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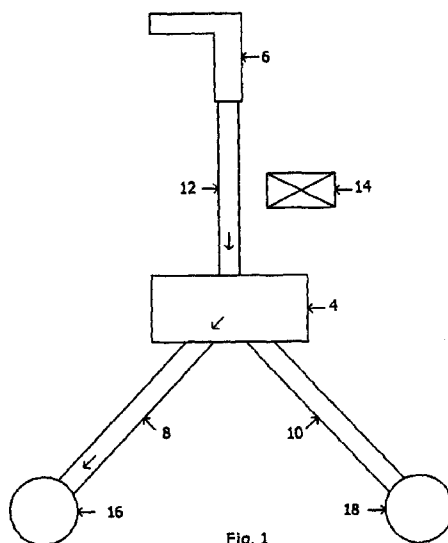


Fig. 1

(57) Abstract: Apparatus (2) for saving water, which apparatus (2) comprises: (i) separator means (4) for separating water that is flowing from a water inlet (6) and that has not been interrupted in flow, from water that is flowing from the water inlet (6) and that has been interrupted in flow; (ii) first outlet means (8) for receiving water that has not been interrupted in flow; and (iii) second outlet means (10) for receiving the water that has been interrupted in flow, and the apparatus (2) being such that in use it permits the water received by the first outlet means (8) to be saved from flowing to waste.



APPARATUS FOR SAVING WATER

This invention relates to apparatus for saving water.

There are many occasions in which water flowing from a water inlet is used with a waste water outlet open. For example, persons washing their hands in a sink will invariably wash their hands using running water and with the waste water outlet open. Similarly, in kitchens, persons will often rinse articles such for example as cups, spoons and knives under running water with the waste water outlet open. During the washing, there are usually periods in which the water flowing from the water inlet such as a tap to the water waste outlet, such as in a sink, is not being used. For example, during the washing of hands, a person may run the water prior to actually getting their hands wet, for example in order that the water reaches a required temperature or simply because the person is otherwise occupied at the relevant time. There may also be an appreciable time period during which water is flowing, and which is after the person has finished what they were doing but before the person actually turns the water off. The water that has not been used for its intended purpose, for example for washing the hands or washing articles, flows to the waste water outlet in the same manner as the ~~water that has actually been used for its intended purpose.~~ The water that has not been used for its intended purpose is usually of drinking quality and the passage of this water to the waste water outlet represents a loss of water, for

example drinking-quality water, that could be used for other purposes. For example, on average, 0.1 litres of water per second may leave a water inlet in the form of a tap. Therefore 0.1 litres of water per second are wasted for every second that the water that has not been used for its intended purpose flows to the waste water outlet.

It is an aim of the present invention to reduce the above mentioned problem and thereby save water.

Accordingly, in one non-limiting embodiment of the present invention there is provided apparatus for saving water, which apparatus comprises:

- (i) separator means for separating water that is flowing from a water inlet and that has not been interrupted in flow, from water that is flowing from the water inlet and that has been interrupted in flow;
- (ii) first outlet means for receiving water that has not been interrupted in flow; and
- (iii) second outlet means for receiving the water that has been interrupted in flow,

and the apparatus being such that in use it permits the water received by the first outlet means to be saved from flowing to waste.

~~The water received by the first outlet means and thus saved from~~ flowing to waste may then be available for any of the possible uses of virgin water that is provided from the water inlet.

The apparatus may be one in which the separator means is a water flow-responsive and/or water pressure-responsive separator means.

The separator means may be a spring separator means comprising a spring mechanism.

Alternatively, the separator means may be a balance weight separator means comprising a balance weight mechanism.

Alternatively, the separator means may be a flexible ball separator means comprising a flexible ball mechanism. The flexible ball may be an elastic ball. Other type of flexible ball may be employed.

Alternatively, the separator means may be a segment separator means comprising a segment mechanism.

Alternatively, the separator means may be an elastic strip separator means comprising an elastic strip mechanism.

Alternatively, the separator means may be an elastic band separator means comprising an elastic band mechanism.

In the apparatus of the present invention, any suitable and appropriate type of separator means may be employed.

Optimal functioning of the apparatus of the present invention may be achieved by having the nozzle of the water inlet located directly above the water outlet for unused water. In order to provide the apparatus in an existing sink, it is preferred to install a water inlet, which may be a tap with a nozzle directly above the water outlet for unused water. This may be achieved using a water tap with a nozzle portion which is fixed or adjustable in length. Various different designs may be employed in order to enable the water tap to

have the adjustable nozzle. Any suitable and appropriate design may be employed providing that the nozzle is able to be fitted or to be adjusted to a vertical position above the water outlet.

The water outlet may be in a sink. The sink may be of various shapes. The sink may be one which provides two or three different outlets in one, two or three different locations. The outlet for the collection of water that has not been used by a person or object is preferably always located in a vertical position directly underneath the inlet of the water source, which may be a water tap.

The apparatus of the present invention may be fitted to the sink. Alternatively, if the sink has an outlet which is for water that has not been used by a person or object and which is positioned higher than an overflow outlet and the outlet in the sink for the water that has been used, then the sink may be used without separate apparatus of the present invention. In this case there may only be an opening in the sink for the water that has not been used, with the opening being directly underneath the water inlet of the tap, next to an outlet for the water than has been used located below, and next to an overflow outlet also located in the sink below the outlet for the water that has not been used.

The water tap and the sink may be made of the same or different materials.

~~The apparatus of the present invention may be one in which the first~~
outlet means is a conduit leading to a first system for receiving the water that has not been interrupted in flow, and in which the second outlet means is a

conduit leading to a second system for receiving the water that has been interrupted in flow. The water in the first system can be used for any of the purposes for which virgin water from the water inlet could be used. Similarly, the water in the second system may be used for any of the purposes for which waste water that has been used or otherwise interrupted in flow could be used.

The apparatus of the present invention may include the first system and the second system.

In one non-limiting embodiment of the present invention the apparatus of the present invention may be for installation in a waste water outlet of a structure and for separating water that is flowing from a water inlet of the structure to the waste water outlet of the structure and that has not been used by a person, from water that is flowing from the water inlet to the waste water outlet and that has been used by the person, and the apparatus being such that it comprises:

- (i) the first outlet means for which is for the water that has not been used;
- (ii) first valve means for opening and closing the first outlet means;
- (iii) the second outlet means and which for the water that has been used;
- (iv) second valve means for opening and closing the second outlet means; and

- (v) the separator means, the separator means being such that it includes diverter means for operating when the first valve means closes the first outlet means to divert the water from the first outlet means to the second outlet means:

and the apparatus being such that:

- (a) the first outlet means is for communication with a first system which utilises the water that has not been used, and the second outlet means is for communication with a second system which is separate from the first system and which utilises the water that has been used;
- (b) in use the water inlet directs the water that has not been used directly towards the first outlet means such that the water that has not been used is able to reach the first outlet means without touching the diverter means or the structure; and
- (c) in use the water that has not been used and the water that has been used are from the same water inlet whereby wastage of water that has not been used is avoided.

The apparatus of the present invention as just above described may be advantageous in enabling water that has not been used and that is of drinking

quality to be saved and used again for the same intended purpose that it was previously used for, or for a lesser purpose, but which lesser purpose is still of a higher water quality value than that afforded by the water that has been used.

The apparatus of the present invention may include third valve means for operating consequent upon a backflow of water that has passed through the first outlet means to cause the first valve means to close. The third valve means may operate in the case of a drain being blocked, or a connecting system or appliance becoming full.

The apparatus may be one in which the first outlet means is a first aperture which is positioned at a top portion of the apparatus. Preferably, the outlet means is centrally positioned with respect to a periphery of the apparatus. Other types of first outlet means, and other positions for the first outlet means, may be employed.

The first valve means may comprise a first float and a second float. Other types of first valve means may be employed.

The first float may comprise first and second parts which pivot with respect to each other to cause the first float to open and shut the first outlet means.

The second float may be disc-shaped with a central downwardly-depending collar.

~~The apparatus may be one which includes a control rod, and in which~~
upward movement of the second float causes the control rod to move to a position in which it maintains the first float closed.

The apparatus may be one in which the second outlet means is formed between the diverter means and a part of the structure around and adjacent the waste water outlet.

The second valve means may be a ring seal in the diverter means. Other types of second valve means may be employed.

The first outlet may be in the diverter means. The first outlet means may be positioned elsewhere if desired.

The diverter means may be a lid. Other types of diverter means may be employed.

The apparatus may be one in which the lid has a downwardly depending skirt portion, in which the first outlet means is in a central body part of the lid, and in which the second valve means is on the skirt portion.

The apparatus may be one in which the first valve means is biased by a spring arrangement to the closed position, and in which the spring arrangement is constructed and arranged to enable the first valve means to open against a biasing force from the spring arrangement when the first valve means receives pressure from the water that has not been used. The pressure of the water that has not been used will be greater than the pressure of the water that has been used. This is because the water that has been used will have struck objects such for example as the person's hands or devices being cleaned, and this will reduce the pressure of the water. The spring may be a circular spring. Other constructions for the spring may be employed so that, for example, the spring may be a coil spring or a leaf spring.

The apparatus may be one in which includes a central tube portion, in which the diverter means is positioned at a top part of the central tube portion, and in which the central tube portion is slidable up and down in an outer tube portion such that the diverter means is movable into and out of contact with the structure around the waste water outlet.

The apparatus may be one which includes pump means for pumping the water that has not been used to one or more predetermined places, and in which the pump means comprises a first turbine which is driven by the water from the mains and a second turbine which is operatively connected to the first turbine such as to drive the first turbine such that the first turbine operates to increase the flow of the water that has not been used and thereby to pump the water that has not been used to the one or more predetermined places.

The second turbine is preferably operatively connected to the first turbine by a gear arrangement. Other mechanical connections may be employed for operatively connecting the second turbine to the first turbine. The mechanical connection may be for example a belt and pulley arrangement.

The apparatus may include a first outlet pipe for the water that has not been used, and a second outlet pipe for the water that has been used.

Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 shows first apparatus of the invention and operating such that water which is flowing from a water inlet to a water outlet has not been interrupted in flow;

Figure 1A shows the apparatus of Figure 1 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 2 shows second apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

Figure 2A shows the apparatus of Figure 2 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 3 shows third apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

Figure 3A shows the apparatus of Figure 3 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 4 shows fourth apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

~~Figure 4A shows the apparatus of Figure 4 but operating such that~~
water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 5 shows fifth apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

Figure 5A shows the apparatus of Figure 5 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 6 shows sixth apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

Figure 6A shows the apparatus of Figure 6 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 7 shows seventh apparatus of the invention and operating such that water which is flowing from a water inlet to a waste water outlet has not been interrupted in flow;

Figure 7A shows the apparatus of Figure 7 but operating such that water which is flowing from the water inlet to the waste water outlet has been interrupted in flow;

Figure 8 shows eighth apparatus of the invention and operating with separator means in the form of a balance weight separator means comprising a balance weight section, and also operating with a first outlet means closed and a second outlet means open.—

Figure 9 shows the apparatus of Figure 8 but with the first outlet means open and the second outlet means open;

Figure 10 shows the apparatus of Figure 8 but with the first outlet means closed and the second outlet means closed;

Figures 11 – 15 are sections through apparatus of the invention, with the apparatus being in different operative modes as explained in the Figures;

Figure 16 shows the apparatus of Figures 11 – 15 installed in an integral two outlet tube configuration;

Figure 17 shows the apparatus of Figures 11 – 15 installed in a domestic water system;

Figure 18 shows how apparatus of the present invention can optionally be connected to pump means for pumping the water that has not been used to one or more predetermined places;

Figure 19 shows the apparatus of the present invention in use in a washing machine; and

Figure 20 shows the apparatus of the present invention in use in a water system for a premises.

Referring to Figure 1, there is shown apparatus 2 for saving water. The apparatus 2 comprises separator means 4 for separating water that is flowing from a water inlet 6 that has not been interrupted in flow, from water that is flowing from the water inlet 6 and that has been interrupted in flow. The apparatus 2 further comprises the first outlet means 8 for receiving the water that has not been interrupted in flow. The apparatus 2 further comprises the ~~second outlet means 10 for receiving the water that has been interrupted in~~ flow.

The apparatus 2 is such that in use it permits the water received by the first outlet means 8 to be saved from flowing to waste. The water received by the first outlet means 8 may then be available for any of the possible uses of virgin water that is provided from the water inlet 6. The water inlet 6 may be a tap or any other suitable and appropriate water inlet. The apparatus 2 may find use in substantially all premises including domestic premises, office premises and industrial premises. The water that is flowing from the water inlet 6 is shown in Figure 1 as water 12. Figure 1 also shows the presence of interrupter means 14 which is not interrupting the flow of water 12. The interrupter means 14 may be any type of means that normally interrupts the flow of water from a water inlet such as a tap. Thus the interrupter means 14 may be a person's hands being washed or it may be objects being washed such for example as cups, saucers plates and cutlery. In bathrooms, if the water inlet 6 is a showerhead, then the interrupter means 14 could be in the form of an entire person's body. In industrial environments, the interrupter means may be a variety of industrial objects.

As shown in Figure 1, the first outlet means 8 leads to a first system 16 for receiving the water that has not been interrupted in flow. The second outlet means 10 leads to a second system 18 for receiving water that has been interrupted in flow. The water in the first system 16 may be used for any of the purposes for which virgin water from the water inlet 6 is used. The ~~water in the second system 18 may be used for any of the purposes for which~~ waste water is used.

Figure 2 shows the apparatus 2 such that the flow of water 12 has been interrupted by the interrupter means 14. This has caused the separator means 4 to operate such that the water from the water inlet 6 now no longer passes to the first outlet means 8 but instead passes to the second outlet means 10.

In Figures 2 – 7A, similar parts as in Figures 1 and 1A have been given the same reference numerals for ease of comparison and understanding.

Figure 2 shows part of apparatus 20 which utilises spring separator means 22 comprising a spring mechanism 24. The spring mechanism 24 comprises a spring 26 contained on a post 28. Figure 2 shows the apparatus 20 operating such that the water 12 which is flowing from the water inlet 6 has not been interrupted in flow and is therefore passing to the first outlet means 8. Figure 2A shows the apparatus 20 of Figure 2 but with the water 12 flowing from the water inlet 6 having been interrupted in flow, for example by the interrupter means 14 shown in Figure 1. The interruption of the water 12 flowing from the water inlet 6 has caused the spring separator means 22 to operate as shown. This has caused the water 12 that is flowing from the water inlet 6 and that has been interrupted in flow to pass to the second outlet means 10.

Figure 3 shows part of apparatus 30 which utilises a balance weight separator means 32 comprising a balance weight mechanism 34. The ~~balance weight mechanism 34 comprises the weight 36, a pivot 38 and an~~ arm 40. Figure 3 shows the apparatus 30 operating such that water which is flowing from the water inlet 6 has not been interrupted in flow. This water

therefore passes to the first outlet means 8. Figure 3A shows the apparatus 30 operating such that the water 12 which is flowing from the water inlet 6 has been interrupted in flow. This has caused the balance weight separator 32 to operate. This has in turn caused the water that has been interrupted in flow to be directed to the second outlet means 10.

Figure 4 shows part of apparatus 42 having a flexible ball separator means 44 comprising a flexible ball mechanism 46. The flexible ball mechanism 46 comprises a flexible ball 48 and a support 50. The flexible ball 48 is preferably an elastic ball but it may be another type of flexible ball.

Figure 4 shows the apparatus 42 operating such that the water 12 which is flowing from the water inlet has not been interrupted in flow. The flexible ball separator means 44 has thus not operated and the water flows to the first outlet means 8.

Figure 4A shows the apparatus 42 of Figure 4 but operating such that the water 12 from the water inlet 6 has been interrupted in flow. This has caused the flexible ball separator mechanism 44 to operate. This in turn has caused the water to stop flowing to the first outlet means 8 and instead to flow to the second outlet means 10.

Figure 5 shows part of apparatus 52 having segment separator means 54 comprising a segment mechanism 56. Figure 5 shows the apparatus 52 operating such that water 12 which is flowing from a water inlet such as the water inlet 6 and that has not been interrupted in flow. The segment separator means 54 has thus not operated and the water passes to the first outlet

means 8. The segment mechanism 56 comprises a plurality of pivoting segments 58.

