DEVICE FOR EXTINGUISHING FIRES.

This device comprises a portable reservoir (2) suspended from a helicopter and provided with at least one lower hatch (21) for discharging the extinguishing liquid or water transported. The device comprises a vacuum pump (4) to create a vacuum inside said reservoir (2), a vacuum sensor (75) to regulate the vacuum created inside the reservoir (2) depending on the quantity of water to be loaded, several means to cause the opening of a lower hatch (21) of the reservoir (2) and the loading of water into the reservoir (2) as a result of the suction effect caused by the vacuum, several means for detecting when the reservoir (2) is full and several means for automatically closing the lower hatch (21) when the water load has reached a preset level.
Description

Object of the invention.

[0001] The present invention relates to a device for extinguishing fire of the type used for supplying water for fire-fighting work outside and suitable for being transported by helicopter.

Background of the invention.

[0002] At present multiple devices intended for the transportation and use of water for extinguishing fires are known, which devices store a considerable amount of water and are transported by vehicles, both by land and air, to the fire area, usually an area exposed to the outside and of a certain extension, such as a forest fire, industrial facilities or a building of considerable size.

[0003] The use of a helicopter as a means of transport is a great advantage, as the helicopter moves fast between the water loading point and the discharge point into the fire, it can carry a significant amount of water, and it discharges accurately and can also load in tight spaces where seaplanes cannot land.

[0004] Some of the anti-fire and helicopter transported devices include a semi-rigid open top reservoir provided with slings or cables for its suspended fixation from a helicopter and a lower discharge hatch, which can be operated by the pilot. The loading of this reservoir can be made at any pond and pool but the loading speed depends on the pilot’s skill to achieve immersion of the reservoir since the loading is performed through the top opening. Other disadvantages of these devices are: they require that the height of water in the loading area is higher than that of the reservoir as the loading is performed through its top, and that during transport part of the load may be lost as the reservoir is permanently opened at its top.

[0005] Other known devices include a rigid belly-tank, permanently installed on the bottom of the helicopter and equipped with a hydraulic pump and a hose for loading said tank, while the unloading is done through hatches or trapdoors at the bottom of the tank. The helicopter equipped with this device is more stable in flight and can reload in shallow areas. However, loading the water with the hydraulic pump is slow and the whole device is very heavy with respect to the water that it can carry.

Description of the invention.

[0006] The device for extinguishing fires, object of this invention, has special technical features intended to allow a fast loading of the reservoir through its lower end and to provide faster and versatile performance of the transportation of water used to extinguish fires.

[0007] Thus, the device for extinguishing fires comprises a vacuum pump connected to the storage reservoir for creating a vacuum inside the reservoir when it is in the closed position, a vacuum sensor to regulate the vacuum created inside the reservoir by the vacuum pump, depending on the quantity of water to be loaded, several means for causing the opening of a lower hatch of the reservoir and the water loading in the reservoir by the suction effect produced by the vacuum created inside.

[0008] Thus, the helicopter pilot operates the vacuum pump while going to the loading place in order to remove the air inside the reservoir in advance, and when he/she reaches the loading place, this vacuum or depression causes the filling of the reservoir without needing water pumps in a few seconds upon opening the lower hatch and raising the sucked up water.

[0009] In addition, the device comprises means for detecting when the reservoir is full and means for automatically closing the lower hatch (21) when said filling detection means indicate that the water load has reached a pre-set level inside the reservoir.

[0010] Suction through the inner hatch, while the reservoir is slightly submerged below the surface of the water of the loading place, only requires a few centimetres in depth of said hatch to prevent entry of outside air. This load can be performed anywhere, whether a swimming pool, pond or river. By creating vacuum inside the reservoir, the loading of water is faster and easier than through the use of conventional water moving pumps, as the vacuum sucks in a short time (about 6 to 12 seconds for 1200 litres) the water that the reservoir is able to hold. Also the discharge is immediate, since once the reservoir is loaded; the lower hatch closes automatically, leaving the device suitable for allowing such discharge by operating this lower hatch.

[0011] The tank is of rigid construction and includes a top sealing hatch allowing, after the loading, a better discharge of the water at the emptying place. The reservoir also has lower support elements that allow the support of the reservoir on a surface independently, the lower hatch being slightly higher with respect to the lower part of said support elements.

