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(54) **Water dispensing and lighting unit**

(57) A dispensing and lighting unit (4) suitable for dispensing a water flow and for directing a light beam in a diffused manner on said flow. The unit (4) exhibits com-

pact dimensions and ensures a wide and diffused lighting on the entire water flow dispensed.

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Description

[0001] The present invention relates to a water dispensing and lighting unit, as well as a shower head comprising at least one water dispensing and lighting unit.

[0002] In the field of taps and fittings, it is known to make tap and fitting elements having water dispensing outlets provided with light sources, for lighting at least partly the water jet dispensed.

[0003] However, the prior art solutions are complex to be obtained and do not ensure an even and diffused lighting of the water jet.

[0004] The object of the present invention is to provide a water dispensing and lighting unit capable of solving the problems mentioned above with reference to the prior art.

[0005] Such object is achieved by a water dispensing and lighting unit according to claim 1.

[0006] Further features and the advantages of the unit according to the present invention will appear more clearly from the following description of preferred nonlimiting embodiments thereof, wherein:

[0007] figures 1-2 respectively show a perspective exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to an embodiment of the invention;

[0008] figures 3-4 respectively show a perspective exploded view and a section view in assembled configuration, of a variation of embodiment of the unit of figure 1;

[0009] figures 5-6 respectively show a perspective exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to a further embodiment of the invention;

[0010] figures 7-8 respectively show a perspective exploded view and a section view in assembled configuration, of a variation of embodiment of the unit of figure 5;

[0011] figures 9-10 respectively show a perspective exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to a further embodiment of the invention;

[0012] figures 11-12 respectively show a perspective exploded view and a section view in assembled configuration, of a variation of embodiment of the unit of figure 9;

[0013] figures 13-14 respectively show a perspective exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to a further embodiment of the invention;

[0014] figures 15-16 respectively show a perspective exploded view and a section view in assembled configuration, of a variation of embodiment of the unit of figure 13;

[0015] figure 17 shows a perspective view of a shower head according to an embodiment of the present invention;

[0016] figure 18 shows a perspective view of the shower head of figure 17, from the side of arrow XVIII of figure 17;

[0017] figures 19-20 respectively show a perspective

exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to a further embodiment of the invention;

[0018] figures 21-22 respectively show a perspective exploded view and a section view in assembled configuration, of a dispensing and lighting unit according to a further embodiment of the invention.

[0019] Elements or parts of elements in common between the embodiments described below are referred to with the same reference numerals.

[0020] With reference to the annexed figures, reference numeral 4 globally denotes a dispensing and lighting unit, suitable for dispensing a fluid flow and lighting such flow in an even and diffused manner.

[0021] Unit 4 comprises a unit body 8, preferably cylindrical relative to an extension axis X, provided, at a side wall 12, with at least one inlet 16 for feeding a fluid flow, in particular water, to be dispensed. Inlet 16 for example is a circular hole on which it is possible to fit a coupling 20 for feeding water to the unit body. The fitting of coupling 16 on the inlet can be of various types, for example with threaded connection, snap-wise, joint-wise, bayonet-wise, by gluing or welding, or the coupling may also be made integral with the side wall 12.

[0022] The unit body 8 is provided with a collecting chamber 24 suitable for receiving water from the at least one inlet 16. Such collecting chamber 24 is preferably symmetrical relative to the extension axis X and is delimited by the side wall 12 and by a dispensing wall 26, for example flat provided with at least one water dispensing outlet 30.

[0023] Opposite the dispensing wall 26, the unit body 8 ends with a circular edge 32 which delimits an opening 33.

[0024] The dispensing outlets 30 can be a plurality of cylindrical holes arranged symmetrically relative to the extension axis X, that is, along a circumference.

[0025] According to a possible embodiment, unit 4 comprises a dispensing outlet 30 having a circular crown extension, preferably coaxial and axial-symmetrical relative to the extension axis X. In other words, the dispensing outlet 30 is a single opening shaped as a circular crown arranged symmetrically relative to the extension axis X.

[0026] According to a possible embodiment, the dispensing outlets 30 can be provided with nozzles 34, for example of rubber, perforated and of truncated-cone shape, suitable for a practical and simple cleaning for removing the scale from the dispensing outlets 30.

[0027] Said nozzles 34 may be disconnected from each other or they may be connected to each other by a disc 37, preferably of polymeric material.

[0028] Preferably, unit 4 is provided with a seat 38 fluidically separate from the collecting chamber 24, for example by a partition wall 42 for example having a cylindrical shape and arranged symmetrically relative to the extension axis X. The partition wall 42 crosses the collecting chamber 24 which therefore takes up a toroidal

pattern, and said wall 42 abuts on the dispensing wall 26 so as to obtain a sealed connection with the dispensing wall 26. Preferably, the partition wall 42 is integral with the dispensing wall 26.

[0029] According to an embodiment, the partition wall 42 is integral with the dispensing wall 26. For example, the partition wall 42 may have a truncated-cone pattern (figures 21-22) and it tapers according to a direction of separation from the dispensing wall 26 along the extension axis X. The partition wall 42 delimits the dispensing outlet 30 with the unit body 8 at the dispensing wall 26.

[0030] According to an embodiment, the partition wall 42 is shaped as a sleeve 43 which extends parallel to the extension axis X and which is integrally associated to the unit body 8 at opening 33 of the circular edge 32. For example, sleeve 43 is attached to the unit body 8 by a threaded connection between a threaded portion 44' of sleeve 43 and a fastening nut 47 provided with a corresponding nut screw 44". The fastening nut 47, preferably provided with flares 47' for facilitating the screwing thereof, is screwed so as to abut against the circular edge 32 of the unit body 8. Preferably, the sleeve comprises an abutment ring 45 suitable for making a travel end abutment and a support in the introduction of sleeve 43 into the unit body 8.

[0031] According to a further embodiment (figures 19-20), sleeve 43 has a cylindrical pattern, is attached to the unit body 8 by a threaded connection between a threaded portion 44' of sleeve 43 and a fastening nut 47 provided with a corresponding nut screw 44". On a side facing the dispensing wall 26, sleeve 43 is integral with a perforated plate 45' for the water flow, and having larger diameter than the inner diameter of the unit body at the dispensing wall 26, so as to abut against a bottom side edge 45" of the unit body 8.

[0032] At the seat portion 38 delimited by the partition wall 42, the dispensing wall 26 is provided with a lighting outlet 46. The lighting outlet 46 has a smaller diameter than the inner diameter of partition wall 42 so as to determine an abutment 48 therewith having a circular section shape.

[0033] Unit 4 comprises a lighting source 50 arranged into seat 38 so that at least one portion of the lighting source 50 protrudes from the dispensing wall 26 through the lighting outlet 46.

[0034] The lighting source 50 for example is a diode 52 having a bulb 54, for example cylindrical with spherical terminal, with such diameter as to cross at least partly the lighting outlet 46. Diode 52 is provided with a neck 58 having larger diameter than bulb 54 so as to make a travel end to the introduction of diode 52 into the lighting outlet 46, optionally abutting against abutment 48.

[0035] Advantageously, in an assembled configuration of unit 4, at least a portion of bulb 54, from which a light beam irradiates, protrudes from the lighting outlet 46 externally to dispensing wall 26, so that the light beam generated by the light source can directly impinge the water flow coming out of the dispensing outlets.

[0036] Unit 4 comprises a header 62, preferably cylindrical, suitable for being inserted in seat 38. Header 62 comprises a fitting portion 66, inserted at least partly in seat 38 through opening 33 in the direction of the lighting outlet 46, and a flange 68 suitable for hermetically abutting on edge 32. The hermetical closure is preferably ensured by a first seal 70, such as an O-ring. The introduction of the fitting portion 66 in seat 38 preferably occurs according to a threaded connection, wherein a first threaded portion 72 obtained on the fitting portion 66 screws into a corresponding nut screw 73 obtained on the partition wall 42 on the side opposite the collecting chamber 24.

[0037] Subsequent to the introduction of the fitting portion 66 into seat 38, a space is formed between the fitting portion 66 and the dispensing wall 26 suitable for seating at least partly diode 52.

[0038] The fitting portion 66 in fact exhibits an inner hole 74 having a smaller diameter than the diameter of neck 58 of bulb 54, so as to lock, relative to axis X, bulb 54 between the fitting portion 66 and the dispensing wall 26.

[0039] Advantageously, a sealing element 80, for example an O-ring seal, is inserted between the lighting source 50 and the lighting outlet 46, and in particular between bulb 54 and abutment 48, for preventing a water backflow from the lighting outlet 46 inwards of seat 38. The seal may be forced into position against abutment 48 through the interposition of a ring 82, for example of plastic material that is pushed by neck 58.

[0040] According to a further embodiment, the sealing element comprises a tube seal 86 having such thickness, along a direction parallel to axis X, as to be compressed between abutment 48 and neck 58.

[0041] It is possible to fit a second seal 88, for example of the O-ring type, between the fitting portion 66 and the partition wall 42. For example, the second seal 88 may be fitted in a zone of the fitting portion 66 adjacent flange 68.

[0042] Through the inner hole 74 of the fitting portion 66 it is possible to fit electrical connection cables of the lighting source with a supply, preferably arranged outside unit 4.

[0043] According to a possible embodiment, the side wall 12 exhibits a plurality of inlets arranged circumferentially, all preferably at the same distance from the dispensing wall 26, relative to axis X.

[0044] A collar 94 provided with a step 96 is fitted on the side wall 12 suitable for abutting against a corresponding recess 98 on the circular edge 32. Collar 94 can be connected to at least one coupling 20, and it comprises at least one feeding through hole 100, suitable for allowing the fluid feeding from couplings 20 to inlets 16.

[0045] Advantageously, the side wall 12, at a portion affected by the collar (94), comprises at least one groove 104 that seats a seal 108, for example of the O-ring type, suitable for allowing a reciprocal rotation, about axis X, between the side wall 12 and collar 94 provided with cou-

plings 20. Irrespective of the relative angular position between collar 94 and the side wall 12, seal 108 ensures the hermetical seal of water which, after being introduced through coupling 20, distributes within a circular chamber 110 and hence is channelled into inlets 16 so as to penetrate into the collecting chamber 24.

[0046] Preferably, the side wall 12 comprises two grooves 104 that seat as many seals 108 arranged, relative to axis X, astride of inlets 16, so as to prevent any water leaks between the side wall 12 and collar 94.

[0047] According to an embodiment, it is possible to use a plurality of dispensing and lighting units 4 for example for making a shower head 114.

[0048] An example of shower head 114, comprising a plurality of units 4, is illustrated in figures 17 and 18.

[0049] Shower head 114 comprises a plate 116, for example rectangular or square, suitable for being at least partly built in a panel or a wall. Plate 116 comprises a plurality of openings 118, having such diameter as to allow the water outflow from the dispensing outlets. A plurality of units 4 is placed at openings 118 so as to align each extension axis X with an axis Y of the openings themselves.

[0050] According to an embodiment, openings 118 are cylindrical with circular section, having said axis Y as symmetry axis.

[0051] Units 4 can be attached to an inner wall 120 of the plate, said inner wall 120 facing the plate attachment panel, so as to not be visible. The assembly of units 4 on the inner wall 120 can take place by attaching the unit body 8 directly to the inner wall 120 and centring the lighting unit 46 relative to opening 118.

[0052] Then, the fixing of the unit into position can be carried out for example by gluing, snap-wise connection on special entrance seats obtained on the inner wall 120 and the like. According to an embodiment, the unit body exhibits a second threaded portion 122 on the side wall 12 suitable for screwing into a corresponding threaded seat obtained on the inner wall 120.

[0053] The connection cables 90 of the various units 4 can be conveyed into the built in panel to be connected to a source, preferably at low voltage. It is also possible to use different supply lines for allowing a partial switching on of some lighting units on request.

[0054] Advantageously, the shower head 114 comprises a conveyor 124, for example arranged along a perimeter of the inner wall 120, so as to surround units 4 applied thereon.

[0055] Advantageously, conveyor 124 comprises a water outlet 126 from which it receives the water flow to be dispensed, which distributes into a cavity that internally crosses the header. A plurality of ducts 128 branch off from the conveyor which distribute the water to each coupling 20 of units 4.

[0056] Preferably, the units are of the type comprising at least one groove 104 which seats at least one seal 108 suitable for allowing a reciprocal rotation, about axis X, between the side wall 12 and collar 94 provided with

couplings 20. In this way it is possible to fit units 4 on the inner wall 120 and then angularly orientate collar 94 with couplings 20 so as to obtain the water connection between ducts 128 and couplings 20.

