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(54) **INTEGRAL SHIELDING NOZZLE FOR SELF-PROTECTION, FIRE-FIGHTING KIT AND SYSTEM, AND METHOD FOR INSTALLING SAID SYSTEM**

(57) The invention is applicable to the rescue of people cornered in fire - extinguishing emergencies. Said invention comprises a connection (1) for coupling to the fluid or water supply, followed by a flowmeter (2) for measuring the flow of the fluid, which is then connected to the proportioner (5) mixing the chemical agent, via a conduit (4) connected to a store (3), a pressure gauge (14) and a connection cylinder (6) being located between the proportioner (5) and the corresponding projection screen (7) which is semicircular and associated with anchoring elements (8) which are adjustable so as to allow the variation of the angle of same. The store (3) is complemented with a band or anchoring element (12) that forms a gripping handle (13) in the upper part thereof, a stopper (9) and a housing (10) for a GPS geolocation device being located in the upper part.

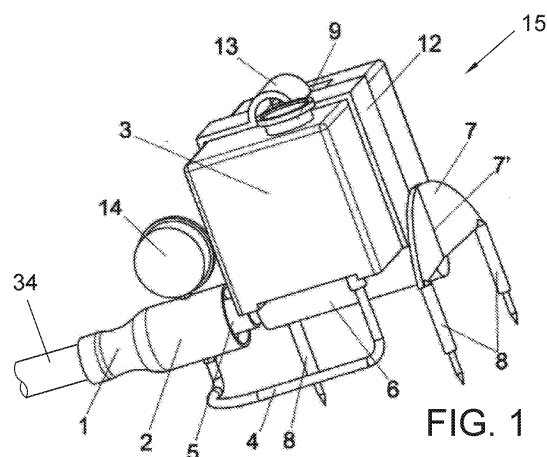


FIG. 1

Description

OBJECT OF THE INVENTION

[0001] The present invention refers to an integrated screen nozzle, envisaged for the creation of an integrated safety zone employed for self-protection, protection and safeguarding of persons and property in situations of risk derived from entrapment in fire emergencies of all kinds: forest, interface, agricultural, urban and industrial.

[0002] The object of the invention is to contribute to solving and securing the existing safety problems for self-protection, protection and safeguarding of persons and property in situations of extreme danger due to fire, so contributing to the establishment of protocols for action which can secure, and minimise the risks to, persons and property from emergency situations of entrapment by fire.

[0003] A kit and fire fighting system, and a procedure for installing the system, are also the object of the invention.

PRIOR ART

[0004] The phenomenon of agricultural-urban-forest-interface fire is no longer a natural perturbation that models the landscape, but has become a terrible menace which, in 95% of cases, is occasioned by human beings. It is an environmental problem of the first order and efforts at prevention must be undertaken to preserve our forests, which are of great importance.

[0005] Taking into account, then, the number of hectares of surface burned in certain countries during the year, and naturally taking also into account the human mortality arising as a consequence of fires of all kinds, it is a fact that many companies, and, of course other entities, are trying to find ways to solve the problems and inconveniences which arise during fire extinction operations.

[0006] With respect to this, we could cite numerous documents such as the Spanish patents PCT/ES 2013070007 (WO 201 31 0481 7 A3); P 201230046; P 9601895; and many other documents corresponding to patents, without forgetting the information and products mentioned on different Internet self-protection sites dedicated to the fight against fire.

[0007] Nevertheless, in relation to the present application, no integrated nozzle for protection/self-protection which determines an integrated safety zone such as that described in this application, has been found.

DESCRIPTION OF THE INVENTION

[0008] The integrated screen nozzle for self-protection, the object of the invention, is a curtain screen nozzle which generates an integrated safety zone, incorporating variable-protection angle devices, as well as a chemical product (retardant-humectant) dispenser, a GPS geolocator device and a flow regulation system with working

pressure gauge, in addition to other elements and components which shall be specified in the course of the present description.

[0009] The integrated nozzle of the invention has taken into account determinants such as:

- Possibility of regulating the flow of water as determined by availability and situation, optimising consumption of the fluid and so extending the self-protection time.
- Possibility of regulating the angle of positioning with respect to the horizontal and establishing different screen angles, for the purposes of guaranteeing the protection of persons and property in the different situations of risk,
- Incorporation of a chemical agent (retardant-humectant) dispenser which is associated to the principal extinguishing agent (water), raising its extinction capacity.
- Incorporation of a GPS geolocator for immediate localisation and activation of protocols for intervention for the protection and rescue of persons and property in situations of risk posed by fire.
- Speeding up the response time in the self-protection manoeuvre, as the reaction time when establishing a safety zone is determinant, for which reason all the elements included in this invention are incorporated into a single integrated system.
- Possibility of using the integrated nozzle with portable motor pumps, drinking water supply networks and fire fighting protection systems, with the particular feature that its source of feeding does not proceed exclusively from a pumper.
- The incorporation of a pressure gauge, which lets us determine the optimal working pressures, according to what is established in the technical descriptions and user manual.

[0010] Taking into account all these determinants, the integrated screen nozzle for self-protection comprises the following as basic elements:

- A connector with the possibility of adaptation to the different connection systems in use in the different countries, according to their regulations.
- A flow meter which allows the flow to be regulated optimally for accomplishing self-protection determined by the availability of water, and with the object of securing the manoeuvre.
- A dispenser which allows a retardant-humectant to

be introduced into the system, which is then mixed with the water in a proportion determined by the manufacturer of the chemical agent employed.

- A pressure gauge to allow the pressure to be measured in the nozzle so as to guarantee the preselected flow, according to the technical data for the nozzle.
- A deposit containing the chemical agent (humectant or retardant) to be employed in the extinction, which is conveyed to the dispenser through a conduit or pipe. On the top of that chemical agent deposit is its lid for filling, and on the opposite side there is a small compartment designed to hold the GPS geolocator, which is situated on the outside. The deposit is fixed to the other components at its base and at its top and side by means of an anchorage which, in turn, serves as a carrying handle for transport; the size, shape and material of that deposit shall be appropriate.
- A protection-projection screen in the shape of a semicircle which offers the possibility of setting different angles between its two symmetric halves, varying them as determined by the field of application and the elements to be protected. In addition, certain anchorages for support and stabilisation are incorporated into that screen, and these can be regulated in height so as to permit changing and orienting the angle of projection of the fluid with respect to the horizontal plane at that location. The optimal working pressure and flow will also depend on the resources and elements to be protected.
- A connecting cylinder attached to the screen mentioned above, which serves as a union between the flow meter and the protection-projection screen itself, the launch of water towards the final screen taking place within that cylinder.
- A GPS geolocator which consists of a localisation system, allowing the exact location of the persons or property which are in a situation of extreme danger to be given.

[0011] The integrated nozzle described is applicable in different fire fighting and rescue services and standard fires (agricultural - industrial - urban - forest - interface) as well as in the different existing fire fighting systems for the defence and protection of structures situated in interface zones, which might be affected by fires, complementing or perhaps replacing the systems currently employed for their protection and defence.

[0012] The integrated nozzle, in the presence of pumps or motor pumps, allows fire fighting personnel to carry out different procedures of action for tackling situations of extreme risk arising from entrapment during the work of extinction, and it is possible to perform different self-

protection manoeuvres with the objective of guaranteeing, or at least minimising the risks, and safeguarding, the lives of the personnel concerned.

[0013] In addition to the defence and protection of structures which might be affected in interface fires, it can also be used in defence and protection of vehicles, of liquefied gases and inflammable liquids located in interface zones, as well as all other property which might be affected as a consequence of a fire.

[0014] It can also be used to support and ensure the preparation of firebreaks, controlled burns or backfires, as well as support for the lines of defence in extreme situations and as a defensive element for creating integrated safety zones at advanced control posts (ACP) and high-risk installations (filling stations, tanks, campsites, etc.).

[0015] A ring of protection could also be created using several water screens to defend structures threatened by the advance of the fire.

[0016] It is also possible to feed this nozzle by connection to a domestic or industrial water network through connectors as prescribed by the regulations in the country of sale and use.

[0017] The protection-projection screen lies in a plane which forms an angle (a) rather greater than 90° (between 91° and 120°) with respect to the direction of the connecting cylinder, so that when deployed in a horizontal direction, the water curtain or screen generated is projected in a substantially vertical plane with a slight rising inclination outward with respect to the integrated nozzle assembly.

[0018] In one embodiment, between the connecting cylinder and the protection-projection screen, a tubular head with a longitudinal perforation has been inserted, which is fixed at one end to the connecting cylinder, while the opposite end of the tubular head has a characteristic outlet mouthpiece comprising the mouth of the cited longitudinal perforation, and a conical flange which affects only part of the annular outline of the cited mouth of the longitudinal perforation.

[0019] The outlet mouthpiece is so deployed as to correspond with a tiered front face of the tubular head which possesses an upper part tucked inwards where the conical flange is located, and a protruding lower part to which the protection-projection screen is fixed using front screws. Once the protection screen has been fixed in position, between the same and upper part of the tiered front face, an open grating is formed, through which the water flows to generate the self-protection water screen of curtain.

[0020] The angular joint between the two parts 19a and 19b on the front face of the tubular head comprises a first rounded angular joint. Likewise, the starting points of the ends of the conical flange comprise a second rounded angular joint.

