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(54) **Nozzle assembly for sprinkler**

Düsenanordnung für Sprinkler

Ensemble de buse pour arroseur

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(73) Proprietor: **Yuan Mei Corporation**
Changhua County 505 (TW)

(72) Inventor: **Lo, Shun-Nan**
505, Changhua County (TW)

(74) Representative: **Lang, Christian et al**
LangPatent
Anwaltskanzlei
Rosenheimer Strasse 139
81671 München (DE)

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Description

BACKGROUND OF THE INVENTION

1. Fields of the invention

[0001] The present invention relates to a nozzle assembly for a sprinkler, especially to a nozzle assembly for a sprinkler that can provide on-off control of water and regulate the amount of water output.

2. Descriptions of Related Art

[0002] A nozzle assembly for conventional underground sprinklers is revealed. Refer to US Pat. No. 5086977 "SPRINKLER DEVICE", underground sprinklers in which water pressure causes a pop-up riser means being moved to its extend or retracted position are disclosed. A nozzle assembly is mounted in an axially movable nozzle housing assembly that is received in a cylindrical housing. An opening is formed in the outer surface of the nozzle housing and a nozzle is inserted through the opening into the nozzle housing assembly. The top of a cylindrical member of the riser means has an adjusting slot for setting the desired oscillating angle for the sprinkler. After water flowing through, the nozzle assembly is popped up slowly to a preset position and then water is ejected from the nozzle.

[0003] The amount of water output though the above nozzle assembly is unable to be adjusted. Thus the water flow ejected out from the nozzle assembly is delivered to a certain range. The water flow is unable to be modified according to terrain and users' requirements.

[0004] A nozzle assembly with adjustable water output has been developed and invented based on the structure of the above underground sprinklers. Refer to US Pat. No. 6241158 "Irrigation sprinkler with pivoting throttle valve" and US Pat. No. 6050502 "Rotary sprinkler with memory arc mechanism and throttling valve", a pivotable arc valve body is arranged on a vertical water channel, located in a riser just below the nozzle. The arc valve is pivotable between two positions by manually turning a drive member with a hand tool. When the valve body pivots to its first (vertical) position, the water flow path is substantially open while the valve body substantially obstructs the water flow path when it pivots to a second (horizontal) position.

[0005] Although the above nozzle assemblies provide functions of on-off and water flow adjustment, they still have the following shortcomings:

1. The arc valve body of the nozzle assembly is set and pivoted in the vertical water channel. The space inside the vertical water channel is small and narrow and this causes difficulties in assembling the arc valve body.
2. Through a gear drive assembly operated by a hand tool, the nozzle is rotated by the arc valve body in

above two patents. Thereby the operation of the drive assembly is not smooth once the connection between the drive member and the arc valve body is poor. On the other hand, once the connection therebetween is good, the arc valve body is difficult to be located precisely. When the arc valve body is in the closed position, it is easy to be moved due to flow pressure and the water flow path is opened automatically.

3. The drive member is mounted in the upper end of the nozzle assembly and is parallel to the vertical water channel of the nozzle assembly. Thus the top of a driving end of the drive member is exposed on a top surface of the nozzle assembly for convenience of moving and adjusting the drive member. However, everyone can easily change the water flow if he intends and there is no protection design.

[0006] For non-underground sprinklers a nozzle assembly is known from US 2,873,083, wherein a water flow through a flow channel is controlled with a rod with a conical head by moving the rod via a threaded structure engaged with a threaded plug, which in turn is threaded into the main body of the nozzle assembly. While the structure allows controlling the flow it is unsuitable for underground sprinklers due to plug and rod extending from the main body. From US 4,184,239 a similar design is known.

[0007] From US 3,830,434 a nozzle assembly is known wherein a water flow through the flow channel is controlled by the conical end of externally threaded valve members threaded into internally threaded holes. While this is suitable for underground sprinklers the valve members are directly thread into the holes from the outside and therefore the sealing is not very good and the valve members can be removed from the nozzle and be lost. From US 2006/0011742 A1 a similar design is known.

[0008] Thus there is a space to improve the nozzle assembly available now and a need to provide the nozzle assembly with novel design.

SUMMARY OF THE INVENTION

[0009] Therefore it is a primary object of the present invention to provide a sprinkler nozzle that is able to regulate the outlet water flow.

[0010] In order to achieve the above object, a nozzle assembly of a sprinkler according to claim 1 is disposed on a top of an inner tube of a sprinkler. A vertical main channel is arranged along an axis of the nozzle assembly. A water inlet connected with a water source for water supply is arranged at the bottom of the main channel while a water outlet is set on one side of the other end of the main channel. An adjustment member for control of water flow is disposed on the main channel, located between the water inlet and the water outlet. A side hole set on the main channel is connected with a ring while an inner threaded section is arranged near an outer end

of an inner bore of the ring. The adjustment member is a cylinder in which one end is a conical frustum having maximum outside diameter larger than the outside diameter of the cylinder and the other end is a slot. The conical frustum is for closing the water outlet while the slot is used to assemble with driving devices. An outer threaded section and a ring groove are respectively arranged on a surface of one end of the adjustment member having the slot. The outer threaded section is threaded with the inner threaded section of the ring while the ring groove is for receiving a sealing ring whose outer part is closely attached to the inner bore of the ring.

