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(54) Oscillating sprinklers

(57) An oscillating sprinkler has support structure (1, 2, 3, 4) supporting an impeller assembly (5) and a generally cylindrical spray bar assembly (6). An impeller (8) of the assembly (5) applies an oscillating drive motion to the spray bar assembly (6). The assembly (6) is manually rotatable between two alternative positions in

the first of which a first set (32) of twenty nozzles is in the operation upwardly facing position and in the second of which a second set (33) of two nozzles is in the operative upwardly facing position. A further adjustment is provided by an adjusting ring (36) rotation of which isolates from the water supply a progressive number of nozzles so as to alter the width of spray produced.

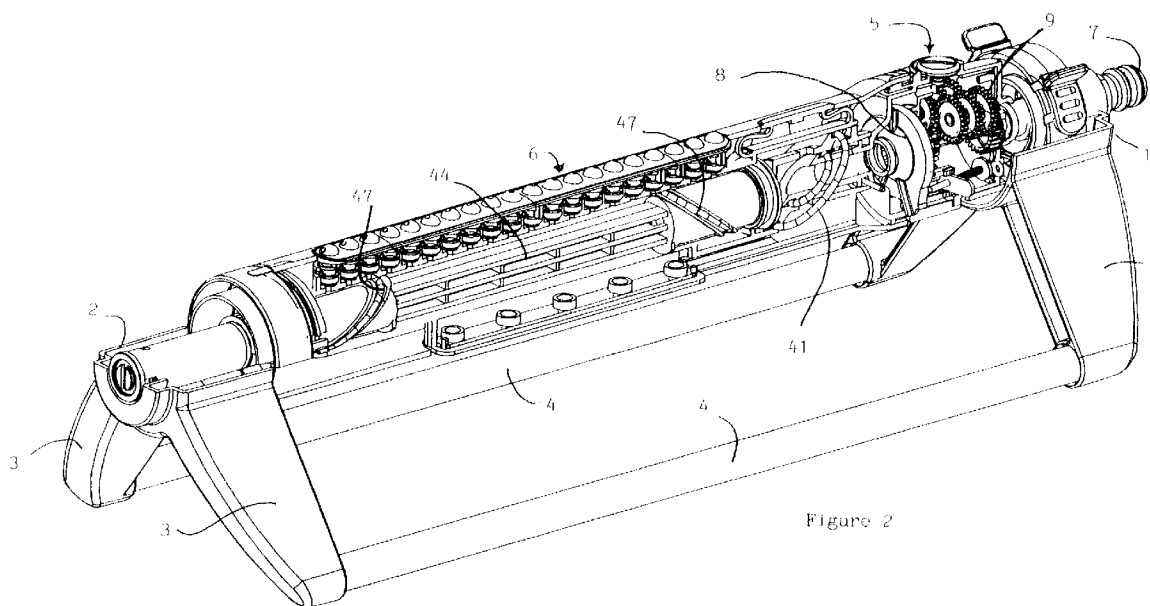


Figure 2

EP 0 826 427 A2

Description

This invention relates to oscillating sprinklers for watering gardens.

According to the invention an oscillating sprinkler comprises support means, a spray bar which is capable of oscillating movement with respect to the support means, the spray bar having outlet nozzles for delivering water, an impeller which is driven by the flow of incoming water to the sprinkler, the impeller driving the spray bar with said oscillating movement, the spray bar having a first set of outlet nozzles and a second set of outlet nozzles and the bar being movable between two operative positions in the first of which water is in use delivered to the first set but not the second set and in the second position of which water is in use delivered to the second set but not the first set.

The first set of nozzles will normally differ from the second set of nozzles in terms of the respective water spray patterns produced, to give the user a choice of water spray patterns.

The spray bar is preferably generally cylindrical, having the first set of nozzles extending in a line, substantially parallel to the longitudinal axis of the bar, and having the second set of nozzles extending substantially parallel to the longitudinal axis of the bar, with the line of the first set of nozzles being diametrically opposite the line of the second set of nozzles.

The bar is preferably rotatable, with respect to the remainder of the sprinkler, about an axis coincident with the central longitudinal axis of the bar, and detent means may be provided positively to locate the bar in each of the first and second positions.

In the preferred embodiment the bar has a first water flow passage leading to the first set of nozzles and a second water flow passage leading to the second set of nozzles, water from the impeller being delivered to the first passage but not the second passage when the bar is in the first position and water from the impeller being delivered to the second passage but not the first passage when the bar is in the second position.

An oscillating sprinkler according to the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an isometric view of the sprinkler,

Figure 2 is an isometric view, from another angle and with parts cut away, to show internal detail,

Figure 3 is a fragmentary longitudinal sectional view with a by-pass valve in a closed position,

Figure 4 is a view similar to that of Figure 3 but with the valve in an open position,

Figure 5 is a fragmentary isometric view of the structure of the sprinkler in the region of the valve,

illustrating the valve in a closed position,

Figure 6 is a view similar to that of Figure 5 but with the valve in an open position,

Figure 7 is a fragmentary isometric view showing adjustable setting rings of the sprinkler,

Figure 8 is an isometric view showing a switching arm and over-centre valve for controlling the flow of water to an impeller of the sprinkler,

Figure 9 is a sectional view on the central longitudinal plane of the sprinkler, with a movable spray bar in a first position,

Figure 10 is a view corresponding to that of Figure 9 but with the spray bar in a second position,

Figures 11 to 14 are fragmentary sectional views showing a nozzle selection means in four alternative positions,

Figure 15 is a sectional view of the line XV-XV of Figure 11, and

Figure 16 is a fragmentary isometric view illustrating how nozzle strips are separately formed and snapped into position in the spray-bar housing.

Referring to Figures 1 and 2, the sprinkler comprises a support structure including two end supports 1, 2. Each support 1 or 2 has a pair of splayed legs 3 with lower ground-engaging ends interconnected by a pair of longitudinally extending bars 4. Between the end supports 1, 2 are disposed an impeller assembly 5 and a spray bar assembly 6 which is generally cylindrical. The end support 1 includes a spigot 7 (omitted from Figure 1) for connection of a hose fitting, enabling water to be supplied to the end support 1. The impeller assembly 5 includes an impeller 8 and a reduction gear train 9. The incoming water flow drives the impeller 8 which, through the reduction gear train 9, applies an oscillating motion to the spray bar assembly 6 which has nozzles from which the water is delivered.

As best shown in Figures 3 and 4, water entering the sprinkler by way of the spigot 7 passes into a central tube 10 in the end support 1, through a pair of opposed openings 12 in the wall of the tube 10 and thence into an inlet chamber 13 in the impeller assembly where it passes into one or other of two impeller inlets 14, 15 (Figure 8), depending on the condition of a toggle valve 16.

The inner end of the tube 10 carries a coaxial stationary gear wheel meshing with one of the gears in the gear train 9. Referring to Figure 8, the toggle valve 16 has a rocker member 17 from which projects a lever surrounded by a helical spring 18. The lever is extended to

form a switching arm 19 which extends into the end support 1. By pushing the arm 19 in one direction the rocker member 17 is moved to the position illustrated in Figure 8 in which the inlet 15 is open to enable water to enter the inlet 15 whilst the inlet 14 is blocked by the member 17. When the arm 19 is pushed in the opposite direction, the rocker member 17 moves over centre to the alternative (non-illustrated) position, in which the inlet 14 is open for the passage of water and the inlet 15 is closed. The gear train 9 runs in the chamber 13.

Movement of the arm 19 is effected by two sweep setting rings 20, 22 (Fig. 7) mounted for independent rotational adjusting movement about the central longitudinal axis of the sprinkler and with respect to the end support 1. Each ring 20, 22 has a radial wall provided with an aperture through which the arm 19 extends, and the edge of each aperture is capable of being engaged by the arm 19 to cause change-over of the rocker member 17.

When water reaches the impeller 8 through the inlet 14, the water flow drives the impeller in one rotational direction and when water reaches the impeller 8 through the inlet 15 the water flow drives the impeller 8 in the other rotational direction. The impeller 8 is linked to the gear train 9, the result being that the whole of the impeller assembly 5 and the spray bar assembly 6 oscillate, about the stationary gear carried by the tube 10, through an angular displacement determined by the setting of the sweep setting rings 20, 22. After driving the impeller 8, the water enters an impeller outlet chamber 23 and thence a duct 24 which projects into the spray bar assembly 6 and which terminates in an angled open end.

The impeller assembly 5 has a water flow path which by-passes the impeller 8. This by-pass path is indicated by the arrow 25 in Figure 4. As can be seen, the by-pass path leaves the impeller inlet chamber 13 by means of a passage 26 the inlet port to which is closable by a rotatably movable valve member 27. The passage 26 leads water, without interruption, into the impeller outlet chamber 23.

