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(54) **Misting apparatus and sprinkling device thereof**

(57) **MISTING APPARATUS AND SPRINKLING DEVICE THEREOF**A misting apparatus includes a hose unit (2) and at least one sprinkling device (4). The hose unit (2) is to be connected to a liquid source for receiving liquid therefrom. The sprinkling device (4) includes a connector pipe (41) connected to the hose unit (2) and including a tube-connecting pipe portion (412), and a nozzle (45) capable of discharging the liquid in a misting manner. The sprinkling device (4) further includes an angle adjusting tube (43) connected between the tube-connecting pipe portion (412) of the connector pipe (41) and the nozzle (45), and a mounting member (44) coupled movably to the tube-connecting pipe portion (412) and operable to permit rotation of the angle adjusting tube (43) on the tube-connecting pipe portion (412) so as to adjust a direction in which the nozzle (45) discharges the liquid.

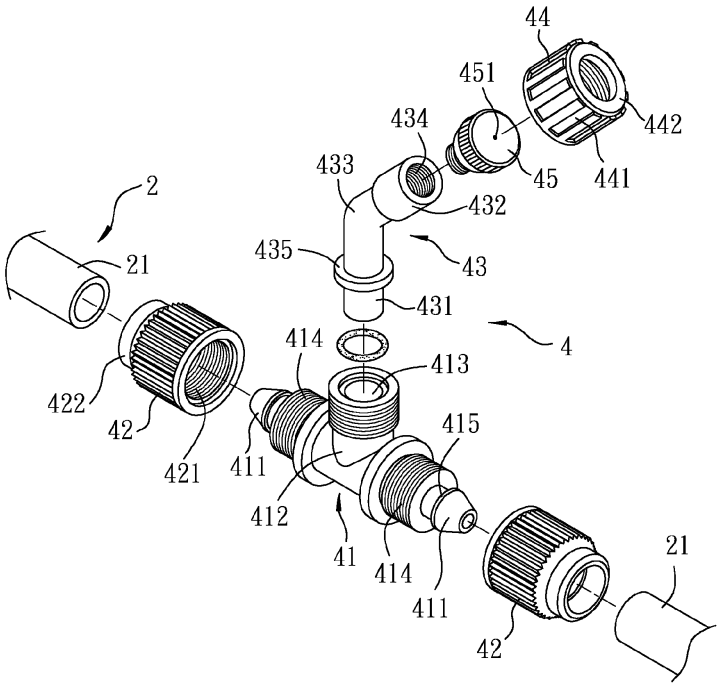

FIG. 5

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Description

[0001] The invention relates to a misting apparatus, more particularly to a misting apparatus connectable to an external liquid source to discharge the liquid towards any desirable direction.

[0002] A misting apparatus may be mounted to various locations, such as under a pavilion, under an umbrella, around a building, etc. Referring to Figures 1 and 2, a conventional misting apparatus 1 includes a hose unit 11, a plurality of first misting devices 12 mounted on the hose unit 11, a second misting device 12', and a source coupling seat 13. The hose unit 11 includes a pluralityof hose segments 111. The first misting devices 12 are each connected between a corresponding adjacent pair of the hose segments 11. The second misting device 12' and the source coupling seat 13 are respectively connected to extreme ones of the hose segments 111 at extreme end portions thereof.

[0003] Each of the first misting devices 12 includes a T-shaped connector pipe 121 including two first pipe portions 122 respectively connected to the hose segments 111 of the corresponding adjacent pair, and a second pipe portion 123 mounted with a misting nozzle 126. The first misting device 12 further includes two mounting pieces 125 respectively sleeved on the hose segments 111 of the corresponding adjacent pair and respectively and threadedly engaged with the first pipe portions 122.

[0004] The second misting device 12' is similar to the first misting device 12 and differs in that the connector pipe 121' of the second misting device 12' includes only one first pipe portion 122. Liquid from an external liquid source travels through the source coupling seat 13 and the connector pipes 121, 121' , and are discharged through the misting nozzles 126 of the first and second misting devices 12, 12'.

[0005] To facilitate easy installation of the misting nozzles 126, the second pipe portions 123 are generally formed at fixed angles relative to the first pipe portions 122. However, since the hose segments 111 are tightly coupled to the respective first and second misting devices 12, 12' to prevent liquid leakage, it is difficult to rotate the first and second misting devices 12, 12' relative to the hose segments 111, making adjustments to the orientations of the first and second misting devices 12, 12' (i.e., the direction in which the mists are discharged) rather difficult.

[0006] Therefore, an object of the present invention is to provide a misting apparatus that facilitates easy adjustments to the direction in which liquid is discharged.

[0007] Accordingly, there is provided a misting apparatus that includes a hose unit and at least one sprinkling device. The hose unit is adapted to be connected to a liquid source for receiving liquid therefrom. The sprinkling device includes a connector pipe and a nozzle. The connector pipe is connected to the hose unit and includes a tube-connecting pipe portion. The nozzle is capable of discharging the liquid in a misting manner.

[0008] The sprinkling device further includes an angle adjustingtube andamountingmember. The angle adjusting tube is connected between the tube-connecting pipe portion of the connector pipe and the nozzle. The mounting member is coupled movably to the tube-connecting pipe portion of the connector pipe, and is operable to permit rotation of the angle adjusting tube on the tube-connecting pipe portion of the connector pipe so as to adjust a direction in which the nozzle discharges the liquid.

[0009] Another obj ect of the present invention is to provide a sprinkling device with an angle adjusting tube.

[0010] Accordingly, there is provided a sprinkling device that includes a connector pipe and a nozzle. The connector pipe includes a tube-connecting pipe portion. The nozzle is capable of discharging liquid in a sprinkling manner. The sprinkling device further includes an angle adjusting tube connected between the tube-connecting pipe portion of the connector pipe and the nozzle, and a mounting member coupled movably to the tube-connecting pipe portion of the connector pipe and operable to permit rotation of the angle adjusting tube on the tube-connecting pipe portion of the connector pipe so as to adjust a direction in which the nozzle discharges the liquid.

[0011] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a fragmentary perspective view of a conventional misting apparatus;
Figure 2 is a fragmentary exploded perspective view for illustrating a first misting device of the conventional misting apparatus;
Figure 3 is a fragmentary perspective view of a misting apparatus according to the first preferred embodiment of the present invention;
Figure 4 is a fragmentary cross-sectional view of the first preferred embodiment for illustrating a first sprinkling device and a second sprinkling device of the misting apparatus;
Figure 5 is a fragmentary exploded perspective view for illustrating the first sprinkling device of the first preferred embodiment;
Figure 6 is a fragmentary exploded perspective view for illustrating the second sprinkling device of the first preferred embodiment;
Figure 7 is a fragmentary cross-sectional view of a misting apparatus according to the second preferred embodiment of the present invention; and
Figure 8 is a fragmentary exploded perspective view for illustrating a first sprinkling device of the second preferred embodiment.