Figure 5A shows the apparatus 52 operating such that the water 12 which is flowing from the water inlet has been interrupted in flow. This has caused the segment separator means 54 to operate. The operation of the segment separator means 54 has stopped the flow of water to the first outlet means 8 and instead the flow of water is to the second outlet means 10.

Figure 6 shows part of apparatus 60 having an elastic strip separator means 62 comprising an elastic strip mechanism 64. The elastic strip mechanism 64 comprises an elastic strip 66 and an anchor plate 68. Figure 6 shows the apparatus 60 operating such that water 12 which is flowing from a water inlet such for example as the water inlet 6 has not been interrupted in flow. The elastic strip separator means 62 has therefore not operated and is allowing the water to pass to the first outlet means 8.

Figure 6A shows the apparatus 60 operating such that water which is flowing from the water inlet 6 has been interrupted. The elastic strip separator means 62 has operated to cause the water 12 to cease flowing to the first outlet means 8 and instead to flow to the second outlet means 10.

Figure 7 shows apparatus 70 having elastic band separator means 72 comprising an elastic band mechanism 72. The elastic band mechanism 72 comprises an elastic band 74 and a ball valve 76. Figure 7 shows the ~~apparatus 70 operating such that water which is flowing from a water inlet,~~ for example the water inlet 6, has not been interrupted in flow. Thus the water 12 passes to the first outlet means 8.

Figure 7A shows the apparatus 70 operating such that water 12 which is flowing from the water inlet has been interrupted in flow. This has caused the elastic band separator means 72 to operate and stop the water flow to the first outlet means 8, and instead direct the water flow to the second outlet means 10.

Figures 8, 9 and 10 show apparatus 78 having a balance weight separator means 80 comprising a balance weight mechanism 82. The balance weight mechanism 82 comprises a first float 84 which pivots on an arm 86 about a pivot 88. The balance weight mechanism 82 also comprises a second float 90 mounted on an arm 92 which pivots about a pivot 100. The first float 84 is operated by a balance weight 102 mounted on an arm 104 which pivots about the pivot 88. The second float 90 balances an arm 106 which pivots about the pivot 100 and controls the mechanism around the pivot 88.

The apparatus 78 includes a cover 108 having a first aperture 110 forming part of first outlet means 112. The cover 108 may have a second aperture 114 forming part of second outlet means 116. The first aperture 110 is able to be closed by the first float 84. The second aperture 114 is able to be closed by the closure formation 118 on the second float 90. Figure 8 shows the first aperture 110 closed. Figure 9 shows the first aperture 110 and the second aperture 114 open. Figure 10 shows the first aperture 110 and the second aperture 114 closed. The apparatus 78 is able to fit in a waste water outlet 120 in a sink 124. The apparatus 78 may include a pin 126 which has a spring 128 as shown. The pin 130 is able to slide through a bore in a pipe 132

forming part of the balance weight separator means 80. The top end 134 of the pin 130 is able to abut against the arm 86 and thus maintain the first float 84 in position in the first aperture 110 as shown in Figure 10.

Figures 8 and 9 show the cover 108 raised above the level of the sink 124 so that the waste water outlet 120 is open. Figure 10 shows the cover 108 closing the waste water outlet 120. In Figure 8, with the first float 84 closing the first aperture 110, the water that has been interrupted in flow is able to pass through the second aperture 114 and to the second outlet means 116. If desired, the spring 128 and the aperture 114 may be omitted.

Referring to Figures 11 – 15, there is shown apparatus 220 for installation in a waste water outlet 204 of a structure 206. The structure 206 is in the form of a sink. If desired however the structure 206 may alternatively be a bath, a shower or another structure.

The apparatus 202 is for separating water that is flowing from a water inlet 208 of the structure 206 to the waste water outlet 204 and that has not been used by a person, from water that is flowing from the water inlet 208 to the waste water outlet 204 and that has been used by the person. The water inlet 208 is shown as a tap but it may be another type of water inlet such for example as a shower head if the structure is a shower.

The apparatus 202 comprises a first outlet means 210 for the water that has not been used. A first valve means 212 is provided for opening and closing the first outlet means 210.

The apparatus 202 further comprises a second outlet means 214 for the water that has been used. Second valve means 216 is provided for opening and closing the second outlet means 214.

The apparatus 202 further comprises separator means which includes diverter means 218 for operating when the first valve means 212 closes the first outlet means 210 to divert the water from the first outlet means 210 to the second outlet means 214.

The apparatus 202 is such that the first outlet means 210 is for communication with a first system 220 which utilises the water that has not been used. The second outlet 214 is for communication with a second system 222 which is separate from the first system 220 and which utilises the water that has been used. The second system 222 may be a drainage system. The first system 220 may be a re-circulating system for re-circulating the water that has not been used so that it can be reused again for its original purpose, for example for use at the structure 206, or for other purposes. The other purposes may be for drinking water, or for purposes which are less than for drinking but which are nevertheless of higher value than simply passing the water that has been used along the same path as the water that has been used.

The apparatus 202 is also such that in use the water inlet 208 directs the water that has not been used directly towards the first outlet means 210. ~~This is so that the water that has not been used is able to reach the first outlet~~ means 210 without touching the diverter means 218 or the structure 206. As shown in Figure 11, the water inlet 208 is positioned directly above the first

outlet means 210. In an alternative embodiment of the invention (not shown), the water inlet 208 could be positioned elsewhere providing it directed the water in a curve such that the water was able to enter the first outlet means 210 without touching the diverter means 218 or the structure 206.

The apparatus 202 is further such that the water that has not been used and the water that has been used are from the same water inlet 208. Thus it will be apparent that the apparatus 202 is able to be used such that wastage of water that has not been used is avoided.

The apparatus 202 includes third valve means 224 for operating consequent upon a backflow of water that has passed through the first inlet 210 to cause the first valve means 212 to close. The third valve means 224 may operate in the event of a drain becoming blocked, or a connecting system or appliance becoming full.

As can be seen from Figures 11 – 15, the first outlet means 210 is a first aperture which is positioned at a top portion 226 of the apparatus 202. The first outlet means 210 is centrally positioned with respect to a periphery 228 of the apparatus 202.

The first valve means 212 comprises a first float 230 and a second float 232. The first float 230 comprises a first part 234 and a second part 236. The first and second parts 234, 236 pivot with respect to each other to cause the first float 230 to open and shut the first outlet means 210. The second float 232 is disc-shaped with a central downwardly-depending collar 238.

The apparatus 202 includes two control rods 240. Upward movement of the second float 232 causes the control rods 240 to move to a position in which they maintain the first float 230 closed.

The second outlet means 214 is formed between the diverter means 218 and a part 242 of the structure 206 around and adjacent the waste water outlet 204.

The second valve means 216 is a ring seal which is in the diverter means 218. The first outlet 210 is also in the diverter means 218.

The diverter means 218 is a lid. The diverter means 218 has a downwardly-depending skirt portion 244. The first outlet means 210 is in a central body part of the diverter means 218. The second valve means 216 is on the skirt portion 244.

The first valve means 212 is biased by a spring arrangement 246 to the closed position. The spring arrangement 246 is constructed and arranged to enable the first valve means 212 to open against a biasing force of the spring arrangement 246 when the first valve means 212 receives pressure from the water that has not been used. The pressure from the water that has not been used will be at a higher pressure than the water that has been used. This is because the water that has not been used will be flowing directly from the water inlet 208 to the first outlet 210 and its path will not have been interrupted by objects such for example as the hands of a person washing ~~their hands, or devices such for example as cups and knives being washed,~~ or other more complex devices being washed. The spring arrangement 246

comprises a circular spring but it may be another type of spring arrangement 246 if desired.

The apparatus 202 includes a central tube portion 248. The diverter means 218 is positioned at a top part 250 of the central tube portion 248. If desired the diverter means 218 may be integrally formed with the central tube portion 248. The central tube portion 248 is slidable up and down in an outer tube portion 252. The sliding is such that the diverter means 218 is movable into and out of contact with the structure 206 around the waste water outlet 204. Sliding of the central tube portion 248 in the outer portion 252 may be controlled and felt by balls 254 acting in detents 256.

The manner of operation of the apparatus 202 is shown in detail in Figures 11 – 15. Figures 11 – 15 show various stages of operation of the apparatus 202, for example to accommodate different operating circumstances.

Figure 16 shows the apparatus 202 in an integral two-pipe system 258. The system 258 comprises a first outlet pipe 260 for the water that has not been used, and a second outlet pipe 262 for water that has been used. The second outlet pipe 262 connects to a waste water outlet pipe 264 as shown.

Figure 17 shows how the apparatus 202 operates in a system including a structure 206 in the form of a sink, and also in a toilet 266.

Figure 18 shows how the apparatus 202 is able to operate with an outlet pipe 268 which leads to pump means 270. The pump means 270 comprises a housing 272 which receives the outlet pipe 268 for the water that has not been used, and also a pipe 274. The pipe 274 may be used for a

domestic water supply. The pump means 270 is for pumping the water that has not used to one or more desired places. The pump means 270 comprises a first turbine 276 which has turbine blades 278 and which enable the first turbine 276 to be driven by the water that has been used. The pump means 270 also comprises a second turbine 280 which operatively connected to the first turbine 276 to drive the first turbine 276 such that the first turbine 276 operates to increase the flow of the water that has not been used and thereby to pump the water that has not been used to the one or more predetermined places. The second turbine 280 is operatively connected to the first turbine 276 by a gear arrangement 282 comprising a first gear 284 and a second gear 286.

The apparatus 202 as shown in Figure 18 may employ a dual tube arrangement 258 like that shown in Figure 16 so that, for example, the illustrated down pipe 262 for the water that has been used can then be that shown in Figure 16.

Referring now to Figure 19, there is shown a washing machine 288 in a water distribution circuit 290. As shown in Figure 19, there is a domestic or industrial water pipe 292 for receiving highest quality water such for example as mains water, and which water is called herein bluewater. A tank 294 is able to receive the bluewater from the water pipe 292. Also provided in the apparatus shown in Figure 19 is a drinking water inlet 296.

~~The washing machine 288 includes an overflow valve 298 associated~~
with a bluewater internal outlet 300. A pipe 302 connects the water pipe 292 to the overflow valve 298. A pipe 304 connects the internal outlet 300 to a

tank 306 which is provided in the washing machine 288. The overflow valve 298 is also associated with a bluewater external outlet 308 which connects to the pipe 302 by a pipe 310. The washing machine 288 has a water outlet 312 for water that has been used and that is therefore not as clean as the bluewater. The water that has been used is referred to herein as greywater. Thus the water outlet 312 is a greywater outlet 312. The water outlet 312 is associated with an outlet pipe 314. A washing chamber 316 is provided in the washing machine 288 as shown. The washing chamber 316 is connected by water pipes 318, 320 to apparatus 322 of the present invention. The apparatus 322 is able to divert the bluewater and the greywater via the various illustrated pipe connections. A water pipe 324 connects the water inlet 296 to the tank 294 via a distribution valve 326 as shown. The distribution valve 326 is connected via an inlet 328 to a water pipe 330. The water pipe 330 is inside the washing machine 288 and it connects to the tank 306 via a pipe 332, and to the washing chamber 316 via a pipe 334.

In operation of the washing machine 288, the apparatus 322 is able to recognise the last washing cycle of the washing machine 288 and direct the relatively clean rinsing water to the bluewater outlet 300. This may be effected by any suitable and appropriate valve, and which may be mechanical, electronic and/or programmed. Although Figure 19 shows a washing machine 288, the washing machine could alternatively be a dishwasher or other device.

Referring now to Figure 20, there is shown a water distribution system 336 having a tank 338 for bluewater, a tank 340 for greywater, and a tank

342. The tank 342 is for sewage water and this water is referred to herein carewater.

The system 336 has connection points 344 for bluewater. The connection points 344 connect to bluewater devices 346 as shown.

The system 336 also has greywater connection points 348 as shown. The system 336 further has carewater connection points 350 as shown. A mains supply 352 is connected via connection points 354 to a sink 356, a shower 358, a bath 360, the three bluewater devices 346, and three water closets 362.

The system 336 is able to include as many units of the apparatus of the present invention as necessary in order to distribute the water as shown. The bluewater tank 338, the greywater tank 340 and the carewater tank 342 may be any suitable and appropriate type of tank or other container or cistern.

It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be effected. Thus, for example, the apparatus of the present invention may use different types of separator means to those shown. The apparatus of the invention may be used in any suitable and appropriate environments for saving water that would otherwise go to waste. The apparatus of the present invention may be made of any suitable and appropriate materials including plastics materials and metals such for example as chrome and stainless steel. Mixtures of materials may be employed as appropriate. The shape of the first outlet 210, the first valve means 212, the second outlet 214, the second valve means 206, the diverter

means 218 and the third valve means 224 may be altered from those shown. References to bluewater, greywater and carewater may apply as appropriate to the water in all embodiments of the apparatus of the invention. Individual components shown in the drawings are not limited to use in their drawings and they may be used in other drawings and in all aspects of the invention.

The apparatus of the present invention may be manufactured and sold under the Trade Mark CAMEL DRAIN or the Trade Mark DUO-DRAIN.

CLAIMS

1. Apparatus for saving water, which apparatus comprises:

- (i) separator means for separating water that is flowing from a water inlet and that has not been interrupted in flow, from water that is flowing from the water inlet and that has been interrupted in flow;
- (ii) first outlet means for receiving water that has not been interrupted in flow; and
- (iii) second outlet means for receiving the water that has been interrupted in flow,

and the apparatus being such that in use it permits the water received by the first outlet means to be saved from flowing to waste.

2. Apparatus according to claim 1 in which the separator means is a water-flow responsive and/or water-pressure responsive separator means.

3. Apparatus according to claim 2 in which the separator means is a spring separator means comprising a spring mechanism.

4. Apparatus according to claim 2 in which the separator means is a balance weight separator means comprising a balance weight mechanism.

5. Apparatus according to claim 2 in which the separator means is a flexible ball separator means comprising a flexible ball mechanism.

6. Apparatus according to claim 5 in which the flexible ball is an elastic ball.

7. Apparatus according to claim 2 in which the separator means is a segment separator means comprising a segment mechanism.

8. Apparatus according to claim 2 in which the separator means is an elastic strip separator means comprising an elastic strip mechanism.

9. Apparatus according to claim 2 in which the separator means is an elastic band separator means comprising an elastic band mechanism.

10. Apparatus according to any one of the preceding claims in which the first outlet means is a conduit leading to a first system for receiving the water that has not been interrupted in flow, and in which the second outlet means is a conduit leading to a second system for receiving the water that has been interrupted in flow.

11. Apparatus according to claim 10 and including the first system and the second system.

12. Apparatus according to claim 1 and for installation in a waste water outlet of a structure, and for separating water that is flowing from a water inlet of the structure to the waste water outlet of the structure and that has not been used by a person, from water that is flowing from the water inlet to the waste water outlet and that has been used by the person, and the apparatus being such that it comprises:

- (i) the first outlet means and which is for the water that has not been used;
- (ii) first valve means for opening and closing the first outlet means;
- (iii) the second outlet means and which is for the water that has been used;
- (iv) second valve means for opening and closing the second outlet means; and
- (v) the separator means, the separator means being such that it includes diverter means for operating when the first valve means closes the first outlet means to divert the water from the first outlet means to the second outlet means:

and the apparatus being such that:

- (a) the first outlet means is for communication with a first system which utilises the water that has not been used,

and the second outlet means is for communication with a second system which is separate from the first system and which utilises the water that has been used;

(b) in use the water inlet directs the water that has not been used directly towards the first outlet means such that the water that has not been used is able to reach the first outlet means without touching the diverter means or the structure; and

(c) in use the water that has not been used and the water that has been used are from the same water inlet whereby wastage of water that has not been used is avoided.

13. Apparatus according to claim 12 and including third valve means for operating consequent upon a backflow of water that has passed through the first outlet means to cause the first valve means to close.

14. Apparatus according to claim 12 or claim 13 in which the first outlet means is a first aperture which is positioned at a top portion of the apparatus.

15. ~~Apparatus according to any one of claims 12 - 14 in which the first~~
outlet means is centrally positioned with respect to a periphery of the apparatus.