The valve member 27 is moulded with a stem which is rotatably mounted in the outer housing 28 of the impeller assembly 5. Below the stem projects a peg 29 (Figure 3) which, in the closed condition of the by-pass valve (Figure 5), covers and effectively obstructs the inlet port to the passage 26 to prevent water passing through the by-pass passage 25. Rotation of the valve member 27 through about 90° from its closed position, causes the peg 29 to move away from the inlet port so as to open the valve and allow water to pass through the by-pass passage 25, this position being illustrated in Figures 4 and 6. As best seen in Figures 5 and 6, the valve member 27 has an externally accessible disc-like top 30 provided with a diametral slot for entry of a coin edge, to facilitate rotational movement of the valve member 27. The housing adjacent the member 27 may bear water pressure markings, to guide the user in positioning the valve member to suit the prevailing inlet wa-

ter pressure.

The by-pass passage 25 acts to compensate for variations in water supply pressure between different users, and possibly for variations experienced by a particular user. When the water pressure is comparatively high, the user opens the by-pass valve to enable a proportion of the water to reach the spray bar without passing through the impeller 8. This increases the volumetric flow rate of water reaching the spray bar, compared with the condition where all the water passes through the impeller. By contrast, when the water supply pressure is comparatively low, the by-pass valve is closed so that all the water passes through and drives the impeller 8.

The whole spray bar assembly 6 is rotatable, about the central longitudinal axis of the sprinkler, between two alternative operative positions respectively shown in Figures 9 and 10. A detent retains the spray bar assembly in the selected one of the two positions which are angularly displaced by 180°. In the position shown in Figure 9 (and also in Figures 1 and 2), a first set 32 of twenty nozzles is in the operative upwardly facing position. In the alternative position shown in Figure 10, a second set 33 of five nozzles is in the operative upwardly facing position. Each of the sets of nozzles is in a line parallel to the longitudinal axis of the sprinkler bar. At the end adjacent the support 1, the housing 34 of the spray bar assembly is rotatable with respect to the impeller housing, the rotational interface being indicated at 35 in Figures 9 and 10. At the end adjacent the support 2, the housing of the spray bar assembly adjoins an adjusting ring 36, the purpose of which will be described. The ring 36 rotates with the spray bar assembly 6, when the latter is rotated between the Figure 9 and 10 positions, and reference 37 indicates the rotational interface between the spray bar assembly 6 and the end support 2.

Within the spray bar assembly is a cup-like chamber 38 into which the duct 24 projects. The circumferential wall of the cup-like chamber has two oppositely positioned side ports 39, 40 which are selectively opened and closed by the angled end of the duct 24. An angled seal 41 surrounds the end of the duct 24 and seals against the wall of the cup-like chamber. In the position shown in Figure 9, the side port 39 is blanked off by the wall of the duct 24, but the other side port 40 is open and allows water to enter a first flow path 42 which extends through the centre of the spray bar and communicates with the first set 32 of nozzles. When the spray bar assembly is grasped and rotated through 180° to the alternative position shown in Figure 10, the port 40 is blanked off by the end of the duct 24, but the port 39 is open and allows water to enter a second flow path 43 through the upper region of the spray bar assembly, so as to lead water to the second set 33 of nozzles. The characteristics of the two sets of nozzles 32 and 33 differ and the sets of nozzles 32, 33 are on opposite sides of the spray bar. Preferably, the nozzles 33 produce a finer jet spray than the nozzles 32.

Extending through the centre of the spray bar assembly is a central stem 44 which rotates with the remainder of the spray bar assembly when the latter is moved between the Figure 9 and Figure 10 positions, but which is capable of rotational movement with respect to the remaining outer structure of the spray bar assembly under the control of the adjusting ring 36. The stem has spaced cylindrical portions 45 interconnected by longitudinally extending bars or strips 46, and each cylindrical portion 45 has, extending therearound and at a skew angle, a corresponding O-ring seal 47 the outer periphery of which seals against the surrounding structure of the spray bar assembly. The O-ring seals 47 are best seen in Figures 11 to 14.

With the spray bar assembly in the position illustrated in Figure 9, rotational movement of the adjusting ring 36 rotates the central stem 44 within the remainder of the spray bar assembly, and this rotation has the effect of varying the angle or disposition of the O-ring seals 47 with respect to the first set of nozzles 32 so as to isolate from the water supply a progressive number of nozzles, from each end of the line of nozzles 32, so as to alter the width of the spray.

Figure 11 illustrates the condition where the maximum number of nozzles (six) are isolated, leaving the central fourteen nozzles operative. The other extreme is shown in Figure 14 where all twenty nozzles 32 are operative. Figures 12 and 13 show intermediate positions where sixteen and eighteen nozzles, respectively, are operative.

The first set of twenty nozzles 32 are formed in four separately moulded plastics strips, namely a first (and end) strip bearing three nozzles, a second strip bearing seven nozzles, a third strip bearing seven nozzles and a fourth (and end) strip bearing three nozzles. The first and second strips are illustrated at 48 and 49 respectively in Figure 16. The strip 48 is shown ready for insertion in the spray bar housing and the strip 49 is shown snapped into position in the spray bar housing.

The end strip 48 is integrally moulded, having a plate-like flange 50 from the upper surface of which project three bulbous projections 52 each with an orifice angled in a particular direction. Below the flange 50, are three stems each of which has a pair of resilient tabs 53 and an elastomeric O-ring seal 54. The strip 48 fits into the end of the spray bar housing which is moulded with three sockets 55 for the respective reception of the three stems. In manufacture of the sprinkler, the strip 48 is pressed into position, with the resilient tabs 53 snapping into position in opposed slots 56 formed in the walls of the sockets and with the O-rings 54 sealing against the bases of the socket walls. The other strips are similarly formed and pressed into position with a snap fit which retains the strips in position.

By moulding the strips separately, the nozzle characteristics can be varied without the need to alter the mould tools for making the remainder of the sprinkler. Also, the angling of the orifices in the nozzles make it

virtually impossible to form all the nozzles in one moulding, so the use of individual strips gives greater flexibility in angling the nozzles.

Claims

1. An oscillating sprinkler comprising support means, a spray bar which is capable of oscillating movement with respect to the support means, the spray bar having outlet nozzles for delivering water, an impeller which is driven by the flow of incoming water to the sprinkler, the impeller driving the spray bar with said oscillating movement, the spray bar having a first set of outlet nozzles and a second set of outlet nozzles and the bar being movable between two operative positions in the first of which water is in use delivered to the first set but not the second set and in the second position of which water is in use delivered to the second set but not the first set.
2. An oscillating sprinkler according to claim 1, wherein the spray bar is generally cylindrical, having the first set of nozzles extending in a line substantially parallel to the longitudinal axis of the bar, and having the second set of nozzles extending in a line substantially parallel to the longitudinal axis of the bar, with the line of the first set of nozzles being diametrically opposite the line of the second set of nozzles.
3. An oscillating sprinkler according to claim 1 or 2, wherein the bar is rotatable, with respect to the remainder of the sprinkler, about an axis coincident with the central longitudinal axis of the bar, and detent means are provided positively to locate the bar in each of the first and second positions.
4. An oscillating sprinkler according to any of the preceding claims, wherein the bar has a first water flow passage leading to the first set of nozzles and a second water flow passage leading to the second set of nozzles, water from the impeller being delivered to the first passage but not the second passage when the bar is in the first position and water from the impeller being delivered to the second passage but not the first passage when the bar is in the second position.
5. An oscillating sprinkler according to any of the preceding claims, wherein the sprinkler has a by-pass passage which allows water to reach the spray bar without passing through the impeller and a valve for controlling the flow of water through the by-pass passage.
6. An oscillating sprinkler according to claim 5, wherein the sprinkler comprises a spray bar assembly, in-

cluding the spray bar, and an impeller assembly, including the impeller, the spray bar assembly and the impeller assembly being driven together with said oscillating movement with respect to the support means which are provided with ground-engaging feet.

7. An oscillating sprinkler according to claim 6, wherein the flow valve includes a flow valve member rotatably mounted in a housing of the impeller assembly, the flow valve member having an externally accessible portion for manual adjustment of the flow valve. 5
8. An oscillating sprinkler according to claim 7, wherein the flow valve member has a projecting peg which progressively opens or obstructs a port forming part of said by-pass passage, so that rotational adjustment of the flow valve member provides progressive opening and closing of the port so to enable the volume of water passing through the by-pass passage to be varied. 10
9. An oscillating sprinkler according to any of the preceding claims, wherein adjustable selection means are provided selectively to isolate the water supply to certain of the nozzles in one of the sets in order to vary the number of operative nozzles which deliver water. 15
10. An oscillating sprinkler according to claim 9, wherein the selection means include a central stem rotatable with respect to the spray bar to vary the number of operative nozzles in said one set. 20
11. An oscillating sprinkler according to claim 10, wherein the central stem carries two spaced O-rings which surround the central stem at skewed angles so that rotation of the central stem progressively isolates the number of nozzles in said one set in communication with the water supply. 25
12. An oscillating sprinkler according to claim 10 or 11, wherein the selection means includes a manually adjustable ring rotation of which causes rotation of the central stem with respect to the spray bar. 30
13. An oscillating sprinkler according to claim 12, wherein the adjusting ring is disposed at the end of the spray bar remote from the impeller. 35
14. An oscillating sprinkler according to any of claims 9 to 13, wherein the selection means are adjustable between maximum and minimum limit positions respectively defined by all the nozzles in a line thereof being operative and the minimum number of nozzles being operative, adjustment of the selection means from the maximum position causing pro-

gressive isolation of the nozzles from each end of the line of the nozzles so that in the minimum position the operative nozzles are constituted by a central group in the line of nozzles.

