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The collections and the processing methods and devices of the rainwater

Technique realm

The invention involves a kind of device and method to collect and process rainwater, especially the rainwater from the sea or the land.

Background technique

In the Coastal cities which involves groups of islands and large population, the supply of the fresh water is a big problem. Desalting seawater costs so much high. So it is great to invent a kind of method and device costs lower to collect and process the fresh water.

To satisfy the fresh water supply of the coastal cities with large groups of islands and population, the invention supplies a device and method to collect and process the rain water.

It is realized as follow

A device to collect the rainwater which contains the device to receive rainwater and the device to remain the water, and they are linked by the pipe.

The rain receiver floats on the sea, top of which is open. And there is a hole at the bottom to educe the rainwater. The hole is linked with a pipe.

The storage device can be fixed or be floating.

The rainwater container of the invention float on the sea, size of which can be changed .the infall is linked with the infall pipes while the out with out pipes. The method can be used in the coastal cities with small lands and large population when the wave is small. The rainwater storage container can be made of soft stuff such as rubber or plastic. The container also can be made of composite stuff, which is made of rubber and plastic as water separating stuff. The rubber or plastic is smeared on one or two sides of the fibre fabric; on the other hand, the fibre fabric is used as intention stuff while the rubber and plastic as water separating stuff. They can change their bulk by changing the size when the water reserves change. When the water storage bulk changes the rainwater container adapt to this change by change the size of the container naturally and the depth in the sea. The floating container can adapt to the storage bulk by changing the size and depth in the sea, also they can adapt to the wave and seawater change, and they can weaken the depth change and the pressure from outside. This is good for transporting the container.

Afloat means that the position and height from sea level are not rigidly fixed, and can change appropriately within a certain scope. A float rainwater receiver and afloat container can move on the sea within a certain scope. And the depth in the sea can be also changed. At the same time, it is afloat even when the container is all in the sea if it satisfied the property of moving and depth changing.

The collected rainwater should be disposed before it is transported to the users. The water is disposed by fibre membrane or filter bed or filter fabric or activated carbon or the compounding of them. Then it should be sterilized. Of course, if sterilizing is not necessary it can be elided.

On the land the rainwater is not arranged to the sea but it is collected in the rainwater container, and then the water is transported to users after it being disposed. There are three processes: process



of rainwater collecting and containing, process of disposing the water and process of cleaning the water.

The land rainwater is transported to the rainwater bar screen tank after being collected. So the big granules are wiped off and the water flows to the desilting tank. That whose density is bigger than water are deposited and the water goes into the container. Then it can be disposed.

There may be some granules difficult to deposit. So coagulant is necessary and then the water is cleaned. Flocculation process could be added between desilting process and filter process.

You can take use of the flocculation medicament from the water plant, such as chloride iron, vitriol iron, vitriol aluminium and its polymer, one more of alkalescence polymerizing chloride aluminium, and it is not forbidden in these medicament. And, you can take such methods for treating the ground rains, it is that ground rains flow into the desilting tank through the function of prevent the big particles by bar screen, the particles whose deposition rate large than the particles of the water or it is directly flow into sand filter bed or fiber filter bed without flowing the desilting tank, and then it is deposited in the sluice tank under using by absorbing of active carbon device or through the minor filtrate membrane device.

The being used reservoir mentioned here means the reservoir have been used as container, on the other hand reservoir containing rain water for drink water. We can collect rainwater from where there is no raw water and the water could be disposed with the methods mentioned. Then the water is transported to the reservoir being used. So the depth of the reservoir increases and the volume increases too. We can increase no other reservoirs but the volume increases to some tune we find another water source.

The land rainwater could be disposed by the compounding of the methods mentioned upside. Surely, the drink water should be sterilized.

Otherwise, it can be use the method to treat rainwater as following, The ground rainwater flows into desilting basin after stopping the big articles and sundries by passing grid, then precipitates the articles which weighted than water in desilting basin or goes straight to filtering bed which made by sand or fiber, after that, the rainwater flow into sluice pond though the equipment of activated carbon adsorption or microfiltrating film.

Or the rainwater is guided to reverse osmosis unit though microfiltrating. The water can go straight to user or sluice pond.

Attached drawing illuminate

Drawing 1. Drawing of the sea rain water treatment actualize1

Drawing 2. Drawing of the sea rain water treatment actualize2

Drawing 3. Drawing of the earth rain water treatment actualize5

Drawing 4. Drawing of the earth rain water treatment actualize6

Illuminate of the drawing number in the drawing

1-rain water 2-floating rainwater recipient on the sea 3-linked pipe 4-floating rainwater

container 5-water pump 6-equipment of membrane filtration 7-drinking rainwater on the sea

8-fixed rain water container 9-equipment of fabric filtration 10-the sea 11-industry rain water on the sea 12-the ground 13-underground pipe 14-bar screen tank 15-desilting basin 16-flocculation tank 17-coagulant 18-sedimentation tank 19-clean water 20-rapid filter 21-equipment active carbon filtration 22-equipment of sterilization 23-drinking rain water on the ground 24-industry rain water on the ground

Method to actualize concretely

This invention can be illuminate with the attached drawing and the method to actualize concretely as follow.

Method 1.

As it show in drawing 1,the rain fall into the floating rain water recipient on the sea, then the rain water flow into floating rain water container on the sea follow the linked pipe. The rain water in the bottom of the container is send to the equipment of membrane filtration by the water pump, the filtrated water is send to the user as industry water.

Method 2.

