AN INTERNAL COMBUSTION ENGINE FOR A VEHICLE WITH MINIMAL ROTATIONAL AND RECIPROCATING UNBALANCED FORCES.

IITM Technology Available for Licensing

Problem Statement

- Small single cylinder internal combustion engines inherently produce high vibrations due to unbalanced forces from the rotating crankshaft and reciprocating piston.
- These vibrations are transferred to the machine or vehicle, causing user discomfort.
- Conventional balancing methods are ineffective for transparent or modified single cylinder engines with additional reciprocating masses, leading to inefficient operation.

Intellectual Property

- IITM IDF Ref. **2775**
- **IN 202441022308 - Patent Published**

Technology Category/ Market

Category- Advanced Engine Management Systems, Automobile & Transportation Applications - Motorcycles and Scooters, Portable Generators

Industry- Automotive, Heavy Machinery

Market - The global internal combustion engine market size is expected to reach USD 228 Billion in 2032, growing at a **CAGR of 5%.**

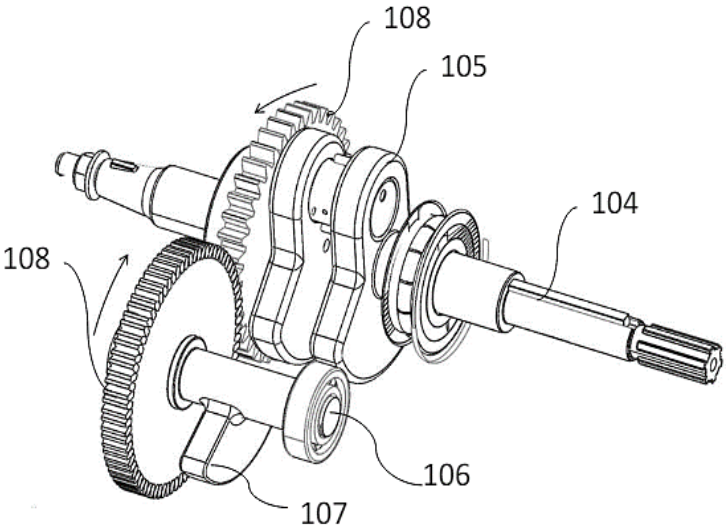

FIG. 1. Perspective view of a crankshaft and an auxiliary shaft. Referral numeral (refer Page 2)

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

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Technology

1 Balanced Crankshaft and Auxiliary Shaft:

- The engine design incorporates a crankshaft with a first counterweight and an auxiliary shaft with a second counterweight, both positioned near the bottom end of the block to balance the forces and reduce vibrations.

2 Opposite Rotation Mechanism:

- The crankshaft and auxiliary shaft are coupled to a driving mechanism with gears that rotate in opposite directions, further aiding in balancing the engine and minimizing vibrations.

3 Integrated Design and Cavities:

- The engine block includes two cavities with C-shaped profiles to accommodate the crankshaft and auxiliary shaft, ensuring proper alignment and structural integrity.

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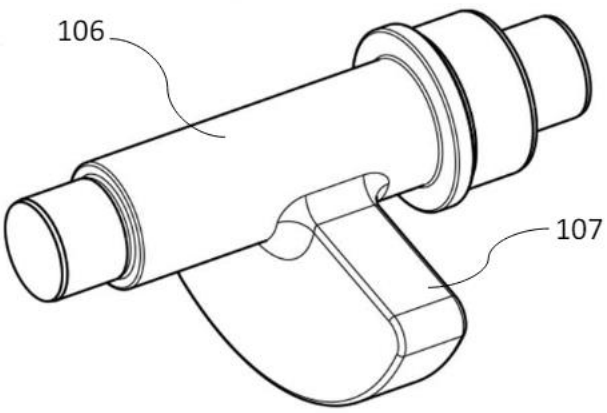

FIG. 2. Perspective view of the auxiliary shaft with the at least one second counterweight of the internal combustion engine. The auxiliary shaft (106) is defined with at least one second counterweight (107).

Referral Numeral:

COMPONENT	REFERRENCE NUMERAL
Engine	100
Block	101
Top portion	101a
Bottom portion	101b
Bottom end	101c
Axis	AA'
Cylinder	102
Piston	103
Crankshaft	104
At least one first counterweight	105
Auxiliary shaft	106
At least one second counterweight	107
Driving mechanism	108
Cavities	109
Connecting rod	110
Filling hole	111
Inclined holes	112
Provision	113
Thread holes	114
extensions	115

Key Features / Value Proposition

1. Enhanced Vibration Reduction: Integrated counterweights on both the crankshaft and auxiliary shaft reduce engine vibrations significantly.

2. Optimized Engine Balance: Parallel auxiliary shaft with counterweights balances reciprocating forces, ensuring smoother operation.

3. Increased Engine Longevity: Reduced vibrations lead to less wear and tear, extending the engine's operational life.

4. Improved Efficiency: Opposite rotating shafts, coupled with a gear mechanism, enhance mechanical efficiency and performance.

5. Space-Efficient Design: Engine block designed with C-shaped cavities for compact and efficient component placement.

6. Versatile Application: Suitable for various vehicles, providing stable and reliable performance across different platforms.

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