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(54) **SPRINKLER WITH ADJUSTABLE SPRINKLING ELEMENTS**

(57) A sprinkler consists of a base and a plurality of sprinkling elements. The base has a first main body and a second main body. A plurality of connecting pipe portions extends from the circumferential edge of the second main body evenly. A groove is arranged on a side of the circumferential edge of the respective connecting pipe portion in such a way that it communicates with the internal space of the connecting pipe portion. The respective sprinkling element has a first housing and a second housing which match with other. A control mount is mounted between the first housing and the second housing. A plurality of clearance holes, a plurality of through holes, and a plurality of driving holes are arranged at corresponding places on the first housing, the second housing, and the control mount. An external threaded tube is arranged at one end of the control mount, extending out of the first housing and the second housing. A screwed connection is screwed on the external threaded tube. A spraying unit is mounted inside the first housing.

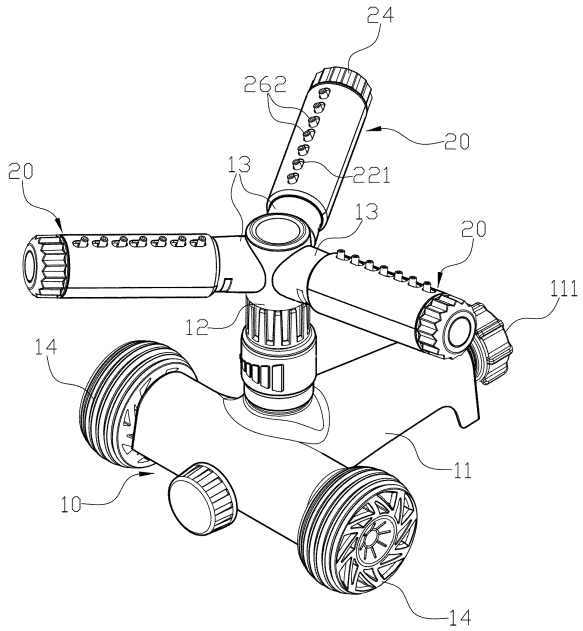

FIG. 1

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Description

BACKGROUND of INVENTION

1. Field of Invention

[0001] The present invention relates to sprinklers, and more particularly to a sprinkler having an arrangement for adjusting the spray angle and the spraying direction.

2. Description of the Related Art

[0002] Conventional sprinklers are generally constructed in such a way that the sprinkler has a base which is to be put down on the ground. The base is provided with a standpipe. One end of the standpipe is to be connected to a water source (for instance a water hose), and a plurality of sprinkling rods extend from the other end of the standpipe. The sprinkling rods and the standpipe communicate with each other, enabling water to be sprayed out of the sprinkling rods to a certain extend.

[0003] However, the spray angle of the conventional sprinklers is fixed and not adjustable. Such conventional sprinklers are suitable for watering small areas. For large areas to be watered, it is required to use many sprinklers at the same time or to move a sprinkler frequently, which is quite inconvenient for the user.

SUMMARY OF THE INVENTION

[0004] An objective of present invention is to provide a sprinkler having an arrangement for adjusting the spray angle and the spraying direction.

[0005] To achieve these and other objects of the present invention, a sprinkler with adjustable sprinkling elements is provided. The sprinkler consists of a base and a plurality of sprinkling elements. A hollow first main body and a hollow second main body are arranged inside the base. The second main body is vertically connected to the top margin of the first main body. The first main body and the second main body communicate with each other. An inlet portion is arranged at one end of the first main body for connecting a water supply. The water will be conveyed into the second main body and then sprayed out. The upper end of the second main body is sealed. A plurality of connecting pipe portions extends from the circumferential edge of the second main body evenly. The connecting pipe portions all communicate with the second main body. A groove is arranged on a side of the circumferential edge of the respective connecting pipe portion in such a way that it communicates with the internal space of the connecting pipe portion. The respective sprinkling element has a first housing and a second housing which match with other. A control mount is mounted between the first housing and the second housing, namely on the top side of the first housing. A plurality of clearance holes, a plurality of through holes, and a plurality of driving holes are arranged at corresponding places on the first housing, the second housing, and the control mount. The through holes are elongated holes. An external threaded tube is arranged at one end of the control mount, extending out of the first housing and the second housing. A screwed connection is screwed on the external threaded tube. The screwed connection is pivoted on a sealed surface at one end of the first housing by means of a pivot pin in such a way that the screwed connection brings the control mount to move translationally under the action of a force. Therefore, the driving holes and the clearance holes are staggered. A spraying unit is mounted inside the first housing, and a hollow tube-shaped adapter is connected to an opening at the other end of the first housing. The spray unit has a plurality of nozzles which are linked to each other by a base plate. The nozzles can be toggled to adjust the spray angle. In the state that the spray unit is fixed inside the first housing, the nozzles go through the clearance holes, the driving holes, and the through holes and then protrude from the through holes. A plurality of notches is arranged on the adapter. Due to the arrangement that the adapter is inserted into the connecting pipe portion of the base and fastened by a fastener engaged with the notch in the groove, the sprinkling element can be surely secured on the base, avoiding the sprinkling element's moving from the base. Moreover, the groove is larger than the fastener, allowing the fastener to rotate in the groove and thus the adjusting of the spraying direction of the whole sprinkling element.

[0006] The sprinkler with adjustable sprinkling elements according to the invention is advantageous in this aspect that the spray angle and the spraying direction of the sprinkler are both adjustable, facilitating a larger spray area and a wider application of the sprinkler.

[0007] The sprinkler with adjustable sprinkling elements according to the invention is furthermore advantageous in this aspect that a large-area spraying is possible with the sprinkler, contributing to a decrease in the number of sprinklers for the same unit area to be irrigated. Thus, it requires less time and labor to mount and arrange the sprinklers.

