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(54) **SYSTEM FOR ESTABLISHING A FIRE BARRIER IN A TERRAIN**

(57) The invention relates to a system (1) for establishing a fire barrier in a terrain with the aim of stopping the spreading of a wildfire. The system comprises a series of rods (2) which each comprises a plurality of nozzles (3) arranged at predetermined locations along a longitudinal axis of the rod at least when it is in an operation configuration. Each of the nozzles is in fluid connection with an inlet (4) via a first tube (5) for allowing pressurized water from an associated water supply to flow from the inlet to the nozzle so that the nozzle can atomize the water and provide a mist of water to the surroundings during use. The system may further comprise a movable carriage (11) for storing the series of rods before they are deployed and for transporting the series of rods along a line of deployment in the terrain during deployment of the rods into the operation configuration.

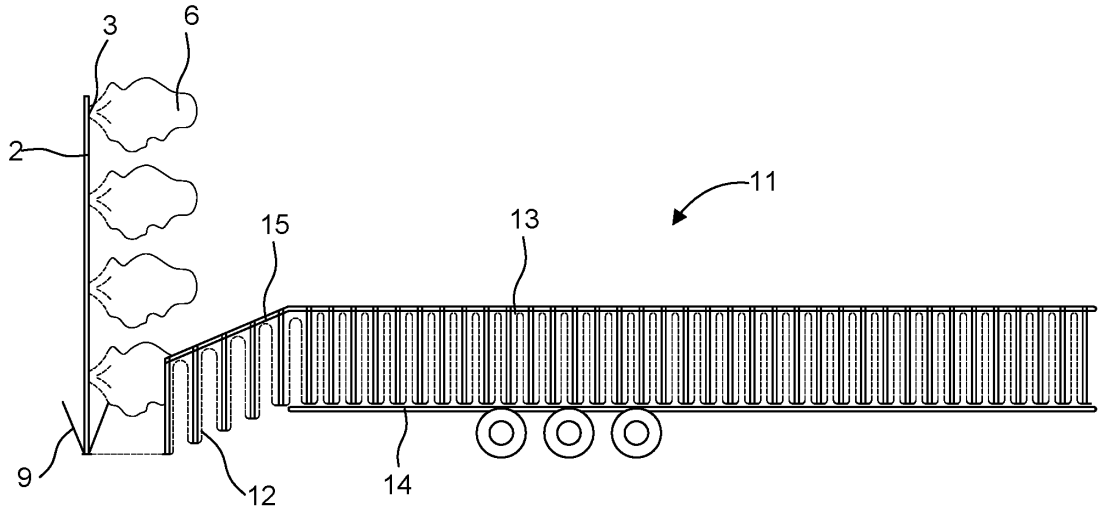

Fig. 7

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a system for establishing a fire barrier in a terrain. In particular, it relates to a system which has a low water consumption and requires less manpower than what is otherwise used for extinguishing a wildfire or at least for preventing a wildfire from spreading uncontrolled.

BACKGROUND OF THE INVENTION

[0002] Due to climate changes, at least partly caused by increasing CO_2 emissions, the global weather conditions are developing extremely, and one of the consequences is long periods of drought in many geographical regions around the world. The resulting very dry nature means that when a wildfire breaks out, it spreads quickly over large areas with fatal consequences, including loss of human and animal lives and destruction of buildings. In addition to the immediate consequences, the wildfires themselves also result in large CO_2 emissions thereby adding to the negative effect on the climate. Some studies have estimated that around 20% of the total CO_2 emission in the world comes from wildfires and that annually more than 300,000 people lose their lives as direct and indirect consequences of wildfires. Furthermore, the attempts to extinguish wildfires require very large amounts of water and manpower that may not be available or that at least could be better spent for other purposes. There is therefore a need for finding new and more efficient ways of fighting wildfires.

OBJECT OF THE INVENTION

[0003] It is an object of the present invention to provide a system for establishing a fire barrier in a terrain which requires significantly less water than traditionally used fire-fighting methods used for extinguishing wildfires.

[0004] It is another object of the present invention to provide a system for establishing a fire barrier in a terrain which requires less manpower than traditionally used fire-fighting methods used for extinguishing wildfires.

[0005] It is a further object of the present invention to provide an alternative to the prior art.

[0006] In particular, it may be seen as an object of the present invention to provide a system that solves the above-mentioned problems of the prior art.

SUMMARY OF THE INVENTION

[0007] The present invention is based on the fact that it often requires enormous amounts of both water and manpower to extinguish a wildfire. Furthermore, more than one wildfire is often active at a time in a region, and lack of resources may therefore result in the wildfire spreading over large areas, including cities, before it can be extinguished. The overall idea behind the invention is therefore to be able to establish fire barriers to prevent the wildfires from spreading, and especially from spreading to cities or other critical areas, such as historically valuable locations, rather than trying to extinguish all the wildfires. Hereby a given amount of water and manpower can be used more efficiently. Preliminary calculations have shown that a possible water consumption may be in the order of 100-200 litres of water per hour per meter of the fire wall established by a system according to the present invention. This is significantly less than a typical amount of water spent on firefighting. Furthermore, by limiting the extension of the wildfires, the CO_2 emissions caused by the wildfires can be limited thereby resulting in less negative influences on the climate.