15. An oscillating sprinkler according to any of claims 9 to 14, wherein the spray bar comprises a spray bar housing and at least one separately formed strip carrying the nozzles of the first set or the second set, on assembly of the sprinkler the strip being snap fitted to the housing. 40
16. An oscillating sprinkler according to claim 15, wherein the spray bar housing is formed with a line of sockets and the or each strip presents upwardly facing nozzles and downwardly projecting nozzle stems which are snap fitted into the sockets to retain the strip with respect of the spray bar housing. 45
17. An oscillating sprinkler according to claim 16, wherein there are four such strips which are snap fitted into the spray bar housing in a single line to form the line of nozzles in the spray bar. 50

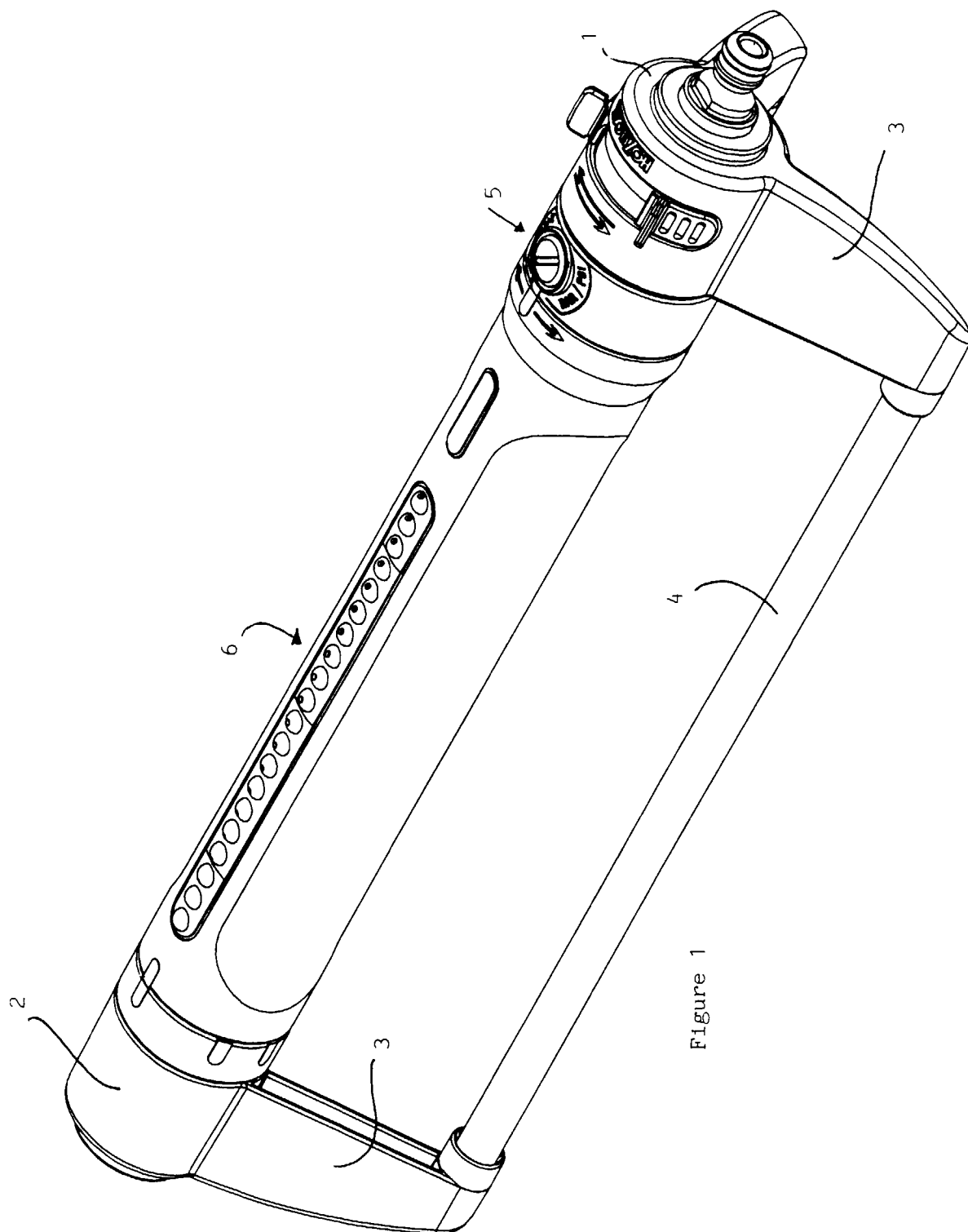