As it show in drawing 2,the rain fall into the floating rain water recipient on the sea, then the rain water flow into fixed rain water container on the sea follow the linked pipe. The rain water in the bottom of the container is send to the equipment of fabric filtration by the water pump, the filtrated water is send to the user as industry water.

Method 3.

Flow chart is show in drawing 1,the difference is that the rainwater is deposited in the fixed rainwater container and the equipment of the filtration is rapid filter.

Method 4.

Flow chart is show in drawing 1, the difference is that the rain water is sterilized deeply after filtrated by the equipment of fabric filtration, then the water is send to the user as drinking water.

Method 5.

As it show in drawing 3,the rainwater flow into the underground pipe from the ground and then flow into the grid tank, where the big suspended object is eliminated. The sand whose density more heavy the water is eliminated by the desilting basin. After that, the water flows into the flocculation tank, after mixing and flocculating with the coagulant flow into the sedimentation tank. After sedimentation, the clean water flow into rapid filter and then flow into the equipment active carbon filtration, where the organic contamination is adsorbed. After that the water is sterilized and send to the user as ground drinking rainwater.

Method 6.

As it show in drawing 3,the rainwater flow into the underground pipe from the ground and then flow into the grid tank, where the big suspended object is eliminated. The sand whose density more heavy the water is eliminated by the desilting basin. After that, the water flows into the flocculation tank, after mixing and flocculating with the coagulant flow into the sedimentation tank. After sedimentation, the clean water flow into rapid filter and then flow into the equipment active carbon filtration, where the organic contamination is adsorbed. After that the water is send to the user as ground industry rainwater.

Method 7.

Flow chart is show in drawing 3,the difference is that there is not flocculation tank and equipment active carbon filtration.

Method 8.

Flow chart is show in drawing 3,the difference is that there is not equipment active carbon filtration.

Method 9.

As it show in drawing 5,the rainwater flow into the underground pipe from the ground and then flow into the grid tank, where the big suspended object is eliminated. The sand whose density more heavy the water is eliminated by the desilting basin. After that, the water flows into the rapid filter or the equipment of fabric filtration, and then flows into the equipment active carbon filtration or equipment of membrane filtration, storages in the clean-water reservoir for further use.

Method 10.

Flow chart is show in drawing 5, the difference is that the rainwater is filtrated by the equipment of membrane filtration and then flow into the equipment of membrane filtration, after that flow into the clean-water reservoir for further use or flow into the storage reservoir mix whit other rainwater for further use.

The method upward is illuminating for the invention, not the limit for the invention. The protective range for the invention is not limited by the method. The protective range of the invention is according to the right request.

The requests of the right

1.A kind of rainwater-collected equipment includes rainwater take-over equipment and rainwater deposited device; its character is that the two equipments are connected by conjoint pipe.

2.As the kind of rainwater collected equipment depicted in the first right request, its character is that the rainwater take-over equipment is floated when used in the sea, which top is open and low sets rainwater export, which connected with conjoint pipe.

3. As the kind of rainwater collected equipment depicted in the first right request, its character is that rainwater deposited equipment is a sea floated rainwater deposited equipment which bulk and size can change with the change of the water storage in order to change the bulk. It has infall and water export, the infall is connected with infall pipe and the water export is connected with export pipe.

4. As the rainwater deposited device depicted in the three right requests, its character is that the device is made by soft rubber or plastic materials or compound materials which made of rubber and plastic materials and has the function of separating water.

5.As the rainwater treatment method of rainwater collected equipment depicted in the first right request, the rainwater from the sea can filtrated by hollow fiber film or filtrated sand bed or filtrated cloth or activates carbon combination of those methods.

6. As the rainwater treatment method of rainwater collected equipment depicted in the fifth right request, its character is that rainwater should be sterilized after filtration and treatment.

7. The character of the rainwater treatment method of rainwater collected equipment is that the ground rainwater collected to grid pool by guide-water pipe or objects with cutting big grain miscellaneous articles, flows into desilting basin with precipitating the articles which weighted than water, then guide to store pond in order to treat the water.

8. As the rainwater treatment method of rainwater collected equipment depicted in the seven right requests, its character is that treatment of ground water is treated by

filtrated sand bed or filtrated cloth or the combination of the two methods to realize.

9. As the rainwater treatment method of rainwater collected equipment depicted in the seven and eight right request, its character is that added flocculate-deposited procedure and flocculate-floated procedure between desilting basin produce and filtration produce, The coagulant used in flocculate-deposited procedure or flocculate-floated procedure is FeCl_3 、 $\text{Fe}_2(\text{SO}_4)_3$ 、 $\text{Al}_2(\text{SO}_4)_3$ and their polymer, one kind of alkalescency AlCl_3 polymer or their compounding。

10. As the rainwater treatment method of rainwater collected equipment depicted in the seven and nine right request, its character is that it added activated carbon adsorption procedure, the activated carbon adsorption equipment consist of curst, adsorption bed ,infall and water export, the infall conjoined with the intake pipe and the water export conjoined with the water export pipe.

11. The ground rainwater flows into desilting basin after stopping the big articles and sundries by passing grid, then precipitates the articles which weighted than water in desilting basin or goes straight to filtering bed which made by sand or fiber, after that, the rainwater flow into sluice pond though the equipment of activated carbon adsorption or microfiltrating film.

12. As the ground rainwater treatment method equipment depicted in the eleven right requests, its character is that the rainwater is guided to reverse osmosis unit though microfiltrating. The water can go straight to user or sluice pond.