16. Apparatus according to any one of claims 12 – 15 in which the first valve means comprises a first float and a second float.
17. Apparatus according to claim 16 in which the first float comprises first and second parts which pivot with respect to each other to cause the first float to open and shut the first outlet means.
18. Apparatus according to claim 16 or claim 17 in which the second float is disc-shaped with a central downwardly depending collar.
19. Apparatus according to any one of claims 16 – 18 and including a control rod, and in which upward movement of the second float causes the control rod to move to a position in which it maintains the first float closed
20. Apparatus according to any one of claims 12 - 19 in which the second outlet means is formed between the diverter means and a part of the structure around and adjacent the waste water outlet.
21. Apparatus according to any one of claims 12 - 20 in which the second valve means is a ring seal in the diverter means.
22. ~~Apparatus according to any one of claims 12 – 21 in which the first~~
outlet is in the diverter means.

23. Apparatus according to any one of claims 12 - 22 in which the diverter means is a lid.

24. Apparatus according to claim 23 in which the lid has a downwardly depending skirt portion, in which the first outlet means is in a central body part of the lid, and in which the second valve means is on the skirt portion.

25. Apparatus according to any one of claims 12 - 24 in which the first valve means is biased by a spring arrangement to the closed position, and in which the spring arrangement is constructed and arranged to enable the first valve means to open against a biasing force of the spring arrangement when the first valve means receives pressure from the water that has not been used.

26. Apparatus according to claim 25 in which the spring is a circular spring.

27. Apparatus according to any one claims 12 - 26 and including a central tube portion, in which the diverter means is positioned at a top part of the central tube portion, and in which the central tube portion is slidable up and down in an outer tube portion such that the diverter means is movable into and out of contact with the structure around the waste water outlet.

28. Apparatus according to any one of claims 12 - 27 and including pump means for pumping the water that has not been used to one or more

predetermined places, and in which the pump means comprises a first turbine which is driven by the water that has been used, and a second turbine which is operatively connected to the first turbine such as to drive the first turbine such that the first turbine operates to increase the flow of the water that has not been used and thereby to pump the water that has not been used to the one or more predetermined places.

29. Apparatus according to claim 28 in which the second turbine is operatively connected to the first turbine by a gear arrangement.

30. Apparatus according to any one of claims 12 - 29 and including a first outlet pipe for the water that has not been used, and a second outlet pipe for the water that has been used.

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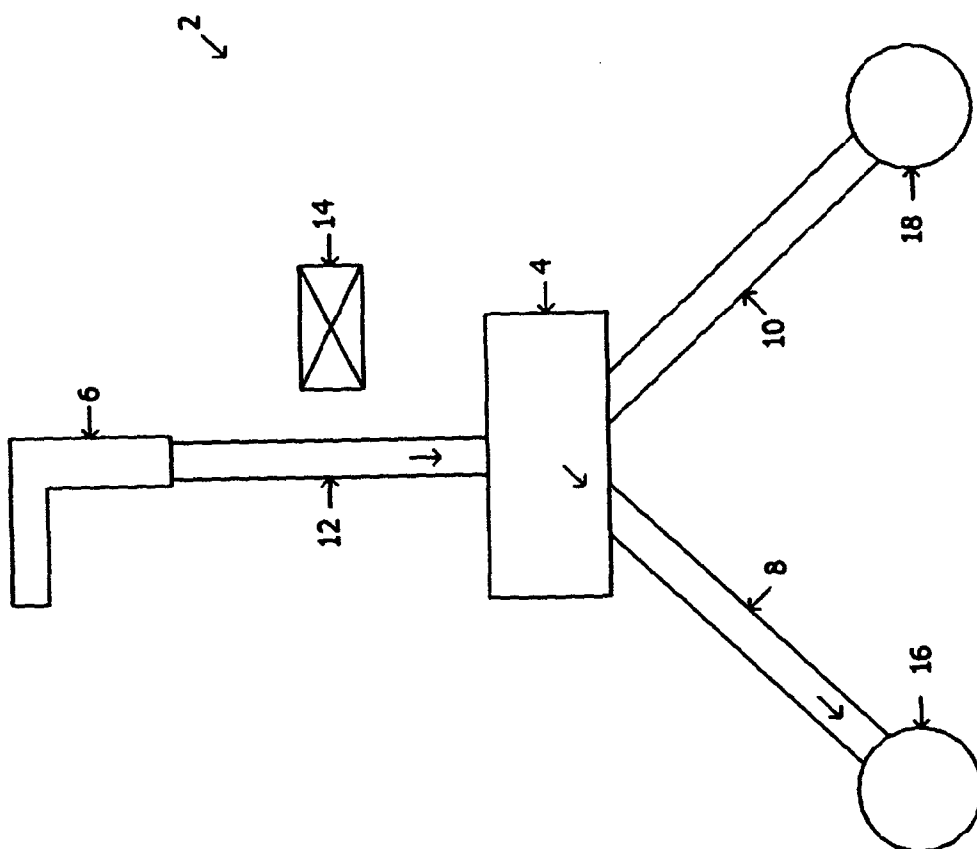


Fig. 1

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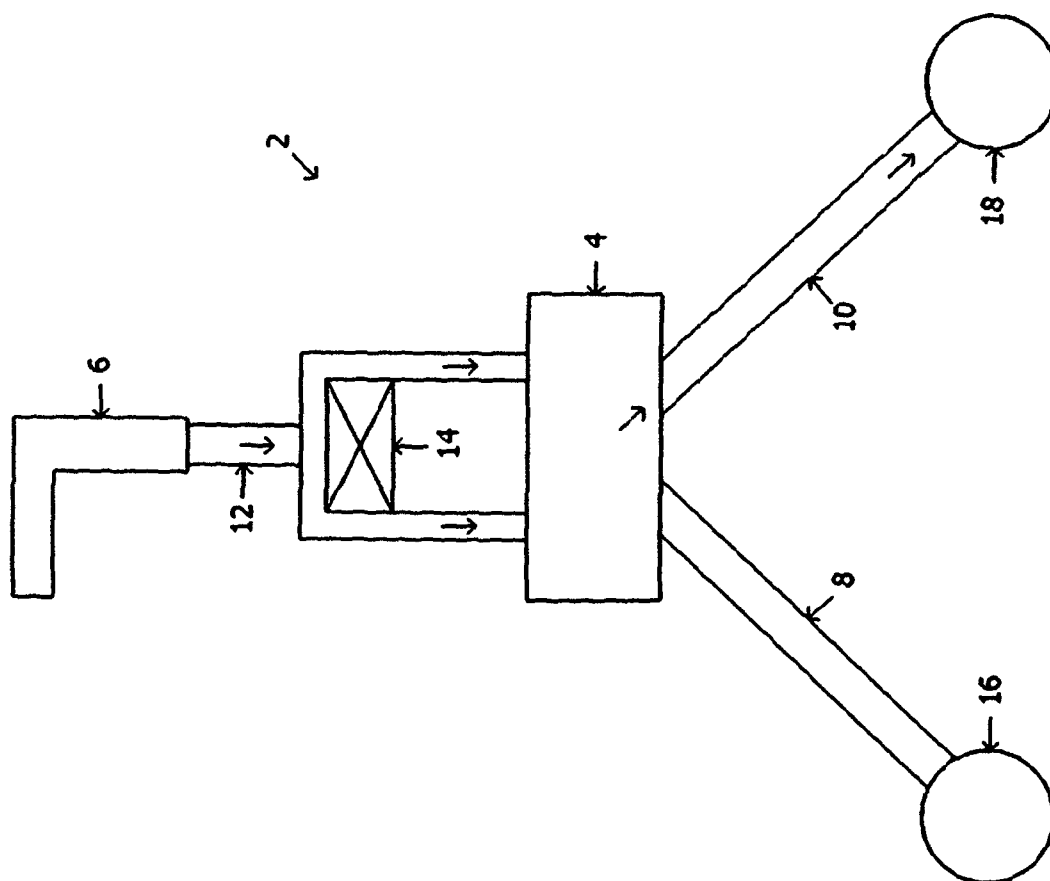


Fig. 1A

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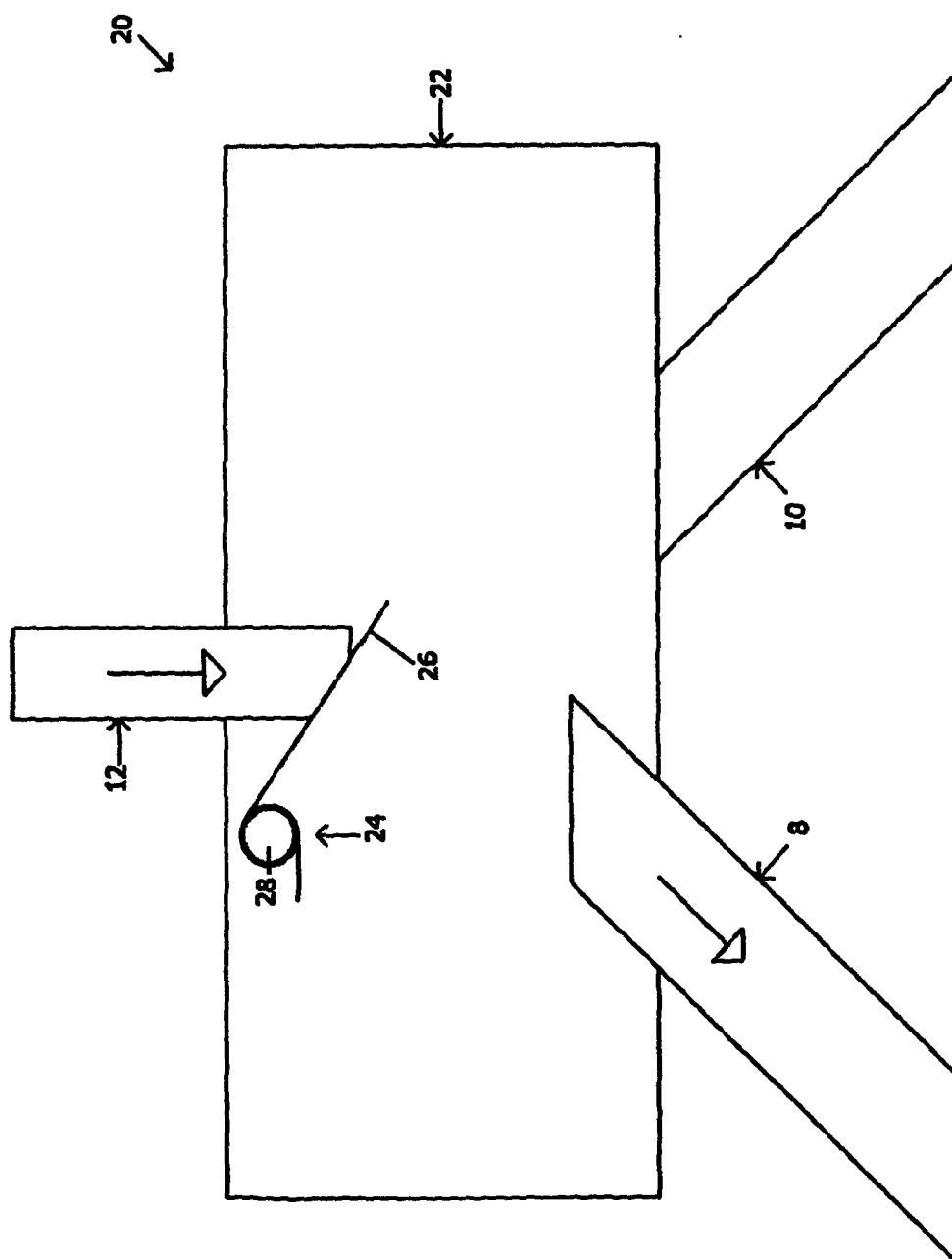


