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(54) Sprinkler with adjustable water spray jets

(57) Sprinkler provided with adjustable water spray jets, particularly adapted for use in lawn and garden watering applications.

It comprises a framework (10) for it to rest on the ground, said framework supporting a pipe (11) provided with nozzles (12) issuing water spray jets, and a turbine-like driving assembly (13). Between the turbine-like driving assembly (13) and the water issuing pipe (11) there is provided a flow-rate adjustment arrangement (22-26).

The sprinkler is therefore a fixed one, featuring a simple and rational construction, while however allowing for an even and progressive watering of the ground.

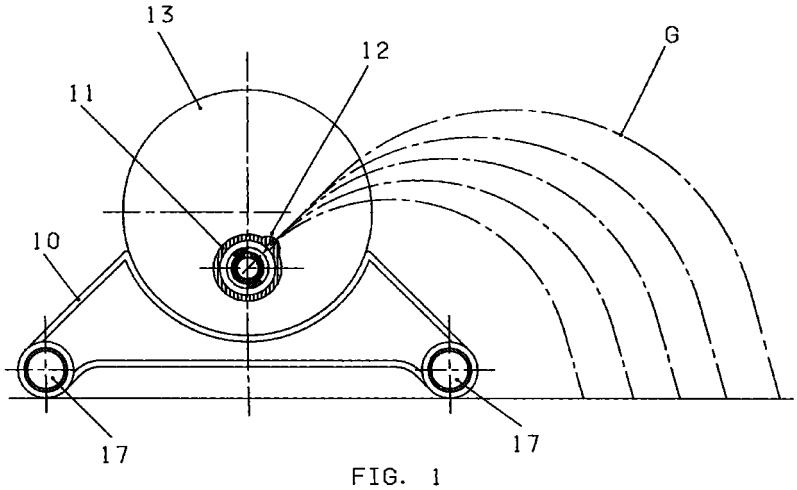

FIG. 1

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Description

[0001] The present invention refers to a sprinkler provided with adjustable water spray jets, adapted in particular for use in gardening applications to water cultivated land, such as lawns or gardens, in which there may grow also trees.

[0002] There are many kinds of sprinklers currently known in the art, ie. fixed, rotating, pulsating and oscillating sprinklers, wherein they differ from each other on the basis of the type of water jets that they produce. However, all of them are substantially constituted by an element which, duly provided with one or more nozzles, is adapted to issue water that is supplied to it through a water turbine from a water supply source to which the same sprinkler is connected via a flexible hose. The sprinklers themselves can either be fixed into the ground by means of a proper spike or be mounted on a base framework that simply rests on the ground.

[0003] Fixed-jet sprinklers are the simplest ones and are capable of watering surfaces that may be variously shaped, but must not be too large in their size, by selecting or replacing the spray nozzles correspondingly.

[0004] Rotary sprinklers, along with pulsating ones, are more complicated in their construction and operation owing to the need arising for a movement to be imparted to the spray jets, and therefore the heads or arms that carry the spray nozzles. Such a movement is generally brought about, through the provision of a transmission mechanism, by the same water turbine that supplies the spray nozzles. These types of sprinklers are adapted to water circular surfaces, either completely or pardally, which are generally larger than the ones that can usually be irrigated with the afore cited fixed sprinklers.

[0005] Oscillating sprinklers are substantially constituted by a horizontal pipe provided with variously oriented perforations or nozzles, mounted on a support framework and rotatably driven alternatingly, ie. according to a reversing pattern, about a longitudinal axis by a water turbine. In the drive gear box containing the water turbine there are provided mechanical control means enabling the surface to be watered to be properly delimited by setting the oscillation angle of the spray pipe accordingly. Further mechanical control means may be provided inside the oscillating pipe to the purpose of enabling the surface to be watered to be adjusted, ie. set, by means of a partialization or throttling of the water spray jets.

[0006] Examples of oscillating sprinklers are described in US-A-3 175 770, US-A-3 567 122 and EP-A-0363717. To bring about the oscillating movement of the water spray pipe, this kind of sprinklers requires a driving mechanism that is rather complicated from a construction point of view, as well as sensitive and delicate from an operational point of view. A further complication is added by the fact that the water spray pipe is out-of-axis with respect to the axis of the drive assembly and the need arises for an external crank to be provided to connect these two elements to each other.