[0057] According to a possible embodiment, it is possible to use a diode, a led, a lamp or the like as lighting source, capable of creating a light beam of different colours. It is possible to change the colour of the light beam not only for creating a different chromatic effect, but also for example for providing chromatic information on a characteristic of the water dispensed, preferably on the temperature thereof. For example it is possible to change the water colour from blue to red as the temperature of the water dispensed increases. In order to obtain such function it is necessary to provide the light source with a member for adjusting the colour of the emitted light and actuate such adjusting member on the basis of a signal sent by a gauge for measuring the water temperature or any other characteristic of the water.

[0058] The operation of the lighting and dispensing unit according to the invention will now be described.

[0059] In particular, the water flow is gathered from a water outlet and conveyed through couplings 20 into the collecting chamber 24. Hence, the flow comes out through the dispensing outlets 30 of the dispensing wall 26. The lighting sources may be actuated automatically, when water flows, or also through a separate control. The light source and in particular the bulb is located at least partly outside the lighting outlet 46 so as to be directly exposed to the air and also to the water flow dispensed. In this way, the light produced is not conveyed into a feeding or conveying channel inside unit 4, but it can directly expand outside the lighting outlet impinging the water flow in a diffused manner.

[0060] As can be understood from the description, the lighting and dispensing units according to the invention allow overcoming the disadvantages of the prior art solutions.

[0061] In fact, the unit is compact and simple to manufacture.

[0062] The dispensed flow is illuminated in an even and diffused manner thanks to the fact that the lighting source is arranged coaxially relative to the dispensing outlet and at least partly outside the dispensing outlet, so that the light beam produced can expand directly from the lighting source to the water flow without having to be channelled into optical fibre beams or ducts.

[0063] Moreover, the light beam produced can directly impinge the water flow without the interposition of grids, walls or covers of glass, plastic or transparent material which, besides being a barrier to the diffusion of the beam itself, are easily subject to staining and opacification.

[0064] Moreover, thanks to the fact that the lighting source is arranged at least partly outside the dispensing outlet, and therefore is directly exposed to the air, the lighting source is subject to lower heating, as compared to prior art solutions wherein it is buried into the fluid dispensing pipe. Moreover, the lighting source according

to the present invention is subject to a continuous heat removal by the same fluid flow dispensed which impinges or can impinge directly thereon, while in operation.

[0065] The high heat removal from the lighting source therefore ensures longer life thereof.

[0066] Of course, a man skilled in the art can make several changes and adjustments to the lighting and dispensing units described above in order to meet specific and incidental needs. By way of an example only, the lighting and dispensing units may be used individually but also in shower heads or in taps of any shape and type, and according to any geometrical arrangement. Moreover, the dispensing units may deliver a fluid differing from water, and different lighting sources may be used.

[0067] The shape of the lighting and dispensing units may differ from the cylindrical one and it does not necessarily exhibit a symmetry axis.

[0068] These and other variations fall within the scope of protection as defined by the following claims.

Claims

1. A water dispensing and lighting unit (4) comprising a unit body (8) provided with at least one inlet (16) for receiving a water flow to be dispensed and provided with a collecting chamber (24) of said flow delimited by a dispensing wall (26) comprising at least one fluid dispensing outlet (30), said unit (4) being provided with a seat (38) fluidically separate from the collecting chamber (24)
characterised in that
the unit (4) comprises a lighting source (50) arranged into said seat (38) so that at least one portion of said lighting source (50) protrudes from the dispensing wall (26) through a lighting outlet (46) of the dispensing wall (26), directing a light beam directly on the water flow dispensed.
2. A water dispensing and lighting unit (4) according to claim 1, comprising a partition wall (42) that crosses the collecting chamber (24) and that forms a sealed connection with the dispensing wall (26), so as to delimit said seat (38).
3. A water dispensing and lighting unit (4) according to claim 2, wherein the dispensing wall (26), at a portion of seat (38) delimited by the partition wall (42), is provided with said lighting outlet (46).
4. A water dispensing and lighting unit (4) according to any one of the previous claims, wherein the partition wall (42) has a truncated-cone pattern, tapering according to a direction of separation from the dispensing wall (26) along the extension axis (X), the partition wall (42) delimiting said dispensing outlet (30) with the unit body (8), at the dispensing wall (26).
5. A water dispensing and lighting unit (4) according to any one of the previous claims, wherein the dispensing outlet (30) is an opening shaped as a circular crown arranged symmetrically relative to the extension axis X.
6. A water dispensing and lighting unit (4) according to any one of claims 2 to 5, wherein the partition wall (42) is made by a sleeve (43) which extends parallel to the extension axis (X) and which is integrally associated to the unit body (8) at an opening (33) of the unit body (8).
7. A water dispensing and lighting unit (4) according to claim 6, wherein the sleeve (43) is attached to the unit body (8) by a threaded connection between a threaded portion (44') of the sleeve (43) and a fastening nut (47) provided with a corresponding nut screw (44''), said nut (47) abutting against a circular edge (32) of the unit body (8).
8. A water dispensing and lighting unit (4) according to claim 6 or 7, wherein the sleeve (43) comprises an abutment ring (45) suitable for making a travel end abutment and a support in the introduction of the sleeve (43) into the unit body (8).
9. A water dispensing and lighting unit (4) according to any one of claims 6 to 8, wherein the sleeve (43) has a cylindrical pattern and is attached to the unit body (8) by a threaded connection between a threaded portion (44') of the sleeve (43) and a fastening nut (47) provided with a corresponding nut screw (44''), said nut (47) abutting against a circular edge (32) of the unit body (8).
10. A water dispensing and lighting unit (4) according to claim 9, wherein said sleeve, on the side facing the dispensing wall (26), is integral with a plate (45') having larger diameter than the inner diameter of the unit body (8) at the dispensing wall (26), so as to abut against a bottom side edge (45'') of the unit body (8).
11. A water dispensing and lighting unit (4) according to any one of the previous claims, wherein said lighting source (50) comprises a bulb (54) of such diameter as to cross at least partly the lighting outlet (46).
12. A water dispensing and lighting unit (4) according to claim 11, wherein the lighting source (50) comprises a neck (58) having a larger diameter than the bulb (54) so as to obtain a travel end to the introduction of the lighting source (50) into the lighting outlet (46).
13. A water dispensing and lighting unit (4) according to any one of the previous claims, comprising a header (62) having a fitting portion (66) suitable for being

fitted at least partly into the seat (38) and a flange (68) suitable for hermetically abutting on said unit body (8).

14. A water dispensing and lighting unit (4) according to claim 13, wherein the hermetic closure between the flange (68) and the unit body (8) is ensured by a first seal (70). 5
15. A water dispensing and lighting unit (4) according to claim 13 or 14, wherein the introduction of the fitting portion (66) into the seat (38) occurs according to a threaded connection between a first threaded portion (72), obtained on the fitting portion (66) and a nut screw (73) obtained on the partition wall (42) on the side opposite the collecting chamber (24). 10
16. A water dispensing and lighting unit (4) according to any one of claims 13 to 15, wherein the fitting portion (66) exhibits an inner hole (74) having a smaller diameter than the diameter of the lighting source (50), so as to lock the lighting source (50) between the fitting portion (66) and the dispensing wall (26). 20
17. A water dispensing and lighting unit (4) according to any one of the previous claims, wherein a sealing element (80) is inserted between the lighting source (50) and the lighting outlet (46) for preventing a water backflow from the lighting source (46) inwards of the seat (38). 25
18. A water dispensing and lighting unit (4) according to claim 17, wherein the seal (80) is forced into position against an abutment on the dispensing wall (26) through the interposition of a ring (82). 30
19. A water dispensing and lighting unit (4) according to claim 17, wherein the sealing element comprises a tube seal (86) having such thickness as to be compressed between the dispensing wall (26) and the fitting portion (66). 35
20. A water dispensing and lighting unit (4) according to any one of claims 13 to 19, wherein a second seal (88) is fitted in a zone of the fitting portion (66) adjacent the flange (68), between the fitting portion (66) and the partition wall (42). 40
21. A water dispensing and lighting unit (4) according to any one of the previous claims, wherein the side wall (12) exhibits a plurality of inlets (16) and a collar (94) is fitted on the side wall (12) connectable to a water outlet and comprising at least one feeding hole (100) suitable for allowing the fluid feeding from the water outlet to the inlets (16). 45
22. A water dispensing and lighting unit (4) according to claim 21, wherein the side wall (12), at a portion af-

ected by the collar (94), comprises at least one groove (104) that seats a seal (108), suitable for allowing a reciprocal rotation, about an axis X, between the side wall (12) and the collar (94).

23. A water dispensing and lighting unit (4) according to claim 22, wherein the side wall (12) comprises two grooves (104) that seat as many seals (108) arranged, relative to axis X, astride of the inlets (16), so as to ensure the fluid seal between the side wall (12) and the collar (94), channelling the water gathered from the water outlet into the inlets (16).
24. A shower head (114) comprising at least one unit (4) according to any one of claims 1 to 23. 55
25. A shower head (114) according to claim 24, comprising a plate (116) suitable for being at least partly built in a panel and comprising a plurality of openings (118), having such diameter as to allow the water outflow from the dispensing outlets (30) of the units (4).
26. A shower head (114) according to claim 25, wherein the units (4) are attached to an inner wall (120) of the plate (116) so as to centre the lighting outlet (46) relative to the opening (118).
27. A shower head (114) according to claim 25 or 26, wherein the unit body (8) of the units (4) exhibits a second threaded portion (122) on the side wall (12) suitable for screwing into a corresponding threaded seat obtained on the inner wall (120) of the plate (116).
28. A shower head (114) according to any one of claims 25 to 27, comprising a conveyor (124), having a water outlet (126) from which it receives the water flow to be dispensed, and arranged along a perimeter of the inner wall (120), so as to surround and intercept the units (4) applied thereon.
29. A shower head (114) according to claim 28, wherein a plurality of ducts (128) branch off from the conveyor (124) which distribute the water to each of said units (4).
30. A shower head according to any one of claims 24 to 29, wherein the units (4) are of the type comprising at least one groove (104) which seats at least one seal (108) suitable for allowing a reciprocal rotation, about an axis (X), between the side wall (12) and the collar (94).

