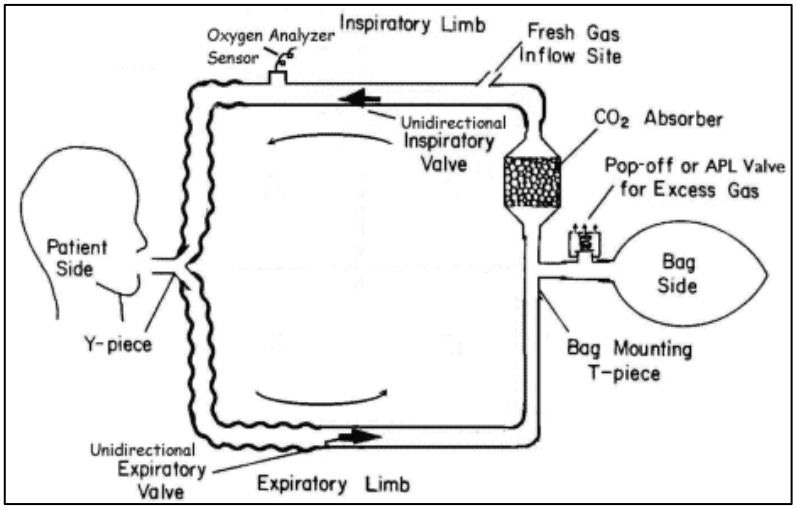
Circle-System Anesthesia Circuit

Anesthetic Pearls: The Optimal Arrangement of the Anesthesia Circle-System

The circle system prevents rebreathing of carbon dioxide by soda lime absorption; yet allows partial rebreathing of other exhaled gases.



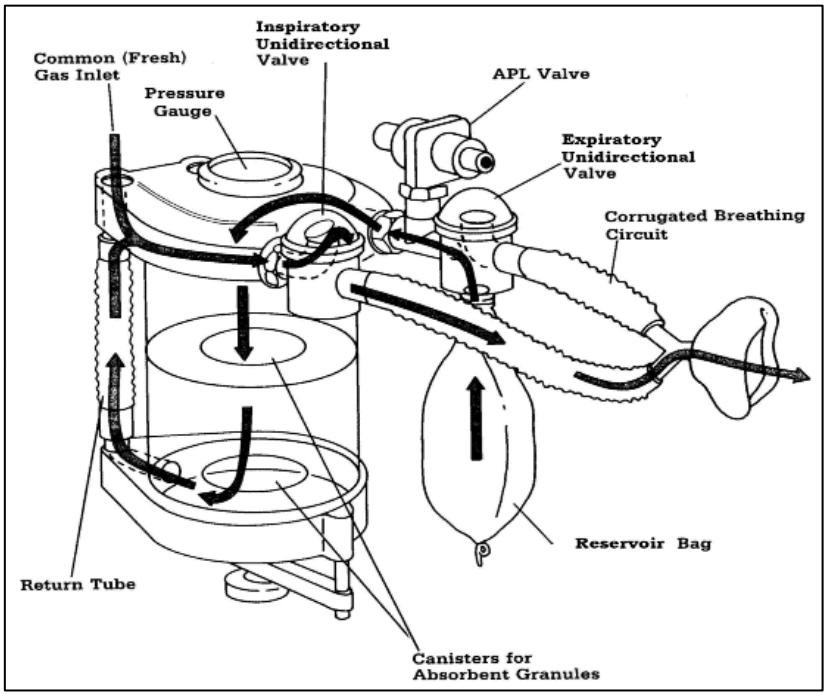
Many variations of the circle system arrangement are possible. To prevent rebreathing of carbon dioxide, three rules must be followed:

(1) A unidirectional valve must be located between the patient and the reservoir bag on both inspiratory & expiratory limbs of the circuit.

(2) The fresh gas inflow may **not** enter the circuit between the expiratory valve and the patient.

(3) The overflow (pop-off) valve cannot be located between the patient and the inspiratory valve.

The most efficient circle-system arrangement that allows the highest conservation of fresh gases is one with the unidirectional valves near the patient, the pop-off valve just downstream from the expiratory valve, and the fresh gas inflow just proximal to the inspiratory valve. This arrangement conserves dead space gas and preferentially eliminates alveolar gas.



The arrangement used on modern anesthesia machines differs by having the unidirectional valves removed from the patient and the pop-off valve is further downstream from the expiratory valve. This arrangement is less efficient but is a far more practical solution.