AL-Ayen University
College of Health and Medical Technology
Department of Anesthesia

Breathing System
Part 1

Lecture (9) theoretical
Basics of Anesthetic Equipment (1)
2nd Stage
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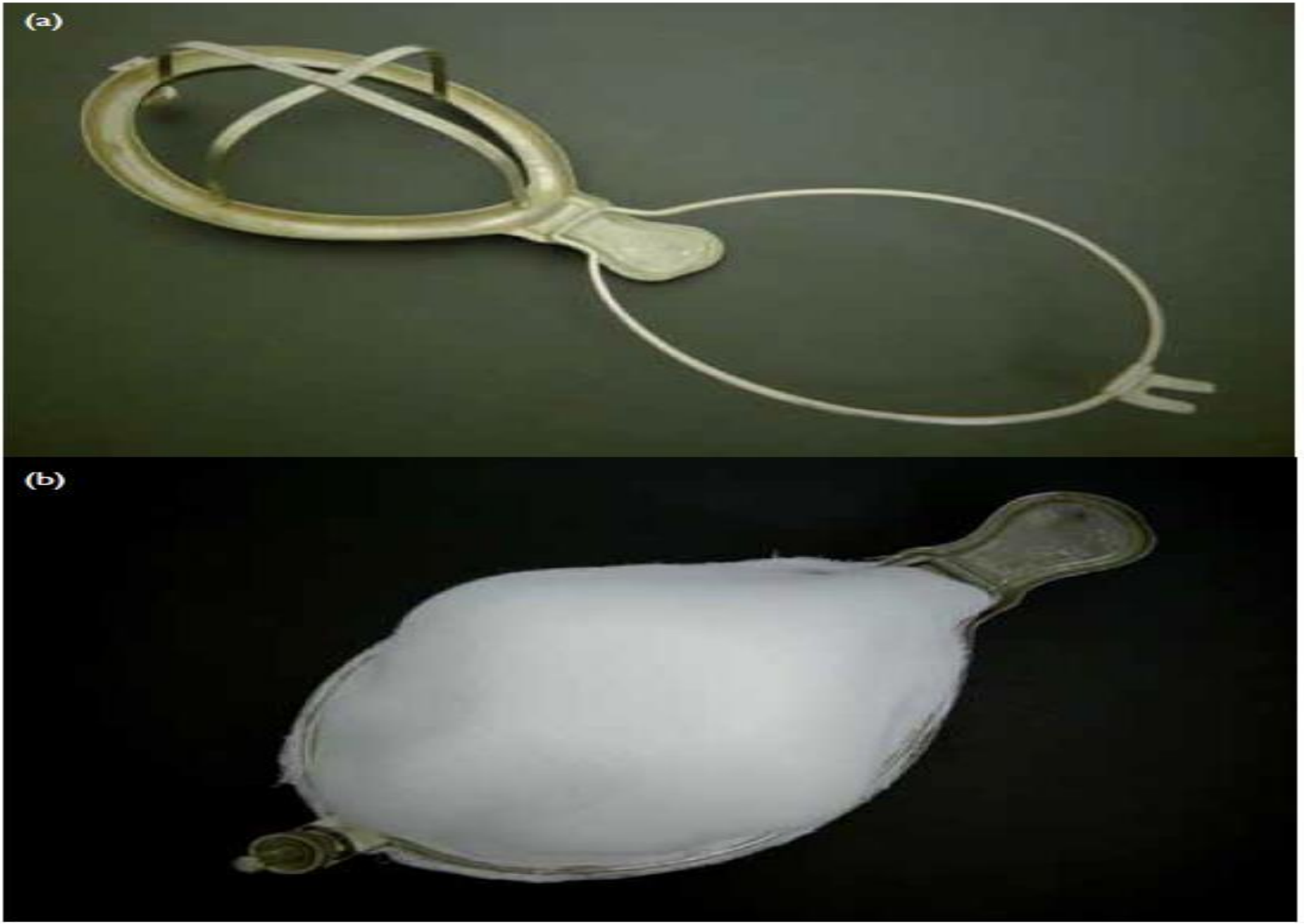
Definition of breathing system:

- Breathing system or breathing circuit: is a medical device used to deliver oxygen, remove carbon dioxide, and deliver inhalational anaesthetic agents to a patien
- Breathing circuits: connects the patient to the anaesthesia machine through endotracheal tube or mask.
- These are divide into: Open system Semi-closed system Closed system.