[0021] A fire fighting kit is also envisaged, made up of an integrated self-protection assembly comprising the integrated screen nozzle, a fireproof, impermeable, collec-

tive fire shelter and a set of thermal wheel protection covers for a fire fighting vehicle.

[0022] The invention also comprises a fire fighting system made up of:

The integrated screen nozzle.

[0023] A fire fighting vehicle fitted with a hose through which water under pressure circulates and to which the integrated screen nozzle is connected, where the water current, fed by a tank, is driven by an impulsion pump.

[0024] A collective fire shelter which is fireproof and impermeable.

[0025] A set of thermal wheel protection covers for a fire fighting vehicle, which are fireproof and impermeable.

[0026] It should be emphasised that the integrated nozzle, collective fire shelter and vehicle - thermal wheel protectors assembly, together comprise a triangle of life, when the collective fire shelter is placed between the vehicle and the integrated nozzle.

[0027] The hose through which water under pressure circulates has an inner diameter of between 20 and 70 mm, and length between 10 and 20 m, where these dimensions optimise the performance of the impulsion pump.

[0028] The impulsion pump pressure is bounded between 10 and 50 bars, with a minimum pressure of 14 bars at the tip of the integrated screen nozzle.

[0029] The invention also comprises an installation procedure for the fire fighting system consisting of the following phases:

- Establish the triangle of life by positioning the fire fighting vehicle in a specific area of the territory affected by a fire.

[0030] Select high water pressure by opening a first water feeder valve by checking the correct positioning of a second valve to select the pressure stage (high or low) on those vehicles fitted with the same, and proceed to close a third valve which permits the return of water to the tank.

[0031] Protect at least those wheels of the vehicle directly exposed to the advance of the fire using the wheel protection covers.

[0032] Initial deployment of the collective fire shelter upon the part of the vehicle facing the advance of the fire, where the collective fire shelter is placed on the ground, with an aluminized part facing upwards and with certain deployment markings indicating the direction of arrival of the fire front.

[0033] Connect the integrated screen nozzle to the hose, where the nozzle is positioned at a distance from a part of the vehicle facing the advancing fire front.

[0034] Open a water valve to feed the hose and the integrated screen nozzle.

[0035] Activate the GPS geolocator by pressing its S.O.S. button.

[0036] Open a valve to allow passage of the chemical agent contained in the deposit of the integrated screen nozzle.

[0037] Place the collective fire shelter against one face of the vehicle, maintaining the aluminized part facing upwards, at which moment the collective fire shelter is erected by the ingress of users into its inner ends, positioning their feet on the lower anchorage points and their hands on the upper anchorage points;

[0038] Deploy the collective fire shelter completely by securing the upper anchorage points associated to the hands of the users and other lower anchorage points associated to the feet of the users, corresponding to the ground supporting the collective fire shelter;

Ensure the perfect deployment of the lower part of the collective fire shelter employing the arms and legs of the users laid or stretched upon the ground.

[0039] Activate the chemical lights inside the collective fire shelter, proceed to don respiratory protection masks and then proceed to open an autonomous respiration system installed inside the collective fire shelter.

[0040] The integrated screen nozzle is situated at a distance of between 2 and 4 metres from the fire fighting vehicle.

[0041] The fire fighting vehicle shall be so positioned that the side opposite to the location of its fuel deposit is facing the front of advance of the fire, describing a line parallel to the advance of the fire, whereby the triangle of life is established on the cited side of the fire fighting vehicle.

DESCRIPTION OF THE FIGURES

[0042] To complement the description which will follow immediately and for the purposes of aiding greater comprehension of the characteristics of the invention, in accordance with a preferred practical embodiment of the same, as an integral part of the cited description, a set of figures has been included representing the following, for the purposes of illustration but without limitation:

Figure 1 - This shows a representation corresponding to a general perspective view of the integrated screen nozzle for self-protection embodied in accordance with the object of the invention.

Figure 2.- This shows another perspective view but from a different angle of vision, of the same nozzle represented in the preceding figure.

Figure 3 - This shows another perspective view of the same nozzle, in this case of the lower part to display the layout of the chemical agent deposit and the connection between the same and the retardant or humectant dispenser.

Figure 4 - This shows a section view of part of the integrated nozzle of the invention, in which a tubular head to which a protection-projection screen against which the water current strikes can be clearly seen.

Figure 5 - This shows a perspective view of the tu-

bular head referred to in the preceding figure.

Figure 6 - This shows a front view of the tubular head.

Figure 7 - This shows a perspective view of the integrated nozzle with a configuration different from that shown in the foregoing figures 1 to 3.

Figure 8 - This shows a plan view of the integrated nozzle represented in the preceding figure.

Figure 9 - This shows a plan view of a fire fighting vehicle associated to different locations of the integrated nozzle and collective fire shelter, which, together with a set of wheel protection covers for the vehicle, constitutes a fire fighting system.

Figure 10 - This shows a plan view similar to that represented in figure 9, with the difference that in this case, two additional light vehicles have also been incorporated.

Figure 11 - This shows a side view of a fire fighting vehicle, where a locker for storage of the protection covers, integrated nozzle and folded collective fire shelter, identified externally with the sign S.O.S., can be clearly seen.

PREFERRED EMBODIMENT OF THE INVENTION

[0043] As can be seen in the figures, the integrated screen nozzle (15) starts from the nozzle of the corresponding water feeder hose (34), whose connector (1) if followed by a flow meter (2) which allows the flow of water to be regulated, with an optimal working pressure at the tip of the integrated nozzle (15).

[0044] Beyond this joint, a dispenser (5) which allows a chemical agent (humectant-retardant) to enter from the deposit (3), which is connected via a conduit (4) with the dispenser (5), in such a way that the latter allows the chemical agent from the deposit (3) to enter, for mixing with water in an optimal percentage as prescribed by the manufacturer.

[0045] After the dispenser (5) there is a connecting cylinder (6) attached to the corresponding protection-projection screen (7) which, as can be seen in the figures, constitutes the connection between the dispenser (5) and the protection-projection screen (7), the water and chemical agent being launched in the cited connecting cylinder (6) towards the protection-projection screen (7).

[0046] The protection-projection screen (7), designed to form a curtain of water, is in the shape of a semicircle with a slight warping (7) which allows different water projection settings to be configured and incorporates anchorage points (8) for support upon the ground, which are adjustable in height, and also allowing the angle of projection of the water curtain with respect to the horizontal plane of support and the location of the protection-projection screen (7) itself to be varied.

[0047] Returning to the connection piping (4) between the dispenser (5) and deposit (3), it should be said that this piping is a connected semi-rigid or rigid conduit.

[0048] For its part, the deposit (3) containing the chemical agent (retardant or humectant) contains the corre-

sponding lid for filling (9) and a small external compartment (19) designed to hold a GPS geolocator.

[0049] The cited deposit (3) may be constituted of a plastic, polyester or stainless steel material, or any other material resistant to fire, and it is fixed to the remaining components underneath with screws (11), as shown in figure 3, while the upper and side parts incorporate a grip (12) which may be of plastic, metal or strong polyamide tape; the grip (12) has, on its upper part, the corresponding handle (13) designed for grip and transport of the entire nozzle (15), and which is of ergonomic design to facilitate grasp and avoid slippage.

[0050] Finally, it should be said that the nozzle (15) is fitted with a pressure gauge (14) to measure the pressure at the nozzle tip and guarantee the preselected flow. In accordance with the characteristics referred to, the functionality or operation of the nozzle is as follows:

Through the connector (1), water enters from a source of supply such as pumpers, motor pumps or water networks for fire fighting systems, which water immediately passes through the flow meter (2), which allows the quantity of water projected on the basis of the selected flow and the pressure set according to the pressure gauge (14) to be regulated, the fluid then passing to the dispenser (5) where the chemical agent is mixed with the water through the channel or piping (4) which connects the chemical agent deposit (3) with the dispenser (5) itself. Subsequently, the fluid is made to pass through the connecting cylinder (6), responsible for comprising the join between the dispenser (5) and the protection-projection screen (7). At this connecting cylinder (6), the fluid accelerates and is projected towards the protection-projection screen (7) itself, forming a water curtain in the shape of a semicircle, with a slight angle of inclination as determined by the shape and design of that screen, which in turn forms an angle of 90° with respect to the supporting surface and where the cited angle may be adjusted using the support and anchorage elements (8), and it is possible to modify the angles of protection of the protection-projection screen (7) with respect to the supporting surface.

[0051] The protection-projection screen (7) lies in a plane which forms an angle (a) rather greater than 90° (between 91° and 120°) with respect to the direction of the connecting cylinder (6), so that when deployed in a horizontal direction, the water curtain or screen generated is projected in a substantially vertical plane with a slight rising inclination outward with respect to the integrated nozzle assembly (15).

[0052] Continuing with what has been said in the preceding paragraph, the warping (7) of the protection-projection screen (7) gives rise to two collateral planes which in one embodiment converge towards the integrated nozzle structure (15), and in another embodiment converge

outwards with respect to the integrated nozzle structure (15).

[0053] On the other hand, in one embodiment, between the connecting cylinder (6) and the protection-projection screen (7), a tubular head (16) with a longitudinal perforation (17) has been inserted, which is fixed at one end to the connecting cylinder (6), while the opposite end of the tubular head (16) has a characteristic outlet mouthpiece comprising the mouth of the cited longitudinal perforation (17), and a conical flange (18) which affects only part of the annular outline of the cited mouth of the longitudinal perforation (17).

