

Experiment No.:

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TO VERIFY THE LAW OF LENGTH AND LAW OF TENSION OF A STRING BY USING A SONOMETER.

APPARATUS REQUIRED:

1. A sonometer with two bridges
2. String and a paper rider
3. Slotted load
4. A set of Tuning forks with different frequencies
5. A rubber pad

THEORY:

The sonometer is an instrument used for demonstrating the relationship between the frequency of the sound that is produced by the string when it is plucked and the tension, length, and mass per unit length of the string.

Basically, a sonometer is a device based on the principle of Resonance.

"When the frequency of the applied force is equal to the natural frequency of the body, the body vibrates with very large amplitude". Corresponding intensity of sound will be maximum. **This phenomenon is known as resonance**

A sonometer can be used:

1. to verify the laws of vibration of stretched string
2. to determine the frequency of tuning fork.
3. to measure the mass per unit length or density of a wire.
4. to find the weight of unknown load.

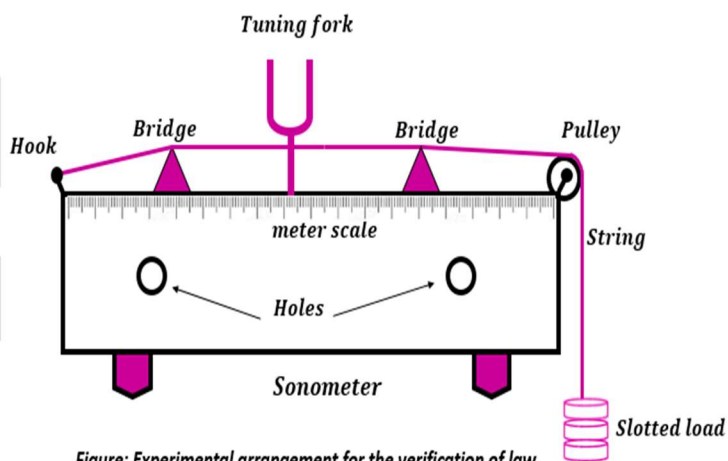


Figure: Experimental arrangement for the verification of law of transverse vibration of string.

Construction:

- **The Wire, Weights and Pulley Apparatus:**

A wire is stretched along the sound box, between the hook (hinge) and the pulley. The wire turns around the pulley to let a weight hang on the end of the wire.

- **The Sound box (A hollow wooden box):**

The sound box is a cuboidal box made of wood, upon which other parts of the sonometer are built. **The function of the sonometer box is to amplify the sound of the tuning fork.** The sonometer box also has a graduated ruler along its length to measure distances on the box.

There are holes kept on one side of the sonometer box. **The holes in the sonometer box act as a way through which the frequency of vibration of the string is communicated inside the hollow portion of the box.**

- **The Knife Edges (bridges):**

The bridges are made to let the user change the length of the wire responsible for producing standing waves. So, **changing the positions of the bridges changes the wavelength of the standing waves.**

Working:

When the stem of a vibrating tuning fork is placed on the surface of the sonometer, the string attached on the sonometer begins to vibrate. These vibrations (waves) are reflected back-and-forth between the bridges and hence transverse standing waves are produced. On adjusting the positions of the bridges to a