[0007] Examples of oscillating sprinklers provided with such a jet partialization or throttling feature for varying the surface of ground to be watered are described in DE-A-3119094 and EP-A-0394653. These sprinklers are provided with hand-operated control means to selectively supply only part of the nozzles of the oscillating spray pipe. Therefore, they substantially have the same drawbacks as the sprinklers of the above cited type, with the further complication, in this case, of a hand-operated control element that is not effective in doing away with the problem of the selection of the ground surface to be watered to any satisfactory extent.

[0008] Moreover, the adjustment of the spray jets usually requires for the water supply to be temporarily shut off in order to prevent the user from getting wet when approaching the sprinkler for the necessary action. Now, such a handling can turn out as being particularly awkward and disadvantageous in those cases in which the sprinkler is situated in a position that is far from the water supply source.

[0009] All prior-art sprinklers have jets sprayed at a constant flow rate under regular operating conditions; in other words, a variation in the flow rate can be only obtained by acting on the control member (usually a faucet) at the water supply source.

[0010] It is therefore desirable, and a main purpose of the present invention, to provide a sprinkler that makes it possible for different ground surfaces to be watered evenly and selectively, wherein this sprinkler, although of the fixed type, has a variable flow rate, so as to feature a simple and rational construction and make it more convenient for the user to operate and adjust it.

[0011] According to the present invention, this aim is reached in a sprinkler provided with adjustable water spray jets, which comprises, as recited in the appended claim 1, a base framework for it to rest on the ground, said framework supporting a pipe provided with water spray nozzles and a turbine-type drive assembly, which are connected to a water supply source, in which between said turbine-type drive assembly and the spray pipe there is installed a device for adjusting the flow rate of the supply water.

[0012] The features and advantages of the present invention will anyway be more readily and clearly understood from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which

- Figure 1 is a schematic view according to the longitudinal axis of a sprinkler according to the present invention;
- Figure 2 is a partially interrupted longitudinal-section view of the sprinkler illustrated in Figure 1;

- Figure 3 is a view of the development of the surfaces of an item of the sprinkler illustrated in the above listed Figures.

[0013] A sprinkler according to the present invention is illustrated in particular in Figures 1 and 2. The sprinkler is substantially constituted by: a framework 10, which enables the sprinkler to rest on the ground; a rectilinear pipe 11, provided with a plurality of nozzles 12, which is mounted in a fixed position with respect to said framework 10; and a hydraulic turbine-type drive assembly 13, secured to the framework 10, which is provided with a water inlet connector 14 ensuring the water supply to the spray pipe 11.

[0014] The support framework 10 is of a traditional type, comprising two appropriately shaped end portions 15 and 16, in which the first one is adapted to allow for the mounting of the drive assembly 13 and the second one is adapted to accommodate the extremity of the spray pipe 11 that is opposed to the one connecting the latter to said drive assembly 13. Said end portions 15 and 16 are joined and connected together through tubular members 17 that are fined into appropriate receptacles provided in the same end portions. The extremity of the spray pipe 11 that is opposite to the one connecting the latter with the drive assembly 13 is normally shut by a cap 30.

[0015] The drive assembly 13, enclosed in a box-like casing, comprises a horizontal-axis water turbine 18 that is operated by the water under pressure that flows in through the water inlet connector 14. To this purpose, the latter is adapted to be connected, for instance, to the water supply source by means of a flexible hose (not shown). This water inlet connector 14 extends into the drive assembly 13 and has an aperture 19 for the water to flow therethrough, in which said aperture is arranged in such a manner as to enable the water jet to hit the blades of the turbine 18 radially.

[0016] On the shaft 20 of the water turbine 18 there is provided a threaded reel 21 that is rotatably engaged by a gear 22 which is firmly joined to an extremity of a cylindrical pipe 23. The latter is capable of rotating inside of a cylindrical housing 24, which is firmly associated to the casing accommodating the drive assembly 13 and extends coaxially inside the water spray pipe 11. In the cylindrical wall of the pipe 23 there is provided an aperture 25, preferably in an elongated oval shape, having its major axis parallel to the central axis of the pipe 23. Correspondingly, in the cylindrical wall of the housing 24 there is provided at least an aperture 26, which has a progressively variable cross-section.

