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(54) Titre : APPAREIL ET METHODE POUR LA PREVENTION DE L'EPUISEMENT DE LA MASSE GLACIERE POLAIRE
(54) Title: APPARATUS AND METHOD FOR THE PREVENTION OF POLAR ICE MASS DEPLETION

(57) Abrégé/Abstract:
An apparatus for the prevention of polar ice mass depletion has a water extraction means, a snowmaking means, a water pumping means and a power means. The water extraction means extracts water from a water source that is located beneath a polar ice mass and transports the water to a ground level. The snowmaking means effects the conversion of the water into snow so that the snow can be deposited upon the surface of a polar ice mass. The water pumping means pumps water from the ground level to the snowmaking means. The power means operates the water extraction means, the water pumping means and the snowmaking means. The depletion of a polar ice mass is prevented by extracting water from beneath a polar ice mass, pumping the water to a snowmaking means, effecting the making of snow by using the snowmaking means and operating the necessary components through the use of a power means.

ABSTRACT

An apparatus for the prevention of polar ice mass depletion has a water extraction means, a snowmaking means, a water pumping means and a power means. The water extraction means extracts water from a water source that is located beneath a polar ice mass and transports the water to a ground level. The snowmaking means effects the conversion of the water into snow so that the snow can be deposited upon the surface of a polar ice mass. The water pumping means pumps water from the ground level to the snowmaking means. The power means operates the water extraction means, the water pumping means and the snowmaking means. The depletion of a polar ice mass is prevented by extracting water from beneath a polar ice mass, pumping the water to a snowmaking means, effecting the making of snow by using the snowmaking means and operating the necessary components through the use of a power means.

APPARATUS AND METHOD FOR THE PREVENTION OF POLAR ICE MASS DEPLETION

FIELD OF INVENTION

The present invention relates to an apparatus and method for preventing the depletion of polar ice masses.

BACKGROUND OF THE INVENTION

The Arctic Ice Masses

Recent studies have indicated that Arctic perennial sea ice has been decreasing at a rate of about 9% per decade since the early 1980s. Researchers suspect that the loss of perennial sea ice is attributable to the build-up of greenhouse gases in the Arctic atmosphere, which has in turn spurred warming trends in the region.

Liquid water absorbs the Sun's energy as opposed to reflecting it into the atmosphere the way ice does. As the oceans warm and ice thins, the water absorbs more solar energy, thus creating positive feedbacks that lead to further melting. The coupling of solar radiation, which is what reduces the conduction process of sea ice growth, with the rise in surface temperatures in the Arctic region, which is a result of climate change, leads to the phenomenon of receding Arctic perennial sea ice.

The effects of receding Arctic perennial sea ice appear to be drastic: change in the temperature of ocean layers, impact upon ocean circulation, increase in sea levels and salinity, change in marine habitats, and widening of shipping lanes. Further, if the melting continues as projected, there is a strong possibility that methane and carbon dioxide gases trapped

within the permafrost in the Arctic soil could be released should the soil be given the opportunity to thaw. Additionally, slightly warmer ocean temperatures could also release frozen gases impeded in the sea floor, all of which act like greenhouse gases once they reach the atmosphere.

Sea ice follows a four-stage lifecycle: formation, growth, deformation and disintegration. With respect to formation (or freezing), it should be noted that as the salinity increases, the freezing point becomes lower. The freezing point for salt water is approximately -1.7 degrees Celsius. Either way, it is with respect to the disintegration of sea ice that the present invention is primarily concerned.

Disintegration of ice takes place primarily through melting, which occurs when the temperature of the ice is raised above its freezing point. The heat required to do this comes from the absorption of the sun's radiation by the ice, and the conduction of heat from the surrounding air, water or land, as the case may be.

