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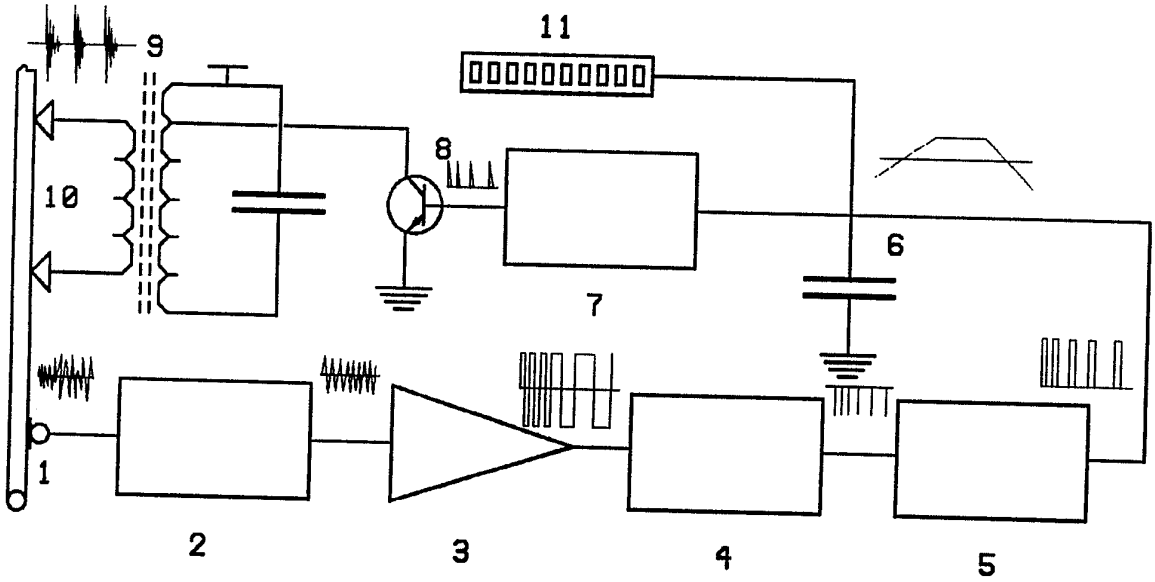

(57) Abstract

A water conditioner using a radio signal, the power of which directly varies with the flow of the water. The conditioner is attached to the water system by a novel method. The power output is controlled by three independant sources, the turbulance created by the rate of flow of water, the turbulance created by the amount of limescale in the water system and the activity in the premises which is an indicator of the future usage of water. The method of connection utilizes electrical contacts on the water conditioner, which are held fast to the water system by means of ties. The water conditioner treats the water in a manner which results in the efficient transfer of heat through the water. This effect reduces heating and energy usage.

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+ DESIGNATIONS OF "SU"

It is under examination in which parts of the former Soviet Union the designation of the Soviet Union has effect.

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DESCRIPTION

WATER CONDITIONERS

This invention relates to an electronic water conditioner.

Water conditioners are well known. They are used to prevent the build up of hard scale in domestic and commercial hot or cold water systems. Such an effect is achieved by additional energy being provided to the water in the form of a magnetic or electromagnetic field. The result is that the salts flowing through the system are altered. This alteration of the molecular structure is manifested in the increase in size of the crystals which remain in suspension and do not appear to bond together in the same way as do the small crystals.(in a similar way that ice crystals bond together and snow crystals do not). Additionally the crystaline structure of the hard scale which has already formed in the pipework slowly alters, softening and dissipating into the water and then harmlessly passes through the system.

They fall into five catagories.

1. In line with magnets in direct contact with the water flow. These magnets collect magnetic debris present in the water flow which passes through the device. This build up of debris progressively reduces the effectiveness of the magnets. Such devices are effective only when the water is in motion and have no effect when the water is still. Additionally the build up of debris on the magnetic surface can occlude the pipe and thus reduce the flow of water. They require considerable installation work.

