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(54) **NOZZLE STRUCTURE USED FOR FIRE-FIGHTING, AND HELICOPTER PLATFORM FIRE-FIGHTING SYSTEM**

(57) The present application discloses a nozzle structure for fire fighting and a helicopter platform fire-fighting system, comprising an outer pipe body and an annular cover; an upper part of the outer pipe body is provided with an annular flanging; an inner pipe body is inserted inside the outer pipe body, with a lower end of the inner pipe body being open and an upper end being provided with an upper orifice; the inner pipe body is capable of sliding up and down inside the outer pipe body; the annular cover is provided on the upper part of the outer pipe body and is sleeved on the upper end of the inner pipe body; a water outflow loop is formed between the inner pipe body and the outer pipe body and between the annular flanging of the outer pipe body and the annular cover.

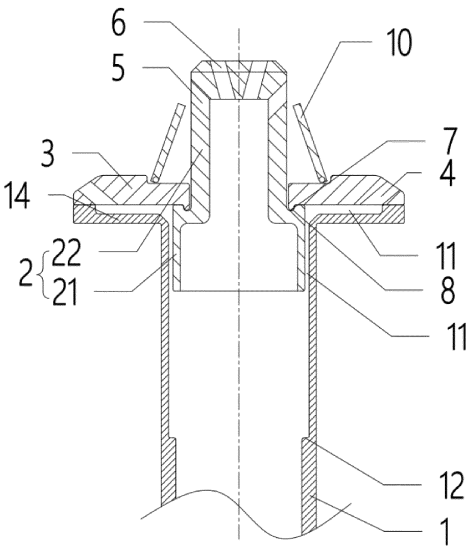

FIG. 2

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Description

TECHNICAL FIELD

[0001] The present application relates to the technical field of nozzle structures, and more particularly to a nozzle structure for fire fighting and a helicopter platform fire-fighting system.

BACKGROUND

[0002] Helicopters are the only fast vehicles for vessels operating on offshore platforms or during operations. As a helicopter takeoff and landing facility, commonly referred to as a helicopter deck or helicopter platform (hereinafter referred to as a helicopter platform), it is a transportation station that must be equipped on various offshore platforms and vessels. It is also a necessary passage for various offshore platforms and vessels to commute, evacuate in an emergency manner and replenish themselves.

[0003] According to the requirements of the International Civil Aviation Organization (ICAO), the helicopter platforms on land and vessels need to be equipped with fire-fighting systems. The traditional fire-fighting systems include two or more fixed fire monitors. However, the coverage of fire monitors is greatly affected by the wind. In addition, ICAO recommends the use of foam as a fire-fighting medium. However, the foam liquid itself contains chemical substances, which may cause environmental pollution. In addition, the foam may only be scrapped and replaced with new foam after the expiry date of foam.

[0004] In the prior art, the fire-fighting system is provided with a spraying device having a simple structure, a narrow spraying range and a poor atomization effect, resulting in a poor fire extinguishing effects. When the helicopter landing causes oil leakage accidents and fire, it needs a long time for the existing spraying devices to extinguish the fire, resulting in large losses. In order to achieve full fire-fighting coverage for the helicopter platform, it is necessary to provide multiple spray heads on the platform, and each spray head needs to have a large three-dimensional coverage, which cannot be achieved by the current common fire spray head.

SUMMARY

[0005] In view of the deficiencies of the prior art, the present application provides a nozzle structure for fire fighting and a helicopter platform fire-fighting system, which may perform all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and may extinguish the fire in a short time.

[0006] The technical solution of the present application for solving the above-mentioned technical problem is as follows.

[0007] A nozzle structure for fire fighting on a helicopter deck comprises an outer pipe body and an annular cover; an upper part of the outer pipe body is provided with an annular flanging; an inner pipe body is inserted inside the outer pipe body, with a lower end of the inner pipe body being open and an upper end being provided with an upper orifice; the inner pipe body is capable of sliding up and down inside the outer pipe body; the annular cover is provided on the upper part of the outer pipe body and is sleeved on the upper end of the inner pipe body; a water outflow loop is formed between the inner pipe body and the outer pipe body and between the annular flanging of the outer pipe body and the annular cover; and the annular cover is further provided with a lower orifice communicating with the water outflow loop.

[0008] The nozzle structure of the above-mentioned technical solution is used on the helicopter deck. When oil leakage occurs during a helicopter landing accident and a fire is caused, a high-pressure pump draws seawater and connects the seawater to an outer pipe body through a pipe network. After the seawater is connected, the seawater entering the bottom of the inner pipe body from the bottom of the outer pipe body of the nozzle may be sprayed upwards through an upper orifice so as to extinguish the fire on the helicopter platform. At the same time, the inner pipe body may move upwards under the impact pressure of seawater, so that the bottom of the outer pipe body communicates with the water outflow loop and the lower orifice on the annular cover. Then the seawater is sprayed from the lower orifice through the water outflow loop from the bottom of the outer pipe body, and quickly spreads on the helicopter platform for fire extinguishing. When the inner pipe body rises to abut against the annular cover, the inner pipe body no longer continues to rise. The seawater is continuously sprayed from the upper orifice and the lower orifice, may be sprayed to a relatively high height from the upper orifice, and sprayed to a larger radiation surface along the platform from the lower orifice, so as to achieve all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and extinguish the fire in a short time. In addition, the use of seawater as a medium to replace foam fire control reduces equipment costs and post-maintenance costs and avoids environmental pollution caused by the foam.

[0009] Further, an inner ring platform is provided at the lower part of the outer tube; the inner pipe body comprises a lower thick pipe body and an upper thin pipe body; and the outer diameter of the thick pipe body is greater than the inner diameter of the inner ring platform.

[0010] By using the above-mentioned technical solution, when the nozzle structure is not connected to seawater, since the outer diameter of the thick pipe body is greater than the inner diameter of the inner ring platform, the inner ring platform has a limiting effect on the inner pipe body, so that the thick pipe body at the lower part of the inner pipe body abuts against the inner ring platform, without falling down.

[0011] Furthermore, the upper end of the inner pipe body is further provided with a middle orifice; and an included angle between a center line of the middle orifice and an axis of the inner pipe body is greater than an included angle between a center line of the upper orifice and an axis of the inner pipe body. Further, an included angle between a center line of the lower orifice and the axis of the inner pipe body is greater than an included angle between the center line of the middle orifice and the axis of the inner pipe body.

[0012] Further, the center line of the upper orifice is formed at an angle of 0°-20° to the axis of the inner pipe body; the center line of the middle orifice is formed at an angle of 15°-75° to the axis of the inner pipe body; and the center line of the lower orifice is formed at an angle of 60°-110° to the axis of the inner pipe body.

[0013] By using the above-mentioned technical solution, the middle orifice at the upper end of the inner pipe body may form mushroom-type spray to extinguish the fire of the helicopter platform. The included angles between the center lines of the upper orifice, the middle orifice and the lower orifice and the axis of the inner pipe body increase successively, so that three layers of orifices at the upper, middle and lower levels may be used to perform all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and extinguish the fire in a short time. In addition, when the included angle between the center line of the lower orifice and the axis of the inner pipe is greater than 90°, the lower orifice may be washed along the ground of the helicopter platform to improve the fire extinguishing effect.

