


Refrigeration and Air-conditioning Equipments

Type of compressors

- Centrifugal compressor
- Rotary compressor
- Reciprocating compressor
- screw compressor
- roots blower compressor
- sliding vane type compressor
- plunger type compressor
- ejector type compressor
- liquid-ring type compressor
- axial type compressor
- swash plate type compressor
- gear lobe type compressor



Classification of compressors

1. according to the method of compression
 - Reciprocating compressor
 - Rotary compressor
 - Centrifugal compressor
- 

Reciprocating compressor

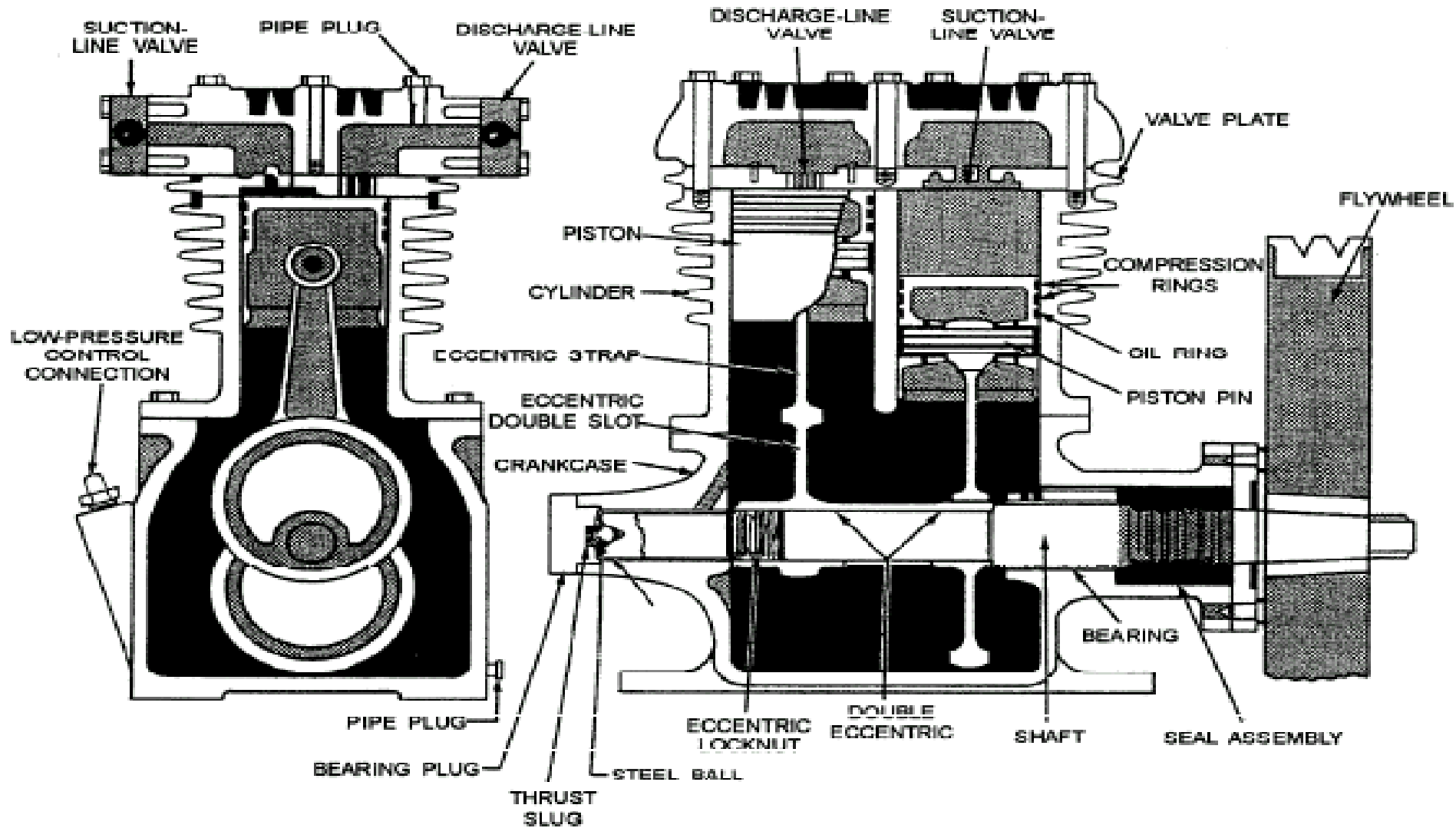


Figure 6-61.—Vertical single-acting reciprocating compressor.