[0012] Before the present invention is described in greater detail, it should be noted that like elements are denoted by the same reference numerals throughout the

disclosure.

[0013] Referring to Figures 3, 4 and 5, a misting apparatus according to the first preferred embodiment of the present invention is adapted to be coupled to a liquid source (not shown) to discharge liquid therefrom in a sprinkling manner, or more particularly in a misting manner. The liquid source may be a faucet, a pressurized water system, or the like. Themisting apparatus includes a hose unit 2, at least one first sprinkling device 4, a second sprinkling device 5 and a source coupling seat 6.

[0014] The hose unit 2 includes at least two hose segments 21, one of which is connected between the source coupling seat 6 and the first sprinkling device 4, and the other of which is connected between the first sprinkling device 4 and the second sprinkling device 5. In this embodiment, there are two first sprinkling devices 4 and three hose segments 21. The source coupling seat 6 and the second sprinkling device 5 are respectively coupled to extreme ends of two extreme ones of the hose segments 21, i.e., extreme ends of the hose unit 2. The lengths of the hose segments 21 may be varying depending on practical requirements.

[0015] Each of the first sprinkling devices 4 includes a first connector pipe 41, two first coupling members 42, a first angle adjusting tube 43, a first mounting member 44, and a first nozzle 45 that is capable of discharging the liquid in a sprinkling manner, or more particularly in a misting manner.

[0016] The first connector pipe 41 is connected to the hose unit 2, and includes two first hose-connecting pipe portions 411 and a first tube-connecting pipe portion 412. The first hose-connecting pipe portions 411 are each connected to a corresponding one of the hose segments 21, and cooperate with the first tube-connecting pipe portion 412 to define a T-shaped passage 413. In this embodiment, the first tube-connecting pipe portion 412 is perpendicular to the first hose-connecting pipe portions 411, and each of the first hose-connecting pipe portions 411 has the corresponding one of the hose segments 21 sleeved thereon. The first coupling members 42 are respectively coupled to the first hose-connecting pipe portions 411 to secure the interconnection between the first connector pipe portions 411 and the corresponding hose segments 21 for preventing leakage. Specifically, each of the first coupling members 42 includes a threaded portion 421 that is threadedly engaged with a threaded section 414 of the respective one of the first hose-connecting pipe portions 411, and a restricted portion 422 that is connected to the threaded portion 422 and that is sleeved tightly on a portion of the hose segment 21 sleeved on a non-threaded section 415 of the respective one of the first hose-connectingpipe portions 411. The first angle adjusting tube 43 is connected between the first tube-connecting pipe portion 412 of the first connector pipe 41 and the first nozzle 45. The first mounting member 44 is coupled movably to, or more particularly, sleeved on and threadedly engaged with, the first tube-connecting pipe portion 412, and is operable to permit rotation of the first angle adjusting tube 43 on the first tube-connecting pipe portion 412 of the first connector pipe 41 so as to adjust a direction in which the first nozzle 45 points, i.e., a direction in which the first nozzle 45 discharges the liquid.

[0017] Referring to Figures 4 and 6, the second sprinkling device 5 includes a second connector pipe 51, a second coupling member 52, a second angle adjusting tube 53, a second mounting member 54, and a second nozzle 55 that is capable of discharging the liquid in a sprinkling manner, or more particularly in a misting manner.

[0018] The second connector pipe 51 is connected to a corresponding extreme one of the hose segments 21, and includes a second hose-connecting pipe portion 511 and a second tube-connecting pipe portion 512. The second hose-connecting pipe portion 511 is connected to the corresponding extreme one of the hose segments 21 and cooperates with the second tube-connecting pipe portion 512 to define an L-shaped passage 513. In this embodiment, the second tube-connecting pipe portion 512 is perpendicular to the second hose-connecting pipe portion 511, and the second hose-connecting pipe portion 511 has the corresponding extreme one of the hose segments 21 sleeved thereon. The second coupling member 52 is coupled to the second hose-connecting pipe portion 511 to secure the interconnection between the second connector pipe 51 and the corresponding extreme one of the hose segments 21 for preventing leakage. The structure of the second coupling member 52 is identical to that of the first coupling members 42, so further details are omitted herein for the sake of brevity. The second angle adjusting tube 53 is connected between the second tube-connecting pipe portion 512 of the second connector pipe 51 and the second nozzle 55. The second mounting member 54 is coupled movably to, or more particularly, sleeved on and threadedly engaged with, the second tube-connecting pipe portion 512, and is operable to permit rotation of the second angle adjusting tube 53 on the second tube-connecting pipe portion 512 so as to adjust a direction in which the second nozzle 55 discharges the liquid.

[0019] Referring to Figures 4, 5 and 6, in the first preferred embodiment, the first angle adjusting tube 43 includes a first engaging tube section 431, a first connecting tube section 432, and a first bent tube section 433. The first engaging tube section 431 is inserted in the first tube-connecting pipe portion 412 of the first connector pipe 41. The first connecting tube section 432 is connected to the first nozzle 45. The first bent tube section 433 interconnects the first engaging tube section 431 and the first connecting tube section 432. The first bent tube section 433 cooperates with the first engaging tube section 431 and the first connecting tube section 432 to define a first passage 434 that is V-shaped. The first angle adjusting tube 43 further includes a first flange 435 protruding radially from the first engaging tube section 431 and abutting against the a rim of the first tube-connecting pipe

portion 412. The second angle adjusting tube 53 is similar to the first angle adjusting tube 43, and includes a second engaging tube section 531, a second connecting tube section 532, and a second bent tube section 533. The second engaging tube section 531 is inserted in the second tube-connecting pipe portion 512 of the second connector pipe 51. The second connecting tube section 532 is connected to the second nozzle 55. The second bent tube section 533 interconnects the second engaging tube section 531 and the second connecting tube section 532. The second bent tube section 533 cooperates with the second engaging tube section 531 and the second connecting tube section 532 to define a second passage 534 that is V-shaped. The second angle adjusting tube 53 further includes a second flange 535 protruding radially from the second engaging tube section 531 and abutting against the a rim of the second tube-connecting pipe portion 512. Moreover, the first mounting member 44 includes a threaded surrounding wall 441 that is sleeved on and threadedly engaged with the first tube-connecting pipe portion 412, and an annular abutting wall 442 that is connected to one end of the threaded surrounding wall 441 and that abuts against the first flange 435. Likewise, the second mounting member 54 has a similar structure as the first mounting member 44.