Fig. 2

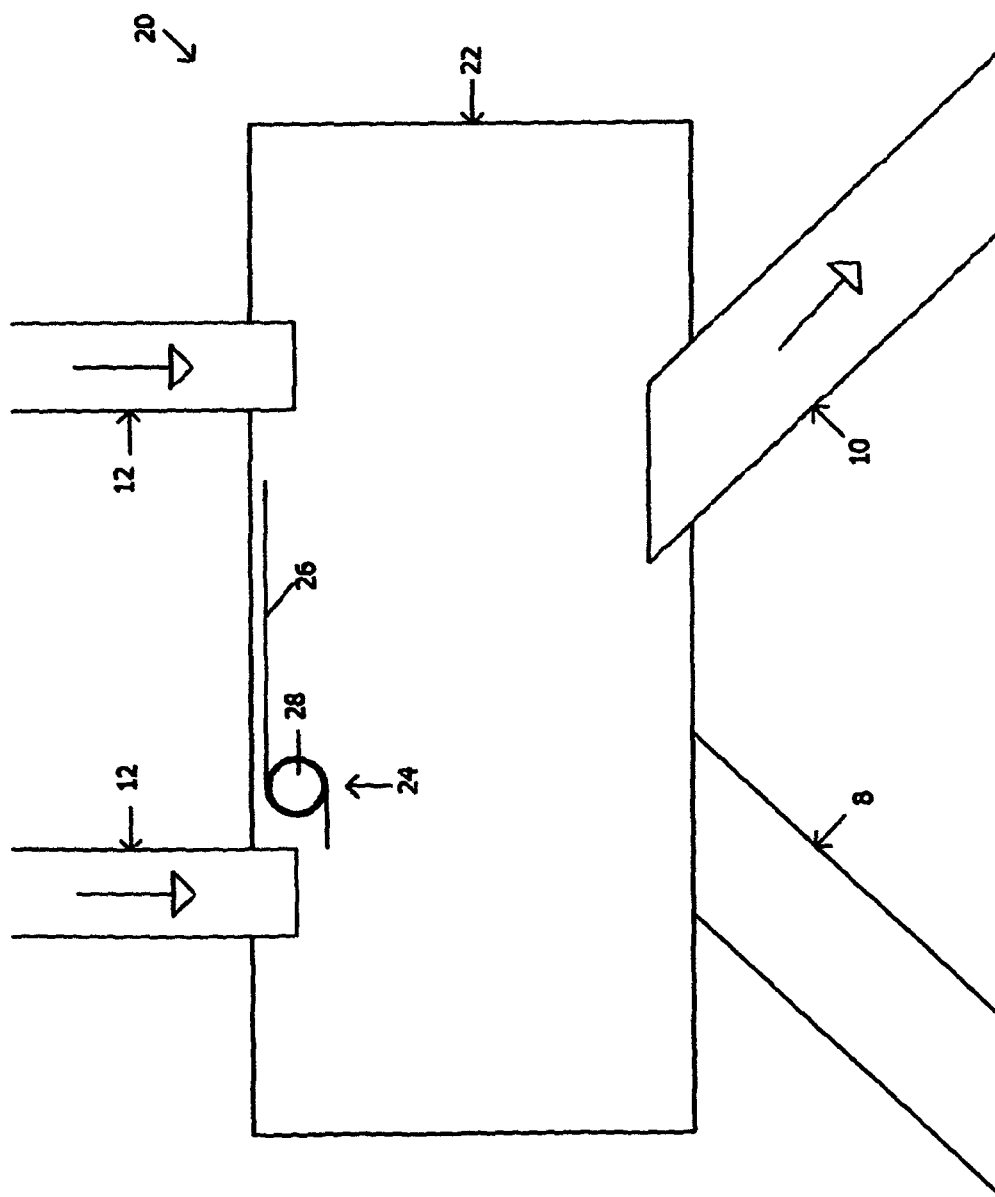


Fig. 2 A

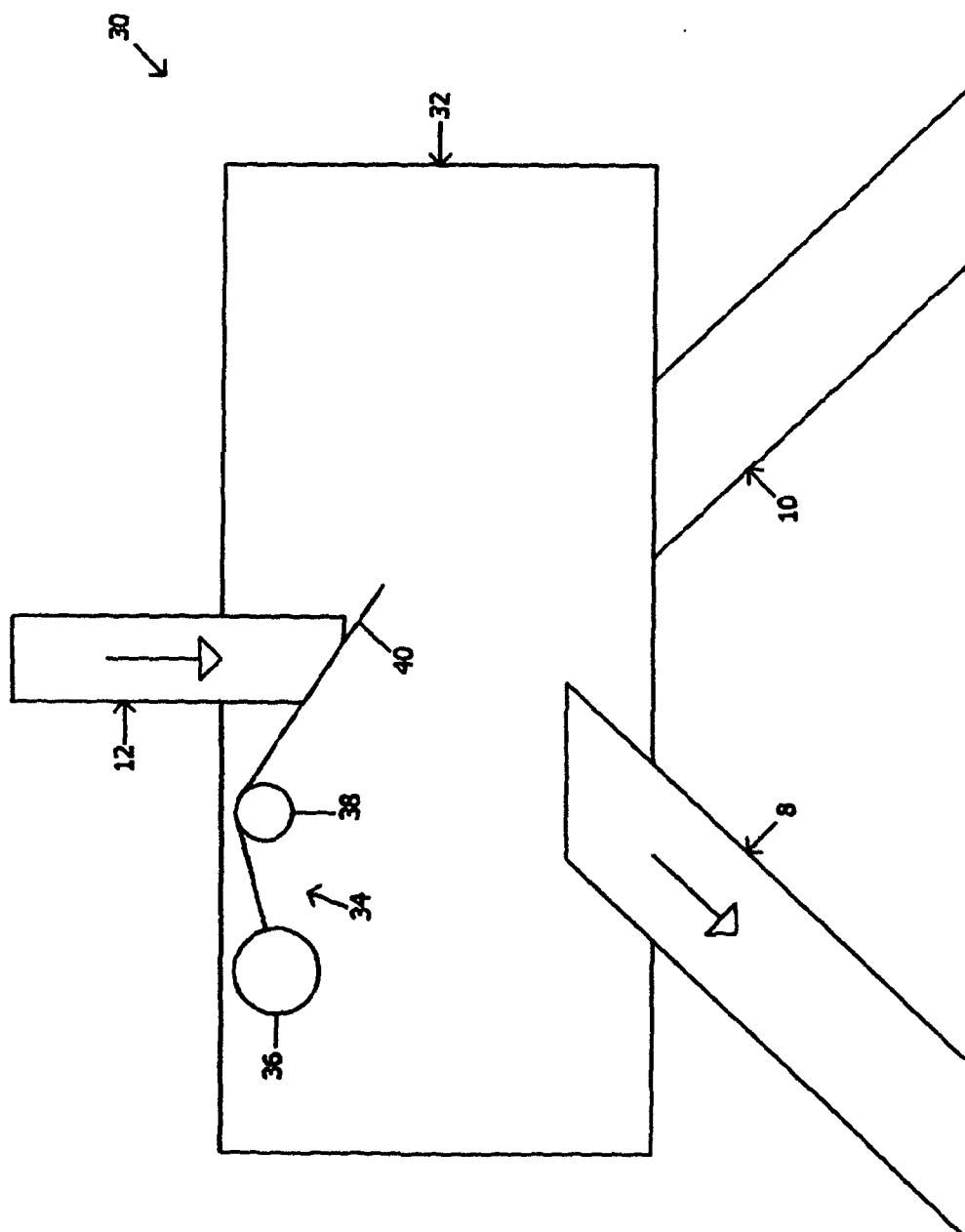


Fig. 3

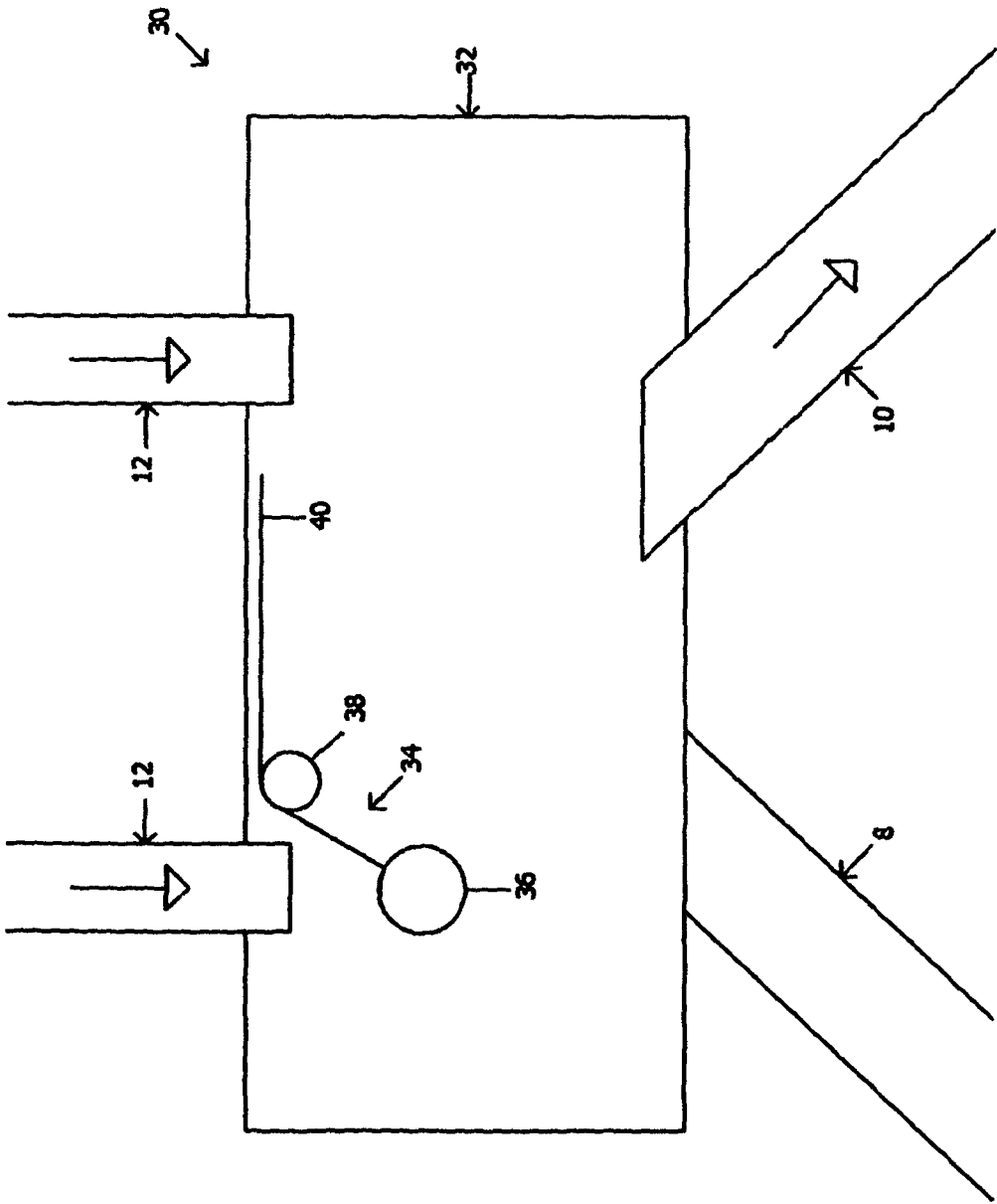


Fig. 3 A

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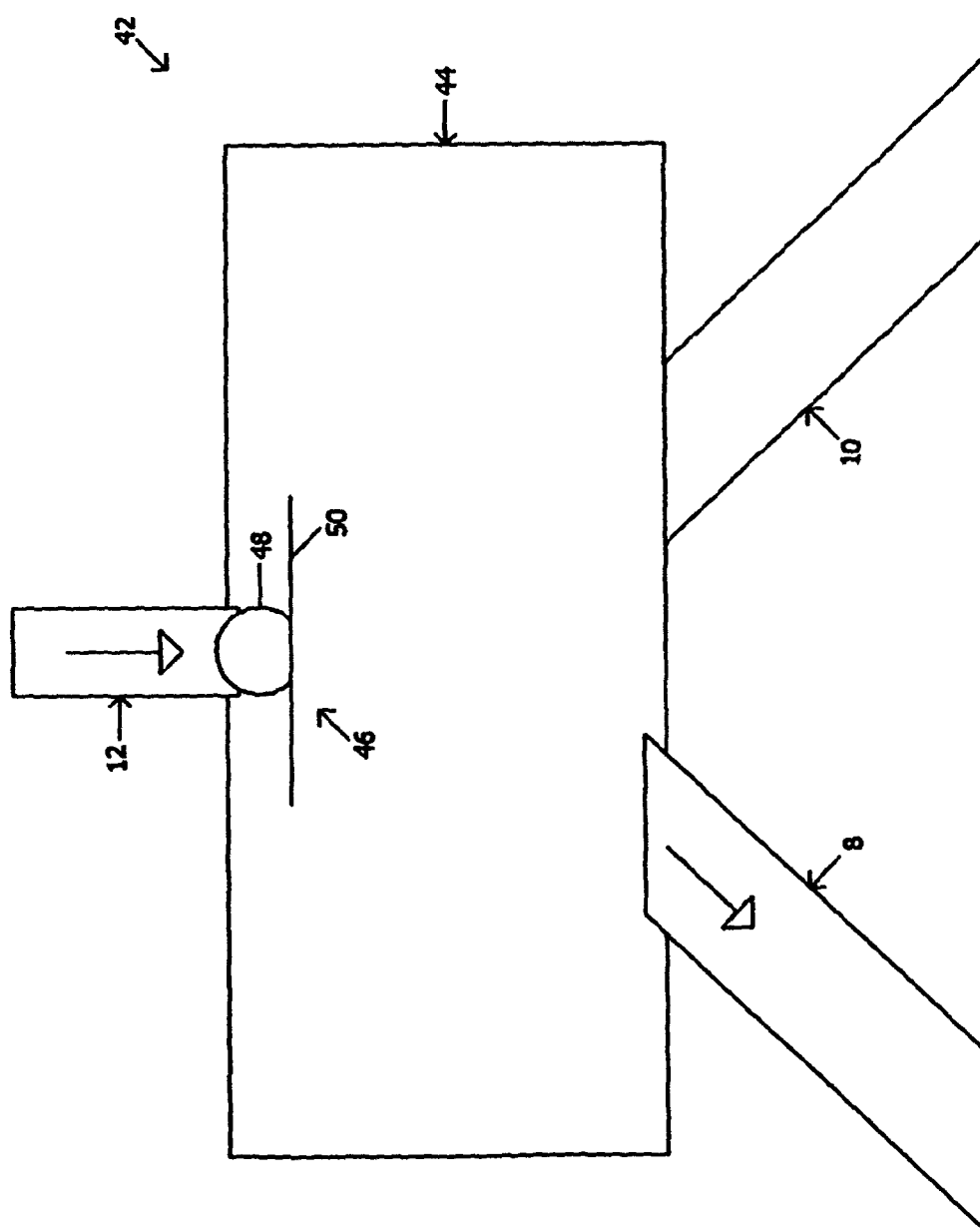


Fig. 4

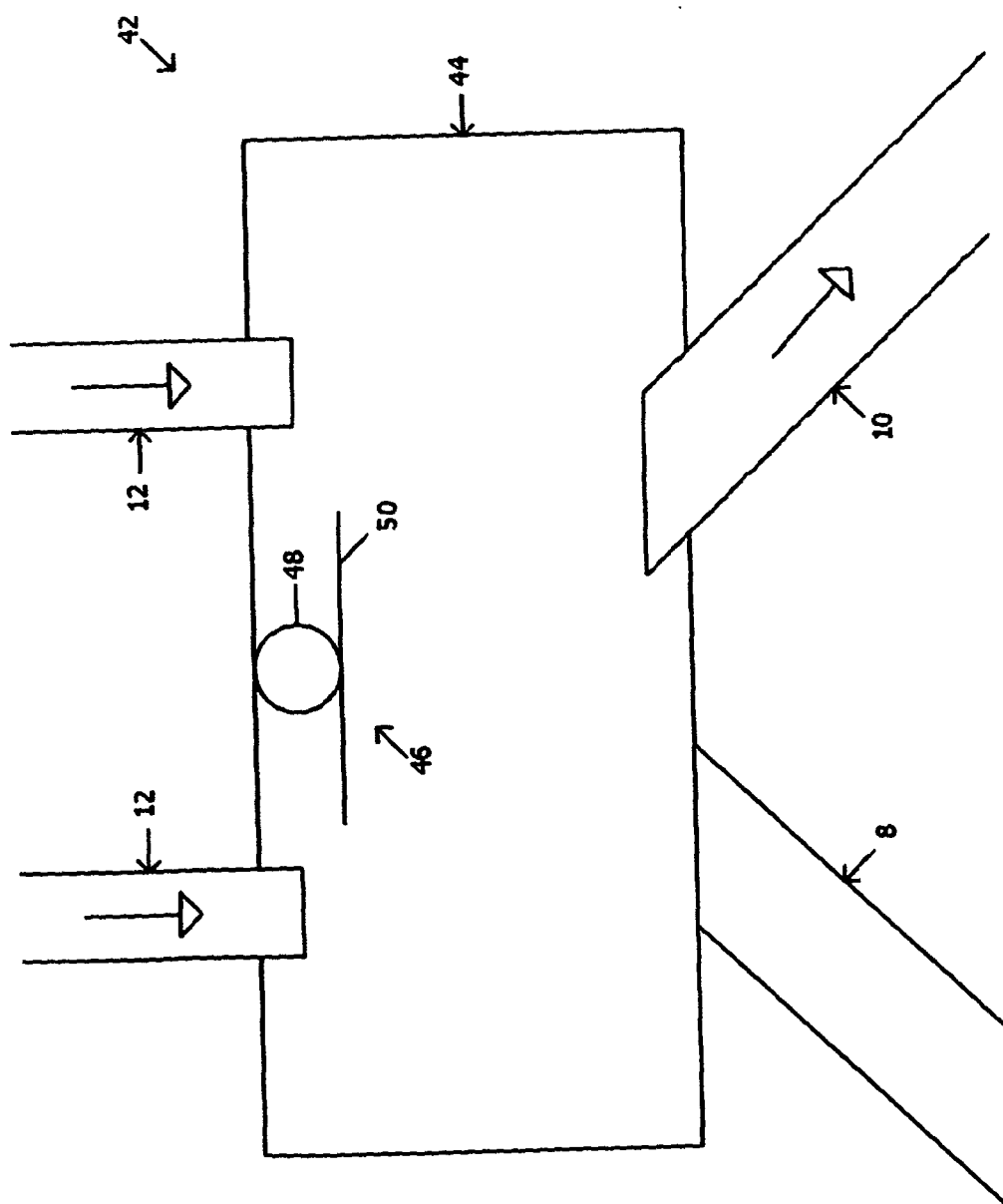


Fig. 4 A

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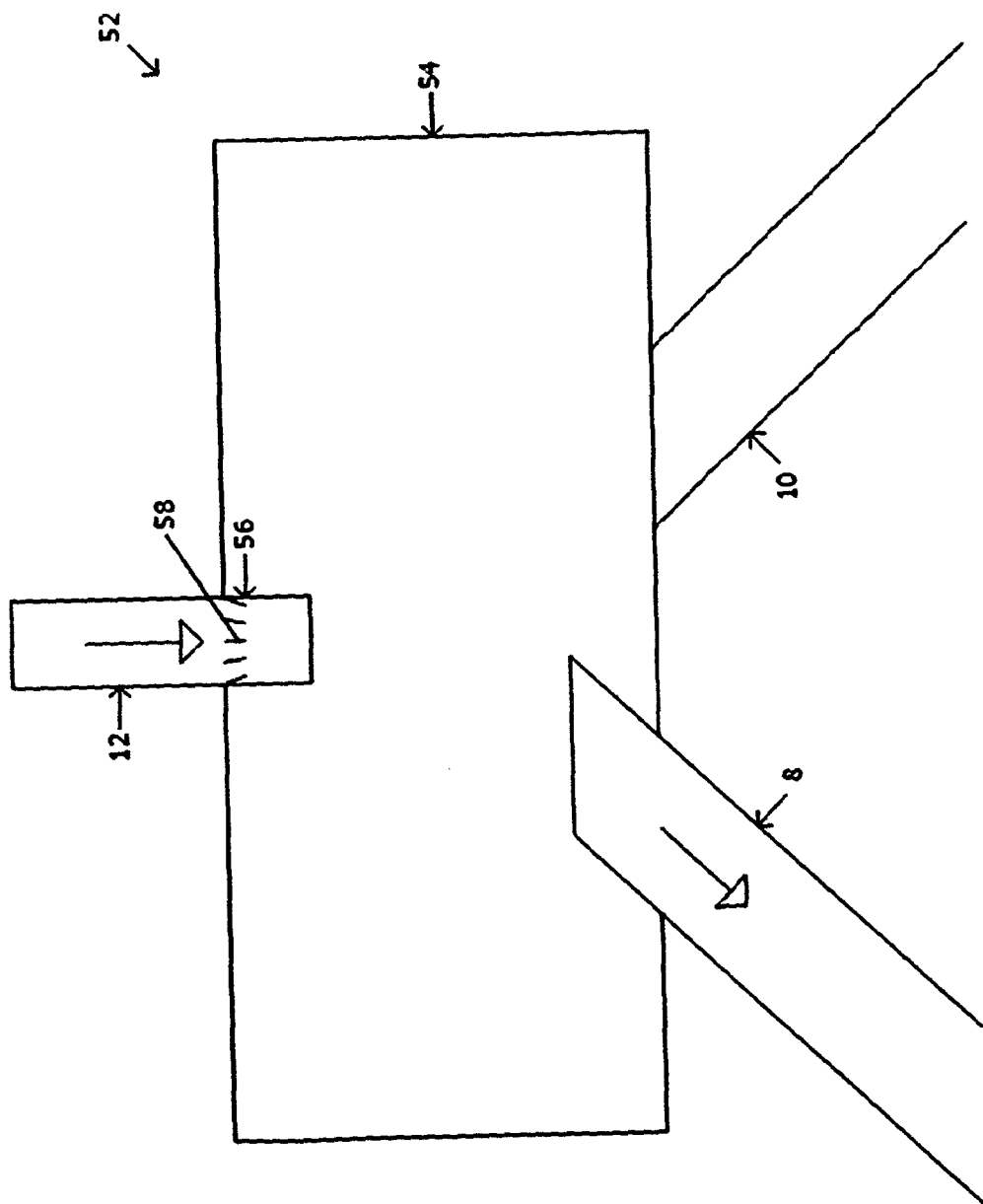


