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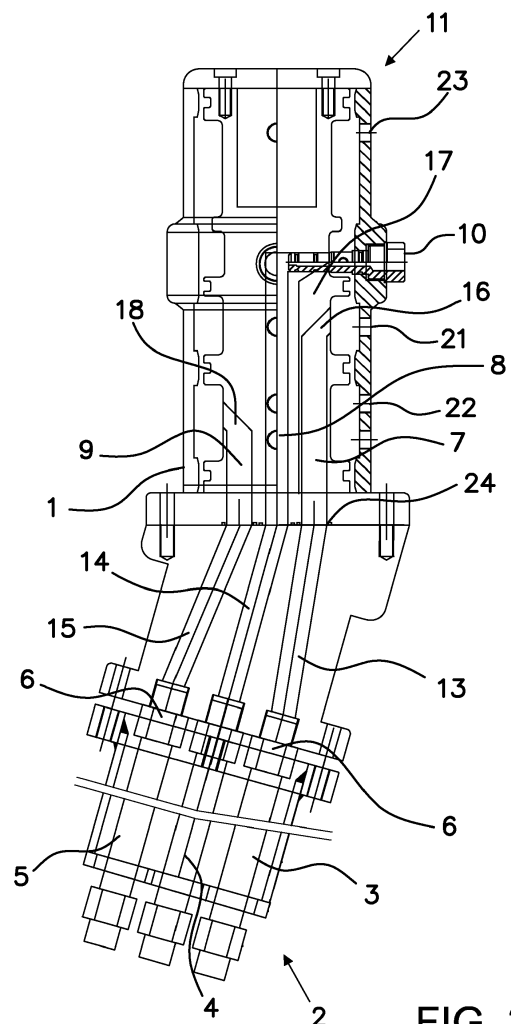
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(54) **HEAD AND POLE FOR SNOWMAKING MACHINE**

(57) It comprises a body (1) pertaining to a head (11) fixed to a pole (2) of said machine, the head (2) fixed by connection means (6) of the pole (2), first tubular elements (3,4,5) provided within pole (2) and connect to the second tubular elements (7,8,9) pertaining to body (1), a liquid fluid and an air carried throughout first tubular elements (3,4,5) to second tubular elements (7,8,9) and flowing through holes (10) provided on the body (1) to form artificial snow then characterised in that it comprises third tubular elements (12,13,14,15) pertaining to the head (11) that connect first tubular elements (3,4,5) to second tubular elements (7,8,9) and in that said third tubular elements (12,13,14,15):

- have a different inclination with respect to first tubular elements (3,4,5) and to second tubular elements (7,8,9),
- have a greater inclination than first tubular elements (3,4,5) defining that second tubular elements (7,8,9) are aligned to the vertical axis, and
- have a different inclination with respect to each of them.



**FIG. 2**

## Description

**[0001]** Head and pole for snowmaking machine.

**[0002]** A head and a pole for a snowmaking machine of the type comprising a body pertaining to the head fixed to the pole of said machine, the head fixed by connection means of the pole, first tubular elements provided within the pole and connected to second tubular elements pertaining to the body, a liquid fluid and an air carried throughout the first tubular elements to second tubular elements and flowing through holes provided on the body to form artificial snow and comprising therefore third tubular elements pertaining to the head that connect the first tubular elements to the second tubular elements and said third tubular elements have: a different inclination with respect to the first tubular elements and to the second tubular elements, a greater inclination than the first tubular elements defining that the second tubular elements are aligned to the vertical axis and a different inclination with respect to each of them.

## BACKGROUND OF THE INVENTION

**[0003]** There are known in the state of art different heads, poles or snowmaking machines disclosing the heads and poles.

**[0004]** So, the state of the art includes European Patent No. 1123479 (ES2178481) "CABEZA DE PULVERIZACION POLIVALENTE PARA LA FABRICACION DE NIEVE ARTIFICIAL", (Multipurpose spray head for making artificial snow) from the year 1999, in the name of YORK NEIGE, now public domain, which relates to a spray head for making artificial snow comprising several nozzles or jets arranged radially on the periphery thereof and fed in a separate manner by pressurized water systems, characterized in that the said nozzles or jets are arranged on a tubular sleeve whose axis is close to the vertical under operating conditions, which sleeve holds a core element that is fitted with radial partitions in order to divide in a watertight fashion, the internal space of the said sleeve into several chambers, connected to the said pressurised water systems in order to feed the said chambers.

