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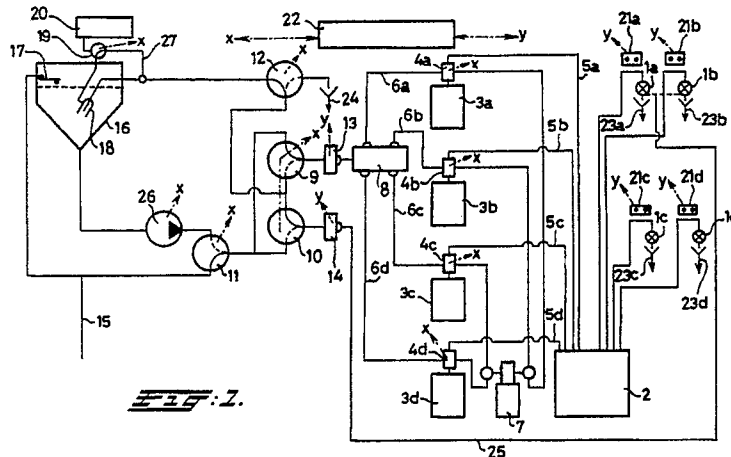
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54 Beer lines cleansing device coupling member therefor and tap.

57 A device for cleansing beverage lines, especially beer lines, each intended to be connected at one end with a coupling member to be inserted into the bung hole (33) of a barrel (3A-3D), the other end leading to a corresponding tap (1), the coupling member being provided with a connection for connecting it with a container of carbon dioxide, in order to place the interior of the barrel (3A-3D) under pressure of carbon dioxide, and a dip tube (29) to be inserted into the barrel (3), which tube is or is to be connected to the corresponding line, a three-way valve being incorporated in the line which is adapted to connect this line selectively with said dip tube (29)

or with a line for rinsing liquid. According to the invention the three-way valve (4a,4b, 4c,4d) is an integral unit (28) with the corresponding coupling member and is provided with a driving means which, by means of a corresponding actuating member (21a,21b,21c,21d) located adjacent to the relative tap (1a,1b,1c,1d), may be remotely actuated in order to allow each line (5a-5b) to be rinsed separately from the three-way valve (4a-4d) and the tap (1a-1d). Moreover the invention relates to a special coupling member and a tap intended for use with the device according to the invention.



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## BEER LINES CLEANSING DEVICE COUPLING MEMBER THEREFOR AND TAP.

The present invention relates to a device for cleansing beverage lines, especially beer lines, each intended to be connected at one end with a coupling member to be inserted into the bung hole of a barrel, the other end leading to a corresponding tap, the coupling member being provided with a connection for connecting it with a container of carbon dioxide, in order to place the interior of the barrel under pressure of carbon dioxide, and a dip tube to be inserted into the barrel, which tube is or is to be connected to the corresponding line, a three-way valve being incorporated in the line which is adapted to connect this line selectively with said dip tube or with a line for rinsing liquid.

It is known to construct beer lines in this way in order to enable them to be rinsed through. This should, in principle, take place at the end of a day in order to prevent beer from remaining in the line for too long. Rinsing is, however, laborious and requires the making of connections and/or the switching of three-way valves in the vicinity of the barrels, which are usually located at a considerable distance of the taps, while for rinsing the relative taps always have to be opened as well. All this is very laborious and time-consuming, so that the danger exists that this daily cleansing operation may sometimes be left undone. A further disadvantage is that it is not possible to cleanse lines separately without loss of beverage and meanwhile continue to use the others normally. Furthermore, the beer lines have to be cleansed more thoroughly at regular intervals. This is usually done by professionals, who for that purpose have to disconnect the lines. An additional problem is that this cleansing cannot usually be carried out at the most appropriate time, since one is dependent on the availability of these professionals. The present invention aims to remedy these disadvantages and to that purpose provides a device as characterized in Claim 1.

With this device, daily cleansing can be carried out in a simple way without the intervention of professionals.

Since the three-way valve is located very close to the coupling member and therefore very close to the beer barrel, it is possible, according to the invention, to cleanse beer lines thoroughly and hygienically along substantially their entire length, from the beer barrel to the tap itself; an additional advantage is that the air bubble which is usually present between the coupling member and the tap after the connection of a new barrel is reduced to negligible proportions, so that there is no longer any risk of infection. Besides, the device according to the invention no longer requires the help of

professionals to be called in, nor is it necessary to disconnect the lines or reconnect them with each other.

For thorough cleansing the invention provides an improvement of a device according to the precharacterizing portion of Claim 2 with the characteristic features there mentioned.

Particular embodiments of this device are claimed in Claims 3 - 9.

The invention further relates to a coupling member for a barrel, intended for the device according to one or more of Claims 1 - 9, as claimed in Claims 10 - 12. The use of such a coupling member has the important advantage that the entire dip tube, including its forward end, can be cleansed, without disconnecting lines or coupling members and the like or connecting them to one another. Such a coupling member is known per se from EP-A-0 269 152, but that coupling member has a number of disadvantages. During cleansing with a rinsing liquid the pressure thereof acts directly against the valve of the barrel, which may cause cleansing liquid to enter the barrel and pollute the remainder of the beverage present therein. Beer especially is very sensitive to pollution, as it quickly acquires an unpleasant taste and/or loses its head. Also, it often occurs that the valve of a barrel, after it has been broached by a dip tube, leaks if the dip tube is removed before the barrel is empty. The coupling member according to EP-A-0 269 152 also makes use of so-called lip valves which are susceptible to wear, so that there is some danger for instance of beer entering the rinsing liquid line. These disadvantages are avoided by the coupling member according to the invention.

The invention further relates to a tap intended for use with the device according to one or more of Claims 1 - 12 as described in Claims 13 and 14. Such a tap avoids the necessity of manually connecting the cleansing agent return line to the tap, so that misconnections or leakage problems are avoided.