[0017] The two portions of the pipe 23 and the housing 24, which are so provided with said aperture 25 and said apertures 26 (the latter are in the number of two, in this case), respectively, are shown in Figure 3 as developed on a plane and in a side-by-side arrangement. As it can be noticed, the apertures 26 have preferably a triangular shape and are arranged with a bisector B-B extending orthogonally to the major longitudinal axis L-L of the aperture 25. As a result, if the items shown in Figure 3 are seen in an overlapping arrangement, when the pipe 23 rotates with respect to the fixed housing 24, thereby moving in the direction indicated by the arrow F, the aperture 25 meets with the apertures 26 that feature a continuously variable cross-section of the port through which the water is able to flow. Namely, as the aperture 25 moves from a vertex V along the axis B-B, in the direction indicated by the arrow F, the water flow rate varies progressively from a minimum to a maximum value. The water flow rate is at a minimum when the aperture 25 of the pipe 23 is located in front of the closed, ie. solid wall of the housing 24. The water flow rate is on the contrary at a maximum when said aperture 25 is located in correspondence of the base of the triangular aperture 26 opposite to the vertex V.

[0018] In practice, in the sprinkler according to the present invention it is the through-flow aperture of the supply water that is varied in order to vary the water flow rate to the nozzles 12, with the result that water spray jets G are actually obtained which are capable of watering the ground with a continuous and progressive (Figure 1) to-and-fro movement, although the sprinkler itself is a fixed one.

[0019] The described solution enables the afore stated aims in terms of a simple and rational construction, even and progressive ground watering effect and convenience of use, to be fully reached

[0020] According to the present invention, the term "sprinkler" shall not be understood as only indicating a device intended to water portions of ground, but rather any device issuing one or more water jets, such as for instance the jets of a fountain. Even in a case like this one, in fact, it may be of advantage to apply a flow-rate regulator for the jets.

[0021] It will of course be appreciated that the above described sprinkler may be the subject of a number of modifications without departing from the scope of the present invention. For example, the water flow-rate regulator device, constituted by the rotating pipe 23 and the fixed housing 24, may feature apertures 25, 26 that differ in both shape and size from the afore described ones shown in the Figures, as long as they anyway ensure full compliance with the basic principle of the described progressive variation of the cross-section of the water through-flow port, for a progressively varying jet issuing therefrom, the sprinkler itself remaining a fixed one. Furthermore, it can be readily appreciated that the constant cross-section aperture 25 and the varying cross-section aperture 26 can exchange their position in the rotating pipe 23 and the fixed housing 24, respectively, since this would anyway produce as a result a variation in the flow-rate of the jets issuing from the sprinkler.

[0022] When stating that the sprinkler is a "fixed" one, it is meant that it remains in the same position dur-

ing its operation; however, it can be easily appreciated that the water spray pipe 11 may be mounted in a different angular position, by rotating it about its own longitudinal axis A-A (Figure 2), depending on the maximum flow-rate that is actually required for the jets G. This adjustment of the inclination, or slope, of the jets issuing from the nozzles 12 is usually performed when the sprinkler is not being supplied with water. However, it can advantageously be performed when the sprinkler is regularly operating, as well. In fact, the sprinkler generates unidirectional jets G (see Figure 1), so that the user can move near the sprinkler by approaching it on the opposite side of the jets, in order to adjust it without getting wet.

[0023] A particular variant thereof, which does not depart from the scope of the present invention, is constituted by the possibility for a double sprinkler to be easily provided, in that two water spray pipes 11 are mounted in a parallel, side-by-side arrangement, said two pipes being able to be supplied by respective water-supply arrangements 22-26 driven by the same drive assembly constituted by the turbine 18, the shaft 20 and the reel 21.

Claims

1. Sprinkler provided with adjustable water spray jets, particularly adapted for use in lawn and garden watering applications, comprising a framework (10) for it to rest on the ground, said framework supporting a pipe (11) provided with nozzles (12) issuing water spray jets and a turbine-like drive assembly (13), both connected to a water supply source, characterized in that between the turbine-like drive assembly (13) and the water issuing pipe (11) there is provided an arrangement (22-26) for the adjustment of the flow-rate of the supply water.

2. Sprinkler according to claim 1, characterized in that the flow-rate adjustment arrangement (22-26) is provided coaxialily with the water issuing pipe (11) and is driven by the turbine (18) of the drive assembly (13).