[0008] Other objects, advantages, and novel features of invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION of DRAWINGS

[0009]

FIG. 1 is a perspective view of a preferred embodiment of a sprinkler with adjustable sprinkling elements according to the present invention.

FIG. 2 is an exploded view of the sprinkler in FIG. 1.

FIG. 3 is an exploded view of a sprinkling element of the sprinkler in FIG. 1.

FIG. 4 is a sectional view of the sprinkler in FIG. 1 in the assembled condition.

FIG. 5 is a schematic of a section of the sprinkler in FIG. 4 in the assembled condition.

FIG. 6 is a sectional view of the sprinkler in FIG. 1 in the assembled condition from another perspective.

FIG. 7 is a schematic showing the adjusting of the spraying direction of the sprinkler in FIG. 1.

FIG. 8 is a schematic showing spraying water of the sprinkler in FIG. 1

FIG. 9 is a schematic showing the adjusting of the spray angle of the nozzles on the sprinkler in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] First, please refer to FIG. 1 to FIG. 6, a sprinkler with adjustable sprinkling elements according to the invention consists of a base 10 and a plurality of sprinkling elements 20. A hollow first main body 11 and a hollow second main body 12 are arranged inside the base 10. The second main body 12 is vertically connected to the top margin of the first main body 11. The first main body 11 and the second main body 12 communicate with each other. An inlet portion 111 is arranged at one end of the first main body 11 for connecting a water supply. The water will be conveyed into the second main body 12 and then sprayed out. The upper end of the second main body 12 is sealed. A plurality of connecting pipe portions 13 extends from the circumferential edge of the second main body 12 evenly. The connecting pipe portions 13 all communicate with the second main body 12. A groove 131 is arranged on a side of the circumferential edge of the respective connecting pipe portion 13 in such a way that it communicates with the internal space of the connecting pipe portion 13. The respective sprinkling element 20 has a first housing 21 and a second housing 22 which match with other. A control mount 23 is mounted between the first housing 21 and the second housing 22, namely on the top side of the first housing 21. A plurality of clearance holes 211, a plurality of through holes 221, and a plurality of driving holes 231 are arranged at corresponding places on the first housing 21, the second housing 22, and the control mount 23. The through holes 221 are elongated holes. An external threaded tube 232 is arranged at one end of the control mount 23, extending out of the first housing 21 and the second housing 22. A screwed connection 24 is screwed on the external threaded tube 232. The screwed connection 24 is pivoted on a sealed surface 212 at one end of the first housing 21 by means of a pivot pin 25 in such a way that the screwed connection 24 brings the control mount 23 to move translationally under the action of a force. Therefore, the driving holes 231 can be staggered in relation to the clearance holes 211. A spraying unit 26 is mounted inside the first housing 21, and a hollow tube-shaped adapter 27 is connected to an opening 213 at the other end of the first housing 21. The spray unit 26 has a plurality of nozzles 232 which are linked to each other by a base plate 261. The nozzles 232 can be toggled to adjust the spray angle. In the state that the spray unit 26 is fixed inside the first housing 21, the nozzles 232 go through the clearance holes 211, the driving holes 231, and the through holes 221 and then protrude from the through holes 221. A plurality of notches 271 is arranged on the adapter 27. Due to the arrangement that the adapter 27 is inserted into the connecting pipe portion 13 of the base 10 and fastened by a fastener 30 engaged with the notch 271 in the groove 131, the sprinkling element 20 can be surely secured on the base 10, avoiding the sprinkling element's being moved from the base 10. Moreover, the groove 131 is larger than the fastener 30, allowing the fastener 30 to rotate in the groove 131 and thus facilitating the adjusting of the spraying direction of the whole sprinkling element 20 (shown in FIG. 7).

[0011] According to the present invention, the base 10 is provided with wheels 14 capable of rolling on the ground.

[0012] According to the present invention, the respective connecting pipe portion 13 is arranged in such a way that it is tilting upwards from the second main body 12.

[0013] According to the present invention, detents 214 and slots 222 are respectively arranged in the first housing 21 and the second housing 22 in such a way that they can match each other respectively and be engaged with each other.

[0014] According to the present invention, the first housing 21 and the second housing 22 will then be jointed together by high frequency when they are assembled together.

[0015] According to the present invention, the first housing 21 and the second housing 22 will then be jointed together by ultrasonic sound when they are assembled together.

[0016] According to the present invention, a channel 215 is formed on the top face of the first housing 21. The control mount 23 is to be embedded into the channel 215. The clearance holes 211 go through the upper side of the channel 215.

[0017] According to the present invention, the control mount 23 is formed in such a way that the middle part of the control mount 23 is corrugated upwards. This constructive design ensures a decreased contact surface of the control mount 23, at which surface the control mount 23 is in contact with the first housing 21. Thus, the control mount 23 can be easier brought to move translationally.

[0018] According to the present invention, the base plate 261 and the nozzles 262 of the spraying unit 26 are connected with each other by means of an elastic portion 263. The elastic portion 263 ensures the nozzles 262 to

be toggled elastically.

[0019] According to the present invention, the nozzles 262 of the spraying unit 26 are made of elastic rubber or silicone.

[0020] According to the present invention, at least one seal ring is fitted on the adapter 27.

[0021] According to the present invention, the fastener 30 is a circlip having a plurality of lugs.

[0022] To use the sprinkler for irrigation, the water supply will be turned on. The water will flow from the inlet portion 111 into the base 10, pass through the first main body 11, the second main body 12, and the first housing 21 und finally sprayed out via the nozzles 262 of the spraying unit 26 (shown in FIG. 8). During the spraying, the control mount 23 can be brought to move translationally by the rotation of the screwed connection 24 in such a way that the driving holes 231 of the control mount 23 and the clearance holes 211 are staggered. The structural design that the through holes 221 are formed as elongated holes and the edges of the driving holes 231 serve as surfaces the nozzles 262 can abut on, the nozzles 262 can be unimpededly toggled to adjust the spray angle (shown in Fig. 9). Moreover, the spray angle can be further fine adjusted by rotating screwed connection 24 on different degrees. By rotating the sprinkling elements 20 on the connecting pipe portions 13, the spraying direction of the sprinkler can be adjusted (shown in Fig. 7). The design that the spray angle and the spraying direction of the sprinkler are both adjustable facilitates a larger spray area and a wider application of the sprinkler.