Finally, the invention relates to a sequential controller as described in Claim 15.

In the following the invention will be described in greater detail with reference to the accompanying drawing, showing in:

Fig. 1 a general diagram of the tap installation according to the present invention;

Fig. 2 and 3a-c respective consecutive cleansing steps of a method for cleansing beverage lines using the device according to Fig. 1;

Fig. 4 an embodiment of the coupling member according to the present invention; and

Fig. 5 (a) and (b) an embodiment of the discs for use, according to the invention, in a tap as a three-position slide valve.

In Fig. 1, 1a-1d indicate taps with drains 23a-d at four drawing points. These taps are connected by lines passing through a cooling apparatus 2 to barrels 3a, 3b, 3c and 3d, respectively. Just above these barrels, i.e. just above the coupling member of the barrel concerned, switch means 4a, 4b, 4c and 4d, respectively, in the form of three-way valves are shown which can be switched over to connect the beverage line 5a, 5b, 5c, respectively, and 5d to the barrel 3a, 3b, 3c and 3d, respectively, or a rinsing liquid line 6a, 6b, 6c, 6d, respectively, as the case may be. The reference numeral 7 indicates a cylinder of carbon dioxide gas which is connected to the respective coupling members of the barrels to keep these barrels pressurized and to provide the beverage with carbon dioxide.

The rinsing liquid lines 6a, 6b, 6c and 6d which branch out from the three-way valves 4a, 4b, 4c and 4d are connected, via a distributor 8, to a valve assembly 9, 10, 11 and 12, the functioning of which will be explained with reference to the following Figs. Adjacent to the valve 12 there is a drain 24.

The reference numerals 13 and 14 indicate sponge-catchers and the reference numeral 26 indicates a pump.

The said valve assembly is connected to water mains 15 and a storage vessel (buffer vessel) 16 in which there are a float valve 17 and a jet pump 18. The jet pump 18 is connected, at one end, to the three-way valve 12 and the inlet connection is connected, via a three-way valve, to a storage container 20 for cleansing agent.

The characteristic feature of this device is that adjacent to the drawing points there are provided actuation panels 21a, 21b, 21c, 21d, by means of which a sequential controller 22 may be actuated, the sequential controller in turn actuating all the three-way valves in the system. Also, sensors may be provided in the sponge-catchers to detect the presence of a sponge, in which case these sensors are also connected with the sequential controller 22.

In Fig. 2 and the subsequent Figs., the suffixes a - d have been omitted from the reference numerals, since the parts shown in these Figs. are illustrated for one beverage line only. In Fig. 2, a first operation step for cleansing beverage lines, viz. rinsing with water, is shown. For this purpose, the tap, e.g. 1, is connected via the cooling apparatus 2 to the three-way valve 4, which is switched so that the beverage line 5 is connected with the rinsing liquid line 6. This rinsing liquid line 6 passes via the distributor 8, the three-way valves 9 and 11 of the valve system to the water mains 15. By opening the tap 1 at this point, the entire line is

rinsed with water.

Prior to this entire operation a user at the respective drawing point has indicated through the actuating panel 21 that it is desired to rinse the line 5. The sequential controller 22 has set the relative valves and the distributor in the way indicated in Fig. 2 in response to the signal thus given.

As a line is rinsed in this way, the beverage therein is pushed away by the rinsing water and so it can be used almost completely. The other lines are rinsed in the same way. During the rinsing or cleansing of one line the other lines can be used normally.

A thorough cleansing is shown in Fig. 3. This cleansing is only carried out after rinsing according to Fig. 2 has taken place. In the course of this cleansing, the sequential controller 22 switches all the valves as shown in Fig. 3a, after the end of a connecting line 25 is connected to the end of the tap 1. To prevent the line being rinsed before the line end in question is fixed to the tap, there may be provided in the tap and/or the end of the cleansing agent return line 25 a sensor which is also connected to the sequential controller 22. The coupling member of the cleansing agent return line 25 is preferably provided with a non-return valve which is lifted during the application thereof to a tap.

By means of the pump 26, water from the vessel 16 is circulated, in the course of which a cleansing agent is supplied into the storage vessel 16 from the cleansing agent storage container 20 through the intermediary of a three-way valve 19. The storage vessel 16 is filled with water during the preceding operation and also during normal use. From the storage vessel 16, water with the cleansing agent moves via the pump 26, the three-way valves 11 and 10 to the sponge catcher 14. The sponge present in this sponge-catcher 14 is drawn by the current through the cleansing agent return line 25 to the sponge-catcher 13 via the tap 1, the beverage line 5, the three-way valve 4, the rinsing liquid line 6 and the distributor 8. A sensor which may be present in the sponge-catcher 13 transmits a signal to the sequential controller 22 after having received the sponge. The cleansing liquid with water moves via the sponge catcher 13 through the three-way valves 9 and 12 and back to the vessel 16. The valve 19 is kept open by the sequential controller 22 until a sufficient quantity of rinsing liquid has been pumped into the vessel 16.

Next, the sequential controller 22 switches the valves in the valve system as shown in Fig. 3b, to reverse the direction of the flow through the beverage line 5. By this reversal of the direction of flow, the sponge caught in the sponge-catcher 13 in Fig. 3a is returned to the sponge-catcher 14 while cleansing the lines it passes. The sensor present in the sponge-catcher 14 transmits a signal

to the sequential controller after the sponge has been caught. The operations shown in Fig. 3a and 3b may be repeated several times, provided that the last operation is according to Fig. 3b.