3. Sprinkler according to claim 1 or 2, characterized in that the flow-rate adjustment arrangement (22-26) comprises at least a pipe (23) adapted to rotate about the longitudinal axis (A-A) thereof and extending inside a fixed housing (24), said pipe and said housing being provided in the respective side walls with at least an aperture (25-26) for the water to flow therethrough, said apertures facing each other radially, and at least one of them having a variable cross-section.

4. Sprinkler according to any of the preceding claims, characterized in that the aperture (26) in the rotating pipe (23) has a constant cross-section elongated in the direction of the longitudinal axis (L-L) of the pipe (23), whereas the aperture (26) in the fixed housing (24) has a variable cross-section in the shape of a triangle with a bisector (B-B) orthogonal to the longitudinal axis (L-L) of the pipe (23).

5. Sprinkler according to any of the preceding claims, characterized in that the water spray pipe (11) is mounted in a fixed position, but is capable of being orientated with respect to the drive assembly (13) and the support framework (10) by the rotation thereof about its longitudinal axis (A-A).

6. Sprinkler according to any of the preceding claims, characterized in that the two water spray pipes (11) are mounted in a parallel, side-by-side arrangement on the support framework (10), each one of said pipes (11) being provided with a respective water supply arrangement (22-26) driven by the same drive assembly (18; 20-21).