[0023] The sprinkler with adjustable sprinkling elements according to the invention is advantageous in this aspect that the spray angle and the spraying direction of the sprinkler are both adjustable, facilitating a larger spray area and a wider application of the sprinkler.

[0024] The sprinkler with adjustable sprinkling elements according to the invention is furthermore advantageous in this aspect that a large-area spraying is possible with the sprinkler, contributing to a decrease in the number of sprinklers for the same unit area to be irrigated. Thus, it requires less time and labor to mount and arrange the sprinklers.

[0025] Although the present invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of invention as hereinafter claimed.

Claims

1. A sprinkler with adjustable sprinkling elements, consisting of a base and a plurality of sprinkling elements, is **characterized in**
   that a hollow first main body and a hollow second main body are arranged inside the base the second main body being vertically connected to the top margin of the first main body, the first main body and the second main body communicating with each other, an inlet portion being arranged at one end of the first main body for connecting a water supply, the water being conveyed into the second main body and then sprayed out, the upper end of the second main body being sealed, a plurality of connecting pipe portions extending from the circumferential edge of the second main body evenly, the connecting pipe portions all communicating with the second main body, a groove being arranged on a side of the circumferential edge of the respective connecting pipe portion in such a way that it communicates with the internal space of the connecting pipe portion; and that the respective sprinkling element has a first housing and a second housing which match with other, a control mount being mounted between the first housing and the second housing, namely on the top side of the first housing, a plurality of clearance holes, a plurality of through holes, and a plurality of driving holes being arranged at corresponding places on the first housing, the second housing, and the control mount, the through holes being elongated holes, an external threaded tube being arranged at one end of the control mount and extending out of the first housing and the second housing, a screwed connection being screwed on the external threaded tube, the screwed connection being pivoted on a sealed surface at one end of the first housing by means of a pivot pin in such a way that the screwed connection brings the control mount to move translationally under the action of a force, the driving holes and the clearance holes being capable of being staggered, a spraying unit being mounted inside the first housing and a hollow tube-shaped adapter being connected to an opening at the other end of the first housing, the spray unit having a plurality of nozzles which are linked to each other by a base plate, the nozzles being capable of being toggled to adjust the spray angle, the nozzles going through the clearance holes, the driving holes, and the through holes and then protruding from the through holes when the spray unit being fixed inside the first housing, a plurality of notches being arranged on the adapter, the sprinkling element being capable of being surely secured on the base due to the adapter's being inserted into the connecting pipe portion of the base and fastened by a fastener engaged with the notch in the groove, which avoids the sprinkling element's being moved from the base, and the groove being larger than the fastener, which allows the fastener to rotate in the groove and thus facilitates the adjusting of the spraying direction of the whole sprinkling element.

2. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the base is provided with wheels capable of rolling on the ground.

3. The sprinkler with adjustable sprinkling elements as

claimed in claim 1, wherein the respective connecting pipe portion is arranged in such a way that it is tilting upwards from the second main body.

4. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein detents and slots are respectively arranged in the first housing and the second housing in such a way that they match each other respectively and are engaged with each other.

5. The sprinkler with adjustable sprinkling elements as claimed in claim 1 or 4, wherein the first housing and the second housing will then be jointed together by high frequency when they are assembled together.

6. The sprinkler with adjustable sprinkling elements as claimed in claim 1 or 4, wherein the first housing and the second housing will then be jointed together by ultrasonic sound when they are assembled together.

7. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein a channel is formed on the top face of the first housing and the control mount is to be embedded into the channel.

8. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the control mount is formed in such a way that the middle part of the control mount is corrugated upwards.

9. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the base plate and the nozzles of the spraying unit are connected with each other by means of an elastic portion.

10. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the nozzles of the spraying unit are made of elastic rubber.

11. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the nozzles of the spraying unit are made of elastic silicone.

12. The sprinkler with adjustable sprinkling elements as claimed in claim 1, wherein the fastener 30 is a circlip having a plurality of lugs.