**[0005]** Another patent that protects the same concept mentioned above in the preceding European patent, is a Spanish Patent No. 1790923 "CABEZAL DE PULVERIZACIÓN" (Spray head), applied for in 2006 in the name of LEOTECH S.R.L., which relates to a machine for producing artificial snow, that comprises a core element provided with nebulizing means arranged for nebulizing water and/or an air/water mixture, sleeve means associated with said core element and leaving a gap between said core element and said sleeve means, so that at least part of said nebulizing means can be supplied with water passing through said gap, said gap being a single gap extending between a base body of said core element that enables water and/or air to be dispensed to pass through and that part of said nebulizing means further away from

said base body, said nebulizing means comprising nucleating nozzles for creating said air/water mixture that is nebulized to generate freezing nuclei and dispensing nozzles arranged for nebulizing the water, characterized in that said nucleating nozzles and said dispensing nozzles are fixed to said core element and comprise at least a portion received in said gap.

## BRIEF DESCRIPTION OF THE INVENTION

**[0006]** This application falls within the field of the machines for producing artificial snow, especially for ski slopes, in particular the ones that disclose the head.

**[0007]** Generally these machines use basically at least one liquid fluid, for example, water and an air so that once they release through the head nozzles or openings, they form the snow outside by the air and water mixture.

**[0008]** One of the problems that these machines faced is that the liquid fluid usually freezes inside the machine.

**[0009]** The closest document is European Patent No. 1123479 (ES2178481). Said patent solves the problem of how to avoid ice forming in the chambers of snowmaking machines by reducing the stop necessity for discharge and clean said ice. This is achieved by means of a head inclined with respect to the pole.

**[0010]** The problem is that liquid fluid continues to freeze, with ice forming in the ducts or tubular elements, since not all the liquid fluid is removed from the tubular elements. If all the liquid fluid is not removed from the head, the liquid fluid freezes when said snowmaking machine is not in use, and the ice by expanding ends up cracking the ducts or tubular elements.

**[0011]** Therefore, the problem to be solved by this invention is how to remove completely the liquid fluid from the head to prevent it from freezing and cracking the tubular elements as a result of the outside cold.

**[0012]** The inventor has solved the above-mentioned problem by introducing tubular elements between the tubular elements coming from the pole and the tubular elements coming from the head, this way, it gives to the unit an additional inclination which means that if any liquid fluid remains, it falls by gravity into the machine's deposit in the base of the pole, and does not remain in the ducts.

**[0013]** Furthermore, it is possible with this inclination to arrange the head vertically and allow a better projection of the artificial snow over the slope once it is formed.

**[0014]** An object of this invention is a head and a pole for a snowmaking machine of the type comprising a body pertaining to the head fixed to the pole of said machine, the head fixed by connection means of the pole, first tubular elements provided within the pole and connected to second tubular elements pertaining to the body, a liquid fluid and an air carried throughout the first tubular elements to second tubular elements and flowing through the holes provided on the body to form artificial snow and comprising therefore third tubular elements pertaining to the head that connect the first tubular elements to the second tubular elements and said third tubular elements

have: a different inclination with respect to the first tubular elements and to the second tubular elements, a greater inclination than the first tubular elements defining that the second tubular elements are aligned to the vertical axis and a different inclination with respect to each of them.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0015] To facilitate the explanation, four sheets of drawings are attached to this specification, representing a practical embodiment, which is provided as a non-limiting example of the scope of this invention:

- Figure 1 is a side view of a snowmaking machine (pole and head) with the head in section,
- Figure 2 is a view of a sectioned head,
- Figure 3 is a detail of the intermediate support,
- Figure 4 is a sectional view along line IV-IV in Figure 3, and
- Figure 5 is a transparency of Figure 2.