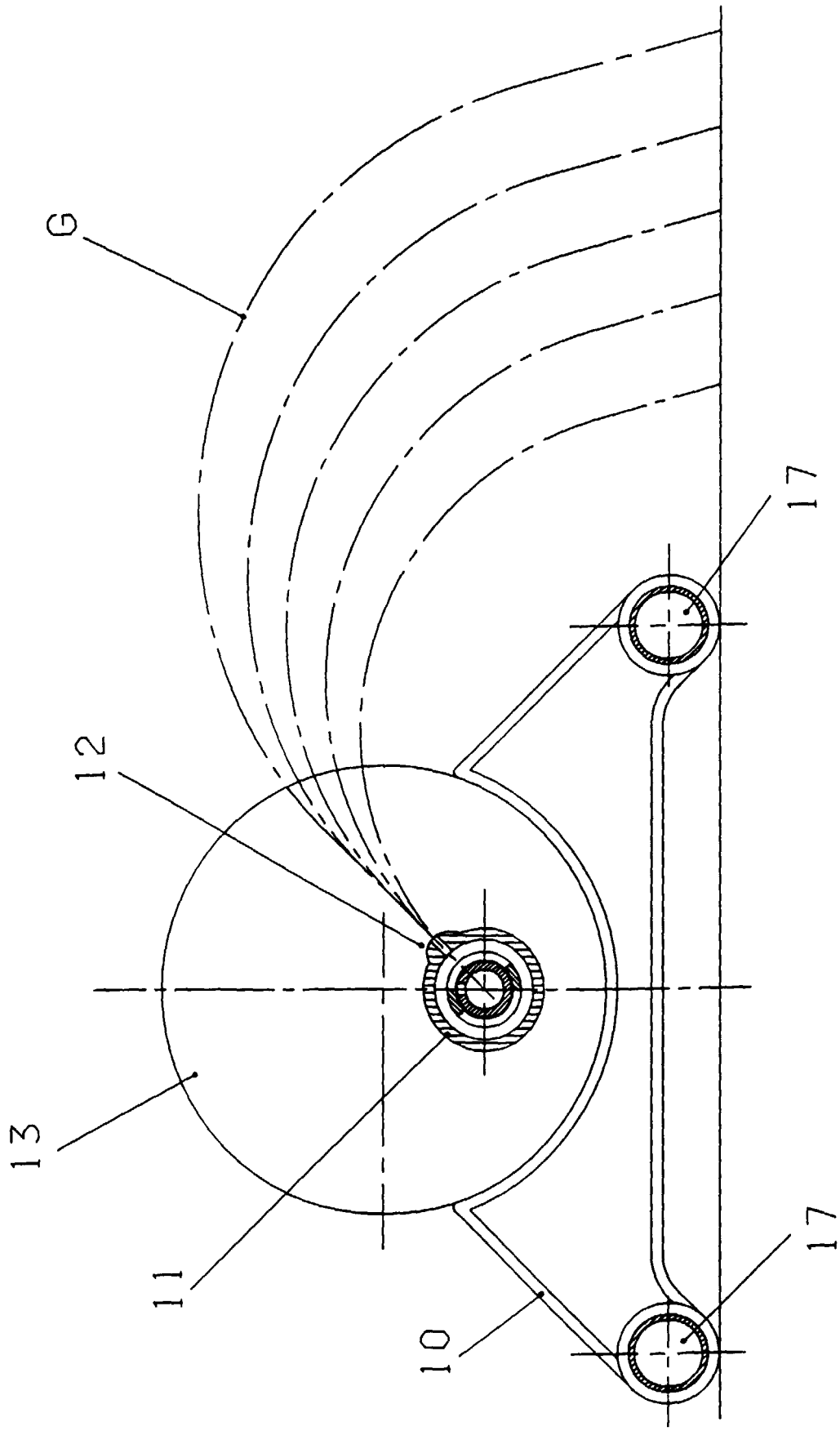

FIG. 1

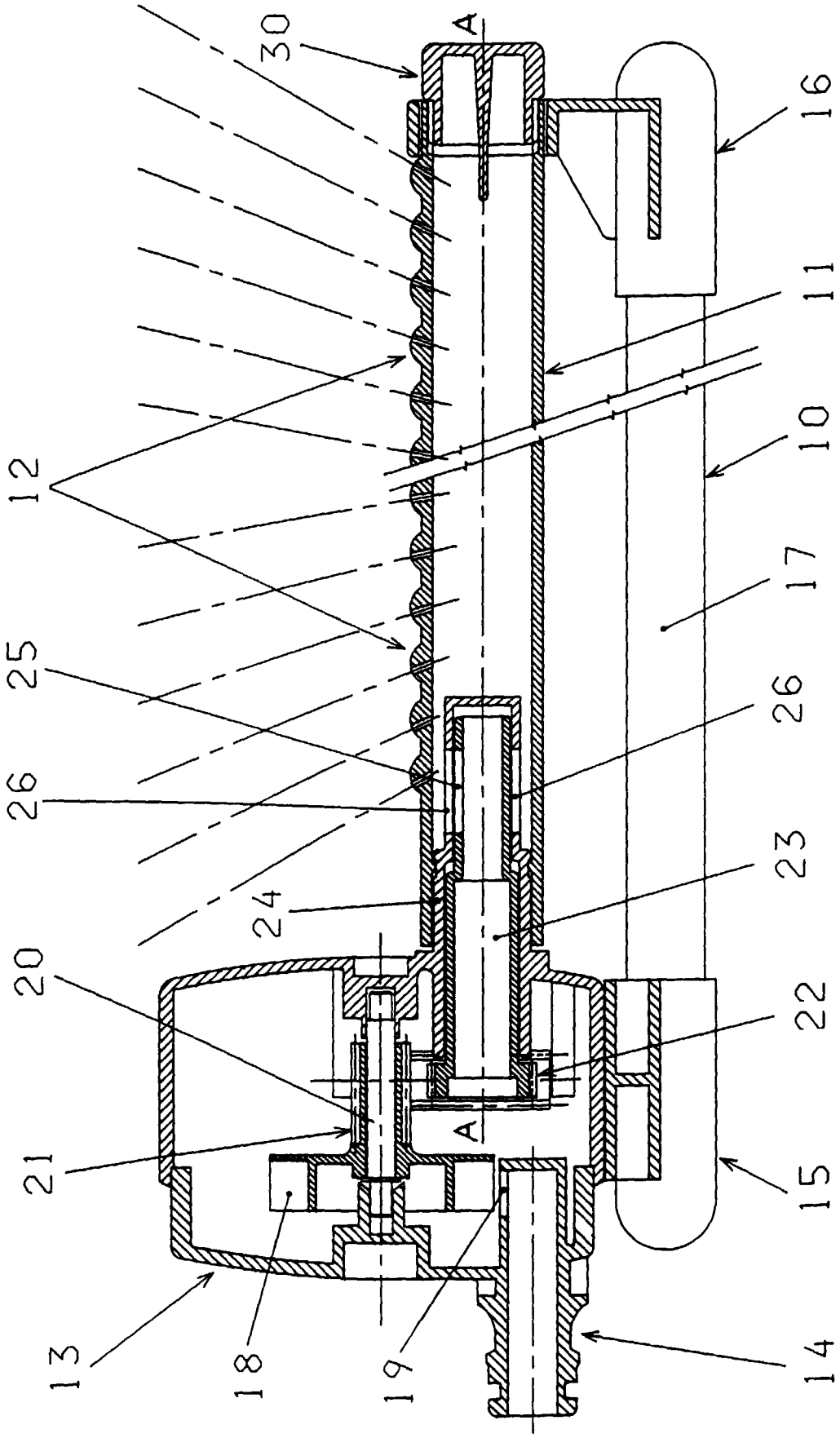