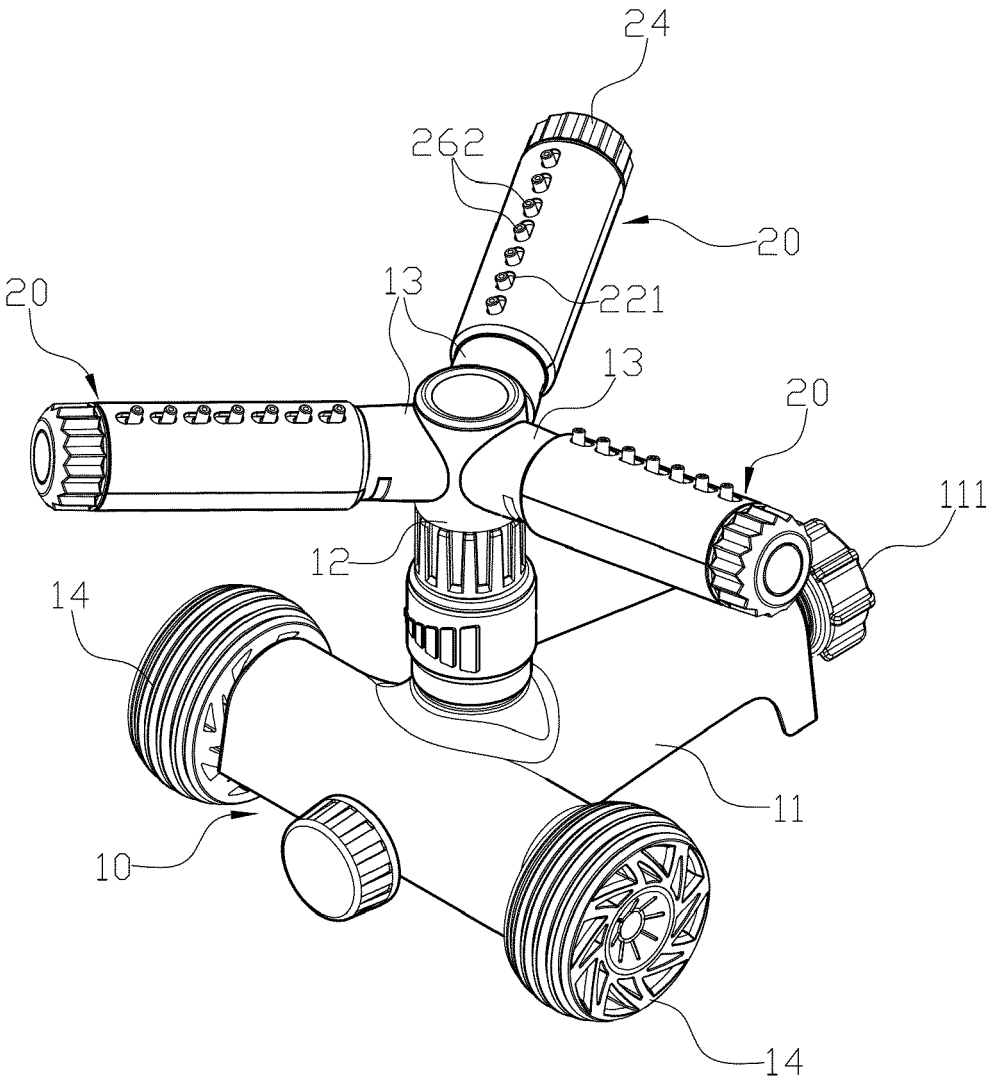
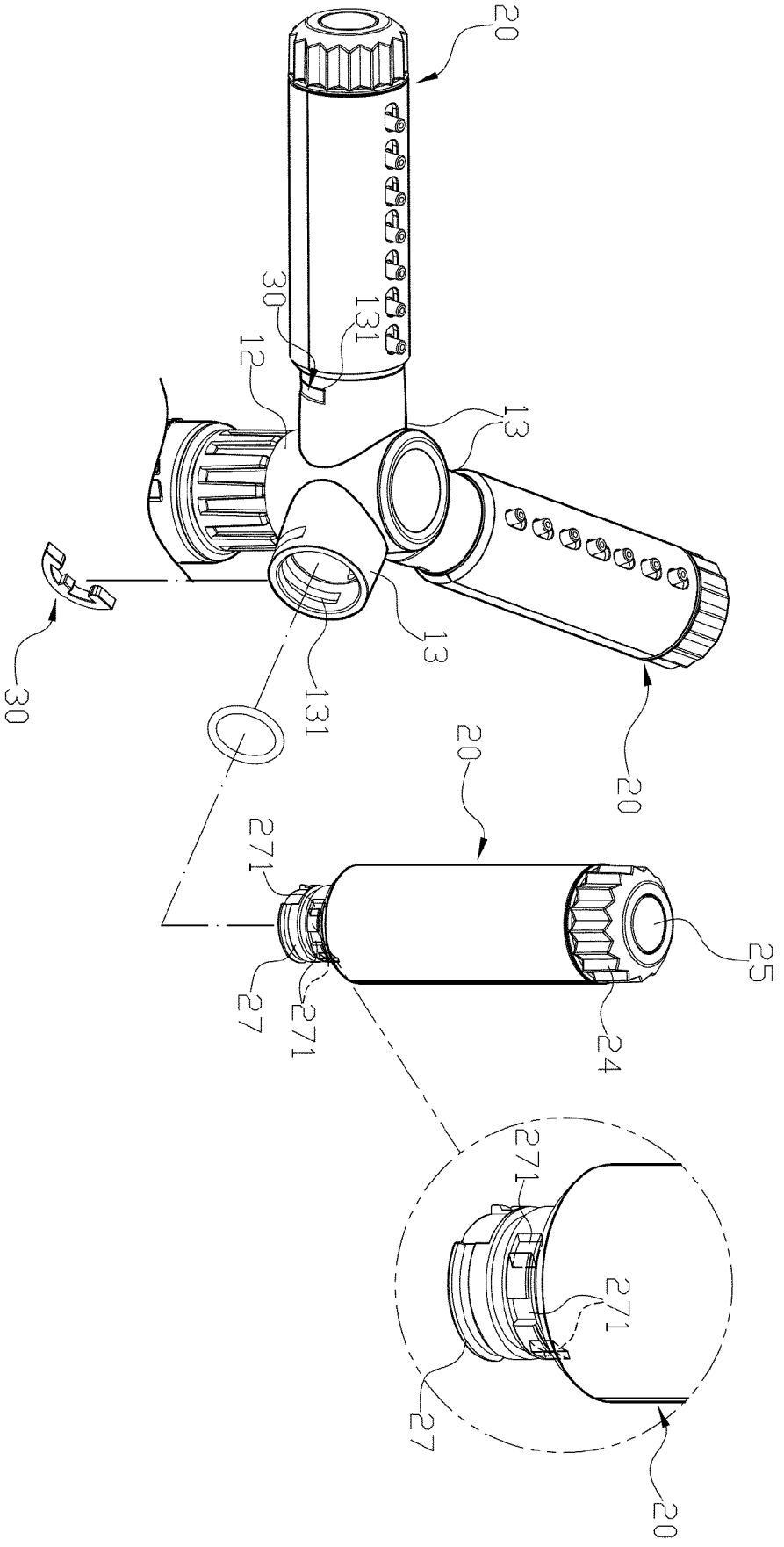