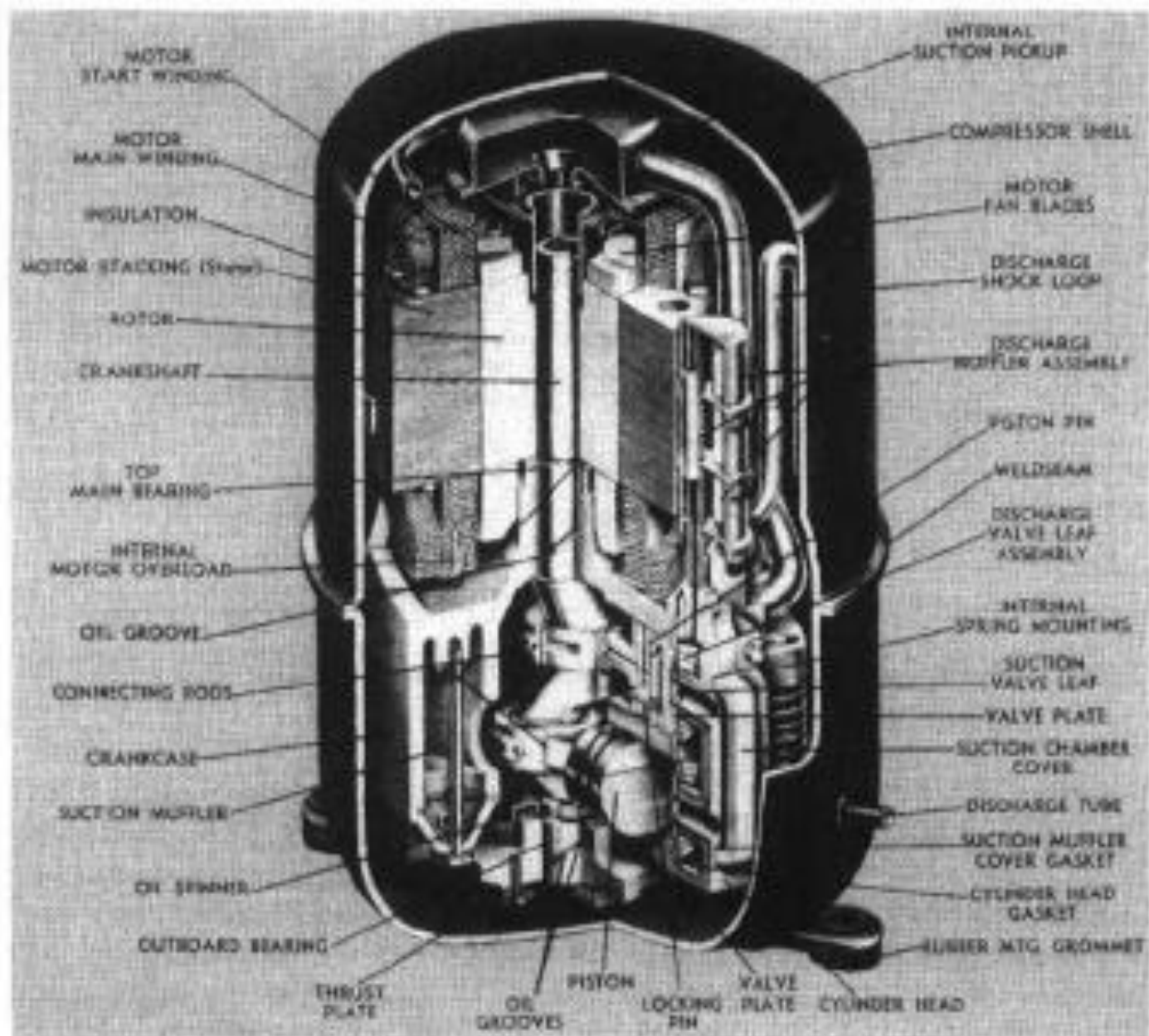
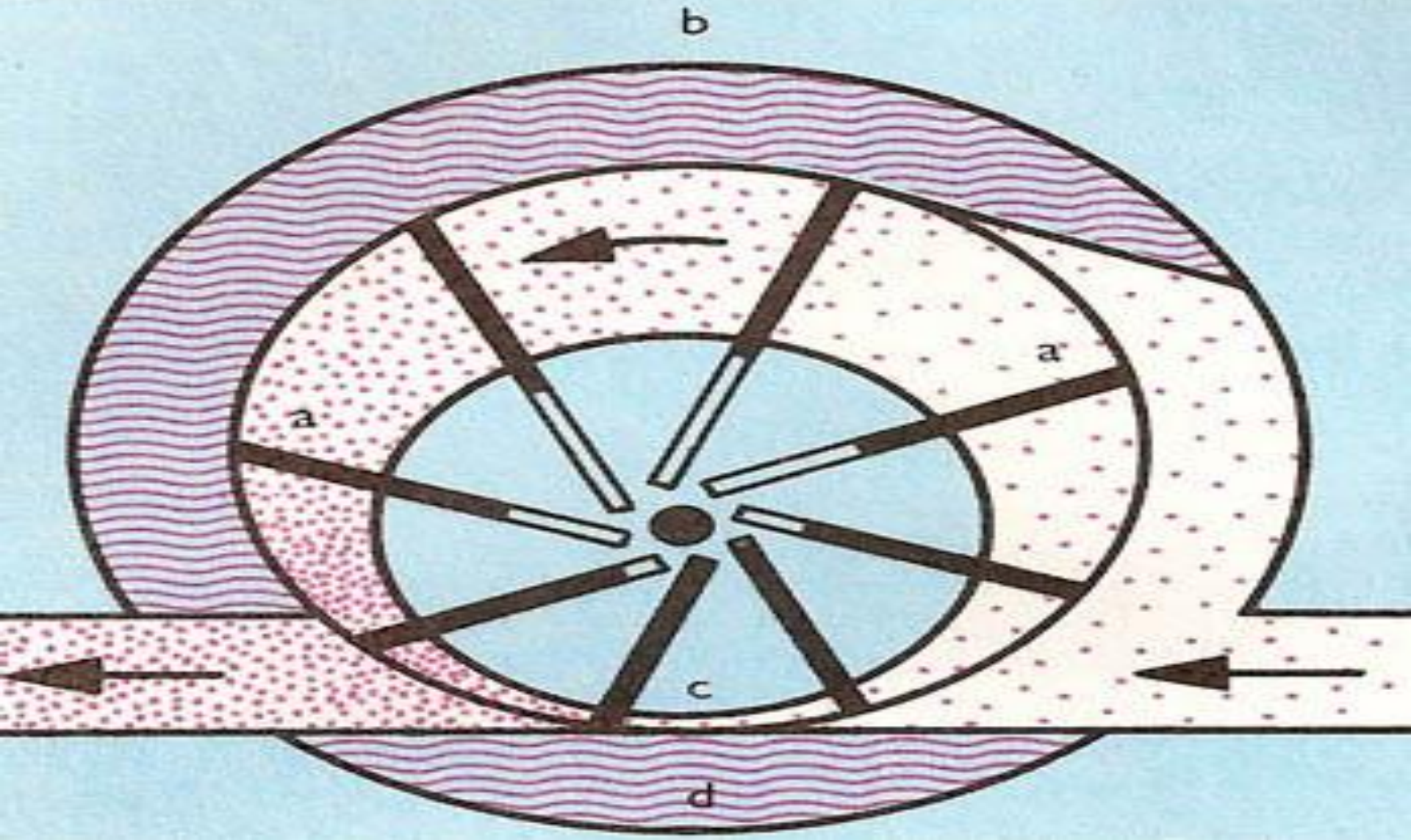