## SPECIFIC EMBODIMENT OF THIS INVENTION

[0016] Thus, Figure 1 illustrates a head 11 and a pole 2.

[0017] Figure 2 represents a body 1 of the head 11, the pole 2, connection means 6, first tubular elements 3,4,5, second tubular elements 7,8,9, third tubular elements 13,14,15, holes 10,21,22,23, O-rings 24 and inclined connections 16,17,18.

[0018] Figure 3 illustrates an intermediate support 20 and the third tubular elements 12, 13, 14,15.

[0019] Figure 4 illustrates the intermediate support 20 and tubular elements 13, 14,15.

[0020] Figure 5 illustrates the head 11, the pole 2, first tubular elements 3,4,5 and third tubular elements 13,14,15.

[0021] Hence, in a specific embodiment the head 11 comprises the body 1 that is attached to the pole 2 pertaining to the machine. Said join is made by connection means 6 of pole 2 already known.

[0022] There are first tubular elements 3,4,5 within pole 2 which transport the liquid fluid, in this case the water and the air, to second tubular elements 7,8,9. The water and air exit to the ski slope through holes 10, 21, 22 and 23 (due the view, only these can be seen, even though it is understood that there are more ones) and then the snow is formed in the outside by the mixing of the water and air.

[0023] The hole 10 releases the air, although optionally, as will be explained later, by energy consumption issue will be air with water, and the holes 21, 22, 23, release the water.

[0024] Second tubular elements 7,8,9 connect to first tubular elements 3,4,5 by means of third tubular elements 13,14,15 that join them, defining a continuous passage from pole 2 to hole 10.

[0025] Said third tubular elements 13,14,15, are within

the head 11, and they are the ones that allow the easy return of the extra water, which has not released through holes 10,21,22,23 preventing it from freezing, and thus first tubular elements 3,4,5 prevent from cracking due to the water freezing and expanding inside first tubular elements 3,4,5.

[0026] Third tubular elements 13,14,15 have a different inclination with respect to first tubular elements 3,4,5 and second tubular elements 7,8,9. This means that, when the head 11 is situated in the vertical position, second tubular means 7,8,9 are arranged the same, but as third tubular elements 13,14,15 are at an inclination, they help the water to accelerate due to gravity and to fall inside the tubular elements.

[0027] Further when the water enters first tubular elements 3,4,5 the water does not lose said acceleration and continues going down, and does not remain in first tubular means 3,4,5.

[0028] This is also facilitated because third tubular elements 13,14,15 have a greater inclination than first tubular elements 3,4,5 defining that second tubular elements 7,8,9 are aligned to the vertical axis, in other words having as a reference that second tubular elements 7, 8, 9 are aligned with the ordinate axis or parallel to it.

[0029] Therefore, when the water remains within second tubular elements 7,8,9, the gravity carries it towards third tubular elements 13,14,15, and, having a certain inclination, it starts to accelerate and it is guided towards first tubular elements 3,4,5 through which it runs to the chamber in the base of pole 2.

[0030] Furthermore, third tubular elements 13,14,15 have a different inclination with respect to each other in order to facilitate that holes 10,21,22,23 are being in all directions.

[0031] Optionally, it can be configured such that first tubular elements 3,4,5 are more separated from one another than second tubular elements 7,8,9.

[0032] This defines a narrowing by connecting the third tubular elements 13,14,15, to the first tubular elements 3,4,5 and to second tubular elements 7,8,9, as can be seen in Figure 2.

[0033] This is carried out thus because it allows more space for openings 10,21,22,23, so that they can be cleaned if there is any water trapped or frozen in openings 10,21,22,23.

[0034] This way there is more space for removing and changing said openings 10,21,22,23 if any of them are defective.

[0035] The connection of second tubular elements 7,8,9 to holes 10,21,22,23 is made by inclined downward connections 16,17,18 with respect to second tubular elements 7,8,9.

[0036] Said inclined connections 16,17,18 reduce the space of second tubular elements 7,8,9 that connect to holes 10,21,22,23, also reducing the length of the section of second tubular element 7,8,9 when in horizontal position, whereby it is difficult for any water to be retained in said second tubular elements 7,8,9.