With respect to solar radiation, part of it is absorbed by the surface it strikes and part of it is reflected. The albedo value – i.e., the percentage of solar radiation that is reflected from a surface – of sea water is only 5-10%, whereas the albedo value of fresh snow is 80-90%. Accordingly, once the disintegration of an ice sheet has proceeded to the point where free water surfaces appear, the rate of further disintegration is very much accelerated due to the low albedo value of open sea water.

With respect to the conduction of heat, the heat from the air that is in contact with the water (i.e., the puddles of water during the initial stages of disintegration) is transferred into the water where it is then conducted further down into the water, which in turn accelerates the melting of ice underneath. This type of conduction promotes the melting of sea ice.

There is, however, another type of conduction that exists in the context of polar ice masses that is in fact beneficial to maintaining sea ice. Because a snow cover acts as a blanket, it

slows down the conduction occurring between water and air. The effectiveness of snow as an insulator, or blanket, depends in part on how compacted it is. A layer of soft, fluffy, newly fallen snow is an excellent insulator because of its high air content. On the other hand, extremely hard, compacted snow is a relatively poor insulator. During the summer months, it is desirable that the colder water beneath the ice be insulated and protected from the warmer air above the ice, as the undersides of polar ice masses are subjected to the seasonal melting and freezing cycles.

Snowmaking Technology

Natural snow is formed when the water vapour in clouds condenses and falls to the ground. If this condensation occurs at temperatures that are cold enough, the condensed moisture forms a tiny crystalline ice structure. Artificial snow is created in much the same way: tiny water droplets freeze into crystals before falling to the ground as snow.

Due to the molecular make up of artificial snow, which is deemed to be more dense in its make up than conventional snow, artificial snow can retain its molecular make up before melting longer than conventional snow can. Therefore, a blanket of artificial snow will be able to reflect more of the sun's radiation than conventional snow. Likewise, artificial snow having many natural snow-like characteristics will hamper the summertime conduction process due to a more substantial amount of air content in the snow's makeup.

Snowmaking equipment has evolved considerably over the years. Ski resorts are the primary users of the equipment, wherein various forms of elevated tower guns, fan-based cannons, and hose-connected and ground-level guns are employed worldwide. When water droplets are propelled from a snowmaking nozzle, heat energy is turned into kinetic energy, which helps cool the water droplets. In terms of the distance travelled by the artificial snow (i.e., the "throw"), a thirty-foot tower gun in a 5 mph wind will have a throw of approximately 125 feet. Accordingly, the higher the tower gun the more of an opportunity the water droplets will

have to freeze, and the greater the area over which the resultant artificial snow will be spread. Both of these propositions also mean, respectively, that snowmaking with tall tower guns can be conducted at relatively higher temperatures than their shorter counterparts, and that an increasingly strong wind substantially broadens the surface area over which snow is covered. According to the United States Armed Forces, the mean annual wind speed for most Arctic and sub-Arctic coastal locations is approximately 10 to 20 mph.

In order to propel the water droplets from the snowmaking apparatus, typically one would utilize an air compressor. These compressors are used by ski resorts to enhance the water-to-air ratio in snowmaking, as the end result is dryer snow and better ski trail quality. The need for compressors is less in cases where the snowmaking nozzles are at an elevated height, such as with a tower gun, and where the pressure for propelling water from the nozzles is satisfactorily supplied by a water pump alone. Indeed, at least one manufacturer, namely, Ratnik Industries, Inc. ("Ratnik"), has produced tower snow guns that have completely eliminated the need for air compressors.

Water Pumping and Extraction Technology

Like snowmaking technology, technology for pumping water has existed for many years. Typical water pumps are quite powerful and are capable of pumping large quantities of water up the height of ski hills.

Similar pumping technology can be used for extracting water from considerable depths and transporting it to a "ground" or "base" level. There exist numerous manufacturers of deep well water pumps that, when combined with well-known drilling equipment that is capable of penetrating to depths of 500 feet, are capable of retrieving and pumping large quantities of water. Indeed, many drilling rigs are portable and ideal for drilling through ice surfaces that are less than 200 feet in thickness, which is well within the maximum thickness of a perennial polar ice mass.