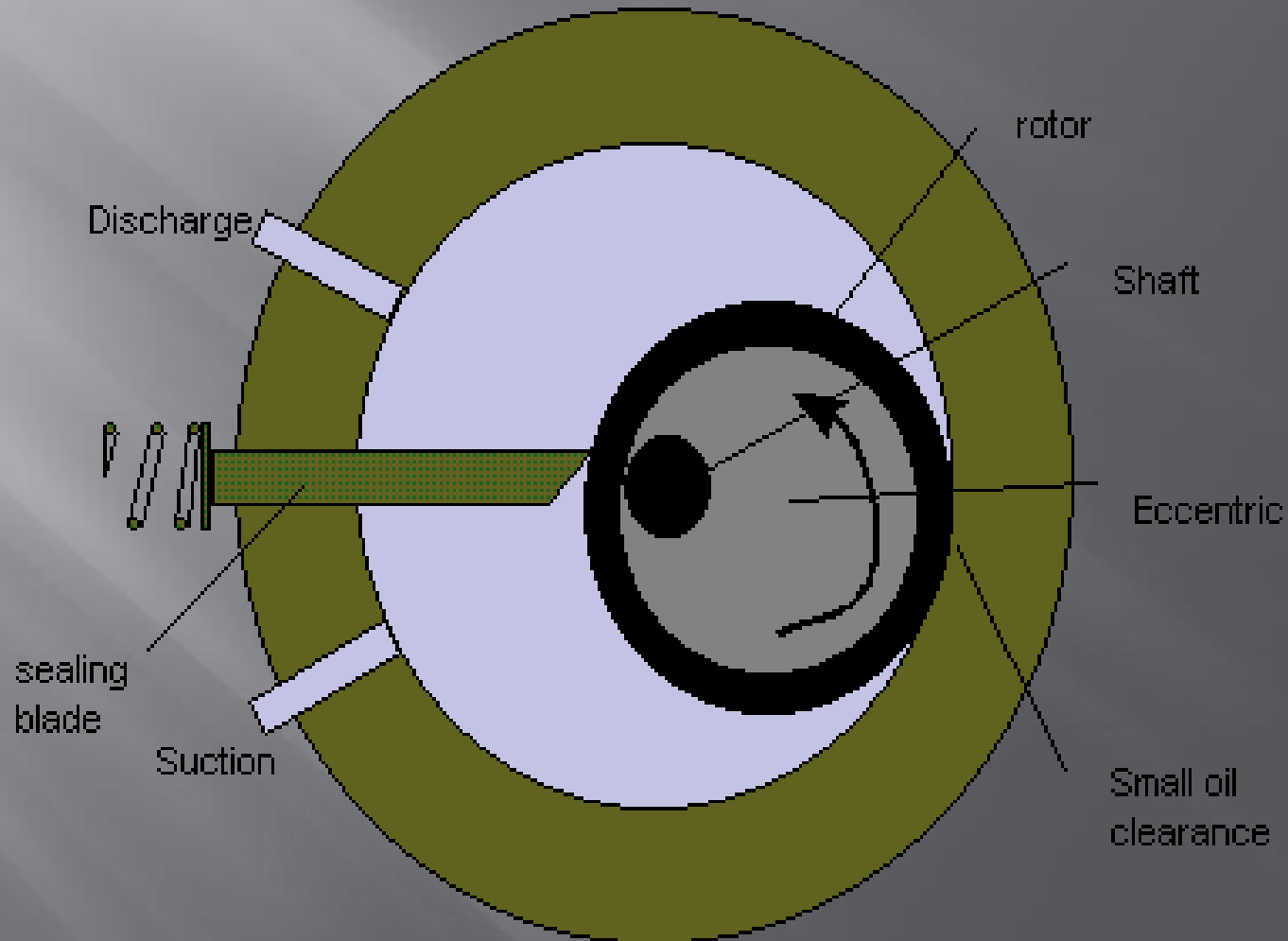