[0037] Another manufacturing option would be that shown in Figures 3 and 4, i.e., arranging an intermediate support 20 belonging to head 11, which houses third tubular elements 13,14,15. Said intermediate support 20 connects the body 1 to the pole 2, and first tubular elements 3,4,5 to third tubular elements 13,14,15 and these ones to second tubular elements 7,8,9.

[0038] This option makes the unit very versatile as it facilitates the replacement, if necessary, of the damaged or blocked parts.

[0039] Faced with the possibility that inside the pole 2 first tubular elements 3,4,5 could have some kind of block or similar that would render them useless, instead of having to change the pole 2 as happens now, it is proposed optionally that the pole 2 is a hollow tubular element, within which the first tubular elements 3,4,5 are arranged the first tubular elements 3,4,5.

[0040] These first tubular elements 3,4,5 are made of tubes or hoses for hydraulic use, for example synthetic rubber or polyester, with high-strength steel spirals, etc., this way, if said tube or hose is damaged the operator would only have to change that particular hose or tube, and not pole 2 as happens in some cases until now.

[0041] Finally, also optionally, the inventor has looked for a formula to reduce compressors consumption.

[0042] Thus, in the tubular elements, the central one 4,8,14 carries air, while the others three carry water. The inventor has seen that by making water as well as air come out from the central tubular element 4,8,14 the same end product is created and also air compressor consumption is reduced by 50% depending on the temperature.

[0043] This invention describes a new head and pole for machines that make snow. The examples mentioned herein do not limit this invention, and therefore it could have different applications and/or adaptations, all within the scope of the following claims.

## Claims

1. Head and pole for snowmaking machine of the type comprising a body (1) pertaining to a head (11) fixed to a pole (2) of said machine, the head (2) fixed by connection means (6) of the pole (2), first tubular elements (3,4,5) provided within the pole (2) and connect to the second tubular elements (7,8,9) pertaining to the body (1), a liquid fluid and an air carried throughout the first tubular elements (3,4,5) to second tubular elements (7,8,9) and flowing through holes (10) provided on the body (1) to form artificial snow then **characterised in that** it comprises third tubular elements (12,13,14,15) pertaining to the head (11) that connect first tubular elements (3,4,5) to second tubular elements (7,8,9) and **in that** said third tubular elements (12,13,14,15):

- have a different inclination with respect to first

tubular elements (3,4,5) and to second tubular elements (7,8,9),

- have a greater inclination than first tubular elements (3,4,5) defining that second tubular elements (7,8,9) are aligned to the vertical axis, and

- have a different inclination with respect to each of them.

2. Head and pole, according to claim 1, **characterised in that** first tubular elements (3,4,5) are more separated from each other than second tubular elements (7,8,9) defining a narrowing when connecting third tubular elements (12,13,14,15) to first tubular elements (3,4,5) and to second tubular elements (7,8,9)

3. Head and pole, according to claim 2, **characterised in that** the connection of second tubular elements (7,8,9) to holes (10,21,22,23) is made by connections inclined downward (16,17,18) with respect to second tubular elements (7,8,9).

4. Head and pole, according to claim 1, **characterised in that** third tubular elements (12,13,14,15) are housed in an intermediate support (20) pertaining to head (11), which connects body (1) to pole (2).

5. Head and pole, according to claim 1, **characterised in that** pole (2) is a hollow tubular element within first tubular elements (3,4,5) are arranged such that are made of tubes or hoses for hydraulic use.

6. Head and pole, according to at least one of the preceding claims, **characterised in that** also the water releases throughout hollow tubular element (4,8,14) intended for the release of air.

