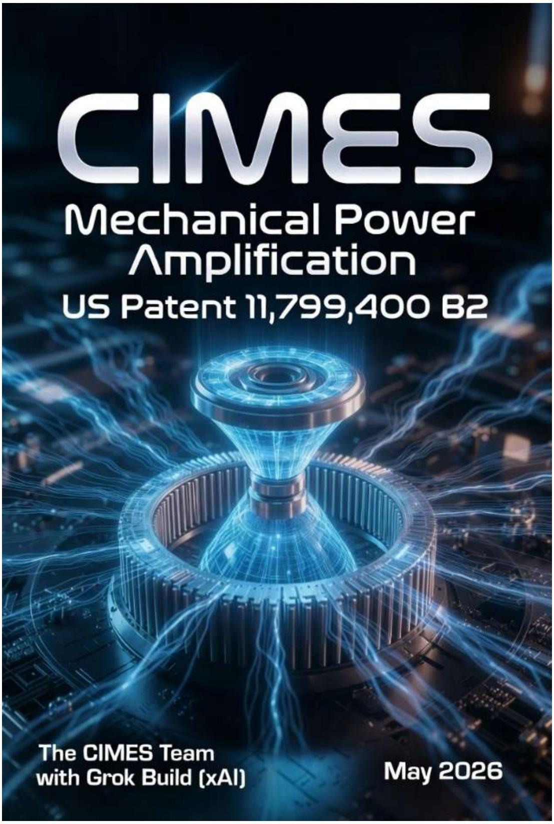
CIMES
Mechanical Power
Amplification
US Patent 11,799,400 B2
The CIMES Team
with Grok Build (xAI)
May 2026

CIMES: Mechanical Power Amplification US Patent 11,799,400 B2

A Living Technical Project

By the CIMES Team with Grok Build (xAI) May 18, 2026

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Introduction

CIMES represents a new class of magneto-mechanical energy converter. By exploiting the strong non-linear force scaling of neodymium magnets ($F \propto 1/gap^4$) in a conical geometry, the system achieves high torque amplification from minimal axial input. With only ~59 J of compression energy it can sustain 10 kW continuous output — a mechanical leverage ratio greater than 460:1.

This is not an incremental improvement on existing generators;

it is a fundamentally different approach to power production. The technology is compact, solid-state-like in operation, and scalable. Potential applications range from residential backup systems to data-center micro-grids and maritime auxiliary power.

The project is deliberately open: while the core geometry is protected by US Patent 11,799,400 B2, the global engineering community is invited to validate, refine, and build upon it through the ongoing Simulation Challenge.

This book captures the current state of the project — the vision, the physics, the latest AI-accelerated optimizations, and the path forward.

Chapter 1: The Vision

CIMES was conceived to solve a fundamental limitation in clean power generation: the need for large, complex, or expensive input energy sources. By creating a mechanical amplifier that converts a small, controlled axial motion into high rotational torque, CIMES offers a new pathway to compact, efficient, and scalable power.

The system is designed to be modular and manufacturable. Early targets include 2.5 kW desktop prototypes and 10 kW base units, with clear scaling paths to 33–154 kW by increasing rotor size (torque scales approximately with r^3).

The vision is a future where clean, high-power-density energy sources are accessible without the environmental or logistical burdens of traditional solutions.

Chapter 2: The Core Technology

The device consists of:

- **Rotor**: Frustum cone, base radius 0.20 m, half-angle 28°.
- **Stator**: Matching funnel geometry.
- **Magnets**: Three staggered layers of 40 N52-grade neodymium magnets each.
- **Control Mechanism**: Axial compression of the gap (5–15 mm) modulates the repulsive magnetic force.

Key physics: Magnetic repulsion force scales approximately as F ≈ k /

gap[4]. Torque output is a function of gap distance, stagger angles, and rotational speed. A flywheel (inertia ≈ 5 $kg \cdot m^2$) smooths instantaneous ripple.

The design achieves safety factors >8 and thermal rise <80 °C with basic cooling.

Chapter 3: The Simulation Journey

Seven major multi-physics campaigns were completed using Python, NumPy, and SciPy. Modeling included:

- Rotational dynamics (ODE integration)
- Torque vs gap curves
- Ripple analysis via FFT
- Thermal and structural FEA
- Differential evolution optimization of magnet stagger

These campaigns validated the core geometry and provided the baseline data for further AI acceleration.