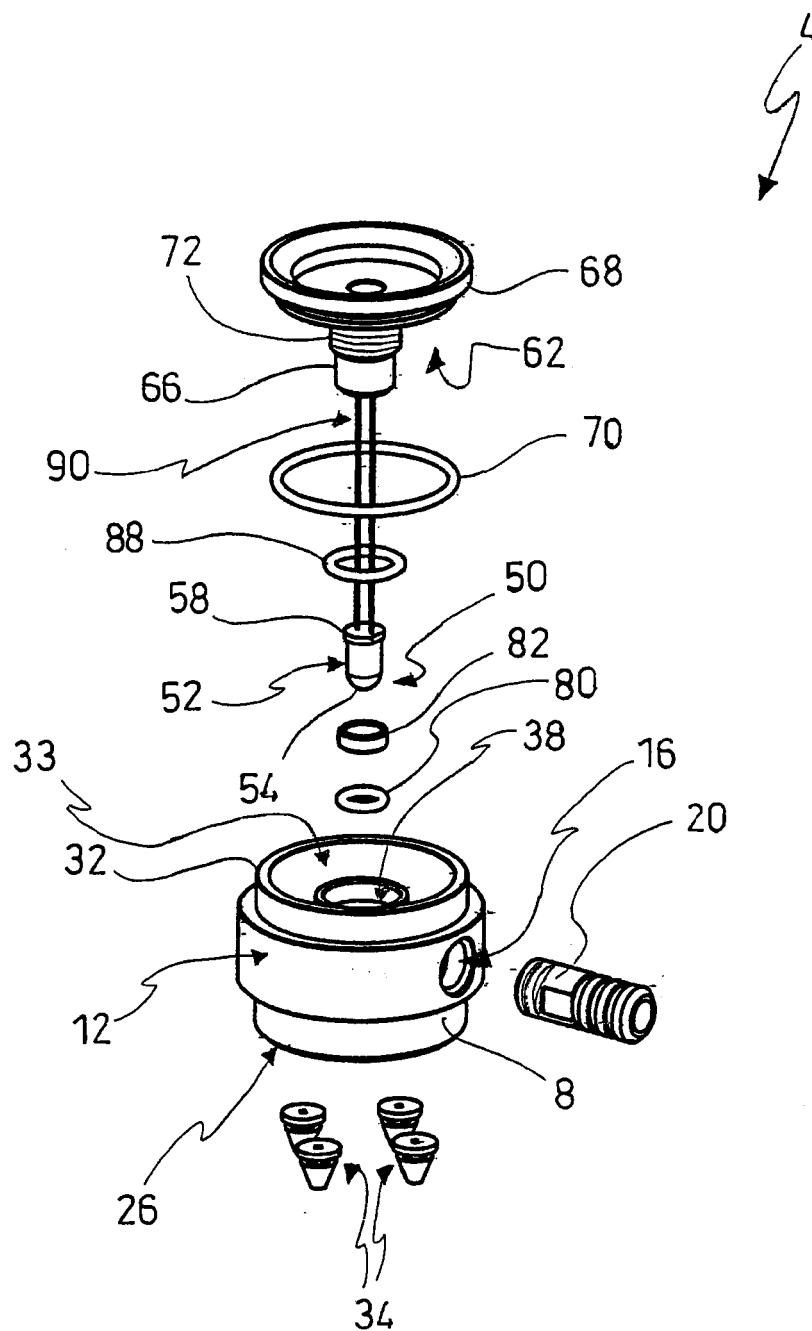


FIG.1

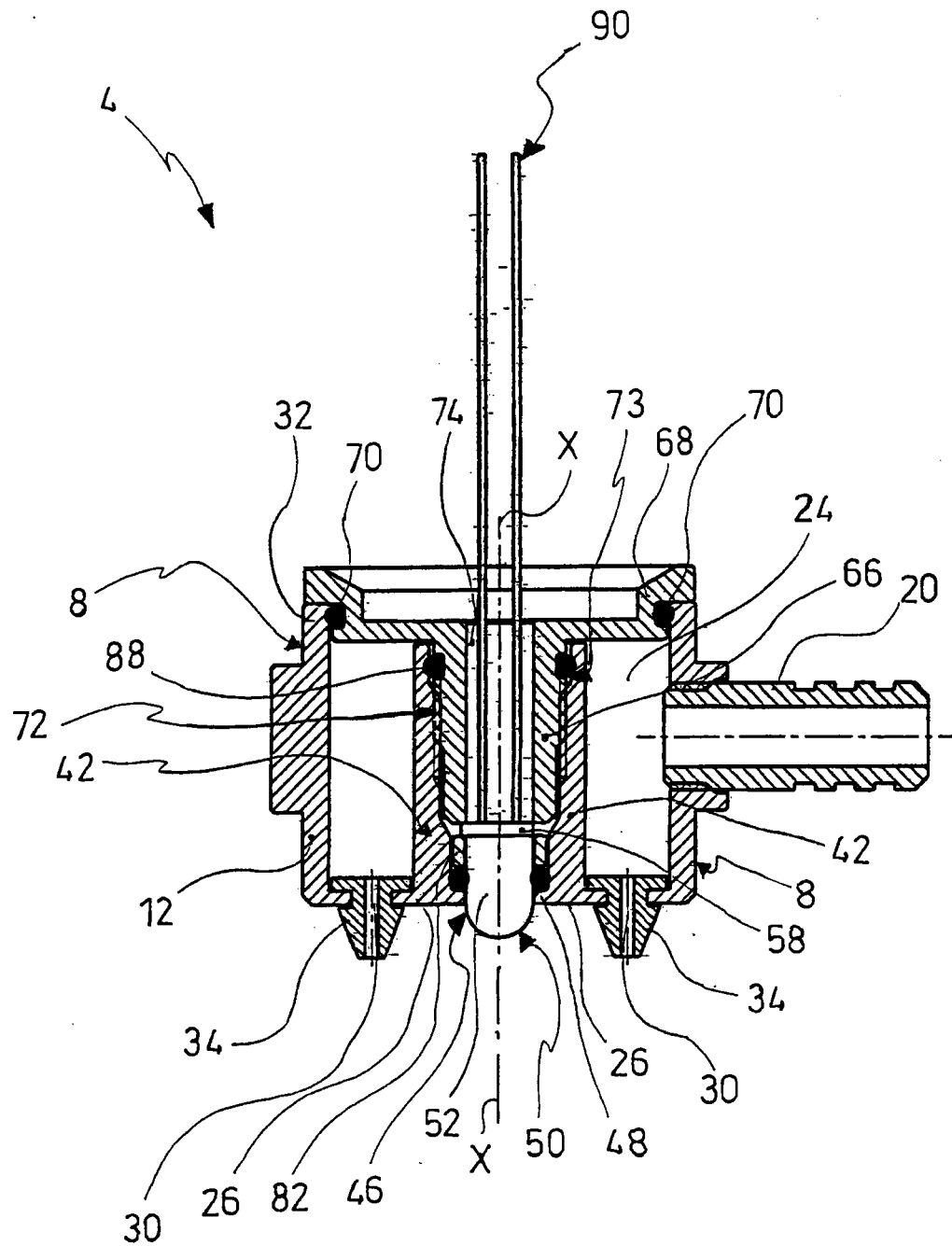


FIG. 2

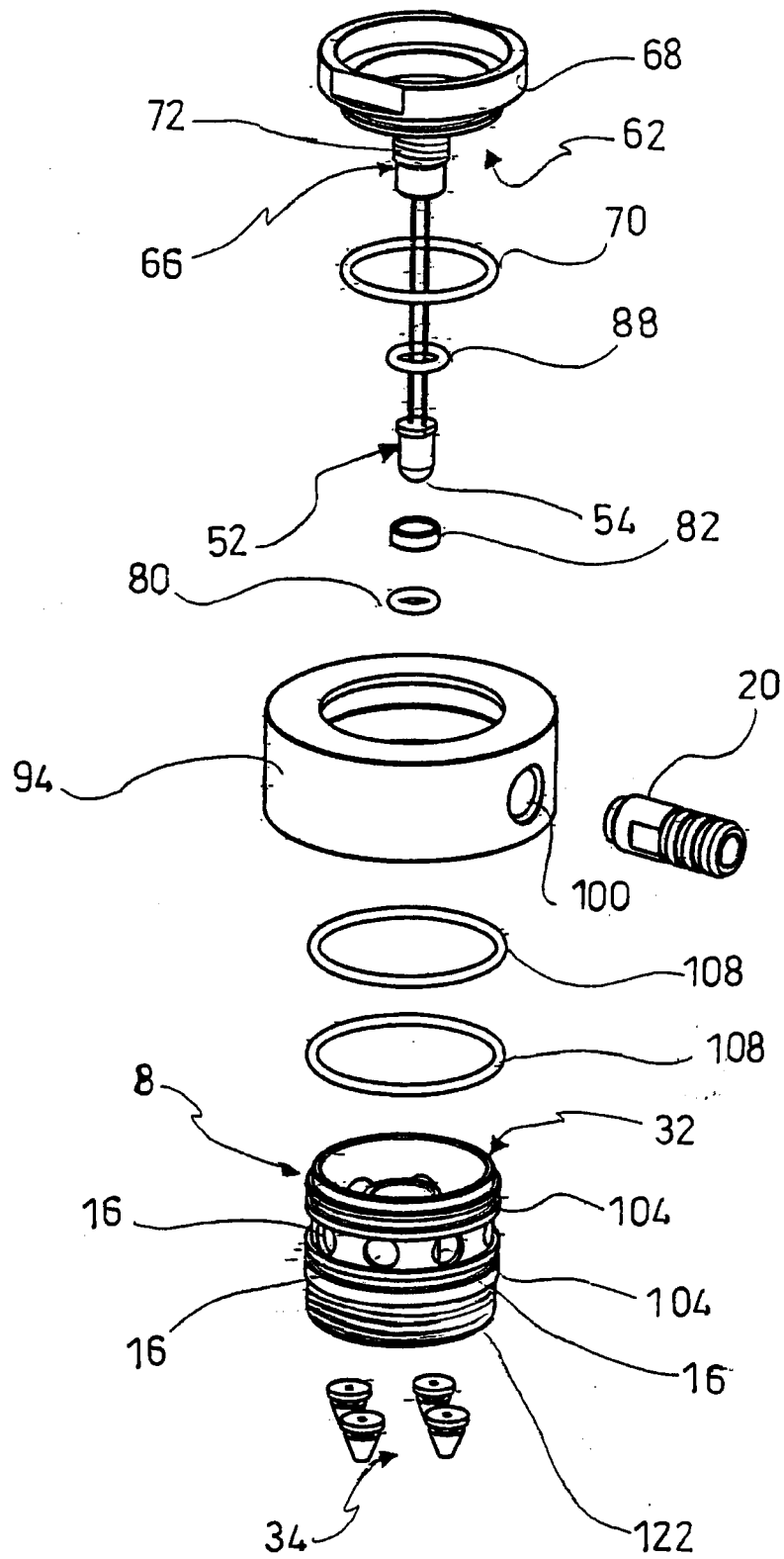


FIG. 3

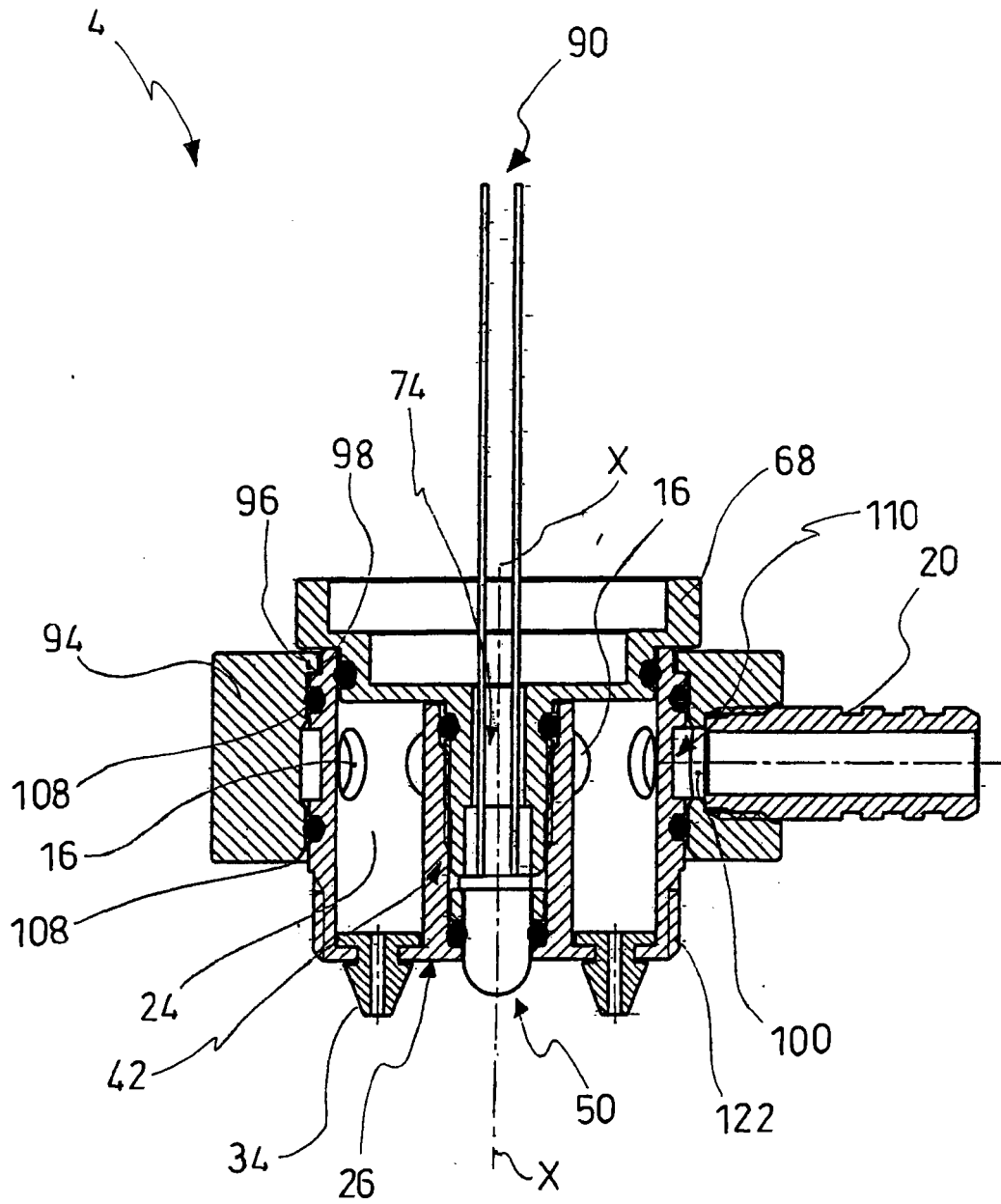


