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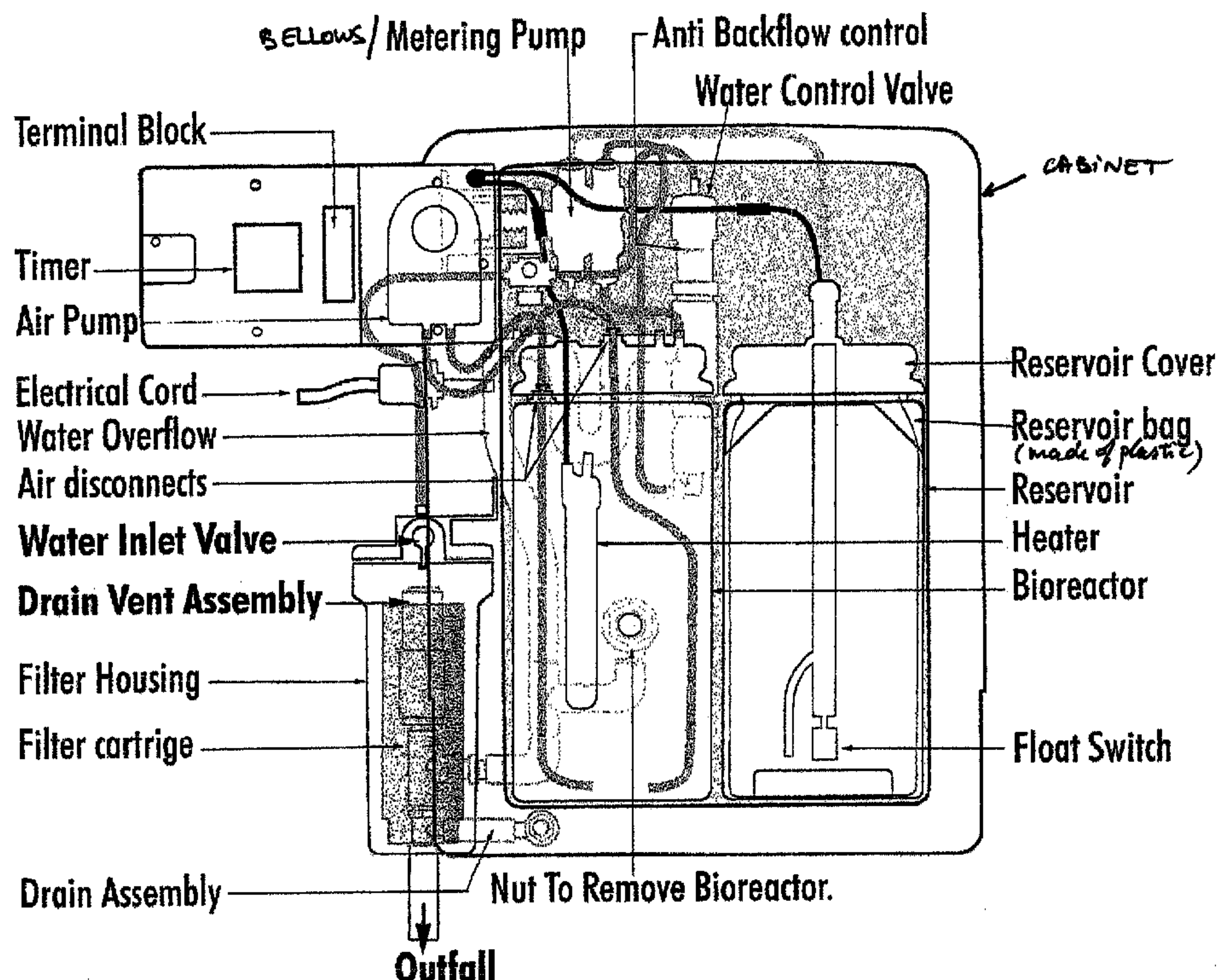
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(54) Titre : SYSTEME AMELIORE DE CROISSANCE ET DE CONDITIONNEMENT POUR LES PRODUITS DE BIOAUGMENTATION UTILISES DANS LE TRAITEMENT DES EAUX USEES

(54) Title: IMPROVED GROWING AND CONDITIONING SYSTEM FOR BIOAUGMENTATION PRODUCTS USED FOR THE TREATMENT OF WASTE WATER



IMPROVED GROWING AND CONDITIONING SYSTEM
FOR BIOAUGMENTATION PRODUCTS USED FOR THE
TREATMENT OF WASTE WATER

BACKGROUND OF THE INVENTION

a) Field of the Invention

The present invention relates to an improved growing and conditioning system also called "improved Bacta-Pur[®] BACTIVATOR" in the following description, which is devised to continuously preactivate or precondition
10 bioaugmentation products.