FIG. 1

FIG. 2



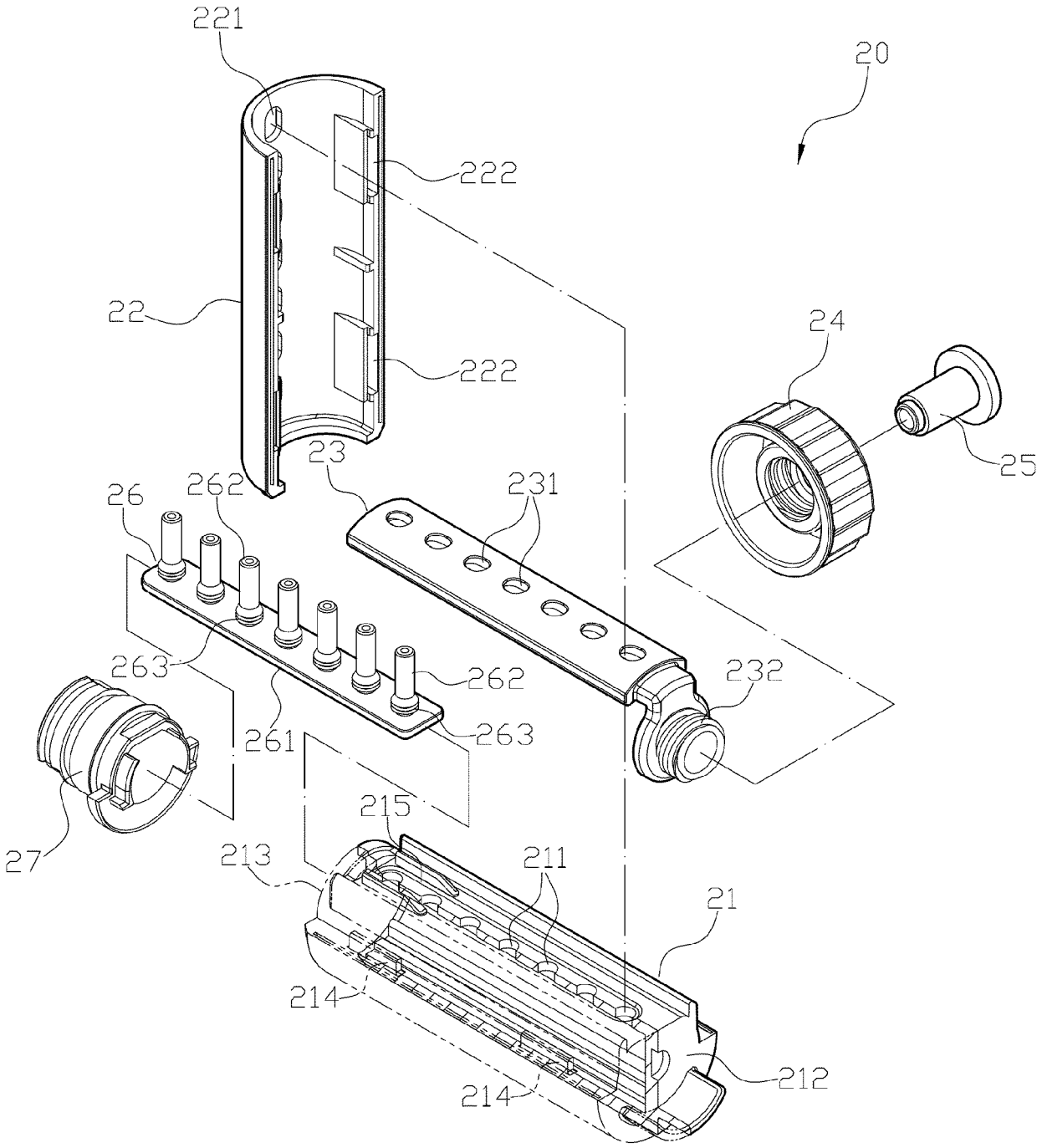

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