2. In line by electrolytic effect. This type introduces undesireable metals into the water. As the electrodes are eroded they lose effectiveness and will ultimately need replacing. The device restricts the water flow and requires considerable installation work.

3. In line with chemicals being introduced into the water system. Such devices need constant replenishment of chemicals. They require considerable installation work.

4. In line and having a magnetic field generated by an electromagnet. This type suffer all the drawbacks as described in catagory 1 above and are more expensive. They require considerable installation work.

5. Electronically with an electromagnetic field being produced and applied externally to the system. Such a device produces a constant effect and is unable to recognise whether the water is still or flowing. The effectiveness of the device is therefore limited in its ability to condition the water in the system since the output of the device cannot vary with water flow. Such devices require little installation work.

According to the present invention there is provided a water conditioner contained in a plastic box with means to attach it directly to the water system. The present invention falls within catagorie 5 above, but employs a novel technique in the way the high frequency is applied to the water. It

differs from other water conditioners in that it has the capability to apply an amount of energy to treat the water, which is relative to the flow of the water passing through the pipe and the amount of limescale already built up within the system.

The frequency used is a lower end radio wave and could be between 200 and 500 KCs. The water conditioner produced as a result of this invention detects the audio frequency and amplitude which is created by the turbulance of the water passing through the water system. The conditioner automatically adjusts the level of high frequency which is released to the water so that the amount of treatment directly relates to the flow of water and the amount of limescale deposits. As the deposits dissipate into the water flow, the frequency and amplitude which result from the turbulance will be reduced thus the level of treatment will be adjusted accordingly.

The water conditioner could be easily tuned to each individual installation by a simple control on the device which enables the maximum power to be set and this can be established by utilising the built in LED power level metre whilst the cold water tap is running.

Only a system which employs the use of an electromagnetic field will propogate throughout the system. This invention is unique in that it is able to adjust the level of electromagnetic field relative to the turbulance in the system which is represented by the level of flow and limescale deposit.

According to another aspect of the invention it should be appreciated that this aforementioned propogation will work both with the flow or against the flow of water, which means that if there is limescale blockage in the feed pipe, this may also be positively treated.

Another aspect of the invention is the way the radio frequency is applied to the water pipe. A very low impedance output radio source is used so that the section of pipe to which the unit is connected forms an electromagnetic loop. This induces an electromagnetic field in the water. In the event that a plastic pipe is used, copper foil is wrapped around the pipe to produce the same effect.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows electronic layout of the water conditioner.

Figure 2 shows box attached to the water pipe.

Referring to the drawing of the electronic layout of the water conditioner the circuit is described thus:-

1. Microphone connected to the box which is in physical contact with the water pipe. The microphone picks up any sound that is generated as a result of the turbulance inside the pipe. This turbulance relates to the surface effect of the water passing through the pipe as well as over obstructions such as limescale deposits.
2. Adjustable Filter which filters out sounds not connected to the sounds of the water passing through the water pipes.

cont

3. Differential Amplifier used to amplify the signal from the filter in preparation for pulse shaping. This stage is also contollable by an outside control(see fig 2) to set the correct power level for individual installation.

4. Pulse Shaping Network and Differentiator. This converts the frequency into shape pulses which relate to the frequency of the signal.

5. Monostable to convert the variable frequency pulses to a frequency square wave.

6. An average stage converting the square wave signal to a voltage which relates to the frequency of the square wave.

7. A variable frequency astable, this stage converts the voltage from the averager to a variable frequency train of pulses.

8. Power output stage, this converts the pulses to a diminishing sine wave in the range 200 to 500 KC

9. HF output transformer with adjustable ferrite core converts to a low impedance output which is fed to the water pipe. The low voltage high current signal induces an electromagnetic field to the water which generates the descaling action.

10. Connector system which transfers the signal from the output transformer to the pipe. This can consist either of either copper pads with plastic ties connecting it to the pipe or a spring loaded catch which wraps round the pipe and connects the signal to it.