[0008] Throughout the description, reference is made to "wildfire" as that is what the invention has been designed in relation to. However, if desired or required, the system may also be used for establishing a fire barrier in other locations than in a terrain, such as within a city.

[0009] Thus, the above-described object and several other objects are intended to be obtained in a first aspect of the invention by providing a system for establishing a fire barrier in a terrain, the system comprising a series of rods which are configured to be arranged:

- in a transport configuration for storage and transportation to a location of deployment, and
- in an operation configuration for establishing the fire barrier during use,

wherein each rod comprises:

- a plurality of nozzles arranged at predetermined locations along a longitudinal axis of the rod at least when it is in the operation configuration, and
- at least one support leg for supporting the rod in an upright or substantially upright orientation in the operation configuration, and

wherein each of the plurality of nozzles is in fluid connection with an inlet via a first tube for allowing pressurized water from an associated water supply to flow from the inlet to the nozzle so that the nozzle can atomize the water and provide a mist of water to the surroundings during use.

[0010] The system will typically be stored and transported to a location of use by a movable carriage as will be described in further details below and in relation to the figures. As will also be described below, the carriage may be a part of the system. Inside the carriage, the rods may e.g. be suspended from rails in the ceiling of the carriage so that they can be moved out of the carriage along the rails. By "carriage" is meant any suitable movable means of transportation. It could alternatively be referred to as a trailer or semi-trailer. It may be self-driven, or it could be

configured to be driven by another vehicle, such as a tractor, a lorry, or a tracked vehicle, typically depending on the terrain in which the fire barrier is to be established. When the system has been deployed and connected to the water supply, it can continue to function on its own or while being monitored by a few persons. Hereby the available manpower can be used for establishing other similar fire barriers or for other tasks. It is at present considered that a system according to the present invention will be most efficient, if the fire barrier has been established well before the wildfire arrives, such as 6-10 hours before, so that the mist of water has had time to soak through the surrounding ground and vegetation.

[0011] The water supply may e.g. be local lakes or rivers from where the water is supplied to the system by use of transportable pumps. It may also be possible to use water otherwise intended for other purposes, such as drinking water supplies, if that is what is available.

[0012] In some embodiments of the invention, all the rods are identical. However, the scope of protection also covers embodiments having different types of rods, such as rods made from different materials, with different dimensions or with different amounts of nozzles. The system may also comprise rods without nozzles, which rods can e.g. be used for supporting the series of rods with nozzles in the operation configuration. This may e.g. be advantageous in very uneven terrain.

[0013] The rods may be telescopic and configured to be extended from a compressed state in the transport configuration to an extended state in the operation configuration during deployment of the system. Hereby they take up less space and are easier to handle during storage and transportation. In some embodiments of the invention, the rods are moved from the storage configuration in the carriage and to a location of use via a cantilever arm typically mounted on the carriage. When the at least one leg has reached the ground and can hold the respective rod in an upright position, the rod is released from the cantilever arm. The release may be performed manually or actuated by a release mechanism forming part of the system.

[0014] In order to ensure a stable arrangement of the rods on the ground, each rod is preferably provided with at least one leg, such as at least three legs, such as four legs. Depending on the design of the at least one leg, one leg may be sufficient.

[0015] In embodiments of the invention comprising telescopic rods, the rods may be hollow and may form a part of the fluid connection, and the rods may be configured to be extended in response to a pressure of the pressurized water flowing from the inlet to the nozzles. This may e.g. be enabled by a combination of the hydraulic pressure of the water and the design of the rods and nozzles. In alternative embodiments of the invention, the fluid connection is provided by hoses arranged on the rods, which rods may be hollow or non-hollow. The actual pressure may be determined by what is available at a given location, including depending on the altitude above sea level and height variations in the terrain. At present it is considered that a pressure of 3-5 bars may be required. A preferred pressure for an optimal functioning of the system may be determined as part of the configuration process, but that pressure may not be available, e.g. if only a limited amount of water is available. Typically, the water supply to which the system is connected during use will comprise one or more pumps used to ensure a sufficient water pressure. If a limited pressure is obtainable, and if the rods are telescopic and designed to be extended in response to a pressure of the pressurized water, it may be necessary to have a higher pressure during the deployment of the series of rods than during the subsequent use of the system.

[0016] The rods may be mutually interconnected with second tubes configured and arranged to allow water to flow from the inlet to the nozzles of a plurality of rods of the series of rods. In such embodiments, the first and second tubes may be coherent and/or formed at least partly by one tube so that "first" and "second" just refers to different parts of the hose.

[0017] In some embodiments of the invention, the rods and the first and second tubes are arranged suspended from rails in the ceiling of the carriage during storage and transportation. In such embodiments, the rods may be suspended from every second rail, and the first and second tubes may be arranged on suspensions from every other second rail. When the carriage comprises a cantilever arm used for the deployment as described above, the cantilever arm may be designed so that it releases a suspension with a part of the tubes, before it releases the neighbouring corresponding rod.

[0018] In some embodiments of the invention, each rod is provided with sets of nozzles arranged at the same, or substantially the same, location along the longitudinal axis of the rod, and each set of nozzles has at least two, such as at least three, such as four nozzles pointing in different directions away from the longitudinal axis of the rod. In such embodiments, each set of nozzles may be provided as a unitary component. Examples of such a design will be shown in the figures and further described in relation thereto.