Figure 1

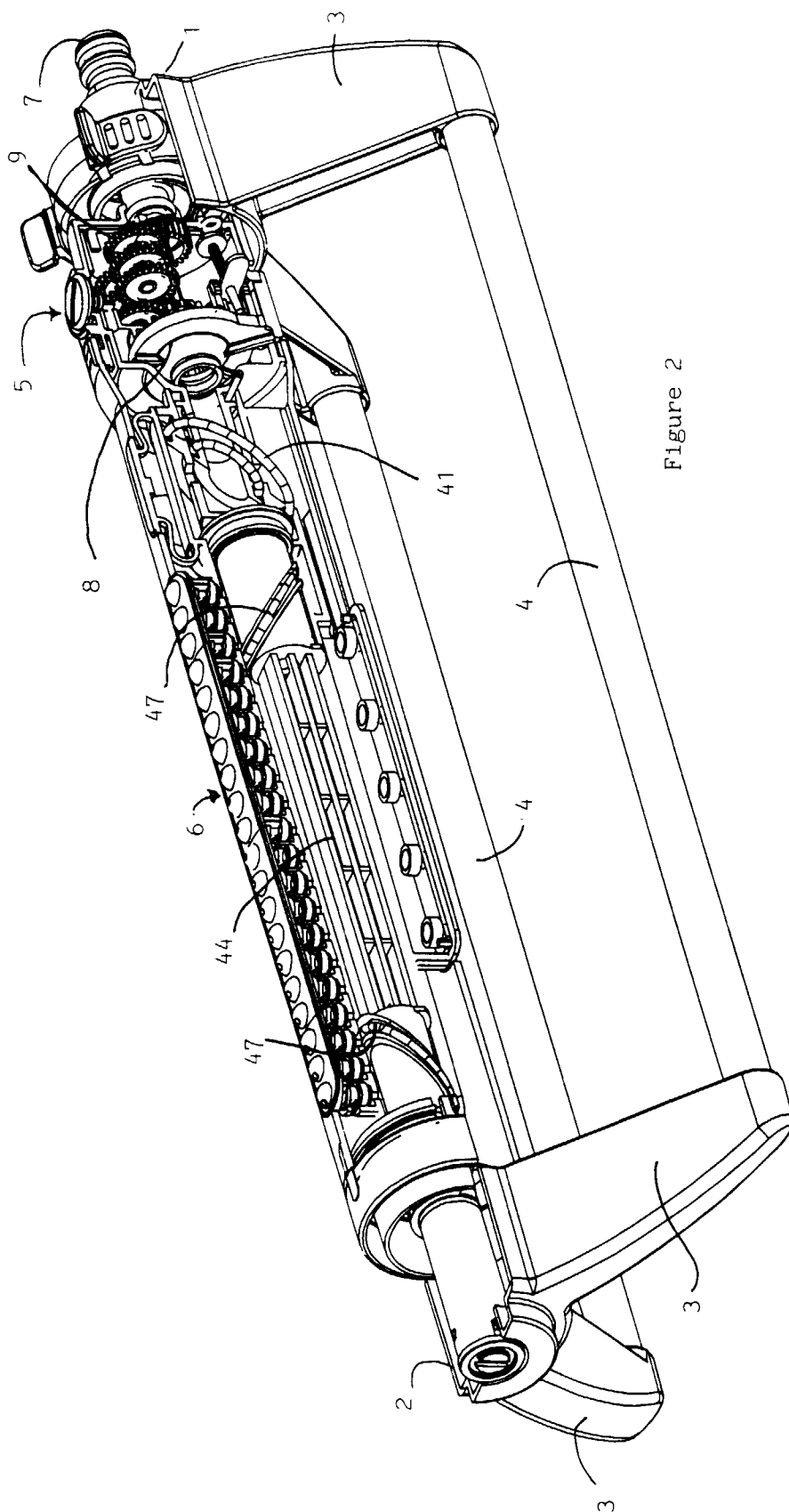


Figure 2

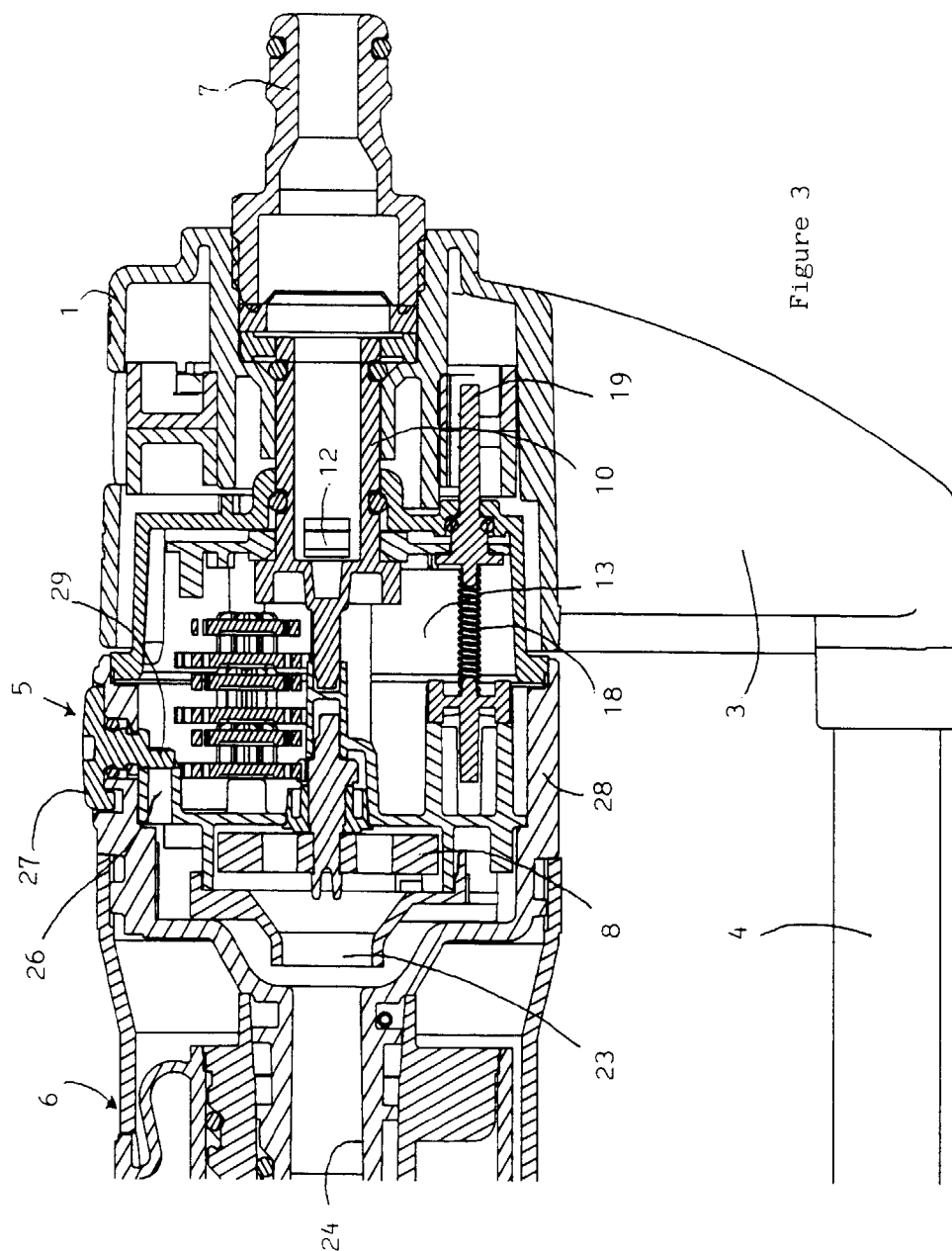


Figure 3

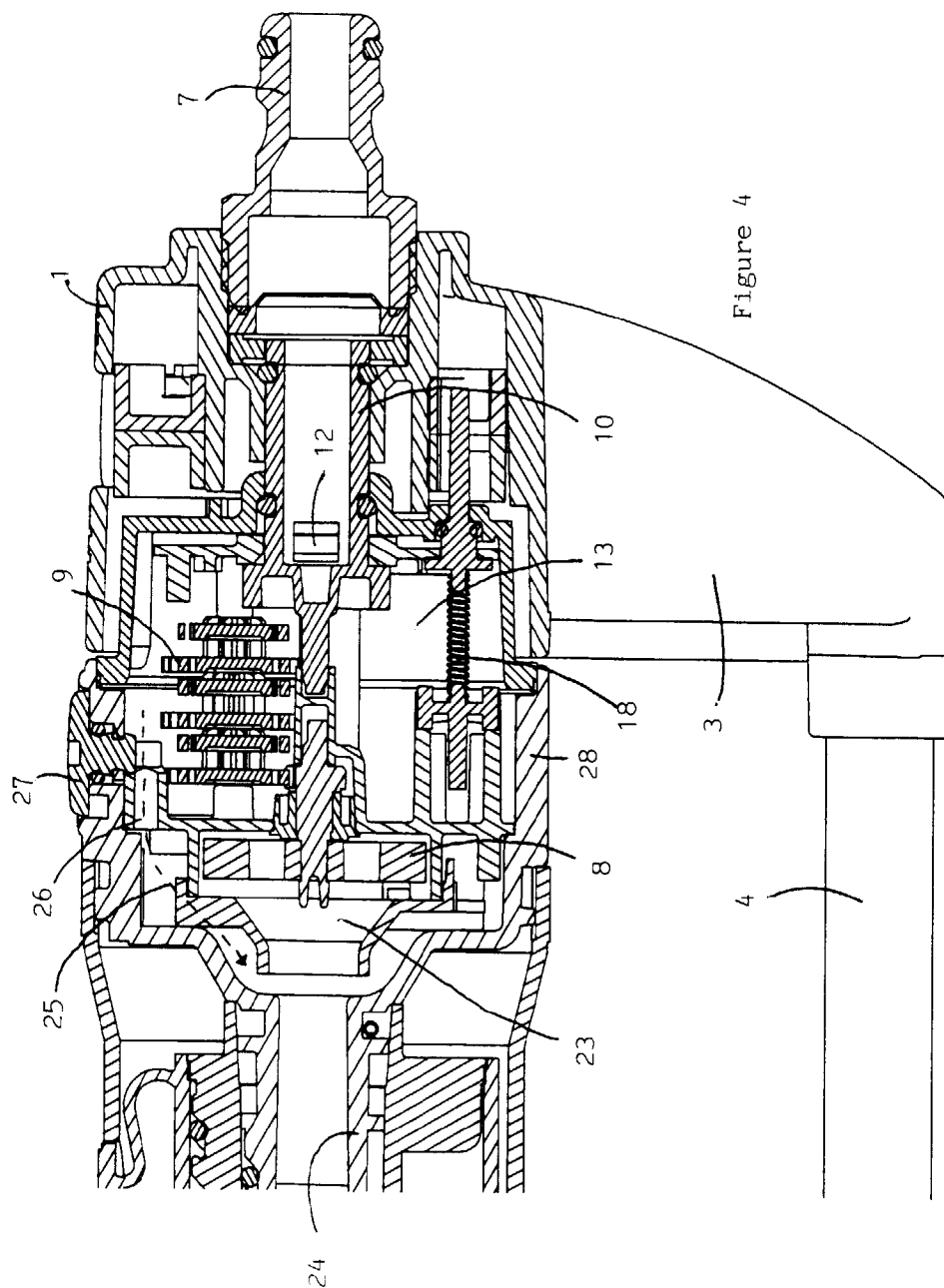


Figure 4

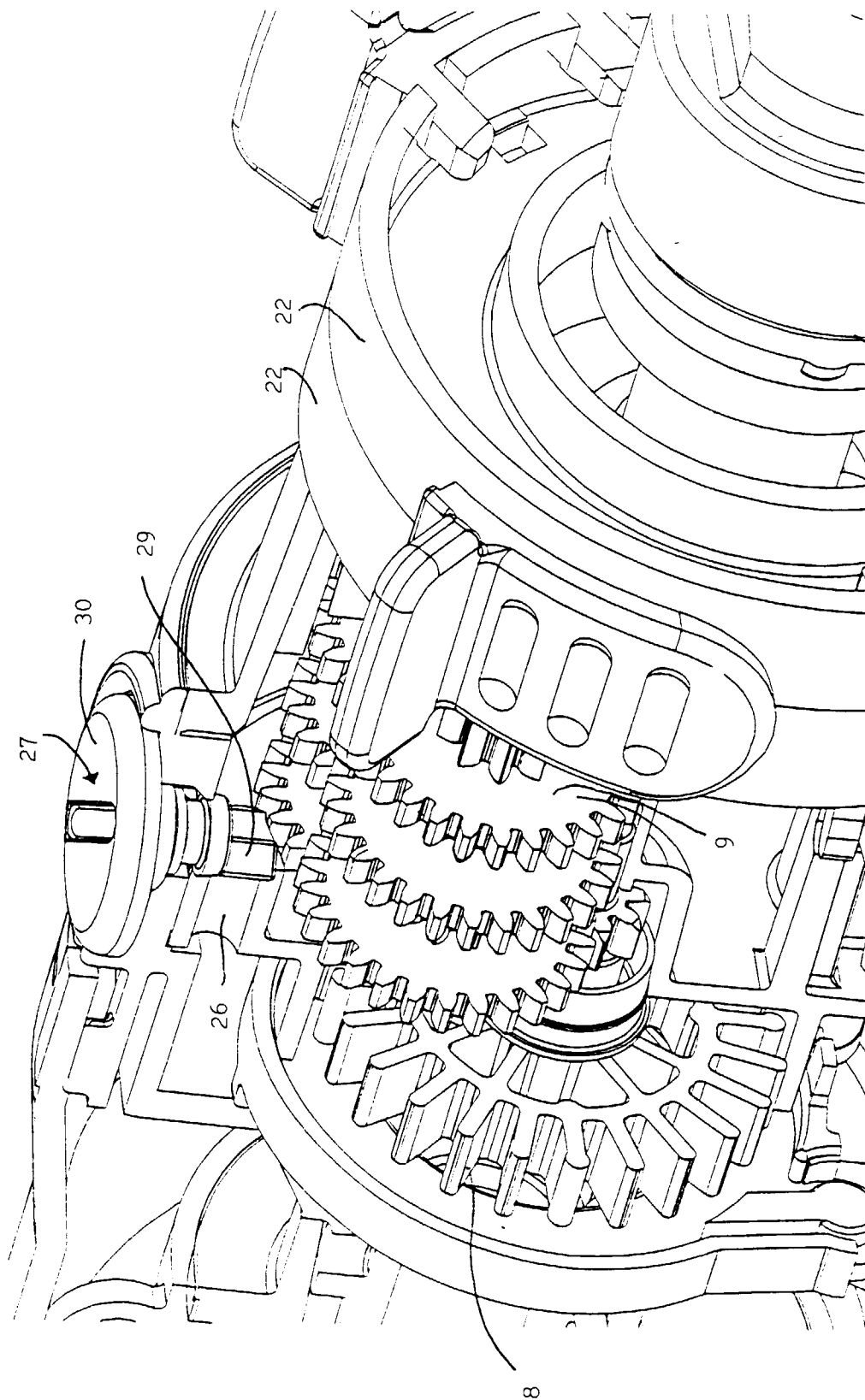


Figure 5

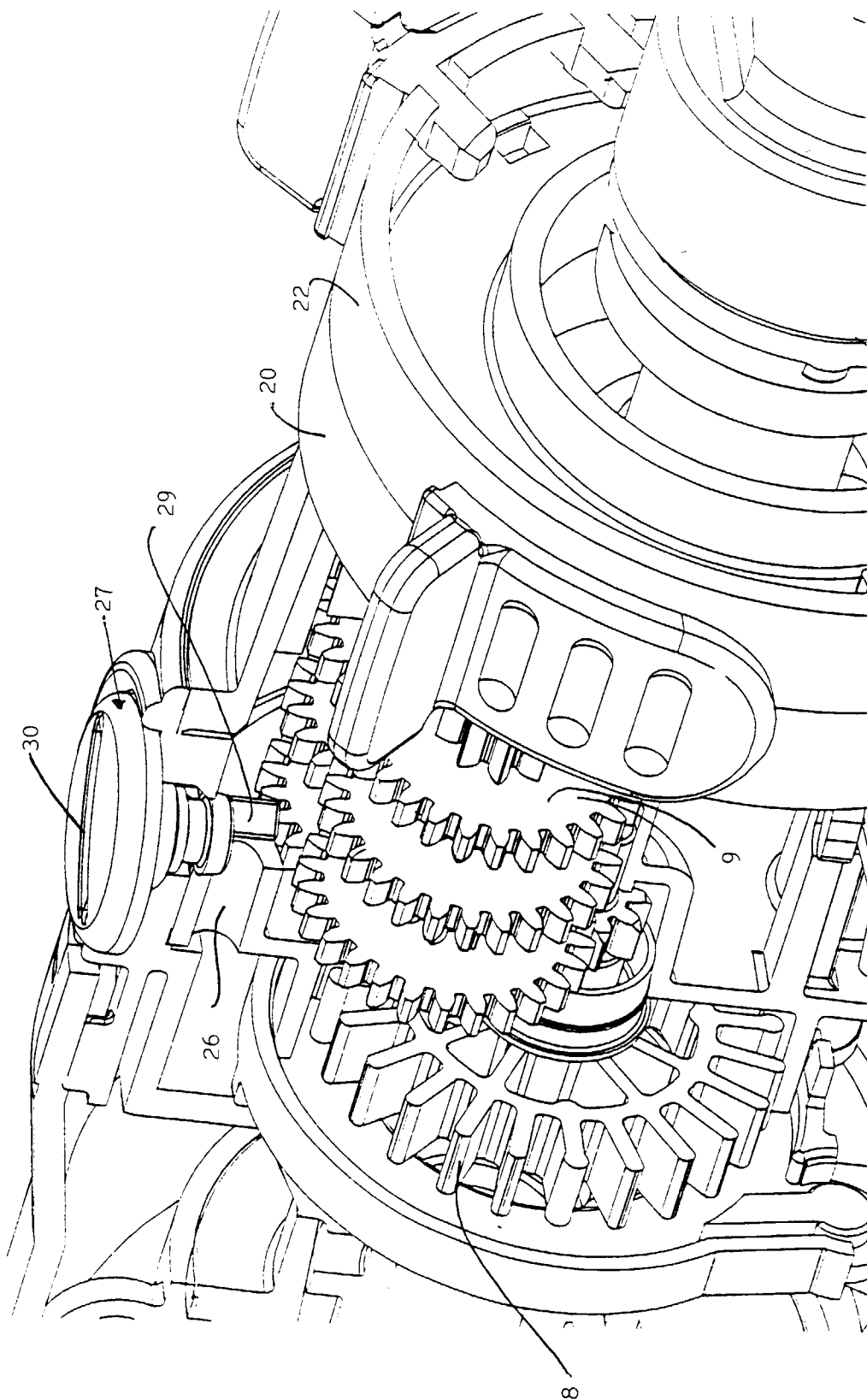