FIG. 2

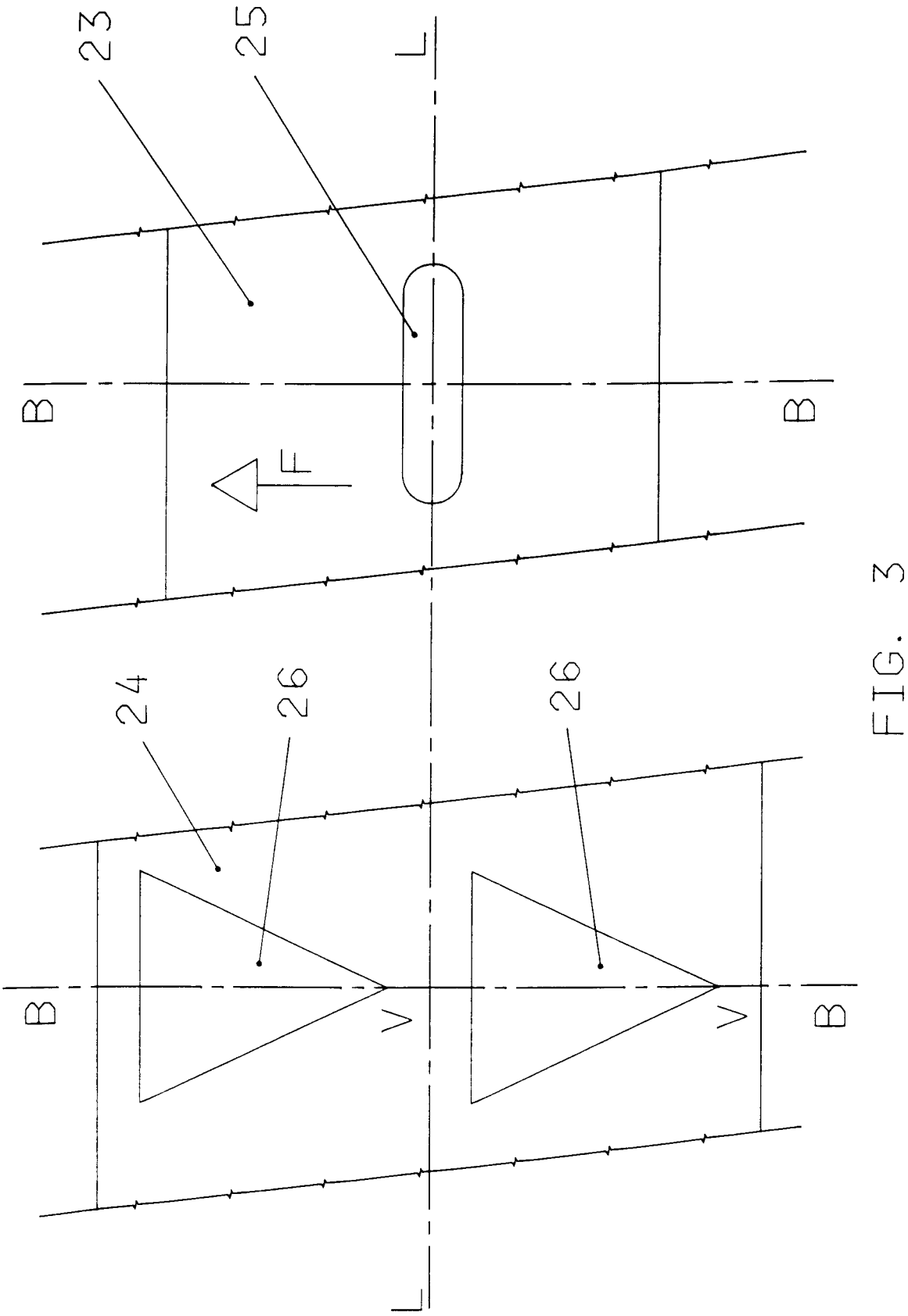

FIG. 3