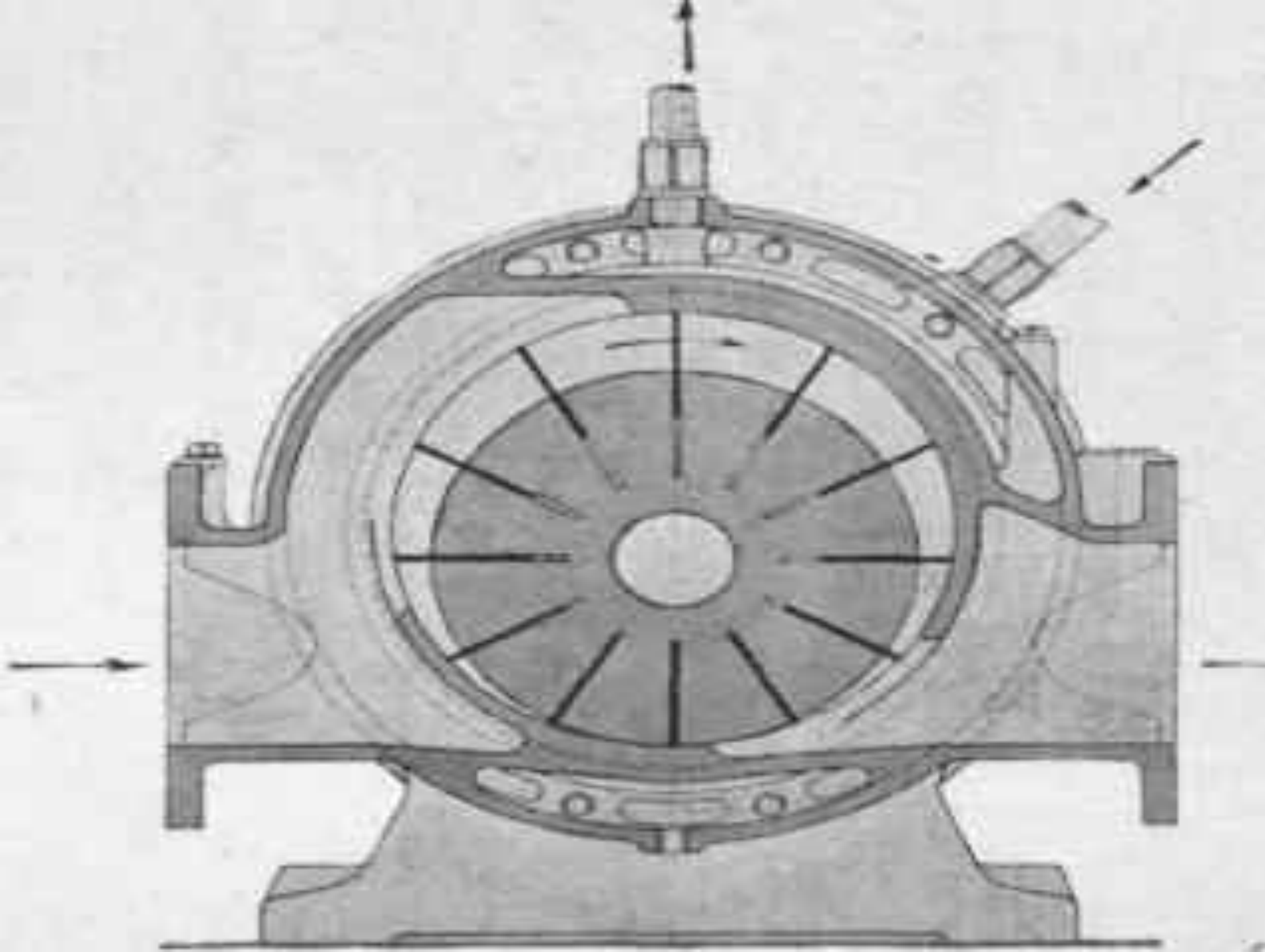
Figure 3.3 A typical hermetic reciprocating compressor (*Courtesy of Tecumseh Products Co.*).