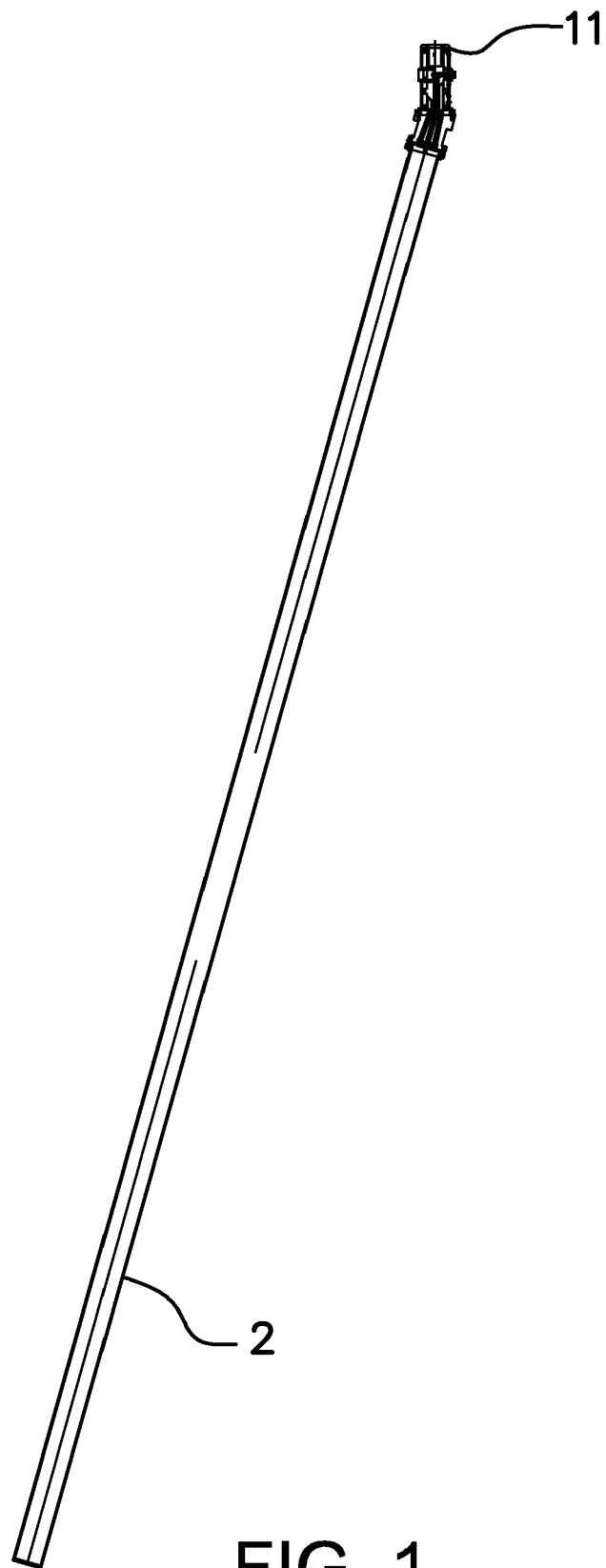
