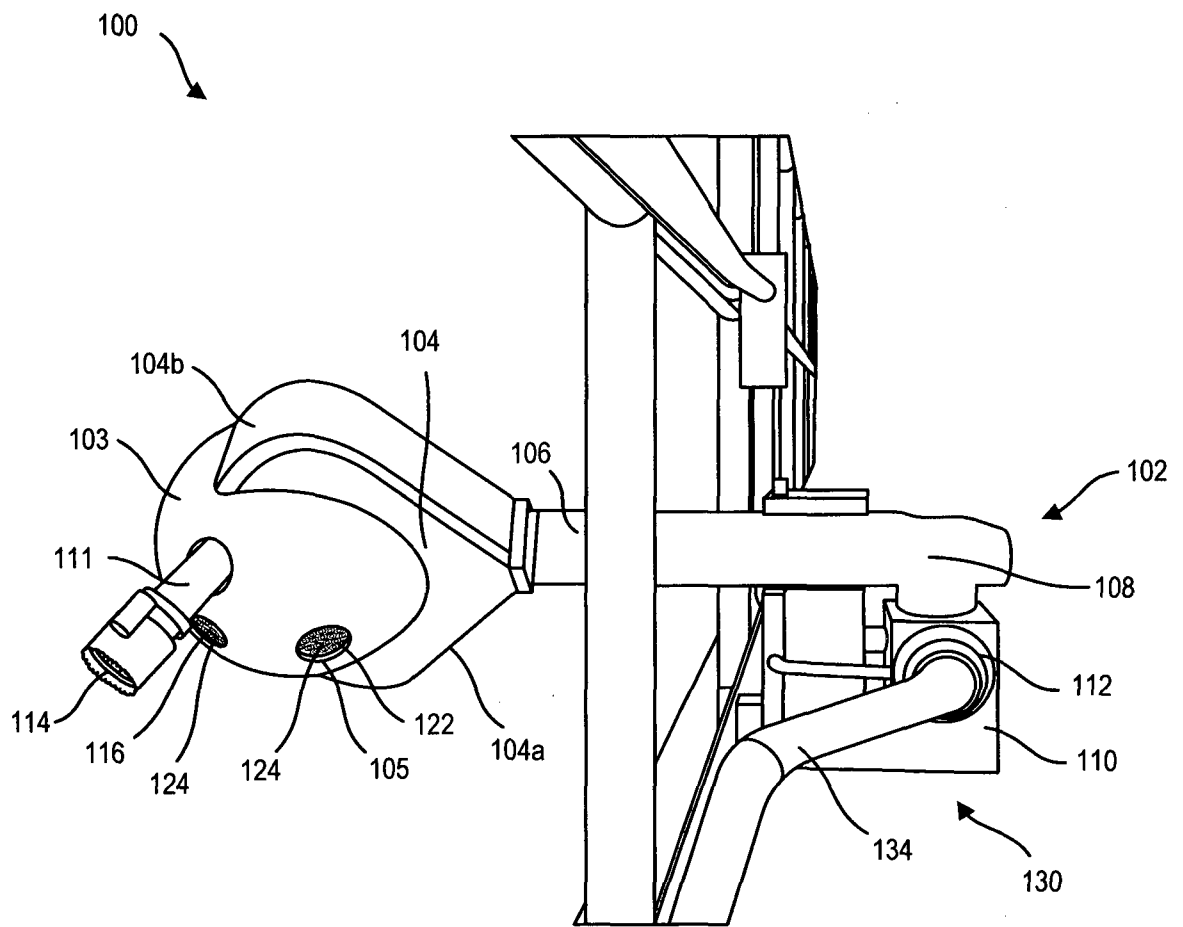


FIG. 8

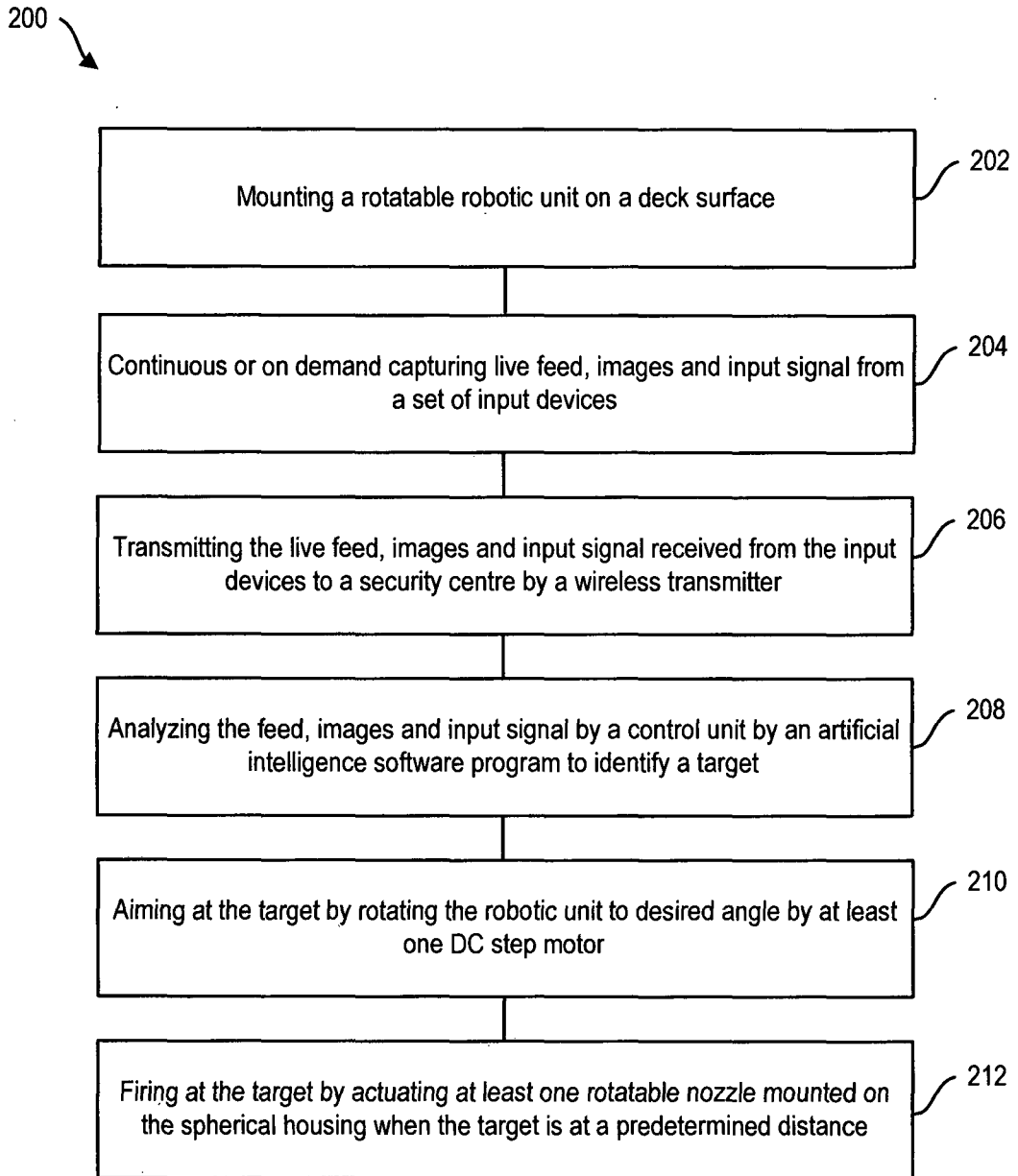


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/001438

A. CLASSIFICATION OF SUBJECT MATTER
INV. B63G13/00 F41B9/00
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)
B63G F41B A62C B63C

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.
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X	KR 2014 0112794 A (SAMSUNG HEAVY IND [KR]) 24 September 2014 (2014-09-24) figure 1 ----- -/--	1,3,4,9, 10,13, 15-18, 21-29, 31, 33-37, 42-44

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

21 August 2018

Date of mailing of the international search report

29/08/2018

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Mauriès, Laurent

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/001438

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/001438

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KR 20140112794 A	24-09-2014	NONE	
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US 2004036006 A1	26-02-2004	NONE	