This system is designed for the treatment of water from a variety of sources. More specifically, the improved Bacta-Pur[®] BACTIVATOR is intended to be used for water body restoration, which encompasses an indefinite number of areas. Examples include wastewater treatment plants (WWRP), aquaculture, industrial waste treatment, lake restoration, etc.

b) Brief Description of the prior art

A system of the above mentioned type is presently
20 being sold by the Applicant, IET-AQUARESEARCH INC., of North Hatley (Quebec). Such a system which is also called "Bacta-Pur[®] BACTIVATOR", is actually an automatic system, which continuously grows, conditions and delivers precise quantities of actively growing beneficial microorganisms selected for their ability to digest grease, clean pipes and prevent causes of noxious odors. The existing Bacta-Pur[®] BACTIVATOR is designed and engineered to overcome inadequacies of other previous systems. Dormant cultures

poured or pumped from a bottle or pail flow through and out of a grease trap or pipe line before they even wake up. Grease traps and pipes receive intermittent doses of cleansers and sterilizers that kill microorganisms - the good with the bad. Continuous addition of famished cultures, of the highest concentration, is the only way to maintain effective communities of beneficial microorganism within grease traps and drain lines.

The existing Bacta-Pur[®] BACTIVATOR has been
10 engineered to overcome cost-effectively all of the above challenges by automatically performing the following operations.

1. grow the beneficial microorganisms to increase their numbers;
2. activate the beneficial microorganisms to be in a rapid phase of growth, to digest grease and sludge, prior to their addition to the traps and drains;
3. add precise quantities of active, famished cultures not just dormant ones 24 hours/day.

20 The existing Bacta-Pur[®] BACTIVATOR contains five principal components, which are mounted in a rotomolded cabinet made of polyethylene (see Fig. 1 identified as "prior art"). These components include:

- a reservoir;
- a dual head dosing pump;
- a bioreactor;
- an electrical system; and
- an integral backflow prevention system.

More specifically, the reservoir contains up to a 30 day supply of beneficial microorganisms and nutrients, thus minimizing filling frequency.

The dual head dosing pump delivers precise quantities of the beneficial microorganisms/nutrient mixture and water to the bioreactor.

The bioreactor has two growth chambers. Aeration is supplied to both chambers by an air pump. The first chamber, which receives the incoming beneficial micro-organisms/nutrients and water, contains an immersion heater to maintain the optimal growth temperature. This chamber serves to bring the beneficial microorganisms out of dormancy and to begin their growth. The flowing culture then enters the second growth compartment before leaving the system and being fed into the drain or grease trap.

The electrical system is used to operate the whole system.

Last of all, the integral backflow prevention system is used to eliminate any possibility of back flow into water lines.

SUMMARY OF THE INVENTION

The present invention is concerned with improvements made to the basic structure of the existing Bacta-Pur[®] BACTIVATOR as briefly disclosed hereinabove.

More specifically, it is concerned with an improved, fully automated modular on-site system for use to continuously grow and physiologically condition microorganisms to obtain optimal condition and activity.

The basic differences between this improved system and the existing one as briefly disclosed hereinabove in the "Brief description of the prior art" are the following.

1. The arrangement of the reservoir and bioreactor has been altered to facilitate a more efficient servicing of the system. The positioning of the reservoir and bioreactor has been changed to a side-by-side arrangement, but these two component could also be positioned in a front-to-back arrangement or a top and bottom (one sitting on top of the other) arrangement.
2. The door latching/locking system has been updated to exclude the necessity of an external latching system. The new design improves the "ease of use" of the door and eliminated the external bulky hardware previously employed. The door now opens a full 180° to facilitate servicing. Moreover, the locking mechanism has been simplified and improved to provide a more secure closure.
3. The design of the system has been optimised so that the same "footprint" can now accommodate a larger volume of microorganisms. The effect of this is to increase the ability of the units operational window (operating time) without requiring addition service time by service personnel - this is a space saving, compact design.
4. The electrical components have been incorporated into a modular unit, which allows for easier access (servicing), for a more safe design (self contained) and for more efficient production as this modular electrical unit now becomes a manufacturing "sub-

assembly". The self-contained module is a hinged "electrical tray", thereby facilitating access.

5. The "mounting system" has been re-designed to allow for "one person installation". The mounting plate can be installed by one person. Then, the improved Bacta-Pur[®] BACTIVATOR can be simply lifted onto the tabs, which simply slide into the openings on the back of the unit.