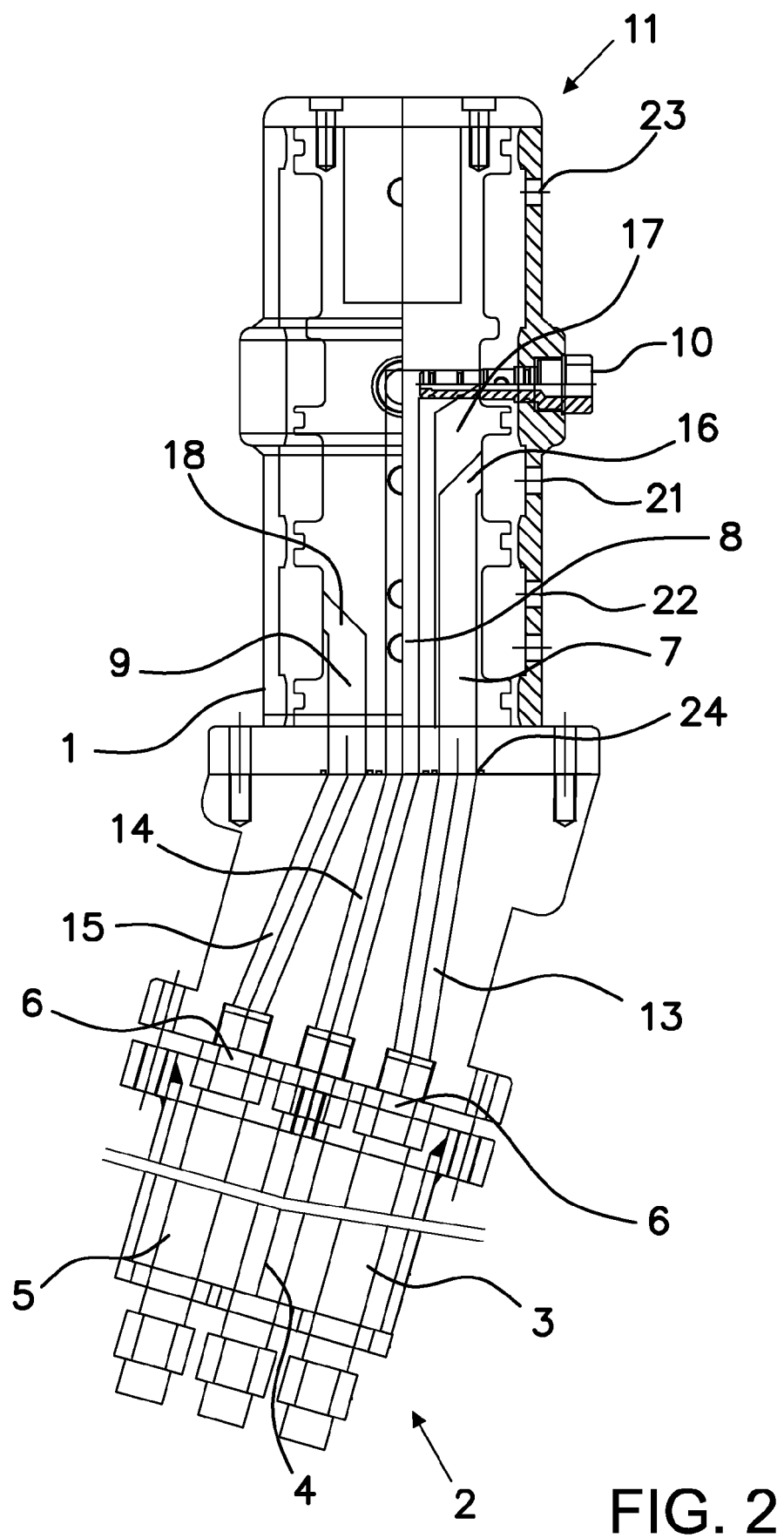