FIG.4

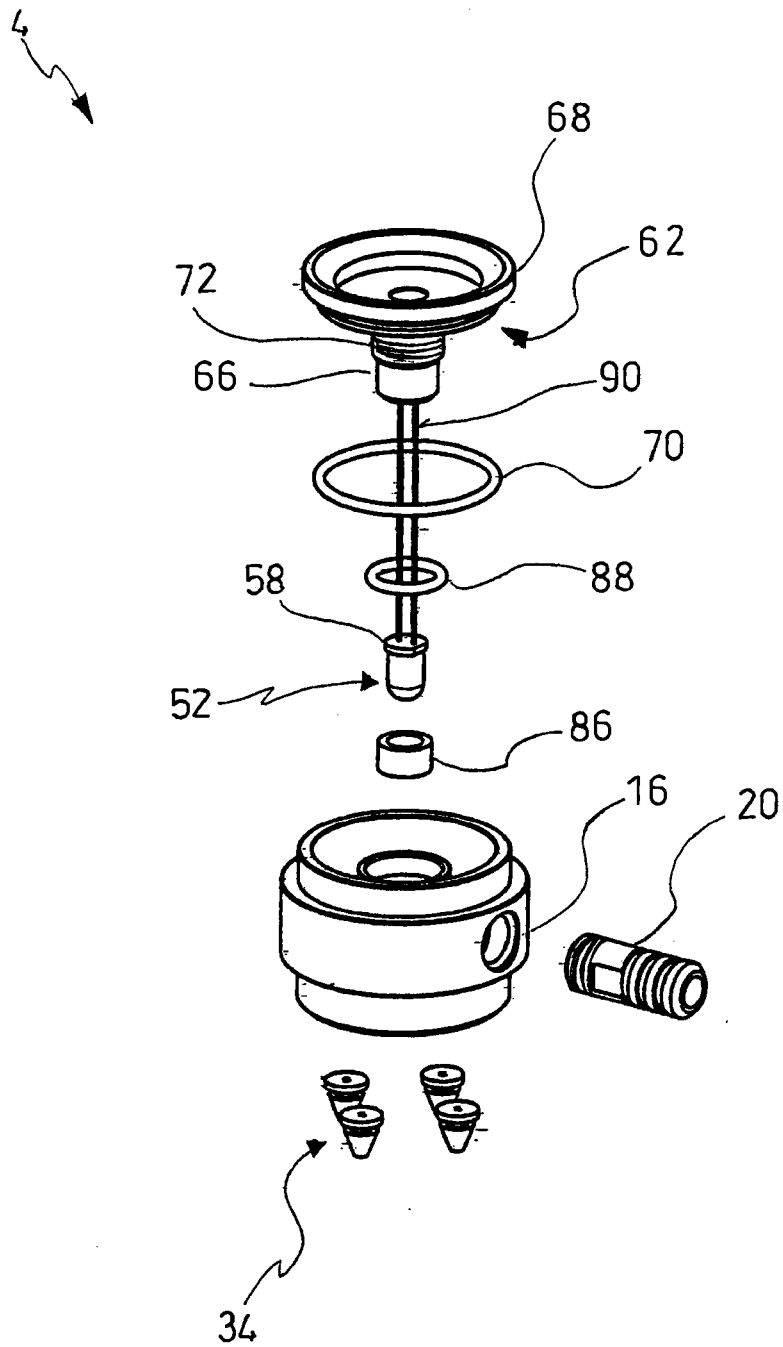


FIG.5

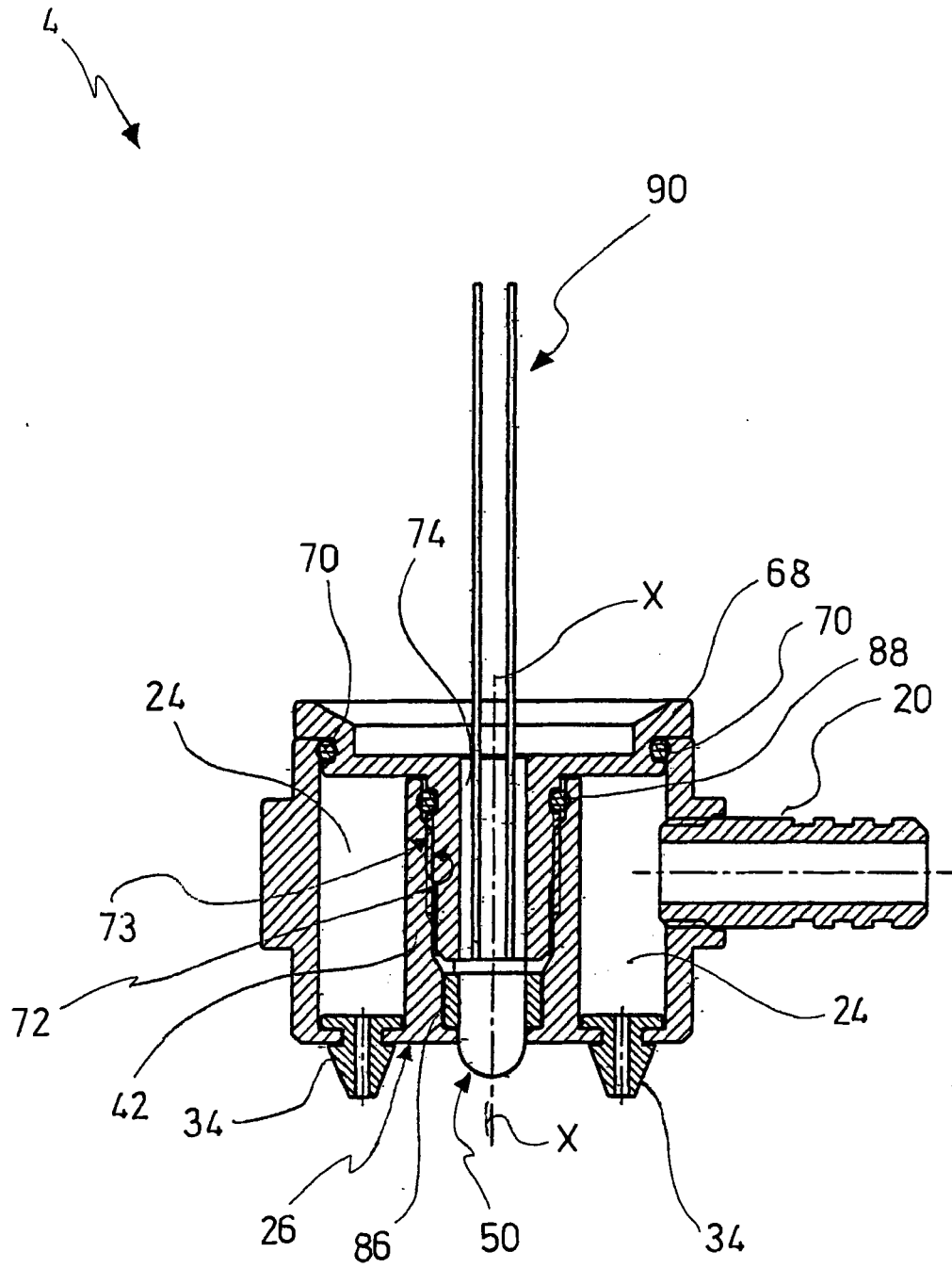


FIG. 6

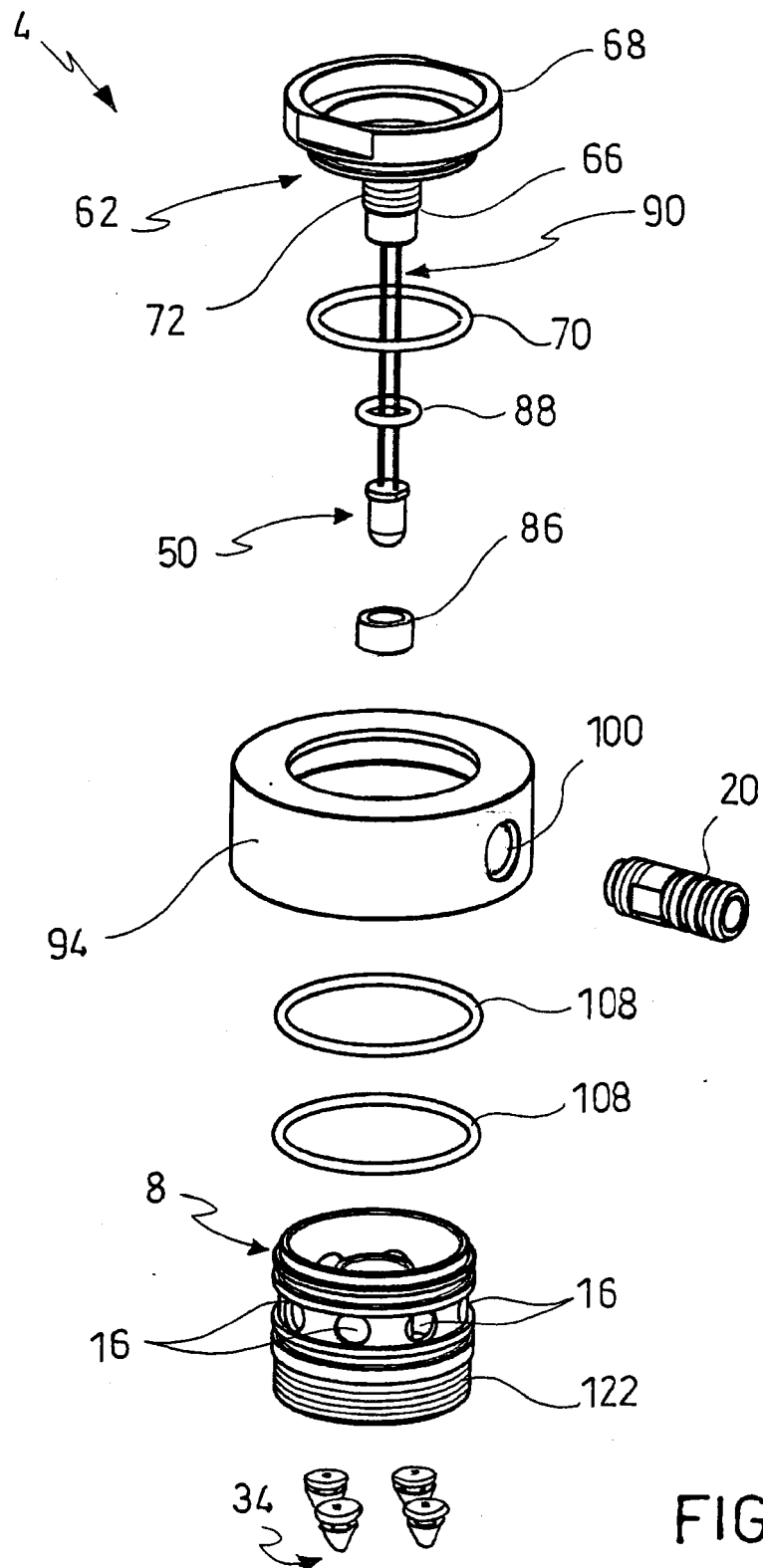


FIG. 7

