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GEOGRAPHICAL INDICATIONS



सत्यमेव जयते

क्रम सं/SL No : 044169051



पेटेंट कार्यालय, भारत सरकार

The Patent Office, Government Of India

पेटेंट प्रमाण पत्र

Patent Certificate

(पेटेंट नियमावली का नियम 74)

(Rule 74 of The Patents Rules)

पेटेंट सं. / Patent No.

480184

आवेदन सं. / Application No.

202041005812

फाइल करने की तारीख / Date of Filing

11/02/2020

पेटेंटी / Patentee

Indian Institute of Technology Madras

आविष्कारकों का नाम / Name of Inventor(s)

1.Dr. Srinivasan Chandrasekaran 2.Mr. Vaddiraju Venkata Sesha Sricharan

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित **A SYSTEM FOR HARNESSING WAVE ENERGY** नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख फरवरी 2020 के ग्यारहवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled **A SYSTEM FOR HARNESSING WAVE ENERGY** as disclosed in the above mentioned application for the term of 20 years from the 11<sup>th</sup> day of February 2020 in accordance with the provisions of the Patents Act, 1970.



अनुदान की तारीख : 11/12/2023

Date of Grant :

पेटेंट नियंत्रक  
Controller of Patents

**टिप्पणी** - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, फरवरी 2022 के ग्यारहवें दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।

**Note** - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 11<sup>th</sup> day of February 2022 and on the same day in every year thereafter.





# IIT MADRAS

Indian Institute of Technology Madras

Technology Transfer Office  
TTO - IPM Cell



## Industrial Consultancy & Sponsored Research (IC&SR)

### A SYSTEM FOR HARNESSING WAVE ENERGY

#### IITM Technology Available for Licensing

##### Problem Statement

- Conventional wave energy converters face challenges in efficiently harnessing wave energy due to sensitivity to wave direction and irregular wave conditions, requiring a robust and flexible technology.
- A directional, insensitive, and mobile wave energy converter system that can effectively harness wave energy irrespective of wave direction, while being easy to fabricate, install, maintain, and transmit electricity with minimal loss.

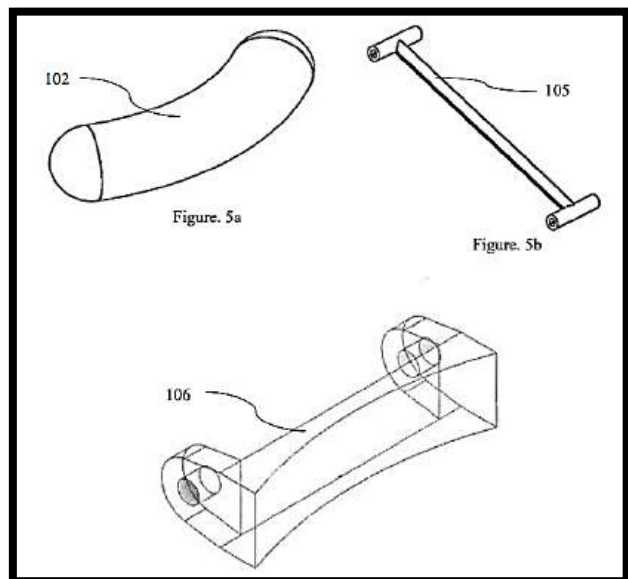
##### Technology Category/ Market

**Category** – Renewable Energy Technology

**Applications** -Sustainable Energy, Electricity Generation

**Industry** - Renewable Energy, Marine Energy Sector, Offshore Engineering

**Market** – Renewable Energy Market size was valued at USD 769.9 Billion in 2021 and is poised to grow from USD 899.24 Billion in 2022 to USD 3114.73 Billion by 2030, at a **CAGR of 16.8%** during the forecast period (2023-2030).



**FIG1 . a, b, and c respectively depict the float, frame, and hinge joint used to connect floats with the buoy in the described embodiment.**

##### Technology

###### Bean-shaped floats:

Designed to **oscillate in response to incident waves**, enabling efficient energy capture.