[0014] Further, an impeller is provided in the inner pipe body; the impeller comprises a fan blade and an impeller shaft; the fan blade is fixed on the impeller shaft; a support rod is fixed in the inner pipe body; and the impeller shaft is fixed on the support rod.

[0015] By using the above-mentioned technical solution, after the seawater is connected, when the seawater enters the inner pipe body from the bottom of the outer pipe body, the seawater will generate a force on the fan blade of the impeller to rotate the fan blade. The fan blade will drive the whole inner pipe body to rotate inside the outer pipe body, and then drive the upper orifice and the middle orifice on the inner pipe body to rotate. With the rotation of the upper orifice and the middle orifice, the upper orifice and the middle orifice may respectively form a water shade at different heights. The spraying range is more comprehensive and the fire extinguishing effect is better.

[0016] Furthermore, an annular protrusion is provided at the bottom of the annular cover; an annular groove adapted to the annular protrusion is provided on the inner pipe body; and the annular protrusion can be clamped in the annular groove.

[0017] By using the above-mentioned technical solution, during the upward movement of the inner pipe body under the impact pressure of seawater, when the annular protrusion at the bottom of the annular cover is clamped in the annular groove on the inner pipe body, the inner pipe body abuts against the annular cover, so that the inner pipe body does not continue to rise. The clamping and fixing of the annular protrusion and the annular groove may limit the position of the inner pipe body, preventing the inner pipe body from shifting, thereby ensuring the normal spraying of the lower orifice.

[0018] Further, a cover plate is hinged on the annular cover; when the cover plate is in an open state, a water outlet hole of the middle orifice is located above the cover plate; and when the cover plate is in a closed state, the cover plate can close the upper orifice.

[0019] By using the above-mentioned technical solution, the cover plate may be opened during the rising process of the inner pipe body. When the cover plate is opened, the cover plate does not affect the normal spraying of the middle orifice. When the cover plate is closed, the cover plate closes the upper orifice to prevent foreign matter from blocking the upper orifice, thereby ensuring normal spraying of the upper orifice.

[0020] Further, the annular cover is detachably connected to the outer pipe body.

[0021] By adopting the above-mentioned technical solution, the annular cover may be detached from the outer pipe body to disassemble, clean or replace the inner pipe body.

[0022] Further, the annular cover is fixed to the outer pipe body by screws.

[0023] By using the above-mentioned technical solution, the mounting and dismounting operations of the screw are simple and fast, so as to facilitate the dismounting and mounting of the annular cover, and further facilitate the dismounting and mounting, cleaning or replacing of the inner pipe body.

[0024] The present application also discloses a helicopter platform fire-fighting system comprising a platform body, a fire-fighting injection pipe network and a pumping unit. The fire-fighting injection pipe network comprises a plurality of nozzle structures as described above, the nozzle structures being provided on the platform body; the platform body is provided with a plurality of anti-skid teeth; the platform body is provided with a plurality of liquid discharge holes, and the plurality of liquid discharge holes are connected to an external treatment device; an inlet of the pumping unit communicates with seawater; an outlet of the pumping unit is connected to a main pipeline; and a plurality of the nozzle structures are collected by the fire-fighting injection pipe network and connected to the main pipeline.

[0025] By using the above-mentioned technical solution, when fuel oil leaks from the helicopter in an emergency landing, the anti-skid teeth and the liquid discharge hole on the platform body may quickly achieve the flow guiding function to the oil, so that the oil may be quickly guided to the outside treatment device as far as possible. In the event of a fire, the seawater enters the main pipeline through an inlet of the pumping unit, and is sprayed

to the surface of the platform body via the plurality of nozzle structures to form water droplets and water mist, so that it quickly extinguishes the fire on the surface of the platform body. According to the helicopter platform fire-fighting system of the present application, the inexhaustible seawater is used as a medium to replace foam fire-fighting, reduces equipment costs and post-maintenance costs, avoids the environmental pollution caused by foam, may quickly control or extinguish a fire, and reduces losses.

[0026] Furthermore, a peripheral water tank is provided at the edge of the platform body; a peripheral downpipe is provided inside the peripheral water tank; and the peripheral downpipe is connected to an external treatment device.

[0027] By adopting the above-mentioned technical solution, the oil and water on the surface of the platform body may quickly flow into the peripheral water tank and be conducted out to the external treatment device via a peripheral downpipe, so as to achieve a flow guiding effect on the oil and water on the surface of the platform body as far as possible, and reduce the oil and water on the surface of the platform body from falling into the sea from the edge of the platform body to pollute the seawater environment.

[0028] In summary, compared with the prior art, the beneficial effects of the above-mentioned technical solutions are as follows.

(1) By spraying seawater upwards from the upper orifice and spraying seawater from the lower orifice, and quickly spreading the seawater on the helicopter platform, it achieves all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and extinguishes the fire in a short time. In addition, the use of seawater as a medium to replace foam fire control reduces equipment costs and post-maintenance costs and avoids the environmental pollution caused by foam;

(2) The middle orifice at the upper end of the inner pipe body may form mushroom-type spray to extinguish the fire of the helicopter platform. The included angles between the center lines of the upper orifice, the middle orifice and the lower orifice and the axis of the inner pipe body increase successively, so that three layers of orifices at the upper, middle and lower levels may be used to perform all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and extinguish the fire in a short time. In addition, when the included angle between the center line of the lower orifice and the axis of the inner pipe is greater than 90°, the lower orifice may be washed along the ground of the helicopter platform to improve the fire extinguishing effect.

(3) The impeller is provided in the inner pipe body. When the seawater enters the inner pipe body from the bottom of the outer pipe body, the seawater will generate a force on the fan blade of the impeller to rotate the fan blade. The fan blade will drive the whole inner pipe body to rotate inside the outer pipe body, and then drive the upper orifice and the middle orifice on the inner pipe body to rotate. With the rotation of the upper orifice and the middle orifice, the upper orifice and the middle orifice may respectively form a water shade at different heights. The spraying range is more comprehensive and the fire extinguishing effect is better.

(4) By means of the platform body, the fire-fighting injection pipe network and the pumping unit of the fire-fighting system, when fuel oil leaks from the helicopter in an emergency landing, the anti-skid teeth and the liquid discharge hole on the platform body may quickly achieve the flow guiding function to the oil, so that the oil may be quickly guided to the outside treatment device as far as possible. In the event of a fire, the seawater enters the main pipeline through an inlet of the pumping unit, and is sprayed to the surface of the platform body via the plurality of nozzle structures to form water droplets and water mist, so that it quickly extinguishes the fire on the surface of the platform body. According to the helicopter platform fire-fighting system of the present application, the inexhaustible seawater is used as a medium to replace foam fire-fighting, reduces equipment costs and post-maintenance costs, avoids the environmental pollution caused by foam, may quickly control or extinguish a fire, and reduces losses.