FIG. 1



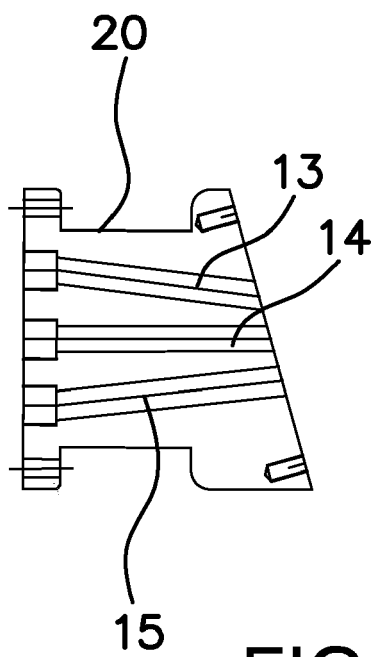


FIG. 4

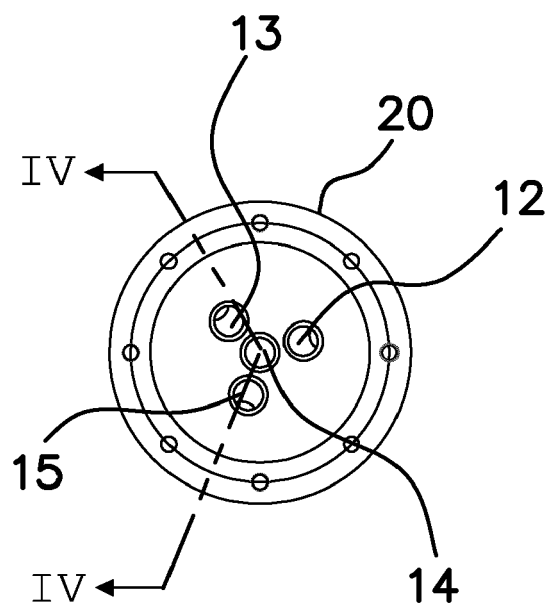


FIG. 3

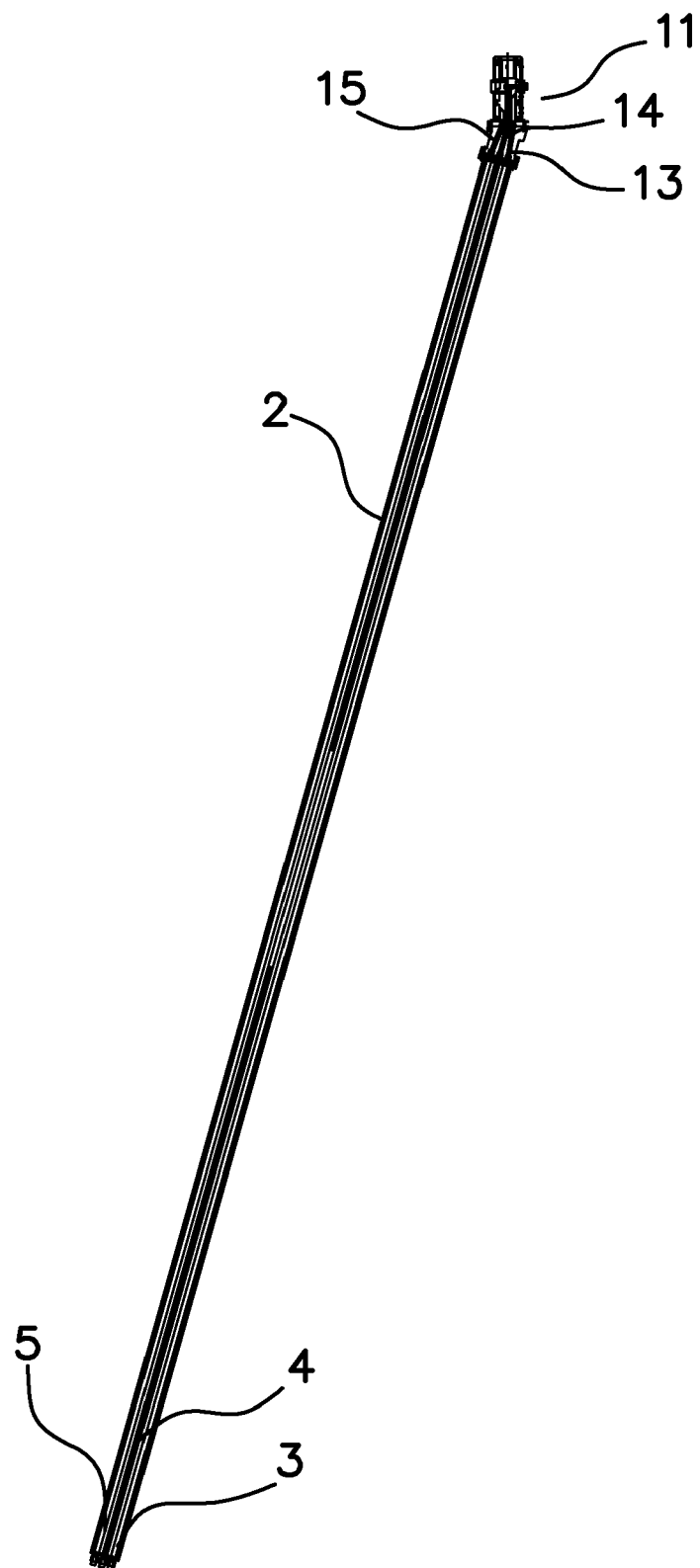


FIG. 5





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Application Number  
EP 17 38 2009

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Place of search The Hague		Date of completion of the search 8 June 2017	Examiner Larrañeta Reclusa, I
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