Figure 6

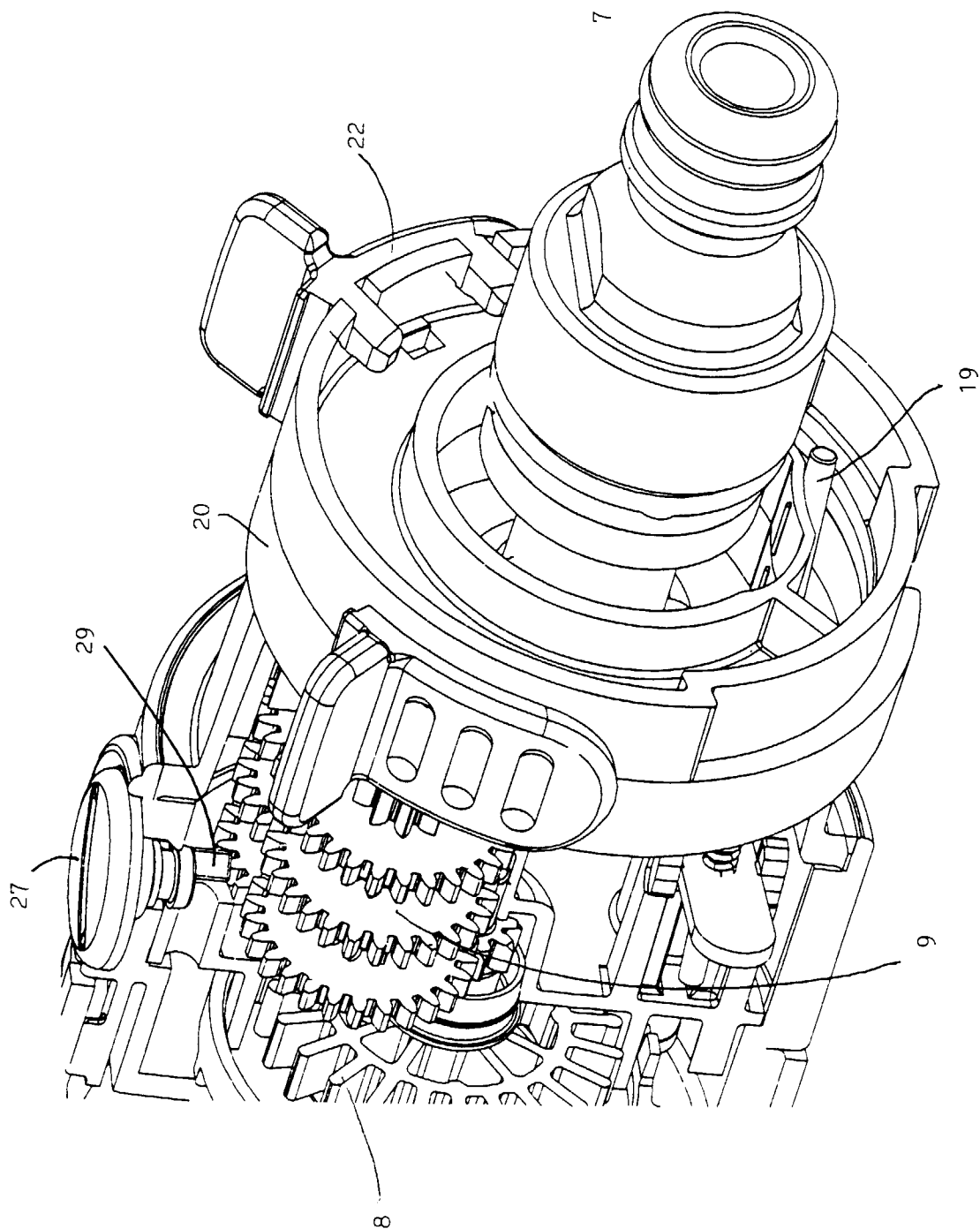


Figure 7

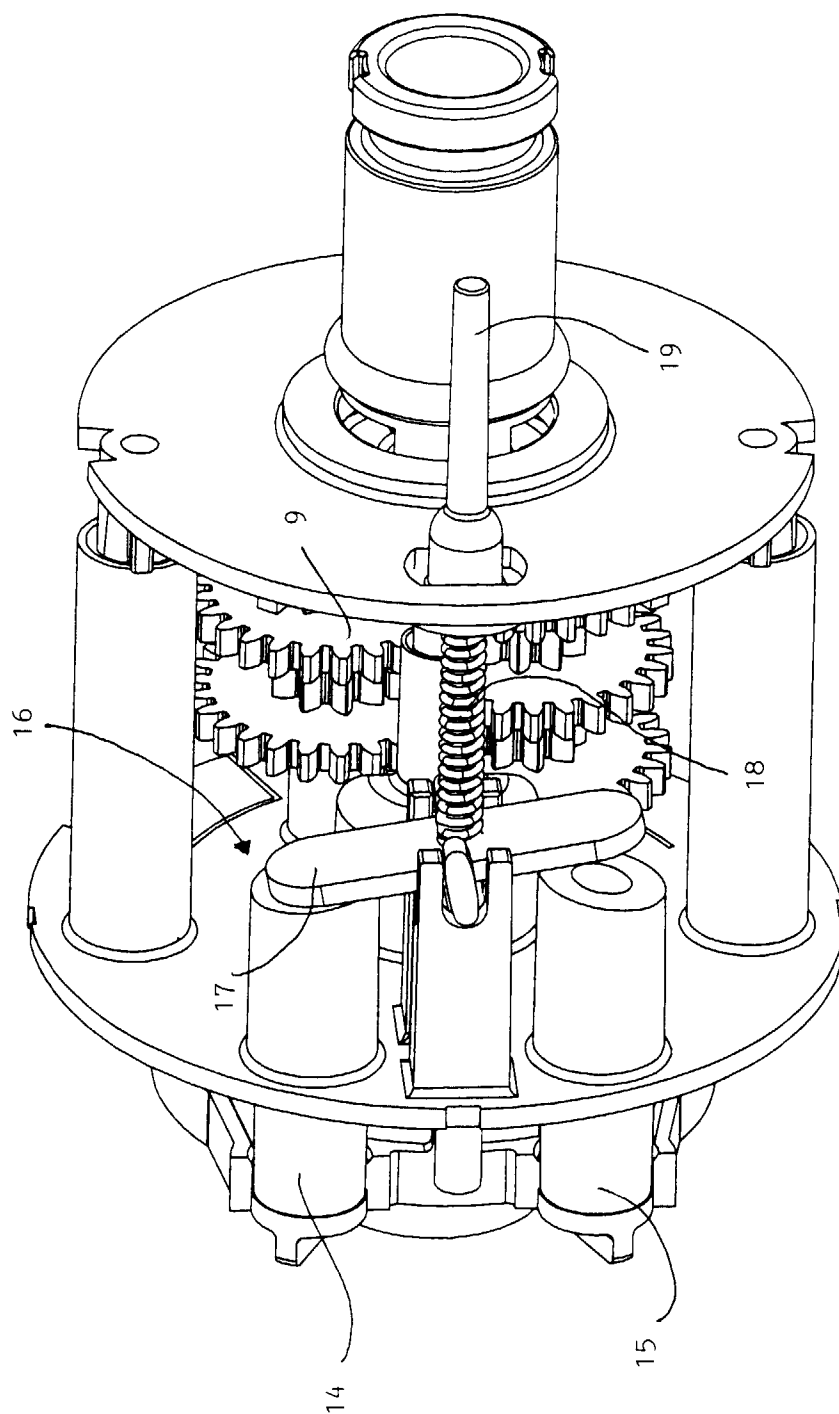


Figure 8

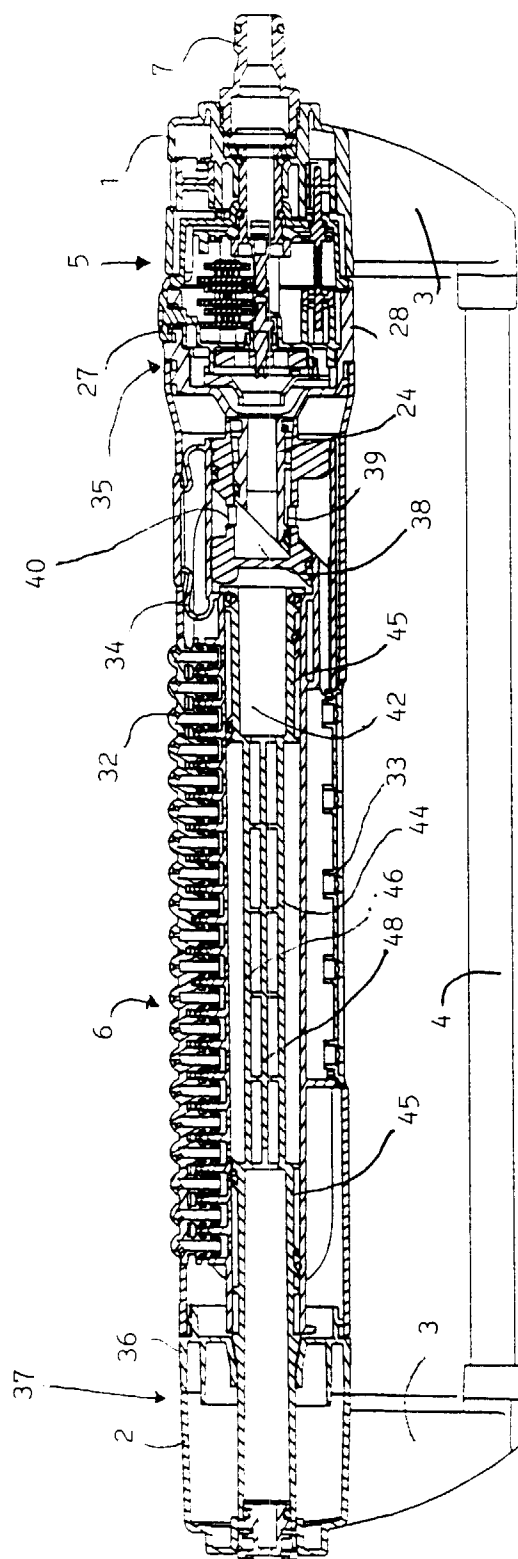


Figure 9

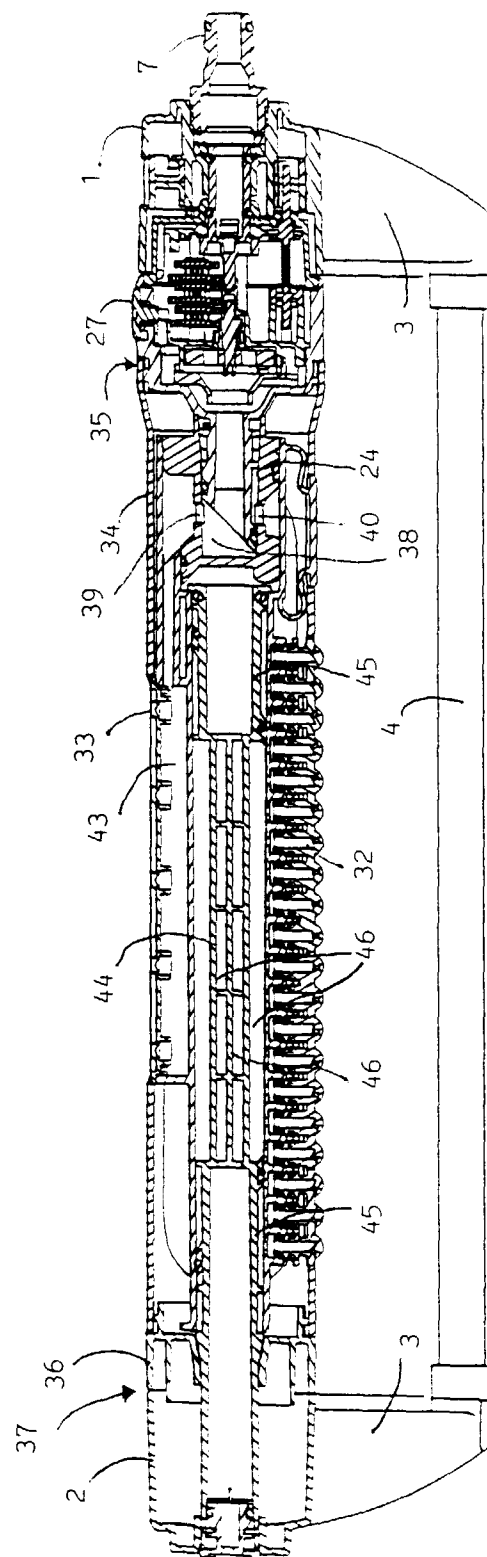


Figure 10

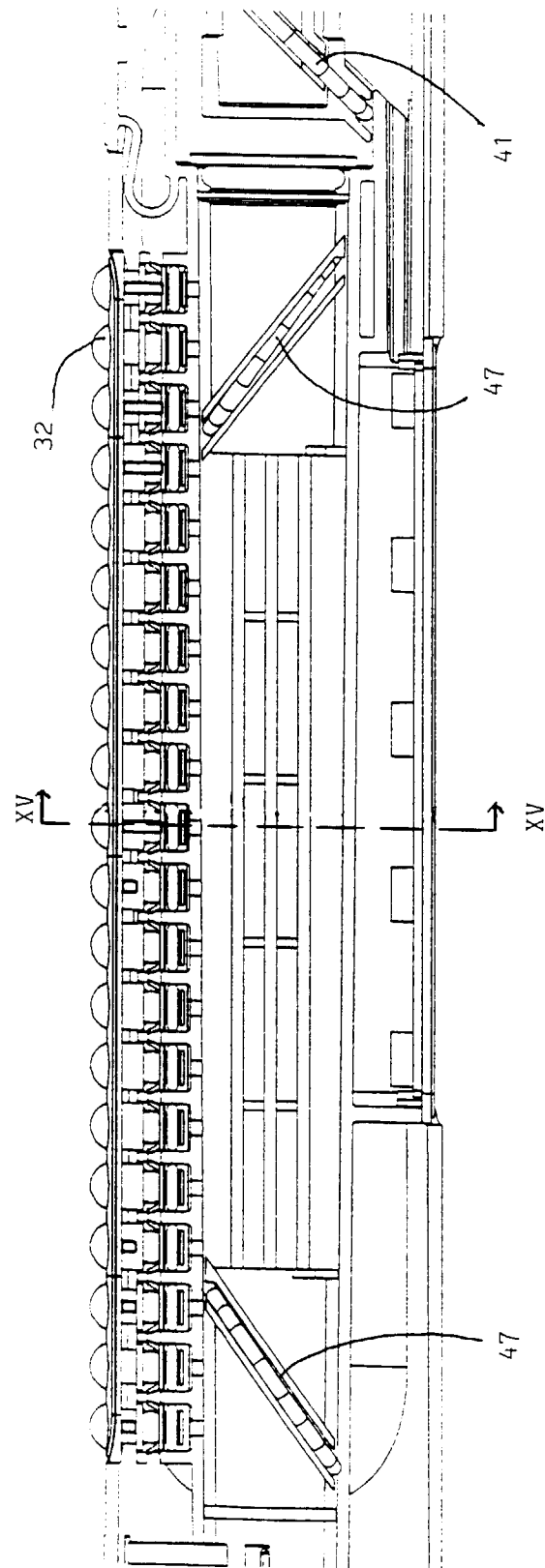