Recently, companies such as Southwest Windpower Inc. ("Southwest") have produced water pumps that are independently powered by wind turbine and hybrid solar/wind turbine energy sources, and are effective for extracting water up to depths of 100 feet or more.

Energy Sources

Alternative sources of energy have increasingly gained momentum in recent years. In particular, alternatives to fossil fuel-based energy sources include wind power, solar energy and hydrogen fuel cells. With respect to wind power and solar energy, although they are highly suitable sources of energy for remote and uninhabited locations, their effectiveness is largely dependent upon the conditions within their local environment. However, given the existence of energy storing and saving technology, certain benefits could be obtained from such alternative energy sources despite a less than optimal production environment.

With respect to hydrogen fuel cells, their main advantage is the zero-emission impact of the technology. Additionally, such technology is long-lasting, low maintenance, and improved in voltage and power characteristics as compared to batteries. The primary disadvantages to hydrogen fuel cell technology are that its power output in certain circumstances is limited and that refuelling requires an extensive infrastructure. In addition to also suffering from the disadvantage of requiring extensive infrastructure, traditional petroleum-based energy sources are a harmful contributor to air pollution; however, such energy sources are nevertheless useful in certain circumstances.

In sum, it is an object of the present invention to satisfy the desire of preventing the depletion of polar ice masses by providing an apparatus and method utilizing existing snowmaking, drilling, pumping and power technologies.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided an apparatus for the prevention of polar ice mass depletion comprising a water extraction means that extracts water from a water source beneath a polar ice mass and transports that water to a ground level, a snowmaking means that converts the water into snow for depositing same upon the surface of a polar ice mass, a water pumping means that pumps water from the ground level to the snowmaking means, and a power means for operating the water extraction means, the water pumping means and the snowmaking means.

According to a second aspect of the present invention there is provided a method for the prevention of polar ice mass depletion which comprises extracting water from a water source located beneath a polar ice mass and transporting that water to a ground level through use of a water extraction means, effecting the making of snow for depositing same upon the surface of a polar ice mass through the use of a snowmaking means, pumping water from the ground level to the snowmaking means through use of a water pumping means, and operating each of the water extraction means, the water pumping means and the snowmaking means through the use of a power means.

The usefulness of the present invention is extensive, and covers not only the environmental concerns surrounding the depleting polar ice masses, but also addresses the security issues related to newly formed shipping lanes and the potential for Canada's armed forces to take a more engaging role in sustainable development initiatives.

The present invention will be better understood from the following description and from the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a slightly angled side view of an apparatus according to the present invention, wherein said apparatus is in operation.

FIG. 2 is a slightly more close-up side view of an apparatus according to the present invention, wherein said apparatus is not in operation.

FIG. 3 is a top-level view of an apparatus according to the present invention, wherein said apparatus is in operation.

FIG. 4 is a side view of a utility vehicle with a drilling rig affixed to it.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, an apparatus in accordance with the present invention is generally comprised of a water extraction means 10, a snowmaking means 12, a water pumping means 14, and a power means 16.

The water extraction means 10 is made possible by first drilling through a polar ice mass 20. Referring to FIG. 4, a utility vehicle 22 that is adapted to carry a seawater drilling rig 24 will be able to penetrate the ice mass 20 to a considerable depth in order to create at least one channel 26 for the extraction of water. Indeed, the DeepRock Manufacturing Company builds custom drilling rigs, such as the DR 100 model, which are capable of drilling to depths of up to 500 feet. Such a drilling capability is clearly sufficient given that perennial polar ice masses do not even reach depths near 100 feet. In terms of an appropriate utility vehicle 22, a traditional snow cat such as Bombardier Inc.'s Go-Tract® is built to order and may be used in off-road, rough terrain applications where special equipment or heavy load transportation is

required. Such a utility vehicle 22 is also useful for transporting personnel and equipment for the implementation of other aspects of the present invention. To this end, the use of a tow hitch 28 would be advantageous.