Rotary Compressor

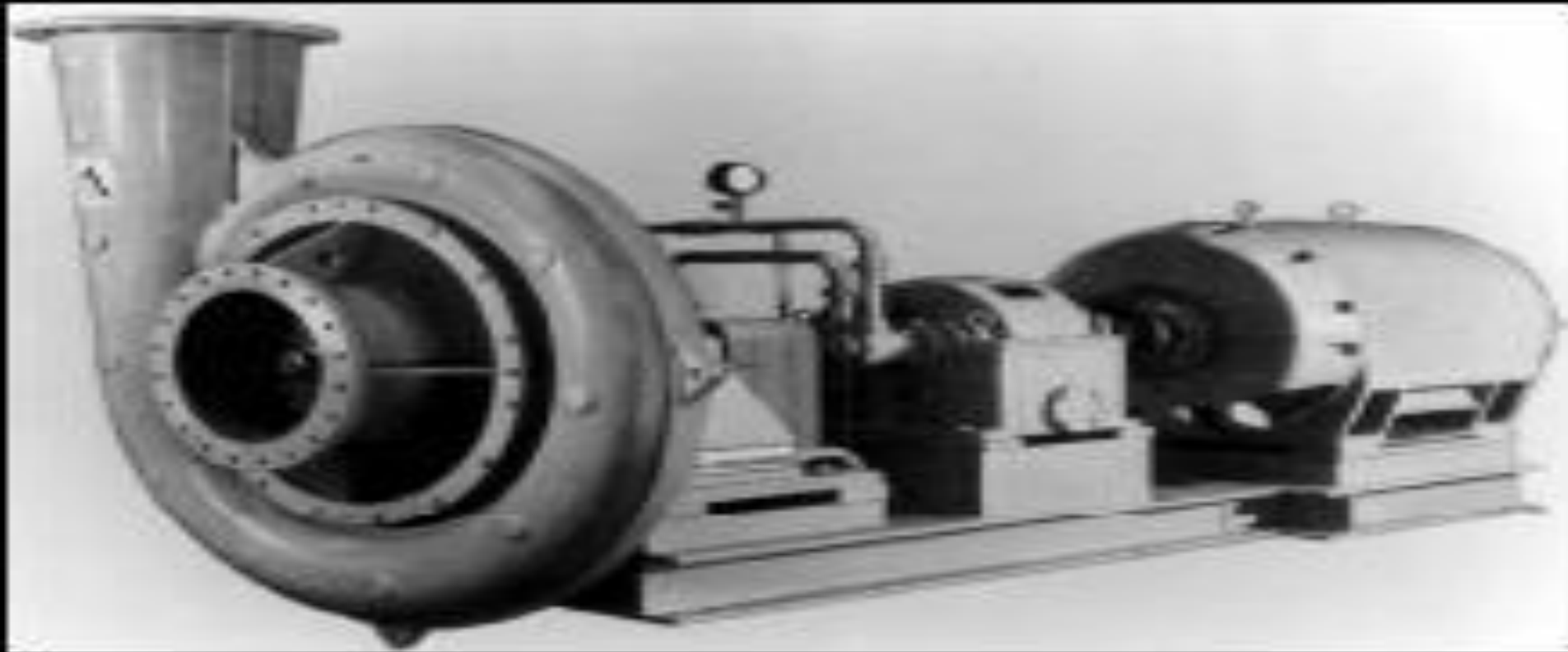


SINGLE STATIONARY BLADE TYPE COMPRESSOR

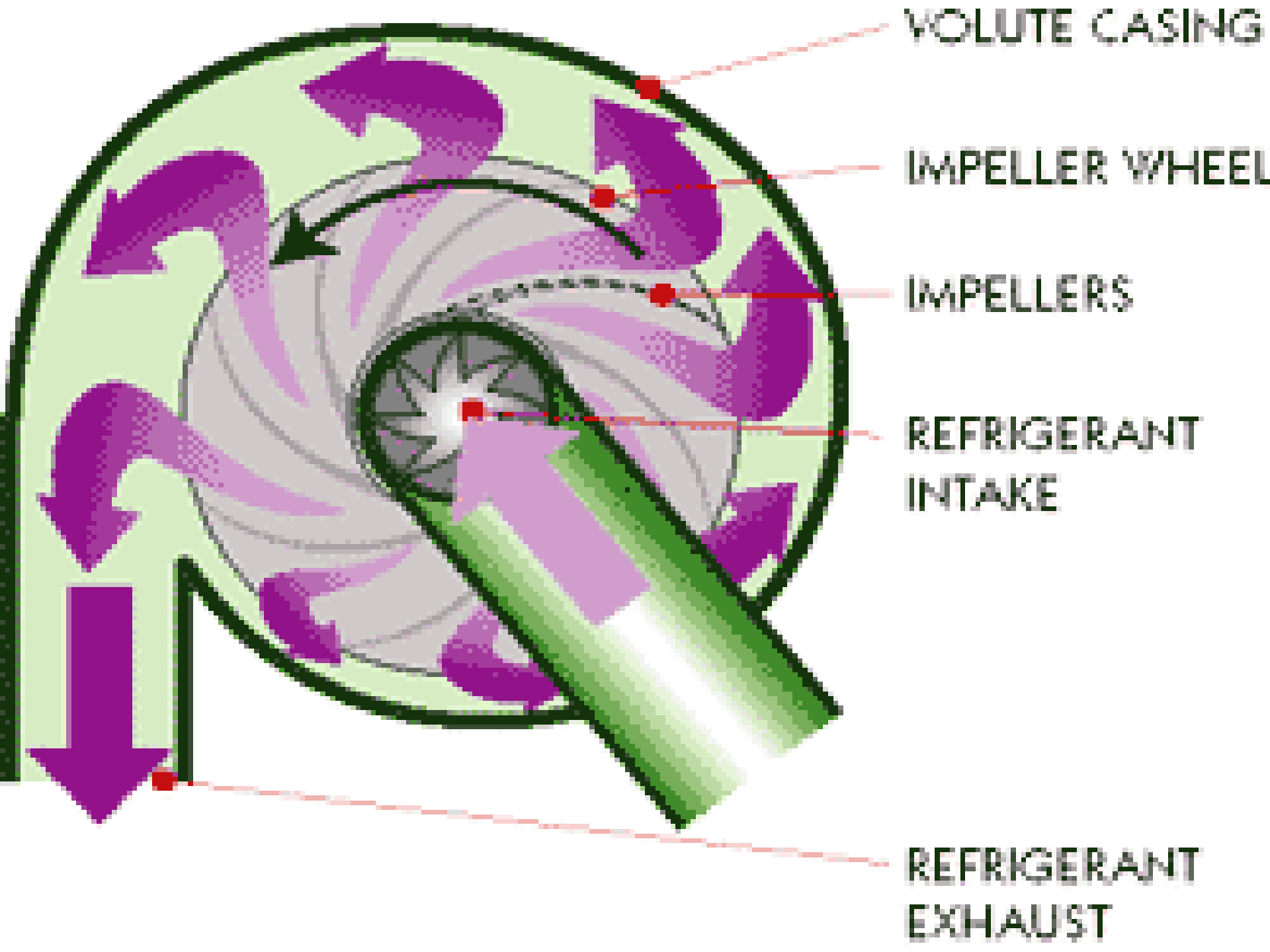




Centrifugal Compressor



A single stage centrifugal compressor (left) driven by an electric motor (right) using gearbox (center). Process gas enters the compressor through the flanged opening at left center and is discharged through the flange in the upper left corner.