[0054] In turn, the outlet mouthpiece is so deployed as to correspond with a tiered front face of the tubular head (16) which possesses an upper part (19a) tucked inwards where the conical flange (18) is located, and a protruding lower part (19b) to which the protection-projection screen (7) is fixed using front screws (20), in such a way that once the protection screen (7) has been fixed in position, between the same and the upper part of the tiered front face, an open grating (21) is formed, through which the water flows to generate the water curtain as it strikes the protection-projection screen (7).

[0055] The angular joint between the two parts (19a) and (19b) on the front face of the tubular head (16) is a first rounded angular joint (22), exactly as is found at the starting points of the ends of the conical flange (18), which comprise a second rounded angular joint (23).

[0056] The passage of water through the flow meter (2) (the water current regulator) can be regulated by turning a lever (24), which has two positions: a first one, which allows passage of a lesser flow, and a second one which allows the passage of a greater flow. In the first position of lesser flow, suction of the chemical agent from the deposit (3) through the conduit or piping (4) is generated, and an anti-return valve is incorporated to prevent the backwash of water in the second position towards the cited deposit (3).

[0057] As can be seen more clearly in figure 4, the flow meter (2) consists of a central passage (25) made up of two conical trunk bodies (26), (27) placed exactly opposite a perforated disc (28) and a coaxial passage (29) laid out around the central passage (25), where part of the water runs through the coaxial passage (29) and also through the perforated disc (28), while the rest of the water runs through the central passage (25). The water current divides on entering the flow meter (2), while at the outlet, the two currents are reunited, running through the connecting cylinder (6) towards the protection-projection screen (7).

[0058] In figure 8, the integrated nozzle (15) incorporating the external compartment (10) which is to house the geolocator is shown, and this is located in correspondence with the upper part of the deposit (3) for the chemical agent forming part of the integrated nozzle (15).

[0059] A fire fighting system has been envisaged, comprising the integrated nozzle (15), a fire fighting vehicle (31), a collective fire shelter (32) and a set of protection

covers (not shown in the figures) for the wheels of the vehicle (31), the invention also including an installation procedure for the fire fighting system.

[0060] An integrated self-protection kit against fires has also been envisaged with the object of maximising the likelihood of survival in the event of entrapment of personnel by fires of forest, industrial, agricultural or interface type, who may be working with a vehicle at the scene of the fire.

[0061] This kit consists of the integrated nozzle (15), the collective fire shelter (32) and the protection covers for the wheels of the vehicle (31).

[0062] The installation procedure must be applied as a last resort, when it is impossible to escape to a zone of safety, and constant evaluation of the behaviour and course of the fire is necessary, observing the safety rules at all times, just as we must assess continuously the degree of risk that a situation of entrapment might occur.

[0063] The installation procedure detailed hereunder is especially designed for tackling situations of risk where people's lives may be at risk in situations of entrapment by forest, urban, industrial, agricultural or interface fires. It is described clearly and simply so as to contribute to the proper training of those personnel who may be affected, so that following a suitable process of instruction, it can be undertaken rapidly and in an orderly and safe way.

[0064] Under no circumstances shall this installation procedure associated to the integrated self-protection kit give rise to any motive for its application in any situations other than that described. As this is an integrated safety kit consisting of different elements, each of the same has different functions in the various fields and sectors of application.

[0065] In its turn, it contains different procedures especially devised and prepared for tackling specific situations within its areas of application and use, such as protection of houses, other property, vehicles, incorporation into fire fighting installations, defence of industrial complexes, housing developments, protection of containers of liquefied, inflammable gases, combustible and inflammable liquids, etc.

[0066] This installation procedure for the fire fighting system is applied in situations of entrapment with vehicles, and is not applicable with other elements or devices other than those reflected in the integrated self-protection kit.

[0067] Entrapment is an extreme situation in which personnel are caught unawares for reasons arising from the behaviour of the fire and the evolution of the risk. It is a situation of a threat to life, in which the safety rules cannot be observed or are inadequate, or in which the escape routes or safe zones are compromised.

[0068] The integrated self-protection kit is a set of elements or devices specially designed, and forming a unified whole, for self-protection and defence of persons and property in situations of extreme risk from entrapment by fires of forest, agricultural, industrial, urban or

interface type.

[0069] The integrated self-protection kit is made up of several safety devices which, when combined in a single space and faced with a single situation of entrapment, constitute a triangle of life which contributes to maximise the likelihood of survival of the people concerned, as well as the protection of the material goods at risk or involved in the entrapment.

[0070] The integrated screen nozzle (15) is devised for self-protection and is made up of different components such as the protection-projection screen (7), flow meter (2) (variable flow regulator), geolocator, chemical agent dispenser (5), chemical agent deposit (3), stabilisation system and incorporating angle regulation for the protection-projection screen (7).

[0071] The collective fire shelter (32) is an enclosure manufactured of a fireproof and impermeable material designed for the protection of persons in situations of extreme danger from entrapment by fires of forest, agricultural, interface, urban or industrial type, and its purpose is to help to minimise the effects of the passage of flames and gases from a fire, so as to raise the likelihood of survival of personnel involved in an emergency. It is fitted with an anti-panic lighting system, individual smoke protection masks, an anchorage system for rapid and easy deployment, a proofing system against gases and flames, and a thermal visor for external visibility. It can optionally incorporate an external temperature probe, a geolocator and a collective autonomous respiration system independent of the outside environment.

[0072] The vehicle wheel protection cover is a thermal protector in the form of a sheath manufactured of a fire-resistant material, easy and rapid to install, flame-resistant and with an outer aluminized, or similar, layer for thermal protection. It is especially manufactured for the protection of tyres exposed to sources of heat from radiation, convection or direct contact. Its purpose is to prevent the tyres of the vehicle wheels from bursting or catching fire as a result of the temperature, protecting them from the source of radiation and preventing the rubber from reaching its flashpoint.

[0073] In the installation procedure, a series of actions are defined which will have to be carried out in an orderly manner to attain the stated objective.

[0074] This procedure is applicable in cases of entrapment and potentially dangerous situations and those derived from situations of risk from fires, directed to fire extinction and emergency services assigned competence in tasks of extinguishing forest, agricultural, industrial and interface (urban - forest) fires.

[0075] This installation procedure for the fire fighting system shall be carried out as a last resort so as to avoid, as far as possible, situations of entrapment which force us to apply the anti-entrapment procedure using the integrated self-protection kit. To this end, all those rules and recommendations in force in relation to health and safety shall be established and complied with, with the aim of avoiding situations of danger of entrapment during

fires, where people's lives and property could be in danger.

[0076] The procedure shall be carried out by performing different actions, to be assigned to the different members comprising the team, so that the execution of the procedure is as rapid as possible.

[0077] The integrated self-protection kit is housed in a locker (33) of the vehicle (31), easy to access and duly marked with the sign S.O.S., so that it can be located, and the associated procedure for action carried out, rapidly, so as to tackle situations of entrapment by fire.

[0078] The actions required of the different members (users) of the team might need to be performed with different configurations, depending on how many persons are involved in carrying out the procedure.

[0079] The actions detailed hereunder, which form part of the procedure established, are configured in the form of steps to be taken, with execution by only two persons (driver of fire fighting pumper and assistant), so as to secure the procedure, given that only two persons comprise the crew of a pumper in reality. In a different situation where there could be more team members, this would call for new personalized configurations and specific training.

[0080] The phases or actions of the fire fighting system installation procedure are the following:

- Avoid undertaking the self-protection manoeuvre at critical points where the fire might evolve violently (elevated places, potential runs, alignments, etc.).
- If at all possible, attempt to conduct the manoeuvre upon natural or artificial protective barriers. Never place the vehicle beneath power lines which might place our lives in danger from electrocution.
- As far as possible, and if the time and conditions permit, position the vehicle in a place free of vegetation with the idea of reducing the effects of the passage of the fire due to lack of fuel, so contributing to facilitate the location of the integrated nozzle (15), as well as the deployment of the collective fire shelter (32).

[0081] The vehicle (31) shall be so positioned that the side opposite to the location of its fuel deposit is facing the advancing fire front, describing a line parallel to the advance of the fire, if possible. Should this be impossible, endeavour to ensure that one of its faces (sides or ends) is as closely oriented as possible facing the advance of the fire, where the triangle of life shall be established by the installation.

[0082] Next, the driver of the vehicle (31) shall proceed to put it into service and operation, activating lights and other visual and acoustic signals. Then, put the fire fighting pump into operation by connecting it to its energy supply. Subsequently, vacate the vehicle cabin, closing doors and windows.

[0083] Next, the driver goes behind the vehicle (31) and proceeds to open the water feeder valve (Tank - Pump), and then ensures that high pressure has been selected by checking the correct positioning of a second valve to select the pressure stage (high or low) on those vehicles fitted with the same, and proceeds to close a third valve which permits the return of water (Pump - Tank).

[0084] Once these actions have been performed, they shall go to the locker (33) of the vehicle (31) where the integrated self-protection kit marked with the sign (S.O.S) is stored. They shall install the cited kit, proceeding first to place the thermal protection covers over those wheels exposed directly to the advance of the fire.

[0085] Next, they proceed to take the collective fire shelter (32), with its Initial deployment upon the part of the vehicle facing the advancing fire front, placed on the ground, with its aluminized part facing upwards and with certain deployment markings indicating the direction of arrival of the fire front. The combination and configuration of the nozzle (15), shelter (32) and vehicle (31) constitute what we call the "triangle of life".