10 6. The bioreactor has been re-designed for more efficient operation. Instead of using a bioreactor having two separated compartments, use is now made of a single bioreactor partitioned to allow for the incorporation of two vessels within a single unit. The partitioning allows for a more controlled and consistent temperature during the activation process, while utilising only one heater. This also allows for improved/optimal environmental control.

In addition to the above, the following additional improvements have been made:

- 20 7. The design of the cabinet has been updated to accommodate a total capacity of 30 litres of liquid products and a total weight capacity of 40 kilogram.
8. The design of the cabinet includes a drain assembly that has been incorporated into the structural design.
9. Moreover, the reservoir has been designed with an ergonomic handle to facilitate servicing.

The invention and its numerous advantages will be better understood upon reading the following, non-restrictive description made with reference to the
30 accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevational view of the existing Bacta-Pur[®] BACTIVATOR disclosed hereinabove in the "Brief description of the prior art";

Fig. 2 is schematic representation of the way the system shown in Fig 1 can be installed in use;

Fig 3 is a front elevational view of a preferred embodiment of the improved Bacta-Pur[®] BACTIVATOR according to the invention;

10 Fig 4 is a front perspective view of the cabinet of the improved Bacta-Pur[®] BACTIVATOR shown in Fig. 3; and

Fig. 5 is a flow chart showing the interrelationship between all the components of the improved Bacta-Pur[®] BACTIVATOR according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

As aforesaid, the improved Bacta-Pur[®] BACTIVATOR according to the invention is an automatic system which continuously preactivates or preconditions bioaugmentation products.

20 More specifically, the improved Bacta-Pur[®] BACTIVATOR according to the invention automatically performs the following operations:

1. it grows the bacteria to increase their numbers;
2. it physiologically engineers or conditions the microorganisms to be in a rapid phase of growth prior to their addition to the waste water treatment system;

3. in the preactivation mode of operation, the cultures are grown then deprived of food so that they leave the machine famished to solubilize grease, protein and/or sludge immediately, and

4. in the preconditioning mode of operation, it induces the bacteria to synthesize the internal enzymes to biodegrade refractory products such as site-specific hydrocarbons.

The improved Bacta-Pur[®] BACTIVATOR according to
10 the invention contains four principal components, which are mounted in a cabinet made of rotomolded polyethylene. This cabinet which is illustrated in Fig. 4, has a hinged door and an internal latching/locking mechanism allowing the door to be padlocked. This mechanism has actually been updated to exclude the necessity of an external latching system. The new design improves the "ease of use" of the door and eliminated the external bulky hardware previously employed. The door now opens a full 180° to facilitate servicing. Moreover, the locking mechanism has been
20 simplified and improved to provide a more secure closure.

The principal components mentioned hereinabove are shown in Figs. 3 and 5. They include:

- (1) a reservoir for the microorganisms and nutrients,
- (2) a multi-step bioreactor,
- (3) a water conditioning system, and
- (4) an electrical control devise.

The reservoir is preferably made by rotomolding. It contains a supply of beneficial bacteria (bioaugmentation product) and nutrients. They are stored in a
30 disposable plastic bag, which is changed at the monthly filling and then discarded. This avoids contamination in

the reservoir from the mixing of old and new product. A bellows/metering pump controlled by the timer, transfers a measured amount of the bacterial/nutrient mixture to the bioreactor preferably 250 times a day. A low level float switch is mounted, within the reservoir. This switch sends a signal to a red indicator light on the cabinet front face when the reservoir needs to be refilled.

Water is introduced into the improved Bacta-Pur[®] BACTIVATOR through an activated carbon filter including a cartridge mounted in a housing (as is illustrated in Fig. 3) and/or through an ultraviolet sterilizer/filter unit (not illustrated). Water passes through a pressure regulator to reduce the incoming pressure to a reset PSI. Water then enters a water well through a pressure compensating drip emitter and/or a flow control valve. This limits the daily water consumption to a measured hourly amount. Another bellows/metering pump, controlled by the timer, transfers a measured amount of the water from the bottom of the water well to the bioreactor preferably 250 times a day. Excess water not needed for the processes is allowed to overflow the water well through a "P" trap to the outfall of the machine.

The bioreactor of the improved system is preferably made also by rotomolding. It is in the form of a single container comprising two compartments or growth chambers, with aeration in each compartment. Air is supplied to the bioreactor by an internally mounted dual chambered air pump. The first compartment contains an immersion heater, preset to control and maintain temperature. The first compartment receives the incoming bacteria/nutrients and water, transferred by the

bellows/metering pump. This compartment serves to bring the bacteria out of dormancy and to begin their growth. As more bacteria/nutrients are added to the first compartment, the bacterial culture transfers from the first compartment in the second compartment allowing the hydraulic retention time for each different product to be met. Fully activated cultures continuously flow from the Bacta-Pur[®] BACTIVATOR. Such a partitioning allows for a more controlled and consistent temperature during the activation process, while
10 utilising only one heater. It also allows for improved/optimal environmental control.