Referring to FIG. 2, the water extraction means 10 is further made possible through the use of well-known water pumping equipment 30 that is capable of extracting water from beneath a polar ice mass 20 and transporting it to a ground level 32. The ground level 32 in this case is the upper surface of the polar ice mass 20. A preferable embodiment of the present invention would utilize a Southwest Whisper H80 Water Pumper to meet the necessary requirements of the water extraction means 10. Each such Southwest Whisper H80 Water Pumper has a wind turbine 52 that has the capacity to produce approximately 6,000 gallons per day, or, 4.2 gallons per minute (GPM). Further, each such Southwest Whisper H80 Water Pumper is 65 feet tall and weighs approximately 450 pounds. Any embodiment that implements the water extraction means 10 is dependant upon a power means 16 for its operation. The particular embodiment of a power means 16 and a water extraction means 10 as discussed above utilizes a wind turbine 52, whereby said wind turbine 52 employs a wind turbine tower 33 and a wind turbine apparatus 35, wherein said wind turbine apparatus 35 comprises a housing 37 and at least one blade 39.

With regards to the water pumping means 14 in FIG. 3, such a component is made possible through equipment that is capable of pumping water from the ground level 32 to the snowmaking means 12, and one embodiment could certainly employ well-known water pumping equipment 30. Under one embodiment of the present invention, the water pumping means 14 is of an adequate strength so as to ensure that the snowmaking means 12 is capable of functioning normally without the need of an air compressor (not shown). Recently, technological advances in the snowmaking industry have produced tower guns 34 that support the snowmaking means 12 and do not require air compressors. An example of a preferable water pumping means 14 for an embodiment of the present invention is the Ratnik Small Booster Pump Station, which has a capacity of 100 GPM, requires 22 kW of power and

weighs approximately 1,000 pounds. Nevertheless, alternative embodiments of the present invention may deem air compressors a valuable aspect of a snowmaking means 12.

In terms of the degree of output of artificial snow 36, there exist certain standard rules of thumb. For example, 1 "acre-foot" of snow is equal to 139,322 gallons of water and the average maximum water consumption for a tower gun 34 is equal to approximately 56 GPM, as based on the H2 Ratnik snow gun, which is 25 feet tall and weighs 215 pounds, and which represents one potential embodiment of the present invention. Given that the water pumping means 14 is based on a preferred embodiment that utilizes the 100 GPM Ratnik Small Booster Pump Station, then one could cover an acre with a foot of snow in approximately 41.5 hours. At such a rate, and using only one tower gun 34, one could theoretically cover 4.05 acres with a foot of snow in one week, and 145.8 acres over nine months. The nine ideal months for operation of snowmaking equipment in an Arctic region would be September through May.

Preferably, the snowmaking means 12 utilizes the most up-to-date technology available for the efficient conversion of water into artificial snow 36, such as is the case with the H2 Ratnik snow gun. As shown in FIG. 3, the snowmaking means 12 preferably comprises a transport means 38 and a dispensing means 40. It is through the transport means 38 that water is pumped by the water pumping means 14, and it is through the dispensing means 40 that the water is dispensed into the surrounding air.

According to one embodiment of the present invention, the transport means is comprised of at least one hose 42 that may be interconnected to other hoses 42 at its ends through use of a coupling mechanism 44, and the dispensing means is comprised of a plurality of nozzles 46. In such an embodiment, the number of hoses 42 will depend upon the distance from the water pumping means 14 it is deemed optimal to place the snowmaking means 12, as based on the circumstances at the time of placement. Equally, under such an embodiment the number of nozzles 46 will depend upon the optimal snowmaking means 12 that has been selected, as based on the circumstances at the time of selection. An embodiment using the H2 Ratnik

snow gun employs 18 nozzles 46. In any event, such selections will depend upon the desired capacity of a particular embodiment of the present invention.