[0011] In accordance with the above structure and parts, the diameter of a flow path opened from the main channel to the water outlet is controlled by the displacement of the adjustment member so as to regulate output water flow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein:

- Fig. 1 is an explosive cross-sectional view of an embodiment according to the present invention;
- Fig. 2 is an assembled cross sectional view of an embodiment according to the present invention;
- Fig. 3 is a perspective view of an embodiment according to the present invention;
- Fig. 4 is a side cross sectional view of an embodiment according to the present invention;
- Fig. 5 is a schematic drawing showing action of the embodiment in Fig. 4;
- Fig. 6 is a schematic drawing showing an embodiment of the present invention assembled to a sprinkler;
- Fig. 7 is another schematic drawing showing an embodiment of the present invention assembled to a sprinkler;
- Fig. 8 is side cross sectional view of another embodiment of a nozzle assembly not covered by the present invention;
- Fig. 9 is an explosive view of a further embodiment according to the present invention;
- Fig. 10 is an assembled view of the embodiment in Fig. 9;
- Fig. 11 is an assembled cross sectional view of the embodiment in Fig. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Refer to Fig. 7, a nozzle assembly 10 for a sprinkler is connected on a top of an inner tube 101 of a sprinkler 100 shown in Fig. 6 and Fig. 7. The above mentioned

inner tube 101 is mounted in an outer tube 102 of the sprinkler 100. The inner tube 101 is moved up and down automatically by water pressure. After water being turned off, the inner tube 101 is retracted into the outer tube 102.

A water outlet 112 arranged at one side of the nozzle assembly 10 on top of the inner tube 101 is also hidden inside the outer tube 102, not exposed. The connection between the sprinkler 100 and the nozzle assembly 10 is similar to that in prior arts.

[0014] The nozzle assembly 10 of the present invention features on that: a vertical main channel 11 is disposed along an axis of the nozzle assembly 10. A water inlet 111 connected with a water source for water supply is arranged at the bottom of the main channel 11 while the water outlet 112 is disposed on one side of the other end of the main channel 11. A nozzle 20 is disposed on a front end of the water outlet 112. An adjustment member 30 that controls water flow is arranged at the main channel 11, between the water inlet 111 and the water outlet 112. The water outlet 112 is closed or opened by displacement of the adjustment member 30. The flow path diameter opened is also controlled by the adjustment member 30.

[0015] In this embodiment, the connection between the nozzle assembly 10 and the adjustment member 30 is as following. A side hole 12 is disposed on the main channel 11 of the nozzle assembly 10 and is connected with a ring 13. An inner threaded section 132 is set near an outer end of an inner bore 131 of the ring 13. The ring 13 is integrated with the side hole 12 by high frequency induction heating.

[0016] The adjustment member 30 is a cylinder in which one end is a conical frustum 31 whose maximum outside diameter is larger than the outside diameter of the cylinder while the other end is a slot 32. The conical frustum 31 is used to close the water outlet 112 while the slot 32 is for mounting driving devices (not shown in the figures). An outer threaded section 33 and a ring groove 34 are respectively arranged around the surface of one end of the adjustment member 30 with the slot 32. The outer threaded section 33 is threaded with the inner threaded section 132 of the ring 13. A sealing ring 341 is mounted in the ring groove 34 and an outer part of the sealing ring 341 is closely attached to the inner bore 131 of the ring 13.

[0017] According to the structure formed by the above components, as shown in Fig. 4 and Fig. 5, while rotating the adjustment member 30, it is driven to move horizontally. Thereby the conical frustum 31 of the adjustment member 30 is also moved to open or close the water outlet 112. Moreover, the diameter of the path from the main channel 11 to the water outlet 112 is controlled by the adjustment member 30 so as to regulate output water flow.

[0018] The ring 13 is connected to the side hole 12 on the main channel 11 of the nozzle assembly 10. Then the adjustment member 30 is threaded into the ring 13 and the conical frustum 31 whose maximum outside di-

ameter is larger than the outside diameter of the adjustment member 30 is arranged at one end of the adjustment member 30. Thus a side end surface 311 of the conical frustum 31 beside the adjustment member 30 is against an inside end surface 133 of the ring 13 correspondingly. Thereby the adjustment member 30 will not be released from the ring 13 during the displacement process.

[0019] As shown in Fig. 8, another embodiment of a nozzle assembly not covered by the present invention is revealed. An inner threaded hole 121 is disposed near an outer end of the side hole 12. Thus the adjustment member 30 with the outer threaded section 33 can be threaded with the inner threaded hole 121 directly. Moreover, a curved surface 35 is arranged at one end of the adjustment member 30 that faces the water outlet 112 for closing the water outlet 112. Thereby the output water flow can also be adjusted and controlled.

[0020] Furthermore, refer from Fig. 9 to Fig. 11, a further embodiment is disclosed. The difference between this embodiment and above is in that: the structure of the nozzle assembly 10 is assembled with the adjustment member 30. That means differences in designs of parts for connection in an upper open end of the nozzle assembly 10.

[0021] In summary, the direction of displacement of the adjustment member and the direction of the water flow in the main channel of the nozzle assembly are crossed. In this embodiment, the directions are perpendicular to each other. Or there is a certain angle between the two directions. The adjustment member is connected and assembled around the nozzle assembly. Thereby after the nozzle assembly being hidden in the outer tube of the sprinkler, the outlet water flow is unable to be changed by others purposely.

[0022] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details, and representative devices shown and described herein. Accordingly, various modifications may be made without departing from the scope of the general inventive concept as defined by the appended claims and their equivalents.

Claims

1. A nozzle assembly (10) of a sprinkler comprising:

a main channel (11) disposed within the nozzle assembly (10);
the main channel (11) having a water inlet (111) on one end thereof and a water outlet (112) on the other end thereof;
wherein an adjustment member (30) that closes the water outlet (112) and controls diameter of a flow path opened from the main channel (11) to the water outlet (112) is connected with the main channel (11);

wherein

a side hole (12) is disposed on the main channel (11) of the nozzle assembly and is connected with a ring (13) having an inner threaded section (132); a conical frustum (31) for closing the water outlet (112) is arranged at one end of the adjustment member (30) while an outer threaded section (33) for being threaded with the inner threaded section (132) of the ring (13) is disposed on the other end of the adjustment member (30); **characterized in that**, the ring (13) is integrated with the side hole (12) by high frequency induction heating.

