



Industrial Consultancy & Sponsored Research (IC&SR)

An Integrated Annular Tube for use as Solar Concentrator, Conveyor and Storage System

IITM Technology Available for Licensing

PROBLEM STATEMENT

- In this age of energy crisis, **solar energy is an important** source of renewable energy.
- There has been **immense research** on various methods of accumulating solar energy.
- The **Primary modes** of solar energy collection/ conversion are
 - concentration of solar radiation by mirrors / lenses** and storage of thermal energy in the fluid media and
 - conversion of solar energy to electrical energy** using solar photovoltaic materials or using thermopiles.

TECHNOLOGY CATEGORY MARKET

Technology: Annular tube for energy storage

Category: Energy, Energy Storage & Renewable Energy

Industry: Solar Industry

Application: Solar concentrator

Market: The global market size was worth around **USD 234.57 billion in 2023** and is predicted to grow around **USD 425.39 billion by 2032** with a compound annual growth rate (CAGR) of roughly **6.84% between 2024 and 2032**

INTELLECTUAL PROPERTY

IITM IDF Ref. 959 ,Patent No: IN 335377

TRL (Technology Readiness Level)

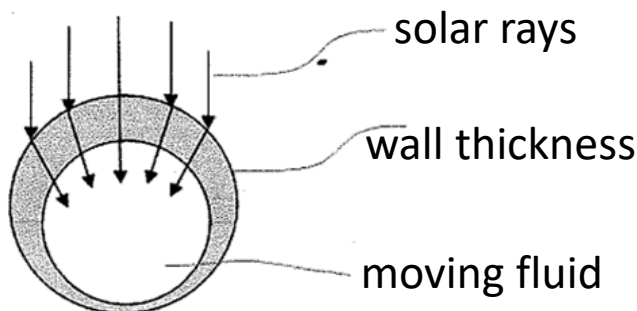
TRL- 3, Experimental Proof of Concept;

Research Lab

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TECHNOLOGY

Fig 1 shows a Schematic of the Cross Section of the Pipe



1

•An integrated annular fluid conveyor and storage tube with circular cross section for solar concentrator.

2

•System comprises an annular passage with a circular section formed by a solid casing encased in glass.

3

•Casing has inner and outer surfaces, forming a hollow passage with a circular cross section along the tube's longitudinal axis.

4

•Wall thickness of casing is circumferentially tapering from one point to a second point, 180° departed from the first point.

5

•System increases fluid temperature, effectively heating the moving or stored fluid.

6

•Casing can be cylindrical, hemispherical, or more than hemisphere but less than cylindrical.

7

•Casing includes solar cells film wrapped into the casing shape.

8

•Casing may be a curved Fresnel lens.

CONTACT US

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Fig 2 Shows a Schematic of the pipe ; concentration happens as fluid moves along inside the pipe

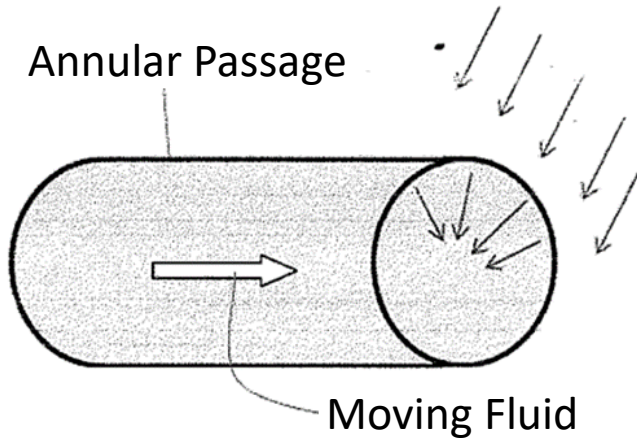
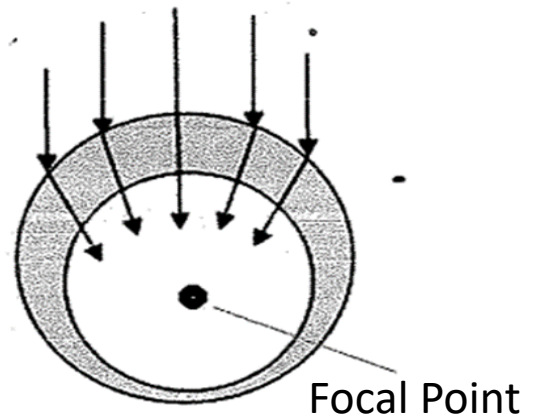


Fig 3 shows a Schematic of the cross section of the pipe with a thermopile at the focal point



Key Features / Value Proposition

Advanced Focusing

- Involves **focusing mirrors and lens** configurations.
- Focused light used to heat pipes or solar photo-voltaic panels.

Mechanism

- **Comprises concentrating mechanism** and target substance (fluid or solar panel).

Heating Properties

- Integrates pipe for heat transport within the solar concentrator.
- Heats fluid as it's transported.

Solar Cell Casing

- Incorporates solar cells film into casing shape.
- Features a **curved Fresnel lens** casing.

Power Generation

- Includes **hot junctions** of thermopile at **focal point** of convergent solar rays for thermoelectric power generation
- **Cold junctions** located at cooler **locations inside or outside casing**.

Material and shape

- Uses a **transparent glass pipe as a fluid pipe** and solar concentrator.
- The **tube's shape is thicker at the top and thinner at the bottom**, allowing solar rays to converge and heat the fluid.

Thermal storage

- Includes **thermal storage devices** like a **transparent spherical container** for continuous solar energy concentration.

Geometry

- **Circular perimeter shape** with hollow passage.
- Circular tapering casing thickness for fluid movement.
- Can have cylindrical, hemispherical, or multiple hemisphere casing.

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