In order to complete the cleansing operation, the beverage line 5 has to be rinsed again. To that end, the valves are set as shown in Fig. 3c by the sequential controller 22. In this setting, the pump 26 conveys water under high pressure from the vessel 16 through the line via the three-way valves 11 and 9, the sponge-catcher 13, the distributor 8, the cleansing line 6, the three-way valve 4 and the beverage line 5 through the tap 1, the cleansing agent return line 25, the sponge catcher 14, the three-way valves 10 and 12 to a drain 24. The presence of the storage vessel 16 provides a buffer store of water for this operation, since the speed at which the pump thrusts the water through the lines is too great to be drawn directly from the water mains. By connecting, as shown at 27 in Figs. 1 and 3b, the circulation line from the three-way valve 19 to the jet pump 18 with the rinsing line in the normal position of this valve, the pump will always be freed of cleansing agent.

After this cleansing operation, either the valve 4 is switched over to reconnect the beverage line 5 to the barrel 3, or a new barrel is broached before the three-way valve 4 is switched over.

The use of the device according to the present invention has the important advantage that the beverage line in question can be rinsed from a drawing point while the other drawing points remain in use. In addition, cleansing may be carried out without disconnecting the barrel and the risk of detergent in the beverage to be drawn off after cleansing is reduced to a minimum.

The sequential controller is not strictly necessary provided that the parts actuated through this controller can be actuated in a corresponding manner. Neither are the sensors essential.

The entire invention can also be considerably simplified by not moving the cleansing liquid through the lines in two directions, but in one direction only, while pulsating the liquid flow. This pulsating is preferably carried out with a turbulent flow of the liquid. This means that the valve assembly 9 and 10 can be left out and operation without sponges is also possible, so that the sponge catchers 13, 14 can be left out.

In Fig. 4 a coupling member is shown with a dip tube 29, which is inside a guide sleeve 30 provided with a carbon dioxide supply 31. This sleeve 30 is inserted into a fitting 32. At the lower end of the coupling member 28, a collar 30' is provided, which is inserted into the bung hole 33 of a barrel 3. Between the members 30 and 30' a slide 34 with a through aperture 35 and a trough-shaped recess 36 is provided. The through ap-

erture 35 allows the dip tube 29 to pass through when the barrel is broached. The movement 29' of the dip tube 29 can be carried out by hand or by, e.g., hydraulic means. The trough-shaped recess 36 connects the dip tube with the rinsing liquid line 6 in the position of the slide shown in Fig. 4. The slide 34 is connected with a drive rod 38 and lodged in a housing 37. The slide 34 may be moved in a variety of ways, e.g. by connecting an electric motor or a hydraulic piston with the rod 38. It is necessary, however, that before the slide 34 is moved, the dip tube is withdrawn to a position above the slide 34. This may be ensured in a simple manner, e.g. by mechanical or electronic latching means such as sensors and the like which may be connected to e.g. the sequential controller. The slide 34 is usually made of a ceramic material, it being advantageous to have the slide 34 slidable along ceramic sealing surfaces 41 and 42.

The reference numeral 40 indicates a spring-packet which ensures a smooth movement of the slide 34.

The coupling member 28 shown in Fig. 4 is suitable for use both in the device according to the present invention in case of the use of reciprocating sponges and in case of the use of a unidirectional pulsating flow of cleansing liquid.

The advantage of the coupling member 28 is that the complete dip tube 29, including its forward end, can be cleansed, and that the three-way valve 4 is included in it, and so substantially no dead space is present therein.

Moreover, the inclusion of the three-way valve has the advantage of reducing the overall dimensions accordingly, and mounting the assembly onto a barrel is extremely easy since the connections with the various lines need not be disconnected and the dip tube 29 can be moved through the slide 34 which acts as the three-way valve.

It will be obvious that all drive members and sensors, if present, of the coupling member may be connected to the sequential controller 22.

Fig. 5(a) and 5(b) show top views of discs 43 and 44, which will usually be made of a ceramic material, of an embodiment of a three-position slide valve for a tap 1 to be used in the device according to the present invention. Fig. 5(a) shows the fixed disc 43 with a beverage line inlet aperture 45, an air vent 46, and a cleansing agent return line aperture 47. Fig. 5(b) shows the rotary disc 44 which lies under the disc 43 in the tap 1. This latter disc comprises a beverage outlet 48 and a U-shaped recess 49. This recess can also be replaced by a U-shaped tube. In the position of the discs shown in this Fig., i.e. With the arrows A and B coinciding, the beverage line 5 is connected to the beverage outlet 48. By rotating the disc 44 so that the arrow C will coincide with the arrow A, the beverage line

inlet aperture 45 is closed off and the beverage outlet opening 48 is connected with the air vent 46, allowing beverage remnants in the tap 1 to run out. In addition, the beverage line 5 can be connected with the cleansing agent return line 25 by rotating the disc 44 so that the arrows A and D will coincide. Preferably, an unlatching mechanism is actuated to enable the tap 1 to be rotated in this latter position in order to prevent the inadvertent influx of beverage into the cleansing agent return line.

### Claims

1. A device for cleansing beverage lines, especially beer lines, each intended to be connected at one end with a coupling member to be inserted into the bung hole of a barrel, the other end leading to a corresponding tap, the coupling member being provided with a connection for connecting it with a container of carbon dioxide, in order to place the interior of the barrel under pressure of carbon dioxide, and a dip tube to be inserted into the barrel, which tube is or is to be connected to the corresponding line, a three-way valve being incorporated in the line which is adapted to connect this line selectively with said dip tube or with a line for rinsing liquid,

**characterized** in that the three-way valve (4a,4b,4c,4d) is an integral unit (28) with the corresponding coupling member and is provided with a driving means which, by means of a corresponding actuating member (21a,21b,21c,21d) located adjacent to the relative tap (1a,1b,1c,1d), may be remotely actuated in order to allow each line (5a-5b) to be rinsed separately from the three-way valve (4a-4d) and the tap (1a-1d).