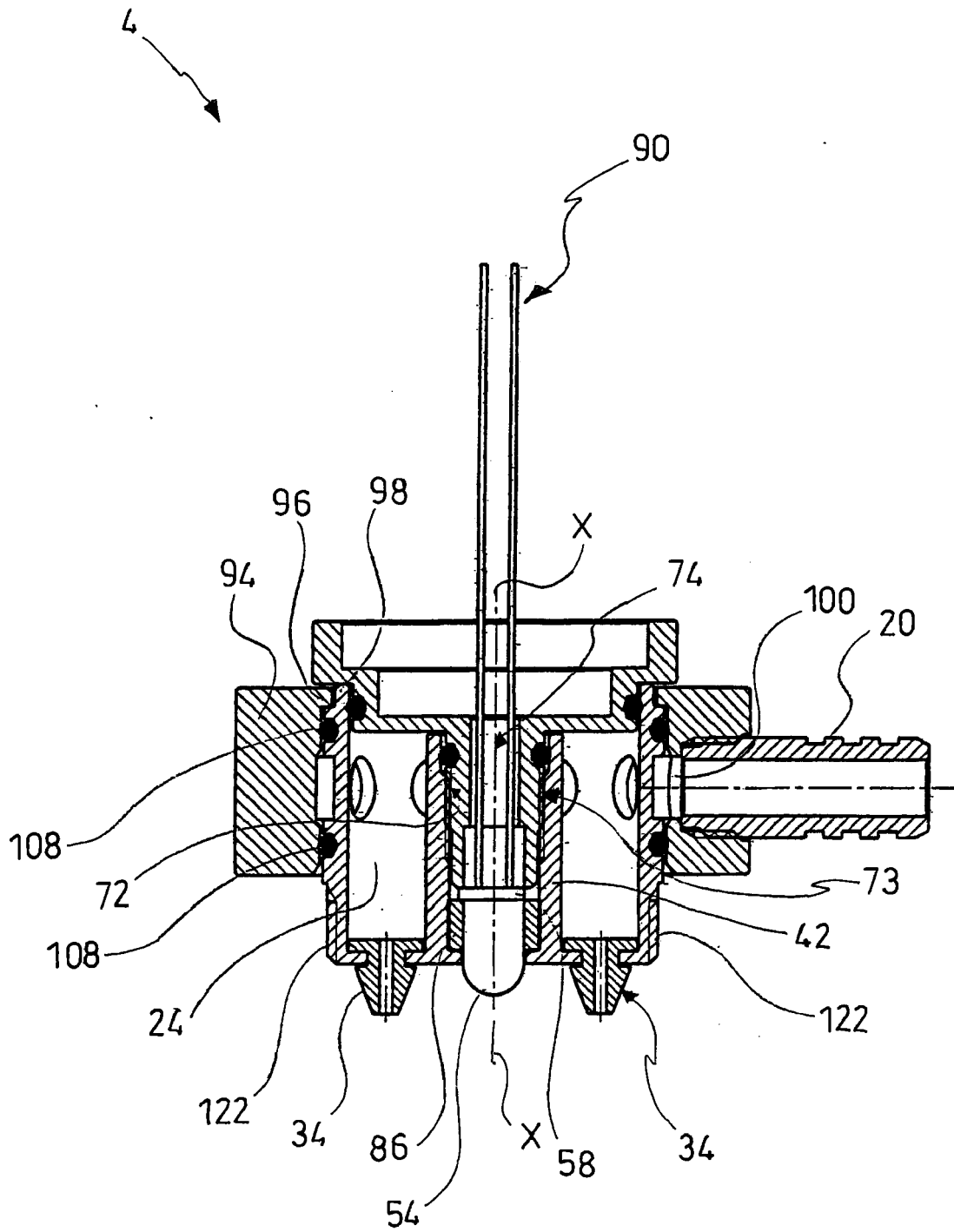


FIG.8

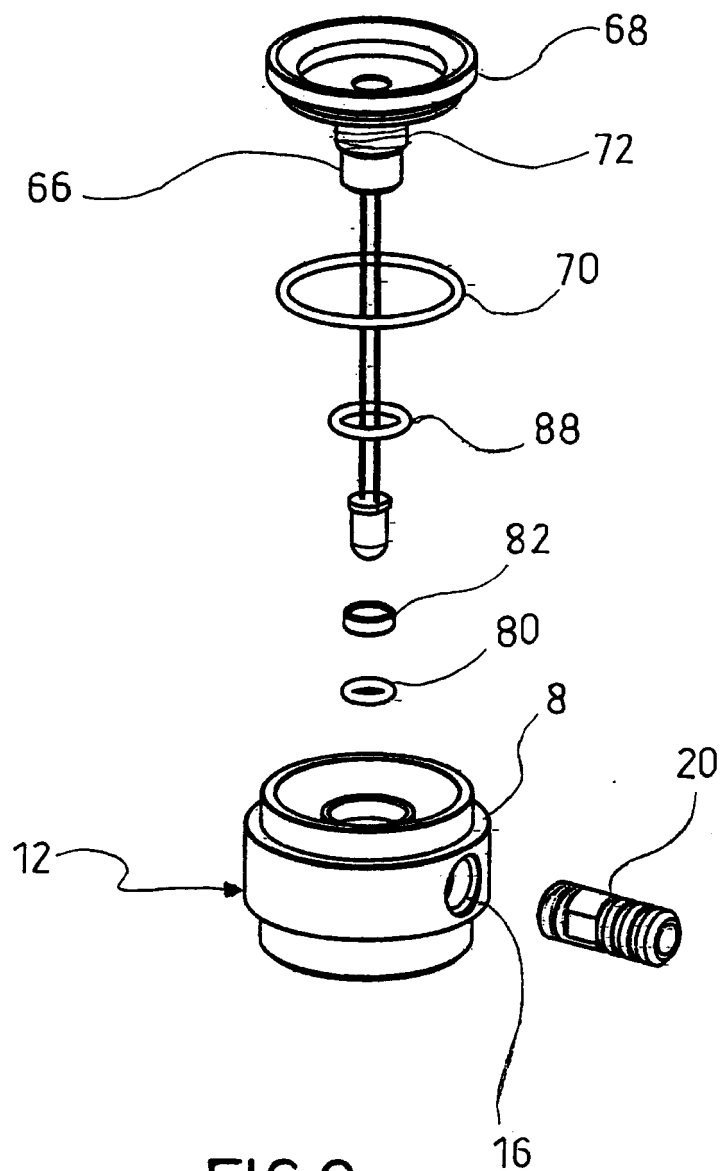


FIG.9

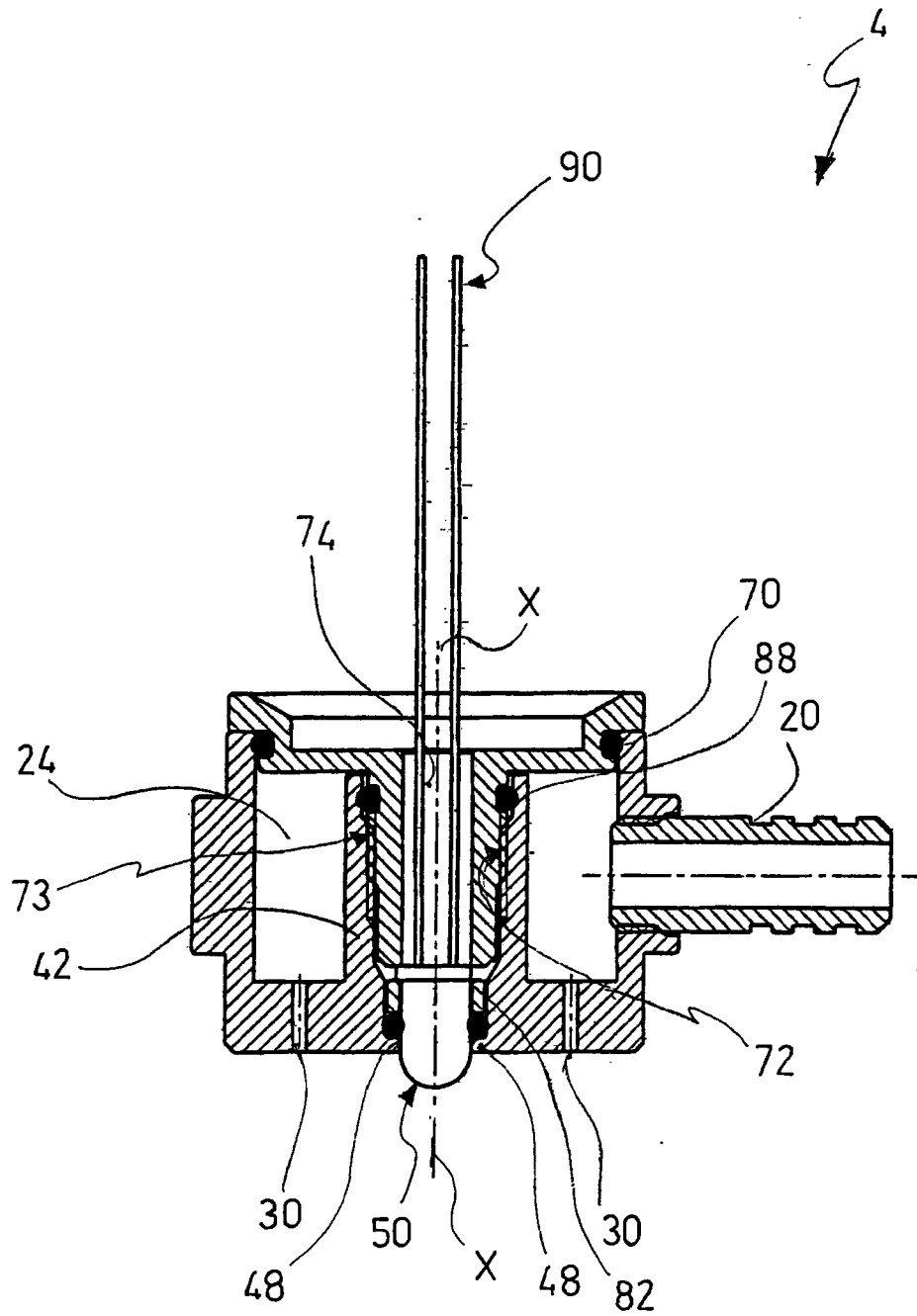
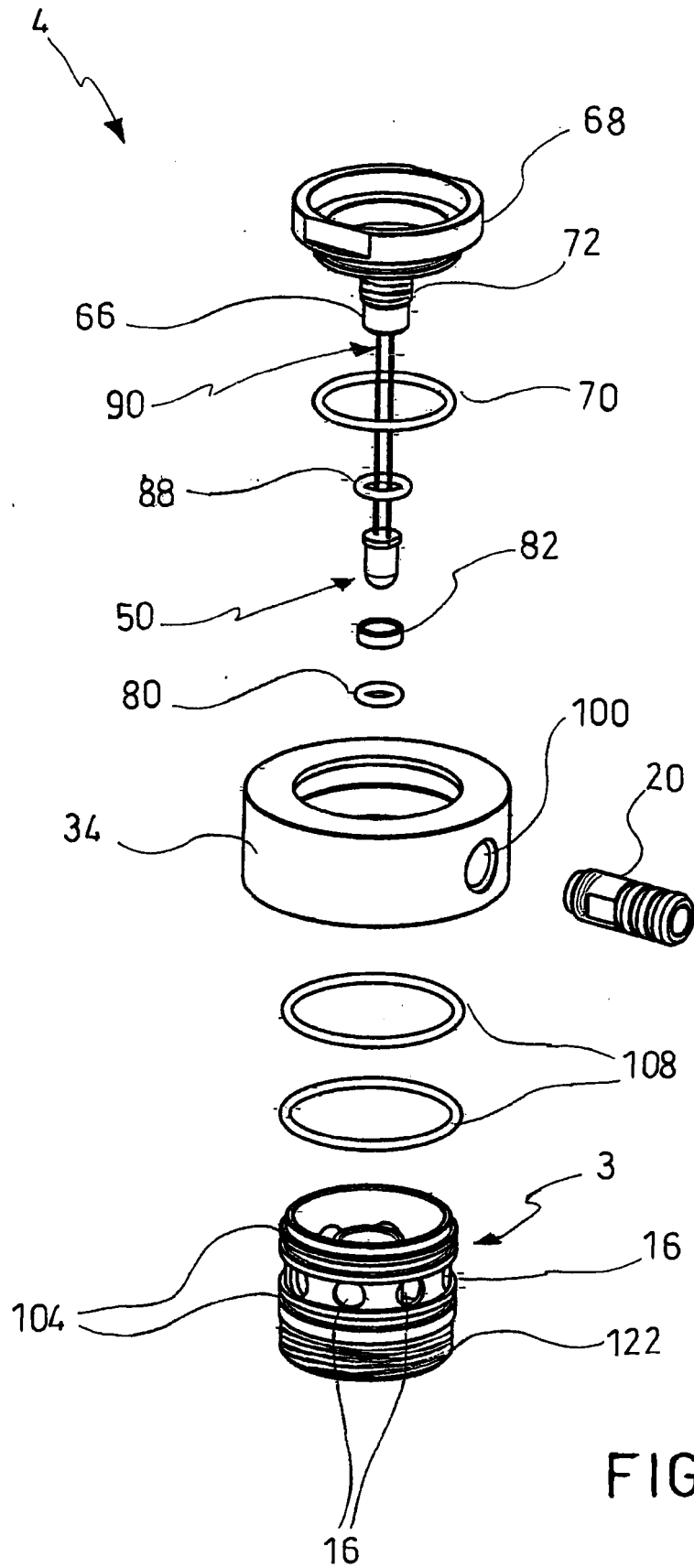