11. Power level indicator connected to the averager consisting of 10 light emitting diodes which can be connected to form a bar graph or moving dot effect. This visual is directly related to the power output.

CLAIMS

1. Water Conditioner comprising of one or two boxes which can be of plastic or any other suitable material. Such a box may be connected to the water system by means of one or more ties which can be of plastic or any other suitable material. Electrical contact with the water pipe or water system is made by the use of two or more connecting contact points mounted on the box and drawn close to the pipe or water system by means of the ties. This connection of the box to the water system may also be achieved by two spring loaded clips or by any other suitable method of connecting the points of contact from the H.F.Transformer to the water system. This aforementioned electrical connection is established in order to enable a low impedance variable radio source to transmit to the water, an electomagnetic field of variable intensity.

   A microphone is contained within the box together with the H.F.transformer. This sensor enables the power of the unit to be directly related to the flow of the water. This aforementioned microphone is able to detect the audio frequency generated by the turbulance due to the flow of water and the turbulance due to the presence of limescale in the system as well as detecting the audio frequency generated by activity around the conditioner.

   A water conditioner wherein the application of the electromagnetic field to the water effects the heat conductivity of the water and thus increases the heat transfer of the heated water to anything whatsoever to which it comes into contact.

2. A Water Conditioner as claimed in Claim 1 wherein the low impedance radio source induces a voltage in the water which produces a transformer effect in order to create currents which flow through the water system.

3. A Water Conditioner as claimed in Claim 1 and Claim 2 wherein the low impedance radio source generates a propogating electromagnetic field in order to produce circulating currents throughout the system.

4 A Water Conditioner as claimed in Claim 2 or Claim 3 wherein a microphone is fitted to pick up audio frequencies. Such frequencies are generated by turbulance in the water system relating to the presence of limescale and any other audio frequency due to human activity. These audio frequencies are converted to an electrical signal which is fed to a filter which filters out unwanted frequencies. Thus the power output is controlled relative to the flow of water, the amount of limescale and the activity in the premises.

5. A Water Conditioner as claimed in Claim 1 and Claim 4 wherein any other suitable method is employed whereby the power put into the water system is proportional to the flow of water.

6. A Water Conditioner as claimed in any preceeding claim wherein a differential amplifier or any other suitable amplifier is used to amplify the signal from the filter in preparation for pulse shaping.

7. A Water Conditioner as claimed in Claim 6 wherein a pulse shaping network and differentiator are used to convert the frequecy signal from the amplifier into a train of sharp pulses which relate to the frequency of the signal.

8. A Water Conditioner as claimed in Claim 7 wherein a monostable is used to convert the variable frequency train of pulses into a variable frequency square wave.

9. A Water Conditioner as claimed in Claim 8 wherein an averager is used to convert a square wave signal to a DC voltage which relates to the frequency of the square wave where this aforementioned averager may be adjusted by external control to determine power level for each individual installation.

10 A Water Conditioner as claimed in Claim 9 wherein a variable frequency astable is used to convert the voltage from the averager to a variable frequency train of pulses.

11. A Water Conditioner as claimed in Claim 10 wherein a power output stage is used to amplify the variable frequency train of pulses.

12. A Water Conditioner as claimed in Claim 11 wherein a tuned ferrite transformer in a single or seperate box is used to convert the train of power pulses into a diminishing sine wave signal.

13. A Water Conditioner as claimed in Claim 12 wherein an H.F ferrite transformer is used to convert the H.F.signal to a low voltage high current signal source.

14. A Water Conditioner as claimed in Claim 1 and Claim 13 wherein a connector system is used to transfer the signal from the H.F.transformer to the water system.

15. A Water Conditioner as claimed in Claim 14 wherein a power level indicator is used which is connected to the averager this may consist of ten LEDs or any other number of LEDs or any other means of power indication, which can be connected to form a bar graph effect or a moving dot effect or a varying single dot effect thus indicating the power level.