[0086] Finally, the driver shall return to the pump and make sure that one end connector of the hose (34) emerging from the installation which supplies water to the nozzle (15), is perfectly connected to the impulsion pump collector outlet, which action will previously have been performed by the driver's assistant. Once this has been checked, the water valve will be opened, and the pump revolutions increased until the pump pressure of 10 to 50 bars is reached, entailing minimum pressure of 14 bars at the tip of the integrated nozzle. In the event that there are no pressure gauges in working order, the alternative shall be to establish the maximum possible pump pressure (maximum revolutions).

[0087] Immediately, they shall go to the shelter (32), where the driver's assistant shall already be awaiting their collaboration for the proper location and deployment of the shelter (32).

[0088] The actions to be carried out by the driver's assistant are the following:

They get down from the vehicle (31), making sure to close door and window, and then go immediately to the locker on the vehicle (31) marked with the S.O.S. sign, to locate the integrated nozzle (15) safety equipment and activate its geolocator by pressing its S.O.S. button.

[0089] Next, the assistant places the integrated nozzle (15) between two and four metres from the vehicle (31), taking as reference that side of the vehicle (31) facing the advancing fire front, and placing the same upon its centre (making this correspond with the side where the collective fire shelter and protection covers are), ensuring correct positioning of the integrated nozzle (15) and proceeding to open the valve for the chemical agent contained in the deposit (3) of the nozzle (15).

[0090] Next, the working flow is selected on the basis of the availability of water in the tank, a first position being selected when the vehicle tank contains less than 3000 litres, and a second position when the tank has more than 3000 litres.

[0091] In the next phase, they should take the hose (34), connecting one of its end connectors to the high-pressure impulsion pump collector outlet and the other end duly connected to the integrated nozzle (15).

[0092] The deployment of the installation shall be performed on the side of the vehicle (31) and right beside it in the supposed case of having placed the integrated nozzle (15) at the front of the vehicle (31); it was placed at the rear part (pump) or else at one of the sides, the installation shall be deployed by passing it underneath the vehicle, with the object of protecting the installation and avoiding kinks which could render the passage of water difficult.

[0093] Next, the driver's assistant goes to the collective fire shelter (32), which will have been previously deployed by the driver, placing themselves at one of the sides and, with the help of their colleague, who will be positioned at the opposite end, they proceed to install it against one face of the vehicle, while maintaining the aluminized part facing upwards. At that moment, they proceed to erect the shelter (32) by entering into its ends, placing their feet on the lower anchorage points and their hands on the upper anchorage points.

[0094] The bodies of the driver and their assistant shall remain standing and, with the interior of the shelter over their shoulders, in such a way that the shelter is fully opened and they can facilitate its proper deployment on the ground.

[0095] Once the feet and hands of the driver and assistant are on the anchorage points, they shall proceed to kneel on the ground and, in unison, proceed to strike forward with your arms, while they sink to the ground. Once in that position and on the ground, they proceed to ensure the perfect deployment of the shelter by extending their arms and legs completely.

[0096] Next, they proceed to activate the chemical lighting inside the shelter and proceed to don the respiratory protection masks, remain calm and attempt to control their breathing. Subsequently, they proceed to open the autonomous respiration system fitted inside the shelter.

[0097] From the interior, and using the thermal screen, they shall monitor the evolution and condition of the passage of the fire front, so that they can have real-time information about what is going on outside. In those models fitted with an outside thermometer, they will be able to read the temperature in real time.

[0098] They should not leave the shelter until they are certain that the environmental conditions outside are optimal for the survival of human beings.

[0099] The installation procedure for the fire fighting system with pumper and the presence of terrestrial or air-transported brigades is the following:

In this case, the actions assigned to the driver of the vehicle and their assistant shall be the same as those described before, with the exception of those related to the deployment of the shelter, which shall be the responsibility of the brigades attached to the vehicle, following prior instruction and training.

[0100] The latter shall be responsible for finding the shelter and deploying it, this being performed exactly as described before.

[0101] After prior instruction and training, they shall maintain the shelter prepared and remain kneeling on the ground, awaiting the entrance of the driver's assistant and the driver, the last-named being responsible for putting the collective fire shelter (32) into operation, and who, having checked the optimum working pressure, shall proceed to enter the shelter (32).

[0102] In the case of a pumper (31), terrestrial brigades and 2 light vehicles (30), the actions to be performed shall be common with those specified above, with the exception of positioning the light vehicles (30) with respect to the pumper (31). There are two possible configurations:

- Pumper with one of its sides facing the advancing fire front.
- Pumper with its front or rear facing the advancing fire front.

[0103] Finally, with respect to the installation procedure, it should be pointed out that all personnel involved in the entrapment by a fire shall enter inside the shelter (32), in such a way that should the number of persons exceed its capacity, a further shelter (32) shall be deployed in the place established to prevent direct exposure of the personnel to the fire front.

Claims

1. Integrated screen nozzle for self-protection, which being devised for the creation of an integrated safety zone and designed for self-protection, the protection and safeguarding of persons and property in situations of risk, derived from entrapment in fire emergencies of all kinds: forest, interface, agricultural, urban and industrial, is **characterised by** the fact that it comprises a connector (1) for coupling to the corresponding supply of water for extinction, and next to which connector (1) there lies a flow meter (2) which measures the flow of fluid, followed by a dispenser (5) of chemical agents (retardant or humectant), connected, via a conduit (4) to the corresponding deposit (3) containing the chemical agent, and there lying next to the dispenser (5) a connecting tube (6) between the same and a protection-projection screen (7), of semicircular configuration and with

a slight warping (7), complemented with some anchorage points (8) for support upon the ground, these anchorage points (8) being adjustable in height so as to allow the angle of projection of the fluid (water) to be changed and oriented, with respect to the horizontal plane of the ground, with the particular feature that upon the chemical agent deposit (3), there are included externally a support (12) which, at its upper part, forms a handle (13), the cited deposit (3) including in its upper part a lid (9) for closure, as well as housing (10) for a GPS geolocator.

2. Integrated screen nozzle for self-protection according to claim 1, **characterised by** the fact that it includes a pressure gauge (14) as a measuring element for the pressure at the tip of the nozzle (15).

3. Integrated screen nozzle for self-protection according to the foregoing claims, **characterised by** the fact that the chemical agent deposit (3), as well as the remaining elements, including the anchorage support (12) and conduit (4) of connection between the deposit (3) and the dispenser (5) may be made of plastic, metal or another suitable material.

4. Integrated screen nozzle for self-protection according to the foregoing claims, **characterised by** the fact that the chemical agent deposit (3) is fixed using screws (11).

5. Integrated screen nozzle for self-protection according to the foregoing claims, **characterised by** the fact that between the flow meter (2) which measures the water current and the projection-projection screen (7), there lies a connecting cylinder (6) with reduction of internal diameter to raise the speed of the fluid towards the protection-projection screen (7).

6. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that the protection-projection screen (7) lies in a plane which forms an angle (a) rather greater than 90° (between 91° and 120°) with respect to the direction of the connecting cylinder (6), so that when deployed in a horizontal direction, the water curtain or screen generated is projected in a substantially vertical plane with a slight rising inclination outward with respect to the integrated nozzle assembly (15).

7. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that:

- between the connecting cylinder (6) and the protection-projection screen (7), a tubular head (16) with a longitudinal perforation (17) has been inserted, which is fixed at one end to the con-

necting cylinder (6), while the opposite end of the tubular head (16) has a characteristic outlet mouthpiece comprising the mouth of the cited longitudinal perforation (17), and a conical flange (18) which affects only part of the annular outline of the cited mouth of the longitudinal perforation (17).

- the outlet mouthpiece is so deployed as to correspond with a tiered front face of the tubular head (16) which possesses an upper part (19a) tucked inwards where the conical flange (18) is located, and a protruding lower part (19b) to which the protection-projection screen (7) is fixed using front screws (20).

- where once the protection-projection screen (7) is fixed, between the same and the upper part of the tiered front face (19a), an open grating (21) is formed, through which the water flows.

8. Integrated screen nozzle for self-protection, according to claim 7, **characterised by** the fact that:

- the angular joint between the two parts (19a) and (19b) on the front face of the tubular head (16) comprises a first rounded angular joint (22);

- the starting points of the ends of the conical flange (18) comprise a second rounded angular joint (23).

9. Fire fighting kit, characterised by the fact that it consists of an integrated self-protection assembly formed by the integrated screen nozzle (15) described in any of the foregoing claims, a collective fire shelter (32) and a set of protection covers (31) for the wheels of a fire fighting vehicle.

10. Fire fighting system, characterised by the fact that it comprises:

- the integrated screen nozzle (15) described in any of the foregoing claims 1 to 8;

- a fire fighting vehicle (31) fitted with a hose (34) through which water under pressure circulates and to which the integrated screen nozzle (15) is connected, where the water current, fed by a tank, is driven by an impulsion pump;

- a collective fire shelter (32), which is fireproof and impermeable;

- a set of wheel protection covers for a fire fighting vehicle (31), which are fireproof and impermeable, where the integrated nozzle (15), collective fire shelter (32) and vehicle (31) together comprise a triangle of life, when the collective fire shelter (32) is placed between the vehicle (31) and the integrated nozzle (15).

11. Fire fighting system, according to the preceding claim, **characterised by** the fact that the hose (34)

through which water under pressure circulates has an inner diameter of between 20 and 70 mm, and length between 10 and 20 m, where these dimensions optimise the performance of the impulsion pump.