FIG. 3

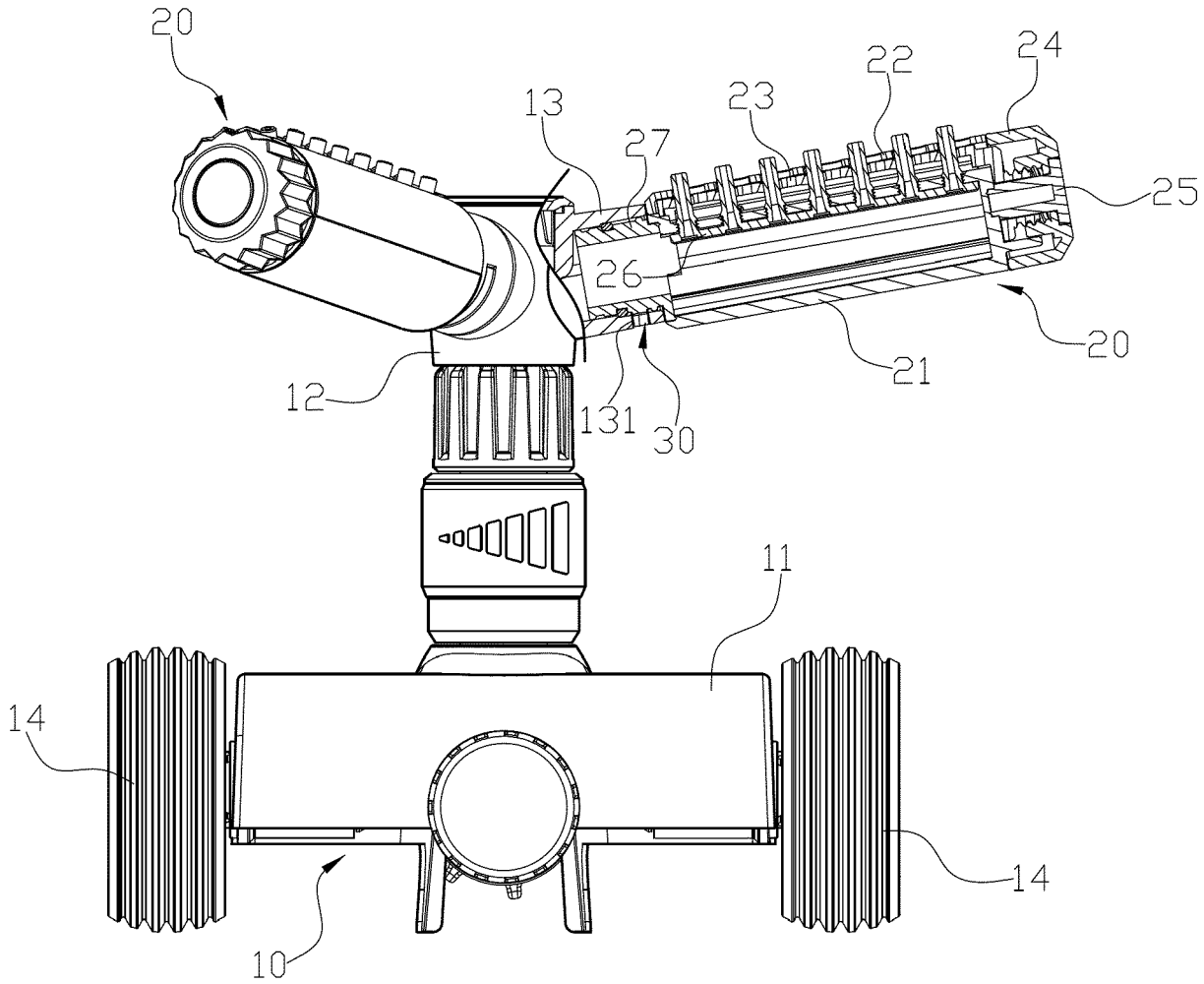


FIG. 4

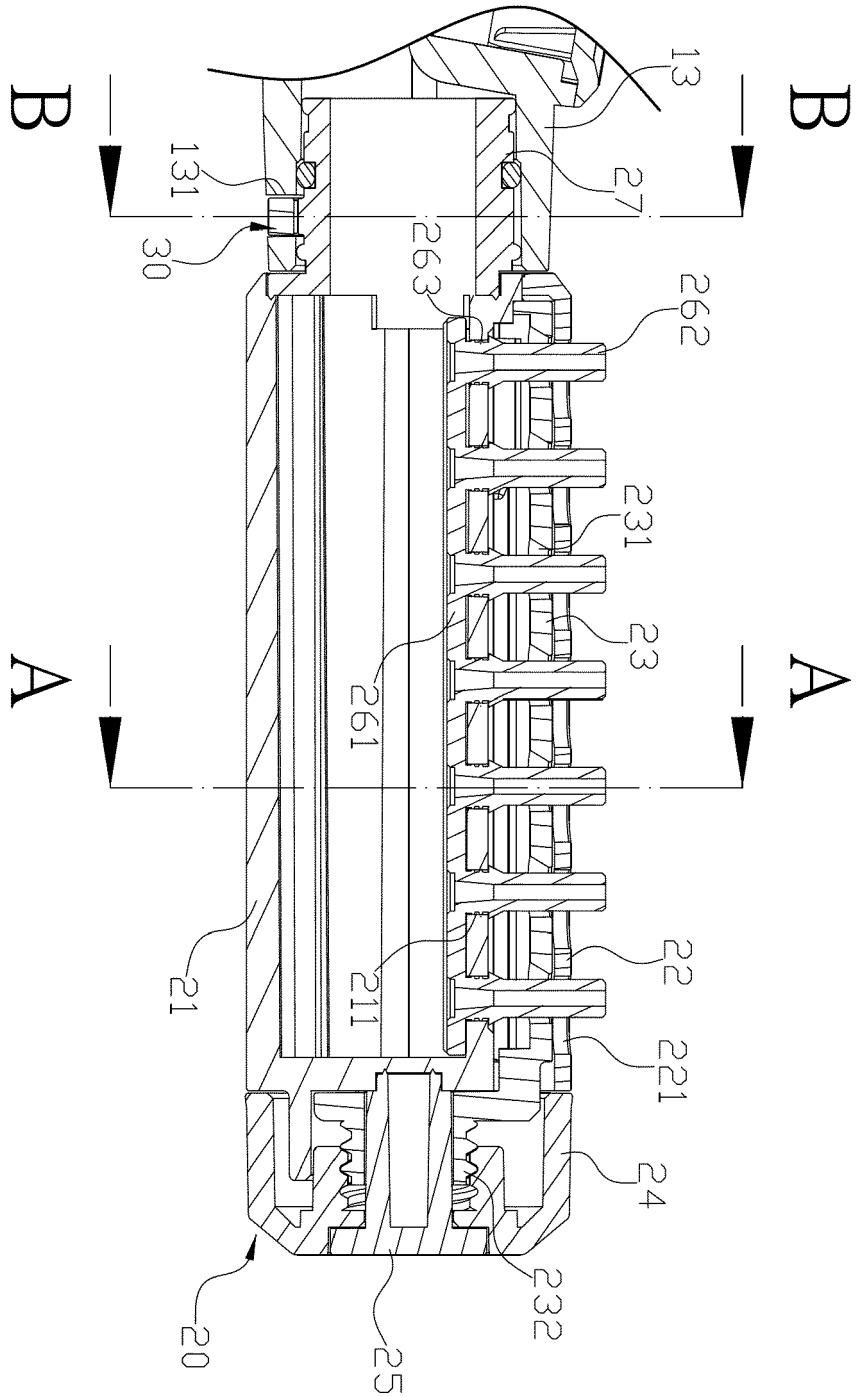