1-Open system:

- ✓ This is now an obsolete technique.
- ✓ The inhalational agent is directly poured over the patient's mouth and nostril.
- ✓ A mask called a Schimmelbush mask is placed over the patient's mouth over which a layer of gauge piece is put and an inhalational agent (especially ether) is poured in drops (open drop anaesthesia)


(a)
(b)

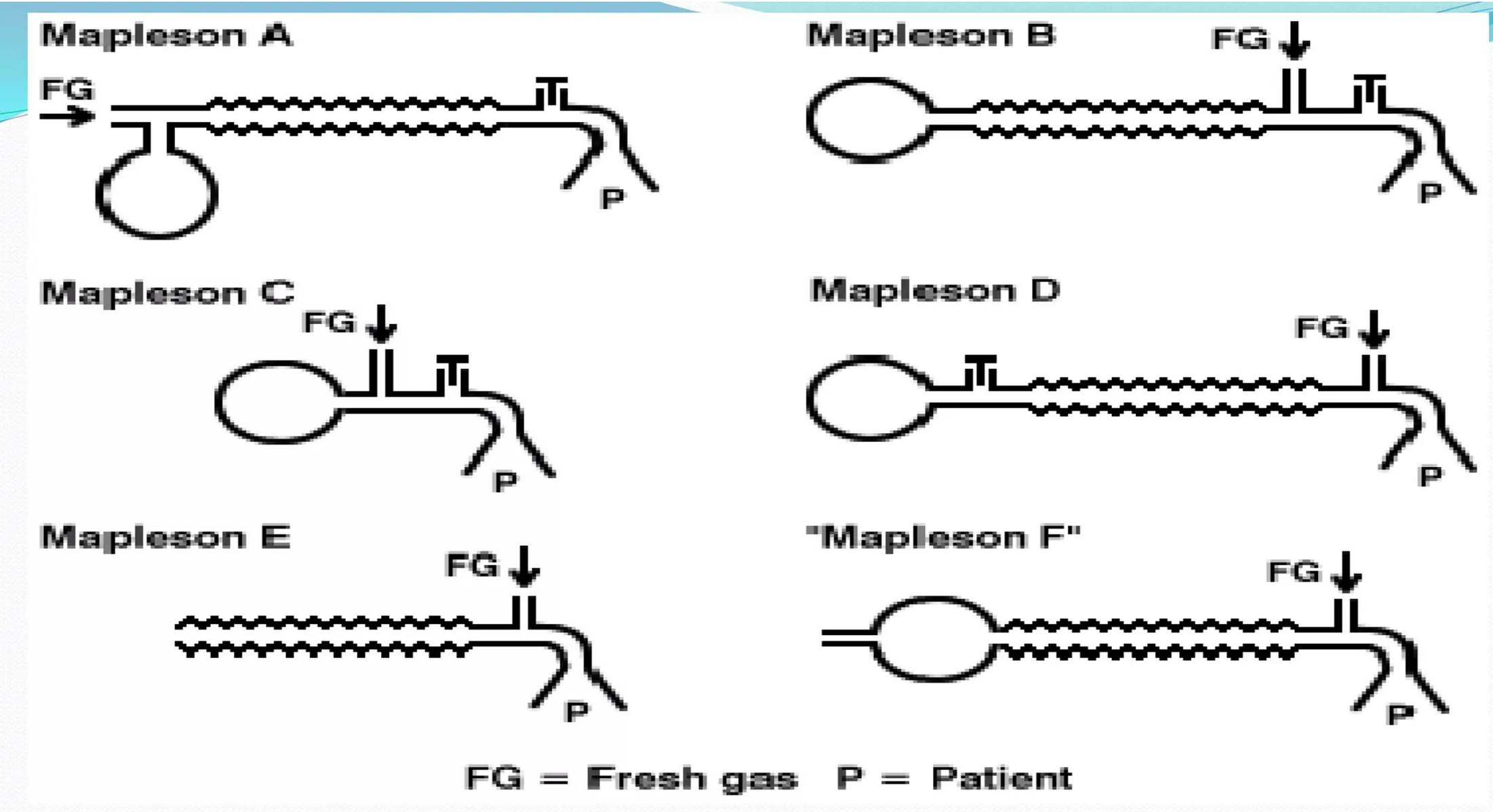
Disadvantages:

1. There is a lot of waste and uncontrollable pollution.
2. Accurate concentration can not be delivered.
3. Time-consuming induction.
4. Gauge piece may become sodden and increase the dead space
5. Fire hazard
6. Skin and eye irritation

The gases which can be given by open method are chloroform and ethyl chloride

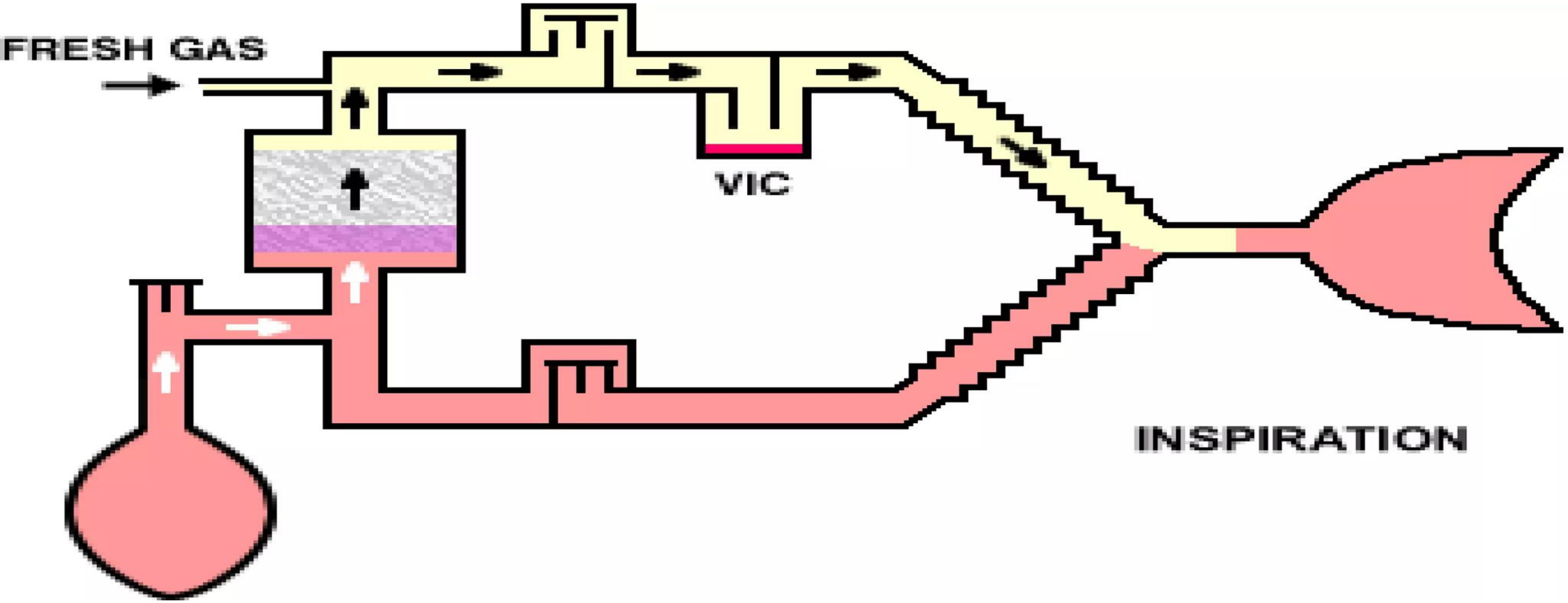
2-Semi-closed Circuits:

- ✓ These circuits were described by MAPELSON therefore also called as Mapelson circuits.
- ✓ These are divided into six types: Type A, B , C, D, E , F Because of similarity in characteristics.