[0012] This reservoir can be made of composites, polyurethane, steel, carbon fibre, aluminium or other materials.

[0013] The vacuum pump is independent from the reservoir and can be preferably housed in a compartment of the helicopter, what facilitates its maintenance and the fact that several reservoirs can be connected to the same transporting helicopter with the vacuum pump staying in the helicopter. The device comprises a vacuum pipe between the reservoir and the vacuum pump.

[0014] Once the device loaded, the pilot should only decide whether to make a very fast, fast, medium, slow, etc. discharge, depending on the instructions he/she receives.

[0015] In order to make the water loading operation as automatic and simple as possible for the pilot it is provided that the control means, causing the opening of the lower hatch and the loading of water, include lower water sensors that determine the time of filling.

[0016] In turn, the means for detecting when the res-
The deposit can take different shapes, but it is mainly spherical or cylindrical shaped with curved bases, as these are the structures which gives the best response to the inside vacuum when proceeding to the water loading. In these cases, the support elements comprise two parallel rigid rings connected by support legs, the upper ring being arranged above the middle of the reservoir and the lower support ring being larger. However, it is possible that at least the upper hatch can be otherwise.

As mentioned, the reservoir of the device can be placed on a solid surface, such as ground, allowing it to be used for water supply in an area more or less close to the fire. Additionally, the reservoir comprises connections for water supply to tankers, hoses and other fire extinguishing equipment, either by hydraulic pumps or simply by gravity.

One of the objects of the invention is to allow the device to be quickly fitted or removed from the helicopter, preferably in less time than half a minute, comprising quick coupling means of the reservoir to the helicopter for this purpose. In one embodiment of the invention, these means are configured by a plate arranged at the bottom of the helicopter and equipped with vacuum connections of hydraulic pressure and power supply and another combined plate with means of quick anchoring to the helicopter plate, with the reservoir fixing slings and connections being attached to said second plate, complementary to the first plate and connected to the vacuum pipe of the reservoir, to the hydraulic pressure pipes driving the reservoir devices and to the electric power connections of the control unit and the control means.

Description of figures.

In order to complement the description that is being carried out and with the purpose of facilitating the understanding of the characteristics of the invention, the present description is accompanied by a set of drawings wherein, by way of a nonlimiting example, the following has been represented:

- Figure 1 shows an elevation view of one embodiment of the device for extinguishing fires attached to a helicopter.
- Figure 2 shows a block diagram of the control means of the device.
- Figure 3 shows an elevation view of the section of the reservoir and inside components.
- Figure 4 shows a detail of a schematic embodiment of the coupling means.

Preferred embodiment of the invention.

As can be seen in the referenced figures, the device comprises a reservoir (2) of rigid and watertight constitution, in this case spherical shaped and made of plastic, which has a lower hatch (21) of butterfly type and a sealing articulated upper hatch (22), both hatches being driven by hydraulic cylinders (21 a and 22 a) connected by pipes (3) to the hydraulic power connections of the helicopter (1). The device comprises a vacuum pump (4), housed in the helicopter (1) and connected by a vacuum pipe (41) to the reservoir (2).

The reservoir (2) presents at its bottom supporting elements (5) defining a support such that the lower hatch (21) is just a few centimetres above the surface on which it rests, these supporting elements (5) being made up of two parallel rigid rings (51 and 52) joined by legs (53), the first upper ring (51) is arranged around the middle of the spherical reservoir (2) and from which the legs (53) extend downwards diverging to the lower ring (52), which has a larger diameter to allow better stability of the reservoir (2) resting on the ground.

In the upper ring (51) are fixed slings (6) for fixing to the bottom of the helicopter (1), what allows the transportation of the suspended reservoir.

The device has means for its operational control that are set by a control unit (71) for the automatic working of certain operations, with said control unit (71) being associated to driving controls (72) at the cockpit and water lower sensors (73) next to the lower hatch (21) and inside water level sensors (74) in the reservoir (2) to check the load. The control means also comprise a vacuum sensor (75) inside the reservoir (2).