2. The device according to claim 1, connected or connectible to a circulation system adapted to circulate by means of a circulation pump a cleansing liquid and cleansing bodies from a storage container through one or more beer lines and returning this liquid to the storage container and provided with members for retaining these bodies upon their leaving a connected line,

**characterized** in that the rinsing liquid line (6a-6d) of the or each three-way valve (4a-4d) is connected with a flow distributor (8) which is adapted to connect one three-way valve respectively to one connection of the circulation system, the other connection of this system being connected to a return line, the other end of which is connectible to the discharge of the relative tap (1a-1d), the connections of this system each being provided with a remotely actuatable assembly of reversing valves which is adapted to circulate the flow of cleansing agent alternately in either direction, the retaining members (13,14) being included in the connection

and between the distributor (8) and the reversing assembly, this in such a way that each line (5a-5d) can be cleansed separately.

3. The device according to claim 2

**characterized** in that the rinsing liquid line (6a-6d) is connected through the intermediary of a valve with the reversing assembly in such a way that, in the position of this assembly in which the cleansing liquid is led to a tap (1a-1d), upon opening of this valve the supply of cleansing liquid is connected with the distributor (8) while the connection with the storage container (16) is interrupted.

4. The device according to claim 3,

**characterized** in that in the return connection between the reversing assembly and the storage container (16) there is incorporated a remotely actuatable three-way valve (12) by means of which this connection can be connected with the storage container (16) or a rinsing liquid outlet (24) as desired.

5. The device according to any one of claims 2-4,

**characterized** in that the storage container (16) is connected by means of a remotely actuatable valve (19) to a cleansing agent container (20), said valve (19) being adapted to admix a certain quantity of cleansing agent to the liquid.

6. The device according to claim 5,

**characterized** in that the valve (19) for the cleansing agent is connected with the suction side of a jet pump (18) which is included in the circulation line.

7. The device according to claim 6,

**characterized** in that the valve (19) is a three-way valve, which in the normal position connects the suction side of the pump with the circulation line.

8. The device according to any one of claims 2-4,

**characterized** in that the connection of the return line (25) for cleansing agent on a tap (1a-1d) and every tap is provided with sensors which are connected to the driving means of the distributor (8) so that the circulation system can operate only when this connection is set to the tap (1a-1d) corresponding to the position of the distributor (8).

9. The device according to any one of claims 2-8,

**characterized** in that the retaining members (13,14) for the cleansing bodies are provided with sensors which are connected to the driving means for the reversing assembly so that this can only be switched over after these bodies have arrived in the retaining member (13,14) in question for switching over.

10. A coupling member for a barrel, intended for the device according to any one of Claims 1-9, comprising a coupling member to be placed on the bung hole of a barrel, a dip tube coaxially slidably therein, and connections for beverage-, carbon dioxide-, and rinsing liquid lines,

**characterized** by a slide (34) directed transversely to the longitudinal axis of the dip tube (29) with two

positions, said tube in one position allowing the dip tube to be shifted, and forming in the other position, in which the dip tube (29) is withdrawn, while closing off the passage to the barrel (3a-3d), a connection between the rinsing liquid line (6) and the beverage line (5a-5d) along the head portion of the dip tube (29). 5

11. The coupling member according to claim 10, **characterized** in that the slide (34) is a flat trough slide with a small height. 10

12. The coupling member according to claim 11, **characterized** in that the slide (34) comprises discs (34,41,42) clamped together and made of stainless steel and/or ceramic material.

13. A tap intended for use with the device according to any one of the preceding claims, comprising at least a tap aperture, a connection for a beverage line and if desired an air vent, characterized in that it is constructed as a three-position slide valve, forming, in the first position, a connection with the beverage line (5a-5d) and the tap aperture, the connections being closed off and the tap aperture (48) being connected to an air vent (46) in the second position, and the beverage line (5a-5d) being connected to the cleansing agent return line (25) in the third position. 15 20 25

14. The beverage tap according to claim 13, **characterized** in that the slide is constructed as a flat rotary slide.

15. A device according to any one of claims 2-14, **characterized** in that the remotely actuatable valve- and/or switch devices, sensors etc. are connected to a sequential controller (22). 30