BRIEF DESCRIPTION OF DRAWINGS

[0029]

FIG. 1 is a sectional view of a nozzle structure in a closed state in an embodiment of the present application;

FIG. 2 is a cross-sectional view of a nozzle structure in an use state according to an embodiment of the present application;

FIG. 3 is a sectional view of an impeller installed in an inner pipe body in an embodiment of the present application;

FIG. 4 is a top view of a nozzle structure in an embodiment of the present application;

FIG. 5 is a cross-sectional view showing a mounting structure of an annular cover in an embodiment of the present application;

FIG. 6 is a schematic view of a helicopter platform fire-fighting system according to an embodiment of the present application;

FIG. 7 is a structurally schematic view showing a peripheral water tank and a peripheral downpipe in an embodiment of the present application.

[0030] Description of Reference Numerals: 1, outer

pipe body; 11, water outflow loop; 12, inner ring platform; 13, threaded hole; 14, annular flanging; 2, inner pipe body; 21, thick tube body; 22, thin pipe body; 3, annular cover; 31, mounting hole; 4, lower orifice; 5, middle orifice; 6, upper orifice; 7, annular protrusion; 8, annular groove; 9, screw; 10, cover plate; 15, impeller; 151, fan blade; 152, impeller shaft; 16, support rod; 17, platform body; 18, fire-fighting injection pipe network; 19, anti-skid tooth; 20, liquid discharge hole; 23, peripheral water tank; 24, peripheral downpipe.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0031] The principles and features of the present application are described below with reference to FIGs. 1-7, which are presented for purposes of illustration only and are not intended to limit the scope of the present application.

[0032] Embodiments of the present application disclose a nozzle structure for fire fighting. Referring to FIG. 1, the nozzle structure for fire fighting includes an outer pipe body 1 communicating with seawater, which is used as a medium to replace foam fire fighting, thereby reducing equipment cost and post-maintenance cost and avoiding environmental pollution caused by the foam. An inner pipe body 2 is inserted inside the outer pipe body 1. The seawater may be sprayed and extinguish a fire on the helicopter platform via the outer pipe body 1 and the inner pipe body 2.

[0033] With reference to FIGs. 1 and 2, the lower end of the inner pipe body 2 is open. The upper end is provided with an upper orifice 6. The inner pipe body 2 may slide up and down inside the outer pipe body 1. An annular cover 3 is mounted on an upper part of the outer pipe body 1. The annular cover 3 is fitted around an upper end of the inner pipe body 2. An annular flanging 14 is fixed on the upper part of the outer pipe body 1. A water outflow loop 11 is formed between the inner pipe body 2 and the outer pipe body 1 and between the annular flanging 14 and the annular cover 3 of the outer pipe body 1. The annular cover 3 is further provided with a lower orifice 4 communicating with the water outflow loop 11.

[0034] With reference to FIGs. 1 and 2, when a fire occurs, after seawater is connected to the outer pipe body 1, the seawater entering the bottom of the inner pipe body 2 from the bottom of the outer pipe body 1 may be sprayed upwards through the upper orifice 6 to extinguish the fire on the helicopter platform. At the same time, the inner pipe body 2 may move upwards under the impact pressure of seawater, so that the bottom of the outer pipe body 1 communicates with the water outflow loop 11 and the lower orifice 4 on the annular cover 3. Then the seawater is sprayed from the bottom of the outer pipe body 1 through the water outflow loop 11 and from the lower orifice 4, and quickly spreads on a helicopter platform for fire extinguishing. When the inner pipe body 2 abuts against the annular cover 3, the inner pipe body 2 no longer continues to rise. The seawater is continuously sprayed from the upper orifice 6 and the lower orifice 4, so as to achieve achieve all-round and three-dimensional spraying on the helicopter platform.

[0035] With reference to FIGs. 1 and 2, an inner ring platform 12 is provided at the lower part of the outer pipe body 1. The inner pipe body 2 includes a lower thick pipe body 21 and an upper thin pipe body 22. The outer diameter of the thick pipe body 21 is greater than the inner diameter of the inner ring platform 12, so that the inner ring platform 12 has a limiting effect on the inner pipe body 2. Thus, the thick pipe body 21 at the lower part of the inner pipe body 2 abuts against the inner ring platform 12, without falling down.

[0036] With reference to FIGs. 1 and 2, the upper end of the inner pipe body 2 is further provided with a middle orifice 5 for forming a mushroom-type spray to extinguish the fire on the helicopter platform. An included angle between a center line of the middle orifice 5 and an axis of the inner pipe body 2 is greater than an included angle between a center line of the upper orifice 6 and an axis of the inner pipe body 2. An included angle between a center line of the lower orifice 4 and the axis of the inner pipe body 2 is greater than an included angle between the center line of the middle orifice 6 and the axis of the inner pipe body 2. Specifically, the center line of the upper orifice 6 is formed at an angle of 15° to the axis of the inner pipe body 2. The center line of the middle orifice 5 is formed at an angle of 45° to the axis of the inner pipe body 2. The center line of the lower orifice 4 is formed at an angle of 60° to the axis of the inner pipe body 2. The included angles between the center lines of the upper orifice 6, the middle orifice 5 and the lower orifice 4 and the axis of the inner pipe body increase successively, so that three layers of orifices at the upper, middle and lower levels may be used to perform all-round and three-dimensional spraying on the helicopter platform, with good atomization effects and good fire extinguishing effects, and extinguish the fire in a short time.

[0037] Referring to FIG. 3, an impeller 15 may also be mounted in the inner pipe body 2. The impeller 15 includes a fan blade 151 and an impeller shaft 152. A support rod 16 is fixed in the inner pipe body 2. The impeller shaft 152 is fixed on the support rod 16. In addition, the longitudinal direction of the impeller shaft 152 coincides with the longitudinal direction of the inner pipe body 2. The fan blade 151 is fixed at both ends of the impeller shaft 152. When the seawater enters the inner pipe body 2 from the bottom of the outer pipe body 1, the seawater will generate a force on the fan blade 151 of the impeller 15 to rotate the fan blade 151. The fan blade 151 will drive the whole inner pipe body 2 to rotate, and then drive the upper orifice 6 and the middle orifice 5 on the inner pipe body 2 to rotate, so that the upper orifice 6 and the middle orifice 5 respectively form a water shade at different heights. The spraying range is more comprehensive and the fire extinguishing effect is better.

[0038] With reference to FIGs. 1 and 2, an annular protrusion 7 is fixed at the bottom of the annular cover 3. An

annular groove 8 adapted to the annular protrusion 7 is provided on the outside of the inner pipe body 2 at a junction of the thick pipe body 21 and the thin pipe body 22. During the upward movement of the inner pipe body 2 under the impact pressure of seawater, the annular protrusion 7 may be clamped into the annular groove 8, so that the top of the thick pipe body 21 on the inner pipe body 2 abuts against the annular cover 3, and the inner pipe body 2 does not continue to rise, so as to limit the position of the inner pipe body 2, preventing the inner pipe body 2 from shifting, thereby ensuring the normal spraying of the lower orifice 4.