[0020] When the misting apparatus of the present invention is put into use, the hose segments 21 are secured in position, and are coupled to the respective first and second hose-connecting pipe portions 411, 511. The coupling between the hose segments 21 and the first and second hose-connecting pipe portions 411, 512 are then secured by the first and second coupling members 42, 52. The first angle adjusting tube 43 of each of the first sprinkling devices 4, having the first nozzle 45 mounted thereto, is set to the desired angle, and then the angle is secured by screwing tightly the first mounting member 44. Likewise, the second angle adjusting tube 53 of the second sprinkling device 5, having the second nozzle 55 mounted thereto, is set to the desired angle, and then secured in place by screwing tightly the second mounting member 54. In addition, the hose segments 21 are secured by securing means (not shown) to a location (not shown), such as a pavilion, to which the misting apparatus is mounted for use.

[0021] With the bent structures of the angle adjusting tubes 43, 53, having the first and second nozzles 44, 54 respectively mounted on the angle adjusting tubes 43, 53, and having the first and second mounting members 44, 54 threadedly and respectively engaged with the first and second tube-connecting pipe portions 412, 512, the directions in which the nozzles 44, 54 point, i.e., the directions in which the liquid is discharged from the nozzles 44, 54, can be easily adjusted by loosening the first and second mounting members 44, 54, making the desired adjustments, and then re-tightening the first and second mounting members 44, 54 without having to deal with the tight interconnection between the hose segments 21 and the first and second hose-connecting pipe portions 411, 511 and the secure mounting of the hose segments 21 to whichever location the misting apparatus is mounted for use.

[0022] Referring to Figures 7 and 8, the second preferred embodiment of the present invention is similar to the first preferred embodiment and only differs therefrom in the configurations of the first and second angle adjusting tubes 43', 53' and the first and second connector pipes 41' , 51'. In this embodiment, the first angle adjusting tube 43' of the first sprinkling device 4' includes a first rotary tube section 436 that is coupled to the first tube-connecting pipe portion 412' of the first connector pipe 41' in a ball-joint configuration. The first connecting tube section 432 of the first angle adjusting tube 43' integrally extends from the first rotary tube section 436, is connected to the first nozzle 45, and cooperates with the first rotary tube section 436 to define the first passage 434. Similarly, the second angle adjusting tube 53' of the second sprinkling device 5' includes a second rotary tube section 536 that is coupled to the second tube-connecting pipe portion 512' of the second connector pipe 51' in a ball-joint configuration. The second connecting tube section 532 of the second angle adjusting tube 53' integrally extends from the second rotary tube section 536, is connected to the second nozzle 55, and cooperates with the second rotary tube section 536 to define the second passage 534.

[0023] With the ball-joint coupling between the first and second angle adjusting tubes 43', 53' and the first and second tube-connecting pipe portions 412', 512', the directions in which the liquid is discharged from the nozzles 44, 54 can also be easily adjusted.

[0024] While the present invention has been described in connection with what are considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all suchmodifications and equivalent arrangements.

Claims

1. A misting apparatus comprising:

a hose unit (2) adapted to be connected to a liquid source for receiving liquid therefrom; and at least one first sprinkling device (4) including a first connector pipe (41) that is connected to the hose unit (2) and that includes a first tube-connecting pipe portion (412), said at least one first sprinkling device (4) further including a first nozzle (45) capable of discharging the liquid in a misting manner;

said misting apparatus being **characterized in that** said first sprinkling device (4) further includes a first angle adjusting tube (43) connect-

ed between said first tube-connecting pipe portion (412) of said first connector pipe (41) and said first nozzle (45), and a firstmountingmember (44) coupled movably to said first tube-connecting pipe portion (412) of said first connector pipe (41) and operable to permit rotation of said first angle adjusting tube (43) on said first tube-connecting pipe portion (412) of said first connector pipe (41) so as to adjust a direction in which said first nozzle (45) discharges the liquid.

2. The misting apparatus as claimed in Claim 1, further **characterized by** a second sprinkling device (5) including a second nozzle (55) capable of discharging the liquid in a misting manner, said misting device being **characterized in that** said hose unit (2) includes at least two hose segments (21), one of which is adapted to be connected between the liquid source and said first connector pipe (41), and the other of which is connected between said first connector pipe (41) and said second sprinkling device (5).

3. The misting apparatus as claimed in Claim 2, **characterized in that** said second sprinkling device (5) further includes a second connector pipe (51) that is connected to the other of said two hose segments (21), and that has a second tube-connecting pipe portion (512), a second angle adjusting tube (53) connected between said second tube-connecting pipe portion (512) of said second connector pipe (51) and said second nozzle (55), and a second mounting member (54) said second tube-connecting pipe portion (512) of said second connector pipe (51) and operable to permit rotation of said second angle adjusting tube (53) on said second tube-connecting pipe portion (512) of said second connector pipe (51) so as to adjust a direction in which said second nozzle (55) discharges the liquid.

4. The misting apparatus as claimed in Claim 3, **characterized in that**:

said first connector pipe (41) further includes two first hose-connecting pipe portions (411) respectively connected to said hose segments (21) and cooperating with said first tube-connecting pipe portion (412) to define a T-shaped passage; and

said first angle adjusting tube (43) includes a first engaging tube section (431) inserted in said first tube-connecting pipe portion (412) of said first connector pipe (41), a first connecting tube section (432) connected to said first nozzle (45), and a first bent tube section (433) interconnecting said first engaging tube section (431) and said first connecting tube section (432), and cooperating with said first engaging tube section (431) and said first connecting tube section (432) to define a first V-shaped passage (434).

5. The misting apparatus as claimed in Claim 3, **characterized in that**:

said second connector pipe (51) of said second sprinkling device (5) further includes a second hose-connecting pipe portion (511) connected to the other of said hose segments (21) and cooperating with said second tube-connecting pipe portion (512) to define an L-shaped passage (513); and

said second angle adjusting tube (53) includes a second engaging tube section (531) inserted in said second connector pipe (51), a second connecting tube section (532) connected to said second nozzle (55), and a second bent tube section (533) interconnecting said second engaging tube section (531) and said second connecting tube section (532),and cooperating with said second engaging tube section (531) and said second connecting tube section (532) to define a secondV-shaped passage (534).