2. A nozzle assembly as claimed in claim 1, wherein a slot (32) for being rotated and driven is disposed on an outer end of the adjustment member (30), opposite to the end of the adjustment member (30) with the conical frustum (31).
3. A nozzle assembly as claimed in claim 1, wherein a direction of displacement of the adjustment member (30) and a direction of a vertical water flow in the main channel (11) of the nozzle assembly (10) are crossed.
4. A nozzle assembly as claimed in claim 1, wherein the adjustment member (30) is rotated to be driven to move forward or backward so as to make a conical frustum (31) on one end of the adjustment member (30) close the water outlet (112) or change water flow from the water outlet (112).
5. A nozzle assembly as claimed in claim 1, wherein the adjustment member (30) is able to be moved and adjusted directly so that one end of the adjustment member (30) is driven to close the water outlet (112) directly or change a flow path diameter for control of water flow from the water outlet (112).

Patentansprüche

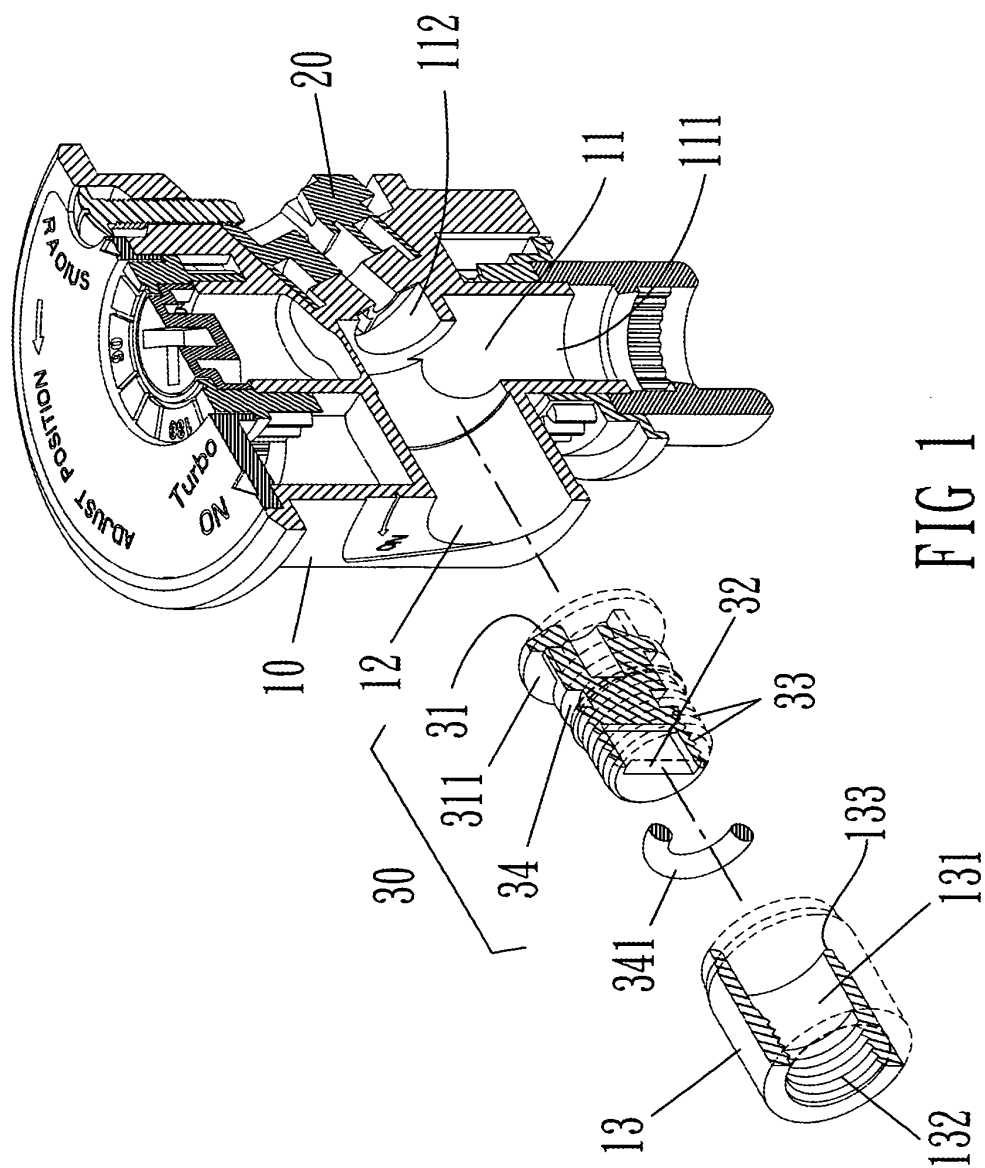
1. Düsenanordnung (10) eines Sprinklers, die umfasst:

einen Hauptkanal (11), der innerhalb der Düsenanordnung (10) angeordnet ist, wobei der Hauptkanal (11) an einem seiner Enden einen Wassereinlass (111) und an seinem anderen Ende einen Wasserauslass (112) umfasst, wobei ein Justierelement (30), das den Wasserauslass (112) verschließt und das den Durchmesser eines Strömungswegs kontrolliert, der von dem Hauptkanal (11) zu dem Wasserauslass (112) hin offen ist, mit dem Hauptkanal (11) verbunden ist, wobei ein seitliches Loch (12) an dem Hauptka-