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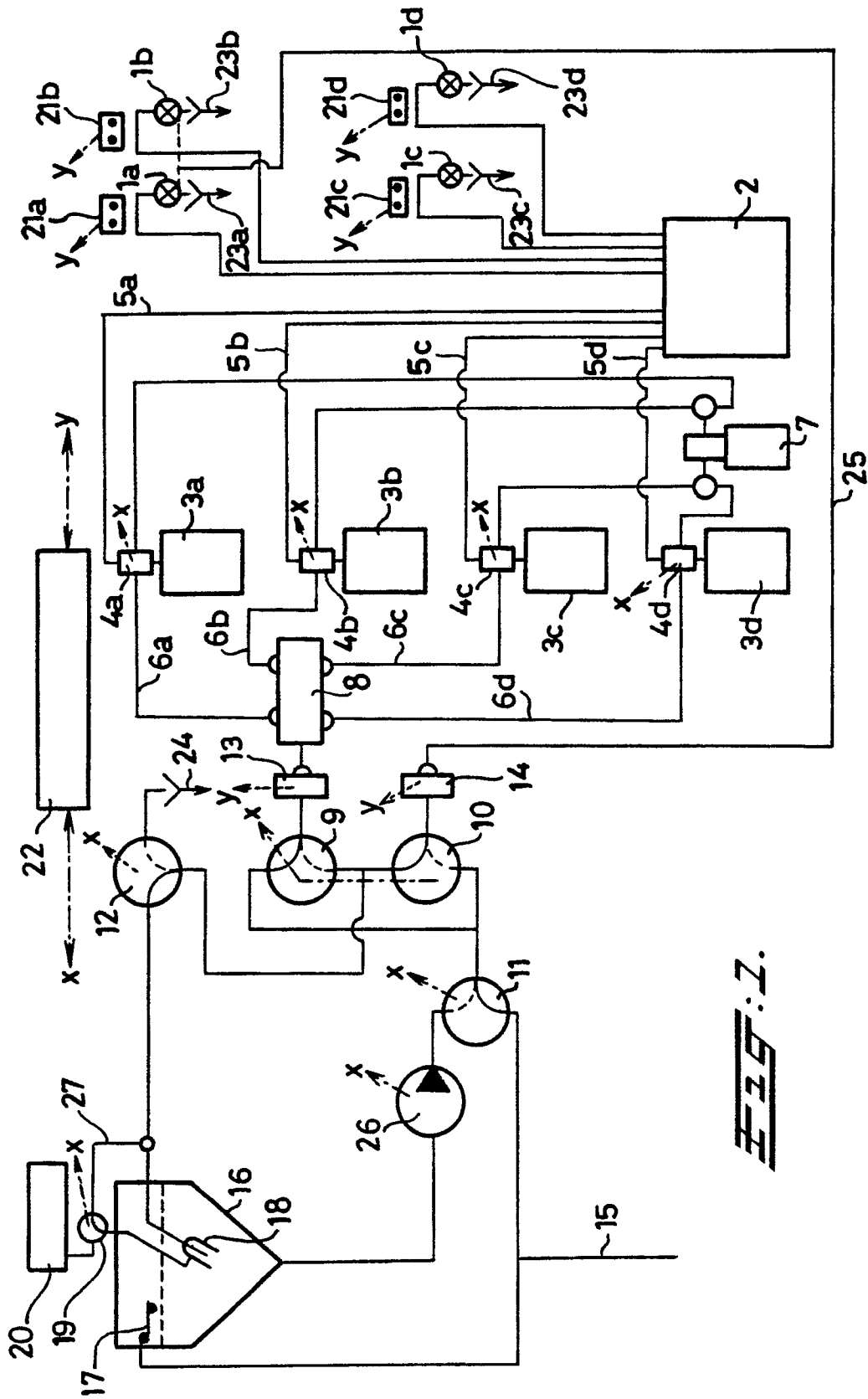
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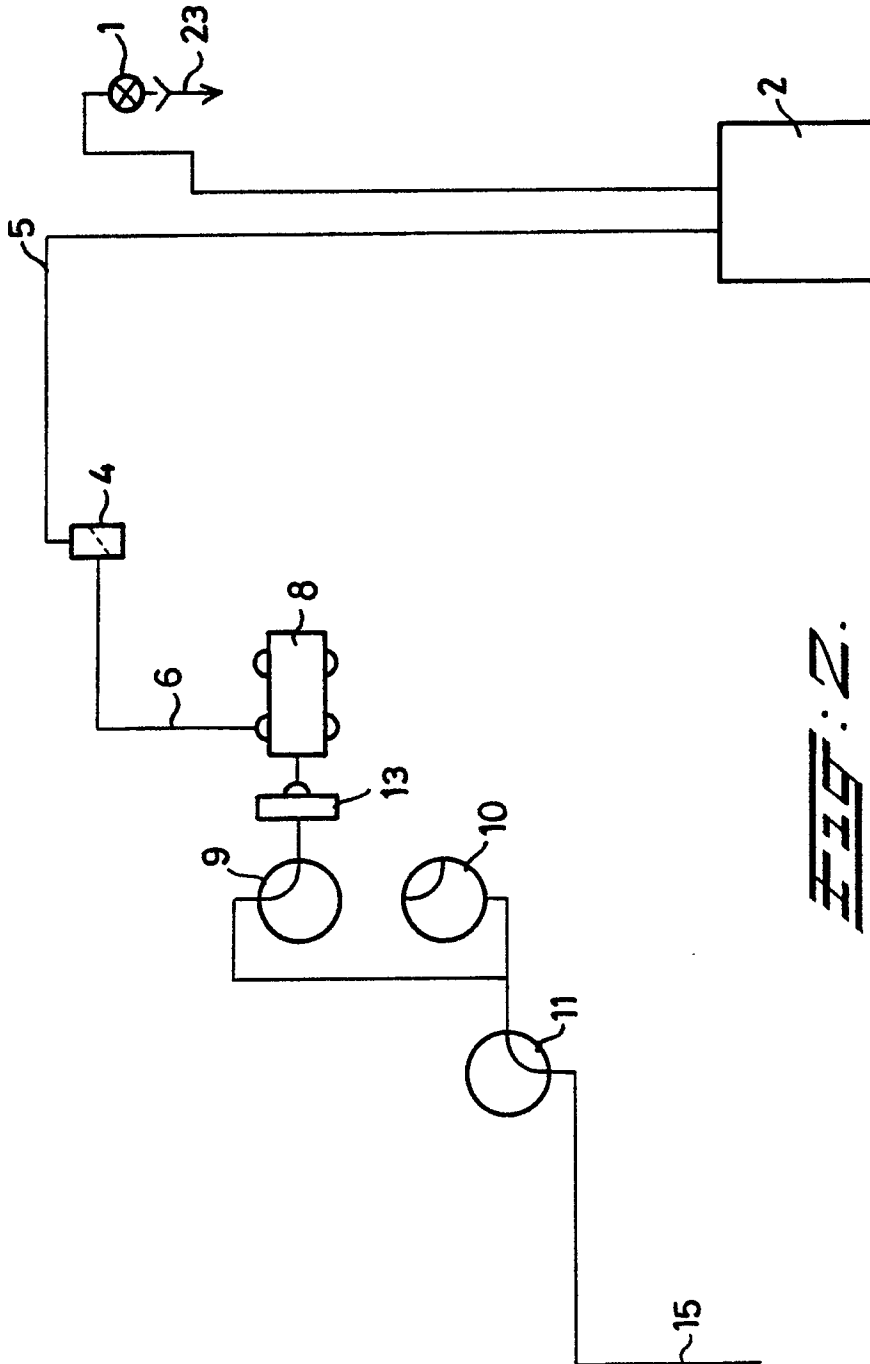
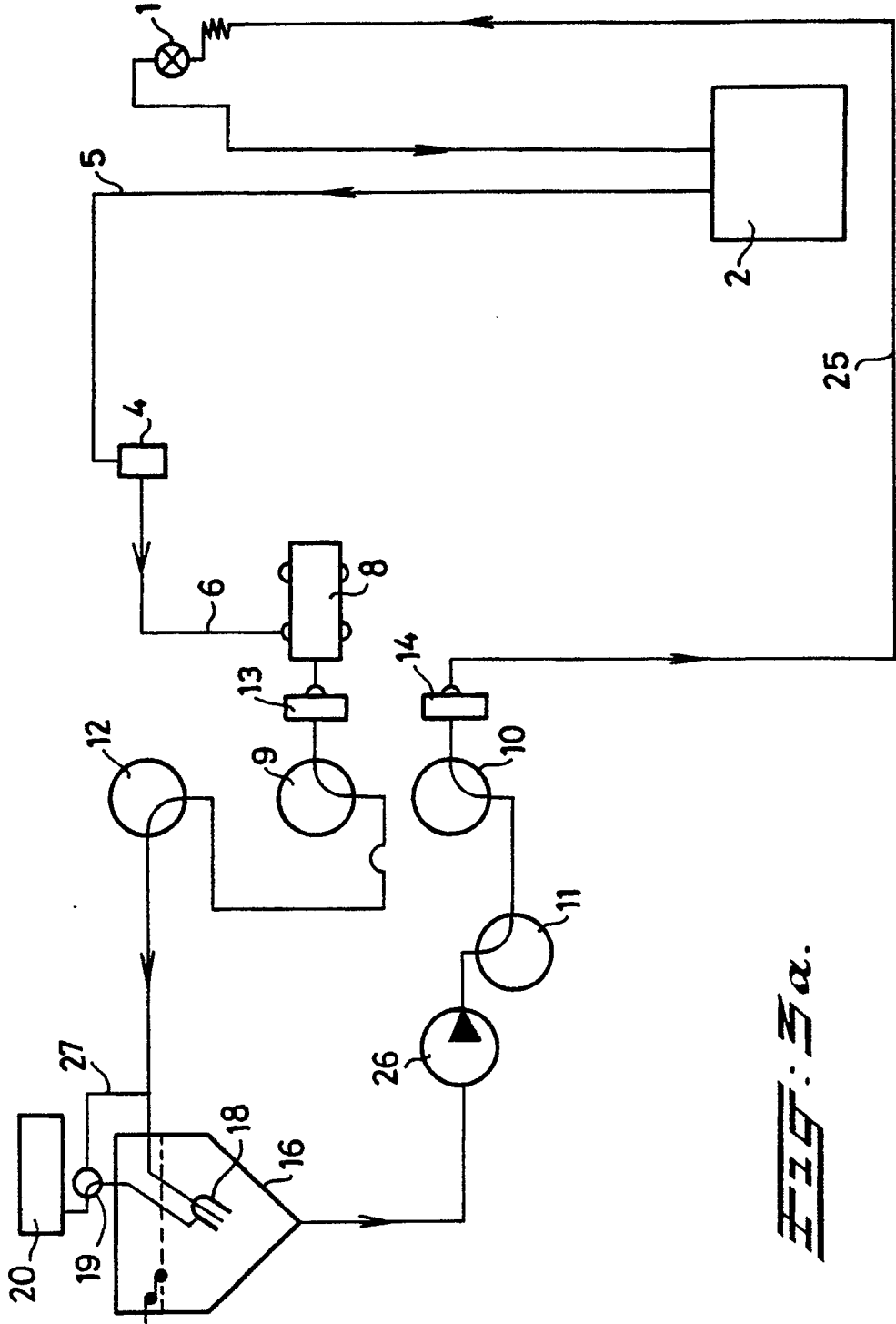