[0039] Referring to FIGs. 4 and 5, the annular cover 3 is detachably connected to the outer pipe body 1, so that the annular cover 3 may be detached from the outer pipe body 1 to disassemble, clean or replace the inner pipe body 2. Specifically, the annular cover 3 is provided with a mounting hole 31. The annular flanging 14 of the outer pipe body 1 is provided with a threaded hole 13 adapted to the mounting hole 31. A screw 9 is inserted into the mounting hole 31, and the screw 9 is threadedly connected to the threaded hole 13, so that the annular cover 3 and the outer pipe body 1 may be fixed via the screw 9. The mounting and dismounting operations of the screw 9are simple and fast, so as to facilitate the dismounting and mounting of the annular cover 3, and further facilitate the dismounting and mounting, cleaning or replacing of the inner pipe body 2.

[0040] With reference to FIGs. 1 and 2, a cover plate 10 is hinged on the annular cover 3. The cover plate 10 may be opened during the rising process of the inner pipe body 2. When the cover plate 10 is in an opened state, the water outlet hole of the middle orifice 5 is located above the cover plate 10 which does not affect the normal spraying of the middle orifice 5. When the cover plate 10 is in the closed state, the cover plate 10 may close the upper orifice 6 to prevent foreign matter from clogging the upper orifice 6, thereby ensuring normal spraying of the upper orifice 6.

[0041] According to the implementation principle of a nozzle structure for fire fighting in the embodiments of the present application, when oil leakage occurs in a helicopter landing accident and a fire is caused, a high-pressure pump draws seawater and connects the seawater to the outer pipe body 1 via a pipe network. After the seawater is connected, the inner pipe body 2 may move upwards under the impact pressure of the seawater, so that the inner pipe body 2 is away from the inner ring platform 12. When the top of the thick pipe body 21 on the inner pipe body 2 abuts against the annular cover 3, the annular protrusion 7 is clamped in the annular groove 8, and the inner pipe body 2 does not continue to rise. At the same time, the seawater is sprayed from the bottom of the outer pipe body 1 through the water outflow loop 11 via the lower orifice 4, and rapidly spreads on a helicopter platform for fire extinguishing. At the same time, the seawater entering the bottom of the inner pipe body 2 from the bottom of the outer pipe body 1 may be sprayed through the middle orifice 5 and the upper orifice 6 respectively. The middle orifice 5 may form a mushroom-type spray for fire extinguishing the fire, and the seawater may be sprayed upwards from the upper orifice 6 for fire extinguishing, i.e., the three layers of the upper orifice 6, the middle orifice 5 and the lower orifice 4 may perform all-round and three-dimensional spraying on the helicopter platform. When the impeller 15 is mounted in the inner pipe body 2 and the seawater enters the inner pipe body 2 from the bottom of the outer pipe body 1, the seawater will generate a force on the fan blade 151 of the impeller 15 to rotate the fan blade 151. The fan blade 151 will drive the whole inner pipe body 2 to rotate, and then drive the upper orifice 6 and the middle orifice 5 on the inner pipe body 2 to rotate, so that the upper orifice 6 and the middle orifice 5 respectively form a water shade at different heights. The spraying range is more comprehensive and the fire extinguishing effect is better.

[0042] Embodiments of the present application also disclose a helicopter platform fire-fighting system. Referring to FIGs. 6 and 7, the helicopter platform fire-fighting system includes a platform body 17, a fire-fighting injection pipe network 18, and a pumping unit. The platform body 17 is fixedly provided with a plurality of anti-skid teeth 19. The platform body 17 is provided with a plurality of liquid discharge holes 20 which are connected to an external treatment device. When the helicopter leaks fuel during an emergency landing, the anti-skid 19 and the liquid discharge holes 20 on the platform body 17 quickly achieve a diversion of the oil, so that the oil is as quickly as possible guided to the external treatment device.

[0043] Referring to FIGs. 6 and 7, an inlet of the pumping unit communicates with seawater. An outlet of the pumping unit is connected to the main pipe. The fire-fighting spray pipe network 18 includes a plurality of the above-mentioned nozzle structures. The plurality of nozzle structures are mounted on the platform body 17. The plurality of nozzle structures are collected and connected to the main pipeline. In the event of a fire, the seawater enters the main pipe through the inlet of the pumping unit and is sprayed to the surface of the platform body 17 via a plurality of nozzle structures to form water droplets and mist to rapidly extinguish the fire on the surface of the platform body 17.

[0044] With reference to FIGs. 6 and 7, the edge of the platform body 17 is fixedly provided with a peripheral water tank 23. A peripheral downpipe 24 is mounted in the peripheral water tank 23. The peripheral downpipe 24 is connected to the external treatment device, so that the oil and water on the surface of the platform body 17 may quickly flow into the peripheral water tank 23 and be conducted out into the external treatment device via the peripheral downpipe 24. Further, the flow guiding effect on the oil and water on the surface of the platform body 17 is achieved as far as possible, reducing the oil and water on the surface of the platform body 17 from falling into the sea from the edge of the platform body 17 to pollute the seawater environment.

[0045] The foregoing is only preferred examples of the application and is not intended to limit the application. Any modifications, equivalents, or improvements within the spirit and principles of the application are intended to be included within the scope of this application.

Claims

1. A nozzle structure for fire fighting comprising an outer pipe body (1) and an annular cover (3), **characterized in that** an upper part of the outer pipe body is provided with an annular flanging (14); an inner pipe body (2) is inserted inside the outer pipe body (1), with a lower end of the inner pipe body (2) being open and an upper end being provided with an upper orifice (6); the inner pipe body (2) is capable of sliding up and down inside the outer pipe body (1); the annular cover (3) is provided on the upper part of the outer pipe body (1) and is sleeved on the upper end of the inner pipe body (2); a water outflow loop (11) is formed between the inner pipe body (2) and the outer pipe body (1) and between the annular flanging (14) of the outer pipe body (1) and the annular cover (3); and the annular cover (3) is further provided with a lower orifice (4) communicating with the water outflow loop (11).

2. The nozzle structure according to claim 1, **characterized in that** an inner ring platform (12) is provided at the lower part of the outer pipe body (1); the inner pipe body (2) comprises a lower thick pipe body (21) and an upper thin pipe body (22); and the outer diameter of the thick pipe body (21) is greater than the inner diameter of the inner ring platform (12).

3. The nozzle structure according to claim 1 or 2, **characterized in that** the upper end of the inner pipe body (2) is further provided with a middle orifice (5); and an included angle between a center line of the middle orifice (5) and an axis of the inner pipe body (2) is greater than an included angle between a center line of the upper orifice (6) and an axis of the inner pipe body (2).

4. The nozzle structure according to claim 3, **characterized in that** an included angle between a center line of the lower orifice (4) and the axis of the inner pipe body (2) is greater than an included angle between the center line of the middle orifice (5) and the axis of the inner pipe body (2).