16. A Water Conditioner as described herein with references to Fig 1 and Fig 2 of accompanying drawings.

17 A Water Conditioner as claimed in all preceeding claims where any of the circuitry stages are omited or added and which the circuitry can be divided in one or more boxes but still generally produce the same effect to achieve the same ends.

18. A water conditioner as claimed in claim 1 wherein the transfer rate of the electromagnetic field to the water is strong enough to effect the heat conductivity of the water and propogate this field to the hot water and central heating system. Thus so produced, the treated water will increase the efficiency of the heat transfer of the boiler and the heat transfer to the radiators. The heat transfer thus being more efficient will be hotter to the touch and this will result in the lowering of thermostats and thus lower energy usage.

19. A Water Conditioner as claimed in claim 1 and 18 wherein the transfer rate of the electromagnetic field to the water is strong enough to effect the heat conductivity of the whole body of water in a private or commercial swimming pool thus enabling a reduction of the temperature in the pool without discomfort to the users. As a result of this change in conductivity of the water the boiler will be far more efficient thus saving additional energy usage.

AMENDED CLAIMS

[received by the International Bureau on 19 November 1991 (19.11.91); new claims 20 - 26 added; other claims unchanged (1 page)]

20 A water conditioner as in all proceeding claims whereby the propagating electromagnetic field is applied to speed coagulation and settlement of fine suspended solids in any process where such settlement is required.

21 A water conditioner as claimed in claim 20 wherein the electromagnetic field is applied to metal barrels containing beer for the purpose of rapidly settling the fine suspended solids.

22 A water conditioner as claimed in claim 20 wherein the propagating electromagnetic field is applied to the water storage tank in a water treatment station for the purpose of rapidly settling the fine suspended solids without the need of chemical coagulates.

23 A water conditioner as claimed in claim 20 wherein the propagating electromagnetic field is applied to a sewerage works settling tanks, for the purpose of rapidly settling the suspended solids in the water therein. Such treatment would facilitate a far higher quality of treated water being discharged into rivers.

24 A water conditioner as claimed in claim 20 wherein the propagating electromagnetic field is applied to the aging tanks used in the process of brewing beer, for the purpose of rapidly settling the suspended solids thus speeding up the settling process(known as the aging process).

25 A water conditioner as claimed in claim 20 wherein the propagating electromagnetic field is applied to the settling tanks used in wine making, for the purpose of rapidly settling solids and speeding up the wine making process.

26 A water conditioner as claimed in claim 20 wherein the propagating electromagnetic field is applied to the fuel line of any internal combustion engine, thus modifying the hydrocarbons to improve combustion and reduce emissions of harmful gases, eliminating the need of a catalytic converter

STATEMENT UNDER ARTICLE 19

The further claims made by me **No 20 - 26, are NEW** and within time, These additional claims were formulated as a result of further applications which became apparent during my own experiments with the water conditioner.

These further new claims for my invention did not come to light from material sent to me as a result of the official search for prior art.

Since non of the claims relate in any way to the material sent, I submit that my further claims be admitted by The International Bureau and be published in their entirety at the appropriate time.