In terms of the specific technology for the hoses 42 under an embodiment of the present invention, manufacturers such as Niedner, who carry the SNOW HOSE 1200® and the SNOW HOSE 2000® products, make hoses of varying lengths and strengths that are useable at temperatures as cold as minus 51 degrees Celsius. Niedner also produces the coupling mechanism 44 for situations where the pre-existing length of a hose 42 is insufficient for the implementation of an embodiment of the present invention. Preferably, the hoses 42 that are used as a transport means 38 in support of the snowmaking means 12 are also used in support of a linking means 48 that permits water from the water extraction means 10 and the ground level 32 to be transported to the snowmaking means 12. Preferably, the linking means 48 comprises a plurality of hydrants 50 in order to further facilitate the transport of water. Equally, more traditional technology such as steel or titanium piping (not shown) could be used in the place of hoses 42. Thus, regardless of the technology used, the transport means 38 and the linking means 48 must utilize some form or another of a conduit to ensure that water travels from the ground level 32 to the snowmaking means 12.

As stated above, one embodiment of the present invention in relation to the dispensing means 40 utilizes 18 nozzles 46, as per the H2 Ratnik snow gun, for the dispensing of water into the surrounding air. Under alternative embodiments, such nozzles 46 could closely resemble the existing technology of such companies as Snow Economics, Inc., who produce a variety of tower guns 34, including the HKD Spectrum model, which incorporates the patented Flex-Flow™ manifold for easy maintenance. As an alternative to tower guns 34 being a component of a snowmaking means 12, fan-based cannon technology (not shown), which atomizes a large amount of water through many tiny nozzles surrounding a fan blade that propels the moisture into the surrounding air, may be advantageous should tower gun technology be impractical in certain circumstances. Likewise, traditional hose-connected and ground-level apparatuses in the form of basic guns (not shown) that are very common at ski resorts worldwide may also be of use where they are deemed to be more advantageous than

either a tower gun 34 or a fan-based cannon. In sum, other embodiments of the snowmaking means 12 may use a plurality of tower guns 34 or a plurality of the other alternatives discussed herein, and not simply be restricted to any one apparatus or device.

In order to sufficiently power an embodiment of the present invention, one must determine which energy sources are best suited as based on the minimum power requirements. Preferably, the water extraction means 10, using a plurality of Southwest Whisper H80 Water Pumpers, is self-sufficient in terms of its power needs. For example, the use of 14 Southwest Whisper H80 wind turbines will produce 58.3 GPM of water at a wind speed of 10 mph, which meets the 56 GPM threshold of the H2 Ratnik tower snow gun. Further, the Southwest Whisper H80 Water Pumper also comes in the form of a hybrid solar panel/wind turbine apparatus, such that a solar panel 51 can be secured to the wind turbine tower 33 or water extraction means 10, and act as a supplementary source of energy. Indeed, under an embodiment that utilizes 140 190-Watt Sanyo HIT 190 solar panels 51, (i.e., 14 groups of 10 190-Watt Sanyo HIT 190 solar panels 51), one can produce up to 26.6 kW of surplus power. Thus, the above aspect of the power means 16 will function under an embodiment of the present invention, provided that another aspect of the power means 16 is sufficient enough in capacity to power the water pumping means 14.

According to an embodiment of the present invention, the use of a plurality of wind turbines 52 as a further aspect of the power means 16 in order to supply energy to the water pumping means 14 may be made possible through the use of a Bergey Wind Power Co. ("Bergey") 10 kW Class wind turbine, which is approximately 60 feet in height and 3,000 pounds in weight, and produces 0.5 kW in a 10 mph wind. As in the case of the Southwest Whisper H80 Water Pumpers, the Bergey 10 kW Class wind turbines comprise a wind turbine tower 33 and a wind turbine apparatus 35, as shown in FIG. 2. Preferably, the wind apparatuses 35 would be rotatable about their vertical axes such that their front portions 54 can be aligned to face the direction from which the wind is coming. Given the above embodiment, the power output from 45 Bergey 10 kW Class wind turbines would be 22.5kW, which would meet the power requirement of 22 kW for the Ratnik Small Booster Water Pump Station. Thus, the 45

additional wind turbines 52 as shown in FIG. 3, represent a preferred embodiment of the present invention.

