



PRACTICE LECTURE OF ANESTHETIC EQUIPEMENTS

FLOWMETERS

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FLOWMETER

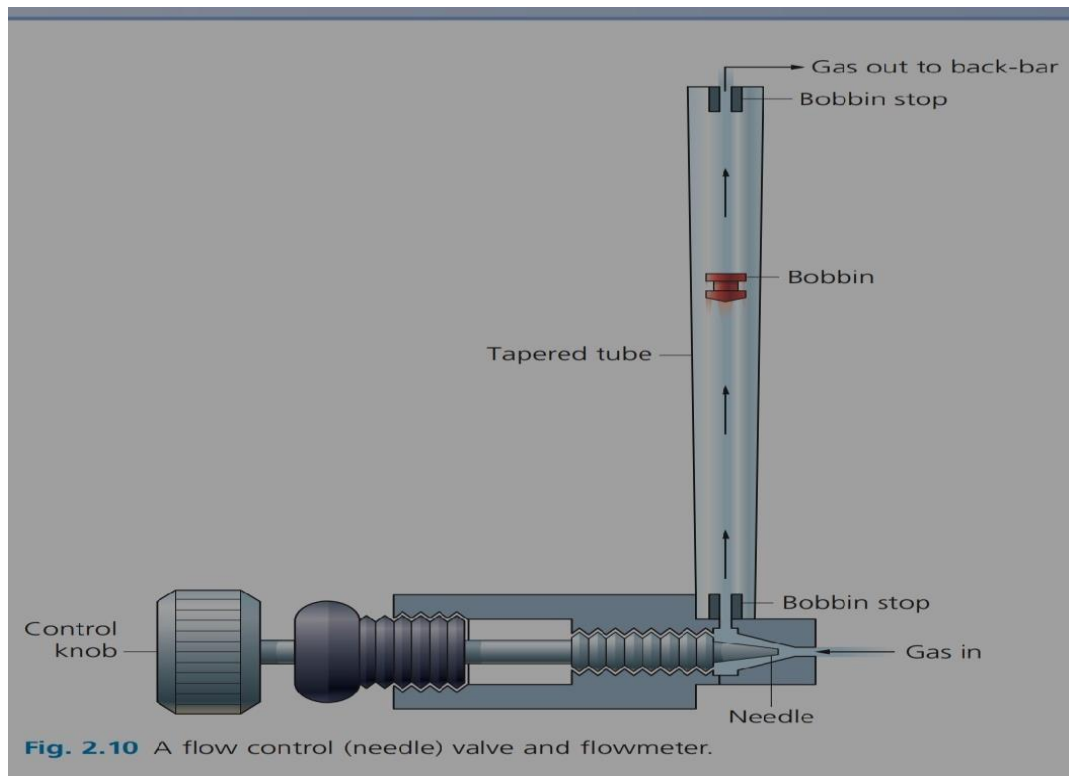
Flowmeters measure the flow rate of a gas passing through them. They are individually calibrated for each gas. Calibration occurs at room temperature and atmospheric pressure (sea level). They have an accuracy of about $\pm 2.5\%$. For flows above 1 L/min, the units are L/min, and for flows below that, the units are 100 mL/min when.



Fig. 2.20 An empty Selectatec back bar of an anaesthetic machine.

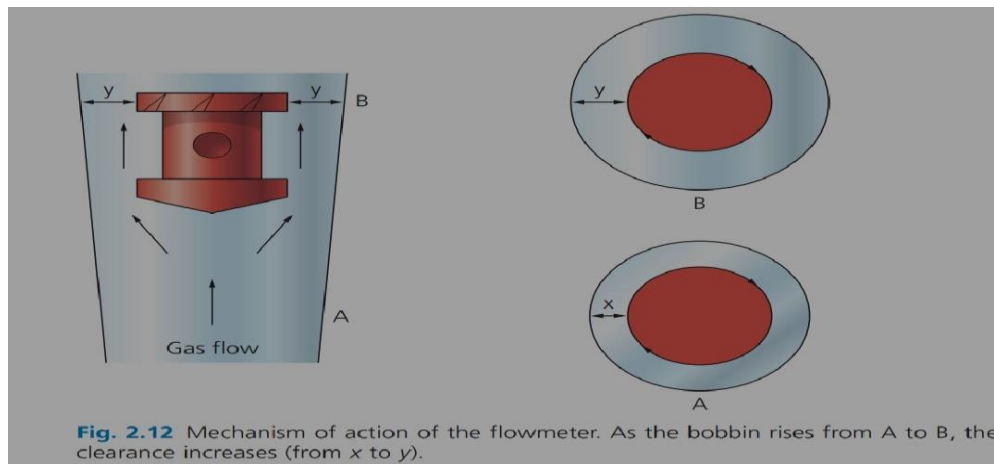
Components:

1. A flow control (needle) valve.
2. A tapered (wider at the top), transparent plastic or glass tube.
3. A lightweight rotating bobbin or ball.



Mechanism of action:

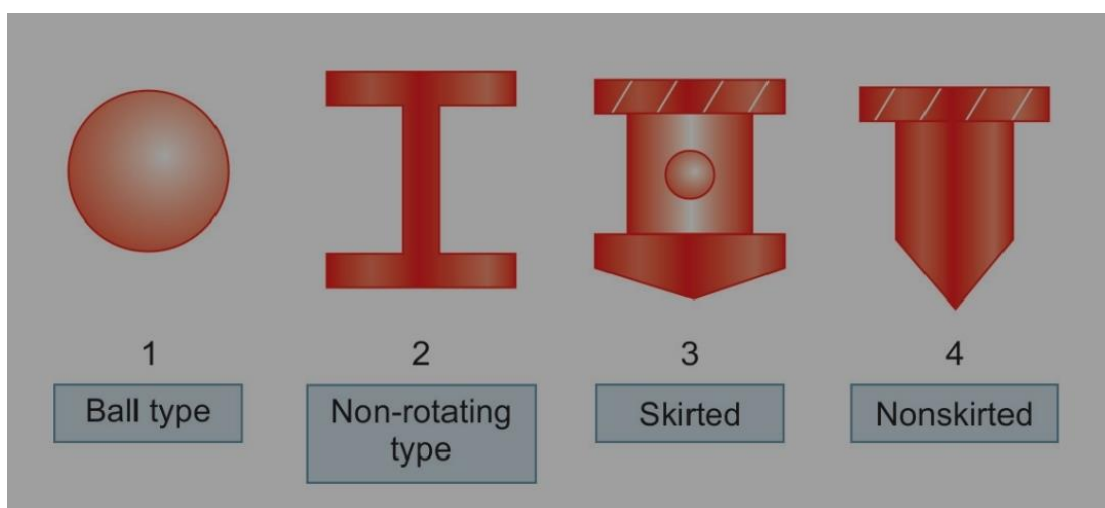
- 1-When the needle valve is opened, gas is free to enter the tapered tube.
- 2-The bobbin is held floating within the tube by the gas flow passing around it. **The higher the flow rate, the higher the bobbin rises within the tube.**



3. The clearance between the bobbin and the tube wall widens as the gas flow increases.

4-The top of the bobbin **has slits (flutes)** cut into its side. As gas flows past it, the slits cause the bobbin to rotate. A dot on the bobbin indicates to the operator that the bobbin is rotating and not stick.

5. The reading of the flowmeter is **taken from the top of the bobbin**. When a ball is used, the reading is generally taken from the midpoint of the ball.

