Patent Publication in Suriname
Patent Family P001

On behalf of its clients Crystal Lagoons Technologies, Crystal Lagoons B.V. and other companies part of the U.S. based Crystal Lagoons business group, with address at 1395 Brickell Avenue, Suite 800 Miami, FL 33131, USA, Schurman Advocaten announces that **Crystal Lagoons® is a patented, state-of-the-art technology** owned by Crystal Lagoons business group, invented and patented by renowned innovator, entrepreneur, and businessman Fernando Fischmann. Crystal Lagoons® technology enables the design, construction and operation of large sized crystalline lagoons for swimming and the practice of water sports, at low costs, and using minimal amount of chemicals and energy. Crystal Lagoons® technology is protected in more than 190 countries and territories through several Intellectual Property rights, including over 2,600 patents.

The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses a process to implement and maintain large water bodies for recreational use, such as lakes or artificial lagoons, with excellent color, high transparency and cleanness characteristics similar to swimming pools or tropical seas at low cost, for water bodies larger than 15,000 m^3**. The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to the patents No. 7,820,055 B2, registered on October 26, 2010, No. 8,070,942 B2, No. 8,062,514 B2, No. 8,790,518 B2, and No. 9,708,822 B2, with priority date of November 21st, 2006, in the United States. The invention also comprises a suction device, and a structure to contain large water bodies or volumes. Some of the individual inventions included in this family are listed herein:

- The name of the invention is "**Process to maintain large clean recreational water bodies**", registered on July 29, 2014 with patent no. US 8,790,518 B2, and it comprises the following steps: (a) providing a structure with skimmers able to contain a large water body larger than 15,000 m3; (b) feeding the structure of step (a) with inlet water having iron and manganese levels lower than 1.5 ppm and turbidity lower than 5 NTU; (c) measuring water pH, wherein the pH is maintained no lower than 5 and no higher than 9; (d) adding an oxidizing agent to the water body contained in the structure of step (a), to maintain an oxidation-reduction potential (ORP) of at least 600 mV in the water body using a pulse of at least 4 hours within a 48 hour cycle; (e) adding a flocculating agent in concentrations within 0.02 and 1 ppm over a time period no greater than 6 days to precipitate impurities in the water to the bottom of the structure of step (a); (f) cleaning the bottom of the structure of step (a) with a movable suction device to remove the precipitated impurities from the bottom of said structure, together with the additional flocculants; and (g) generating a displacement of surface water containing impurities and surface oils by means of injection of inlet water

according to step (b), which generates said displacement in such a way to remove said surface water using said skimmers provided in the structure of step (a), which together with step (f) replaces filtration to remove suspended debris from the water body.

- The name of the invention is **"Structure to contain a large water body of at least 15,000 m3"**, registered on November 22, 2011 with patent no. US 8,062,514 B2, and it comprises a structure to contain a large water body, including a water body larger than 15,000 m3, for recreational use with color, transparency and cleanness characteristics similar to swimming pools or tropical seas, wherein the structure includes a bottom and walls covered with a plastic liner made of a non-porous material able to be thoroughly cleaned; wherein the depth of the structure to the bottom is about 0.5 meters or higher; wherein the structure includes a system of skimmers for the removal of impurities and surface oils, a fresh water feeding pipe system that allows entrance of fresh water and results in water removal by displacement of surface water through the skimmer system, and a pumping system including a coupling means connected to a moveable suction device for cleaning the plastic liner.

- The name of the invention is **"Suction device for cleaning a bottom surface of a structure of at least 15,000 m3"**, registered on December 6, 2011 with patent no. US 8,070,942 B2, and it comprises a suction device for thoroughly cleaning a bottom surface of a structure, covered with a non-porous plastic liner, that contains a body of water larger than 15,000 m^3 for recreational use with color, transparency and cleanness characteristics similar to swimming pools or tropical seas at low cost, the device operating by suctioning impurities from the bottom surface by a pumping system of the structure, wherein the device comprises: a structural frame, a cover covering the structural frame and including at least one suction connection in fluid communication with the pumping system, a propelling device to move the suction device around the bottom surface of the structure, rollers or wheels operatively coupled to the structural frame for movement of the suction device over the bottom surface to be cleaned, a fixed brush line operatively coupled to the structural frame to remove precipitated impurities from the bottom surface of the structure, and bottom suction pipes, in fluid communication with the at least one suction connection, and arranged and configured to suction the impurities from the bottom surface of the structure.