3-Close Circuit:

- ✓ In human being this technique was used by Water`s in 1923
- ✓ In this system, no gas escapes to the atmosphere(that`s why called as closed circuit) ,
- ✓ Exhaled gases after absorption of carbon dioxide are re-inhaled by the patient .
- ✓ The same gases can be re-used very low flows are sufficient therefore anaesthesia given with a closed circuit is called as low flow anaesthesia



Breathing Systems Components:

1. A fresh gas inlet from the common gas outlet of the anesthetic Machine.

2. inspiratory and expiratory corrugated tubing,

3. inspiratory and expiratory valves,

4. a canister containing carbon dioxide absorbent (soda lime)

5. reservoir bag

6. adjustable pressure limiting (APL) valve.

7. Y-piece connector

Breathing Tubes:

1. Made of rubber, plastic and silicone.

2. It may be co-axial or side-by-side.

3. Length is variable.

5. Internal diameter

- ✓ Adults – 22mm.
- ✓ Pediatric – 15mm.

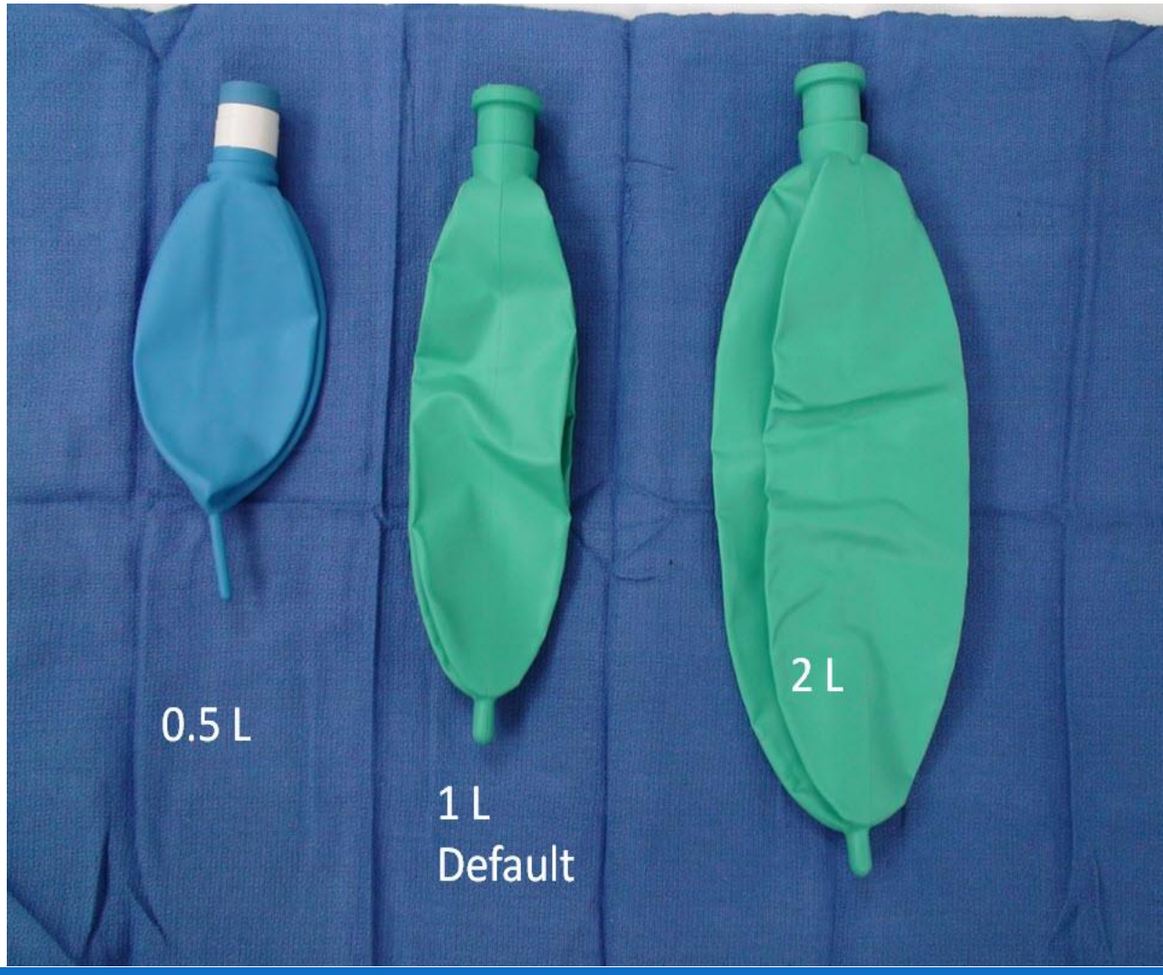
6. Internal volume

- ✓ 400 - 500ml/metre

7. Corrugations prevent kinking and increase flexibility.

RESERVOIR BAGS:

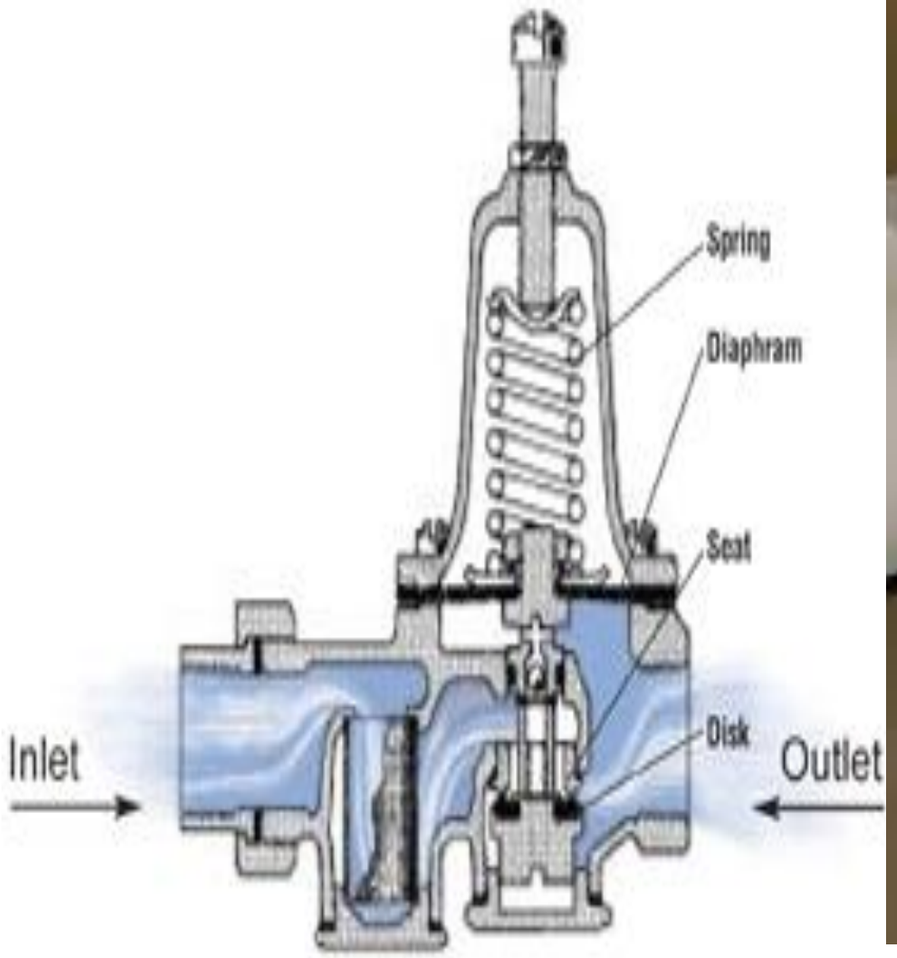
- Composition: Rubber, synthetic latex, and Ellipsoidal in shape.
- Available in sizes 0.5L to 3L.
- permits manual ventilation, manual assessment of compliance .
- pressure rises to the peak of about 50- 70cmH20 but falls late with massive distension



Adjustable Pressure Limiting Valve (APL Valve): Also called expiratory valve, pressure relief valve, pop-off valve

