FORM 2

THE PATENTS ACT 1970

39 OF 1970

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THE PATENT RULES 2003

COMPLETE SPECIFICATION

(SEE SECTIONS 10 & RULE 13)

1. TITLE OF THE INVENTION

SpiCEN - A micro algae-based carbon Emission Neutraliser

2. APPLICANTS (S)

NAME	NATIONALITY	ADDRESS
Hyderabad Institute of Technology and Management		Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
KEPHI INNOVATIONS PRIVATE LIMITED		KEPHI INNOVATIONS PRIVATE LIMITED 18-232/5 NEHRU NAGAR, NARSAMPET WARANGAL Pin:506132 TELANGANA INDIA
Mr. Pabba Pavan Kumar	Indian	Student Hyderabad Institute of Technology and Management, Gowdavelly (Village),

		Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Mr. Vanamamala Giridhar	Indian	Student Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Mr. Gajalajamgam Yuvaraj	Indian	Student Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Mr. Kaparthi Keerthan	Indian	Student Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Ms. Lakkonda Geethika	Indian	Student Hyderabad Institute of Technology and Management,

		Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Dr. Kowdodi Siva Prasad	Indian	Professor Department of Mechanical Engineering, Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India
Dr. Y. Anil Reddy	Indian	Associate Professor Hyderabad Institute of Technology and Management, Gowdavelly (Village), Near Kompally, Medchal (Mandal), Medchal-Malkajgiri (Dist.) Pin: 501401 Telangana India

2. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed

SpiCEN - A micro algae-based carbon Emission Neutraliser

Abstract:

SpiCEN, or Spirulina Carbon Emission Neutraliser, uses an innovative technology designed to reduce the carbon footprint of power plants. It contains a Spiral Photobioreactor, which acts as an artificial growth medium for the Spirulina micro plant and captures carbon dioxide from the atmosphere using a novel technique based on the Peltier effect. The system converts wastewater and carbon dioxide emissions generated by Power Plants into oxygen using the photosynthesis process. The SpiCEN system is monitored and controlled using an IoT platform that has microcontrollers and sensors to detect CO_2, Dissolved Oxygen (DO), Total Dissolved Solids (TDS), Electrical Conductivity (EC), etc. The biomass generated from the SpiCEN has potential for use as biofuel. The SpiCEN technology has strong commercial potential and can revolutionize the way we approach carbon capture and wastewater treatment in power plants.

Introduction

The world is facing a severe crisis of climate change, and the need for sustainable and eco-friendly technologies is higher than ever. The rising levels of Carbon Dioxide in the atmosphere are a major contributor to global warming. SpiCEN (Spirulina Carbon Emission Neutralizer) is a revolutionary product designed to address this issue. SpiCEN is an artificial growth medium for the Spirulina micro plant that captures carbon dioxide from the atmosphere using a novel technique. The product is designed to be placed

near power plants, where waste water and carbon dioxide from power plants are converted into oxygen during the process of photosynthesis. The biomass generated from SpiCEN has the potential to be used for many purpose including biofuel production. This report presents the patent application for SpiCEN.

Background and Prior Art

Spirulina is a blue-green algae that grows naturally in alkaline lakes and is known for its high protein content and other nutritional benefits. In recent years, there has been growing interest in using Spirulina for carbon capture and sequestration, as it is an efficient photosynthetic organism that can remove carbon dioxide from the atmosphere. Various techniques have been proposed to use Spirulina for carbon capture, including the use of photobioreactors, which provide controlled conditions for Spirulina growth.

One prior art is US Patent 2018/0224876A1, which describes a method for carbon capture using algae. The method involves growing algae in a photobioreactor and supplying it with carbon dioxide from a flue gas stream. The patent describes various methods for enhancing the efficiency of the process, such as optimizing the pH and temperature of the growth medium.

Another prior art is US Patent 2019/0315809A1, which describes a method for treating wastewater using Spirulina. The method involves growing Spirulina in a photobioreactor, which removes pollutants from the wastewater and provides nutrients for the Spirulina growth. The patent describes various

methods for optimizing the conditions for Spirulina growth, such as controlling the light intensity and temperature.

While the prior art provides useful insights into the use of Spirulina for carbon capture and wastewater treatment, there is a need for a more efficient and scalable approach that can be used near power plants to capture carbon dioxide and treat wastewater.

