

STEP CLIMBING APPARATUS

IITM Technology Available for Licensing

Problem Statement

- Conventional equipment cannot navigate the stepped and sloped terraces, leading to reduced farming productivity and manual labor.
- Current climbing technologies are complex, bulky, expensive, and lack stability and adaptability for steep slopes.
- Autonomous agricultural robots are effective only on flat terrains and do not address the unique challenges of step farming.

Intellectual Property

- IITM IDF Ref. **2591**
- **IN 542650 - Patent Granted**

Technology

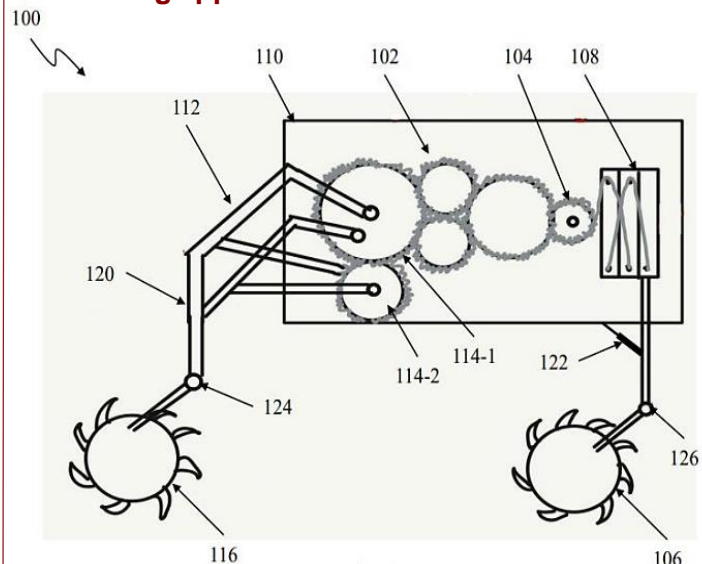
Advanced Climbing Mechanism:

The step climbing apparatus features a gear train, telescopic slider unit, and a four-bar linkage system to enable efficient traversal of steps and step slopes up to 90 degrees, enhancing mobility and stability on uneven terrains.

Active Control for Stability: The apparatus includes an active control mechanism and vibration-dampening features to prevent tilting and damage to the payload, ensuring stable operation while climbing and navigating irregular surfaces.

Versatile Applications: Designed for terraced agricultural fields, the apparatus can also be utilized in construction, industrial processes, and rescue operations, offering robust performance in challenging environments.

FIG. 1. Schematic representation of a step climbing apparatus.



100	Step climbing apparatus
110	Housing
102	Gear train
108	Telescopic slider unit
104	Input gear
112	Four-bar linkage
116	Two front legs
106	Two rear legs
122	Linear actuator

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

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CONTACT US

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Technology Category/ Market

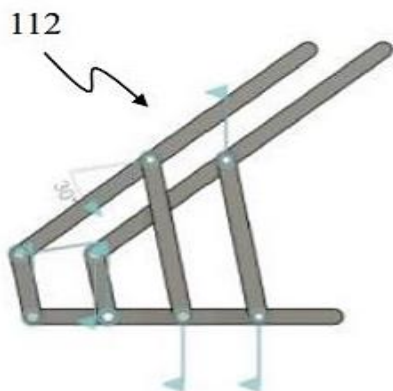
Category - Robotics & Automation

Applications - Construction Sites, Rescue Operations

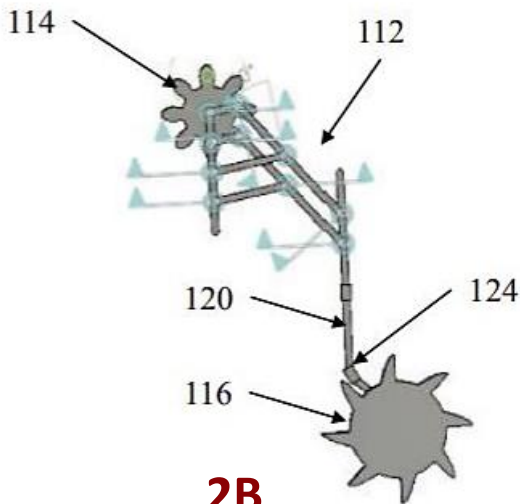
Industry - Agriculture Technology (AgTech), Construction and Infrastructure

Market - Global automatic stair climbing wheelchair market size is estimated to grow by USD 818 million, at a **CAGR of 13.1%** between 2023 and 2028.

FIG. 2A and 2B illustrate exemplary representations of a four-bar linkage of the step climbing apparatus.



2A



2B

Key Features / Value Proposition

- Advanced gear train and telescopic slider system enable smooth traversal of steps and steep slopes.

1. Efficient Terrain Navigation:



- Integrated active control mechanism and vibration-dampening features prevent tilting and damage, ensuring reliable performance on uneven terrains.

2. High Stability and Control



- Capable of climbing steep slopes up to 90 degrees with precision, addressing challenges in steep agricultural and industrial environments.

3. Robust Climbing Capabilities



- Four-bar linkage system and curved blade wheels optimize traction and maneuverability, facilitating efficient operation on irregular surfaces.

4. Enhanced Mobility



- Adaptable design for use in agriculture, construction, and rescue operations, providing a broad range of applications in various industries.

5. Versatile Application



- Built with robust components and self-locking gears, ensuring long-term durability and consistent performance in demanding conditions.

6. Durable and Reliable



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