FIG.10



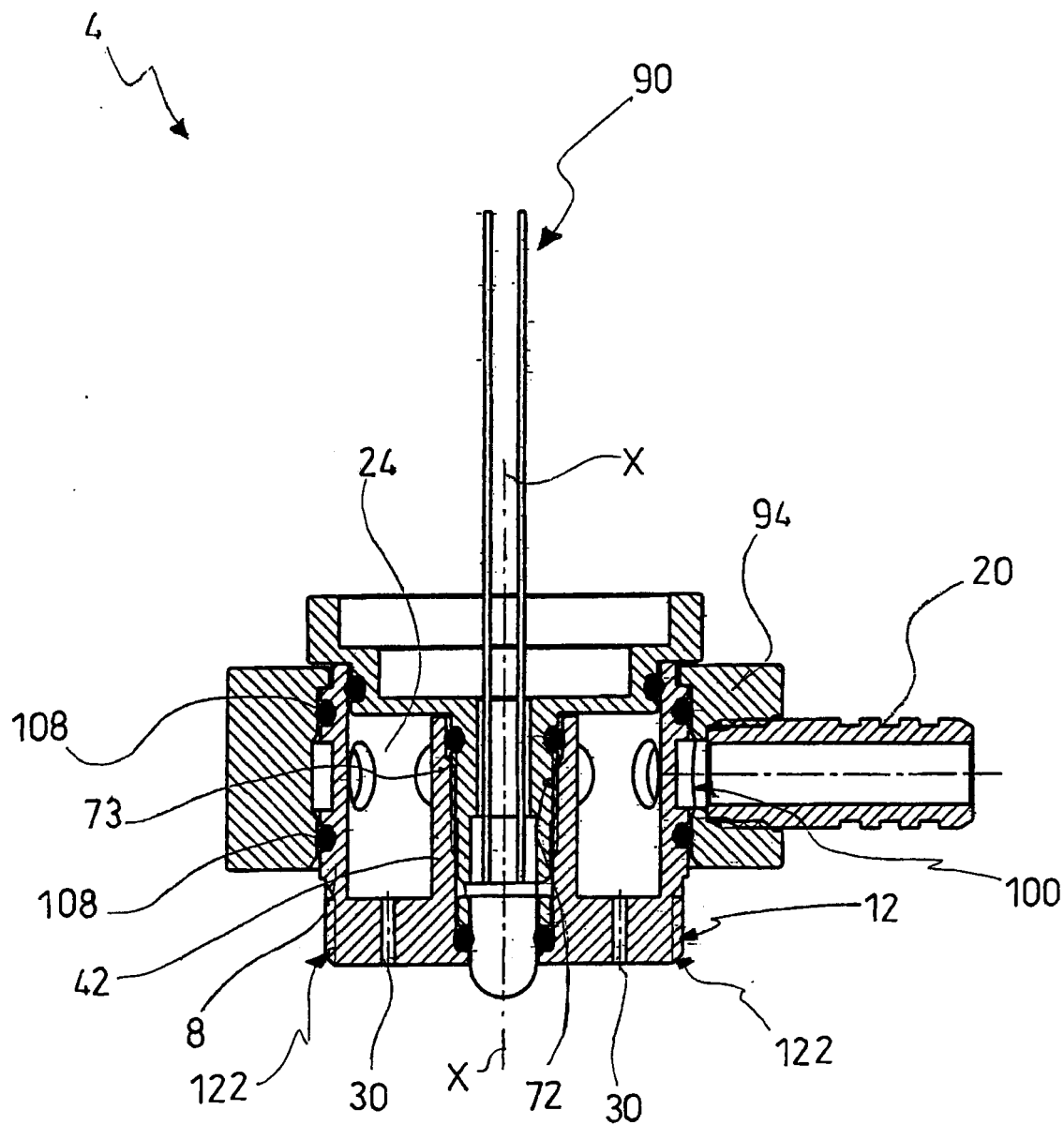


FIG.12

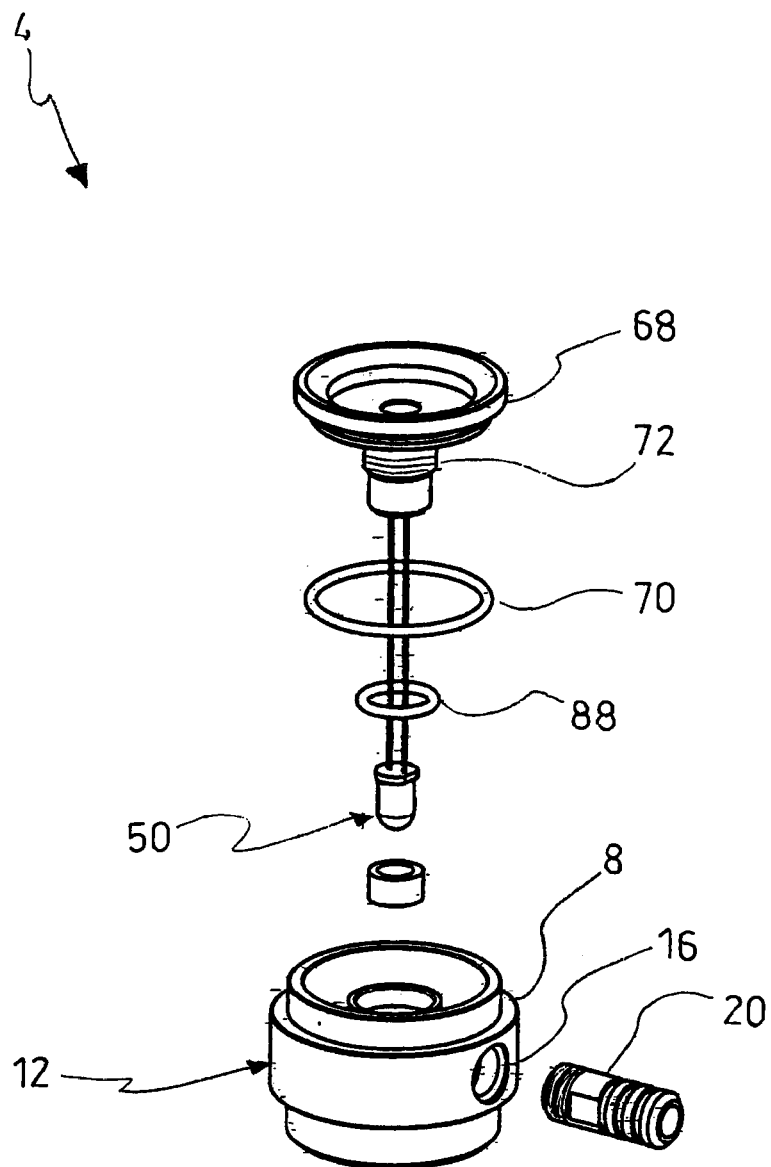


FIG.13

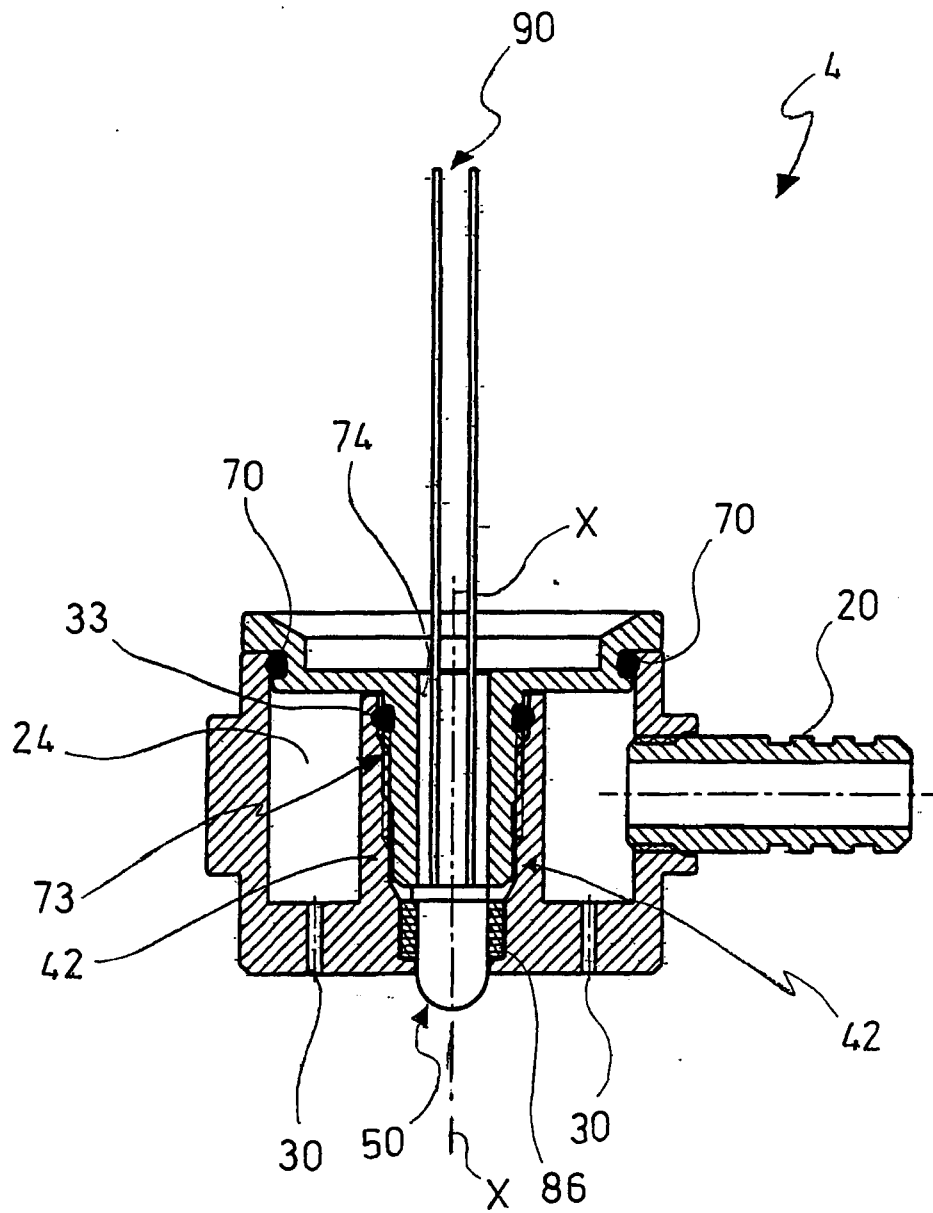


FIG.14

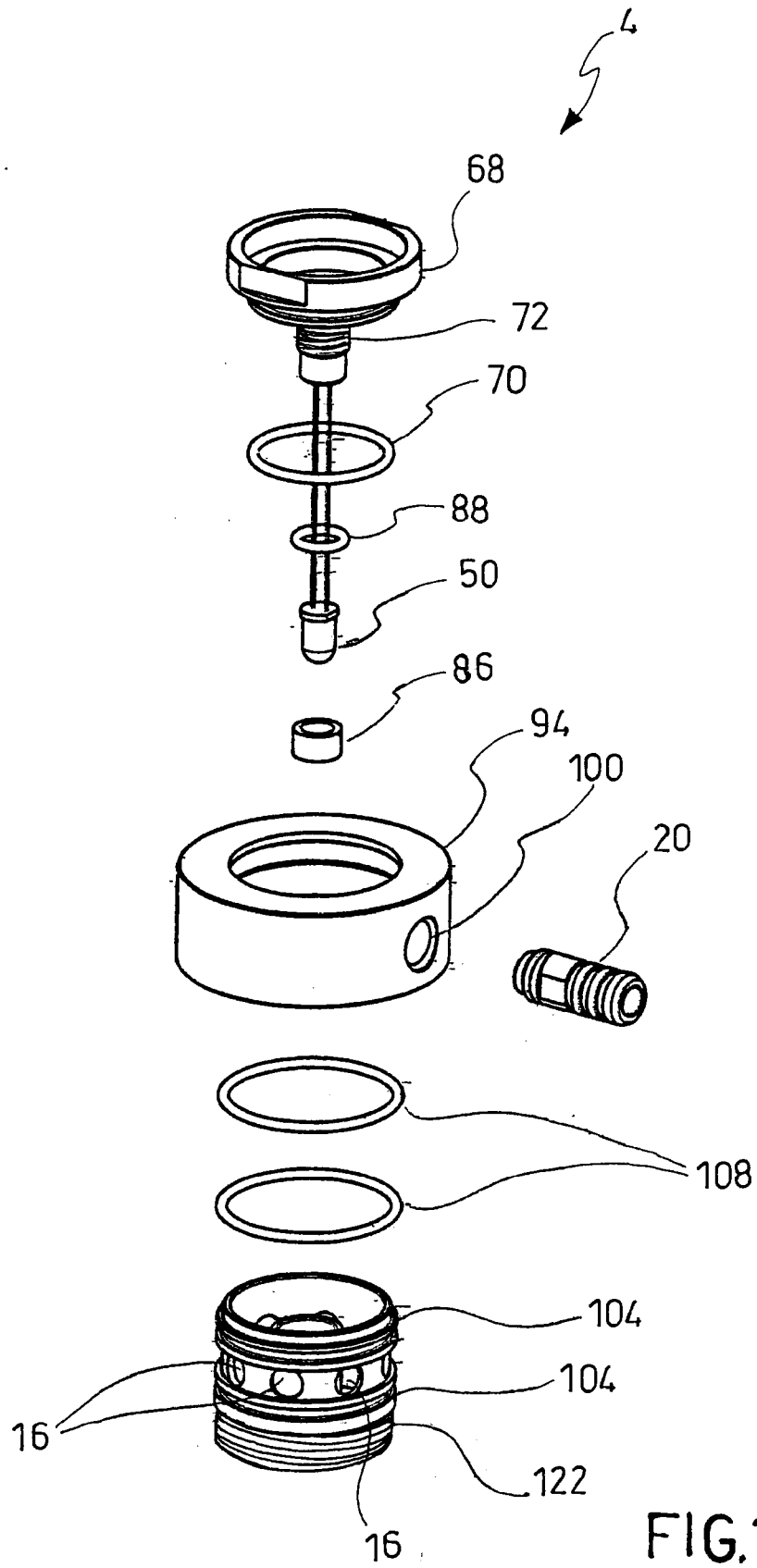