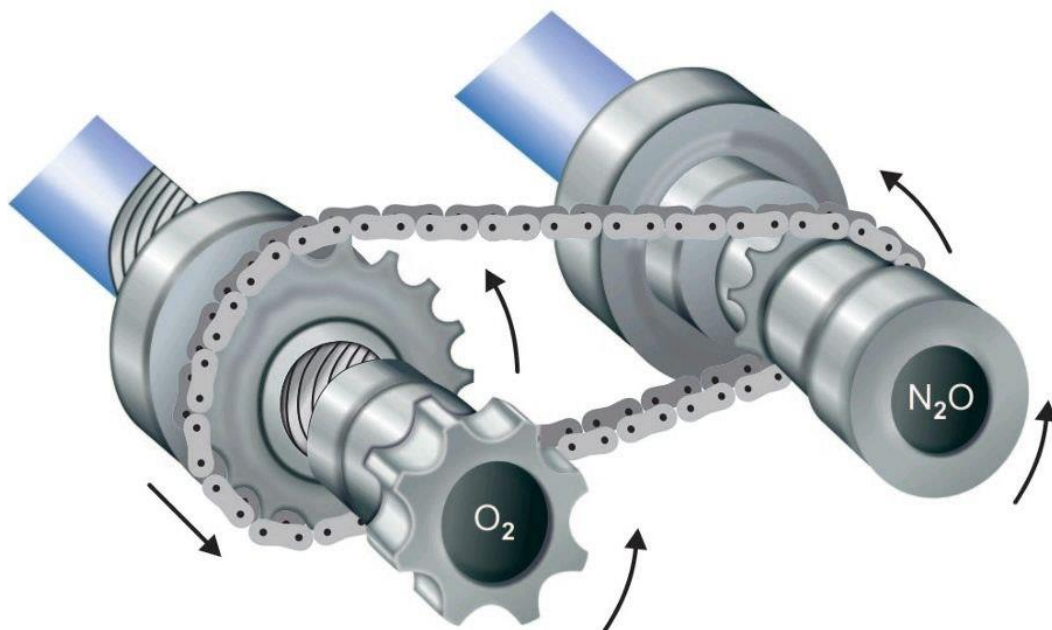


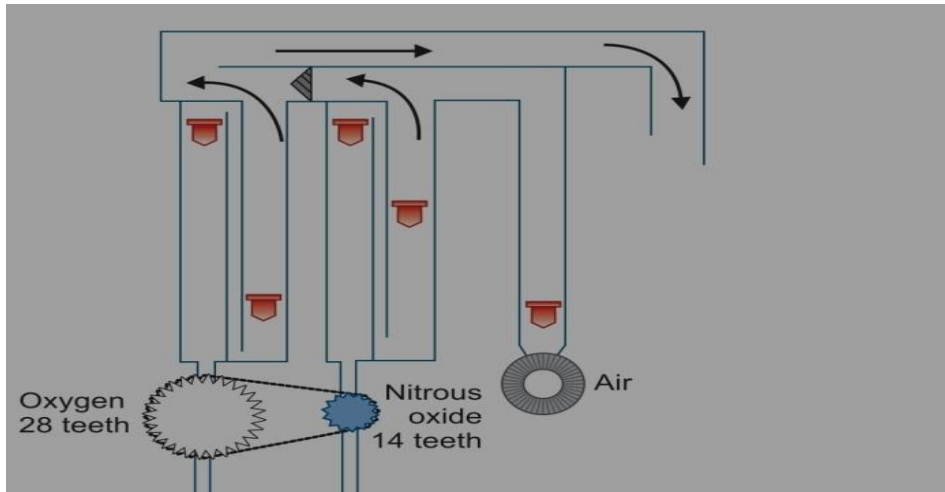
Problems in practice and safety features:

1-The flow control knobs are **colour-coded** for their respective gases.

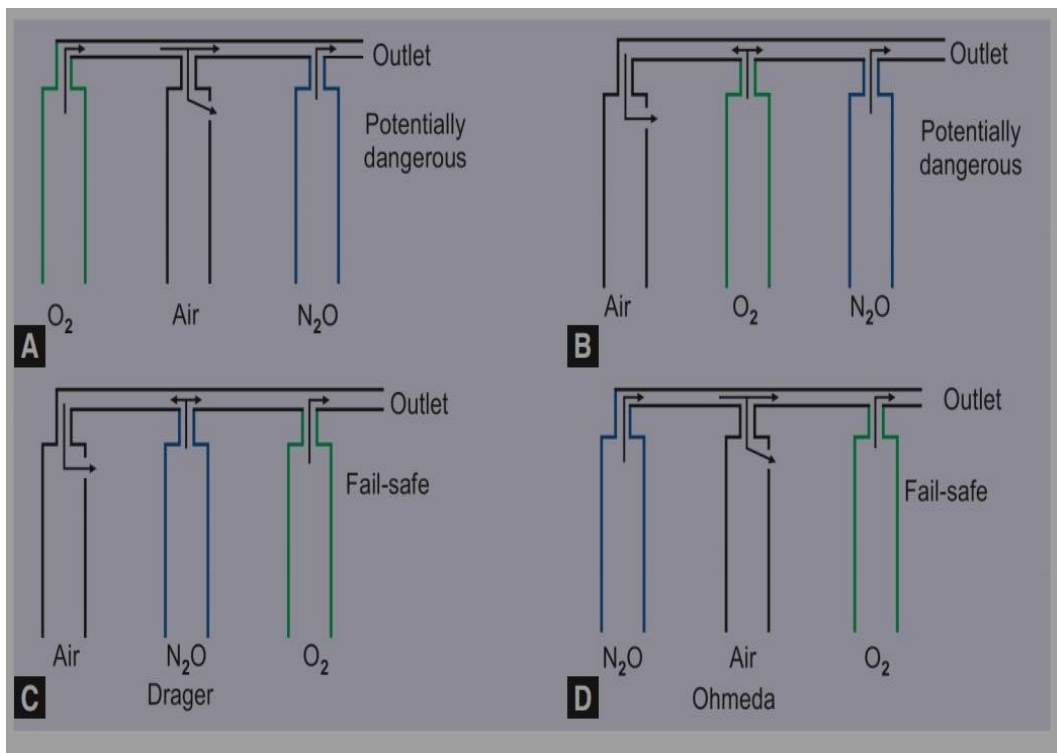
2- anaesthetic machines **prevent the delivery of a gas mixture with an oxygen concentration below 25%**.

