# Gas Power Station

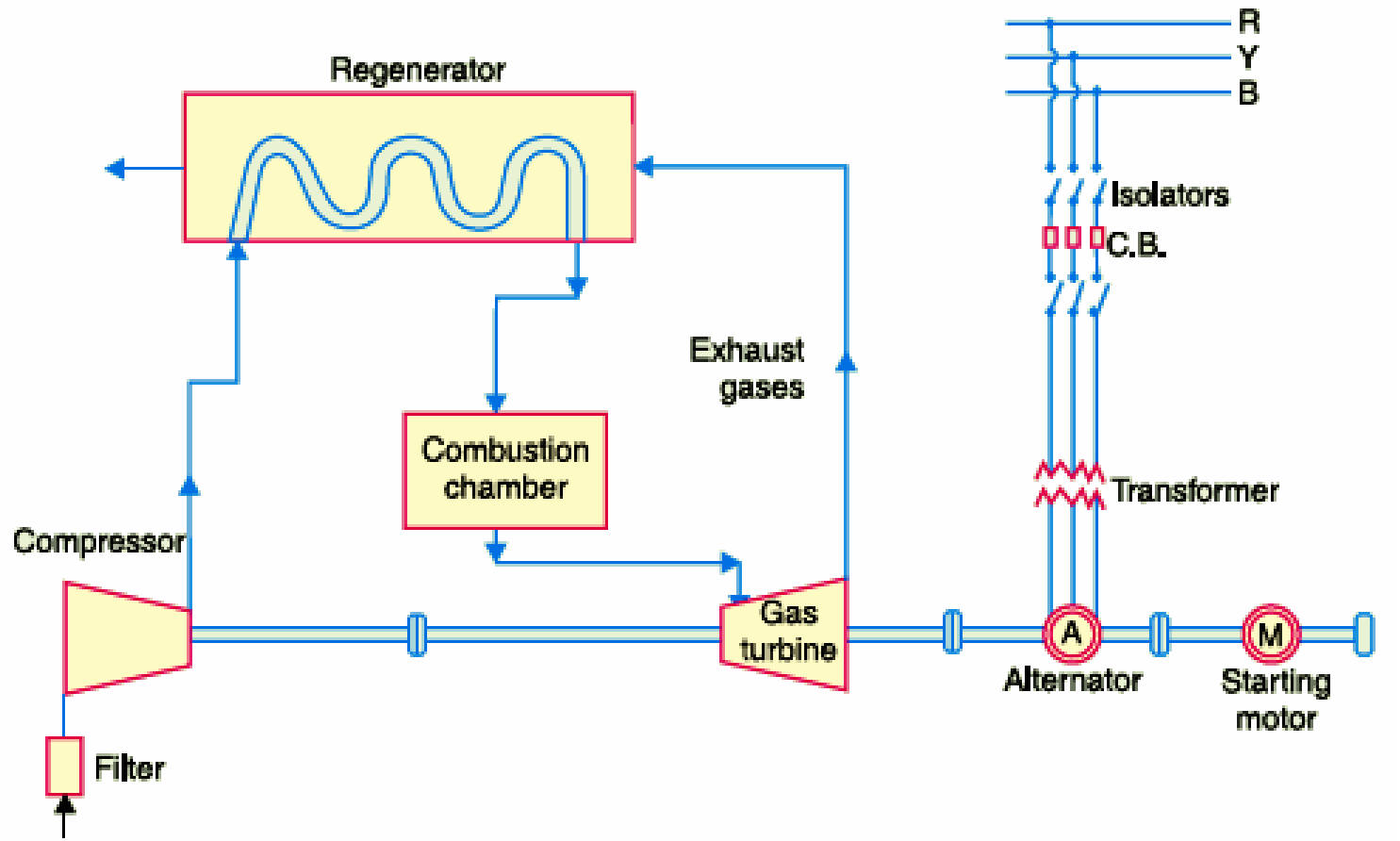
*- It is a generating station that employs gas turbine as the prime mover for the generation of electrical energy*.

*- A gas power station comprises a* ***compressor****,* ***gas turbine*** *and an* ***alternator****, all mounted on the same shaft so that a part of the turbine's mechanical power can be utilized for the operation of the compressor.*

*- In a gas turbine, air is used as the working fluid. Air is compressed by the compressor and led to the combustion chamber*.

*- Heat is added to the compressed air either by burning fuel in the chamber or by air heaters. The hot and high pressure air from the combustion chamber is then passed to the gas turbine where it expands and produces mechanical work.*

*-Gas turbine power plants are used as standby plants for hydro-electric stations, and as a starting plant for driving auxiliaries in power plants*.




**Schematic arrangement of gas power station**

***(i) Compressor*:** Generally of rotatory type. Air at atmospheric pressure is drawn by the compressor *via* the filter which removes the dust. The rotatory blades of the compressor push the air between stationary blades to raise its pressure. Thus air at high pressure is available at the output of the compressor.

***(ii) Regenerator:*** A device which recovers heat from the passing exhaust gases. It consists of a shell containing a nest of tubes through which compressed air passes on its way to the combustion chamber. Compressed air is thus heated by the surrounding hot exhaust gases.

***(iii) Combustion chamber:*** Air at high pressure from the compressor is led to the combustion chamber *via* the regenerator. In the combustion chamber, heat is added to the air by burning oil injected through the burner into the chamber at high pressure to ensure atomization of oil and thorough mixing with air. The chamber attains a very high temperature (about 3000°F). Combustion gases are suitably cooled to 1300°F to 1500°F and then delivered to the gas turbine.

***(iv) Gas turbine:*** The products of combustion consisting of a mixture of gases at high temperature and pressure are passed to the gas turbine. These gases in passing over the turbine blades expand producing mechanical work. The temperature of the exhaust gases from the turbine is about 900oF.

***(v) Starting motor:*** Before starting turbine, compressor is started by an electric motor mounted on the turbine's shaft. The motor is energized by batteries. Once the unit starts, a part of mechanical power of the turbine drives the compressor.

## ***Advantages***

- Simple in design as compared to steam power station.
- Much smaller in size as compared to a same capacity steam power station.
- Initial & operating costs are much lower than equivalent steam power station.
- Requires comparatively less water as no condenser is used.
- Maintenance charges are quite small.
- Gas turbines are much simpler in construction and operation than steam turbines.
- Can be started quickly form cold conditions.
- No standby losses; (steam boiler is kept in operation even at no load).

## ***Disadvantages***

- External power source is required for operating the compressor at start.
- Plant life is low due to high temperature of combustion chamber (3000˚F)
- Low net output and low overall efficiency (about 20%) due to:
  - Part of power developed by the turbine is used in driving the compressor.
  - Exhaust gases from the turbine contain sufficient heat.