FIG.15

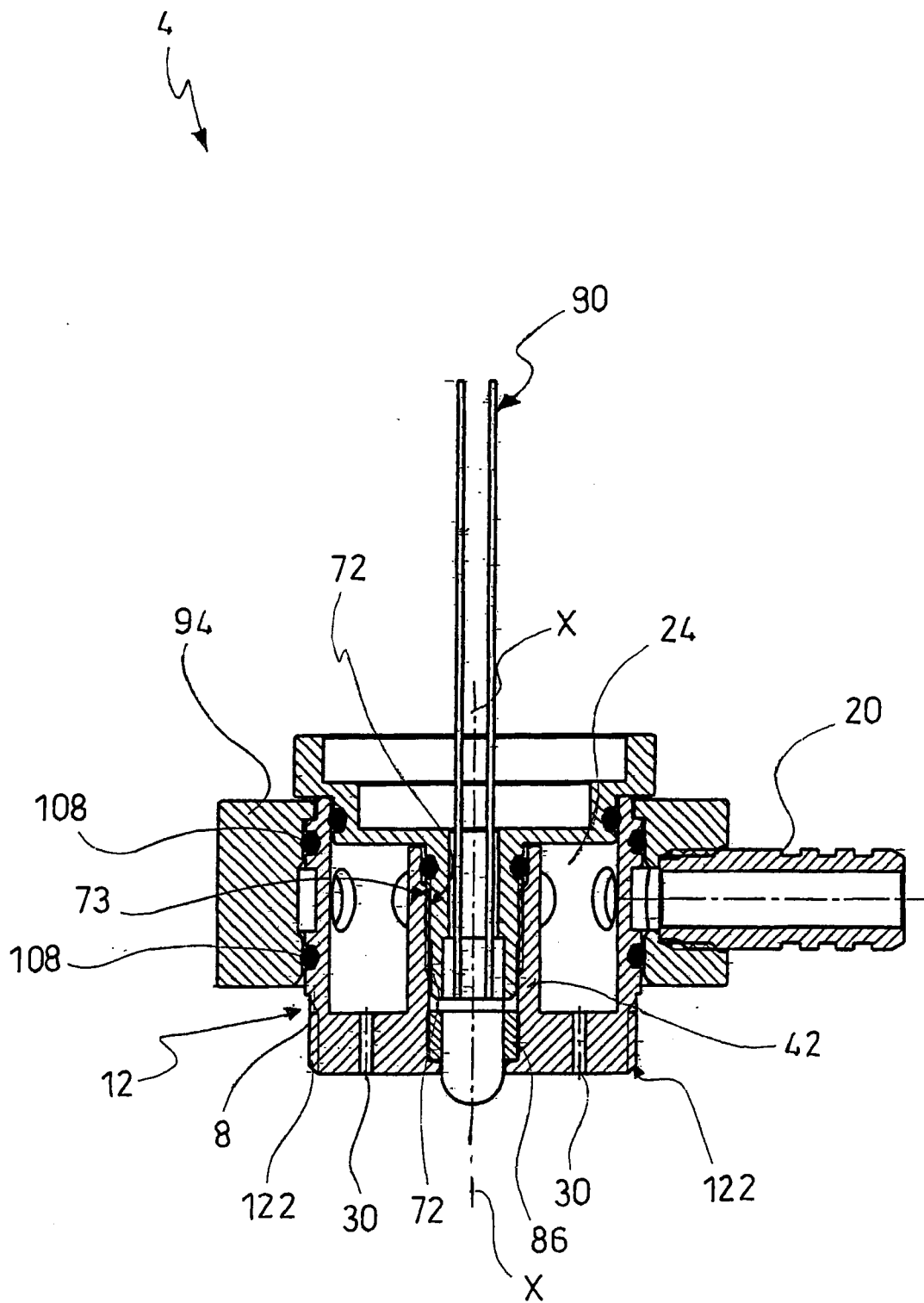


FIG. 16

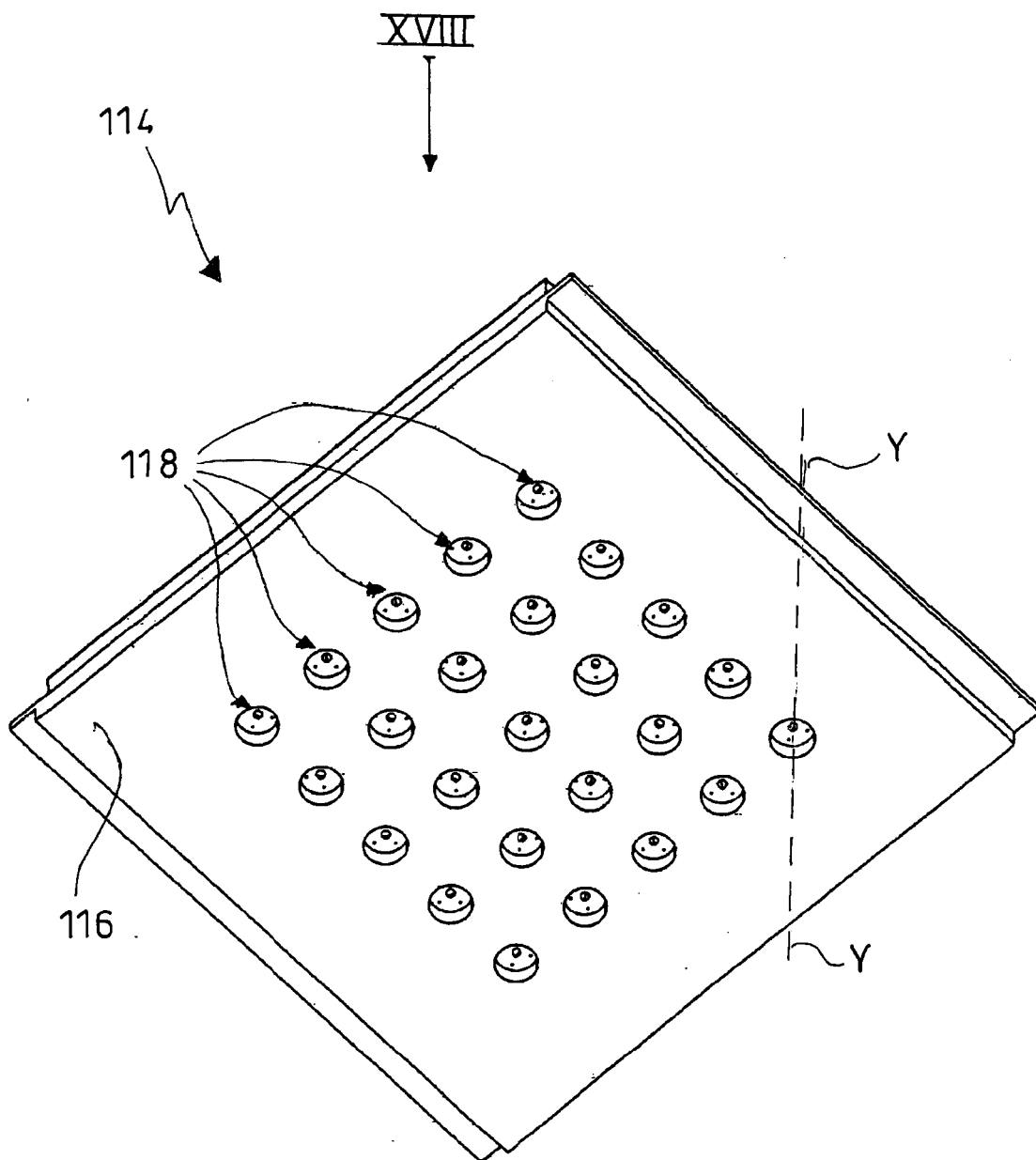


FIG.17

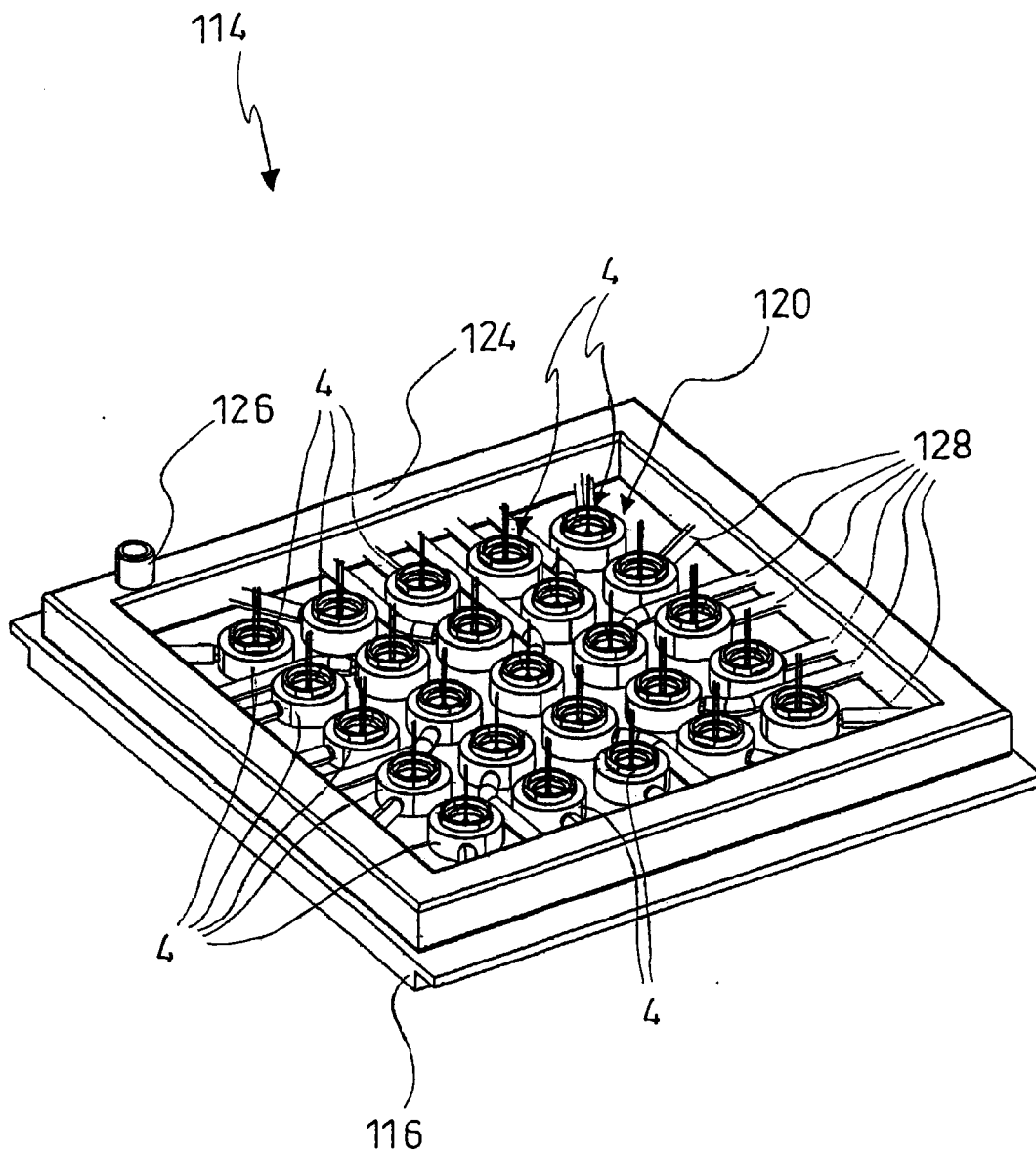


FIG.18