[0019] In embodiments of the invention in which each rod is provided with sets of nozzles, each rod may be provided with at least six, such as at least eight sets of nozzles arranged spaced apart, such as at regular intervals, along the rod. By arranging the sets of nozzles along the rod, it is obtained that mist of water is efficiently spread over a large area and along the height of trees or other vegetation present along the fire barrier formed by the series of deployed rods. Hereby the fire barrier may be formed not only at ground level but also in higher trees or vegetation thereby providing a high degree of fire protection.

[0020] The rods may further comprise at least one top nozzle at an upper end of the rods, which at least one top nozzle is arranged to provide an upwardly extending mist of water during use. Such upwardly extending nozzles

will increase the height to which the mist of water can be spread thereby providing better protection against the wildfire.

[0021] In some embodiments of the invention, the rods, at least when in the operating configuration, have a height of 10 to 30 m, such as 15 to 25 m, such as around 20 m. This dimension could also be referred to as length, but since the rods are arranged in an upright position at least in the operating configuration, the word "height" is used. The height will influence the spreading of the mist of water, and it may be determined depending on an intended use of the system. It may therefore depend on local requirements and also on the available water pressure at a given location.

[0022] The rods may made from aluminium or fibre-reinforced polymer, such as carbon-reinforced polymer. Such materials typically have high strength-to-weight and stiffness-to-weight ratios so that they are easy to transport and handle while still providing the required mechanical properties.

[0023] In any of the embodiments described above, the system may further comprise a movable carriage for storing the series of rods before they are deployed and for transporting the series of rods along a line of deployment in the terrain during deployment of the rods into the operation configuration.

[0024] The carriage may configured to store at least 50 rods, such as at least 100 rods, such as at least 150 rods, such as at least 200 rods.

[0025] The carriage may comprise an installation ramp and/or a cantilever arm for guiding the rods from the transport configuration to the operation configuration.

[0026] In a second aspect, the invention relates to a method of establishing a fire barrier in a terrain by use of a system according to any of the preceding claims.

[0027] In embodiments comprising a movable carriage as described above, the method may comprise the following steps:

- transporting the series of rods to the terrain by use of the carriage,
- moving the series of rods from the carriage to the terrain while moving the carriage along the line of deployment,
- arranging the at least one support leg so that the rod is thereby supported in an upright or substantially upright orientation in the terrain,
- deploying each of the rods into the operation configuration, and
- connecting at least one inlet of the system to an associated supply of pressurized water thereby allowing pressurized water to flow from the at least one inlet to the nozzles so that the nozzles can atomize the water and provide a mist of water to the surroundings.

[0028] In some embodiments of the invention, the supply of pressurized water, or at least a part of this supply, forms a part of the system. It may e.g. be provided as an add-on feature for use in geographical locations where this is the most efficient or reliable way of ensuring that the necessary amount of pressurized water can be supplied to the system.

[0029] The step of moving the series of rods from the carriage to the terrain may take place simultaneously with, or overlapping with, the step of deploying each of the rods. Hereby the speed of establishing the fire barrier can be as high as possible which may be critical when a wildfire is approaching.

[0030] The step of deploying each of the rods into the operating configuration may comprise un-folding the at least one leg to extend further away from the rods than during transportation. In embodiments having more than one leg for each rod, they may be individually movable so that they can be adjusted to match an uneven ground surface and thereby provide as stable a support of the rod as possible.

[0031] In embodiments wherein a part of the step of deploying the rods into the operating configuration includes using the pressurized water to extend telescopic rods, at least this part of the deployment takes place after the step of connecting the at least one inlet of the system to an associated water supply.

[0032] The first and second aspects of the present invention may be combined so that the description given for one of the aspects also applies to the other aspect. These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE FIGURES

[0033] The system according to the invention will now be described in more detail with regard to the accompanying figures. The figures show one way of implementing the present invention and is not to be construed as being limiting to other possible embodiments falling within the scope of the attached claim set.

Figure 1 schematically shows the overall functioning of the invention.

Figure 2 schematically shows one of the rods in the operating configuration.

Figure 3 schematically shows how a series of the rods in figure 2 is arranged to establish the fire barrier.

Figures 4.a and 4.b schematically show examples of nozzle units.

Figure 5 schematically shows an example of a telescopic, hollow rod.

Figure 6 schematically shows a cross-sectional view

of a part of a rod around the location of a nozzle unit.

Figure 7 schematically shows a system comprising a movable carriage.

Figure 8 is a flow-chart of a method according to the second aspect of the invention.

DETAILED DESCRIPTION OF AN EMBODIMENT

[0034] The overall functioning of the invention is illustrated schematically in figures 1 and 2. The system 1 for establishing a fire barrier in a terrain comprises a series of rods 2 which are provided with a plurality of nozzles 3 (see figure 2) arranged along the rods 2. Each of the plurality of nozzles 2 is in fluid connection with an inlet 4 via a first tube 5 for allowing pressurized water from an associated water supply (not shown) to flow from the inlet 4 to the nozzles 3, so that the nozzles 3 can atomize the water and provide a mist of water 6 (see figure 2) to the surroundings. This mist of water is not shown in figure 1 to make the other details more clearly seen. By establishing the fire barrier before the wildfire reaches that location, the mist of water 6 makes the surrounding soil and vegetation so wet that the wildfire cannot pass it, whereby the area on the other side of the fire barrier, shown schematically as houses 7 in the figure, is protected. When the wildfire 8 reaches the series of rods 2, the mist of water 6 will also lower the temperature thereby further lowering the risk of spreading of the wildfire 8 across the fire barrier. The fire barrier established by a system 1 according to the present invention thereby causes a demarcation of the continued ravages of the wildfire 8.