12. Fire fighting system, according to any of the foregoing claims, **characterised by** the fact that the impulsion pump pressure is bounded between 10 and 50 bars, with a minimum pressure of 14 bars at the tip of the integrated screen nozzle (15).

13. Installation procedure for the fire fighting system, undertaken with the system described in any of the foregoing claims 10 - 12, **characterised by** the fact that it comprises the following phases:

- establish the triangle of life by positioning the fire fighting vehicle (31) in a specific area of the territory affected by a fire;

- select high water pressure by opening a first water feeder valve by checking the correct positioning of a second valve to select the pressure stage (high or low) on those vehicles fitted with the same, and proceed to close a third valve which permits the return of water to the tank.

- protect at least those wheels of the vehicle (31) directly exposed to the advance of the fire using the wheel protection covers;

- initial deployment of the collective fire shelter (32) upon the part of the vehicle facing the advancing fire front, where the collective fire shelter (32) is placed on the ground, with an aluminized part facing upwards and with certain deployment markings indicating the direction of arrival of the fire front;

- connect the integrated screen nozzle (15) to the hose (34), where the integrated nozzle (15) is positioned at a distance from a part of the vehicle (31) facing the advancing fire front;

- open a water valve to feed the hose (34) and the integrated screen nozzle (15);

- activate the GPS geolocator by pressing its S.O.S. button;

- open a valve to allow passage of the chemical agent contained in the deposit (3) of the integrated screen nozzle (15);

- place the collective fire shelter against one face of the vehicle (31), maintaining the aluminized part facing upwards, at which moment the collective fire shelter (32) is erected by the ingress of users into its inner ends, positioning their feet on the lower anchorage points and their hands on the upper anchorage points;

- deploy the collective fire shelter (32) completely by securing the upper anchorage points associated to the hands of the users and other lower anchorage points associated to the feet of the

users, corresponding to the ground supporting the collective fire shelter (32);

- ensure the perfect deployment of the lower part of the collective fire shelter (32) employing the arms and legs of the users laid or stretched upon the ground;

- activate the chemical lights inside the collective fire shelter (32), proceed to don respiratory protection masks and then proceed to open an autonomous respiration system installed inside the collective fire shelter (32);

14. Installation procedure for the fire fighting system, according to claim 13, **characterised by** the fact that the integrated screen nozzle (15) is situated at a distance of between 2 and 4 metres from the fire fighting vehicle (31).

15. Installation procedure for the fire fighting system, according to either of the foregoing claims 13 or 14, **characterised by** the fact that the fire fighting vehicle (31) shall be so positioned that the side opposite to the location of its fuel deposit is facing the advancing fire front, describing a line parallel to the advance of the fire, whereby the triangle of life is established on the cited side of the fire fighting vehicle (31).

Amended claims under Art. 19.1 PCT

1. Integrated screen nozzle for self-protection, which being devised for the creation of an integrated safety zone and designed for self-protection, the protection and safeguarding of persons and property in situations of risk, derived from entrapment in fire emergencies of all kinds: forest, interface, agricultural, urban and industrial, is **characterised by** the fact that it comprises a connector (1) for coupling to the corresponding supply of water for extinction, and next to which connector (1) there lies a flow meter (2) which measures the flow of fluid, followed by a dispenser (5) of chemical agents (retardant or humectant), connected, via a conduit (4) to the corresponding deposit (3) containing the chemical agent, and there lying next to the dispenser (5) a connecting tube (6) between the same and a protection-projection screen (7), of semicircular configuration and with a slight warping (7), complemented with some anchorage points (8) for support upon the ground, these anchorage points (8) being adjustable in height so as to allow the angle of projection of the fluid (water) to be changed and oriented, with respect to the horizontal plane of the ground, with the particular feature that upon the chemical agent deposit (3), there are included externally a support (12) which, at its upper part, forms a handle (13), the cited deposit (3) including in its upper part a lid (9) for closure,

as well as housing (10) for a GPS geolocator.

2. Integrated screen nozzle for self-protection, according to claim 1, **characterised by** the fact that it includes a pressure gauge (14) as a measuring element for the pressure at the tip of the nozzle (15).

3. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that the chemical agent deposit (3), as well as the remaining elements, including the anchorage support (12) and conduit (4) of connection between the deposit (3) and the dispenser (5) may be made of plastic, metal or another suitable material.

4. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that the chemical agent deposit (3) is fixed using screws (11).

5. Integrated screen nozzle for self-protection according to any of the foregoing claims, **characterised by** the fact that between the flow meter (2) which measures the water current and the protection-projection screen (7), there lies a connecting cylinder (6) with reduction of internal diameter to raise the speed of the fluid towards the protection-projection screen (7).

6. Integrated screen nozzle for self-protection, according to any of the foregoing claims, is **characterised by** the fact that the protection-projection screen (7) lies in a plane which forms an angle (a) rather greater than 90° (between 91° and 120°) with respect to the direction of the connecting cylinder (6), so that when deployed in a horizontal direction, the water curtain or screen generated is projected in a substantially vertical plane with a slight rising inclination outward with respect to the integrated nozzle assembly (15).

7. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that:

- between the connecting cylinder (6) and the protection-projection screen (7), a tubular head (16) with a longitudinal perforation (17) has been inserted, which is fixed at one end to the connecting cylinder (6), while the opposite end of the tubular head (16) has a characteristic outlet mouthpiece comprising the mouth of the cited longitudinal perforation (17), and a conical flange (18) which affects only part of the annular outline of the cited mouth of the longitudinal perforation (17).
- the outlet mouthpiece is so deployed as to cor-

respond with a tiered front face of the tubular head (16) which possesses an upper part (19a) tucked inwards where the conical flange (18) is located, and a protruding lower part (19b) to which the protection-projection screen (7) is fixed using front screws (20);
 - where once the protection-projection screen (7) is fixed, between the same and the upper part of the tiered front face (19a), an open grating (21) is formed, through which the water flows.

8. Integrated screen nozzle for self-protection, according to claim 7, **characterised by** the fact that:

- the angular joint between the two parts (19a) and (19b) on the front face of the tubular head (16) comprises a first rounded angular joint (22);
- the starting points of the ends of the conical flange (18) comprise a second rounded angular joint (28);

9. Integrated screen nozzle for self-protection, according to any of the foregoing claims, **characterised by** the fact that its water feeding and supply source is a fire fighting pumper.

10. Integrated screen nozzle for self-protection, according to any of the claims 1 to 8, **characterised by** the fact that its water feeding and supply source is a mobile or fixed source of water under pressure.

11. integrated screen nozzle (15), characterised by the fact that it comprises an integrated self-protection assembly comprising the integrated screen nozzle (15), a fireproof, impermeable, collective fire shelter (32) and a set of thermal wheel protection covers for a fire fighting vehicle (31).

12. Fire fighting system, characterised by the fact that it comprises:

- the integrated screen nozzle (15) described in claims 1 to 10;
- a fire fighting vehicle (31) which acts as a source of water under pressure and which is fitted with a hose (34) through which water under pressure circulates and to which the integrated screen nozzle (15) is connected, where the water current, fed by a tank, is driven by an impulsion pump;
- a collective fire shelter (32), which is fireproof and impermeable;
- a set of wheel protection covers for a fire fighting vehicle (31), which are fireproof and impermeable, where the integrated nozzle (15), collective fire shelter (32) and vehicle (31) together comprise a triangle of life, when the collective fire shelter (32) is placed between the vehicle

(31) and the integrated nozzle (15).

13. Fire fighting system, according to claim 12, **characterised by** the fact that the hose (34) through which water under pressure circulates has an inner diameter of between 20 and 70 mm. Its length also lies between 10 and 20 m, where these dimensions optimise the performance of the impulsion pump.

14. Fire fighting system, according to claims 12 or 13, **characterised by** the fact that the impulsion pump pressure is bounded between 10 and 50 bars, with a minimum pressure of 14 bars at the tip of the integrated screen nozzle (15).

15. Installation procedure for the fire fighting system, undertaken with the system described in claims 12 - 14, **characterised by** the fact that it comprises the following phases:

- establish the triangle of life by positioning the fire fighting vehicle (31) in a specific area of the territory affected by a fire;
- select high water pressure by opening a first water feeder valve by checking the correct positioning of a second valve to select the pressure stage (high or low) on those vehicles fitted with the same, and proceed to close a third valve which permits the return of water to the tank;
- protect at least those wheels of the vehicle (31) directly exposed to the advance of the fire using the wheel protection covers;
- initial deployment of the collective fire shelter (32) upon the part of the vehicle facing the advance of the fire, where the collective fire shelter (32) is placed on the ground, with an aluminized part facing upwards and with certain deployment markings indicating the direction of arrival of the fire front;
- connect the integrated screen nozzle (15) to the hose (34), where the integrated nozzle (15) is positioned at a distance from a part of the vehicle (31) facing the advancing fire front;
- open a water valve to feed the hose (34) and the integrated screen nozzle (15);
- activate the GPS geolocator by pressing its S.O.S. button.
- open a valve to allow passage of the chemical agent contained in the deposit (3) of the integrated screen nozzle (15).
- place the collective fire shelter against one face of the vehicle (31), maintaining the aluminized part facing upwards, at which moment the collective fire shelter (32) is erected by the ingress of users into its inner ends, positioning their feet on the lower anchorage points and their hands on the upper anchorage points.
- deploy the collective fire shelter (32) complete-

ly by securing the upper anchorage points associated to the hands of the users and other lower anchorage points associated to the feet of the users, corresponding to the ground supporting the collective fire shelter (32);

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- ensure the perfect deployment of the lower part of the collective fire shelter (32) employing the arms and legs of the users laid or stretched upon the ground.