Of course, an electrical control device is provided to operate the system. This device is made available for 120v, 60Hz or 220-240v, 50Hz service. UL/CSA approved components are used. Wires for the timer and main terminal block are contained in a hinged covered compartment at the top of the cabinet and behind the cabinet door. Wires for the other components are induced from the main terminal block to each component. A
20 power cord is provided on the unit.

As aforesaid, all these electrical components are incorporated into a modular unit, which allows for easier access (servicing), a more safe design (self contained) and it allows for more efficient production as this modular electrical unit now becomes a manufacturing "sub-assembly". The self-contained module is a hinged "electrical tray", thereby facilitating access.

The advantages of all these improvements have already been emphasizing hereinabove"

30 In practise, this improved Bacta-Pur[®] BACTIVATOR can be used by carrying out the following steps.

Water & Drain Connection

- 1- Connect outfall from cabinet to drain or entrance to the area or structure to be treated. Use either a barb connector with a flex hose or preferably a rigid pipe.
- 2- Attach water filter assembly to the bolts protruding from the right side of the cabinet.
- 3- Insert water line protruding from the side of cabinet into the quick release connector on the filter.
- 4- Connect cold water line to the inlet of the filter housing.
- 5- Turn on water entering filter.

Bioreactor Connection

- 1- Fill the two compartments with tap water until the water flows out of the second bioreactor compartment to the outfall.

Water Well Connection

- 1- Fill a syringe with water from the bioreactor and then transfer this water to the Water Well.

Bacteria/Nutrient Reservoir Connection

- 1- Carefully fill the bag in the reservoir to the line indicating the correct amount of bioaugmentation product. Then fill to the next line with nutrient.
- 2- Place a rigid pipe containing the level switch and the yellow suction line from the pump into the reservoir. The cover should be tightened onto the top of the reservoir container, and the pipe should be pushed

down until the float switch just touches the bottom of the reservoir.

Priming of the Pumps

- 1- Lift the cover of the bioreactor to have access to nipples acting as the feed lines of the water and bacteria/nutrients. Connect the tubing on the syringe to one of the nipples and then fill the syringe. This will have filled the lines and pump head. Empty the syringe into the bioreactor.
- 2- Repeat the process with the second nipple, and again empty the syringe into the bioreactor. Both pump heads should now be primed.

Energizing the Unit

- 1- Plug the electrical connection into a GFI protected receptacle of the correct voltage. A small amount of liquid should be seen being pumped briefly from the water line and from the reservoir of beneficial microbes/nutrients. The pump is programmed to work intermittently; the flow is not continuous. The flow rates will be adjusted at the factory, prior to shipment.