Description of Invention

SpiCEN is an artificial growth medium for the Spirulina micro plant that captures carbon dioxide from the atmosphere using a novel technique. The product is designed to be placed near power plants, where waste water and carbon dioxide from power plants are sent to SpiCEN. SpiCEN consists of a Spiral Photobioreactor, which provides controlled conditions for Spirulina growth. The Spiral Photobioreactor uses a novel technique for capture of carbon dioxide from the atmosphere by using the Peltier effect.

The Peltier effect is a thermoelectric phenomenon that occurs when a current is passed through a junction between two materials with different thermal conductivities. When a current is passed through the junction, heat is either absorbed or released, depending on the direction of the current. SpiCEN uses the Peltier effect to capture carbon dioxide from the atmosphere. The Spiral Photobioreactor is made up of two layers: an inner layer and an outer layer. The inner layer is made of a material with a high thermal conductivity, such as copper, while the outer layer is made of a material with a low thermal conductivity, such as aluminium. When a current is passed through the

junction between the two layers, heat is absorbed from the atmosphere, causing the carbon dioxide to condense on the inner layer. The carbon dioxide is then captured and sent to the Spirulina micro plant for photosynthesis. SpiCEN is also designed to treat wastewater from power plants. The wastewater contains various pollutants that can be used as nutrients for Spirulina growth. SpiCEN uses the pollutants in the wastewater as a nutrient source, which not only cleans the wastewater but also produces biomass that can be used for various purposes, including biofuel production.

SpiCEN is completely monitored and controlled using an IoT platform. The IoT platform consists of microcontrollers and sensors, including CO_2, Dissolved Oxygen (DO), Total Dissolved Solids (TDS), Electrical Conductivity (EC), etc. The microcontrollers and sensors ensure that the conditions for Spirulina growth are optimal, and the process is efficient.

Novelty and Advantages

SpiCEN is a novel product that addresses the pressing issue of carbon emissions from power plants. The product offers several advantages over existing methods for carbon capture and wastewater treatment:

a. Novel Technique: SpiCEN uses a novel technique to capture carbon dioxide from the atmosphere using the Peltier effect. The technique is efficient and scalable, making it suitable for use near power plants.

b. Dual Functionality: SpiCEN not only captures carbon dioxide from the atmosphere but also treats wastewater from power plants. The pollutants in

the wastewater are used as a nutrient source for Spirulina growth, producing biomass that can be used for various purposes.

c. Efficient Monitoring and Control: SpiCEN is completely monitored and controlled using an IoT platform, which ensures optimal conditions for Spirulina growth and an efficient process.

d. Biofuel Production: The biomass generated from SpiCEN can be used for biofuel production, which offers a sustainable and eco-friendly alternative to fossil fuels.

Patent Claims

The following claims are proposed for the SpiCEN patent:

Claim 1: A Spirulina growth medium that captures carbon dioxide from the atmosphere using the Peltier effect.

Claim 2: The Spirulina growth medium of claim 1, comprises a Spiral Photobioreactor that provides controlled conditions for Spirulina growth.

Claim 3: The Spiral Photobioreactor of claim 2, comprises an inner layer and an outer layer, wherein the inner layer is made of a material with a high thermal conductivity, and the outer layer is made of a material with a low thermal conductivity.

Claim 4: The Spiral Photobioreactor of claim 3, wherein a current is passed through the junction between the inner layer and the outer layer to capture carbon dioxide from the atmosphere.

Claim 5: The Spirulina growth medium of claim 1, further comprises an IoT platform that monitors and controls the conditions for Spirulina growth.

Claim 6: The IoT platform of claim 5, comprises of microcontrollers and sensors, including CO_2, Dissolved Oxygen (DO), Total Dissolved Solids (TDS), Electrical Conductivity (EC), etc.

Claim 7: The Spirulina growth medium of claim 1, further comprises a mechanism for treating wastewater from power plants.

Claim 8: The mechanism for treating wastewater of claim 7, uses the pollutants in the wastewater as a nutrient source for Spirulina growth.

Claim 9: The Spirulina growth medium of claim 1, further comprises a mechanism for producing biofuels from the biomass generated from Spirulina growth.

Claim 10: The mechanism for producing biofuels of claim 9, uses the biomass generated from Spirulina growth as a feedstock for biofuel production.