5. The nozzle structure according to claim 3, **characterized in that** an impeller (15) is provided in the inner pipe body (2); the impeller (15) comprises a fan blade (151) and an impeller shaft (152); the fan blade (151) is fixed on the impeller shaft (152); a support rod (16) is fixed in the inner pipe body (2); and the impeller shaft (152) is fixed on the support rod (16).

6. The nozzle structure according to claim 1, **characterized in that** an annular protrusion (7) is provided at the bottom of the annular cover (3); an annular groove (8) adapted to the annular protrusion (7) is provided on the inner pipe body (2); and the annular protrusion (7) can be clamped in the annular groove (8).

7. The nozzle structure according to claim 1, **characterized in that** a cover plate (10) is hinged on the annular cover (3); when the cover plate (10) is in an open state, a water outlet hole of the middle orifice (5) is located above the cover plate (10); and when the cover plate (10) is in a closed state, the cover plate (10) can close the upper orifice (6).

8. The nozzle structure according to claim 1, **characterized in that** the annular cover (3) is detachably connected to the outer pipe body (1).

9. A helicopter platform fire-fighting system comprising a platform body (17), a fire-fighting injection pipe network (18) and a pumping unit, **characterized in that** the fire-fighting injection pipe network (18) comprises a plurality of nozzle structures as claimed in any one of claims 1-8, the nozzle structures being provided on the platform body (17); the platform body (17) is provided with a plurality of anti-skid teeth (19); the platform body (17) is provided with a plurality of liquid discharge holes (20), and the plurality of liquid discharge holes (20) are connected to an external processing device; an inlet of the pumping unit communicates with seawater; an outlet of the pumping unit is connected to a main pipeline; and a plurality of the nozzle structures are collected by the fire-fighting injection pipe network (18) and connected to the main pipeline.

10. The fire-fighting system according to claim 9, **characterized in that** a peripheral water tank (23) is provided at the edge of the platform body (17); a peripheral downpipe (24) is provided inside the peripheral water tank (23); and the peripheral downpipe (24) is connected to an external treatment device..