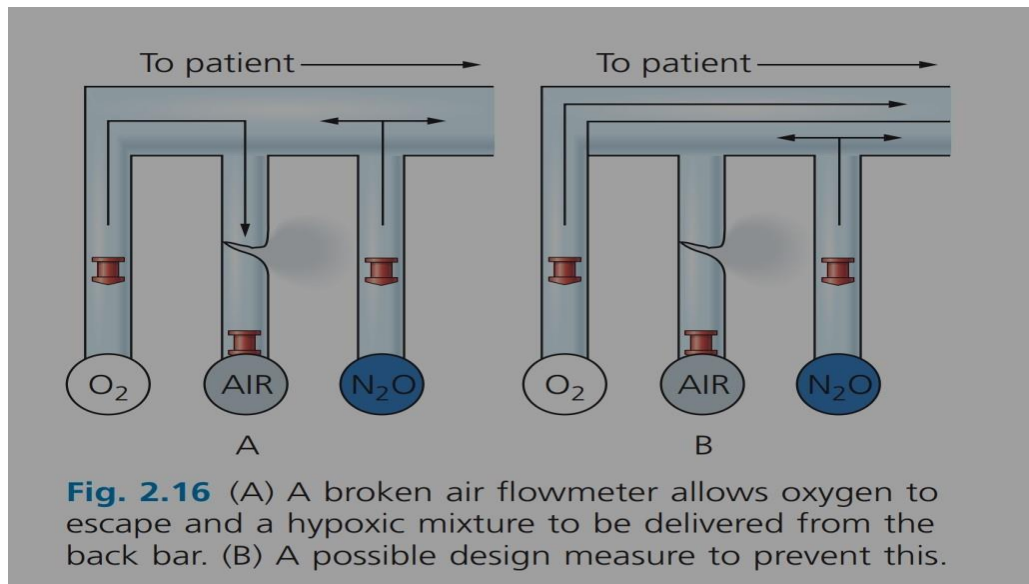
Current designs make it impossible for nitrous oxide to be delivered without the addition of a fixed percentage of oxygen.. This helps to prevent the possibility of delivering a hypoxic mixture to the patient. In the mechanical system, two gears are connected together by a precision stainless steel link chain. One gear with **14 teeth** is fixed on the nitrous oxide flow control valve spindle. The other gear **has 28 teeth** and can rotate the oxygen flow control valve spindle. **This is called (Link 25).**





3-A crack in a flowmeter may result in a hypoxic mixture. To avoid this, oxygen is the last gas to be added to the mixture delivered to the back bar.





4. Flow measurements can become inaccurate if the bobbin sticks to the inside wall of the flowmeter. **The commonest causes are:**

a) dirt: this is a problem at low flow rates when the clearance is narrow.

b) static electricity: the charge usually builds up over a period of time.

5-Accidents have resulted from failure to see the bobbin clearly at the extreme ends of the tube. This can be prevented by **a wire stop at the top** to prevent the bobbin reaching the top of the tube.

6-Highly accurate computer controlled gas mixers are available.



THANK YOU