- nal (11) der Düsenanordnung vorgesehen ist und mit einem Ring (13) verbunden ist, der einen inneren Gewindebereich (132) umfasst, wobei ein konischer Kegelstumpf (31) zum Schließen des Wasserauslasses (112) an einem Ende des Justierelements (30) angeordnet ist, während ein äußerer Gewindebereich (33) zum Verschrauben mit dem inneren Gewindebereich (132) des Rings (13) an dem anderen Ende des Justierelements (30) angeordnet ist, **dadurch gekennzeichnet, dass** der Ring (13) durch Hochfrequenzinduktionsheizen mit dem seitlichen Loch (12) kombiniert ist.
2. Düsenanordnung nach Anspruch 1, bei welcher ein Schlitz (32) zum Drehen und Antreiben an einem äußeren Ende des Justierelements (30) gegenüber dem Ende des Justierelements (30) mit dem konischen Kegelstumpf (31) angeordnet ist.
 3. Düsenanordnung nach Anspruch 1, bei welcher sich eine Verschiebungsrichtung des Justierelements (30) und eine Richtung des vertikalen Wasserflusses in dem Kanal (11) der Düsenanordnung (10) kreuzen.
 4. Düsenanordnung nach Anspruch 1, bei welcher das Justierelement (30) gedreht wird, um dazu gebracht zu werden, sich vorwärts oder rückwärts zu bewegen, so dass ein konischer Kegelstumpf (31) an einem Ende des Justierelements (30) dazu gebracht wird, den Wasserauslass (112) zu schließen oder den Wasserfluss aus dem Wasserauslass (112) zu ändern.
 5. Düsenanordnung nach Anspruch 1, bei welcher das Justierelement (30) in der Lage ist, direkt bewegt und verstellt zu werden, so dass ein Ende des Justierelements (30) dazu gebracht wird, den Wasserauslass (112) direkt zu schließen oder einen Strömungswegdurchmesser zum Steuern des Wasserflusses aus dem Wasserauslass (112) zu ändern.
- dans lequel un trou de côté (12) est placé sur le canal principal (11) de l'ensemble de tuyère et est relié à un anneau (13) ayant une section filetée intérieure (132), un cône tronqué (31) pour fermer la sortie d'eau (112) est arrangé à une extrémité de l'organe d'ajustage (30) tandis qu'une section filetée extérieure (33) qui doit être enfilée avec la section filetée intérieure (132) de l'anneau (13) est placée sur l'autre extrémité de l'organe d'ajustage (30), **caractérisé en ce que** l'anneau (13) est intégré avec le trou de côté (12) par chauffage par induction à haute fréquence.
2. Ensemble de tuyère selon la revendication 1 dans lequel une fente (32) pour être tournée et entraînée est placée à une extrémité extérieure de l'organe d'ajustage (30), opposée à l'extrémité de l'organe d'ajustage (30) avec le cône tronqué (31).
 3. Ensemble de tuyère selon la revendication 1 dans lequel une direction de déplacement de l'organe d'ajustage (30) et une direction de l'écoulement d'eau vertical dans le canal principal (11) de l'ensemble de tuyère (10) sont croisées.
 4. Ensemble de tuyère selon la revendication 1 dans lequel l'organe d'ajustage (30) est tourné pour être entraîné pour se déplacer en avant ou en arrière pour faire en sorte que le cône tronqué (31) à une extrémité de l'organe d'ajustage (30) ferme la sortie d'eau (112) ou change l'écoulement d'eau de la sortie d'eau (112).
 5. Ensemble de tuyère selon la revendication 1 dans lequel l'organe d'ajustage (30) est capable d'être déplacé et ajusté directement si bien qu'une extrémité de l'organe d'ajustage (30) est entraînée pour fermer la sortie d'eau (112) directement ou pour changer un diamètre de la voie d'écoulement pour contrôler l'écoulement d'eau de la sortie d'eau (112).

Revendications

1. Ensemble de tuyère (10) d'un arroseur comprenant : un canal principal (11) placé à l'intérieur de l'ensemble de tuyère (10), le canal principal (11) ayant une entrée d'eau (111) sur une extrémité de celui-ci et une sortie d'eau (112) sur l'autre extrémité de celui-ci, dans lequel un organe d'ajustage (30), qui ferme la sortie d'eau (112) et qui contrôle le diamètre d'une voie d'écoulement ouverte du canal principal (11) vers la sortie d'eau (112), est relié au canal principal (11),