Indeed, given that wind fluctuations are probable, surpluses and shortfalls in energy production are likely. It is preferable that said surpluses be captured for instances where a shortfall in energy occurs due to either poor winds or reduced solar radiation. An energy storage device 56 that is suitable for an embodiment of the present invention could consist of a flywheel-based energy storage system that is designed for long-lasting performance in harsh environments. Indeed, the Beacon Power Corporation's Single Smart Energy 25 fly wheel, which provides a power delivery of 50 kW for 30 minutes, weighs approximately 3,200 pounds per unit and is preferable for meeting such an embodiment. Such an energy storage device 56 is designed to store energy from a variety of sources, including wind turbines 52 and solar panels 51, for hours. Depending on the quantum of energy required, it may be desirable to include a plurality of energy storage devices 56. In sum, such energy storage devices 56 would ensure a stronger likelihood of continuous operation of numerous embodiments of the present invention. When combined with power connectors 58, the wind turbines 52 under the embodiment disclosed above are capable of supplying power to the water extraction means 10 and the water pumping means 14, as the case may be, and form an integral part of the power means 16 under an embodiment of the present invention.

Other further energy alternatives are available, including hydrogen fuel cell technology (not shown). As in the case of the solar panels 51, hydrogen fuel cells offer an environmentally-friendly backup power alternative to the wind turbines 52. To incorporate hydrogen fuel cells into an embodiment of the present invention, one would have to address the issues of infrastructure and maintenance. Accordingly, it is preferable for one to incorporate hydrogen fuel cell technology as an aspect of the power means 16 into an embodiment of the present invention in the context of short-term and high-consumption power applications. Should traditional petroleum-based fuels be determined to be necessary for the implementation of the power means 16 under an embodiment of the present invention, it will be preferable for those fuels to also be limited to the context of short-term and high-consumption power applications.

Other aspects of preferred embodiments of the present invention may include desalinization capabilities, automated control mechanisms, and equipment transportation structures.

With respect to desalinization capabilities (not shown), it has been stated that the freezing point for salt water is approximately -1.7 degrees Celsius. Nevertheless, should it be determined that desalinized water is preferred over normal seawater, then desalinization of the seawater may be effected through use of a Reverse Osmosis Water Purification Unit (not shown). An embodiment that uses desalinization capabilities or a Reverse Osmosis Water Purification Unit must consider the impact upon the capacity of the power means 16 as a result of the new energy demands associated with such devices.

With respect to automated control mechanisms (not shown), it may be highly desirable that a computer program (not shown) govern an embodiment of the present invention by monitoring air temperatures and wind speeds, controlling water extraction and pumping rates, and adjusting the position of various elements, such as the wind turbines 52 and the direction that their front portions 54 face. Indeed, such mechanisms could even be operated remotely using radio frequency signals or wireless Internet access. The power connectors 58 not only facilitate the transmission of power amongst the various elements of the present invention, but also may be adapted to house signalling means for the purpose of any automated control mechanisms.

With respect to equipment transportation structures, a preferred embodiment of the present invention is one that is portable. Given the nature of the environment, retrofitting particular components with industrial-sized skis 60 may greatly facilitate transport of said components, as is shown in FIG. 3 wherein skis 60 are affixed to the snowmaking means 12. A utility vehicle 22 as depicted in FIG. 4 would be able to tow many components that have skis 60 affixed thereto.