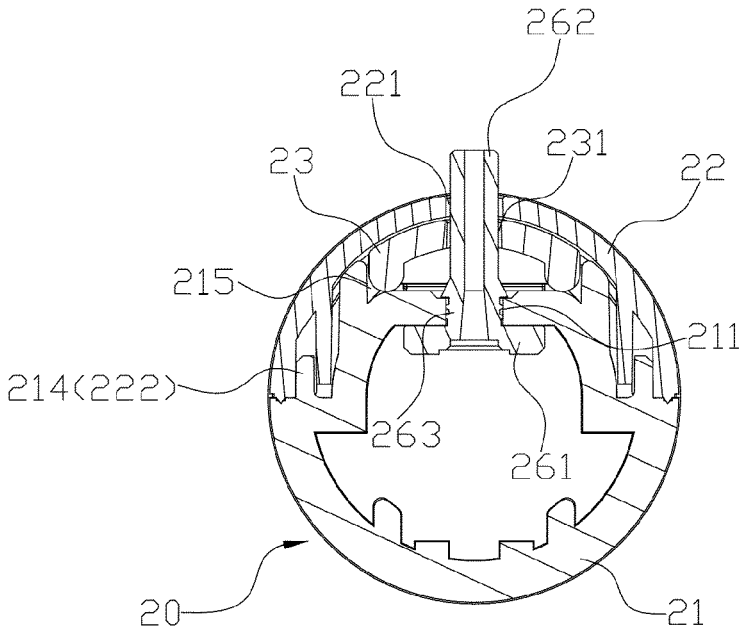
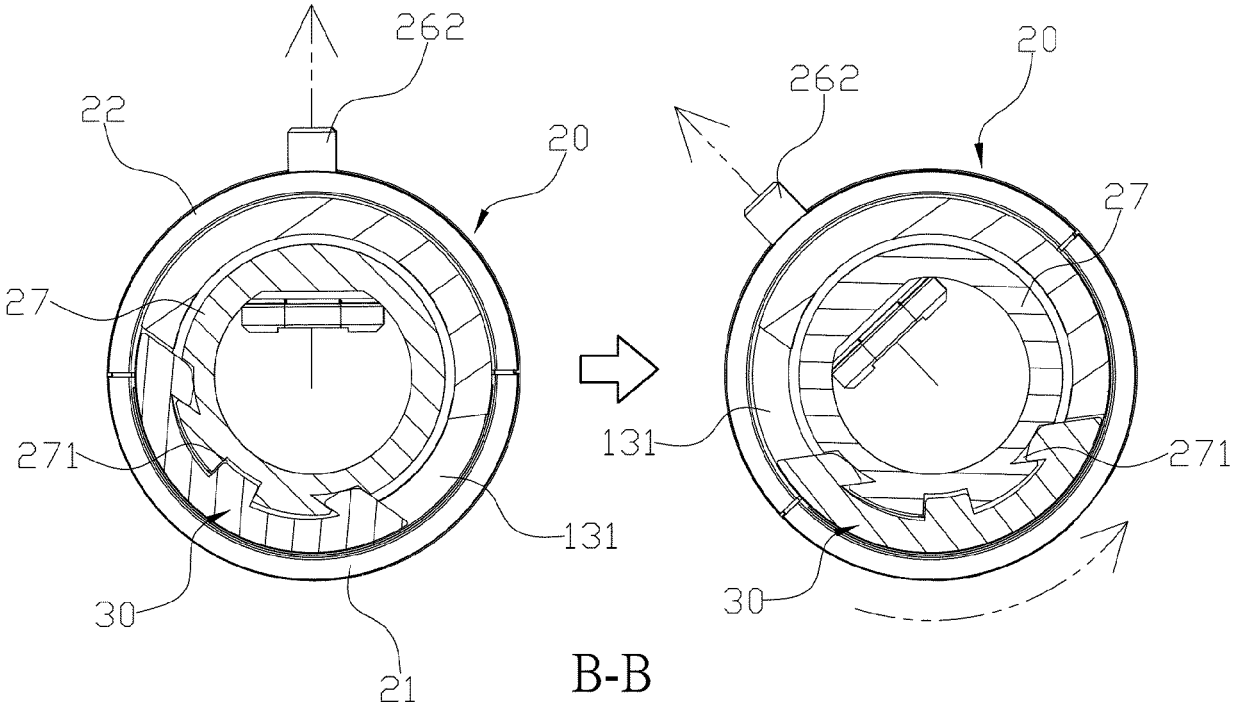