6. The misting apparatus as claimed in any of Claims 1 to 3**, characterized in that** said first angle adjusting tube (43') includes a first rotary tube section (436) that is coupled to said first tube-connecting pipe portion (412') of said first connector pipe (41') in a ball-joint configuration, a first connecting tube section (432) that integrally extends from said first rotary tube section (436), that is connected to said first nozzle (45), and that cooperates with said first rotary tube section (436) to define a first passage (434).

7. The misting apparatus as claimed in Claim 6, **characterized in that** said second angle adjusting tube (53') includes a second rotary tube section (536) that is coupled to said second tube-connecting pipe portion (512') of said second connector pipe (51') in a ball-joint configuration, a second connecting tube section (532) that integrally extend from said second rotary tube section (536), that is connected to said second nozzle (55), and that cooperates with said second rotary tube section (536) to define a second passage (534).

8. The misting apparatus as claimed in Claim 1, **characterized in that** said first angle adjusting tube (43) includes a first engaging tube section (431) inserted in said first tube-connecting pipe portion (412) of said first connector pipe (41), a first connecting tube section (432) connected to said first nozzle (45), and a first bent tube section (433) interconnecting said first engaging tube section (431) and said first connecting tube section (432), and cooperating with said first engaging tube section (431) and said first connecting tube section (432) to define a V-shaped passage

(434).

9. The misting apparatus as claimed in any of the Claims 1 to 8, further **characterized by** a source coupling seat (6) adapted for connecting said hose unit (2) to the liquid source.

10. A sprinkling device (4, 4', 5, 5') comprising:

a connector pipe (41, 41', 51, 51') that includes a tube-connecting pipe portion (412, 412' , 512, 512'); and
a nozzle (45, 55) capable of discharging liquid in a sprinkling manner;
said sprinkling device (4, 4', 5, 5') being **characterized by** an angle adjusting tube (43, 43', 53, 53') connected between said tube-connecting pipe portion (412, 412', 512, 512') of said connector pipe (41, 41', 51, 51') andsaidnozzle (45, 55), and a mounting member (44, 44', 54, 54') coupled movably to said tube-connecting pipe portion (412, 412', 512, 512') and operable to permit rotation of said angle adjusting tube (43, 43', 53, 53') on said tube-connecting pipe portion (412, 412', 512, 512') so as to adjust a direction in which said nozzle (45, 55) discharges the liquid.

11. The sprinkling device (4) as claimed in Claim 10, **characterized in that**:

said connector pipe (41) further includes two hose-connecting pipe portions (411) adapted to be respectively connected to two hose segments (21) and cooperating with said tube-connecting pipe portion (412) to define a T-shaped passage; and
said angle adjusting tube (43) includes an engaging tube section (431) inserted in said tube-connecting pipe portion (412) of said connector pipe (41), a connecting tube section (432) connected to said nozzle (45), and a bent tube section (433) interconnecting said engaging tube section (431) and said connecting tube section (432), and cooperating with said engaging tube section (431) and said connecting tube section (432) to define a V-shaped passage (434).

12. The sprinkling device (5) as claimed in Claim 10, **characterized in that**:

said connector pipe (51) further includes a hose-connecting pipe portion (511) adapted to be connected to a hose segment (21) and cooperating with said tube-connecting pipe portion (512) to define an L-shaped passage (513); and
said angle adjusting tube (53) includes an engaging tube section (531) inserted in said connector pipe (51), a connecting tube section (532) connected to said nozzle (55), and a bent tube section (533) interconnecting said engaging tube section (531) and said connecting tube section (532), and cooperating with said engaging tube section (531) and said connecting tube section (532) to define a V-shaped passage (534).

13. The sprinkling device (4') as claimed in Claim 10, **characterized in that**:

said connector pipe (41') further includes two hose-connecting pipe portions (411) adapted to be respectively connected to two hose segments (21) and cooperating with said tube-connecting pipe portion (412') to define a T-shaped passage (413); and
said angle adjusting tube (43') includes a rotary tube section (436) that is coupled to said tube-connecting pipe portion (412') of said connector pipe (41') in a ball-joint configuration, a connecting tube section (432) that integrally extends from said rotary tube section (436), that is connected to said nozzle (45), and that cooperates with said rotary tube section (436) to define a passage (434).

14. The sprinkling device (5') as claimed in Claim 10, **characterized in that**:

said connector pipe (51') further includes a hose-connecting pipe portion (511) adapted to be connected to a hose segment (21) and cooperating with said tube-connecting pipe portion (512') to define an L-shaped passage (513); and
said angle adjusting tube (53') includes a rotary tube section (536) that is coupled to said tube-connecting pipe portion (512') of the connector pipe (51') in a ball-joint configuration, a connecting tube section (532) that integrally extends from said rotary tube section (536), that is connected to said nozzle (55), and that cooperates with said rotary tube section (536) to define a passage (534).