An additional consideration in implementing an embodiment of the present invention is to consider what weight restrictions exist for apparatuses resting on the surface of a perennial polar ice mass 20. For example, as a 1 metre thick sea ice mass is capable of supporting a 13-ton aircraft while parked, then any embodiment, as is the case with the embodiments described herein, ought to be mindful of this restriction in its implementation and of possible solutions thereto such as spreading elements of the embodiment out across the surface of the polar ice mass 20. Given that the draft for the average perennial polar ice mass 20 is between 1.2 and 2.3 metres, the potential exists for a particular embodiment to exceed safe weight amounts.

A further note of importance is that although the present invention is focused on addressing the concerns surrounding the depleting polar ice masses, and in particular the perennial polar ice masses, such polar ice masses are not limited to those ice masses within the Arctic Circle or within regions traditionally considered "polar" in nature, but rather the present invention has applicability in any region that is seeing depleting ice masses and has a need for preventing such depletion.

In sum, one embodiment of the present invention may couple the water extraction means 10 with the water pumping means 14 such that no physically discernable difference is apparent, as well-known water pumping equipment 30 could be used so as to combine the purposes of the water extraction means and the water pumping means. As stated herein, both the water extraction means 10 and the water pumping means 14 have stated purposes such that an embodiment that uses one physical component to accomplish each purpose is nevertheless accomplishing both said purposes.

WHAT IS CLAIMED IS:

1. An apparatus for the prevention of polar ice mass depletion comprising:

a water extraction means for extracting water from a water source and transporting said water to a ground level, said water source being located beneath a polar ice mass;

a snowmaking means for effecting the conversion of the water into snow, wherein said snow is to be deposited upon the surface of a polar ice mass;

a water pumping means for pumping water from the ground level to the snowmaking means; and,

a power means for operating said water extraction means, said water pumping means and said snowmaking means.

2. The apparatus set forth in claim 1 wherein said snowmaking means comprises a transport means and a dispensing means.

3. The apparatus set forth in claim 2 wherein said transport means comprises one hose.

4. The apparatus set forth in claim 2 wherein said transport means comprises a plurality of hoses.

5. The apparatus set forth in claim 4 wherein said hoses can be interconnected by using a coupling mechanism.

6. The apparatus set forth in claim 2 wherein said dispensing means comprises a plurality of nozzles.

7. The apparatus set forth in claim 1 wherein said snowmaking means comprises at least one tower gun.

8. The apparatus set forth in claim 1 wherein said snowmaking means comprises at least one fan-based cannon.

9. The apparatus set forth in claim 1 wherein said power means comprises at least one wind turbine.

10. The apparatus set forth in claim 9 wherein said wind turbine comprises a tower and a wind turbine apparatus.

11. The apparatus set forth in claim 1 wherein said power means comprises solar panels.

12. The apparatus set forth in claim 1 wherein said power means comprises hydrogen fuel cells.

13. The apparatus set forth in claim 1 wherein said power means comprises traditional energy sources.

14. The apparatus set forth in claim 1 wherein said power means comprises an energy storage device.

15. The apparatus set forth in claim1 wherein said water extraction means comprises well-known water pumping equipment.

16. The apparatus set forth in claim 1 wherein said water pumping means comprises well-known water pumping equipment.

17. The apparatus set forth in claim 1 wherein said water pumping means comprises a linking means and at least one hydrant.

18. The apparatus set forth in claim 1 wherein said power means comprises power connectors.

19. The apparatus set forth in claim 1 wherein said snowmaking means comprises desalinization capabilities.

20. The apparatus set forth in claim 1 wherein said snowmaking means, said water extraction means, said water pumping means and said power means each comprise automated control mechanisms.