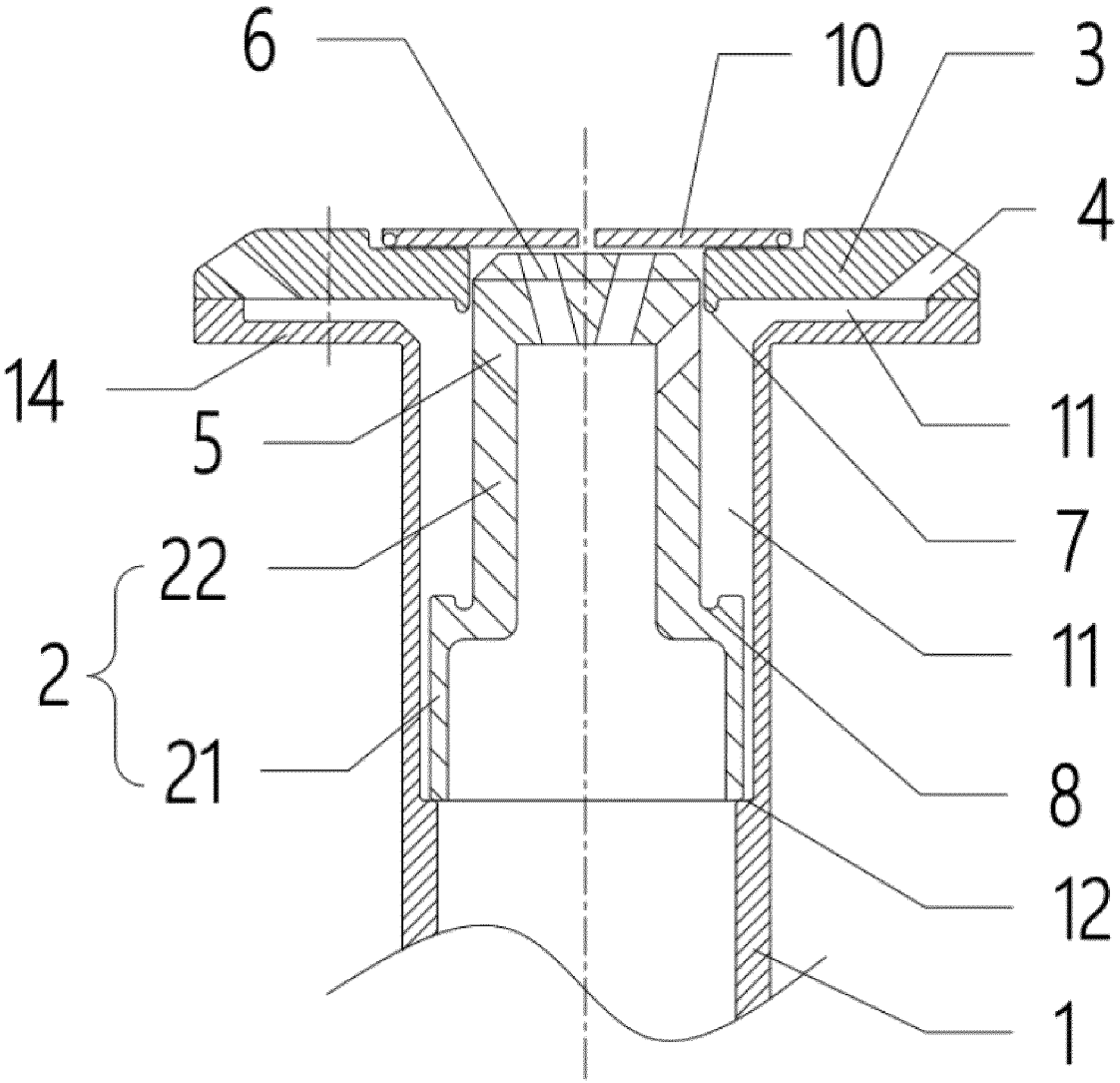

FIG. 1

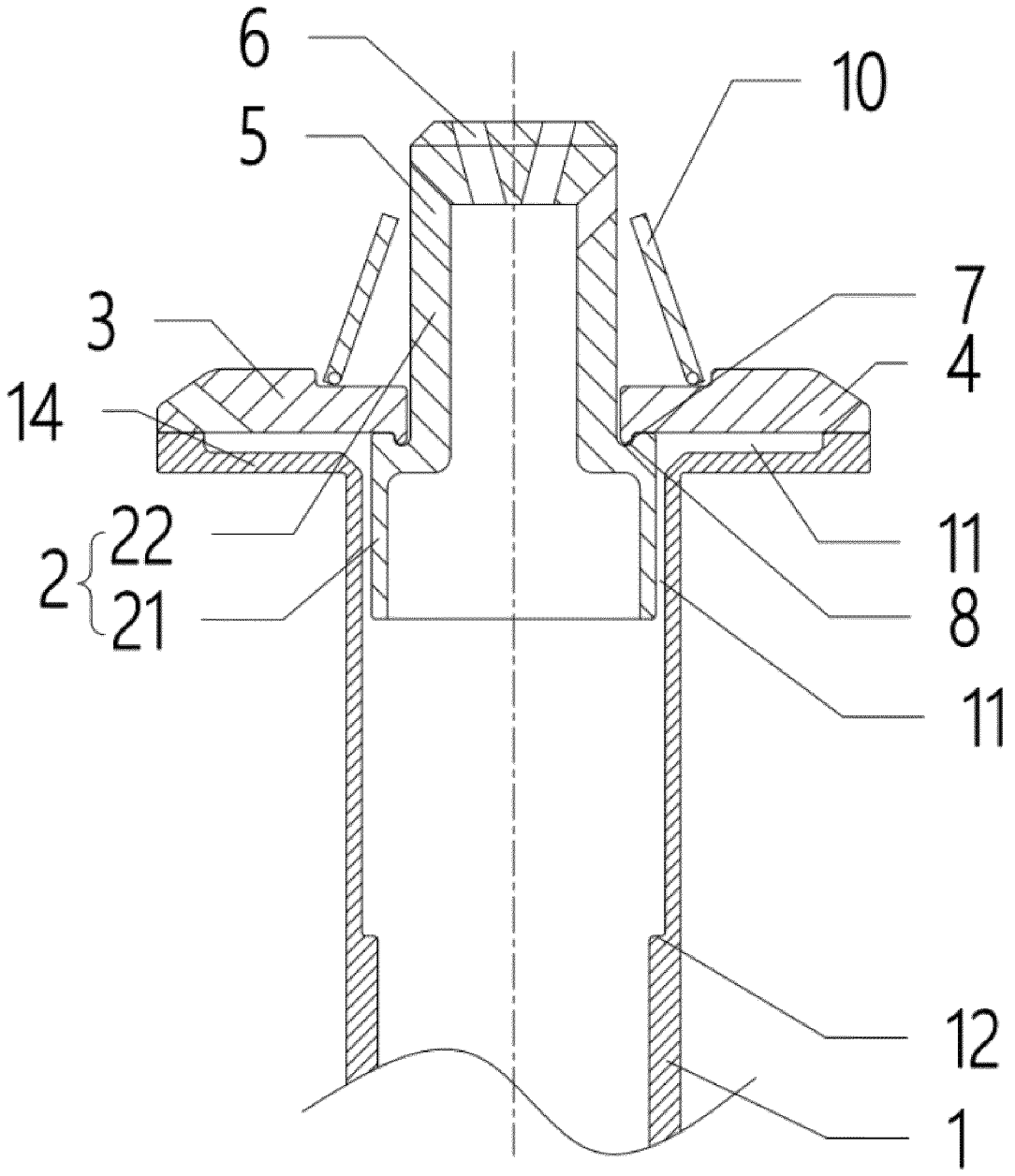

FIG. 2

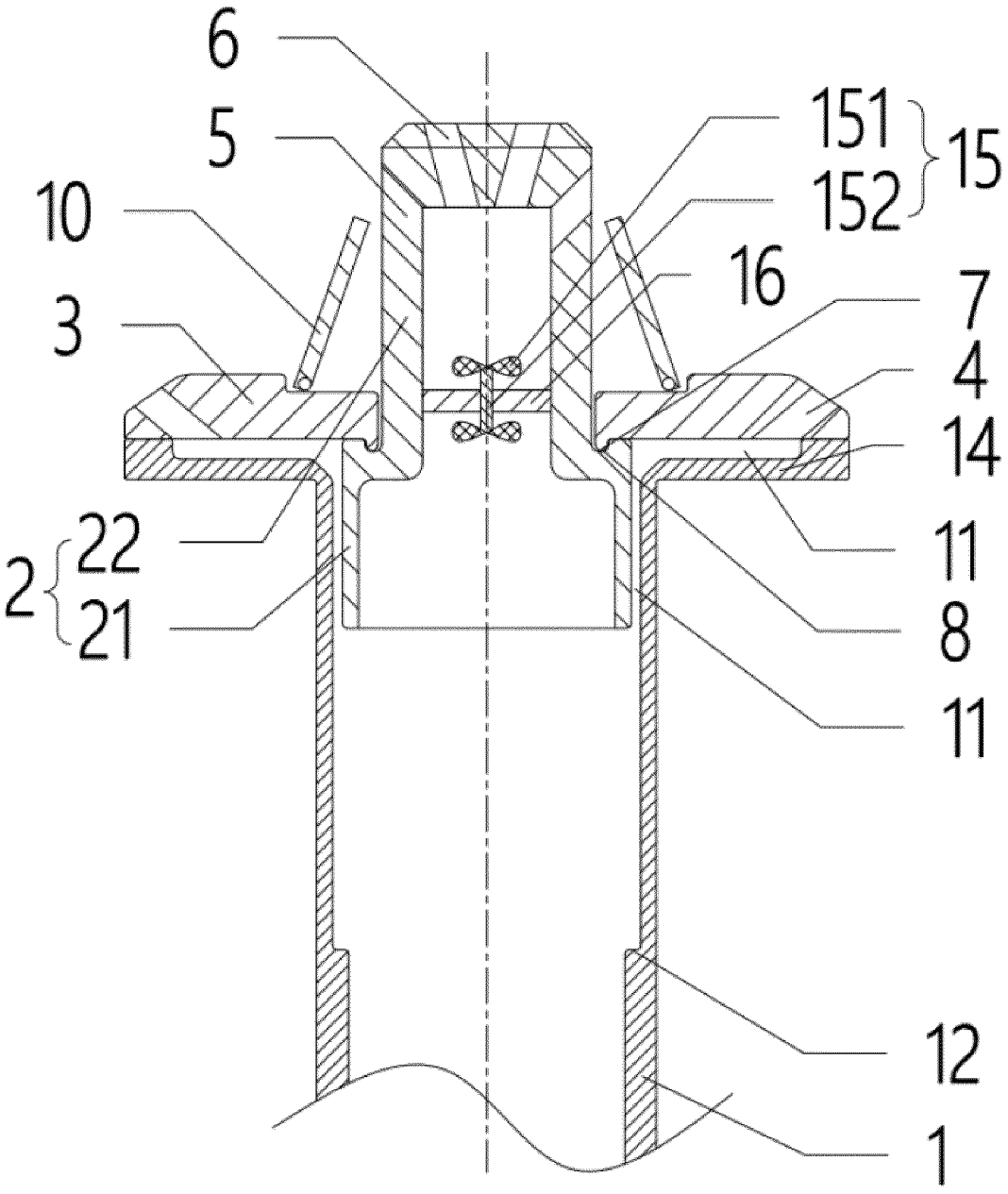

FIG. 3

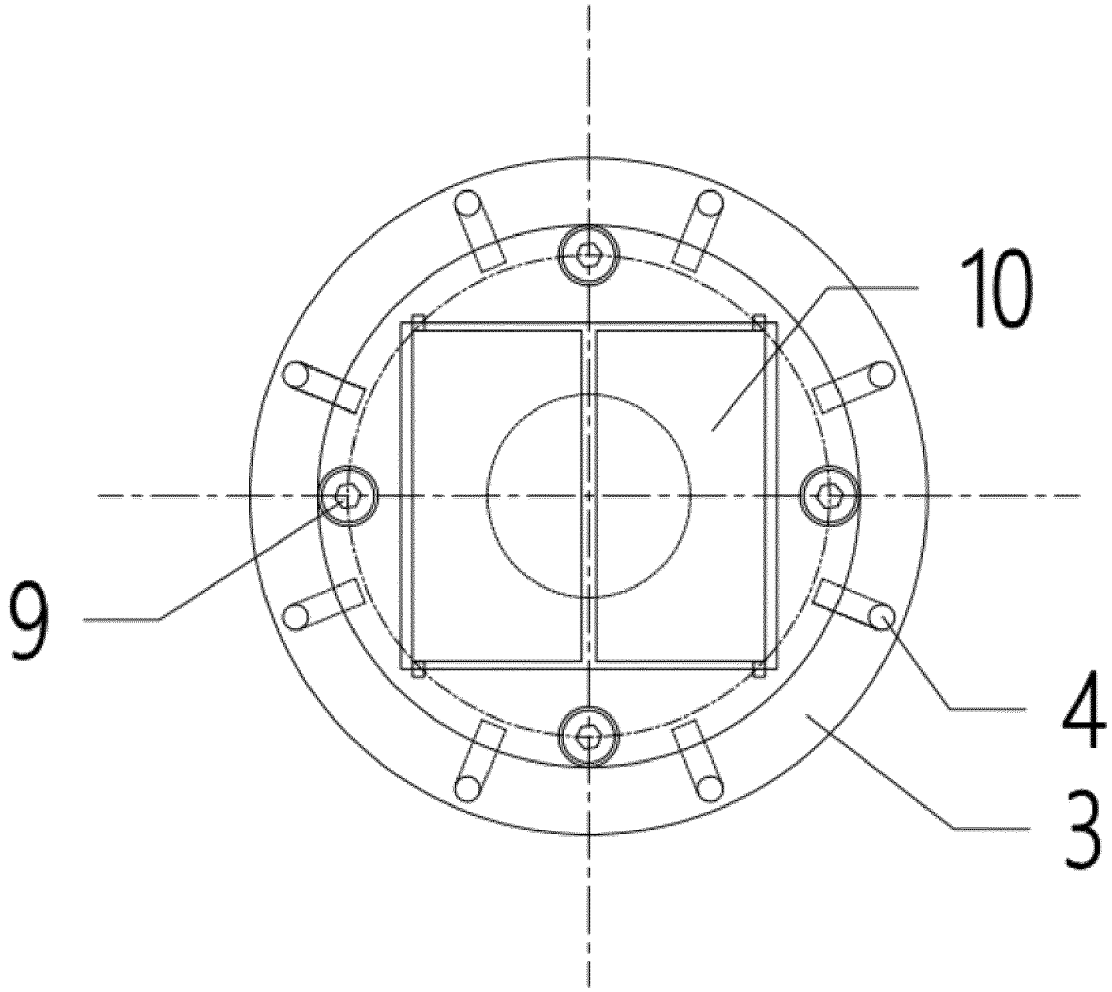

FIG. 4

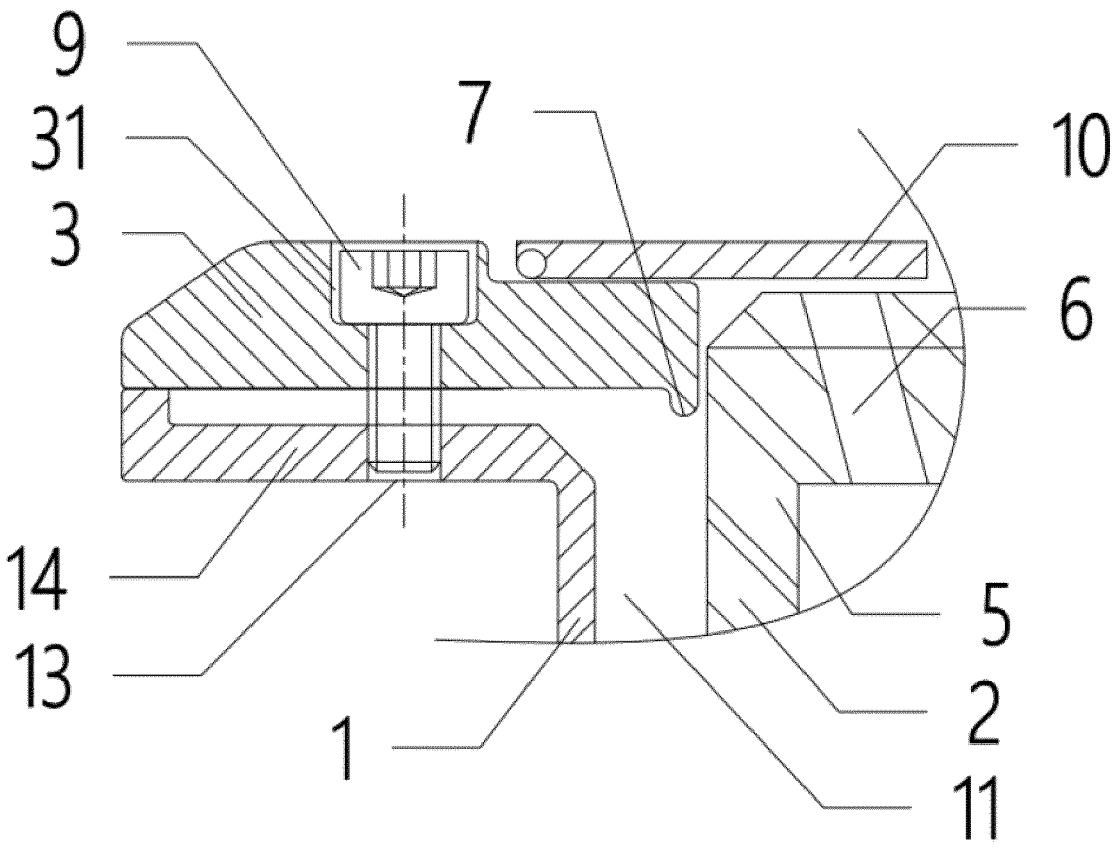

FIG. 5

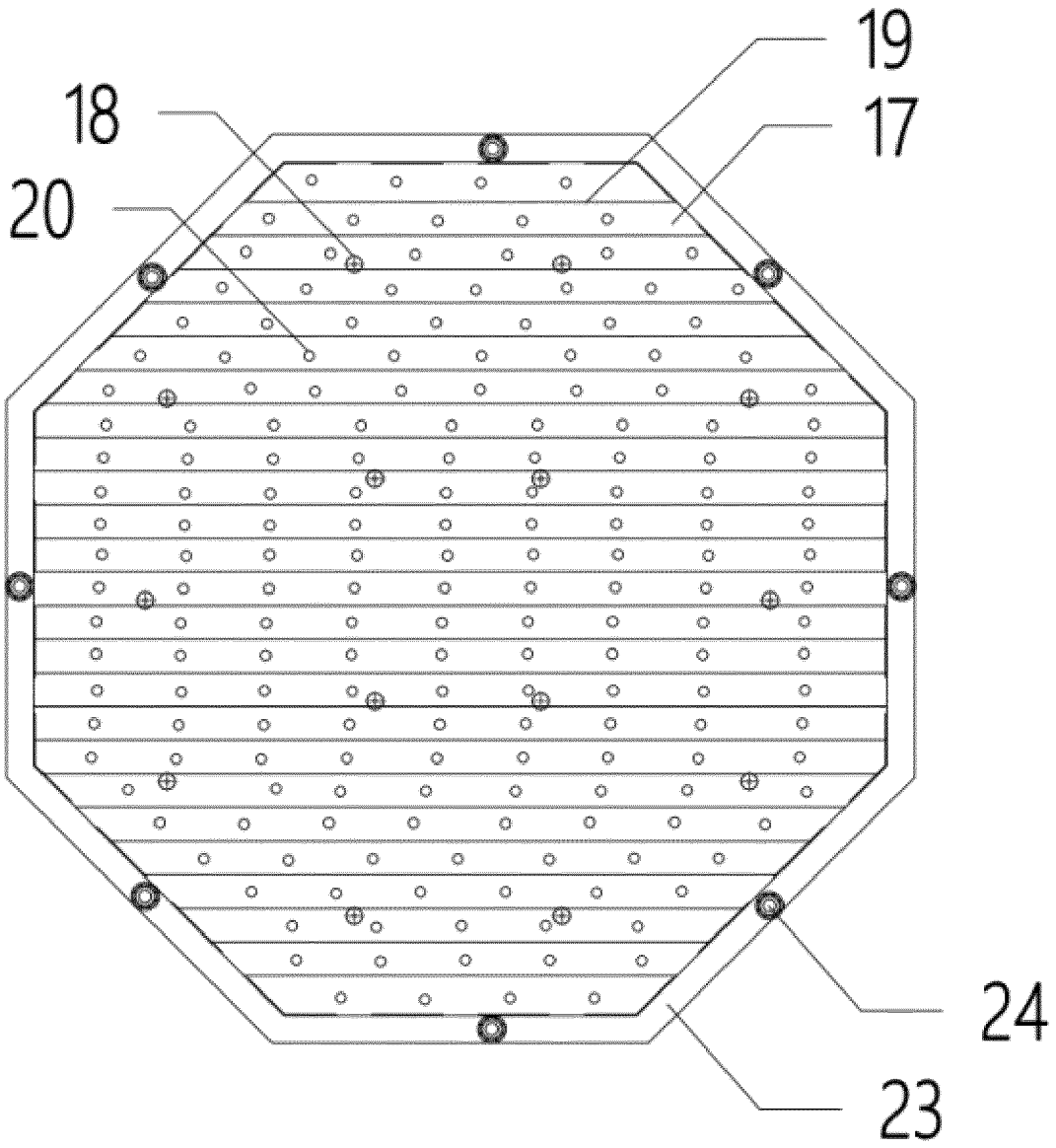

FIG. 6

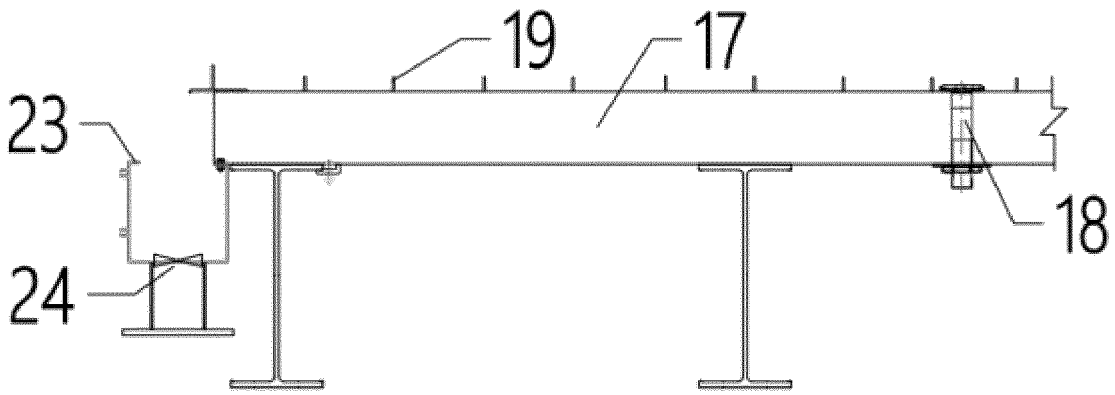

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/089124

A. CLASSIFICATION OF SUBJECT MATTER

A62C31/03(2006.01)i; A62C31/28(2006.01)i

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)

IPC: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)

CNTXT, ENTXTC, DWPI, VEN: 喷嘴, 消防, 停机坪, 平台, 升降, 顶升, 顶推, 上升, 盖, 喷孔, nozzle, firefight+, park+, apron, platform, ris+, lift+, push, upward, cover, cap, opening, hole