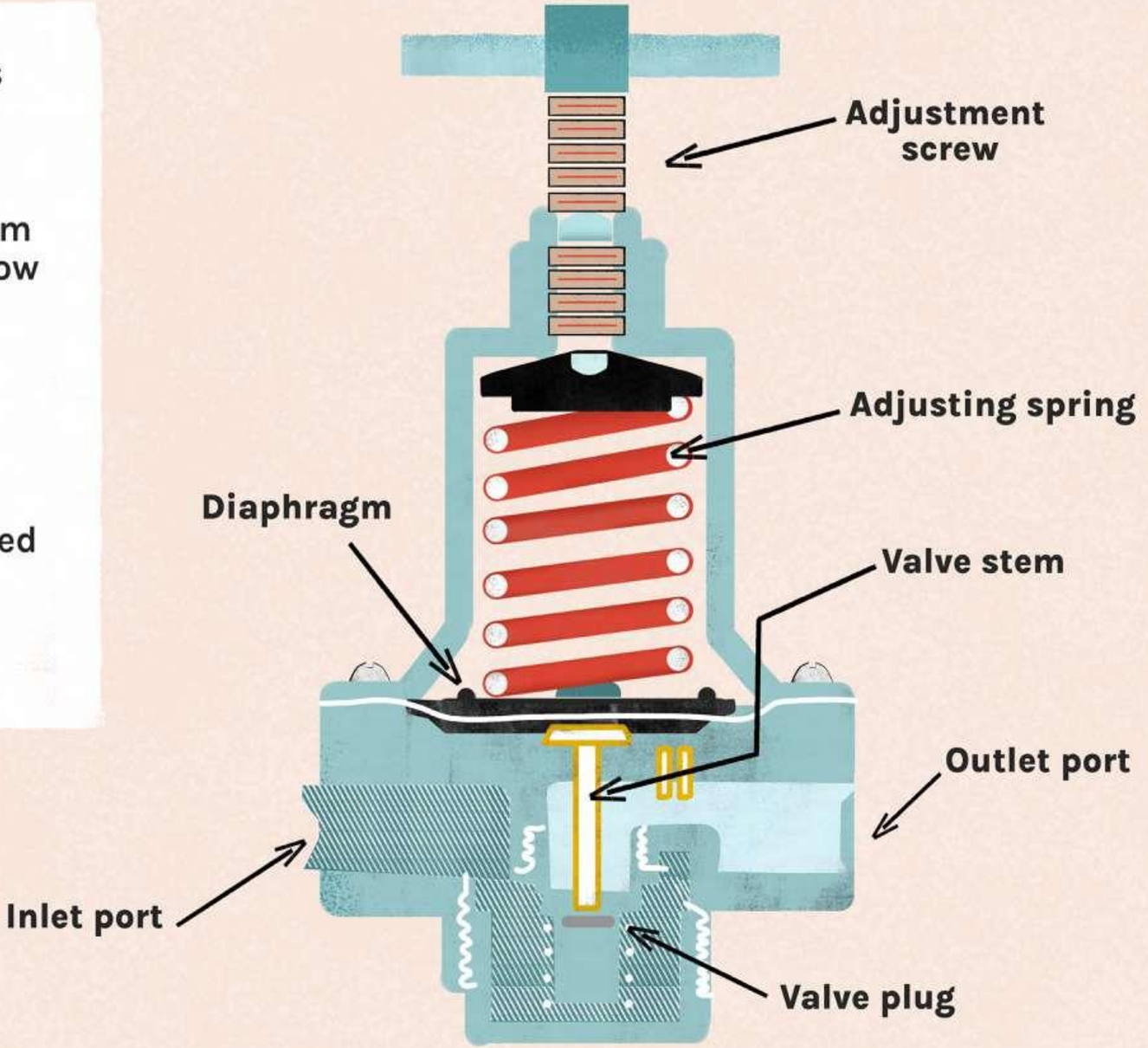
Parts of APL:

1. Diaphram
2. Retaining screw
3. disc
4. Spring
5. Valve stem
6- inlet and outlet



How a Pressure Reducing Valve Works

- √ Spring-loaded diaphragm widens and narrows depending on water pressure entering valve
- √ At high pressure, inner mechanism constricts the diaphragm to narrow flow of water
- √ When pressure drops, diaphragm widens to allow more water to flow through
- √ Adjustment screw can be tightened to increase tension on inner spring, or loosened to allow water to flow more freely



the spruce

"Y" Piece

Standard 22 mm connections for breathing hoses. **for connecting two breathing tubes of a circuit breathing apparatus to a breathing mask or endotracheal tube.**


Thank you