Application number/ Numéro de demande : 2368407

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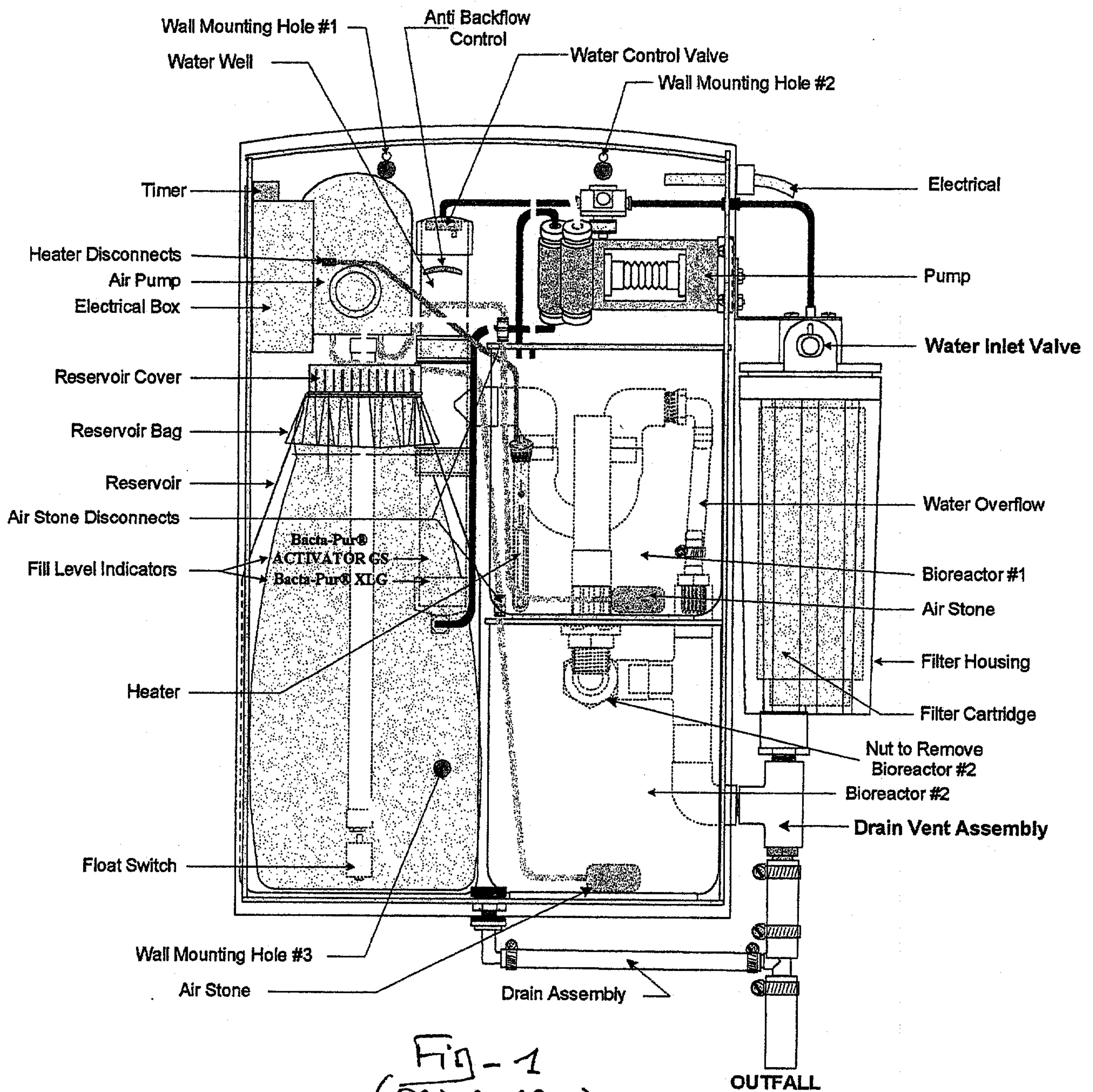


Fig-1
(PRIOR ART)