[0035] Figure 2 schematically shows one of the rods 2 in the operating configuration. The illustrated rod 2 has three support legs 9 and eight sets of nozzles 3 each arranged at the same location along the longitudinal axis of the rod 2. In the illustrated embodiment, each set of nozzles 3 is provided as a unitary component, here referred to as a nozzle unit 10, and has four nozzles 3 pointing in different directions away from the longitudinal axis of the rod 2. The illustrated rod 2 also has a top nozzle 3A (see figure 4) at an upper end of the rod 2, which top nozzle 3A is arranged to provide an upwardly extending mist of water 6 during use. In the figures, the water is shown as being sprayed along horizontal and vertical planes. This is for ease of illustration only whereas in practise the water will form a spatial region of water mist as shown in figure 7. Figure 3 schematically shows how a series of the rods 2 in figure 2 is arranged to establish the fire barrier. As an example, the rods 2 may be arranged with a horizontal distance of 5-6 m and with a vertical distance of 2 m between the nozzle units 10. However, these numbers are not limiting to the scope of protection.

[0036] Figures 4.a and 4.b schematically show examples of nozzle units 10, such as the ones in figures 2 and 3. Figure 4.a is a top view of a nozzle unit 10 with four nozzles 3, and figure 4.b is a three-dimensional view of a nozzle unit 10 further comprising a top nozzle 3A. The nozzles 3 should preferably be designed to provide a mist of water in all directions to ensure an efficient soaking of the surroundings. The nozzle units 10 will typically be made from aluminium as two halves that are joined, e.g. by gluing. However, any manufacturing method suitable for making the required geometry will be covered by the scope of protection.

[0037] Figure 5 schematically shows an example of a telescopic, hollow rod 2 which is configured to be extended from a compressed state in the transport configuration to an extended state in the operation configuration during deployment of the system 1. The rod 2 shown in figure 5 only has two mutually movable sections, but in a typical rod, there will be more of such sections. The rod 2 may be configured to be extended in response to a pressure of the pressurized water flowing from the inlet 4 to the nozzles 3 as described above.

[0038] Figure 6 schematically shows a cross-sectional view of a part of a rod 2 around the location of a nozzle unit 10. The figure shows how the pressurized water can flow, as shown with arrows, from the inlet 4 to the nozzle 3 via the hollow rod 2.

[0039] Figure 7 schematically shows an example of a system 1 comprising a movable carriage 11 for storing the series of rods 2 before they are deployed and for transporting the series of rods 2 along a line of deployment in the terrain during deployment of the rods 2 into the operation configuration. The carriage 11 may e.g. be moved by a tractor or a truck (not shown). The figure also shows how the rods 2 are mutually interconnected with second tubes 12 configured and arranged to allow water to flow from the inlet 4 to the nozzles 3 of a plurality of rods 2 of the series of rods 2 during use. In the transport configuration, the second tubes 12 may be arranged along the rods 2 as shown in figure 7. During transportation, the rods 2 and second tubes 12 are suspended from a rail system 13 arranged in the ceiling of the carriage 11. They are preferably configured to be moved along the rails driven by a motor (not shown), but in principle they can also be manually moved. To stabilise the rods 2 during transportation, there may be inflatable channels 14 at the bottom of the carriage 11, which channels 14 are inflated before the transportation begins. Just before deployment of the system 1, the channels 14 are deflated, and the rods 2 hang freely so that they can be moved out of the carriage 11. The illustrated carriage 11 comprises a cantilever arm 15 for guiding the rods 2 from the transport configuration to the operation configuration. When the rods 2 hit the end of the cantilever arm 15, the legs 9 are released and allowed to reach the ground before the rods 2 are released from the cantilever arm 15. Thereafter the rods 2 are kept in the upright or substantially upright orientation supported by the legs 9, and the carriage 11 moves on along the line of deployment to place the subsequent rods 2.

[0040] Just to give an idea of the needed manpower, preliminary calculations have shown that a team of 10

trained persons will be able to make a system 1 according to the present invention ready for operation within 1-2 hours, depending on the terrain. Afterwards, 2-3 persons may be able to monitor a continued functioning of the system, including performing minor adjustments or repairs, if necessary. Since wildfires often occur regularly in some geographical regions, a plan for the use of the system will preferably be determined beforehand, so that valuable time is not wasted on planning when the wildfire breaks out.

[0041] Figure 8 is a flow-chart showing a method according to the invention. The method comprises the following steps:

A: Transporting the series of rods 2 to the terrain by use of the carriage 11.
B: Moving the series of rods 2 from the carriage 11 to the terrain while moving the carriage 11 along the line of deployment.
C: Arranging the at least one support leg 9 so that the rod 2 is thereby supported in an upright or substantially upright orientation in the terrain.
D: Deploying each of the rods 2 into the operation configuration.
E: Connecting at least one inlet 4 of the system to an associated supply of pressurized water thereby allowing pressurized water to flow from the at least one inlet 4 to the nozzles 3 so that the nozzles 3 can atomize the water and provide a mist of water 6 to the surroundings.