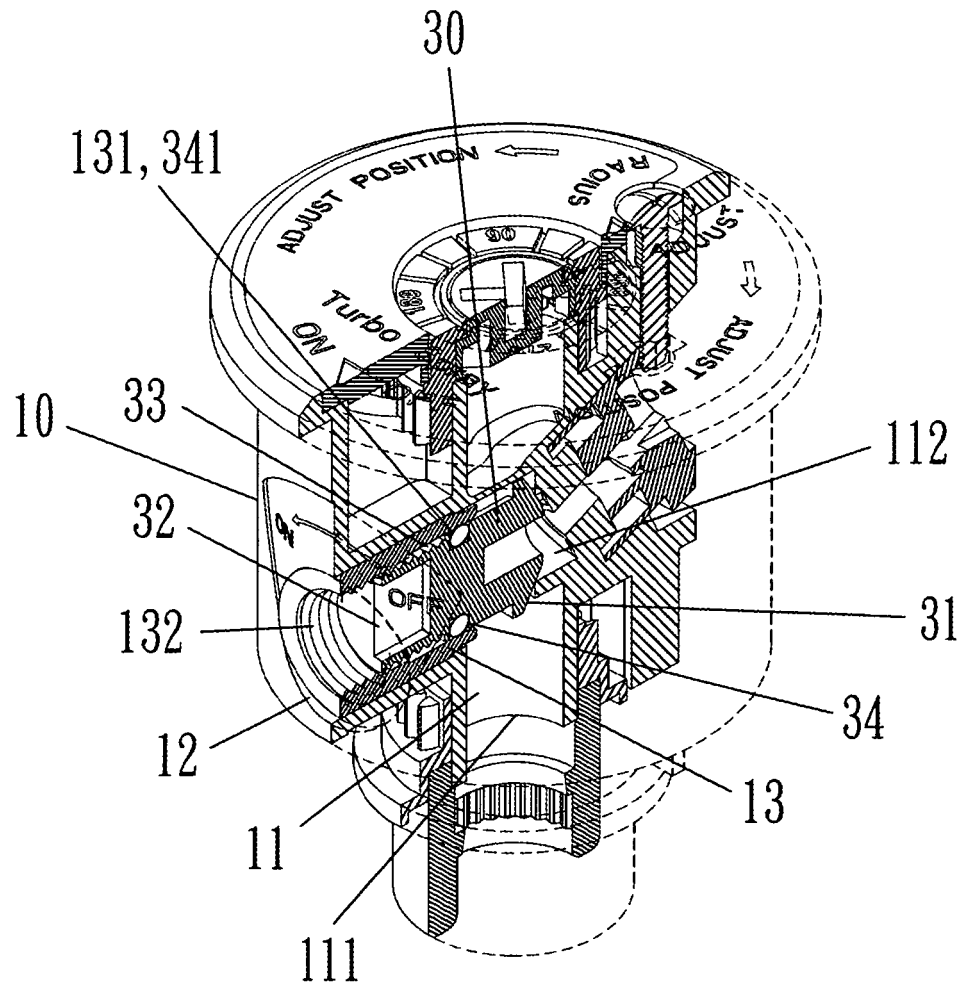


FIG 2

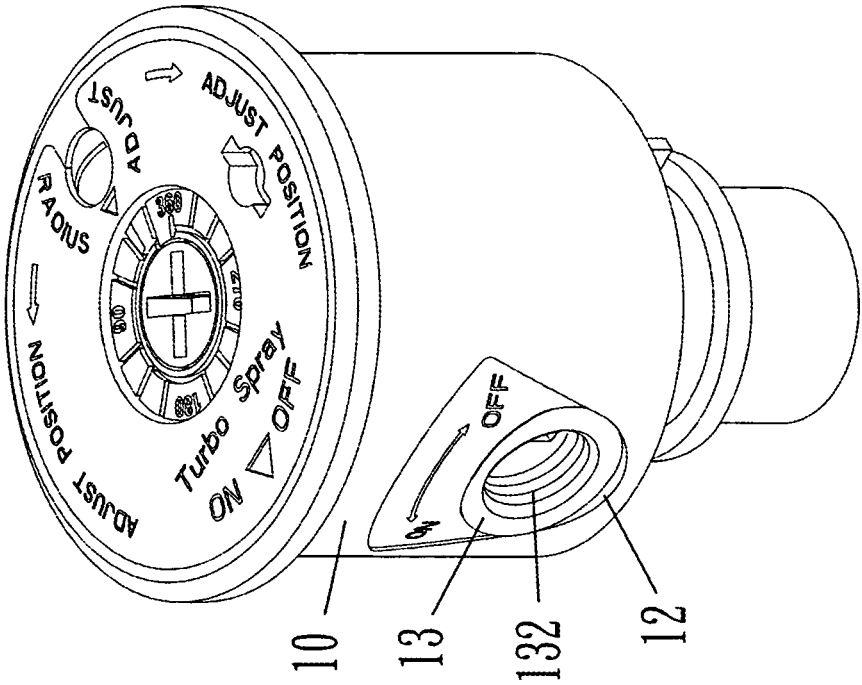


FIG 3

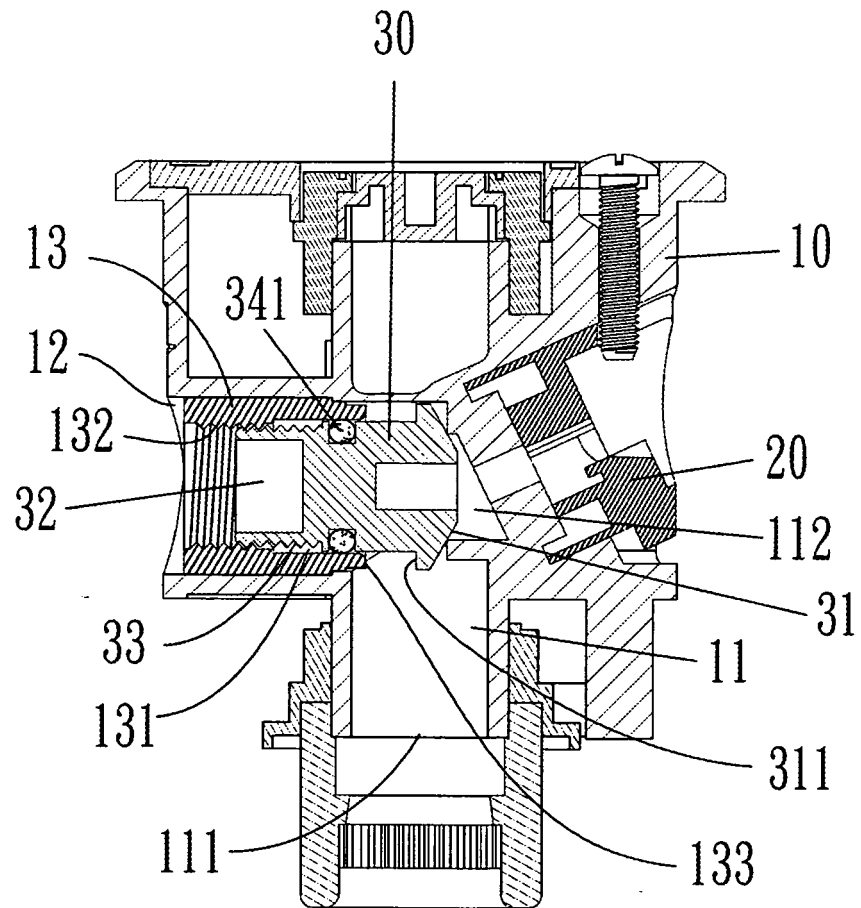


FIG 4