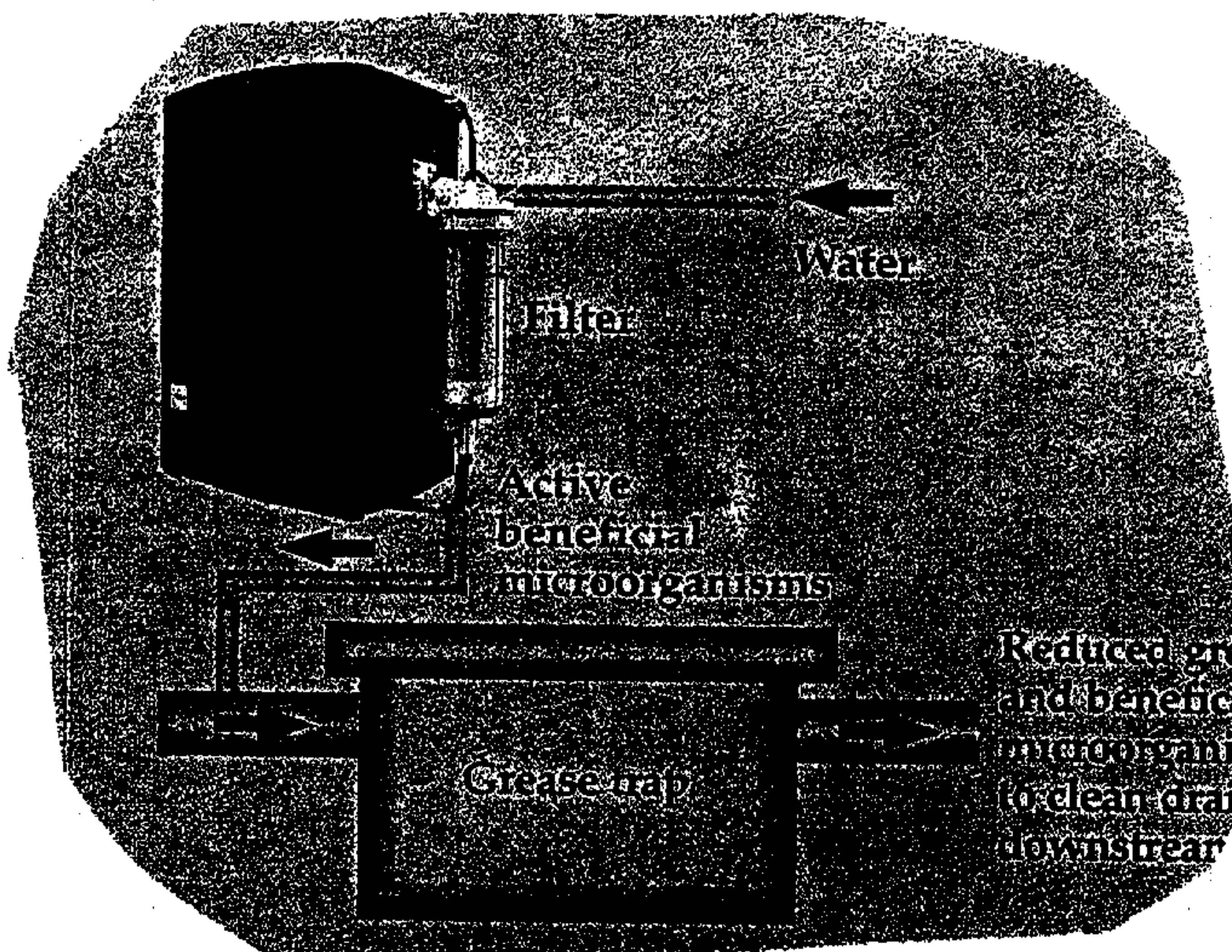
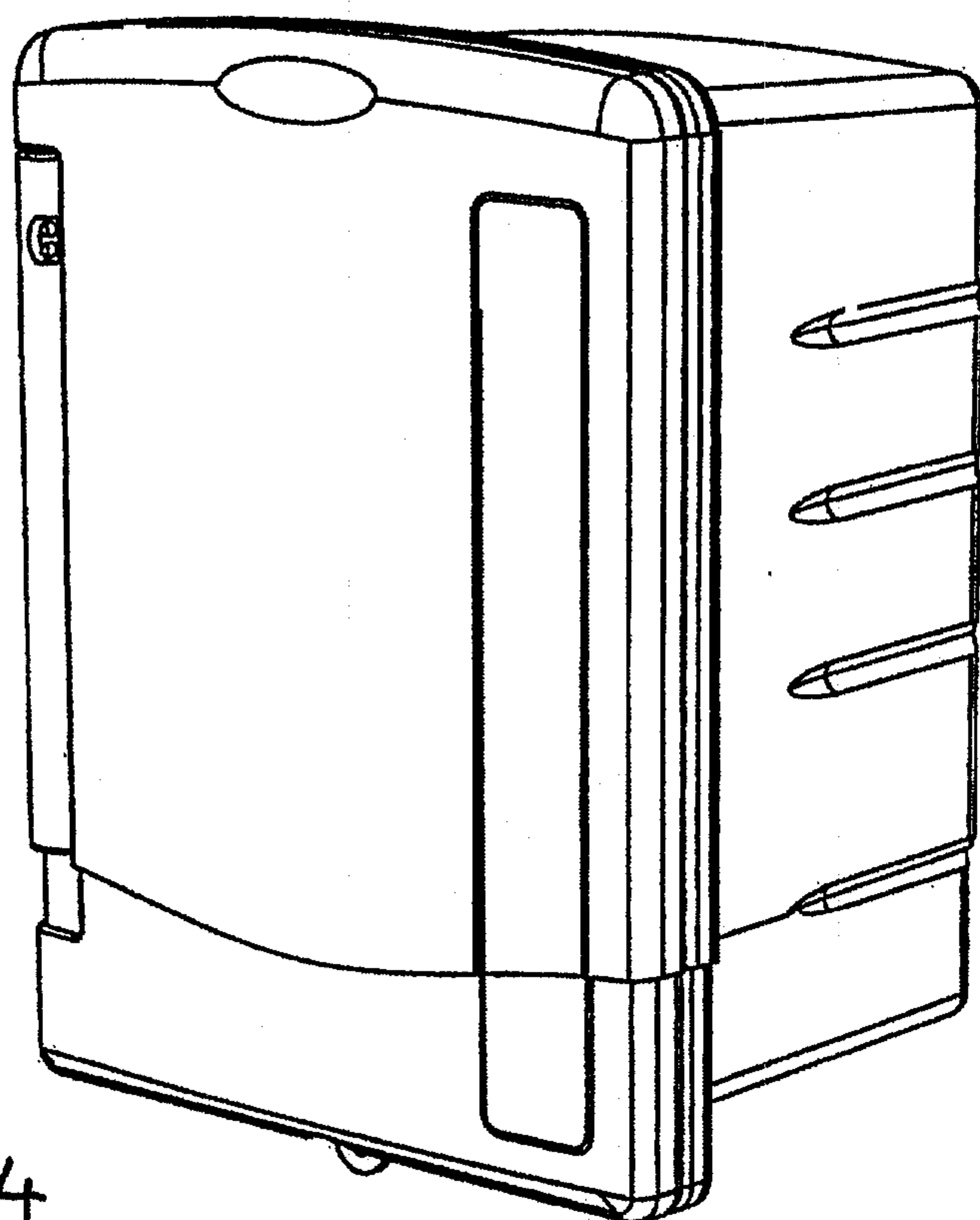