Conclusion

SpiCEN is a novel and efficient product that addresses the pressing issue of carbon emissions and wastewater treatment from power plants. The product offers several advantages over existing methods, including a novel technique for carbon capture, dual functionality for carbon capture and wastewater treatment, efficient monitoring and control using an IoT platform, and the production of biomass that can be used for biofuel production. The proposed patent claims highlight the unique features of SpiCEN and its potential applications in the field of carbon capture and wastewater treatment.

SpiCEN has the potential to revolutionize the way we address carbon emissions and wastewater treatment from power plants. With its efficient carbon capture and wastewater treatment mechanisms, SpiCEN offers a sustainable and eco-friendly alternative to existing methods. Additionally, the production of biomass from SpiCEN offers a renewable source of energy that can be used for various purposes, including biofuel production.

In conclusion, SpiCEN is a product that offers a unique and innovative solution to the pressing issue of carbon emissions and wastewater treatment from power plants. With its novel technique for carbon capture, efficient monitoring and control using an IoT platform, and the production of biomass that can be used for biofuel production, SpiCEN has the potential to revolutionize the field of carbon capture and wastewater treatment. We propose the above patent claims for SpiCEN to protect its unique features and potential applications.

Additionally, SpiCEN has several advantages over existing carbon capture and wastewater treatment methods. One of the main advantages is its scalability. SpiCEN can be designed to meet the needs of any power plant, ranging from small-scale operations to large-scale power plants. This scalability is due to the unique design of SpiCEN, which allows for the artificial growth of Spirulina microplants in a Spiral Photobioreactor. The capacity of SpiCEN can be easily adjusted to meet the needs of any power plant, ranging from 100 kg/year to any desired load based on the design.

Another advantage of SpiCEN is its use of the Peltier effect in its carbon capture mechanism. The Peltier effect is a thermoelectric phenomenon that is

used to generate an electric current when a temperature gradient is applied to a thermoelectric material. In SpiCEN, the Peltier effect is used to capture carbon dioxide from the atmosphere, which is then used by the Spirulina microplants during the process of photosynthesis. This unique carbon capture mechanism allows SpiCEN to capture carbon dioxide from the atmosphere more efficiently than existing methods.

The wastewater treatment mechanism of SpiCEN is also highly efficient. SpiCEN uses the waste water and carbon dioxide from the power plants as a nutrient source for the Spirulina microplants. During the process of photosynthesis, the Spirulina microplants convert the carbon dioxide into oxygen, and also absorb pollutants in the wastewater as nutrients. This highly efficient wastewater treatment mechanism not only reduces the amount of pollutants released into the environment, but also produces biomass that can be used for various purposes, including biofuel production.

In addition to its environmental benefits, SpiCEN also has economic benefits. The biomass produced by SpiCEN can be used as a renewable source of energy for biofuel production. Biofuels are becoming an increasingly popular alternative to fossil fuels, and SpiCEN offers a sustainable and eco-friendly source of biomass for biofuel production. Additionally, the efficient carbon capture and wastewater treatment mechanisms of SpiCEN can help power plants reduce their carbon emissions and wastewater treatment costs.

In conclusion, the SpiCEN is a unique product that provides an efficient and sustainable solution for capturing carbon dioxide and treating wastewater. Its innovative design and technology make it highly efficient and cost-effective,

and its scalability makes it an ideal solution for power plants of all sizes. Furthermore, the SpiCEN's ability to generate high-quality biomass for biofuel production further enhances its value as a tool for reducing the carbon footprint of power plants. The use of machine learning algorithms and IoT technology to monitor and optimize the performance of SpiCEN further demonstrates its sophistication and efficiency. Overall, the SpiCEN has the potential to revolutionize the way we approach carbon capture and wastewater treatment in power plants, and we believe it has strong commercial potential. We intend to protect our innovation through patent filings and other appropriate measures, and we look forward to bringing the SpiCEN to market in the near future.