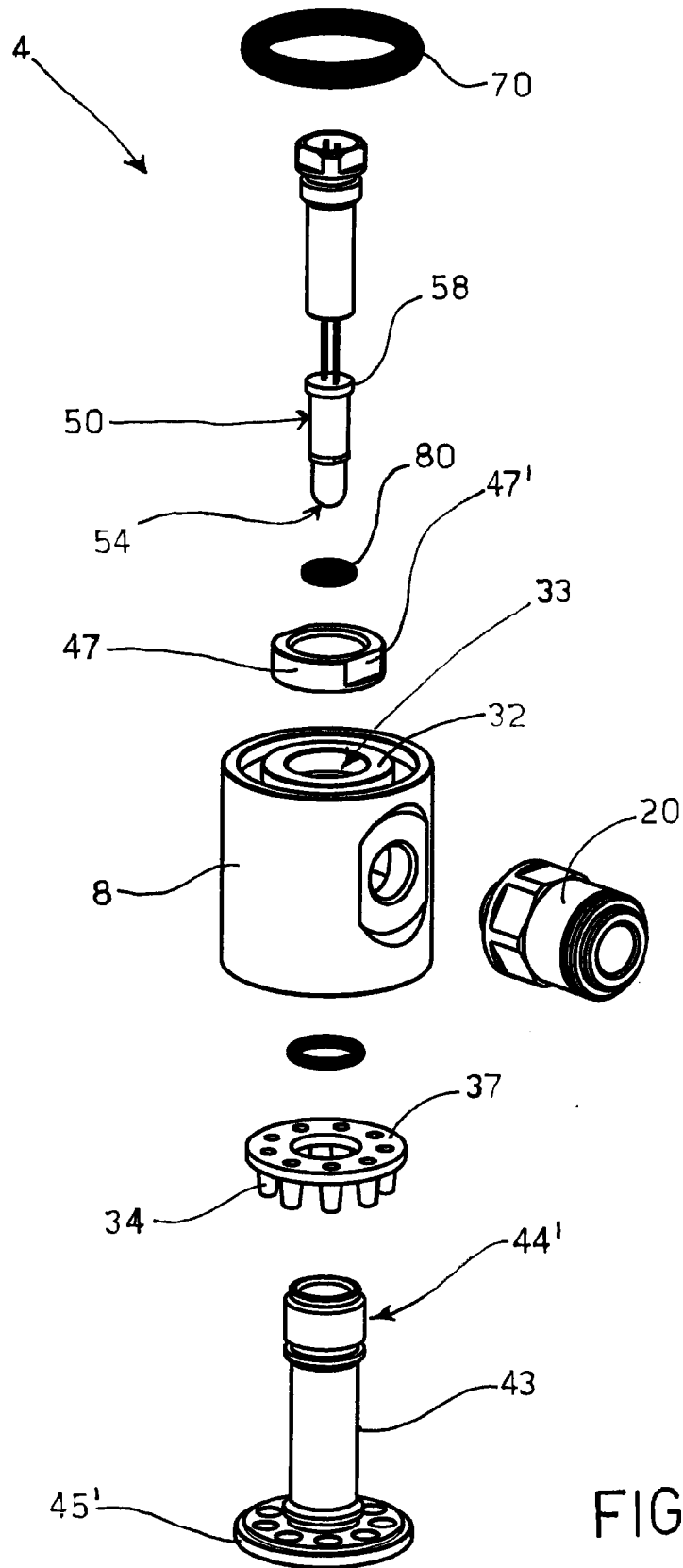


FIG. 19

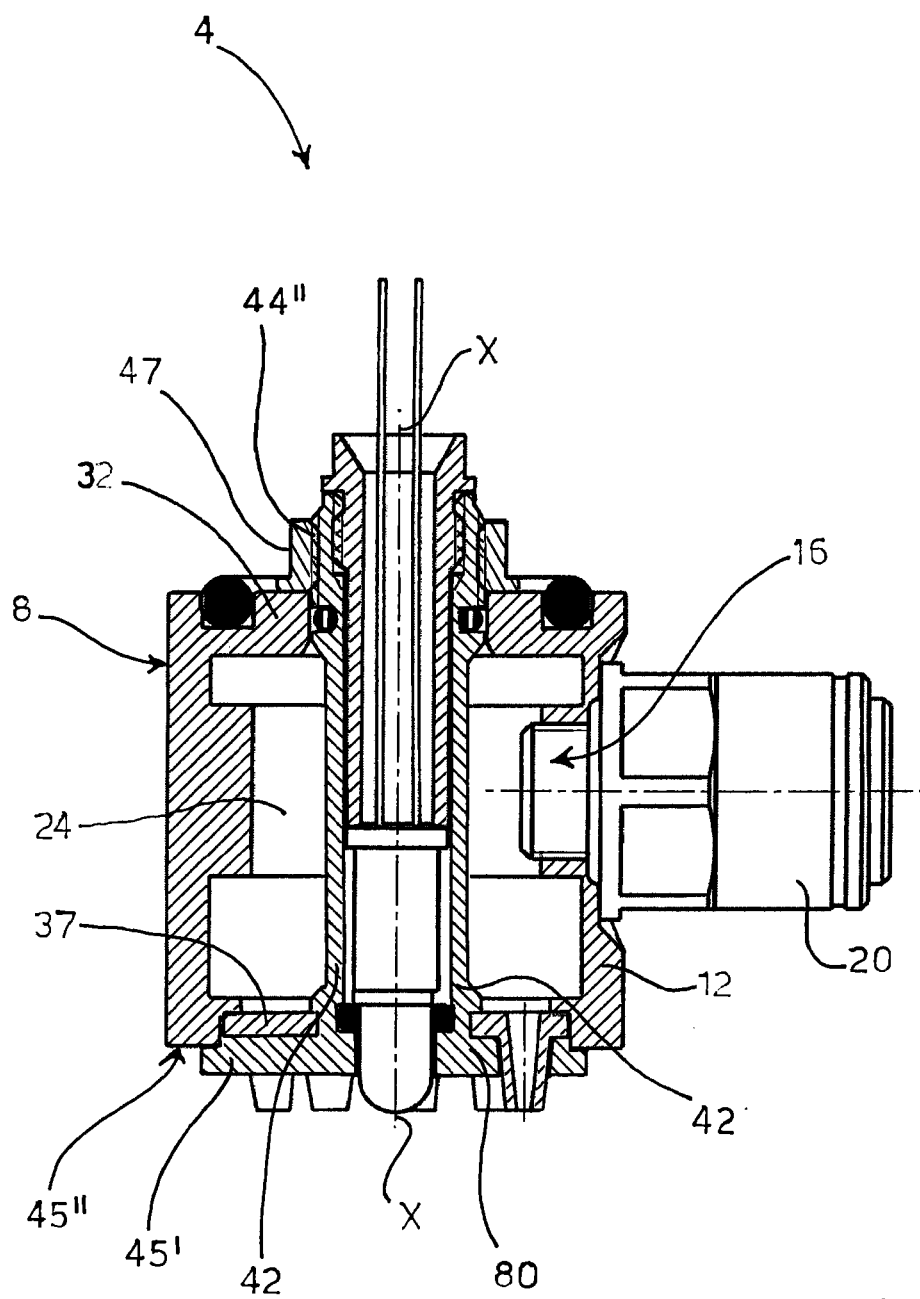


FIG. 20

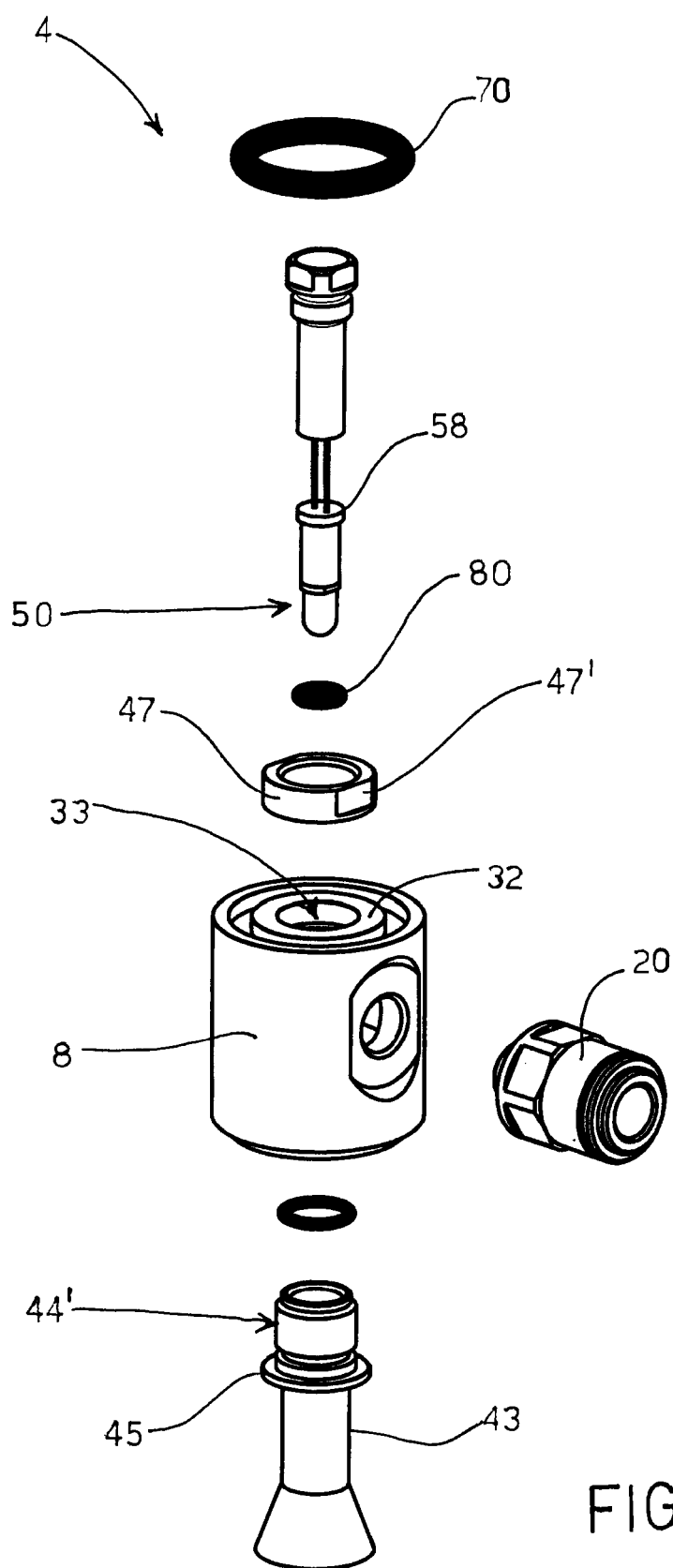


FIG. 21

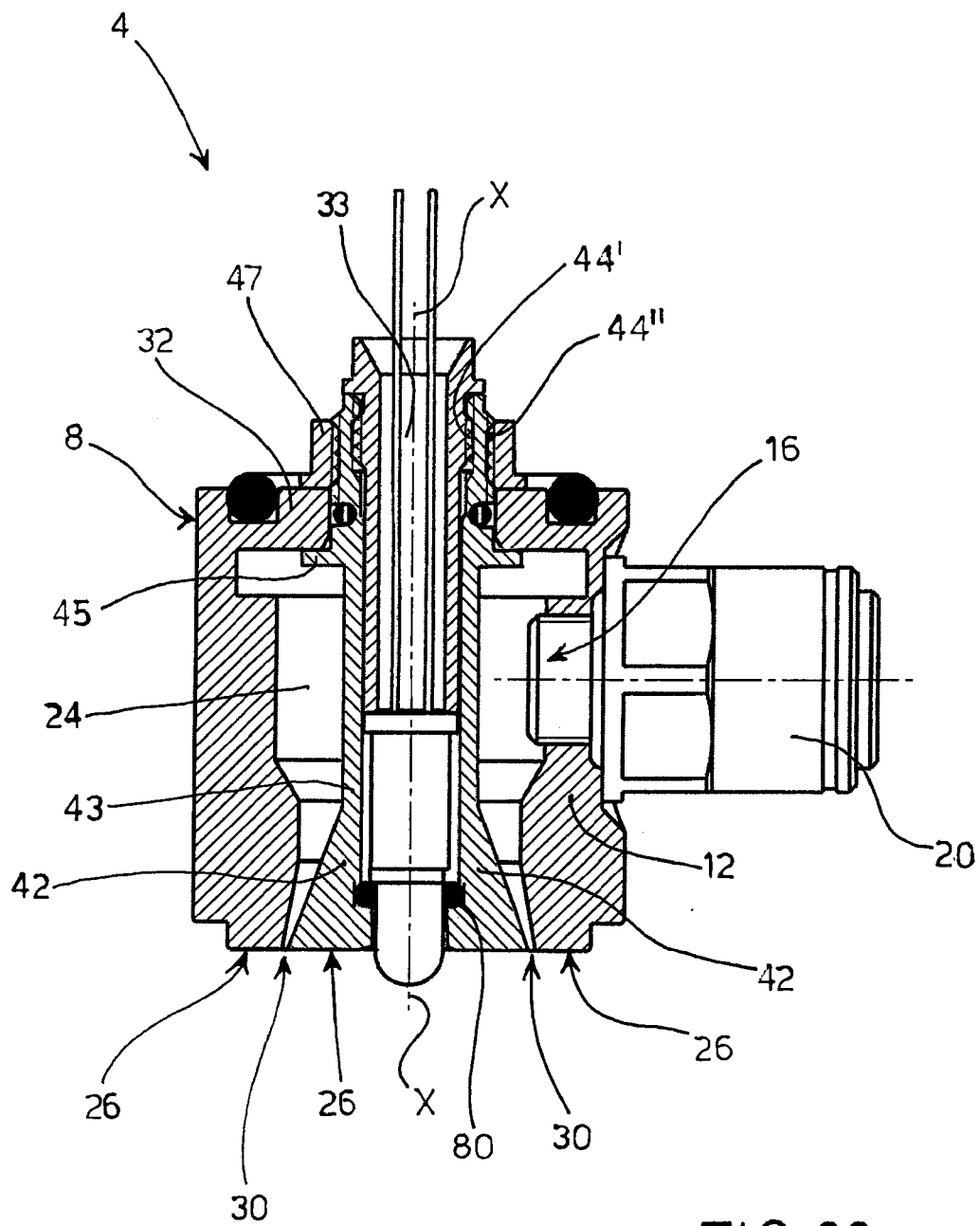


FIG. 22