Figure 4 shows a detail of a quick coupling means for attaching the device to the helicopter (1), said quick coupling means being configured by a plate (81) fixed at the bottom of the helicopter (1) and another combined plate (81), which in this case has a few direct coupling hooks (82) on the sides, with the corresponding connections of the fixing slings (6), the vacuum pipe (41) between the vacuum pump (4) and the reservoir (2), and the pipes (3) with hydraulic power connections and electric power connections (76) of the sensors (73, 74 and 75) from inside the helicopter (1) being associated with said plate (81).
Figure 3 shows the reservoir (2) having at its bottom connections (23) for coupling hoses. Once the nature of the invention as well as an example of preferred embodiment have been sufficiently described, it is stated for all pertinent purposes that the materials, form, size and arrangement of the elements described are susceptible to changes, provided these do not involve an alteration of the essential characteristics of the invention that are claimed subsequently.

Claims

1. Device for extinguishing fires, of the type comprising a water reservoir (2) with fixing slings (6) or cables at the bottom of a helicopter (1) for the transportation of water or liquid fire extinguishers and their discharge through the opening of at least a lower hatch (21) of the reservoir (2) by control means operable from controls (72), these control means being associated by means of pipes (3) to the power connections of the hydraulic system of the helicopter (1) for the device driving, characterized in that it comprises a vacuum pump (4) connected to the reservoir (2), for creating a vacuum inside the reservoir (2) when said reservoir (2) is in the closed position, a vacuum sensor (75) to regulate the vacuum created inside the reservoir (2) by the vacuum pump (4) depending on the quantity of water to be loaded, means to cause the opening of a lower hatch (21) of the reservoir (2) and the loading of water in the reservoir (2) as a result of the suction effect caused by the vacuum created inside it, means for detecting when the reservoir (2) is full and several means for automatically closing the lower hatch (21) when said full detecting means indicate that the water loading has reached a pre-set level inside the reservoir (2).

2. Device for extinguishing fires, according to claim 1, characterized in that the reservoir (2) is of rigid constitution and comprises a sealing upper hatch (22), and lower support elements (5) that allow the support of the reservoir (2) on a surface independently, the lower hatch (21) being slightly higher with respect to the lower part of said support elements (5).

3. Device for extinguishing fires, according to claim 1, characterized in that it further comprises a vacuum pipe (4) between the reservoir (2) and the vacuum pump (4), which is arranged in a compartment of the helicopter (1).

4. Device for extinguishing fires, according to claim 1, characterized in that the control means causing the opening of the lower hatch (21) and the water loading comprise lower water sensors (73) arranged outside, next to said lower hatch (21) and connected to a control unit (71).

5. Device for extinguishing fires, according to claim 1, characterized in that the means for detecting when the reservoir (2) is full comprise inside level sensors (74) connected to a control unit (71).

6. Device for extinguishing fires, according to claim 1, characterized in that the support elements (5) comprise two parallel rigid rings (51 and 52) connected by support legs (53), the upper ring (51) being arranged above the middle of the reservoir (5) and the lower support ring (52) being larger.

7. Device for extinguishing fires, according to any of claims 1 and 2, characterized in that the lower and upper hatches (21 and 22) are of the butterfly type and are associated with driving hydraulic cylinders (21 a and 22a).

8. Device for extinguishing fires, according to claim 1, characterized in that the reservoir (2) comprises connections (23) for coupling external hoses.

9. Device for extinguishing fires, according to any of the preceding claims, characterized in that it further comprises means for quick coupling of the reservoir (2) to the helicopter (1), consisting of a plate (8) fixed to the helicopter (1) and another combined plate (81) having anchoring means, with the fixing slings (6) and the corresponding connections of the vacuum pipes (41) between the vacuum pump (4) and the reservoir (2), and that of the pipes (3) with hydraulic power connections and electric power connections (76) being fixed to said plate (81).
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

see extra sheet

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, B64D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**INVENES, EPDOC, WPI, PAJ**

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>RU 2197308 C2 (PROMYSHELNNO-INVESTITISNONNAYA KOMPANIYA &quot;RESURSPROMINVEST&quot;) 27.01.2003; page 3, right column, lines 6-38; figure 1.</td>
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

- "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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Date of the actual completion of the international search: 17.02.2010

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

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**INTERNATIONAL SEARCH REPORT**

**CLASSIFICATION OF SUBJECT MATTER**

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- **B64D 1/16** (2006.01)