- activate the chemical lights inside the collective fire shelter (32), proceed to don respiratory protection masks and then proceed to open an autonomous respiration system installed inside the collective fire shelter (32);

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16. Installation procedure for the fire fighting system, according to claim 15, **characterised by** the fact that the integrated screen nozzle (15) is situated at a distance of between 2 and 4 metres from the fire fighting vehicle (31).

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17. Installation procedure for the fire fighting system, according to claims 16 or 16, **characterised by** the fact that the fire fighting vehicle (31) shall be so positioned that the side opposite to the location of its fuel deposit is facing the advancing fire front, describing a line parallel to the advance of the fire, whereby the triangle of life is established on the cited side of the fire fighting vehicle (31).

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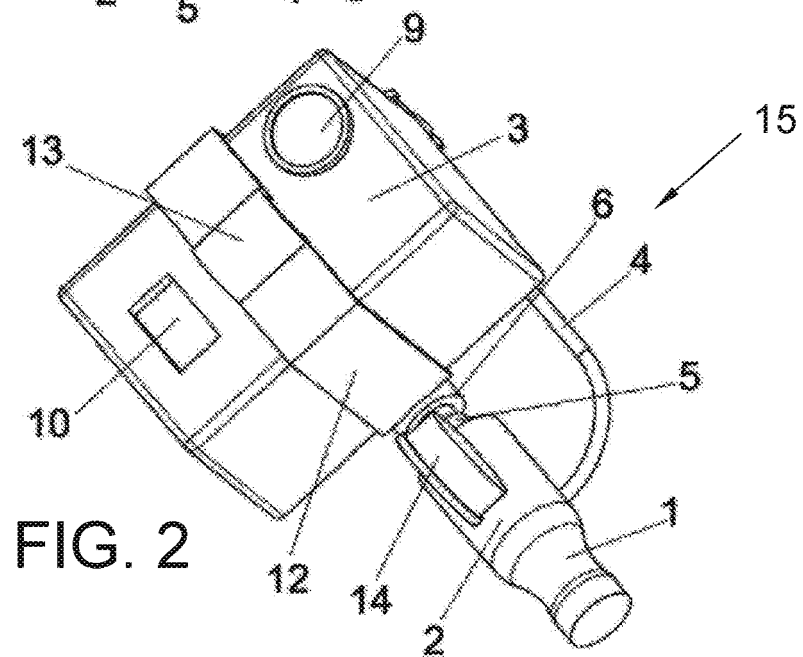
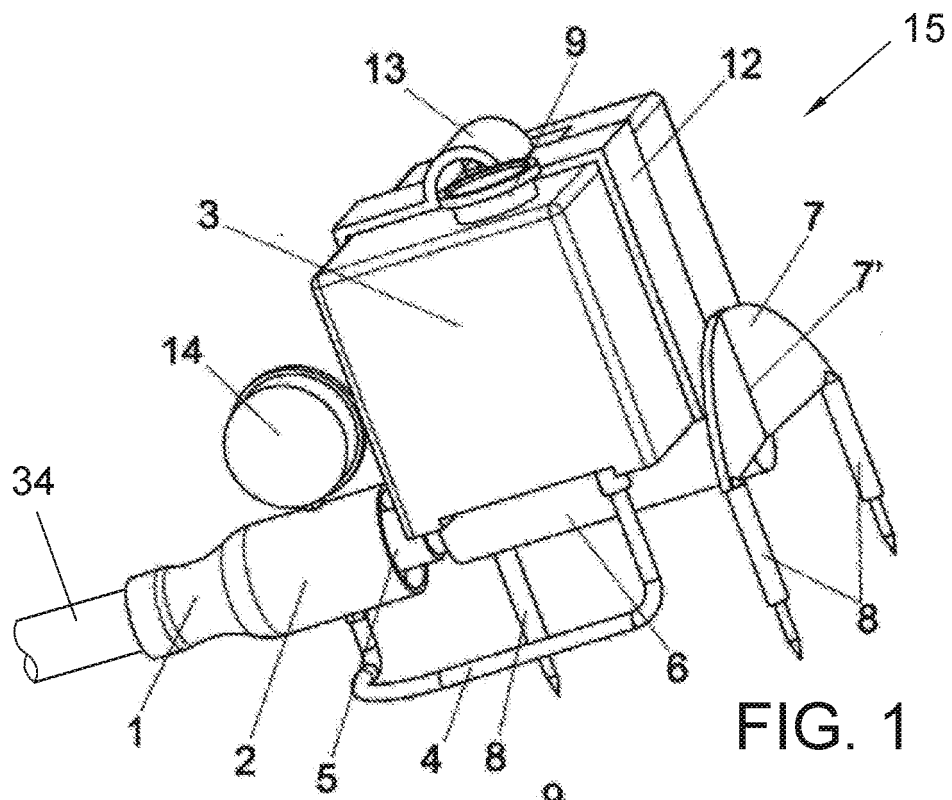
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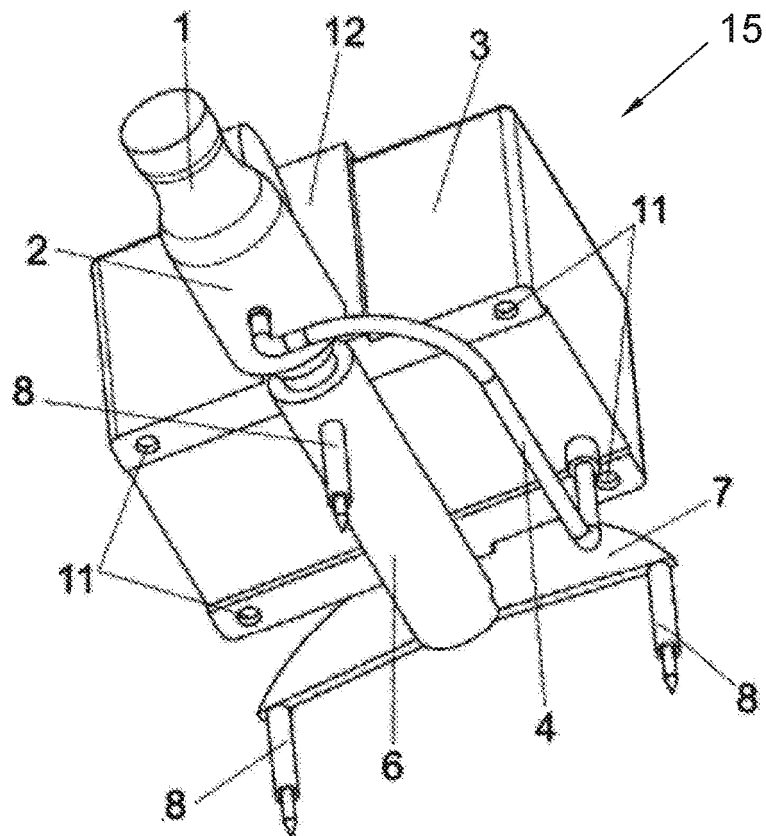