Figure 11

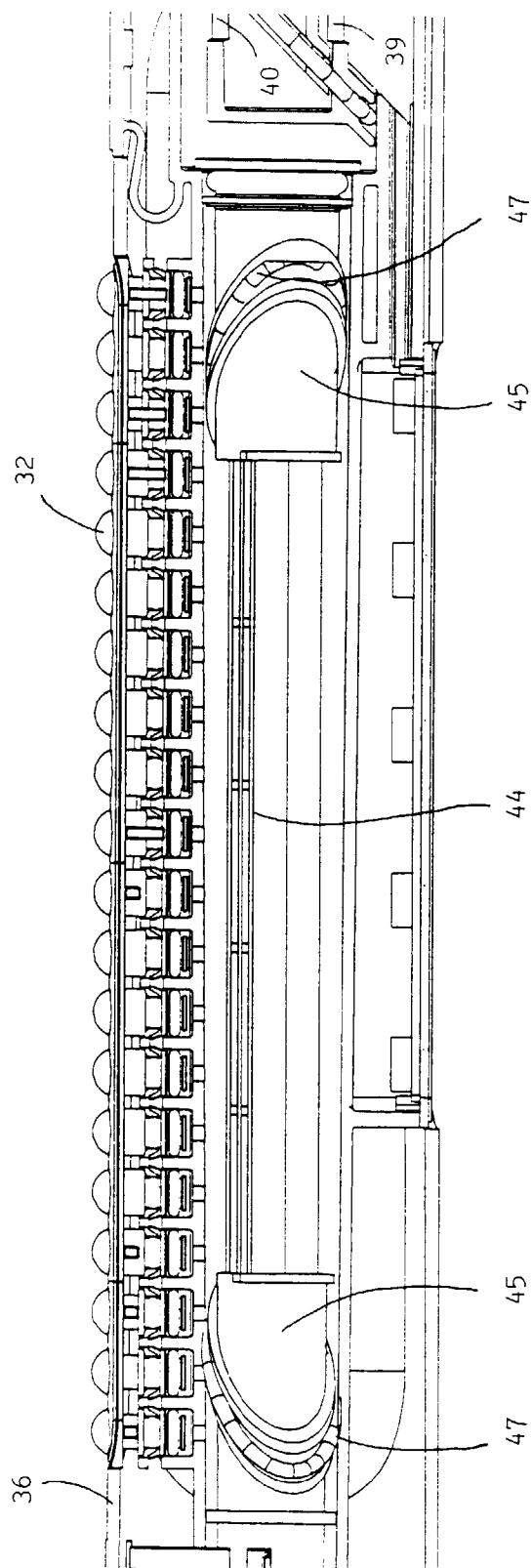


Figure 12

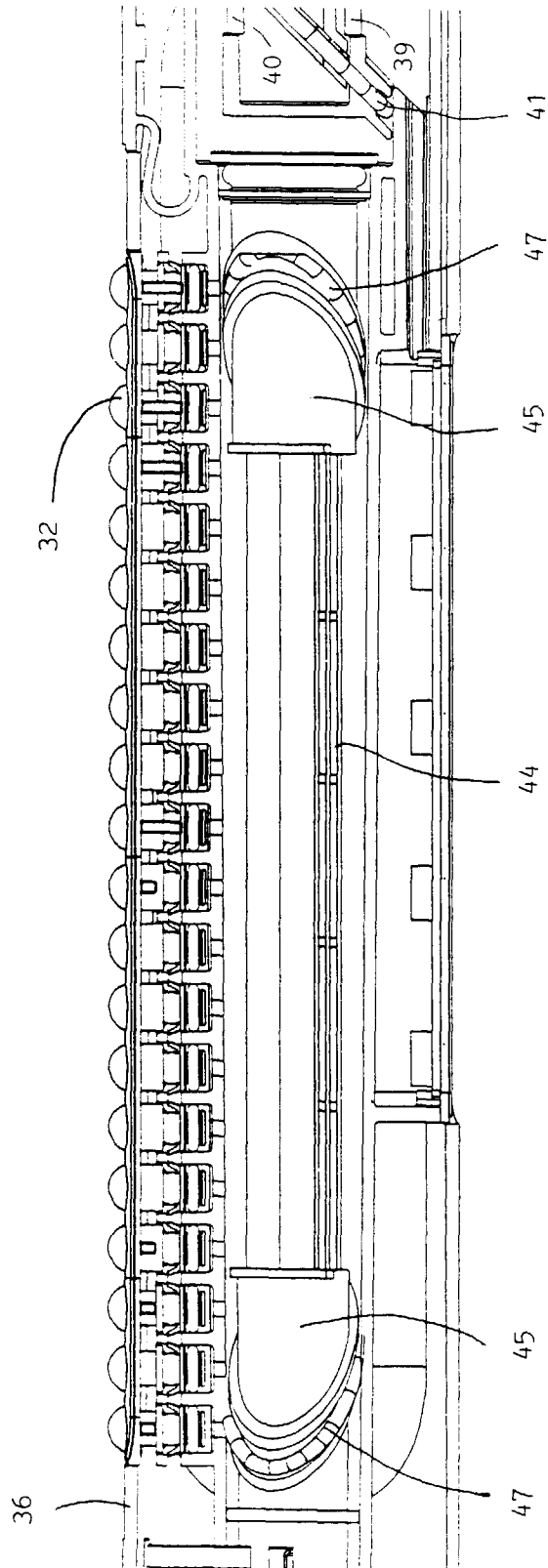


Figure 13

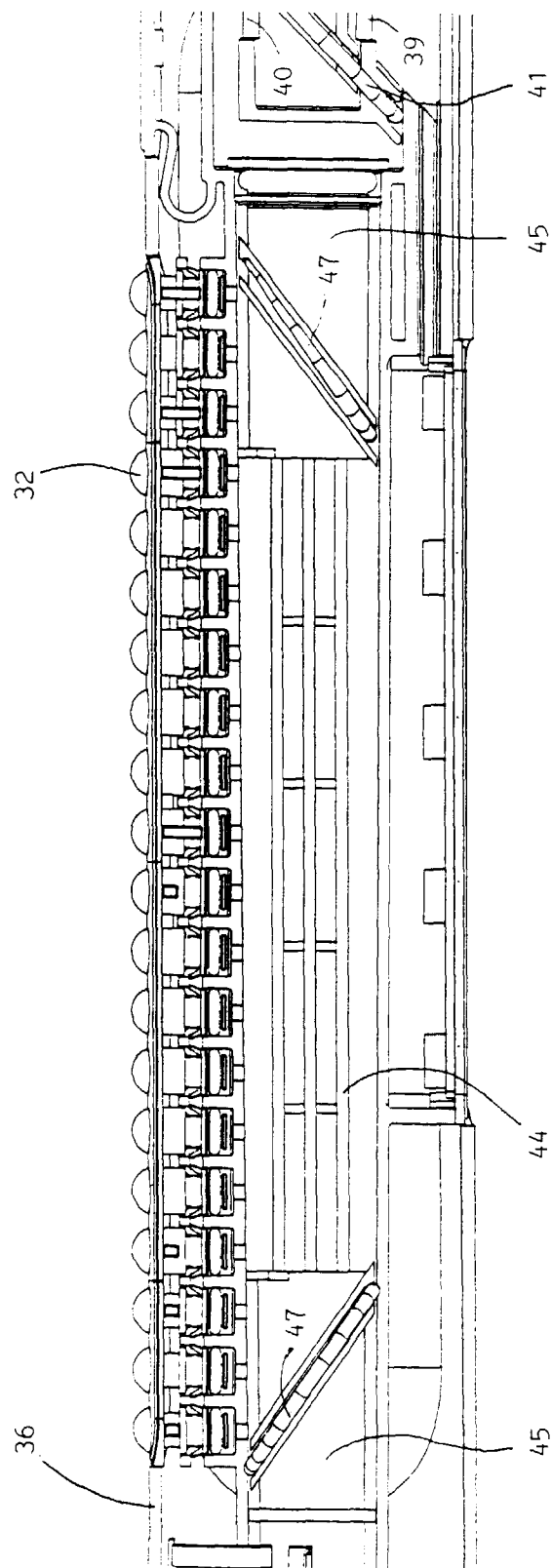


Figure 14

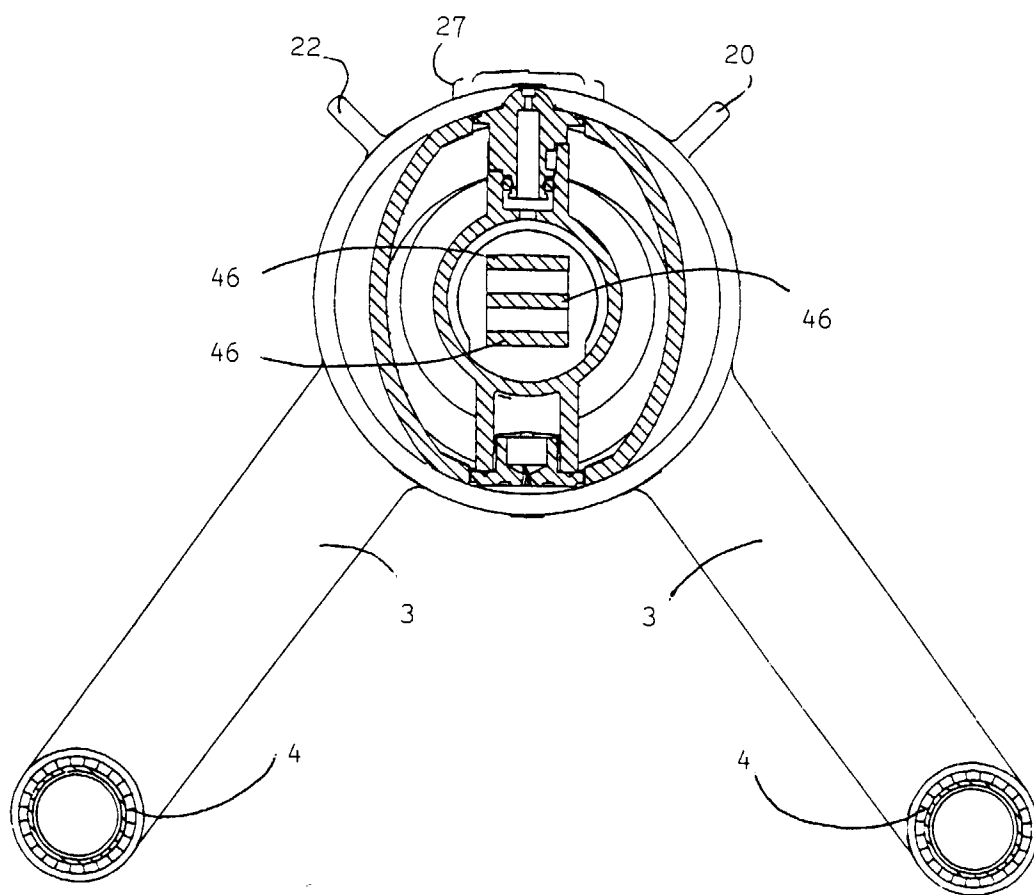


Figure 15

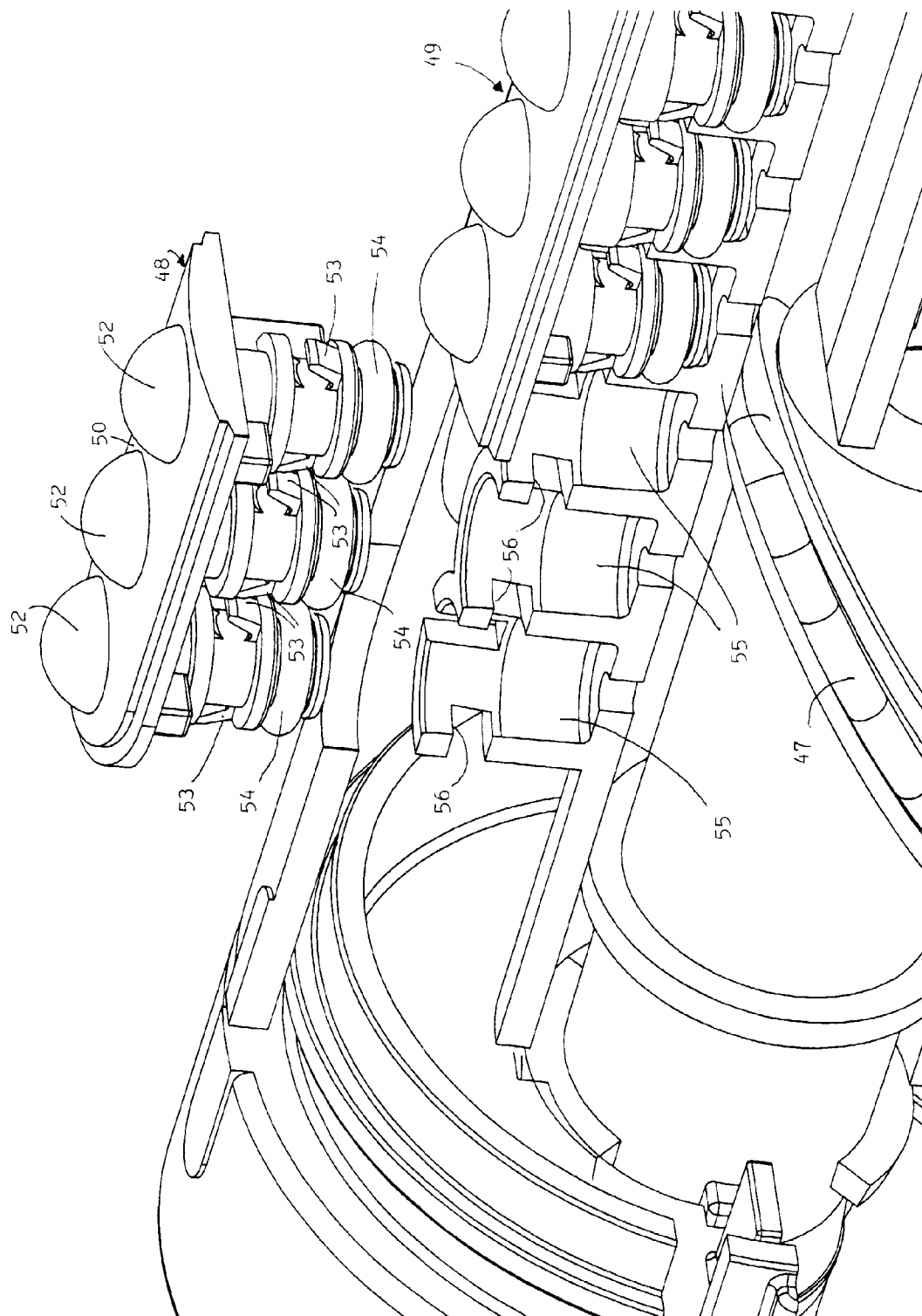


Figure 16