TWO-STAGE DESIGN BASED HIGH SPEED GAS GUN

IITM Technology Available for Licensing

Problem Statement

- Existing **high-speed gas guns lack efficiency and precision** in achieving desired pressure and velocity profiles.
- A **two-stage design gas gun** is sought to **optimize pressure and velocity control** for **enhanced experimental accuracy and efficiency.**

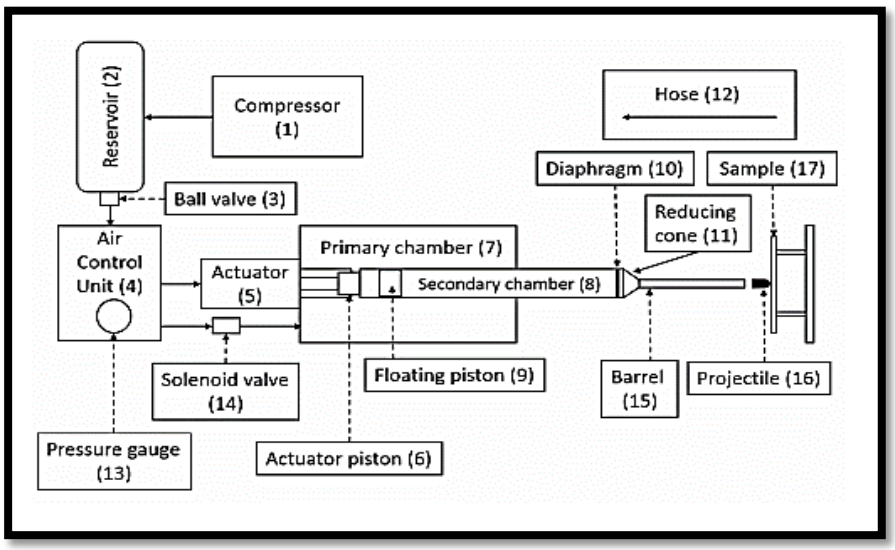

FIG. 1: illustrates a schematic view of a two-stage design-based high-speed gas gun for firing rod-like projectiles (low mass) of various nose shapes at very high velocities on samples to find their ballistic limits and dynamic behavior, by the disclosed embodiments;

Key Features / Value Proposition

User perspective:

- It provides **a safer and more cost-effective solution** for researchers and engineers involved in **ballistic resistance characterization, reducing risks associated with explosives and complexity.**

Technical perspective:

- Implements a novel **two-stage gas gun design** coupled with predictive capabilities, **enhancing accuracy and efficiency** in characterizing materials' ballistic limits and dynamic behavior.

TRL (Technology Readiness Level)

TRL- 4, Technology validated in lab.

Technology Category/ Market

Category – Ballistic Testing Equipment
Applications - Aerospace, Military and Defense, Automotive
Industry - Aerospace Engineering, Automotive Manufacturing
Market - The global Test and Measurement Equipment market size was valued at USD 31922.18 Million in 2022 and will reach USD 63925.62 Million in 2028, with a **CAGR of 12.27%** during 2022-2028.

Intellectual Property

- **IITM IDF Ref. 1900**
- **IN 479752 (Patent Granted)**

CONTACT US
Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
https://ipm.icsr.in/ipm/

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@imail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719

IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO – IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

Technology

Two-stage design:
Utilizes a two-stage gas gun mechanism for firing projectiles at high velocities, enhancing efficiency and control.

Pneumatic reservoir:
Charges with high-pressure air to propel projectiles, providing a safer alternative to explosives.

Diaphragm rupture:
Controlled diaphragm rupture at predetermined pressure levels enables precise propulsion of projectiles.

Pneumatic actuator:
Regulates airflow between primary and secondary chambers, ensuring controlled acceleration of projectiles.

Use of light gases:
Utilizes light gases like hydrogen, helium, or atmospheric air as working fluids, optimizing efficiency and safety in ballistic testing.

Research Lab

Prof. Velmurugan R
Dept. of Aerospace Engineering
Prof. Jayaganthan
Dept. of Engineering Design

Image

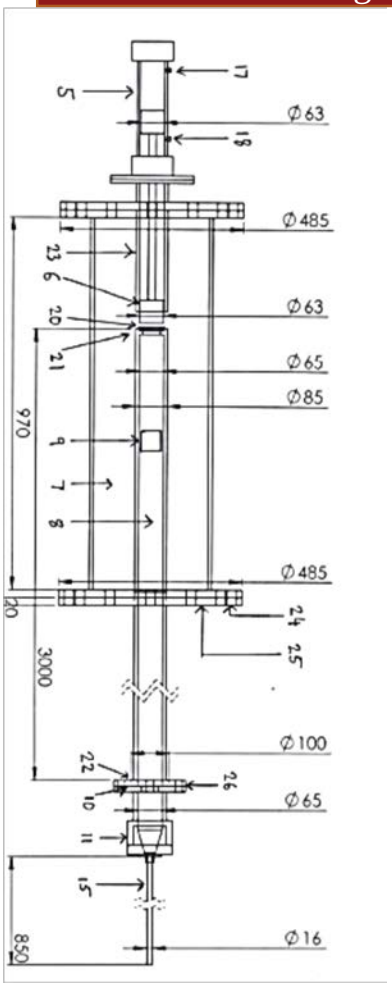

FIG. 2 depicts a schematic of a two-stage high-speed gas gun with parts and dimensions.

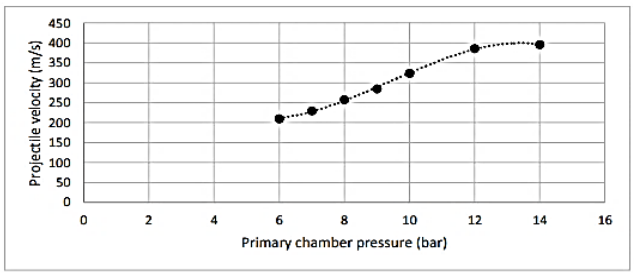

FIG.3

FIGS. 3 Graphical representation of pressure and velocity in primary chamber of two-stage high-speed gas gun.

CONTACT US
Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
https://ipm.icsr.in/ipm/

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@imail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719