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Patent Publication in Suriname
Patent Family P002

On behalf of its clients Crystal Lagoons Technologies, Crystal Lagoons B.V. and other companies part of the U.S. based Crystal Lagoons business group, with address at 1395 Brickell Avenue, Suite 800 Miami, FL 33131, USA, Schurman Advocaten announces that **Crystal Lagoons® is a patented, state-of-the-art technology** owned by Crystal Lagoons business group, invented and patented by renowned innovator, entrepreneur, and businessman Fernando Fischmann. Crystal Lagoons® technology enables the design, construction and operation of large sized crystalline lagoons for swimming and the practice of water sports, at low costs, and using minimal amount of chemicals and energy. Crystal Lagoons® technology is protected in more than 190 countries and territories through several Intellectual Property rights, including over 2,600 patents.

The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses an efficient filtration process of water from a tank and a suctioning device used in the efficient filtration process**. The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to international patent application PCT/US2009/036809 filed on March 11, 2009 which subsequently entered into PCT national phase application globally; as well as patent No. 9,470,007 B2 registered on October 18, 2016 and No. 9,080,342 B, with priority date December 24th, 2008, in the United States. Some of the individual inventions included in this family are listed herein:

- The name of the invention is "**Efficient filtration process of water in a tank for recreational purposes and ornamental uses**", registered on October 18, 2016 with patent no. US 9,470,007 B2, and it comprises a process for filtration of water in a tank, wherein the process is adapted to eliminate turbidity from water in the tank, and wherein the process comprises: (a) emitting ultrasonic waves into the water in the tank, wherein one or more ultrasonic wave emitters are positioned within the tank to broadcast the ultrasonic waves to the total volume of water in the tank and the ultrasonic waves are emitted into the water with a frequency of from 20 to 100 kHz and power in a range of about 10 W to about 45 W; (b) adding a flocculant agent to the water to flocculate suspended solids in the water; (c) suctioning a portion of water in the tank containing flocculated solids with a suctioning device to provide a suctioning device effluent flow, wherein the suctioning device suctions a water flow comprising settled flocculated solids from a bottom of the tank avoiding resuspension of flocculated solids, thereby providing for removal of the flocculated solids from the water in the tank without filtering the total volume of water in the tank; (d) discharging the suctioning device effluent flow to an effluent collecting line; (e) filtering the suctioning device

effluent flow from said effluent collecting line to produce a filtered flow; and (f) returning the filtered flow to the tank.

- The name of the invention is "**Suctioning device for travelling a tank bottom**", registered on July 14, 2015 with patent no. US 9,080,342 B2, and it comprises an efficient filtration process of water from a tank, where the filtration is performed over a small volume of water and not on the totality of the water from the tank; the process comprises the following steps: (a) emitting ultrasonic waves in the tank; (b) adding a flocculant agent to the water; (c) covering the tank bottom with a suctioning device which suctions a water flow with flocculated particles, discharging to a collecting effluent line; (d) filtering the effluent flow of the suctioning device from said collecting effluent line; and (e) returning the filtered flow to the tank. The present invention additionally comprises a suctioning device used in said efficient filtration process.

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Patent Publication in Suriname
Patent Family P003

On behalf of its clients Crystal Lagoons Technologies, Crystal Lagoons B.V. and other companies part of the U.S. based Crystal Lagoons business group, with address at 1395 Brickell Avenue, Suite 800 Miami, FL 33131, USA, Schurman Advocaten announces that **Crystal Lagoons® is a patented, state-of-the-art technology** owned by Crystal Lagoons business group, invented and patented by renowned innovator, entrepreneur, and businessman Fernando Fischmann. Crystal Lagoons® technology enables the design, construction and operation of large sized crystalline lagoons for swimming and the practice of water sports, at low costs, and using minimal amount of chemicals and energy. Crystal Lagoons® technology is protected in more than 190 countries and territories through several Intellectual Property rights, including over 2,600 patents.

The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses a sustainable method and system for treating and maintaining bodies of water at low cost for low density recreational use**. The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to international patent application PCT/US2011/051244, filed on September 12, 2011 which subsequently entered into PCT national phase application globally; as well as patent No. 8,465,651 B2 registered on June 18, 2013, and No. 9,062,471 B2, with priority date March 30th, 2011, registered in the United States. Some of the individual inventions included in this family are listed herein:

- The name of the invention is "**Sustainable method and system for treating water bodies affected by bacteria and microalgae at low cost**", registered on Jun 18, 2013 with patent no. US 8,465,651 B2, and it comprises a sustainable method for treating and maintaining a body of water affected by bacteria and microalgae at low cost by filtering a small fraction of the total volume of the body of water, the method comprising: (a) collecting water with a concentration of total dissolved solids (TDS) of up to 50,000 ppm; (b) storing said water in at least one container, wherein said container has a bottom surface able to be thoroughly cleaned by a non-intrusive mobile suction means; (c) limiting the density of bathers up to 0.05 bathers per cubic meter in said water contained in said container; (d) during a 7 day interval, treating said water in said container for a total oxidation reduction potential (ORP) treatment time during the interval by periodically adding disinfectant agents to said water to establish an ORP of about 500 mV, wherein said total ORP treatment during the interval is dependent on temperature of said water being treated and comprises a minimum period of about 1

hour for each degree Celsius (° C.) of water temperature up to a maximum temperature of 45° C.; (e) activating the following processes through a coordination means to purify said water and eliminate solids from said water by filtering only a small fraction of the total volume of said water in said container, wherein said coordination means receives information regarding water quality parameters controlled by said coordination means and activates processes i, ii, and iii to adjust said parameters within their limits: (i) suctioning a portion of said water containing settled solids with a mobile suction means to prevent the thickness of settled material from exceeding an average of 3 mm; (ii) filtering the portion of said water suctioned by the mobile suction means; and (iii) returning the filtered water to said container.

- The name of the invention is "**Sustainable system for treating water bodies affected by bacteria and microalgae at low cost**", registered on June 23, 2015 with patent no. 9,062,471 B2, and it comprises a system for treating and maintaining a body of water affected by bacteria and microalgae at low cost by filtering a small fraction of the total volume of the body of water, the system comprising: a container for storing the body of water, the container having a volume greater than 50,000 m3 and comprising a membrane or liner for receiving settled particles that is fixed to a bottom surface of the container; at least one feeding line of affluent water to the container; a coordination means for maintaining the water in the container within predetermined water quality limits; at least one chemical application means for applying or dispersing a disinfectant or antiscalant to the water in the container; a mobile suction means for moving along the bottom of the container and suctioning a portion of the water from the bottom of the container containing settled particles; a propelling means for moving the mobile suction means along the bottom of the container, the propelling means operatively coupled to the mobile suction means; a filtration means having a capacity to filter up to about 2.5% of the total volume of the body of water in a 24 hour period for filtering the portion of water containing settled particles suctioned by the mobile suction means; at least one collecting line coupled between the mobile suction means and the filtration means; and a return line from the filtration means to the container; wherein the coordination means is configured to receive information obtained by visual inspection, an empirical method, an algorithm, or a detector regarding the water quality parameters and control activation of the chemical application means, mobile suction means, and filtration means to adjust the water quality parameters within predetermined limits, the water quality parameters comprising oxidation reduction potential (ORP), temperature, and thickness of settled particles.

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Patent Publication in Suriname
Patent Family P006

On half of its clients Crystal Lagoons Technologies, Crystal Lagoons B.V. and other companies part of the U.S. based Crystal Lagoons business group, with address at 1395 Brickell Avenue, Suite 800 Miami, FL 33131, USA, Schurman Advocaten announces that **Crystal Lagoons® is a patented, state-of-the-art technology** owned by Crystal Lagoons business group, invented and patented by renowned innovator, entrepreneur, and businessman Fernando Fischmann. Crystal Lagoons® technology enables the design, construction and operation of large sized crystalline lagoons for swimming and the practice of water sports, at low costs, and using minimal amount of chemicals and energy. Crystal Lagoons® technology is protected in more than 190 countries and territories through several Intellectual Property rights, including over 2,600 patents.

The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses a localized disinfection system for large water bodies**. The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to international patent application PCT/EP2012/076170, filed on December 19th, 2012 which subsequently entered into PCT national phase applications globally; as well as patent No. 8,753,520 B1 registered in the United States on June 17th, 2014. Some of the individual inventions included in this family are listed herein:

- The name of the invention is "**Localized disinfection system for large water bodies**", registered on June 17, 2014 with patent no. US 8,753,520 B1, and it comprises a method for controlling microbiological properties of a portion of water within a water body, comprising: (a) identifying a portion of water intended for recreational purposes within the water body, the portion of water comprising one or more zones wherein: at least one zone is designated a sanitary compliance zone, at least one zone is designated a delimiting zone, and one zone is designated a most unfavorable zone, the most unfavorable zone corresponding to the zone that exhibits the lowest ORP value within the identified portion of water; (b) maintaining at least a minimum ORP level in the portion of water for at least a minimum period of time, wherein the minimum ORP level and the minimum period of time cannot be lower than the values calculated by: (i) determining salinity of the water at the most unfavorable zone; and (ii) determining the