FIG. 5



A-A

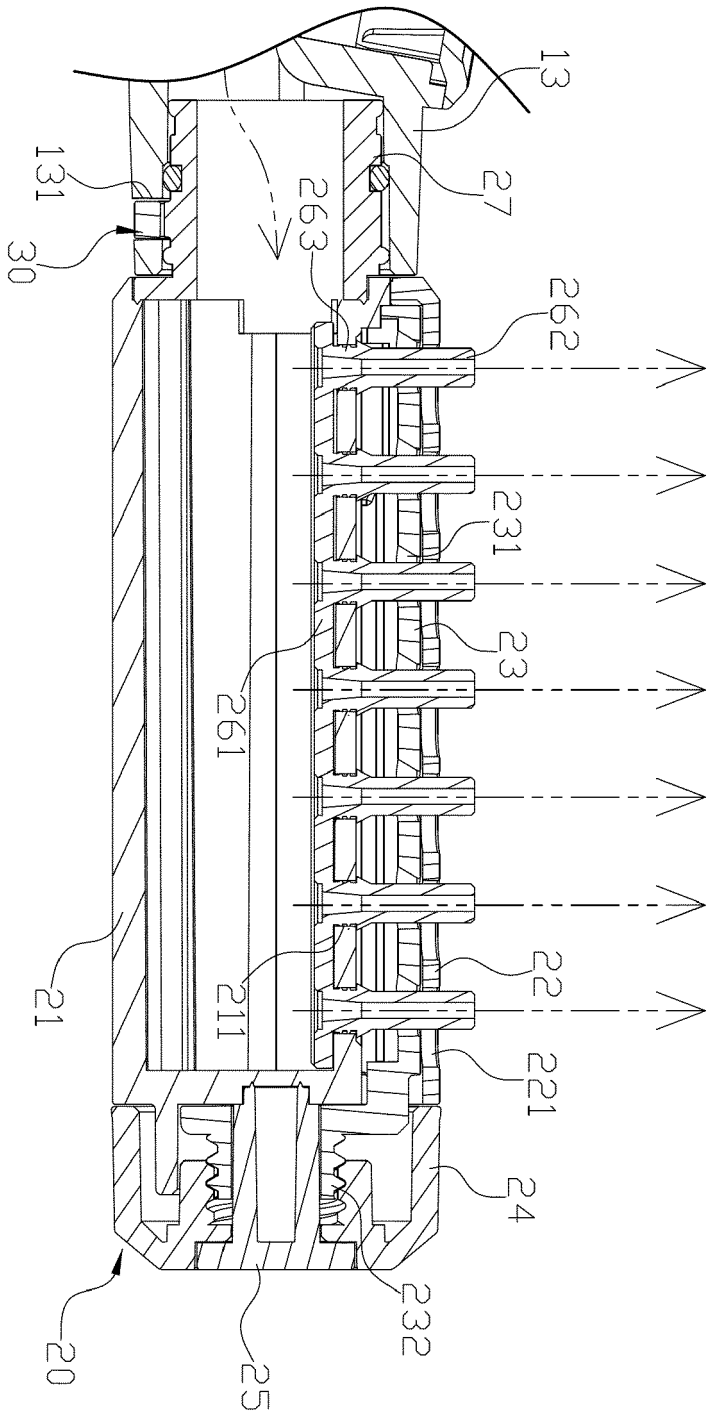
FIG. 6



B-B

FIG. 7

FIG. 8



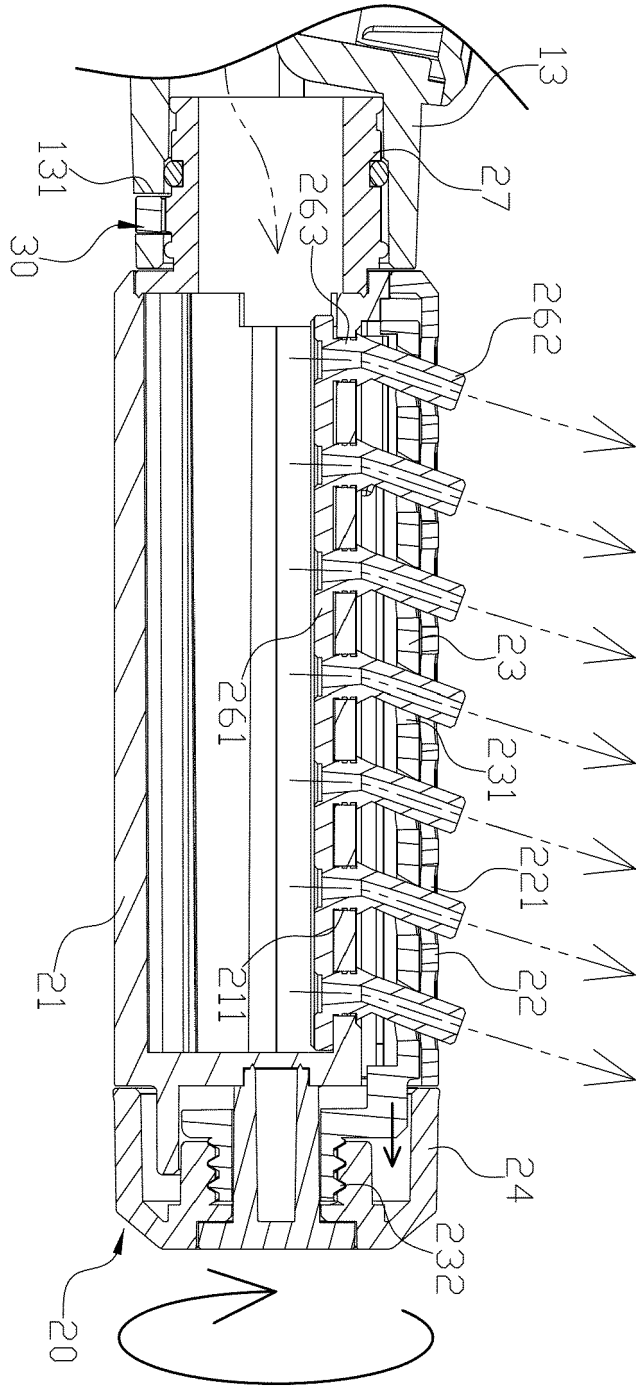


FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 2945

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 206 895 409 U (YANG ZHIJUN) 19 January 2018 (2018-01-19) * abstract; figures 1-3 * * paragraph [0007] - paragraph [0030] *	1-12	INV. B05B1/20 B05B15/652
A	CN 108 575 677 A (SUN PEIZONG) 28 September 2018 (2018-09-28) * abstract; figure 6 *	1-12	
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A	US 5 305 956 A (WANG PO H [TW]) 26 April 1994 (1994-04-26) * abstract; figures 1-6 * * column 1, line 41 - line 60 *	1-12	
A	US 2006/032949 A1 (LO SUN-NAN [TW]) 16 February 2006 (2006-02-16) * abstract; figures 1-7 * * paragraph [0011] - paragraph [0014] *	1-12	TECHNICAL FIELDS SEARCHED (IPC) B05B A01G
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 August 2022	Frego, Maria Chiara

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

& : member of the same patent family, corresponding document

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82