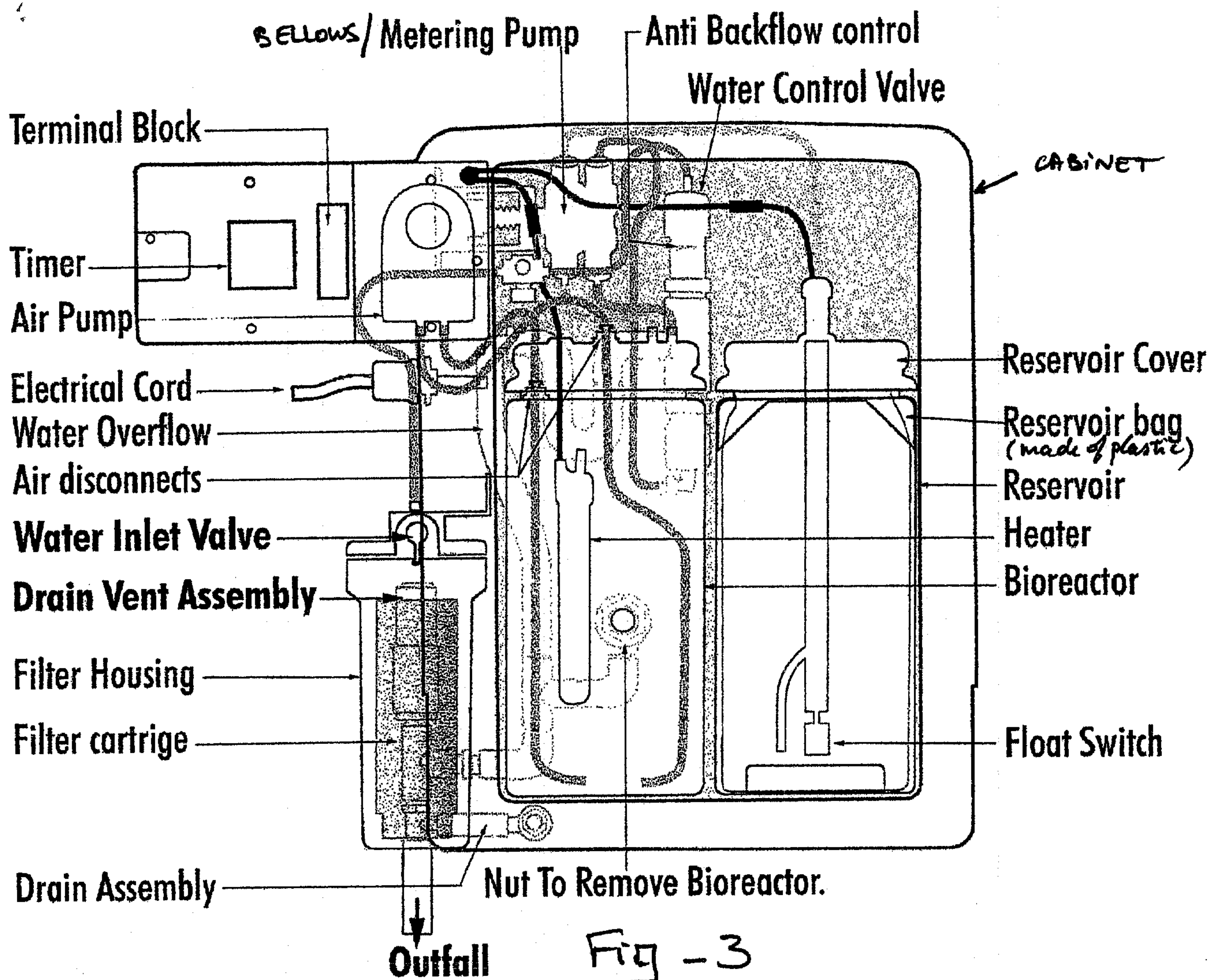