Fig. 2.



**FIG. 5a.**

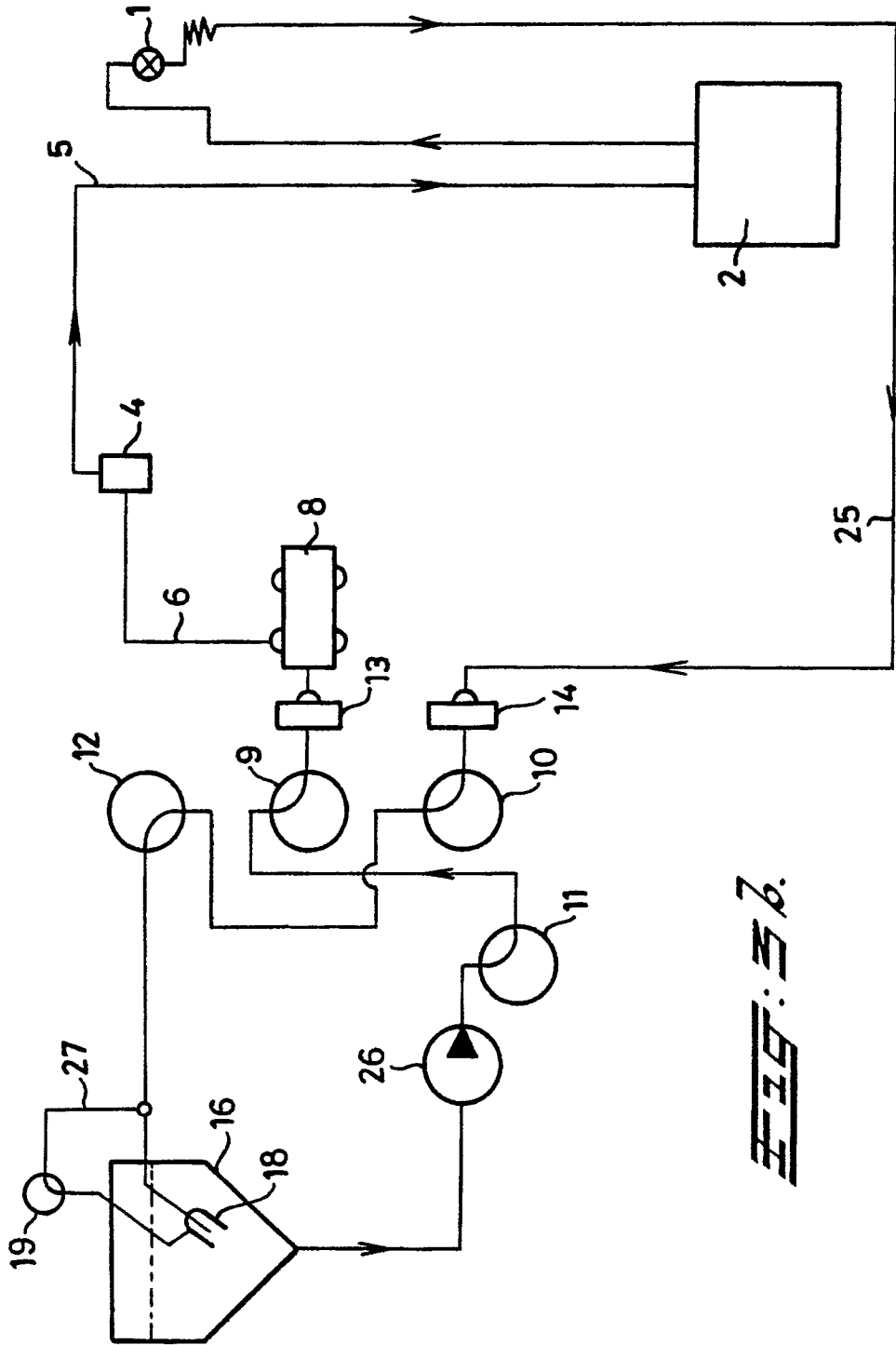