Fig. 5

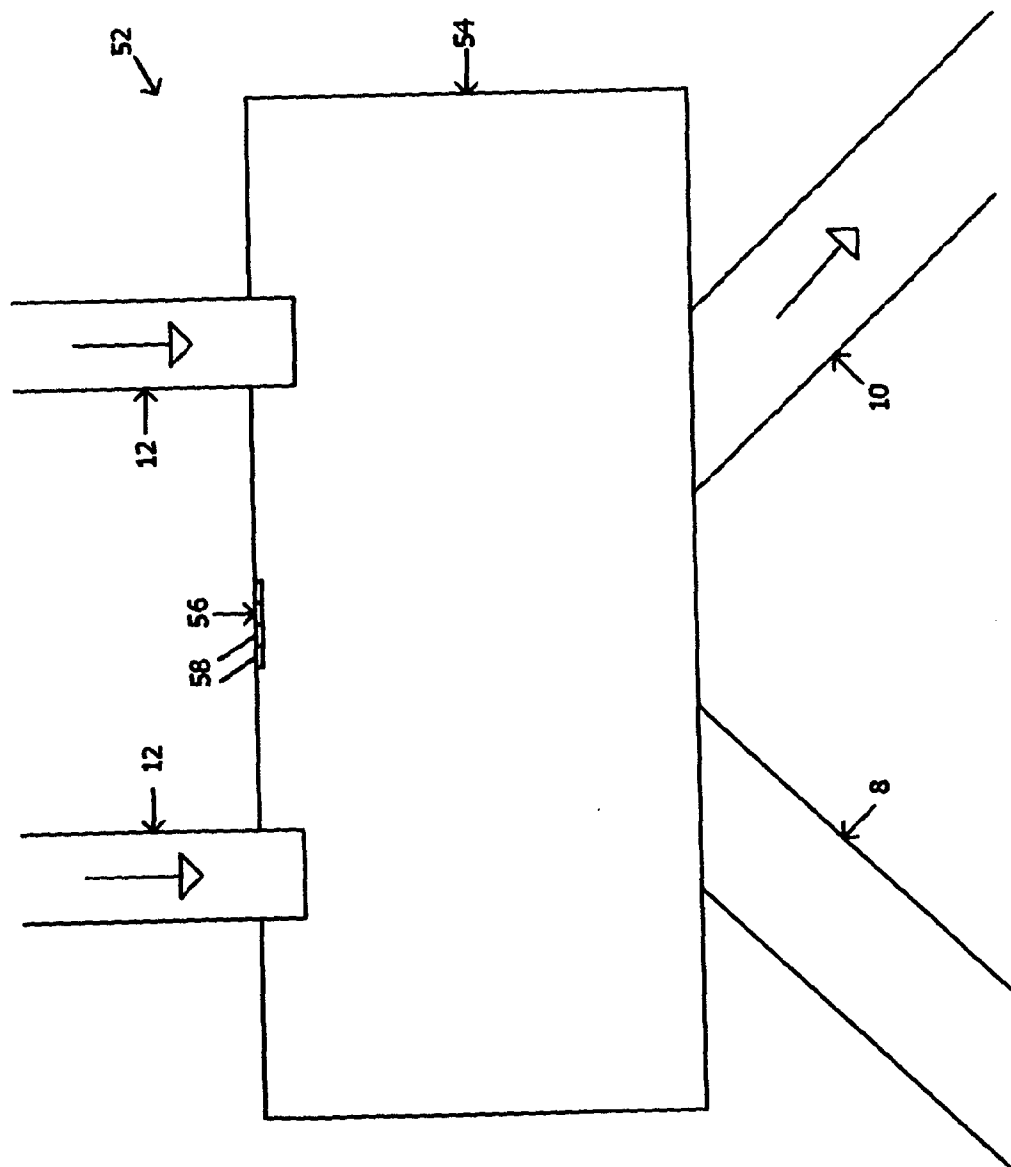


Fig. 5 A

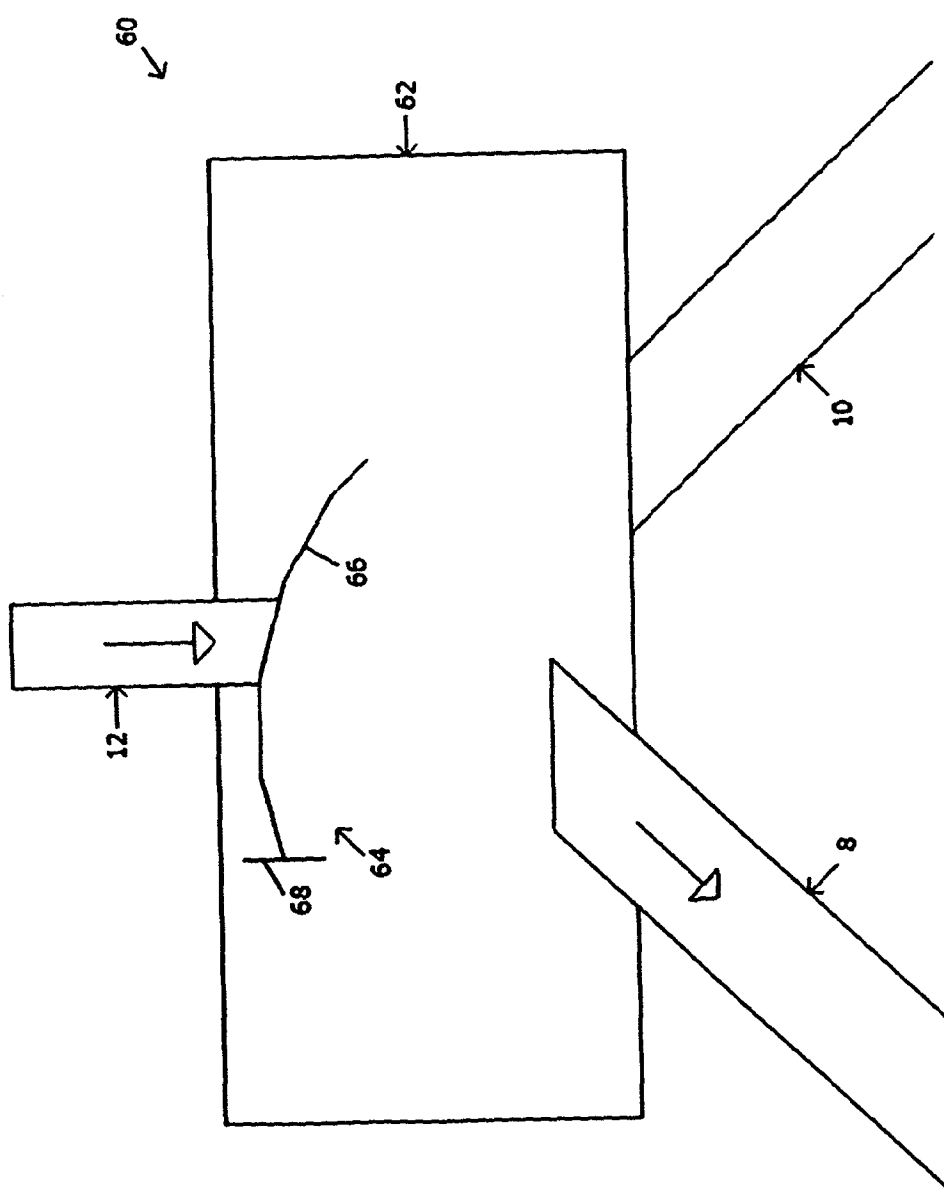


Fig. 6

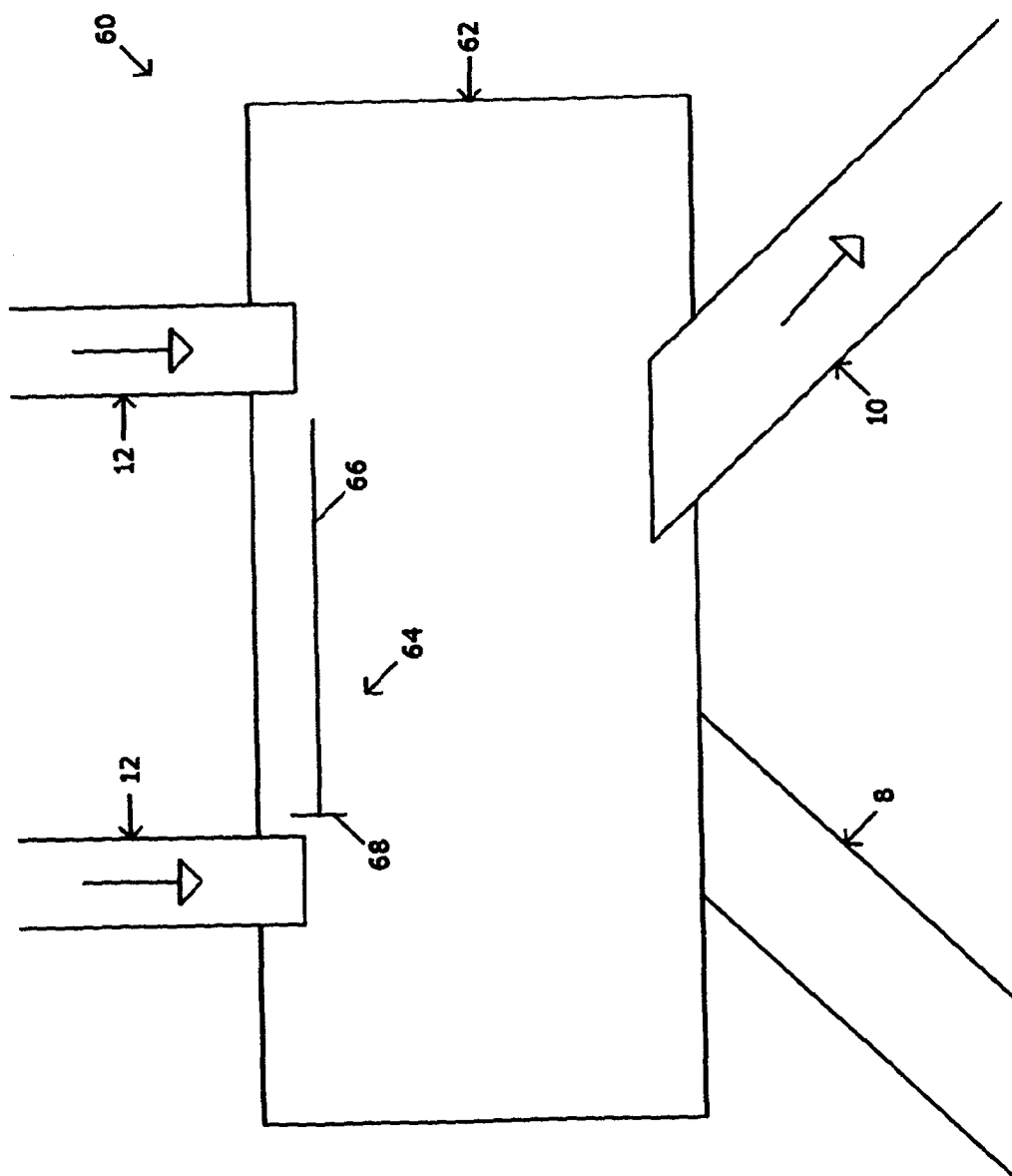


Fig. 6 A

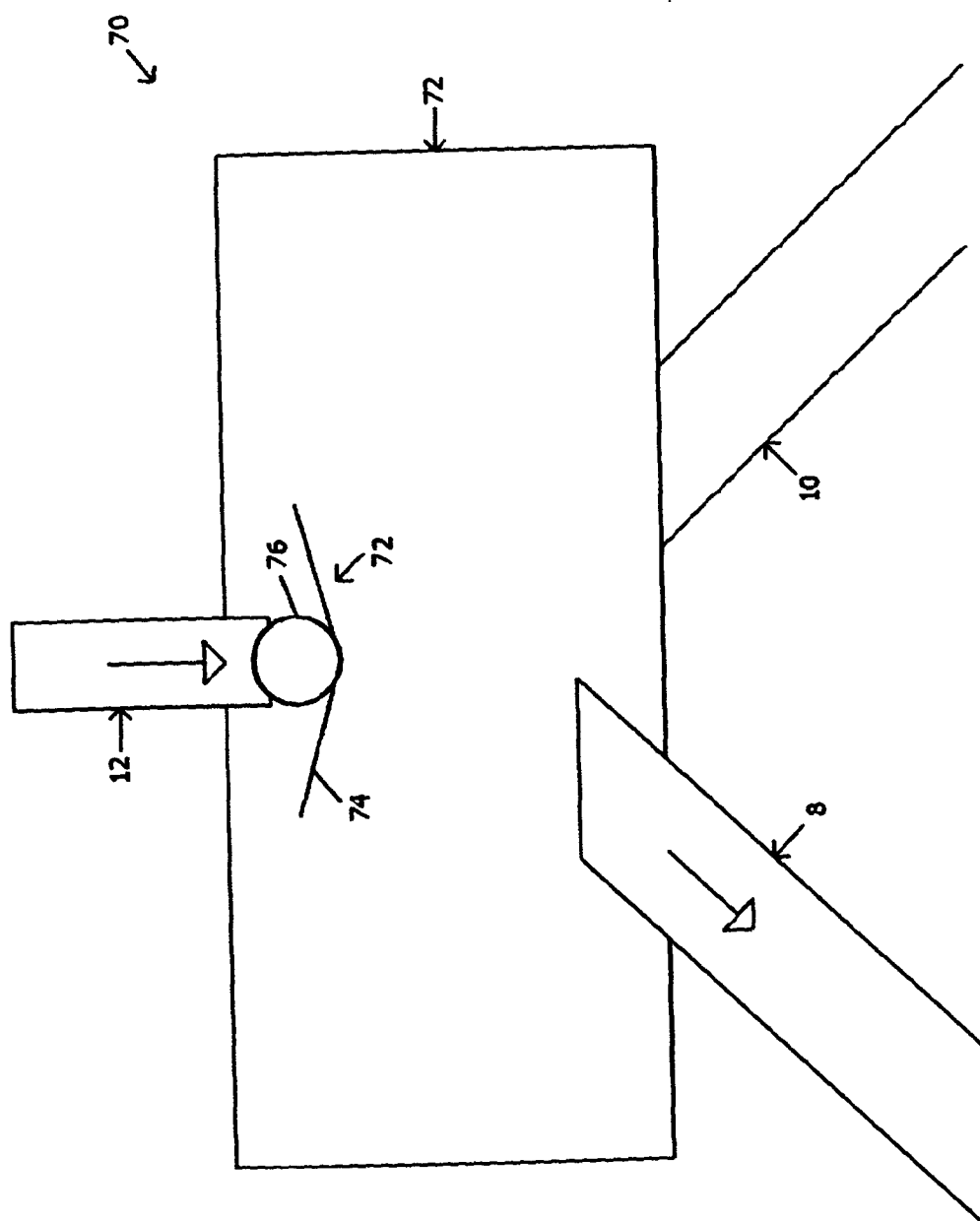


Fig. 7

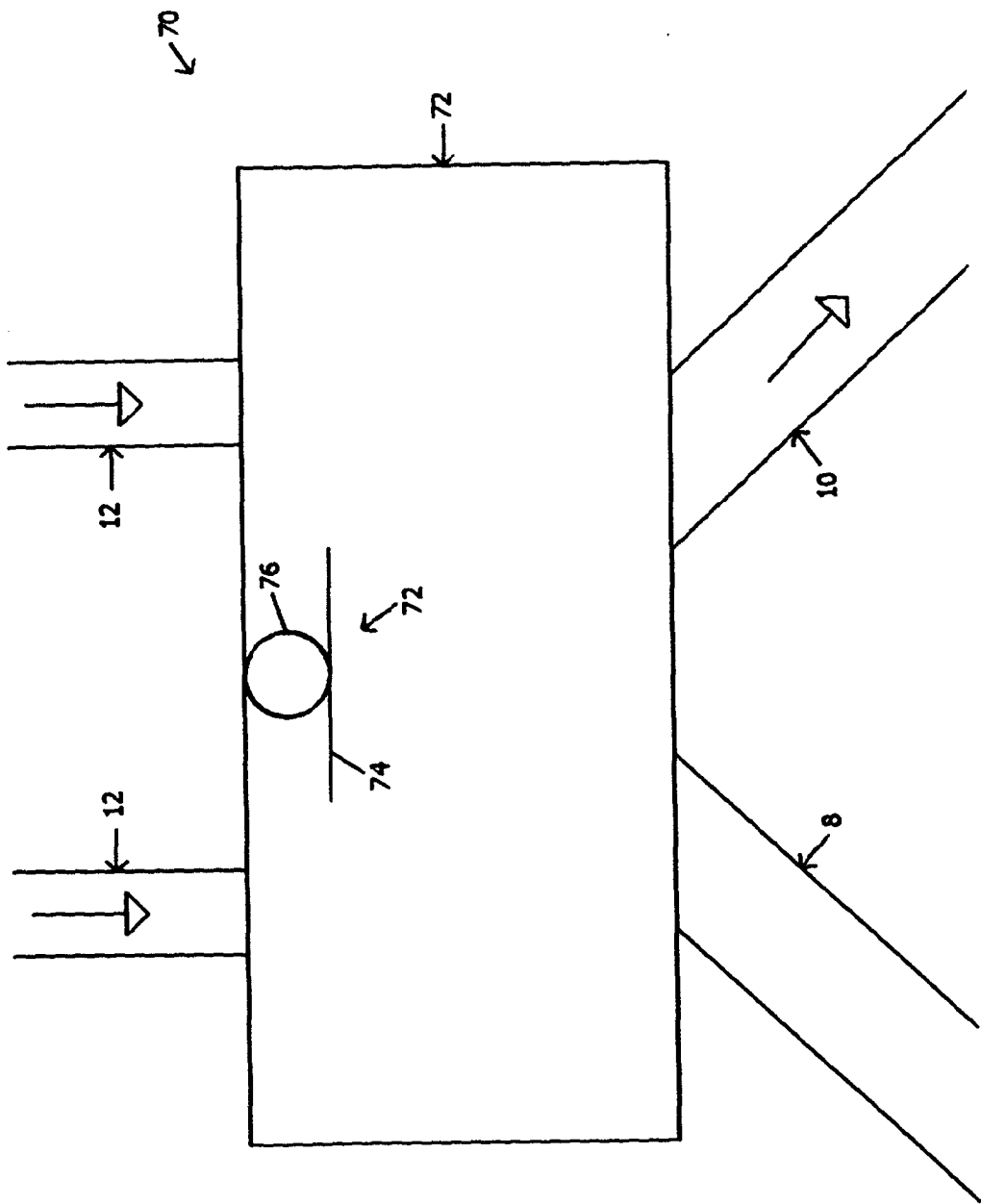


Fig. 7 A