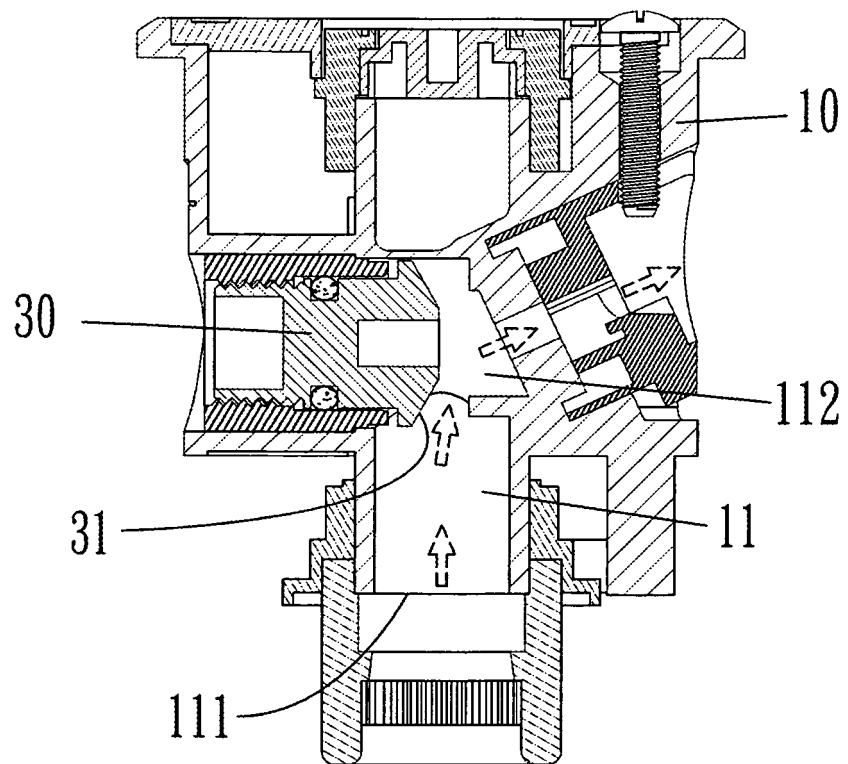


FIG 5

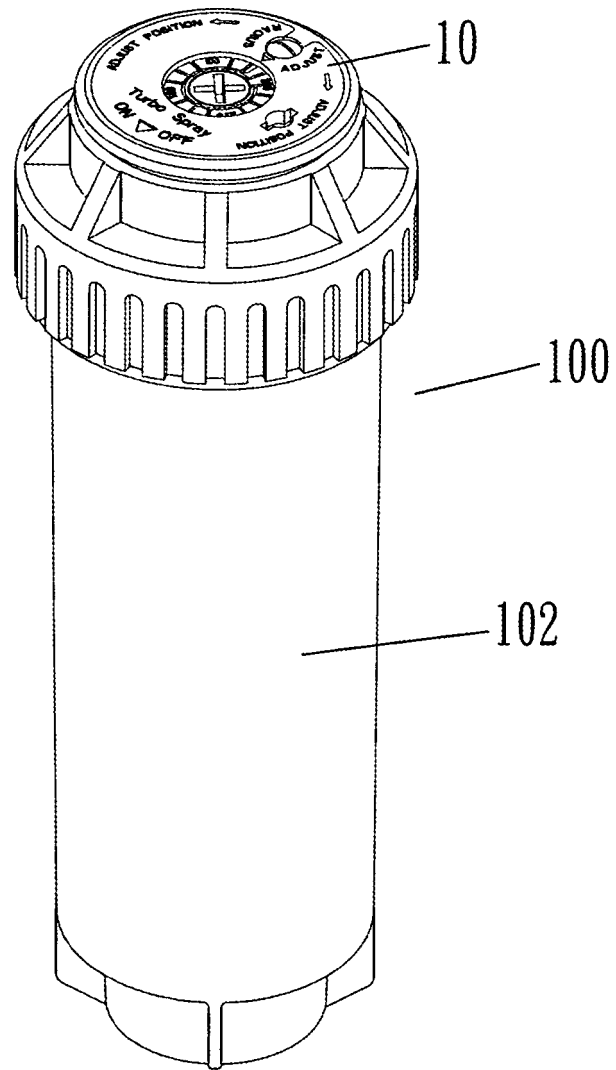


FIG 6

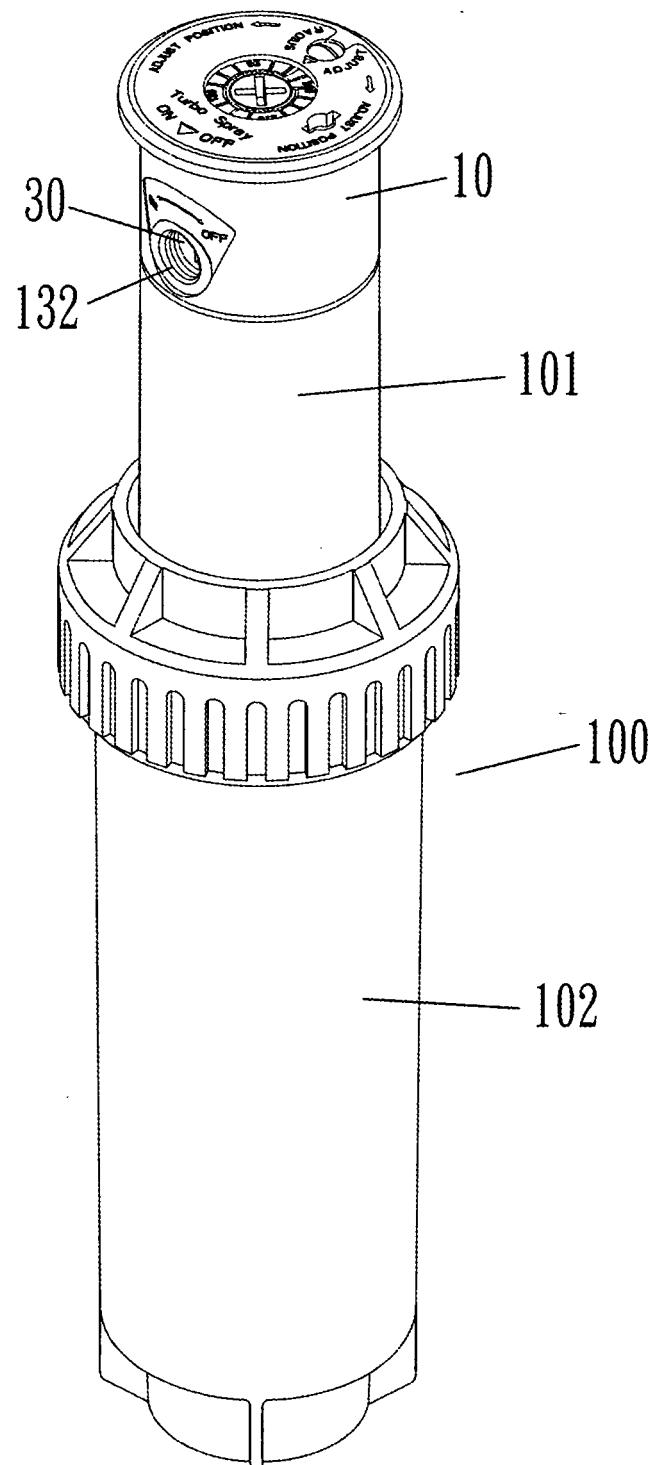