minimum ORP value based on the salinity of the water where: for salinities in the water between 0% and up to 1.5% the minimum ORP level is 550 mV; for salinities in the water higher than 1.5%, and up to 2.5%, the minimum ORP level is calculated by the following equation: [Minimum ORP,mV]=625−50*[Salinity of the Water,%(Weight Percent)]; and for salinities in the water higher than 2.5%, the minimum ORP level is 500 mV; (iii) determining the temperature of the water in the most unfavorable zone; and (iv) determining the minimum period of time based on the water temperature, wherein: for water temperatures from 5° C. to 35° C., the minimum period of time is calculated by the following equation: [Minimum period of time,min]=80−2*[Temperature of the water,° C.]; and for water temperatures between 35° C. and up to 45° C., the minimum period of time is calculated by the following equation: [Minimum period of time,min]=5*[Temperature of the water,° C.]−165; c. dispensing an effective amount of chemical agent into the identified portion of water in order to maintain at least the minimum ORP level during at least the minimum period of time at the most unfavorable zone, and d. repeating step c as needed to prevent the ORP in the most unfavorable zone from decreasing by more than 20% of the minimum ORP value.

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Patent Publication in Suriname
Patent Family P007

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The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses a system and method for maintaining water quality in large water bodies.** The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to international patent application PCT/IB2014/002891, filed on December 29, 2014 which subsequently entered into PCT national phase applications globally; as well as patents No. 9,470,008 B2 registered on October 18, 2016 and No. 10,364,585 B2, with priority date December 12th, 2012, registered in the United States. Some of the individual inventions included in this family are listed herein:

- The name of the invention is "**System and method for maintaining water quality in large water bodies**", registered on October 18, 2016 with patent no. 9,470,008 B2, and it comprises a method for treating large water bodies for recreational uses, including large artificial excavated or floating structures with bottoms comprising flexible membranes, wherein the method comprises: (a) applying an effective amount of a flocculant to water in the water body to maintain turbidity of the water below 2 NTU, wherein the flocculant flocculates suspended solids in the water into particles that settle to the bottom of the water body; (b) monitoring to determine the color of the bottom of the water body, receiving information regarding the color of the bottom and activating a mobile suctioning device to adjust the color within a set limit by suctioning settled particles from the bottom of the water body; (c) operating the mobile suctioning device to maintain an increase in a black component of the color of the bottom below 30% based on the CMYK scale, wherein the mobile suction device moves on the bottom of the water body and suctions a portion of water from the bottom of the water body containing settled particles, wherein the device is capable of moving and cleaning at a rate of 10,000

m2 per 24 hours, and wherein operating the mobile suctioning device does not re-suspend more than 30% of the settled particles in the area on the bottom of the water body cleaned by the mobile suction device; (d) filtering the water suctioned by the mobile suction device and returning the filtered water to the water body, wherein the water suctioned by the mobile suction device does not exceed 10% of the total water volume of the water body in a 24 hour interval; and (e) operating a degreasing system to maintain a surface water layer having less than about 20 mg/L of floating greases within a top-most 1 cm of the surface water layer, wherein greases from the surface water layer flow into the degreasing system and are removed by a separation unit comprising a degreaser, and the water that has passed through the degreaser is returned to the water body.

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Patent Publication in Suriname
Patent Family P011

On half of its clients Crystal Lagoons Technologies, Crystal Lagoons B.V. and other companies part of the U.S. based Crystal Lagoons business group, with address at 1395 Brickell Avenue, Suite 800 Miami, FL 33131, USA, Schurman Advocaten announces that **Crystal Lagoons® is a patented, state-of-the-art technology** owned by Crystal Lagoons business group, invented and patented by renowned innovator, entrepreneur, and businessman Fernando Fischmann. Crystal Lagoons® technology enables the design, construction and operation of large sized crystalline lagoons for swimming and the practice of water sports, at low costs, and using minimal amount of chemicals and energy. Crystal Lagoons® technology is protected in more than 190 countries and territories through several Intellectual Property rights, including over 2,600 patents.

