Tyndall's bar breaker U8442150

Instruction Sheet

06/09 ALF

1 Tensioning screw
2 Abutment
3 Metal bridge
4 Stand rod
5 Bolts
6 Spare bolts

1. Safety instructions

- Set up the experiment so that any pieces of bars that break and fly off are not able to hit any nearby people or breakable objects.
- Do not tighten the tensioning screw too much.
- Do not touch the equipment while heating the metal bridge.
- Allow the equipment to cool before putting it away.

Caution! Broken bolts will be hot.

- Only pick up broken pieces with the aid of heat-resistant gloves or a suitable cloth.

2. Description

The bar breaker demonstrates the huge forces that are involved in a change of volume of solid materials due to temperature.

The bar breaker consists of a U-shaped abutment with a metal bridge and a tensioning screw. At the open end of the fork are two drilled holes through which cast-iron bolts may be inserted, also passing through the metal bridge to hold it in place. A rod attached to the side of the abutment allows the bar breaker to be attached to a retort stand.

3. Equipment supplied

1 Bar breaker apparatus
10 Cast-iron bolts

4. Technical data

Bolt holes:	10 mm dia.
Length of abutment:	290 mm
Stand rod:	65 mm x 12 mm dia.
Weight:	approx. 1.3 kg

5. Accessories

Set of 10 cast-iron bolts	U8442110

6. Operating principle

As the metal bridge is heated, it expands to such a degree that its tensioning screw needs to be tightened up. When it cools it contracts back to its original length. However, it no longer has the play to do this, since the tensioning screw has been tightened at one end and the bolt prevents contraction at the other. Eventually, the resulting tension in the metal bridge becomes so great that it snaps the bolt in two with a loud bang.

7. Operation

The following equipment is also required to perform the experiment:

1 Stand base, A-shaped	U8611160
1 Stainless steel rod, 470 mm	U15002
1 Universal clamp	U13255
1 Cartridge burner	
1 Gas cartridge	

- Set up the experiment as in Fig.1. Check that the bolt is not aligned towards any viewing persons.
- Secure the bolt with its fastening screw before heating it.
- Heat the bridge for about 5 minutes in a naked gas flame. As the bridge heats up, keep tightening the tensioning screw to match the expansion.
- Take away the burner and allow the bridge to cool.

Some time later, the bolt will break apart.

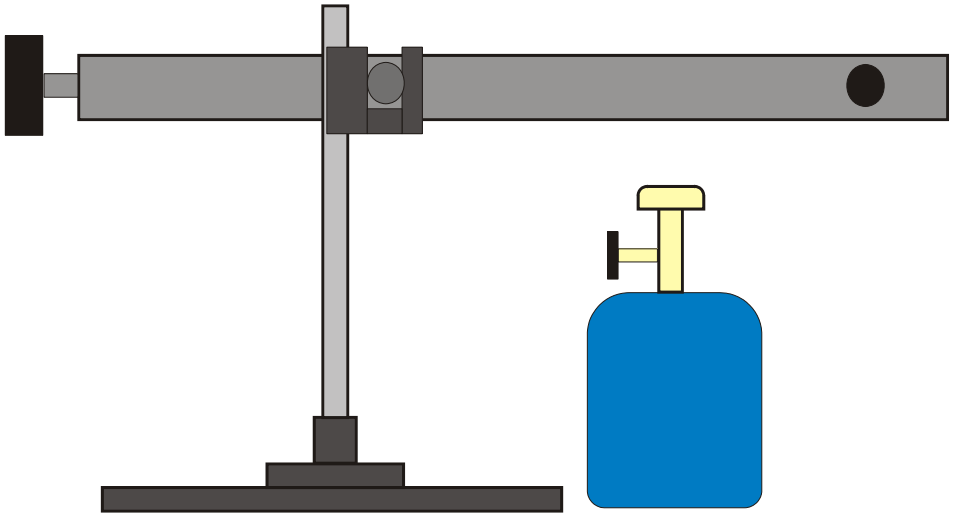

Fig. 1 Bar breaker experiment set-up