[0042] Although the present invention has been described in connection with the specified embodiments, it should not be construed as being in any way limited to the presented examples. The scope of the present invention is set out by the accompanying claim set. In the context of the claims, the terms "comprising" or "comprises" do not exclude other possible elements or steps. Also, the mentioning of references such as "a" or "an" etc. should not be construed as excluding a plurality. The use of reference signs in the claims with respect to elements indicated in the figures shall also not be construed as limiting the scope of the invention. Furthermore, individual features mentioned in different claims, may possibly be advantageously combined, and the mentioning of these features in different claims does not exclude that a combination of features is not possible and advantageous.

Claims

1. System (1) for establishing a fire barrier in a terrain, the system (1) comprising a series of rods (2) which are configured to be arranged:

    - in a transport configuration for storage and transportation to a location of deployment, and
    - in an operation configuration for establishing the fire barrier during use,

    wherein each rod (2) comprises:

    - a plurality of nozzles (3) arranged at predetermined locations along a longitudinal axis of the rod (2) at least when it is in the operation configuration, and
    - at least one support leg (9) for supporting the rod (2) in an upright or substantially upright orientation in the operation configuration, and

    wherein each of the plurality of nozzles (3) is in fluid connection with an inlet (4) via a first tube (5) for allowing pressurized water from an associated water supply to flow from the inlet (4) to the nozzle (3) so that the nozzle (3) can atomize the water and provide a mist of water (6) to the surroundings during use.

2. System (1) according to claim 1, wherein the rods (2) are telescopic and configured to be extended from a compressed state in the transport configuration to an extended state in the operation configuration during deployment of the system (1).

3. System (1) according to claim 2, wherein the rods (2) are hollow and form a part of the fluid connection, and wherein the rods (2) are configured to be extended in response to a pressure of the pressurized water flowing from the inlet (4) to the nozzles (3).

4. System (1) according to any of the preceding claims, wherein the rods (2) are mutually interconnected with second tubes (12) configured and arranged to allow water to flow from the inlet (4) to the nozzles (3) of a plurality of rods (2) of the series of rods.

5. System (1) according to any of the preceding claims, wherein:

    - each rod (2) is provided with sets of nozzles (3) arranged at the same, or substantially the same, location along the longitudinal axis of the rod (2), and
    - each set of nozzles (3) has at least two, such as at least three, such as four nozzles (3) pointing in different directions away from the longitudinal axis of the rod (2).

6. System (1) according to claim 5, wherein each set of nozzles (3) is provided as a unitary component (10).

7. System (1) according to claim 5 or 6, wherein each rod (2) is provided with at least six, such as at least eight sets of nozzles (3) arranged spaced apart, such as at regular intervals, along the rod (2).

8. System (1) according to any of the preceding claims, wherein each of the rods (2) further comprises at least one top nozzle (3A) at an upper end of the rod (2), which at least one top nozzle (3A) is arranged to provide an upwardly extending mist of water (6) during use.

9. System (1) according to any of the preceding claims, wherein the rods (2), at least when in the operating configuration, have a height of 10 to 30 m, such as 15 to 25 m, such as around 20 m.

10. System (1) according to any of the preceding claims, wherein the rods (2) are made from aluminium or fibre-reinforced polymer, such as carbon-reinforced polymer.

11. System (1) according to any of the preceding claims, further comprising a movable carriage (11) for storing the series of rods (2) before they are deployed and for transporting the series of rods (2) along a line of deployment in the terrain during deployment of the rods (2) into the operation configuration.

12. System (1) according to claim 11, wherein the carriage (11) is configured to store at least 50 rods (2), such as at least 100 rods, such as at least 150 rods, such as at least 200 rods.

13. System (1) according to claim 11 or 12, wherein the carriage (11) comprises an installation ramp and/or a cantilever arm (15) for guiding the rods (2) from the transport configuration to the operation configuration.

14. Method of establishing a fire barrier in a terrain by use of a system (1) according to any of the preceding claims.

15. Method according to claim 14, wherein the system (1) is according to any of claims 11-13, the method comprising the following steps:

- transporting the series of rods (2) to the terrain by use of the carriage (11),
- moving the series of rods (2) from the carriage (11) to the terrain while moving the carriage (11) along the line of deployment,
- arranging the at least one support leg (9) so that the rod (2) is thereby supported in an upright or substantially upright orientation in the terrain,
- deploying each of the rods (2) into the operation configuration, and
- connecting at least one inlet (4) of the system to an associated supply of pressurized water thereby allowing pressurized water to flow from the at least one inlet (4) to the nozzles (3) so that the nozzles (3) can atomize the water and provide a mist of water (6) to the surroundings.