Fig-2



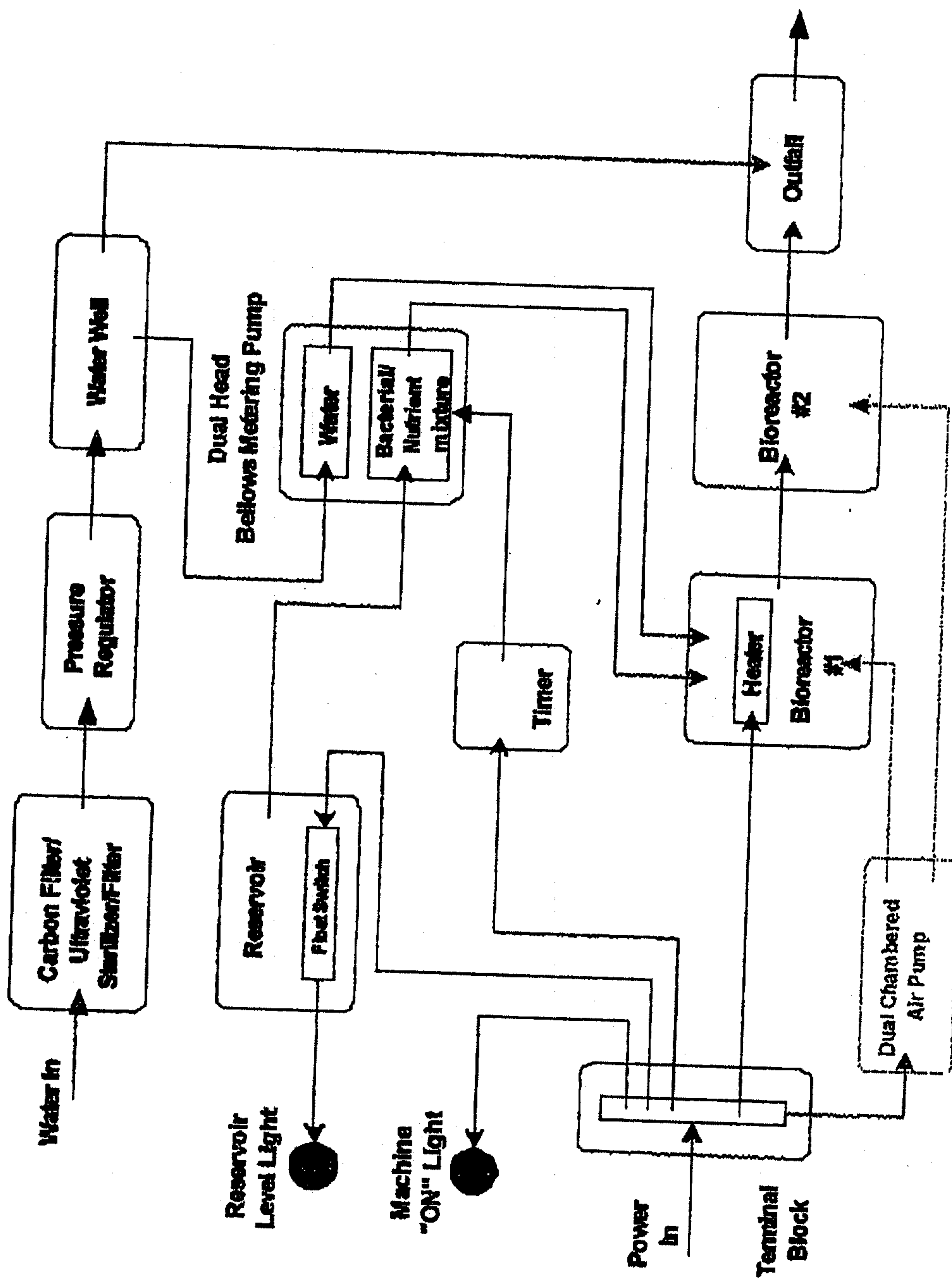


Fig-5

BELLOWS / Metering Pump

Anti Backflow control

Water Control Valve

Terminal Block

CABINET

Timer

Air Pump

Electrical Cord

Water Overflow

Air disconnects

Water Inlet Valve

Drain Vent Assembly

Filter Housing

Filter cartridge

Drain Assembly

Nut To Remove Bioreactor.

Outfall

Reservoir Cover

**Reservoir bag
(made of plastic)**

Reservoir

Heater

Bioreactor

Float Switch