###### Hinge-joint connections:

Facilitate free movement of floats around the buoy, ensuring adaptability to wave direction.

###### Hydraulic piston-cylinder arrangement:

Converts **mechanical motion of floats into pressurized hydraulic fluid**.

###### Gearbox arrangement:

Transforms **hydraulic pressure into rotational motion** to drive an electric generator.

###### Heave plate:

Enhances system stability and efficiency by **mitigating the effects of wave motion on the buoy**.

##### Intellectual Property

- IITM IDF Ref. 1975
- IN 480184 (Patent Granted)
- PCT/IB2021/050992

##### TRL (Technology Readiness Level)

TRL- 4, Technology validated in lab

##### Research Lab

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## Industrial Consultancy & Sponsored Research (IC&SR)

### Key Features / Value Proposition

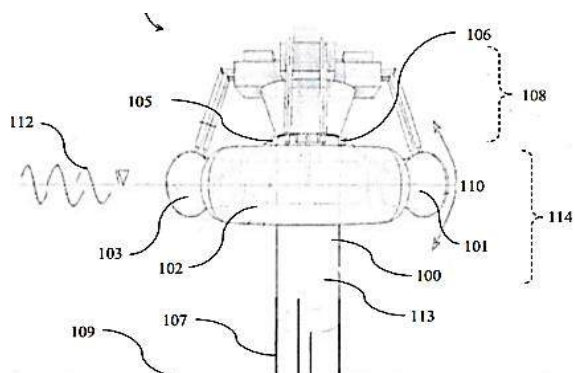
#### User Perspective:

- Provides a **reliable and sustainable** source of electricity generation by harnessing abundant ocean wave energy.
- Offers a **solution that is environmentally friendly**, economically viable, and **adaptable to varying sea conditions**.

#### Technical Perspective:

- Utilizes a **novel design with bean-shaped floats** and **hinge-joint connections** to ensure efficient energy capture from waves.
- Implements **hydraulic and gearbox systems** to efficiently convert **mechanical wave motion into electrical power**, overcoming traditional limitations of wave energy converters.

### Image



**FIG. 2 depicts a schematic front view of a wave energy harnessing system comprising a buoy, multiple floats, and a power take-off unit.**

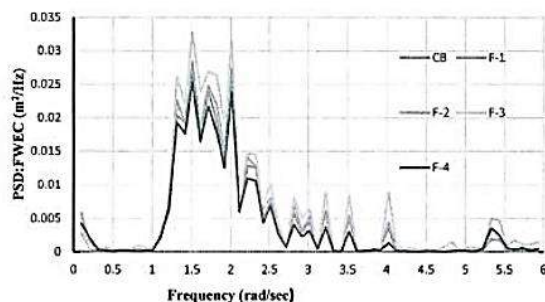


Figure. 6a

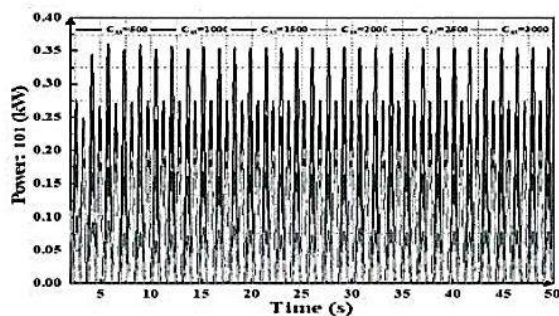


Figure. 6b

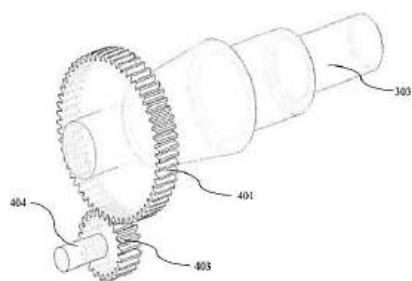


Figure. 4

**FIG. 3 shows a perspective view of the gearbox arrangement within the power take-off unit as per the described embodiment.**

**FIG4. a and b display performance curves numerically computed to represent the energy trapping capabilities of the system in the described embodiment.**

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