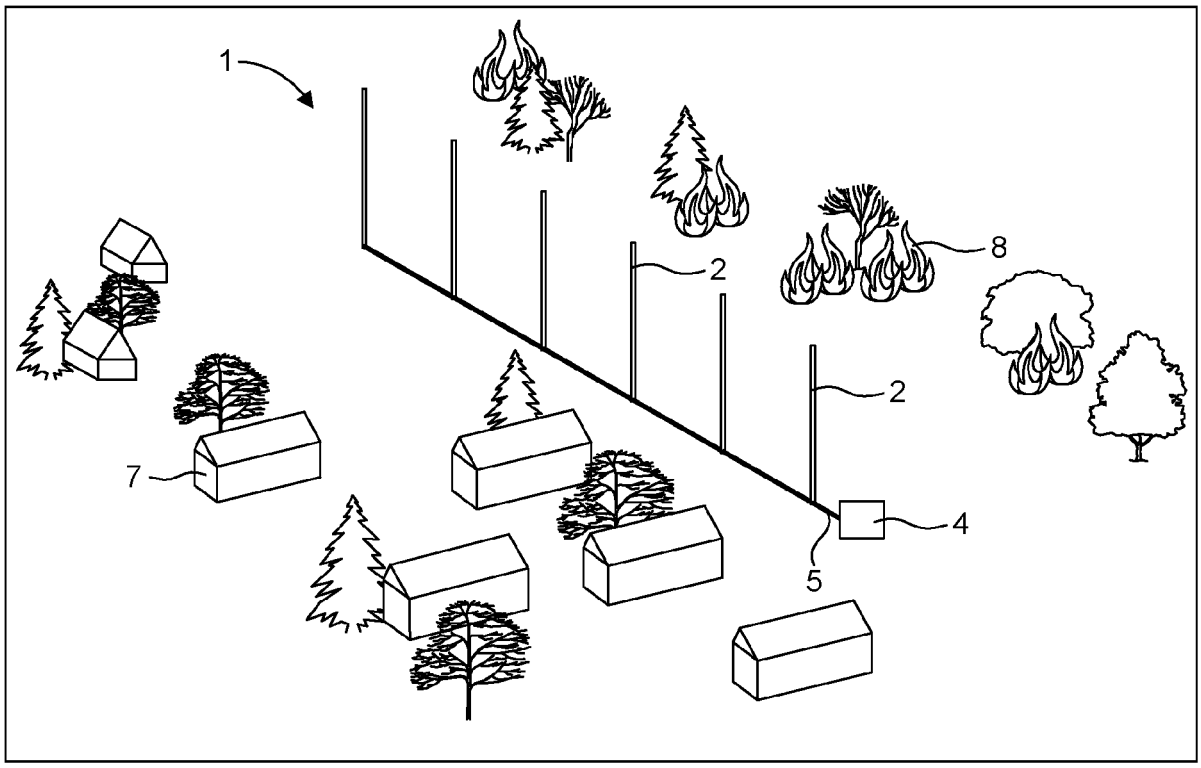

Fig. 1

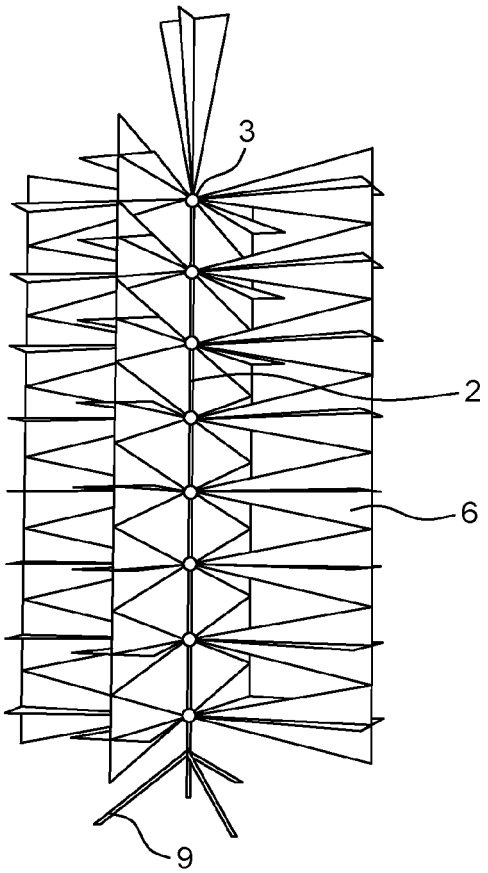

Fig. 2

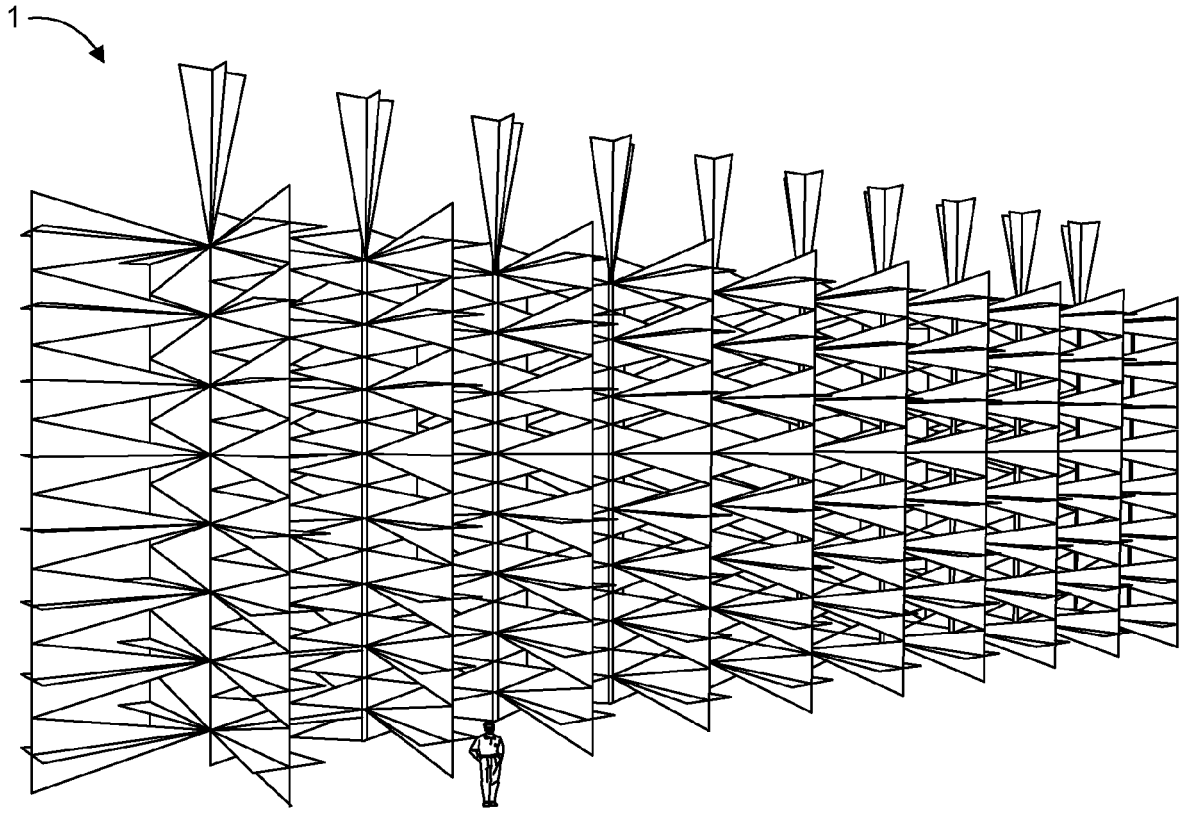

Fig. 3

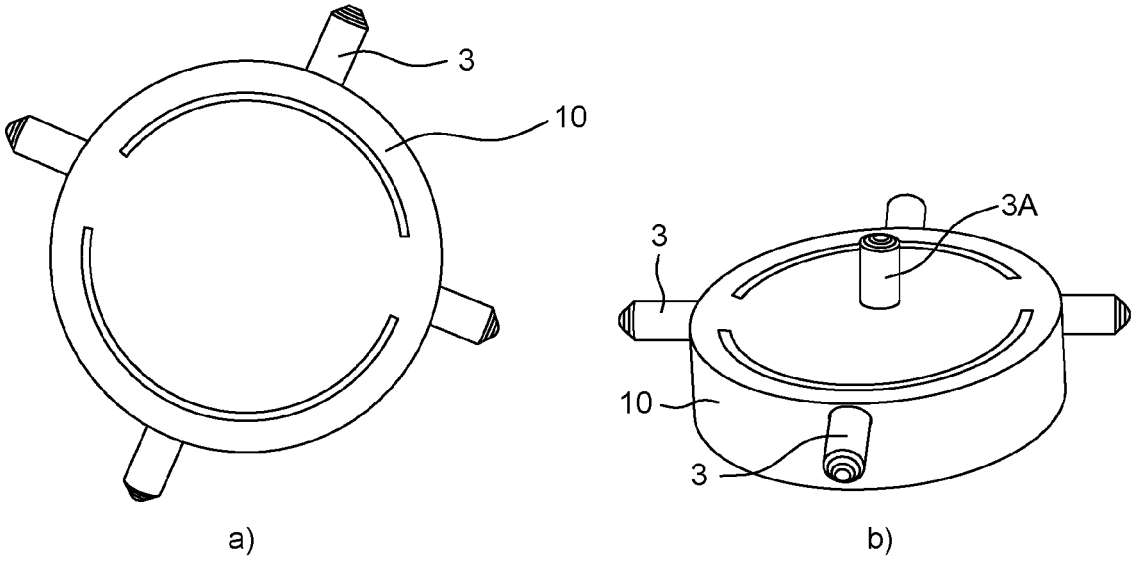

Fig. 4

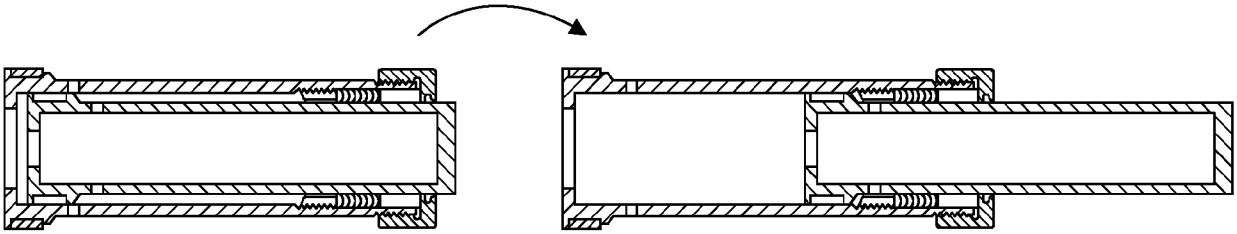

Fig. 5

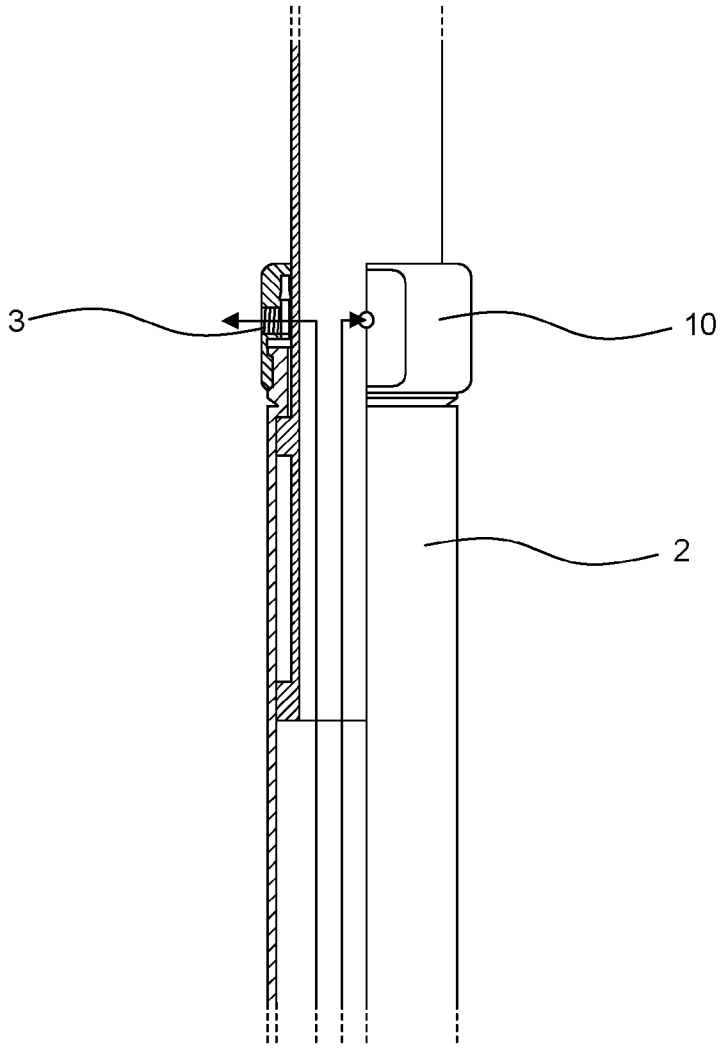

Fig. 6

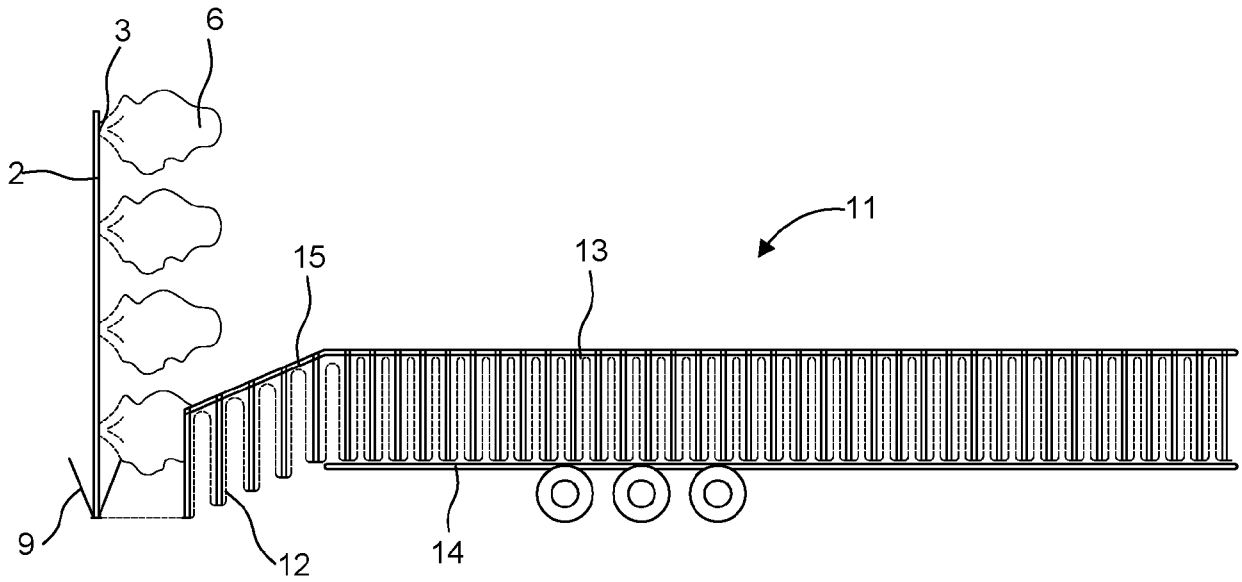

Fig. 7

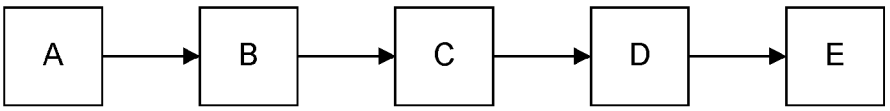

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 24 21 1616

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 2020 0068367 A (TAEYOUNG TECH INC [KR]) 15 June 2020 (2020-06-15) * paragraph [0065]; figures *	1-15	INV. A62C2/08 A62C3/02
X	US 2019/175965 A1 (HUEFNER BRYCE [US]) 13 June 2019 (2019-06-13) * paragraph [0026]; figures *	1,14	
A	US 2008/271903 A1 (LINDSTROM TORBJORN [SE] ET AL) 6 November 2008 (2008-11-06) * paragraph [0099]; figures *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A62C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 March 2025	Vervenne, Koen

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 21 1616

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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21-03-2025

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