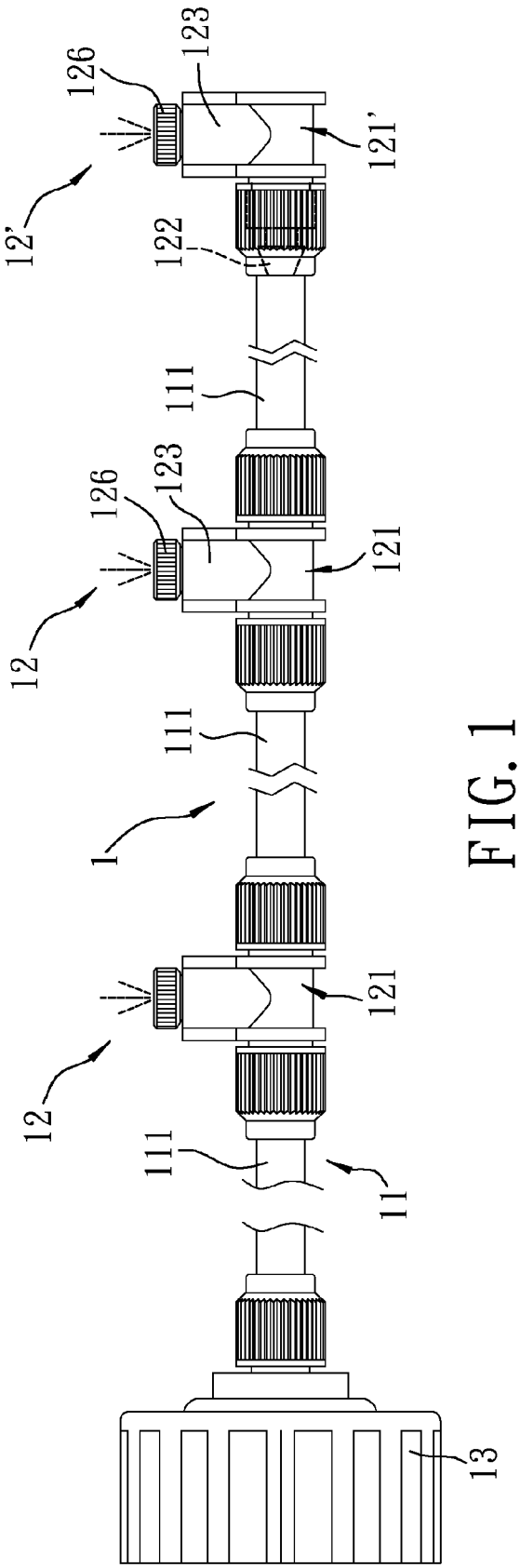

FIG. 1
PRIOR ART

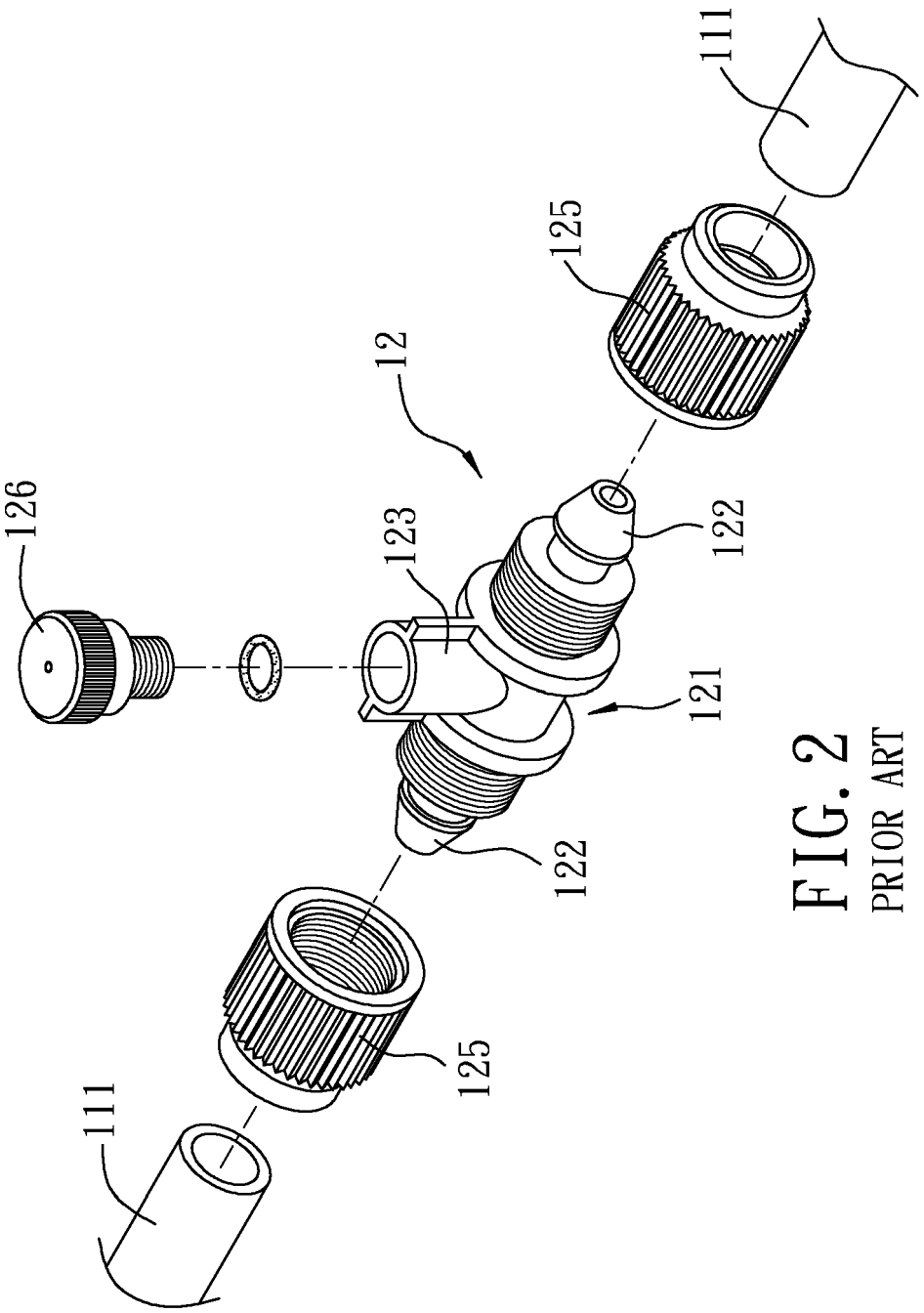

FIG. 2
PRIOR ART

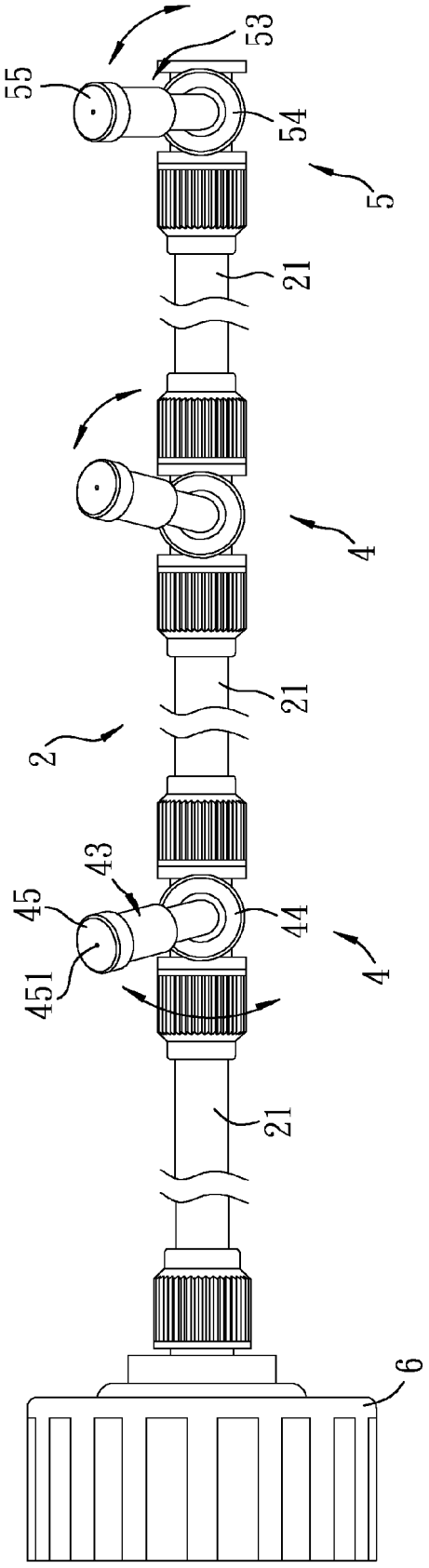

FIG. 3