FIG 7

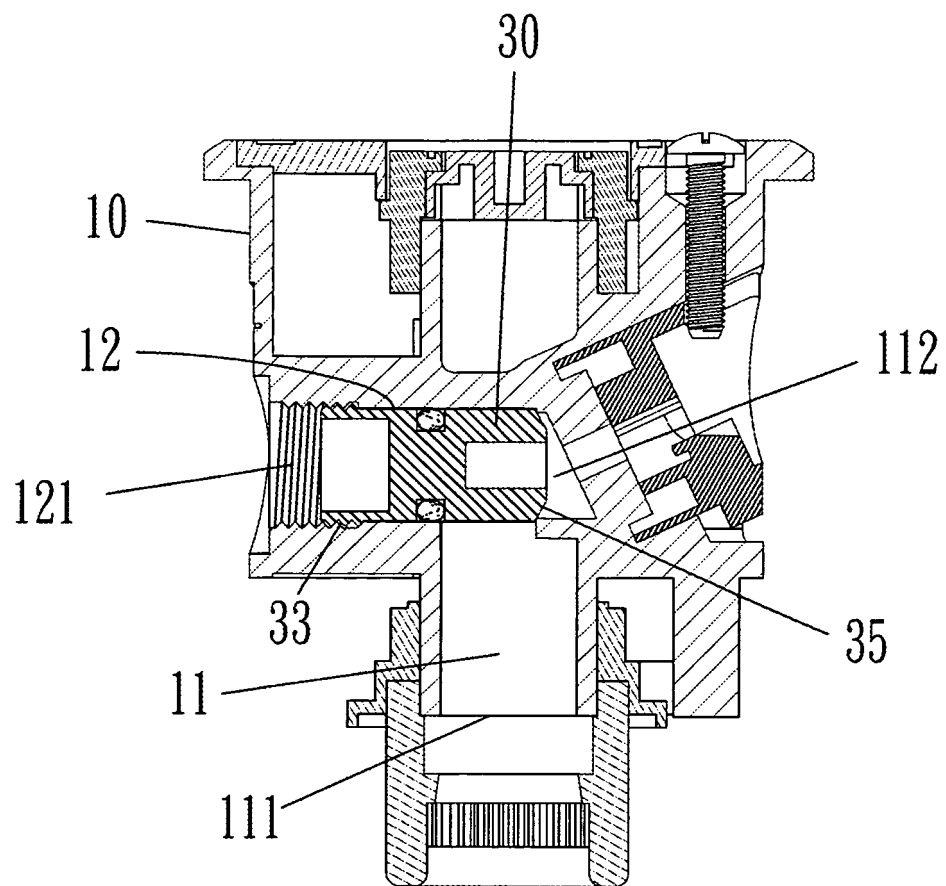


FIG 8

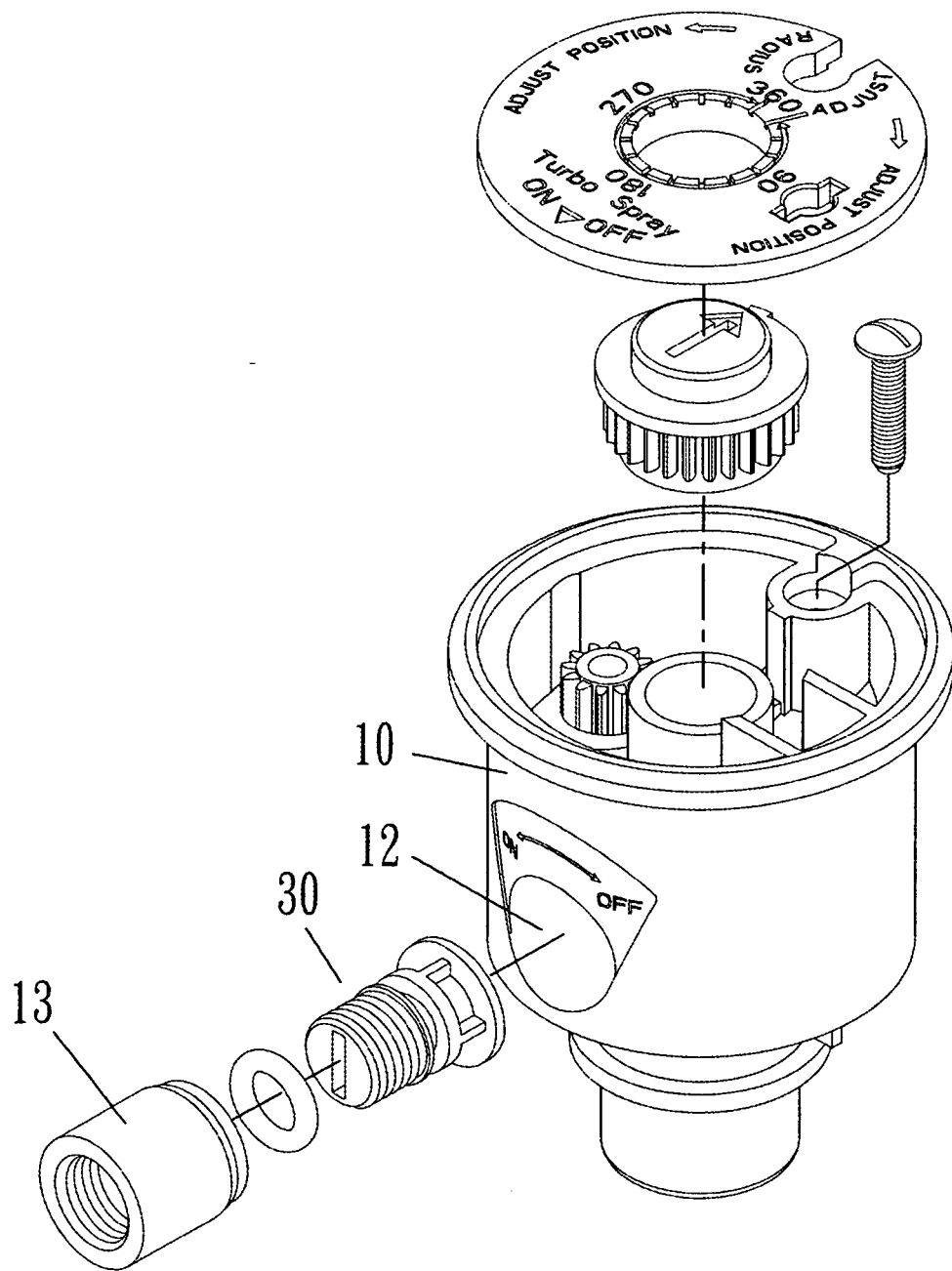


FIG 9

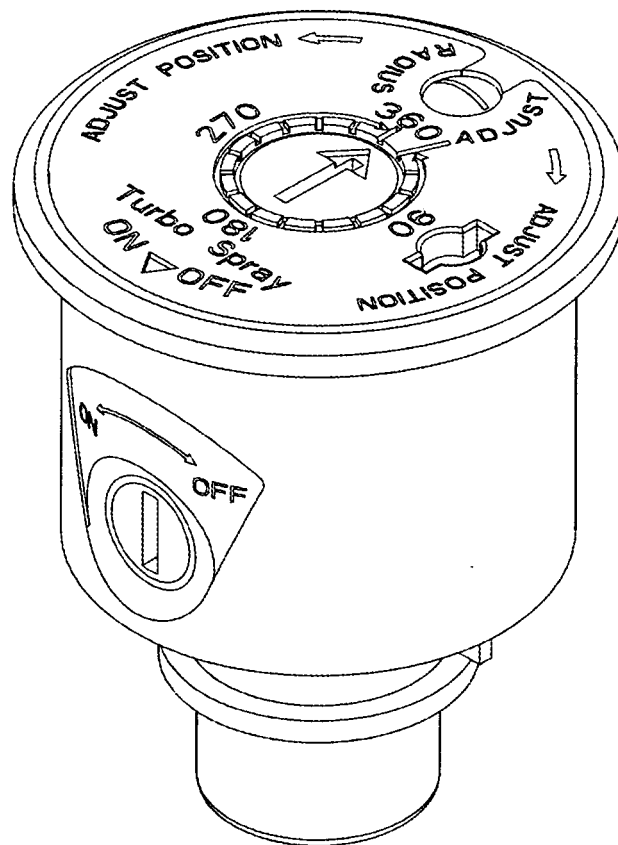