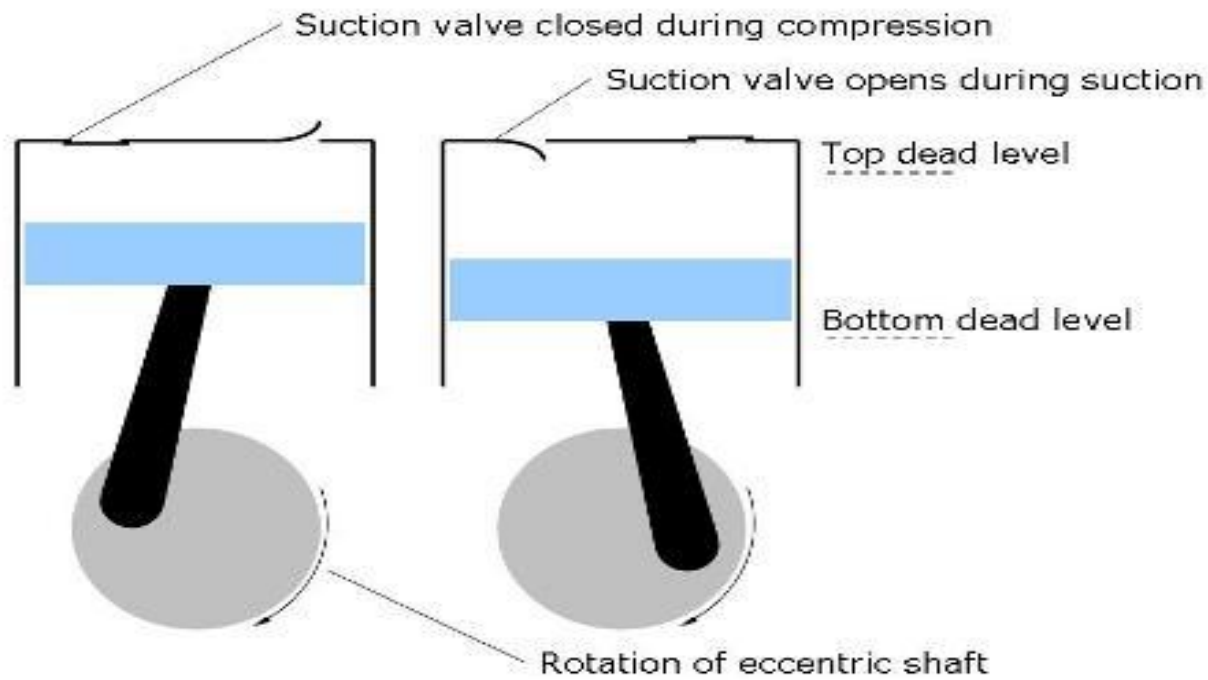
IMPELLER



The piston or reciprocating compressor

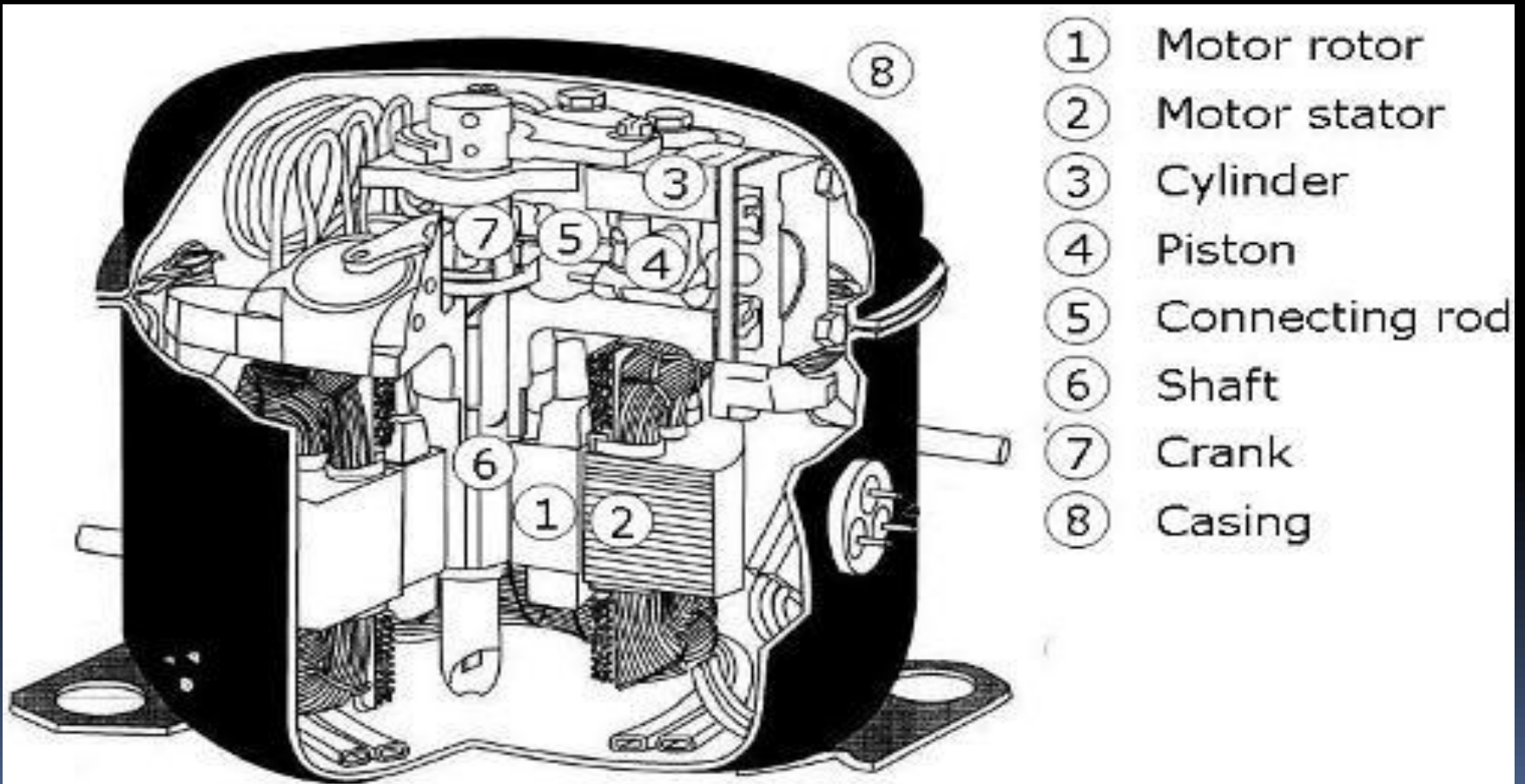
- piston head – functions as the gas compressing “agent” by continuously reducing the cylinder volume
- piston rings – functions as the sealant between the piston head, and the cylinder, to prevent gas leakage from the compression chamber
- crank shaft – a shaft that enables the reciprocating motion of the piston
- piston rod – the connecting piece between the piston head, and the crankshaft
- spring loaded suction and discharge valves – separates low pressure side and high pressure side from the compression chamber. Enables positive displacement of gases, by correct opening and closing of the valves. Suction valve will open as the piston moves away from the valves, and discharge valve will open as the piston moves towards the valves. The valves will otherwise, be in closed position
- and, compressor’s cylinder block – functions as the housing for the compressor parts