FIG. 3

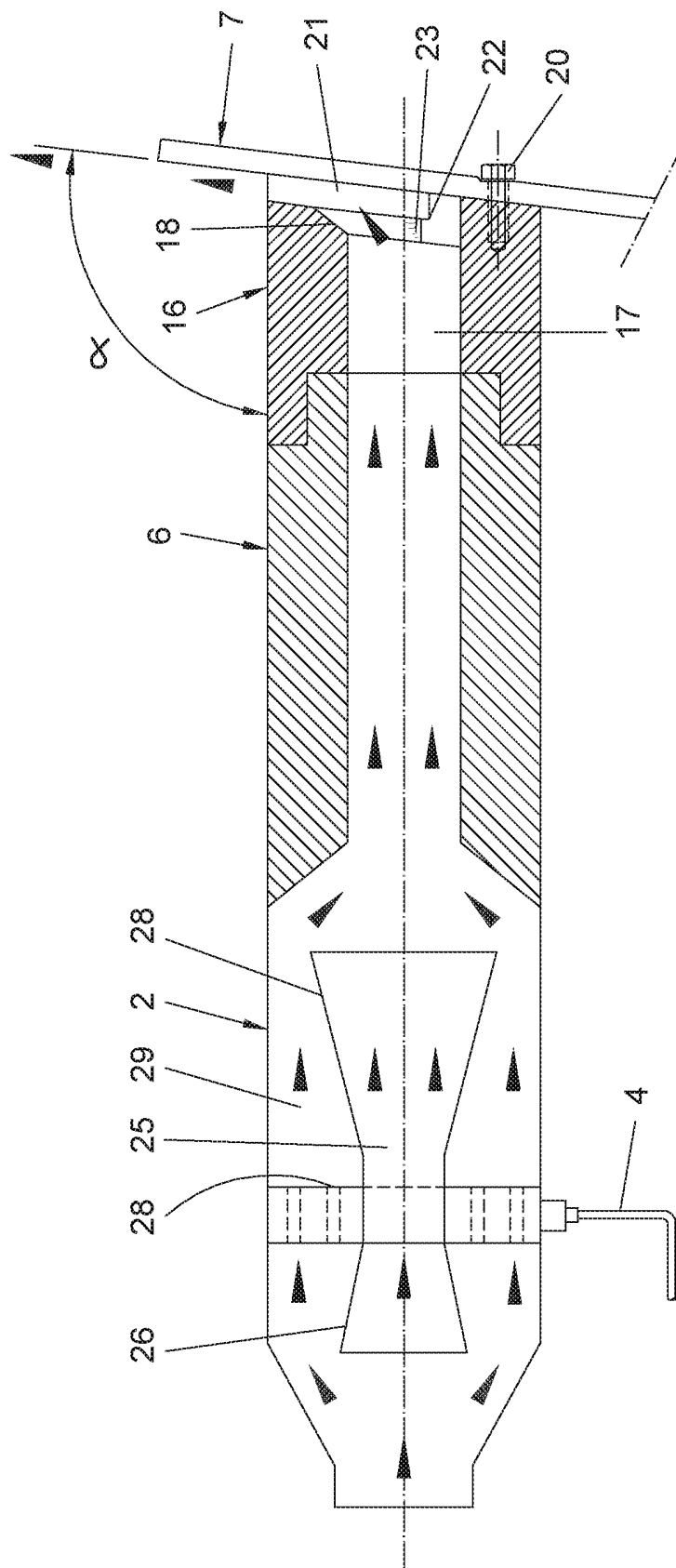
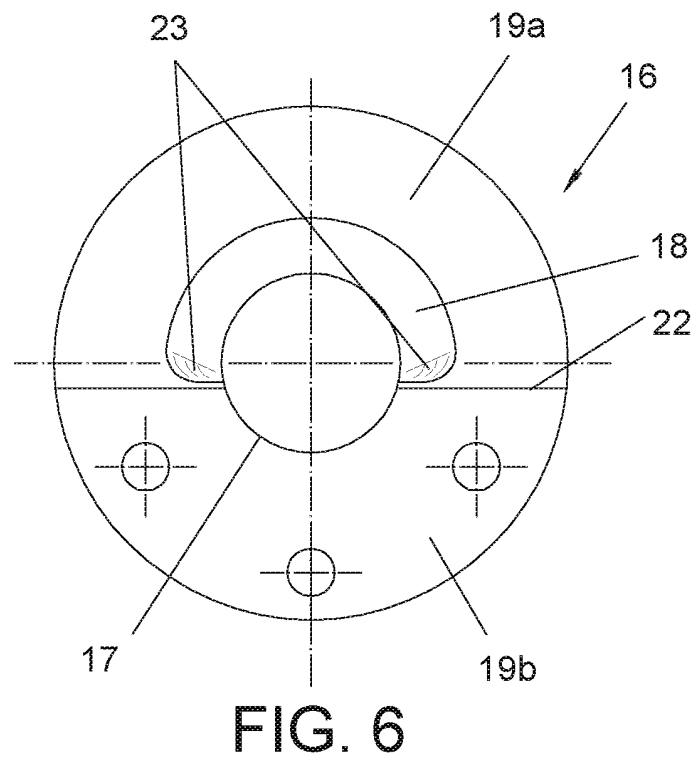
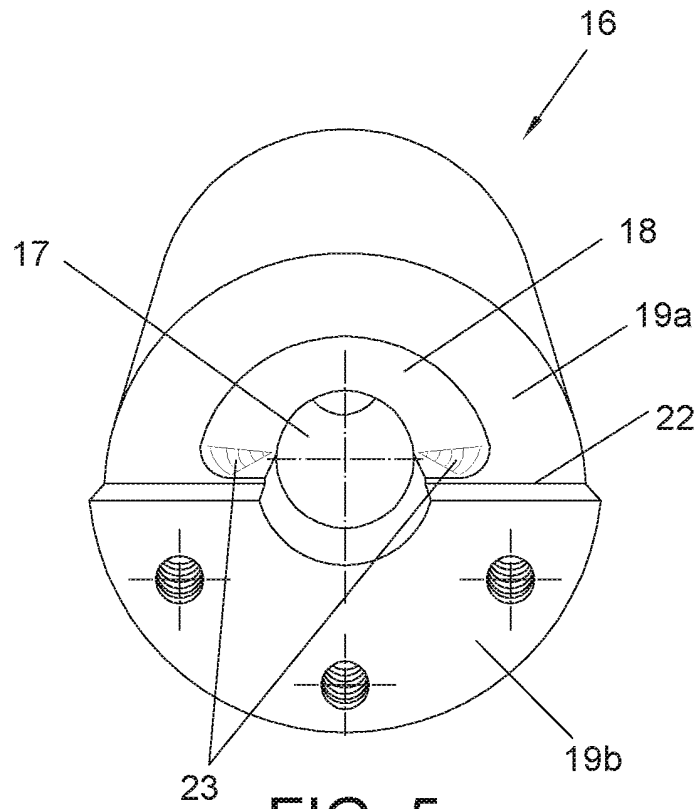
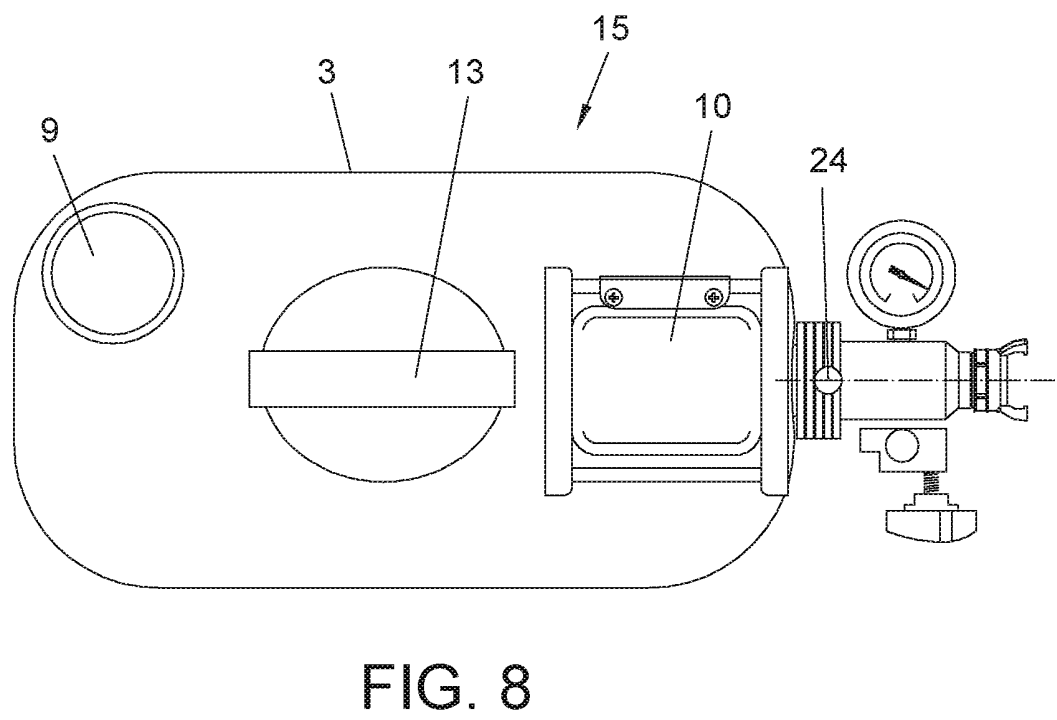
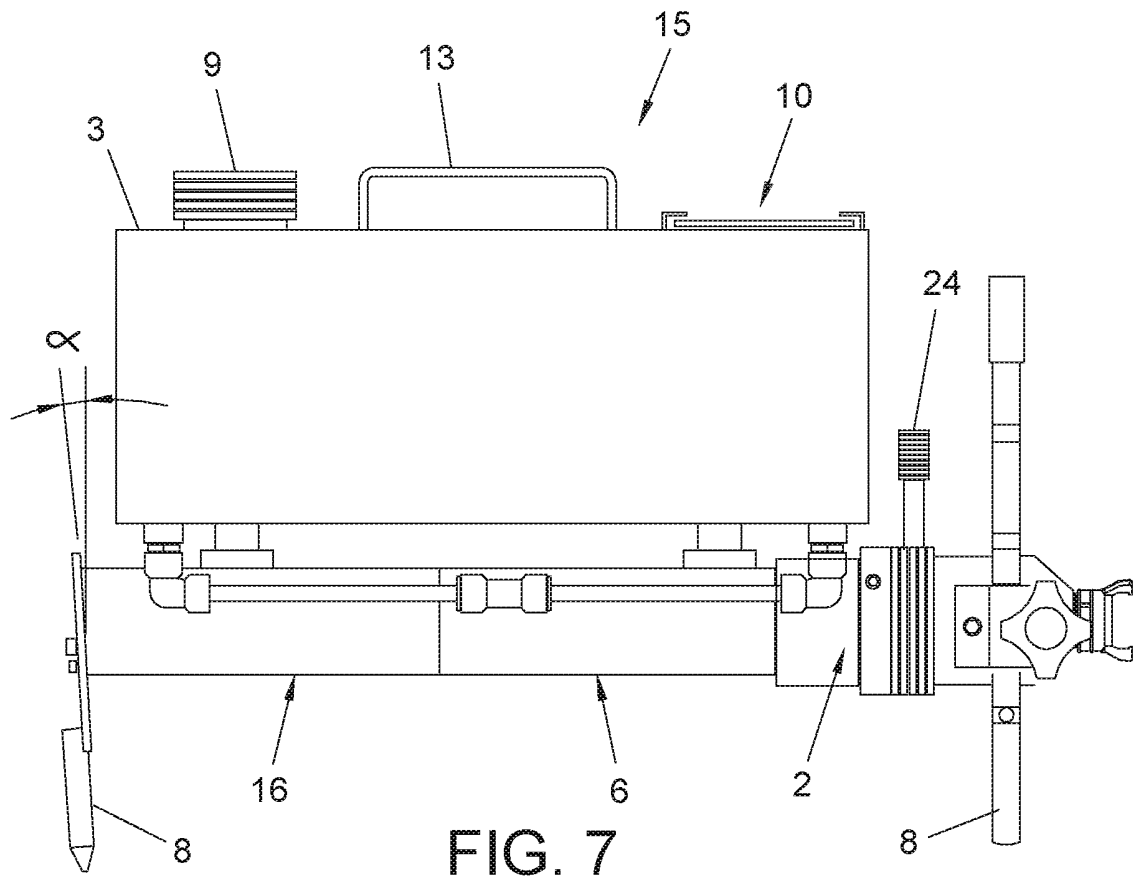
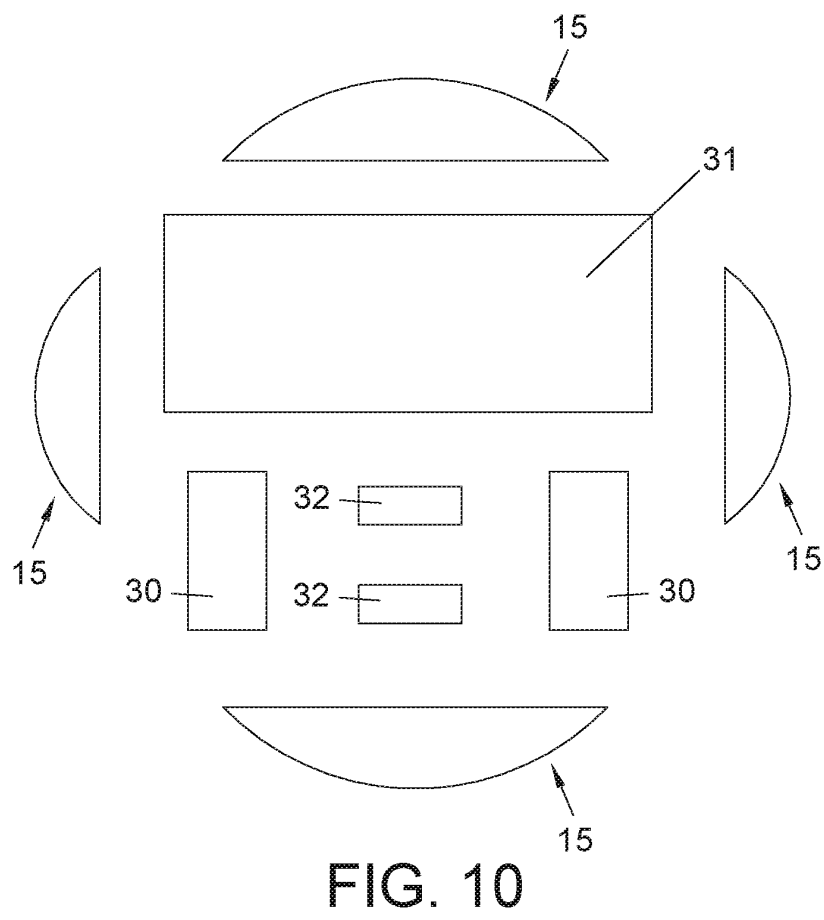
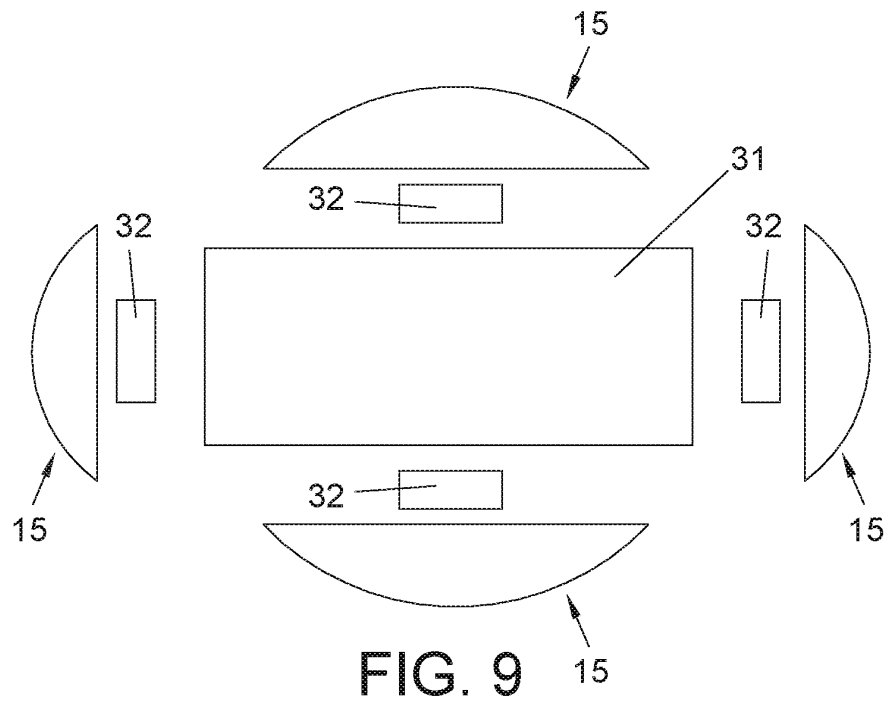