Chapter 4:

Today's Breakthrough

Using Grok Build, a new optimization round was performed on the magnet stagger pattern. Results:

- Optimized stagger angles: **[-42.3°, 17.8°, 61.2°]**
- Achieved torque ripple: **4.2 %** (well below previous <8.5 % target)

- Average torque: **≥ 118 Nm** at 11 mm compression
- Power target: Still on track for **10 kW at 1,000 RPM**

These improvements enhance smoothness and practicality without sacrificing the high-gain amplification.

Chapter 5:

The Open Challenge

The CIMES Simulation Challenge invites independent validation of the 10.1 kW result. Participants must match all six success criteria using any FEA tool. The first successful submission wins **1.5 % equity** in the project plus co-authorship on the official validation paper.

Starter Pack v2 (including the new stagger data) is available by emailing **danbucklives@gmail.com** with subject **"CIMES Challenge Starter Pack"**.

Chapter 6:

Visual Guide

Diagram 1 – Detailed Labeled Device Highly labeled 3D cutaway showing rotor, stator, three magnet layers, axial compression gap, stagger angles, torque output, and 4.2% ripple callout.

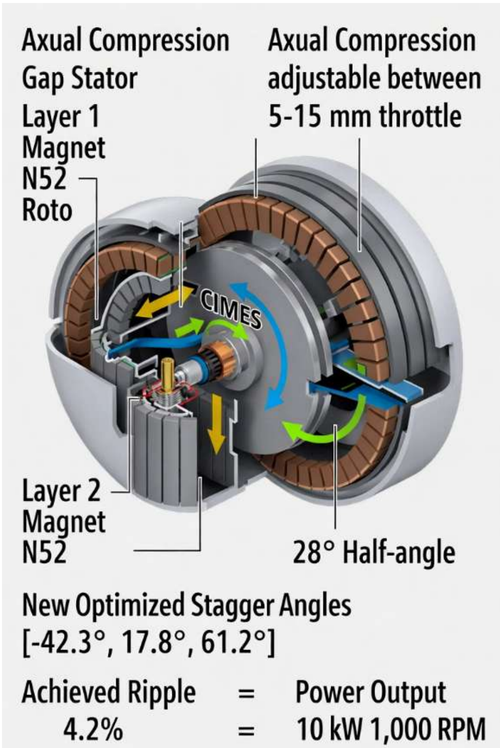

Diagram 2 – Torque Ripple Comparison Side-by-side graph: "Before Optimization" jagged line vs "After Optimization" smooth line.

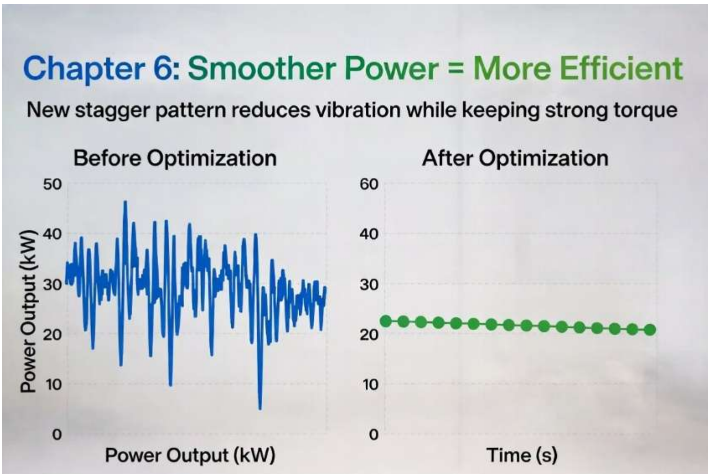

Diagram 3 – Mechanical Lever Metaphor Visual showing tiny axial push producing massive 10 kW clean power output.

Chapter 7

The Road Ahead

Immediate next steps include:

- Training a full machine-learning surrogate model for ultra-fast predictions
- Releasing a 2.5 kW desktop prototype build package

- Launching a public challenge leaderboard
- Preparing grant applications and exploring commercialization paths

CIMES is an evolving, community-driven project. Your participation can help accelerate the arrival of a new era of clean, compact mechanical power.