FIG 10

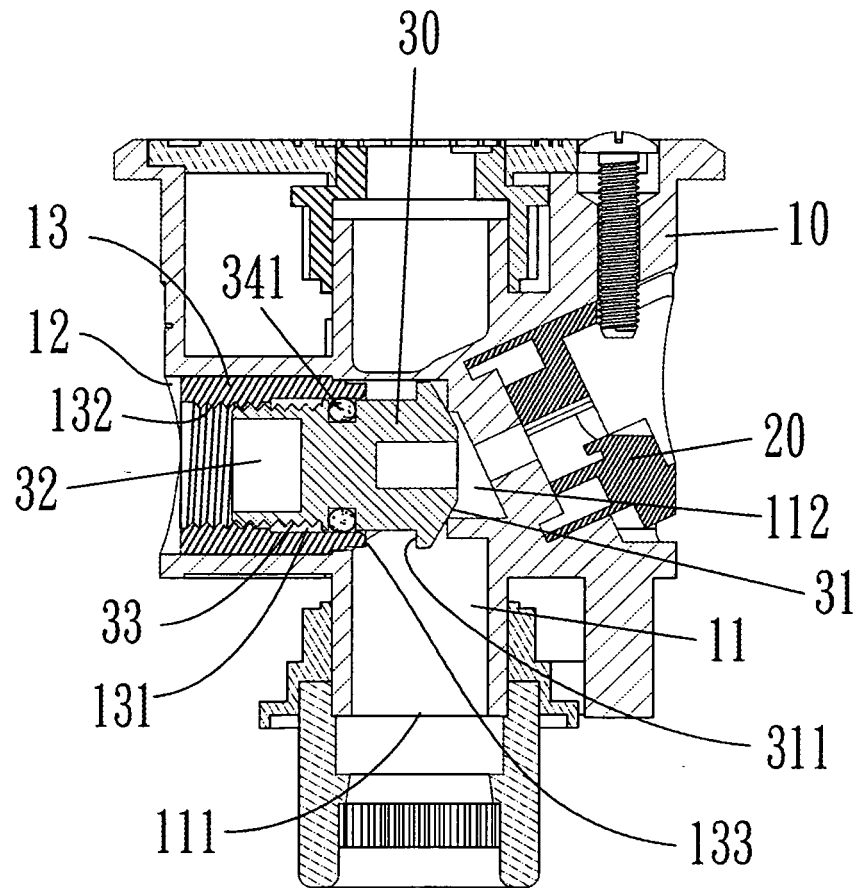


FIG 11

REFERENCES CITED IN THE DESCRIPTION

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