FIG. 4







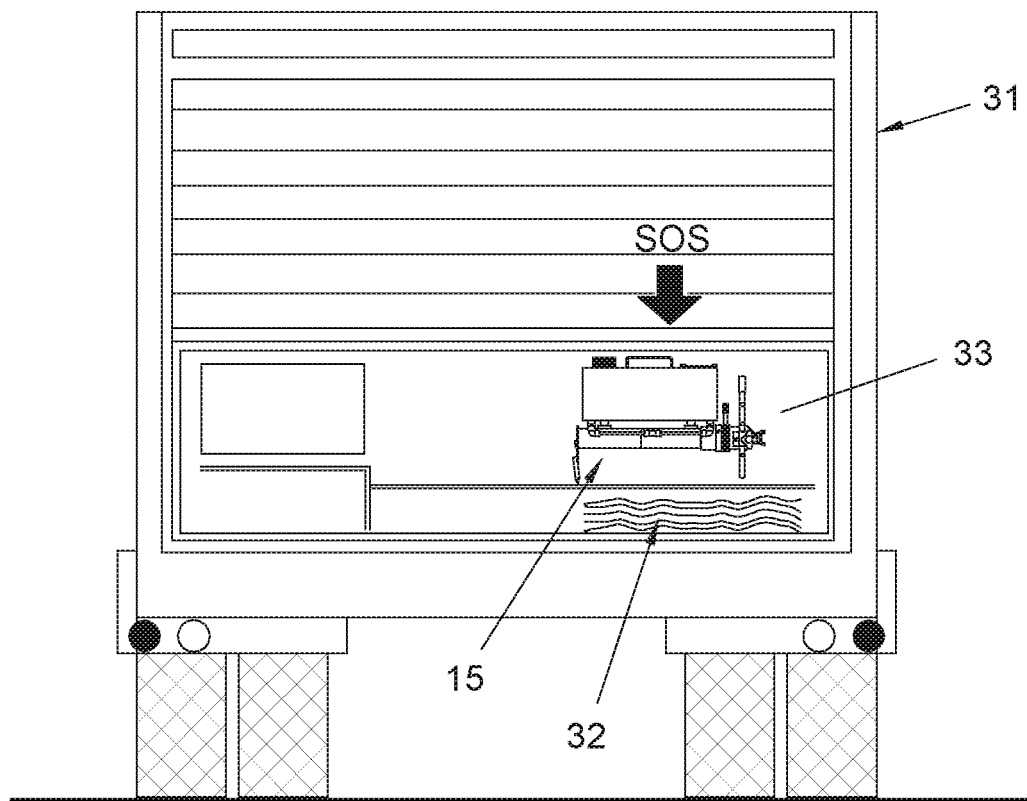


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2014/070901

A. CLASSIFICATION OF SUBJECT MATTER

A62C3/02 (2006.01)

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)

A62C

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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 203280942U U (SUN SHIQING) 13/11/2013, Figures & abstract from DataBase EPODOC. Retrieved in EPOQUE; AN- CN-201320137095-U	1, 9, 13
A	CN 202355738U U (HENAN HIGH POWER SPECIAL ELECTROMECHANICAL MANUFACTURE CO LTD) 01/08/2012, Figures & abstract from DataBase EPODOC. Retrieved in EPOQUE; AN- CN-201120434047-U	1, 9, 13

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

04/02/2015

Date of mailing of the international search report

(06/02/2015)

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070901

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	CN 2124724U U (STATE QINGYUAN MAN NATIONAL AU) 16/12/1992, Figures & abstract from DataBase EPODOC. Retrieved in EPOQUE; AN- CN-92216212-U	1, 9, 13
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2014/070901

Information on patent family members

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REFERENCES CITED IN THE DESCRIPTION

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- WO P9601895 A [0006]