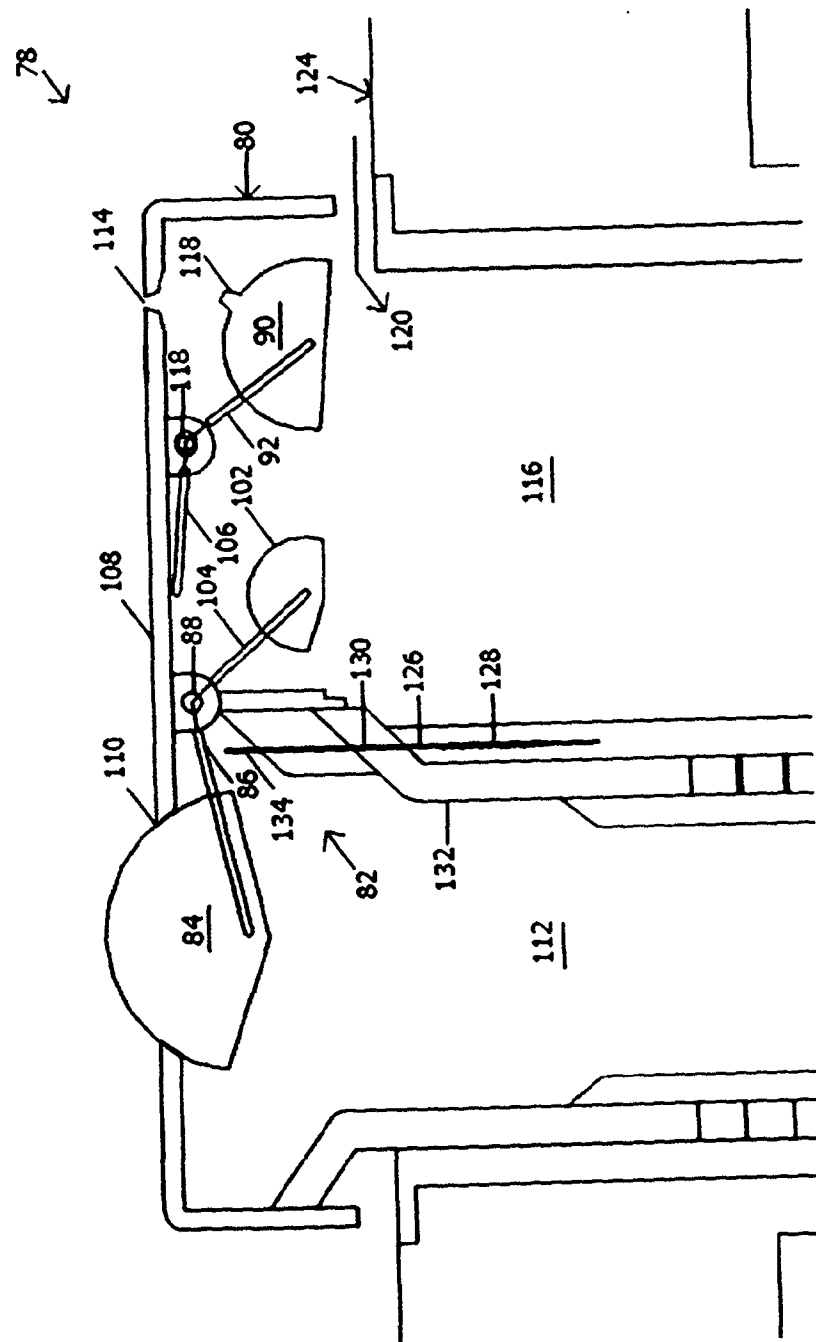


Fig. 8

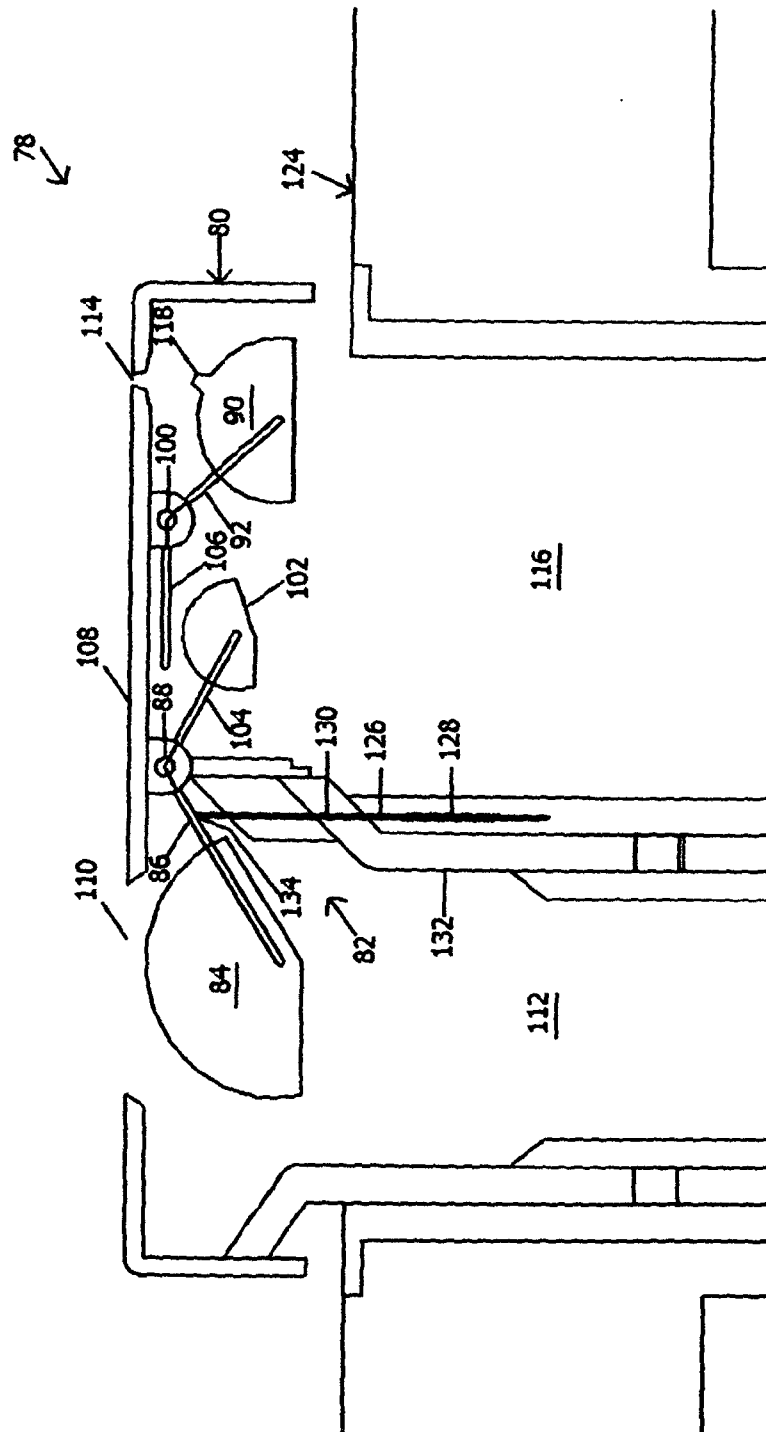


Fig. 9

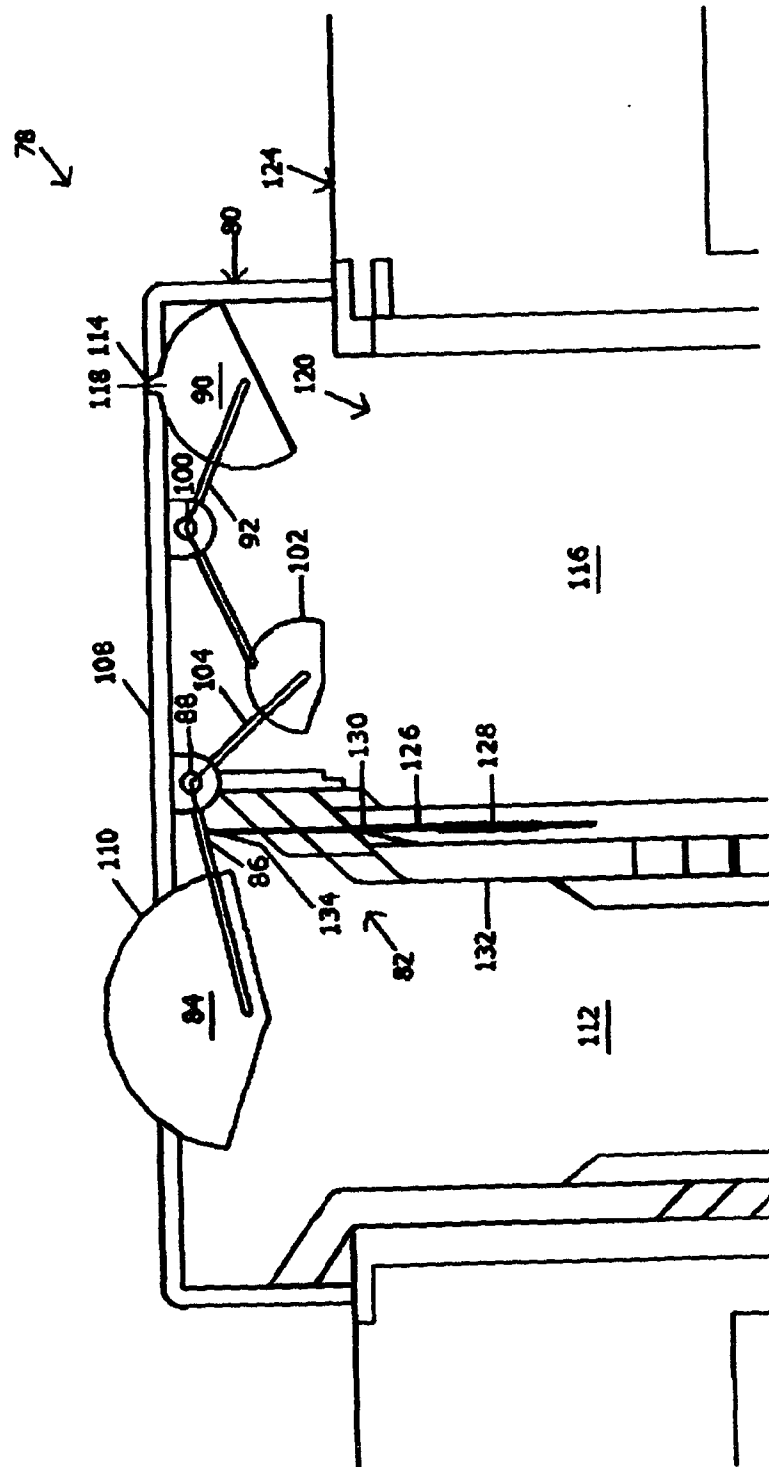


Fig. 10

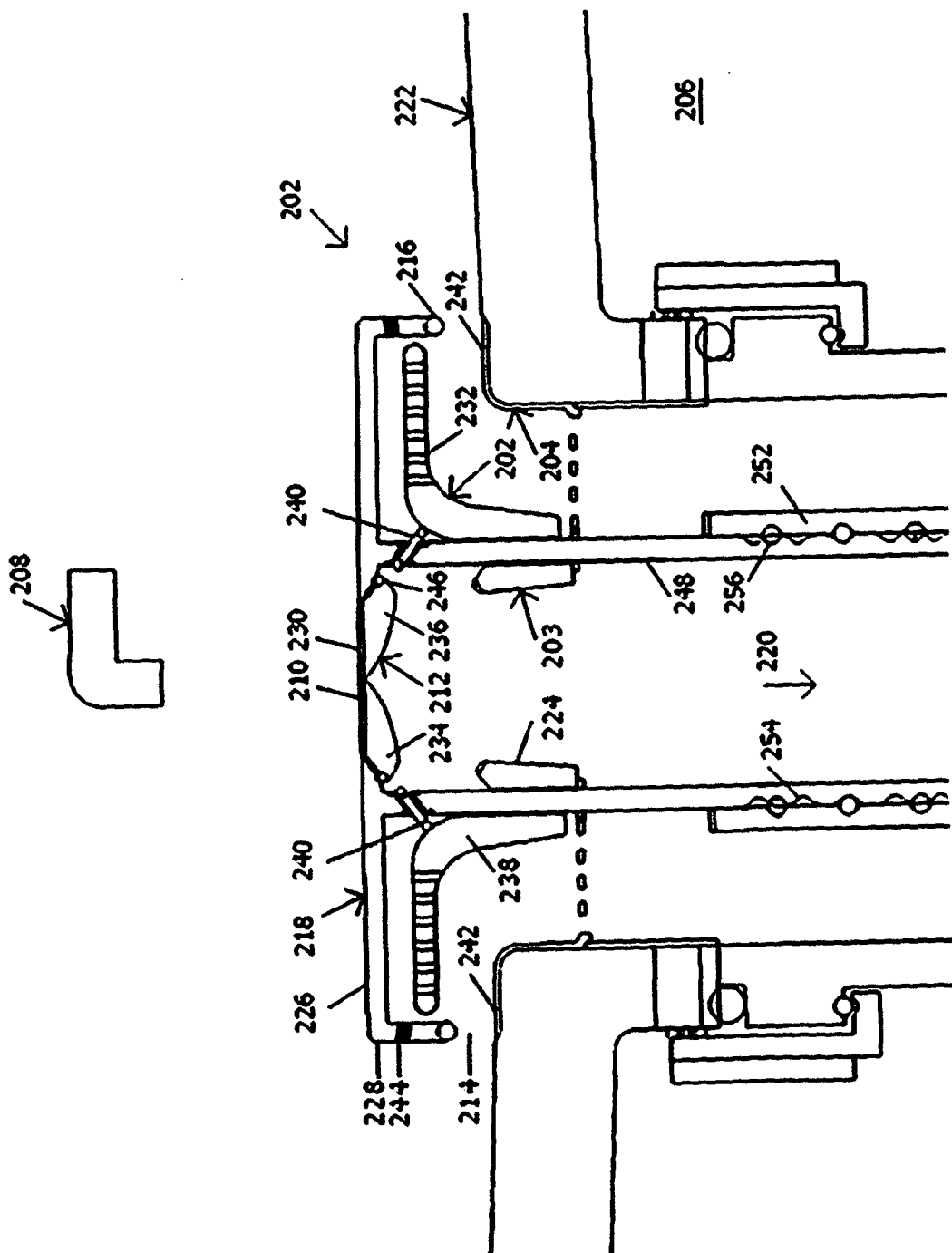


Fig. 11

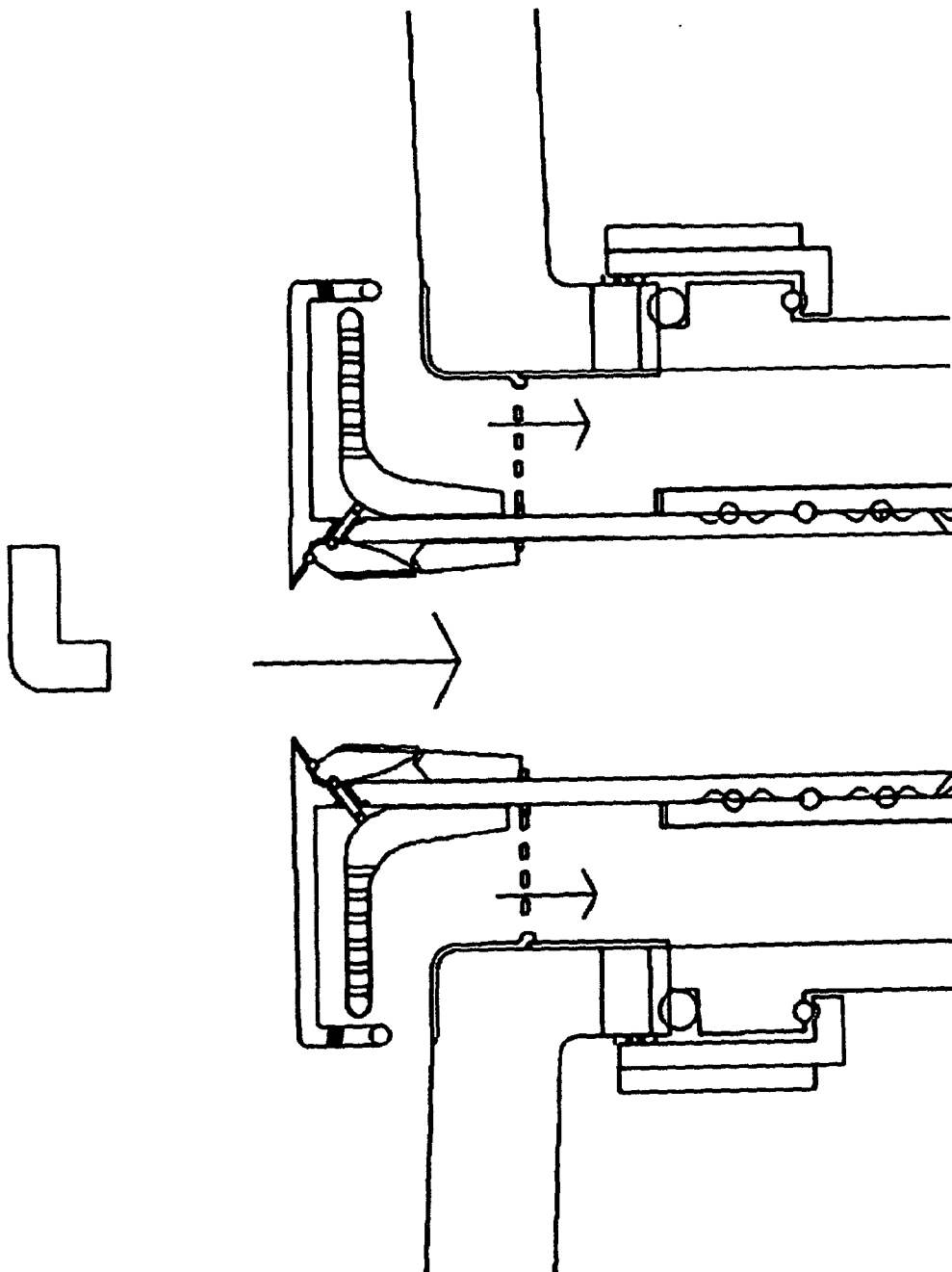


Fig. 12