The patent portfolio of Crystal Lagoons business group includes, but is not limited to, **a patent family that discloses a suctioning device for a large artificial water bodies.** The inventions within this patent family are subject to various patent registrations and applications worldwide, including but not limited to international patent application PCT/IB2018/001084, filed on August 21, 2018 and subsequently entered into PCT national applications globally; as well as patents No. 10,521,870 B2 registered on December 31, 2019; No. 10,997,683 registered on May 4, 2021; No. 11,123,645 registered on September 21, 2021; No. 10,997,684 registered on May 4, 2021; No. 11,186,981 registered on November 30, 2021; No. 11,250,533 registered on February 15, 2022; and No. 11,270,400 registered on March 8, 2022, in the United States. Some of the individual inventions included in this family are listed herein:

- The name of this invention is "**Publicly accessible urban beach entertainment complex with a center piece man-made tropical-style lagoon and method for providing efficient utilization of limited use land**", registered on December 21, 2019 with patent no. US 10,521,870 B2, and it discloses a publicly accessible urban beach entertainment complex, the complex comprising: (a) a large centerpiece lagoon, the lagoon having a bottom, a perimeter, and a minimum surface area of 10,000 m2 to recreate a tropical lifestyle look and feel, and wherein a majority of the bottom is constructed with a flexible, plastic material, the lagoon not presenting a noticeable chemical smell in its majority as in conventional pools that maintain a permanent residual chlorine level of 1 ppm, and wherein the lagoon further includes: (i) at least one bathing zone within the lagoon, the bathing zone having a zero-entry edge at the perimeter, wherein the bathing zone comprises a localized disinfection system, whereby an increased chemical concentration is provided in the bathing zone; (ii) at least one water sports zone located within the lagoon, the water sports zone comprising a water depth of at least 1.8 meters at its deepest point; (b) at least one sand beach area and a rest area surrounding the perimeter of the lagoon, wherein the sand of the sand beach area has a light color thereby resembling a tropical beach,

and wherein the sand beach areas and rest areas have a surface area of at least 2,500 m2; (c) a water supply system, operatively connected to a water supply, for providing both filling and make-up water for the lagoon; (d) a water treatment system arranged and configured to utilize at least 50% less electricity compared to a conventional swimming pool centralized filtration system, wherein the filtration capacity and filtration water volume is at least 50% lower than for a conventional swimming pool filtration system that filters the complete water volume 4 times per day; (e) a physical barrier surrounding at least a portion of the urban beach entertainment complex, the barrier being arranged and configured to limit individual access to the complex or its centerpiece lagoon; (f) an access control system located in at least one portion of the physical barrier, wherein the access control system is arranged and configured to selectively permit entry of individuals into at least a portion of the urban beach entertainment complex; and (g) at least one ancillary facility located within the complex, selected from the group of commercial, recreational, educational, cultural, residential, and sports facilities in order to allow different events and activities to be held within the complex.

- The name of the invention is "**Publicly accessible urban beach entertainment complex with a center piece man-made tropical-style lagoon and method for providing efficient utilization of limited use land**", registered on May 4, 2021 with patent no. 10,997,683 B2, and it comprises a method for efficiently utilizing limited use land by creating a publicly accessible urban beach entertainment complex, the method comprising: (a) selecting a site with a minimum total surface of 16,000 m2, wherein the site is selected from vacant land, underutilized sites, limited use land, or land that is contiguous or nearby recreational, educational, sports, or commercial venues, has a minimum surrounding population of 500.000 people within a 50-mile radius connected by road access, and has a water supply with sufficient availability for use at the site; (b) constructing a centerpiece lagoon, the lagoon having a bottom, a perimeter, and a surface area between 10,000 m2 and 200,000 m2 to recreate a tropical lifestyle look and feel, wherein a majority of the bottom is constructed with a flexible, plastic material, and wherein at least one portion of the lagoon further includes a zero-entry edge resembling a natural beach edge: (c) establishing at least one sand beach area and a rest area surrounding the perimeter of the lagoon, wherein the sand of the sand beach area has a light color thereby resembling a tropical beach, and wherein the sand beach areas and rest areas have a surface area of at least 2,500 m2; (d) connecting a water source to the lagoon with a water supply system, the water supply system providing both filling and/or make-up water for the lagoon; (e) incorporate a water treatment system for treating water in the lagoon, wherein the water treatment system is arranged and configured to utilize at least 50% less electricity compared to a conventional swimming pool centralized filtration system, wherein the filtration capacity and filtration water volume is at least 50% lower than for a conventional swimming pool filtration system that filters the complete water volume 4 times per day; (f) delimiting at least a portion of the lagoon, the sand beach area, and the rest area with a physical barrier, wherein the area within the physical barrier further creates an urban beach entertainment complex, the barrier being arranged and configured to limit individual access to the complex; (g) locating an access control system in at least one portion of the physical barrier, wherein the access control system is arranged and configured to selectively permit entry of individuals into at least a portion of the urban beach

entertainment complex; and (h) establishing at least one ancillary facility located within the entertainment area, selected from the group of commercial, recreational, educational, cultural, residential, and sports facilities; whereby individual entry fees provide revenue for the urban beach entertainment complex, thereby providing an efficient use of a facility or land that has limited use.

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