Drawings:

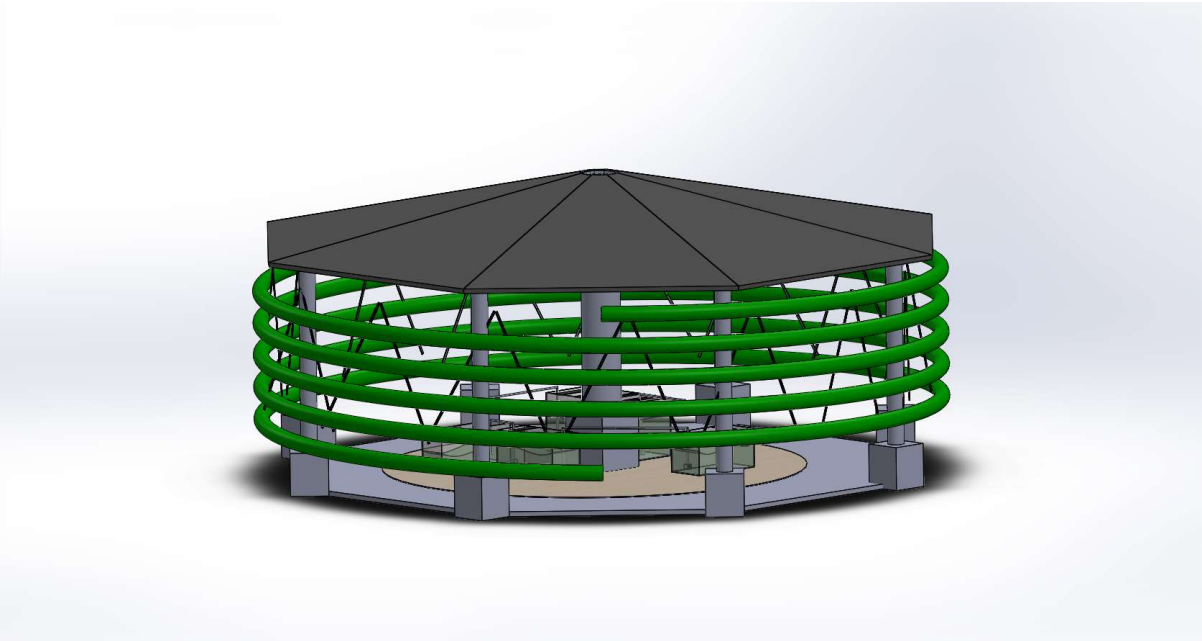

Fig 1: SpiCEN – A Microalgae-based Carbon Emission Neutralizer