21. A method for the prevention of polar ice mass depletion which comprises:

extracting water from a water source and transporting said water to a ground level through use of a water extraction means, said water source being located beneath a polar ice mass;

effecting the making of snow through the use of a snowmaking means, wherein said snow is to be deposited upon the surface of a polar ice mass;

pumping water from the ground level to the snowmaking means through use of a water pumping means; and,

operating each of the water extraction means, the water pumping means and the snowmaking means through the use of a power means.

Application number: numéro de demande: 2473345

Figures: 1, 3,

Pages:

Drawings

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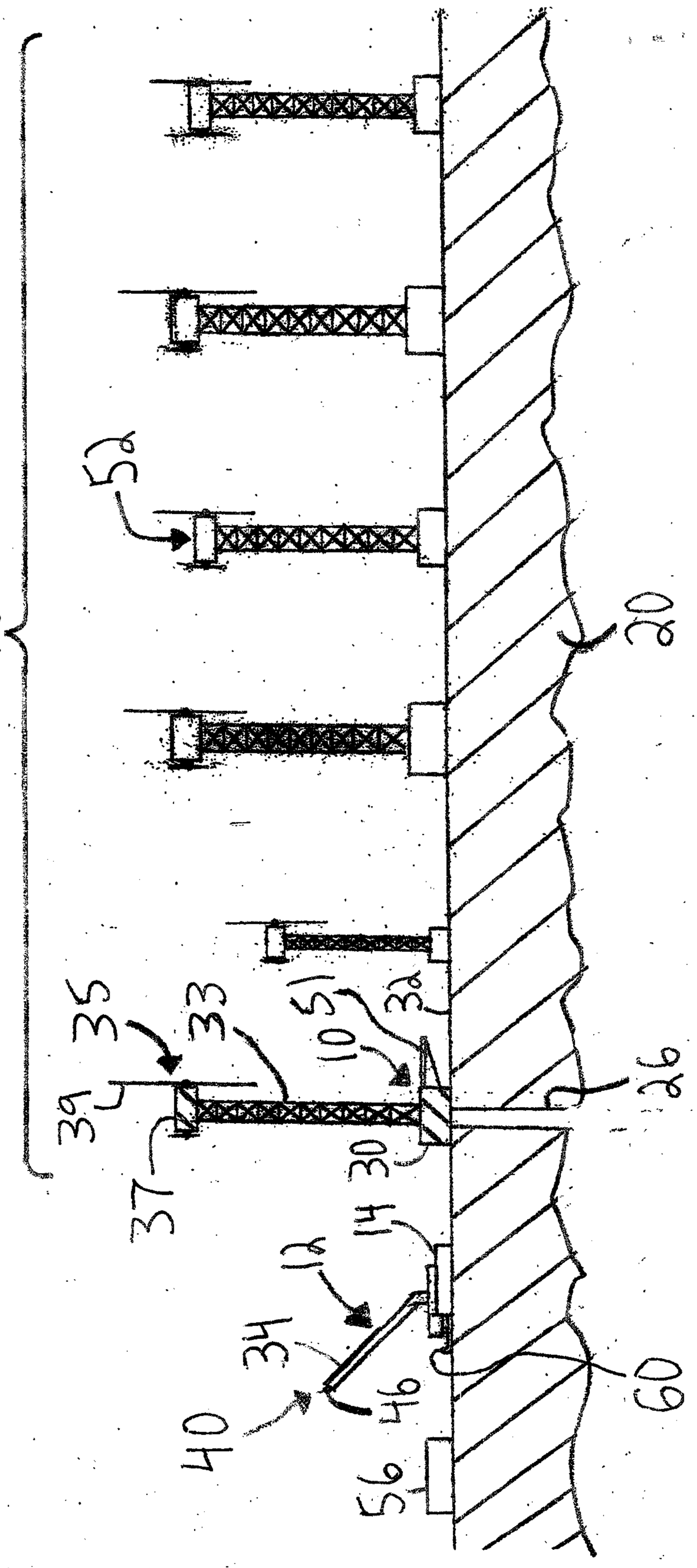

FIG. 2

FIG. 4