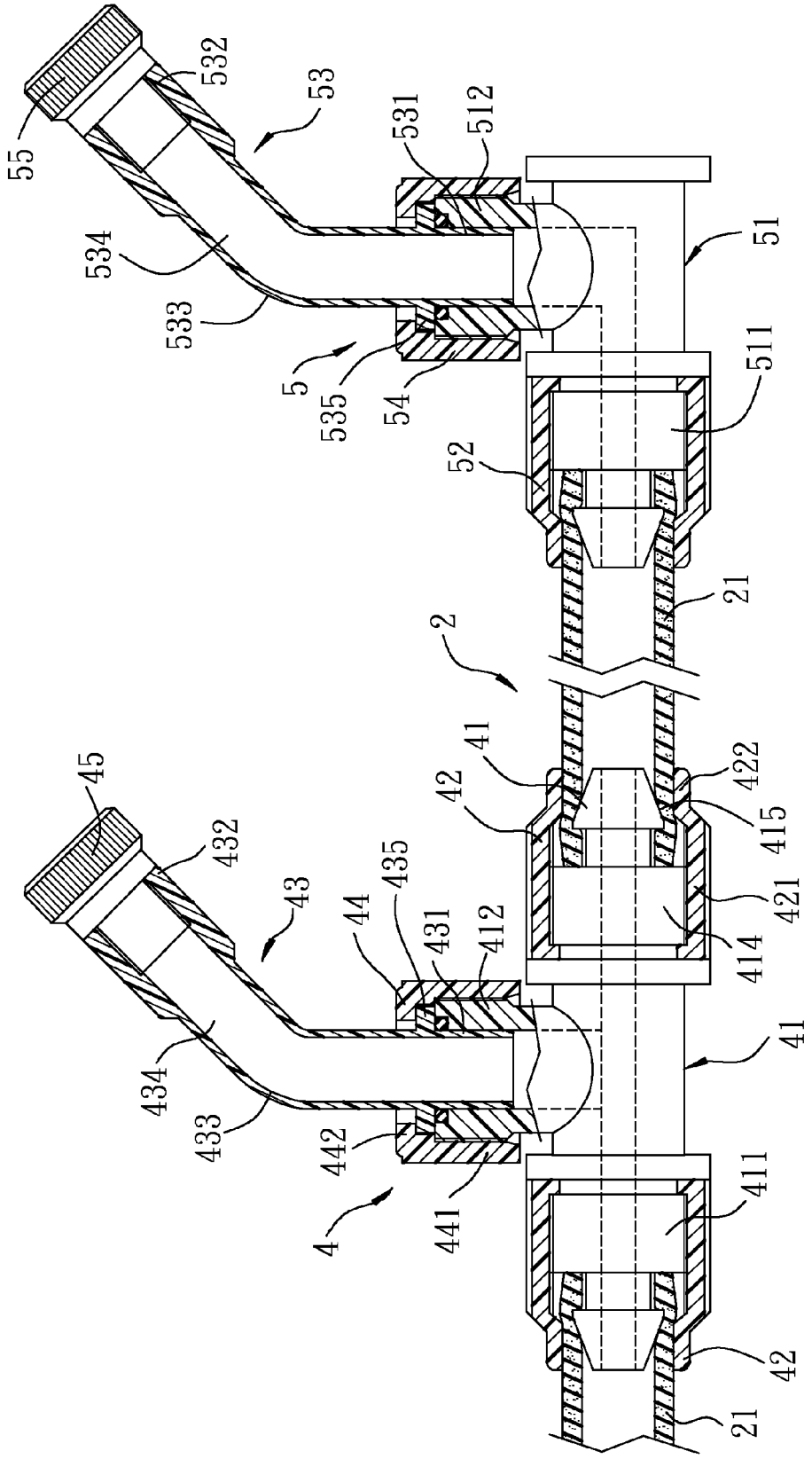
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FIG. 4

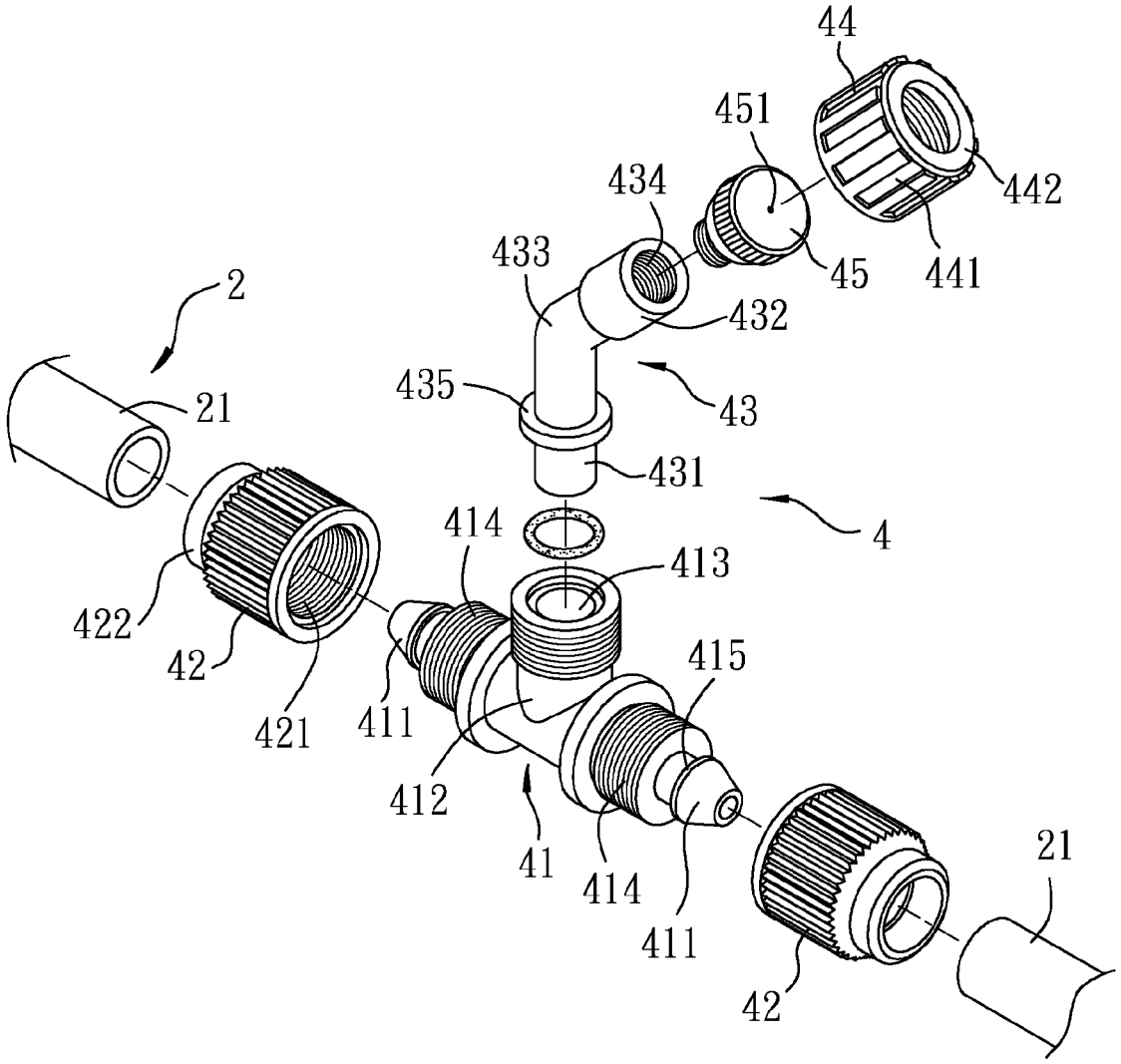
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FIG. 5