1/2

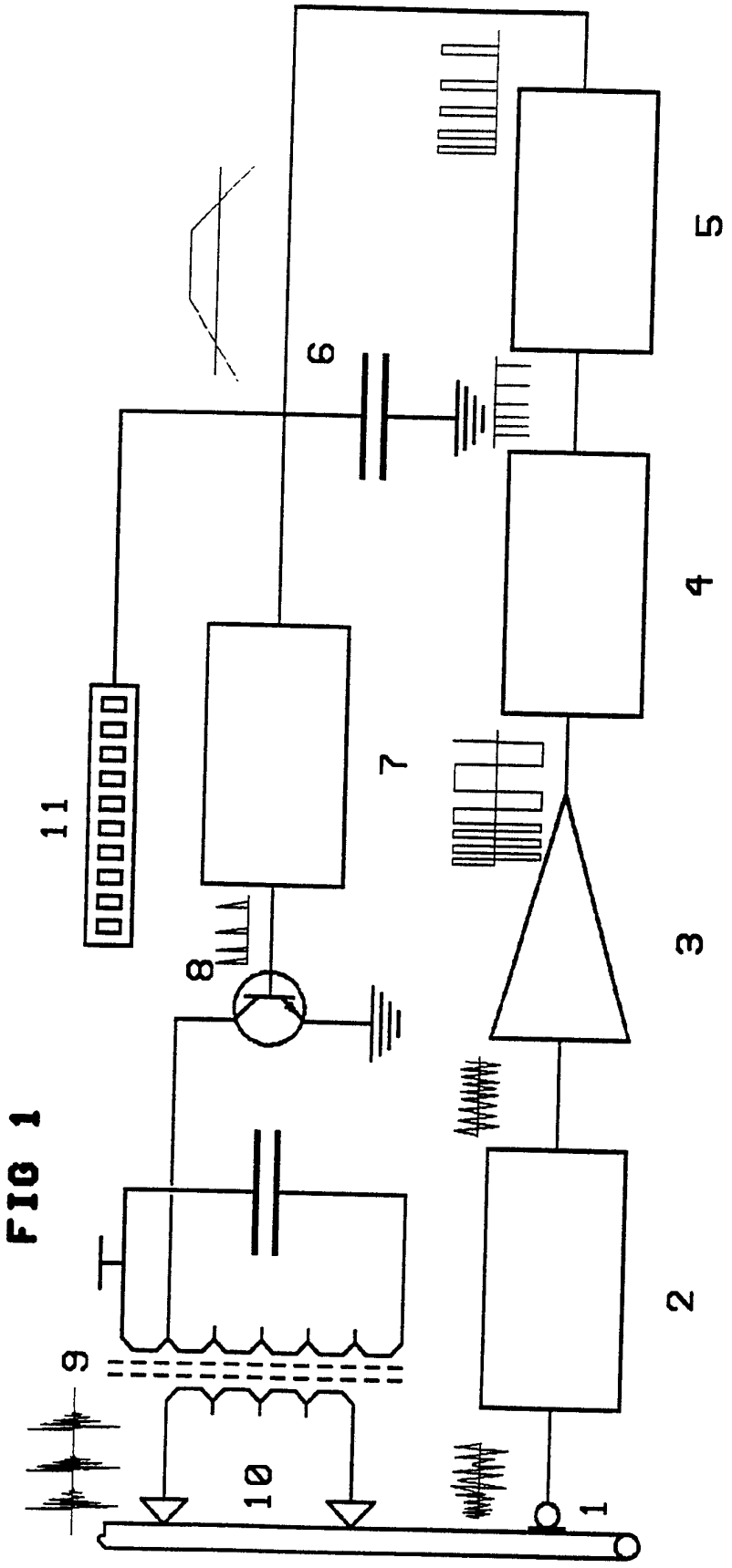

FIG 1

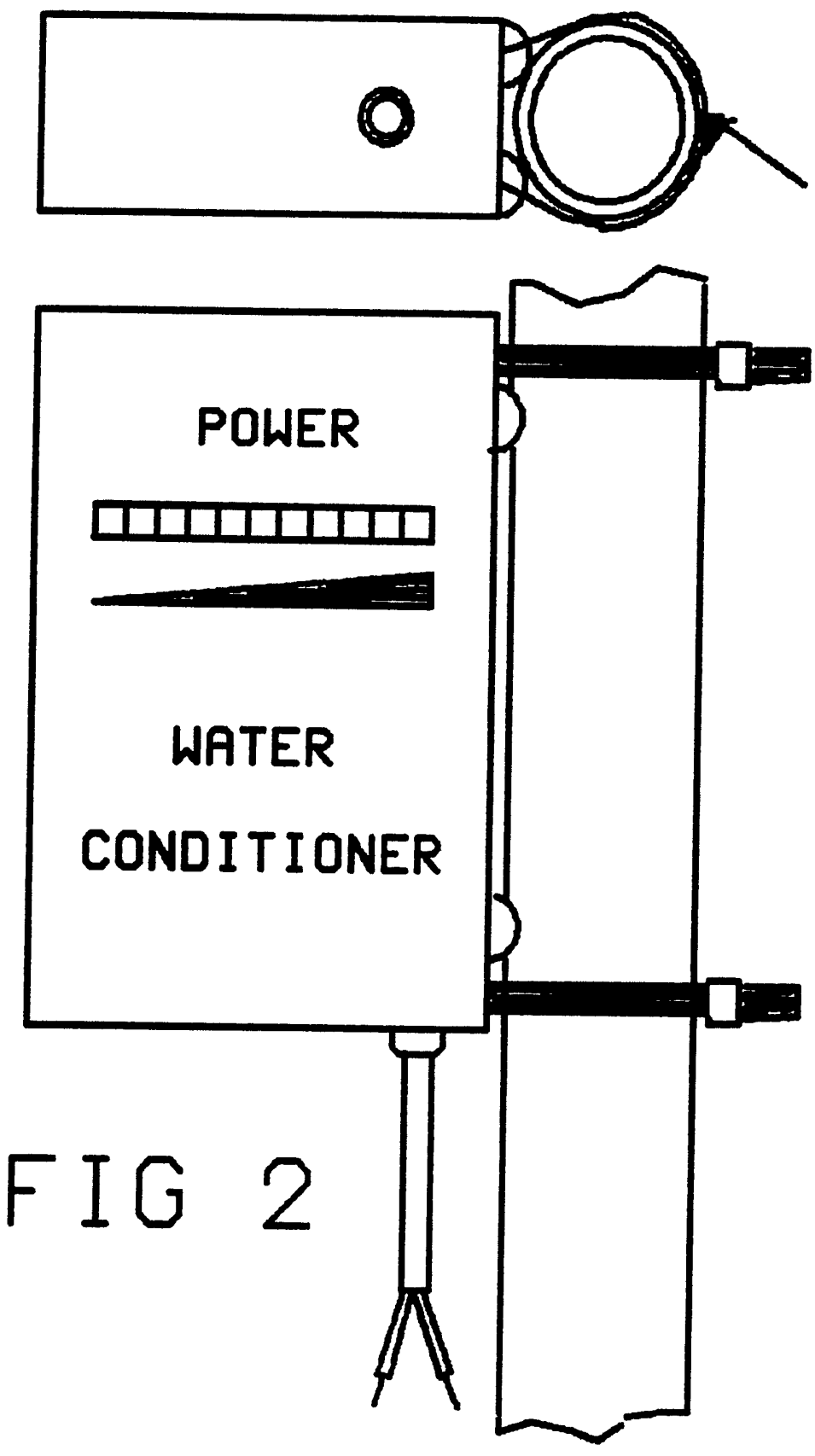

FIG 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 91/01119

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 C02F1/48

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	C02F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
A	EP,A,0 338 697 (AQUA DYNAMICS GROUP) October 25, 1989 see claims 1-8	1
A	EP,A,0 357 102 (J.P. DE BAAT DOELMAN) March 7, 1990 see summary	1
A	DE,A,3 225 806 (M.P. JIMINEZ) January 12, 1984 see summary	1
A	DE,U,8 913 491 (A. TORMÖLLEN) February 1, 1990 see claims 1,5	1

° Special categories of cited documents :[10]

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
02 OCTOBER 1991	- 9. 10. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	KASPERS H.M.C.

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9101119
SA 49274

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
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02/10/91

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0338697	25-10-89	US-A- 4865748	12-09-89
		US-A- 4963268	16-10-90
		AU-B- 605686	17-01-91
		AU-A- 3303089	26-10-89
		JP-A- 2043983	14-02-90
EP-A-0357102	07-03-90	NL-A- 8802179	02-04-90
DE-A-3225806	12-01-84	None	
DE-U-8913491	01-02-90	None	