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 106215354 A (YIWEI ELECTROMECHANICAL EQUIPMENT (SHANGHAI) CO., LTD.) 14 December 2016 (2016-12-14) description, paragraphs 11-17, and figure 1	1-10
Y	KR 101860229 B1 (FIRE SIS CO., LTD.) 29 June 2018 (2018-06-29) description paragraphs 22-49, and figures 1-5	1-10
Y	CN 202211948 U (TAIAO ALUMINIUM (TAISHAN) CO., LTD.) 09 May 2012 (2012-05-09) description, paragraphs 13-14, and figures 1-2	9-10
PX	CN 217745478 U (YANTAI NORTH SEA OFFSHORE TECHNOLOGY CO., LTD.) 08 November 2022 (2022-11-08) description, paragraphs 43-55, and figures 1-7	1-10
PX	CN 114939248 A (YANTAI NORTH SEA OFFSHORE TECHNOLOGY CO., LTD.) 26 August 2022 (2022-08-26) description, paragraphs 43-55, and figures 1-7	1-10
A	CN 104399216 A (UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA) 11 March 2015 (2015-03-11) entire document	1-10

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

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 May 2023	**23 May 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/089124

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2020112629 A1 (MINIMAX VIKING RESEARCH & DEVELOPMENT GMBH) 04 June 2020 (2020-06-04) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/089124

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 106215354 A	14 December 2016	None	
KR 101860229 B1	29 June 2018	None	
CN 202211948 U	09 May 2012	None	
CN 217745478 U	08 November 2022	None	
CN 114939248 A	26 August 2022	None	
CN 104399216 A	11 March 2015	None	
WO 2020112629 A1	04 June 2020	None	

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