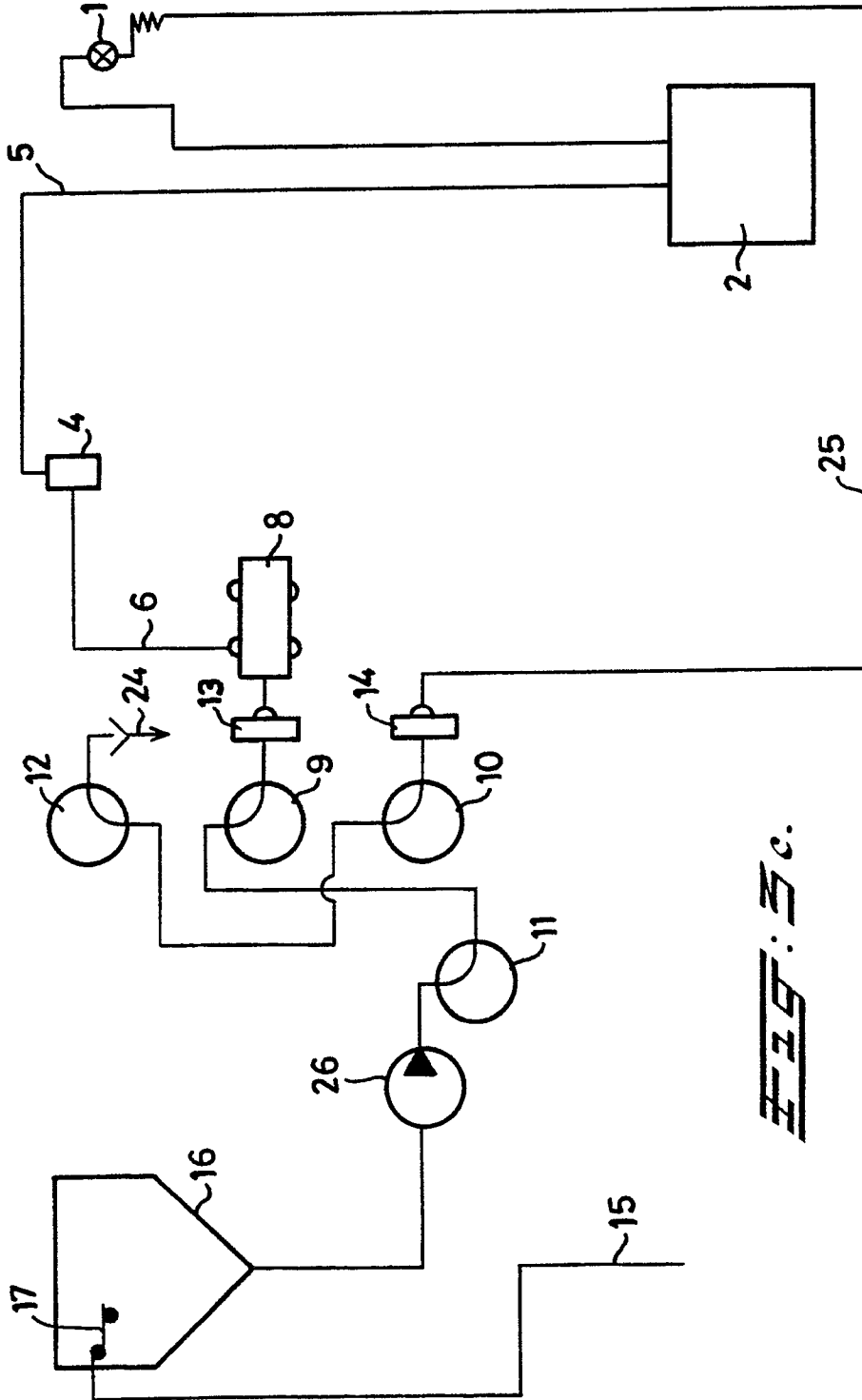
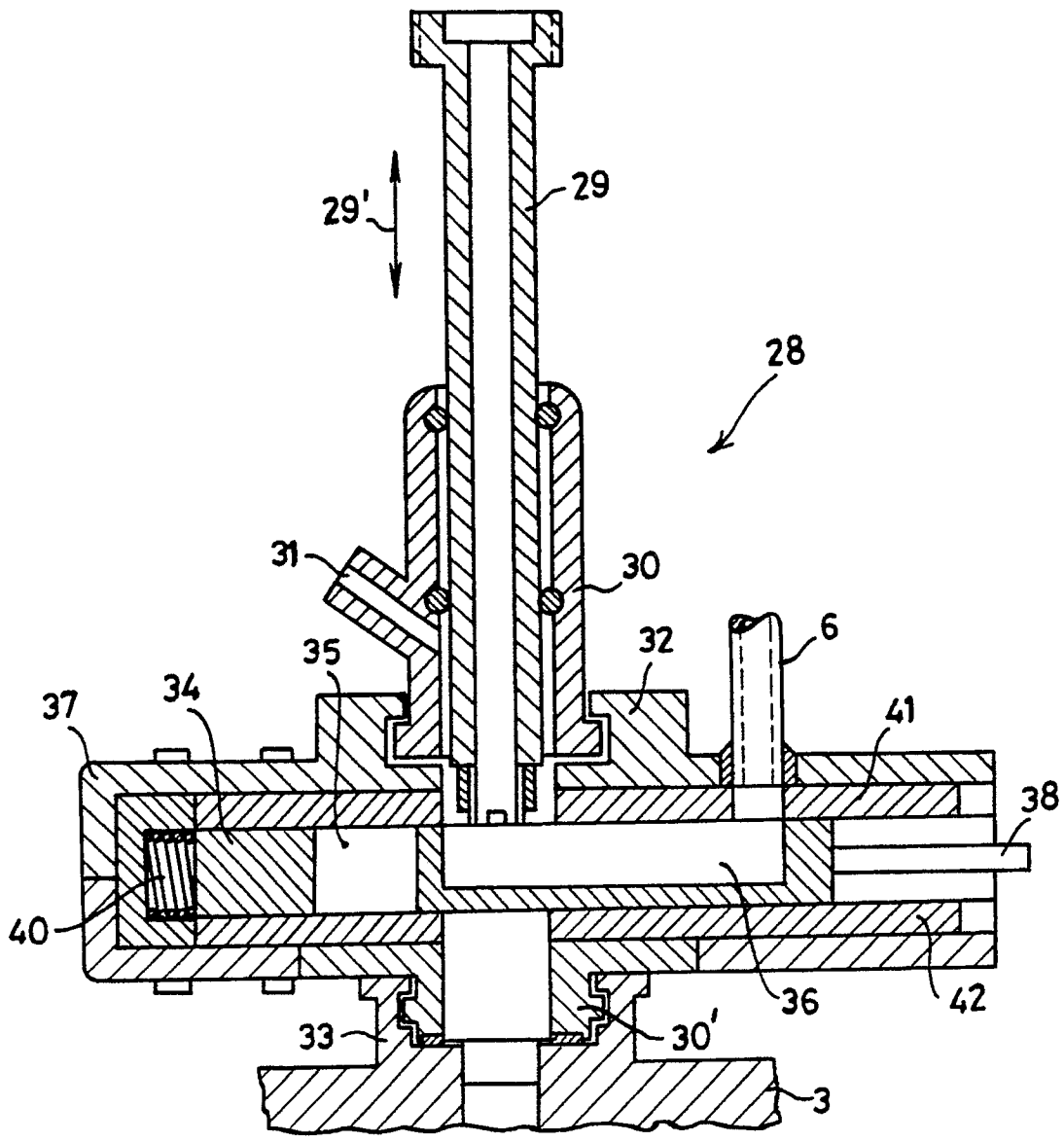