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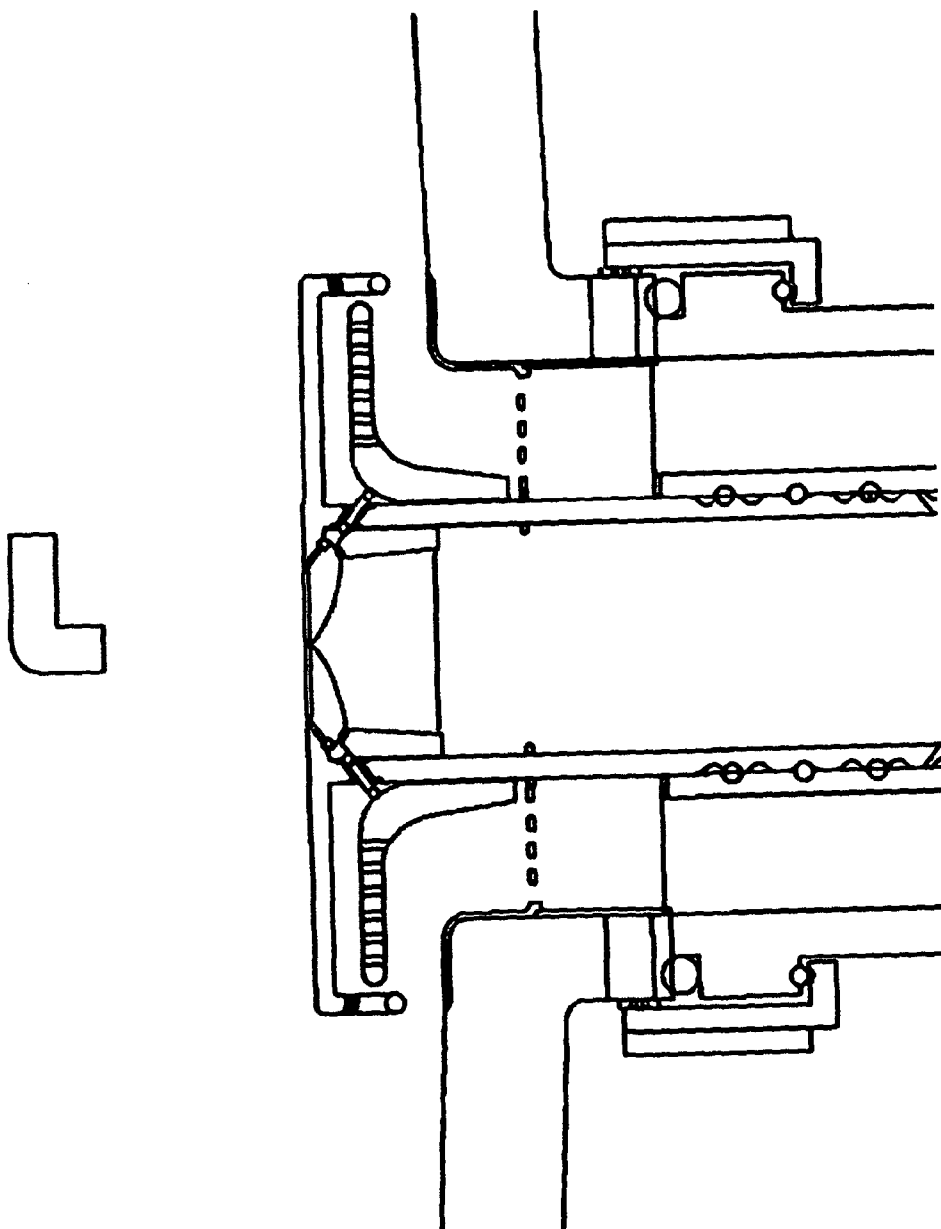


Fig. 13

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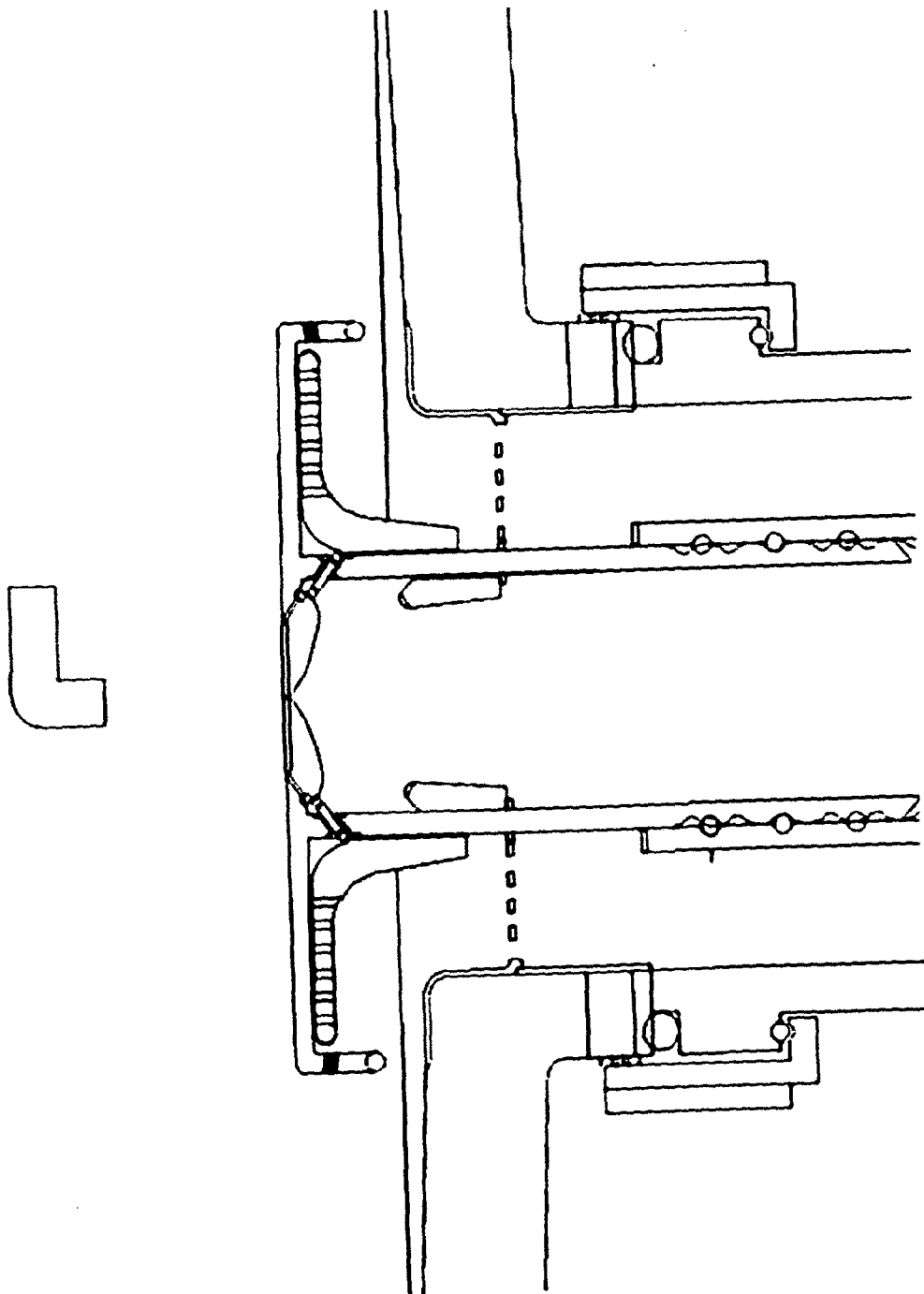


Fig. 14

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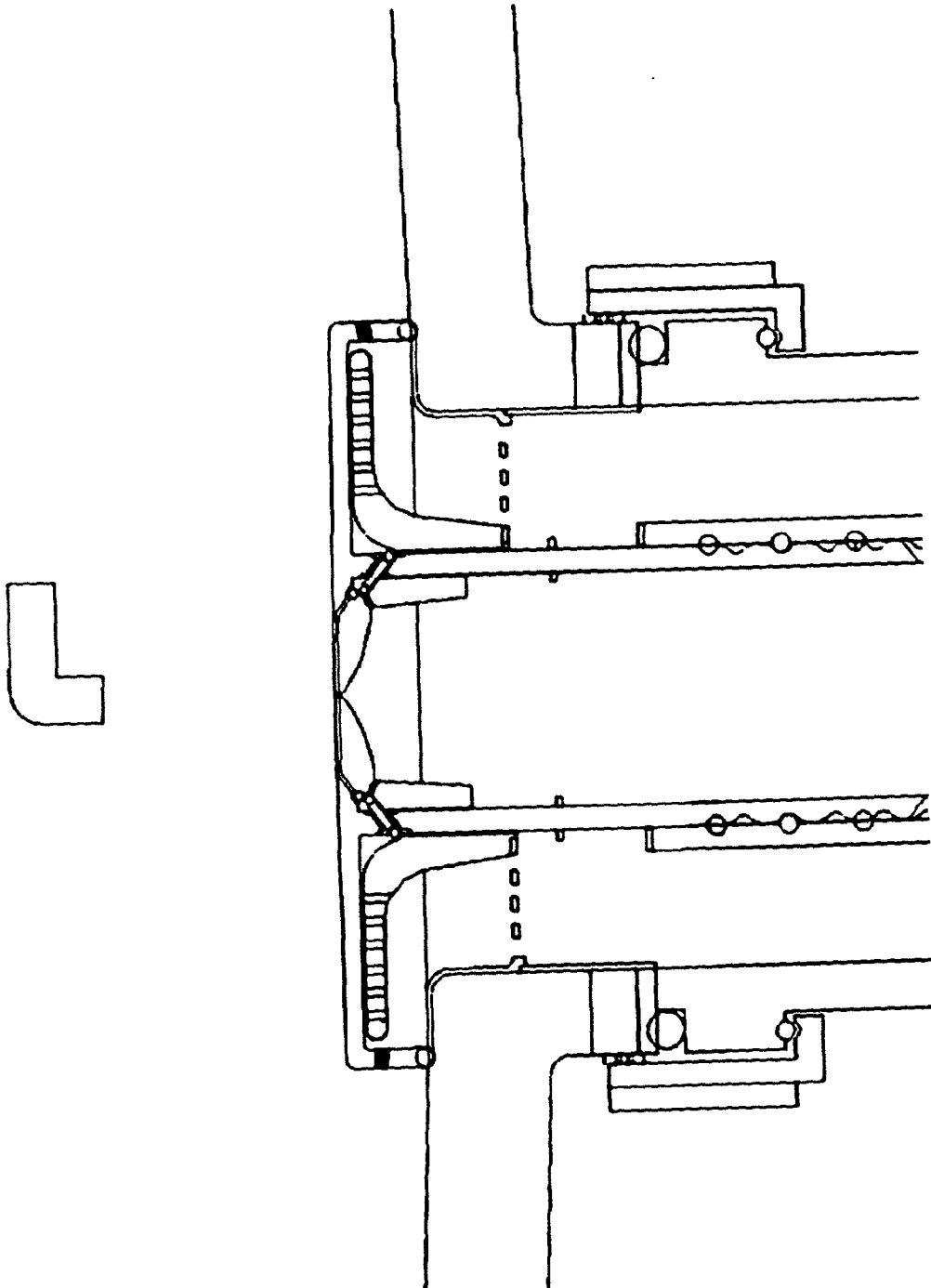