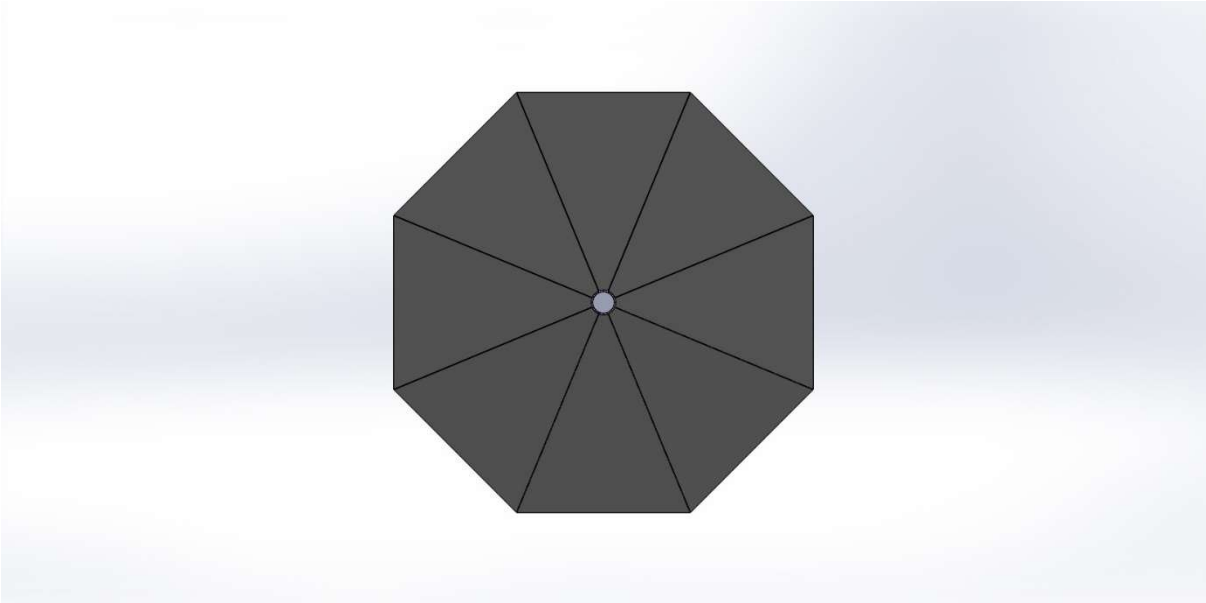

Fig 2: Top View of the SpiCEN

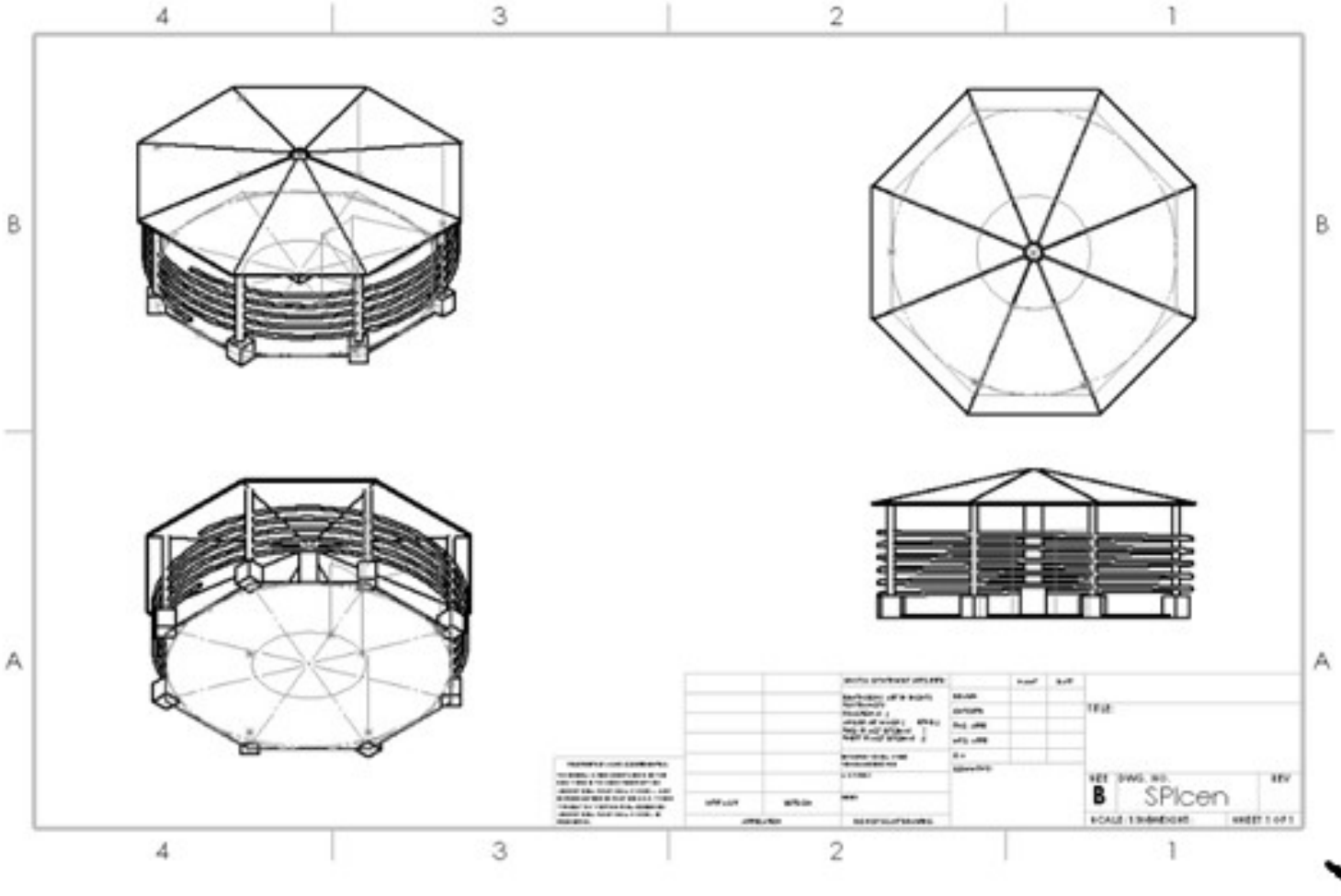

Fig 3: Views of the SpiCEN