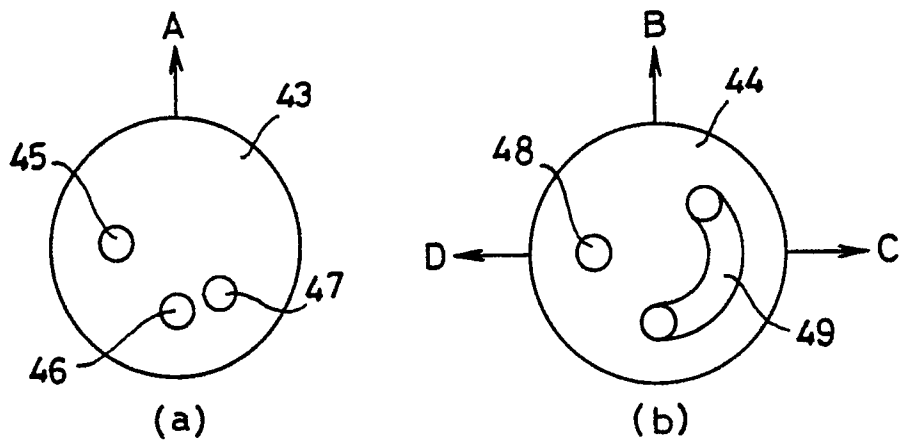
FIG. 3 b.



529: 3 c.



**FIG. 4.**



**FIG. 5.**