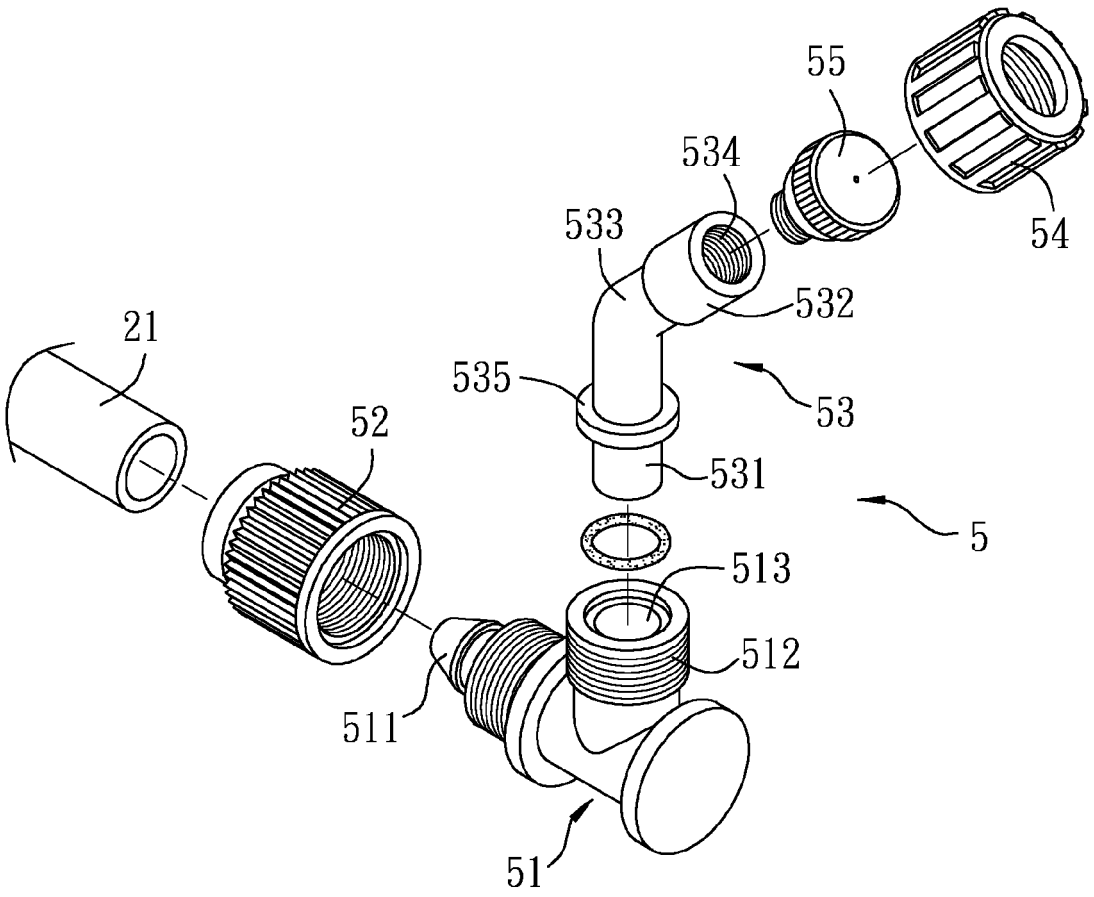

FIG. 6

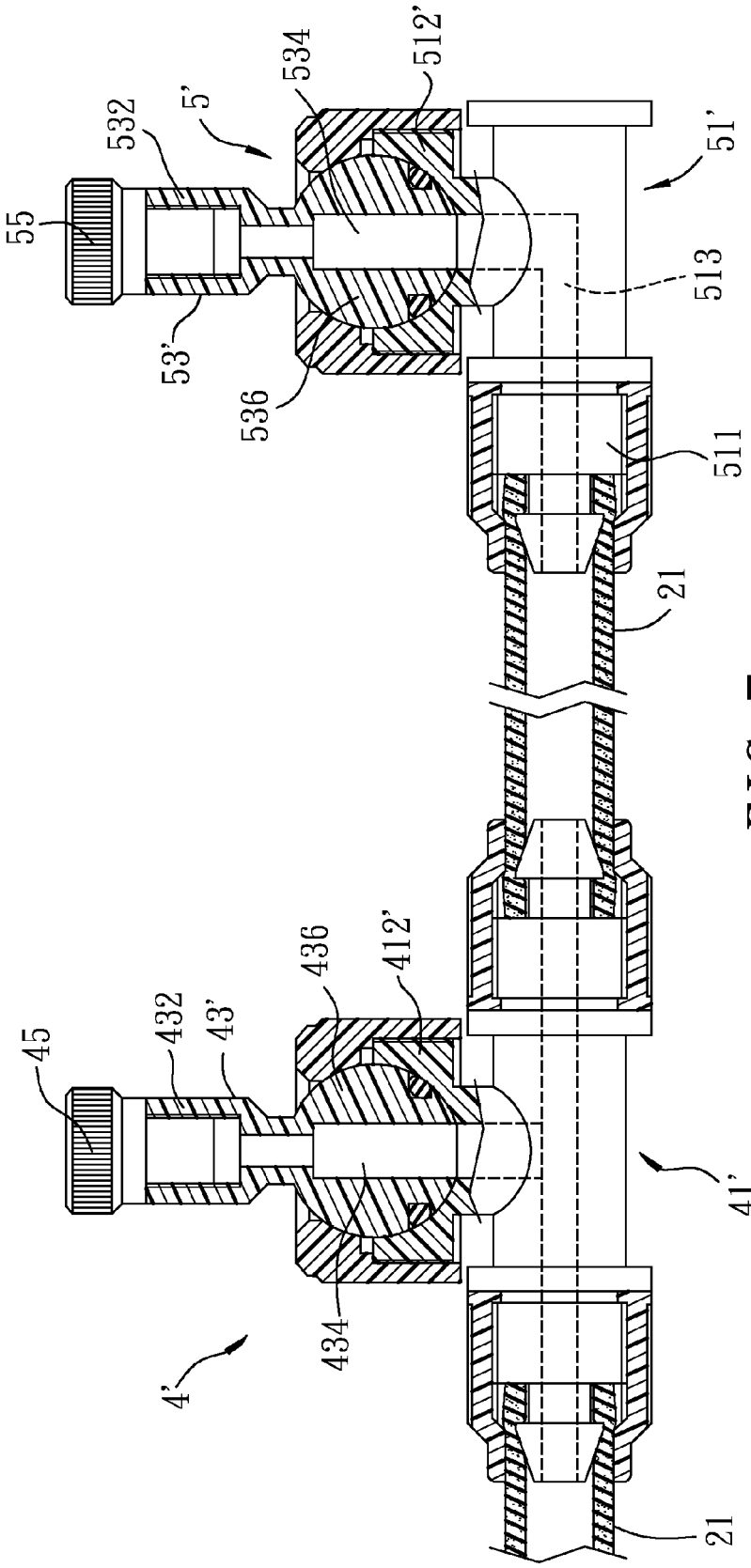

FIG. 7

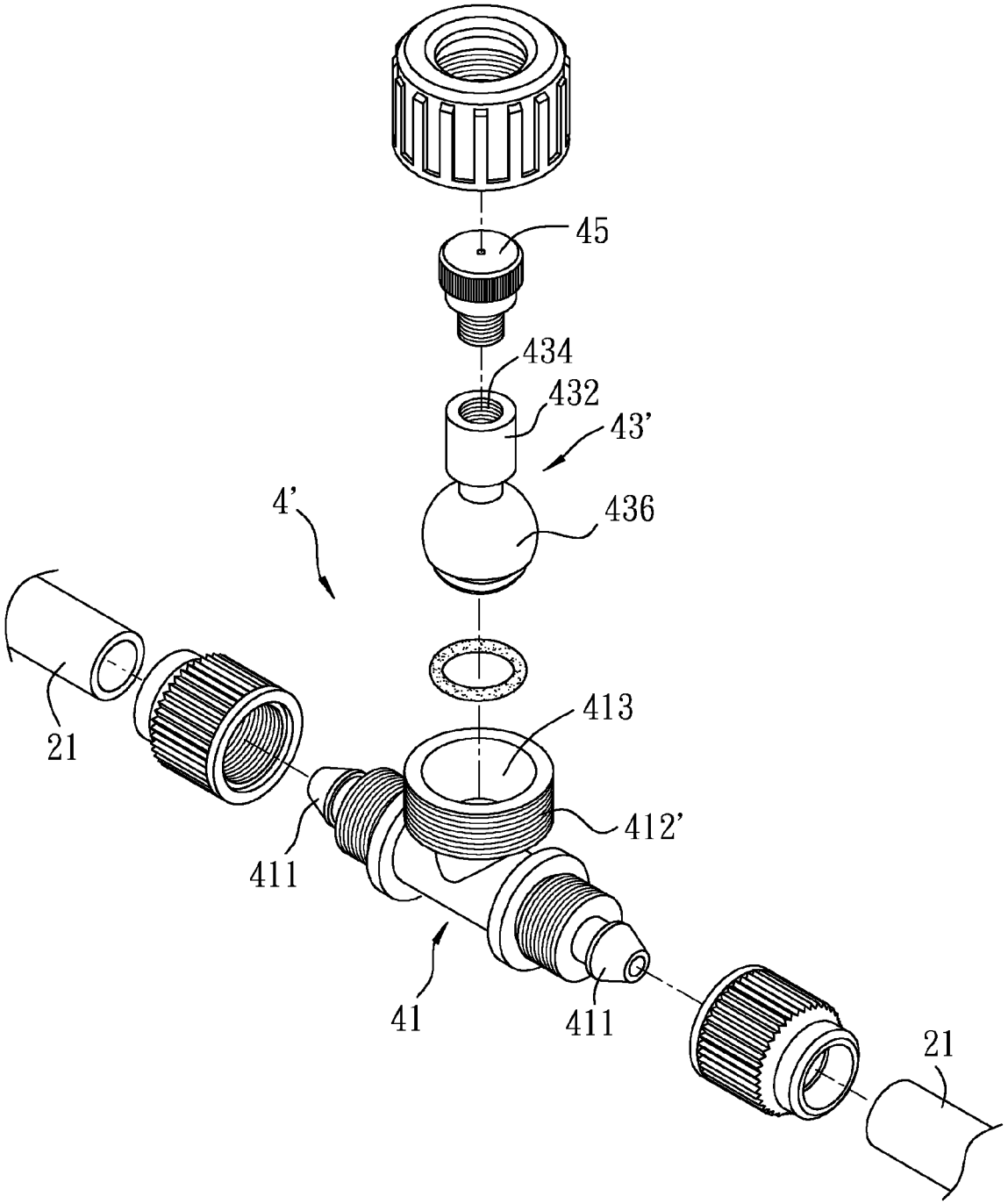

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 13 15 7766

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 6 065 693 A (LUKAS JOHN J [US]) 23 May 2000 (2000-05-23) * column 3, line 36 - column 4, line 56; figures 1, 2 *	1-14	
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