Fig. 15

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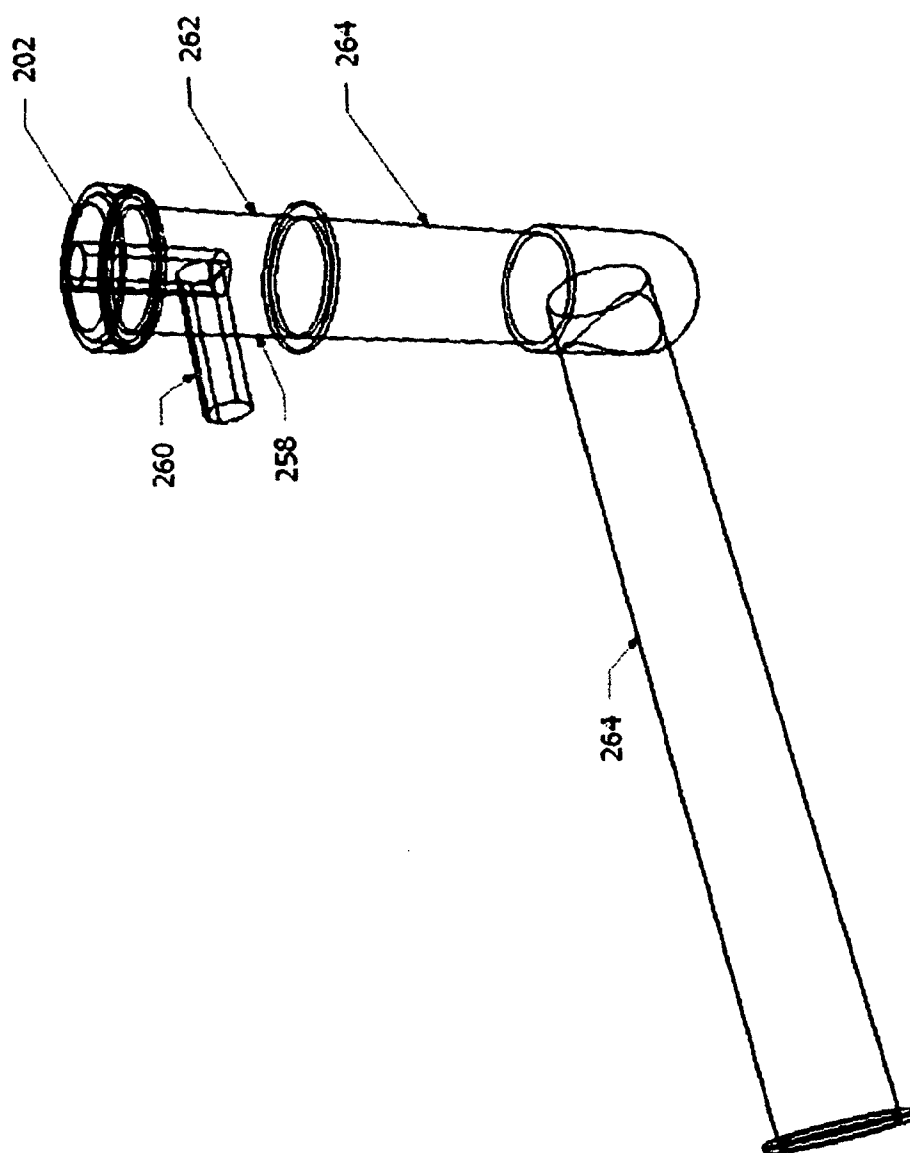


Fig. 16

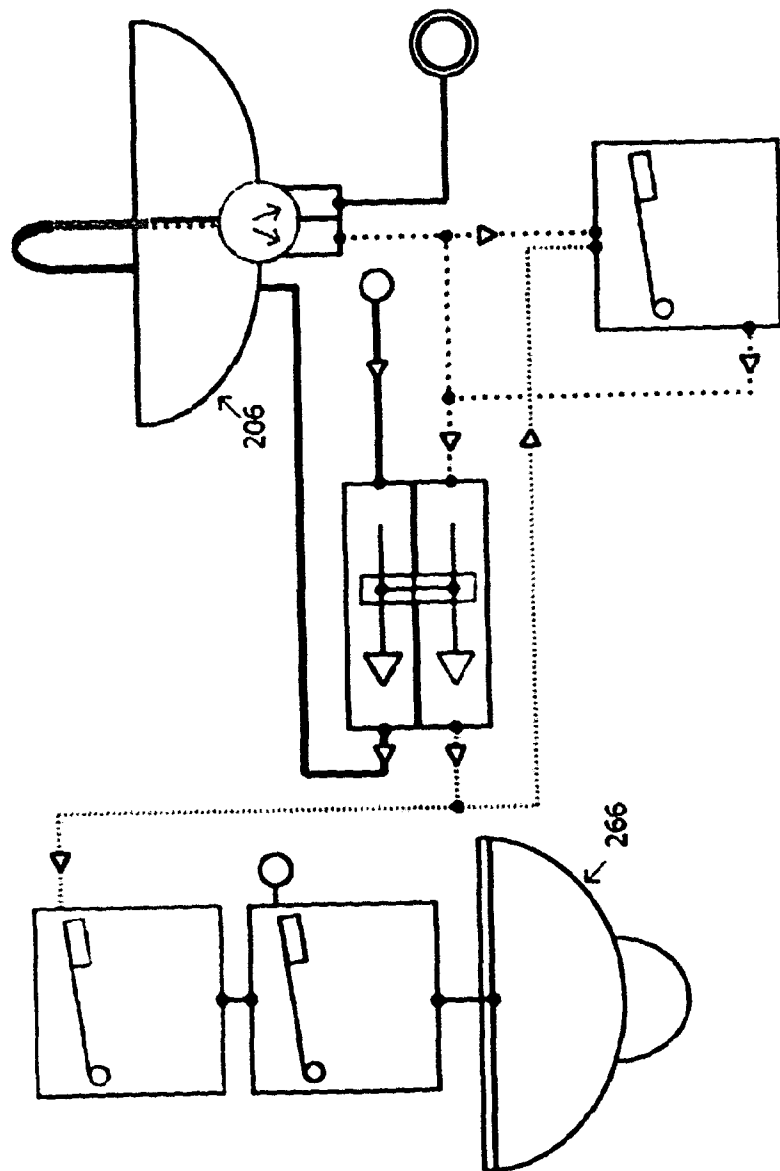


Fig. 17

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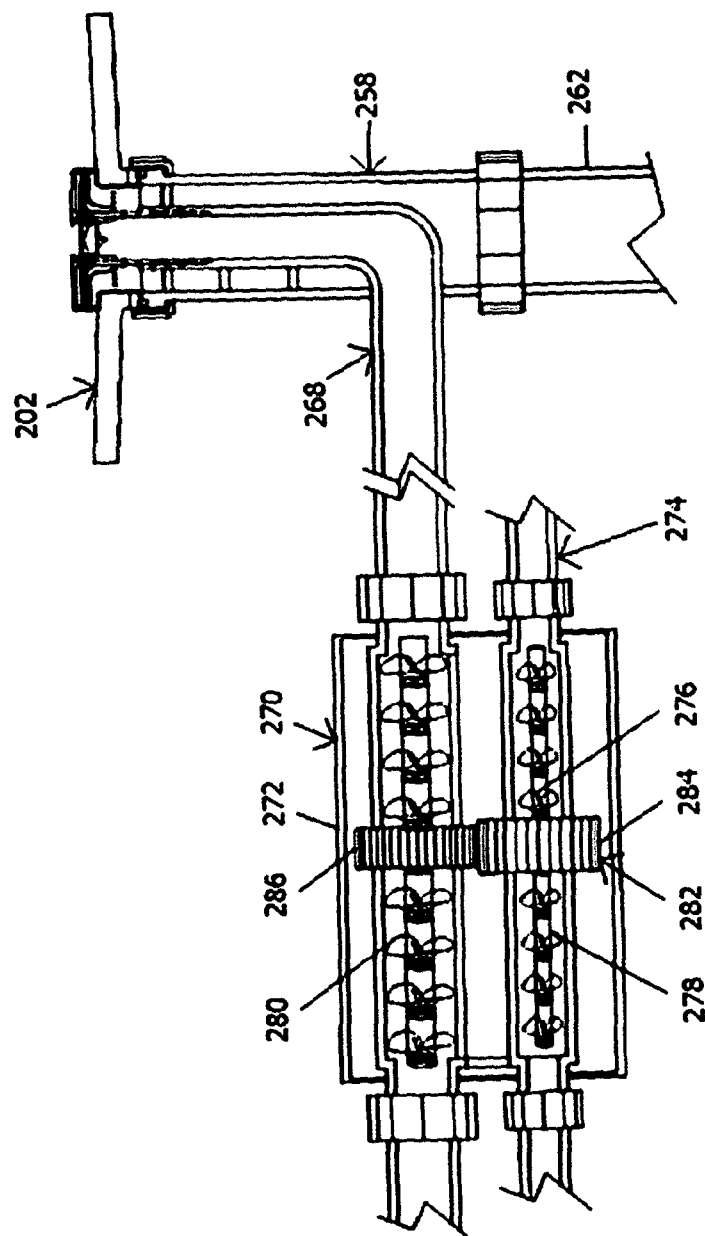


Fig. 18

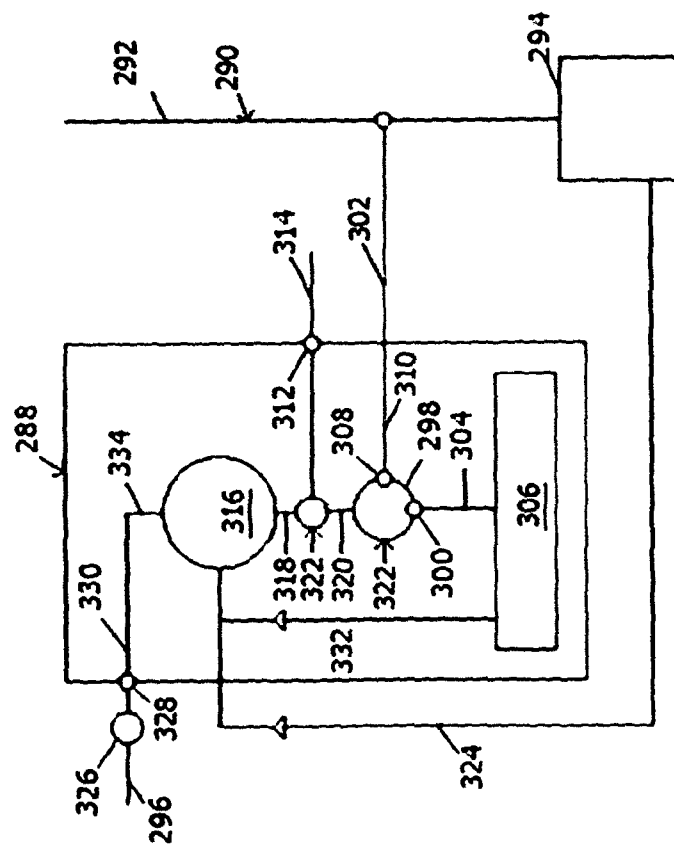


Fig.19

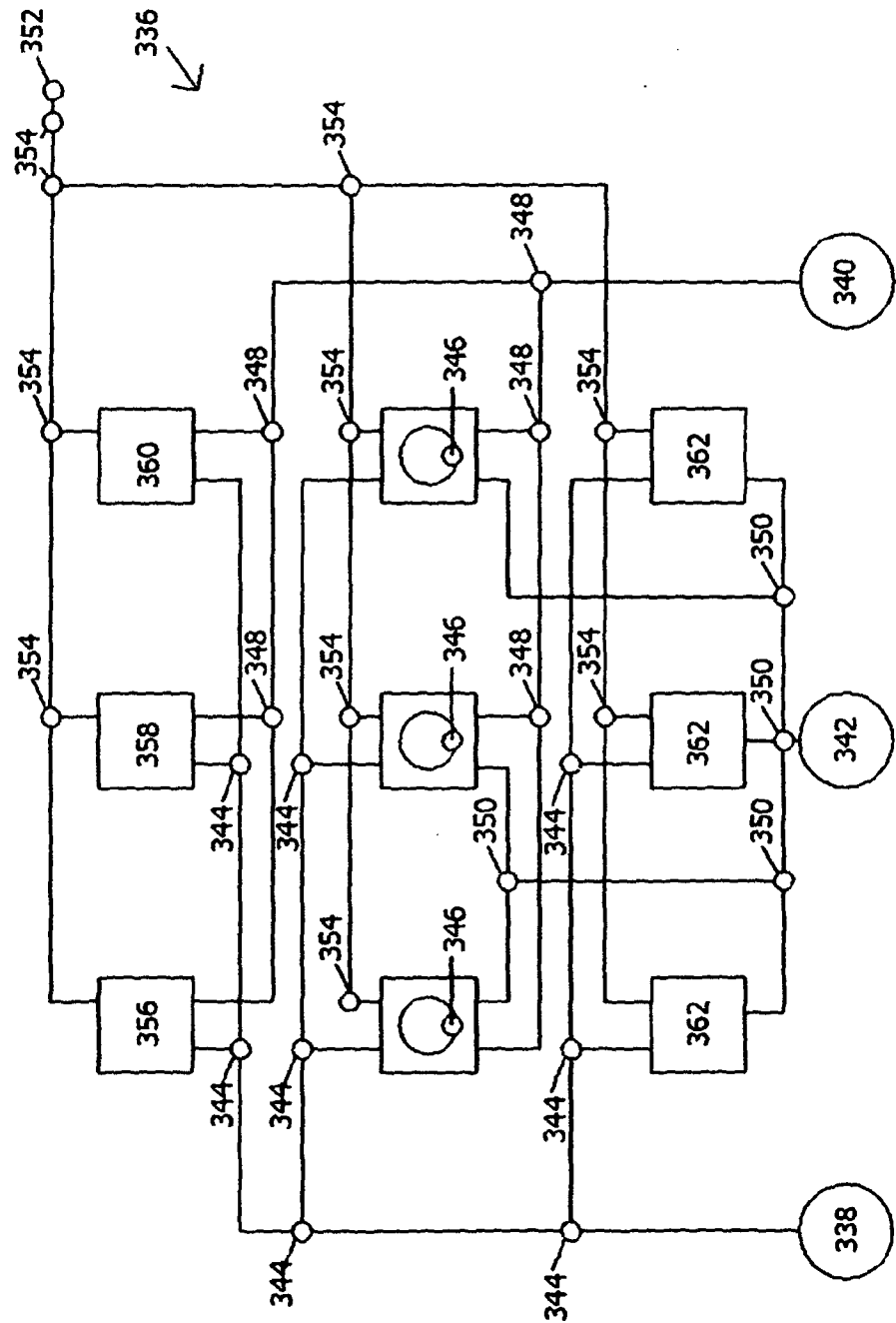


Fig. 20