Reciprocating type compressor



air-conditioner-selection.com. Reproduction with permission only

Those are the basics. However, modifications are carried out in air conditioner compressors of this type, to have **two pistons**, and oriented **horizontally**, to improve the compression efficiency.



Identifying a reciprocating compressor is quite easy, even without opening its casing. The **casing is almost square in shape, with similar height of its width.**

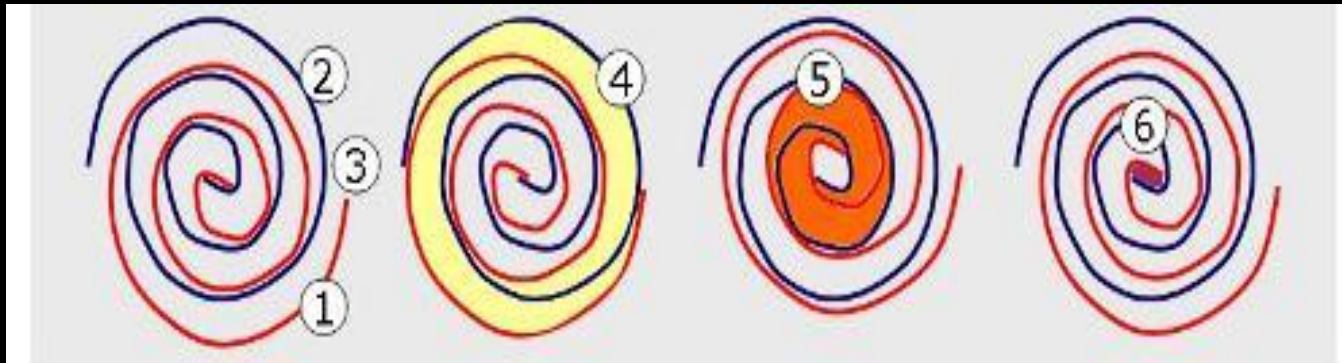


- Most approved refrigerants are compatible with this type of compressor. Those are, R-22, R-134a, R-404A, R-407C and R-507

Scroll compressor

- It was invented in the beginning of 1900's. As usual, initial inventions need improvements, but all credits to Léon Creux who created it, so we can work on improvements. It was optimised and improved around late 60's.
- **Scroll** type compressors, able to achieve the flow rate, and outlet pressure, **similar to reciprocating** compressors, at a **smaller** size, and **better efficiency**.
- However, cooling for scrolls are quite difficult compared to piston air conditioner compressors. This is the reason for its performance drop against piston type, at higher compression ratios.
- Nevertheless, most air conditioning applications require scroll compressors to be used against piston type, due to the advantages.

Scroll compressor



- ① Orbiting scroll
- ② Stationary scroll
- ③ Refrigerant gas inlet point
- ④ } Gas is progressively forced towards the centre of the assembly
- ⑤ }
- ⑥ Until it finally exits at the centre, at high pressure

Scroll compressor

- This type of compressor is constructed using,
- a stationary scroll and an orbiting scroll – the orbiting spiral scroll will orbit around the stationary scroll, thus continuously and progressively trapping gas and directing towards the centre of the scrolls, to be discharged pass the discharge check valve, and towards discharge line
- crank shaft – used for creating the orbiting motion. This shaft is equipped with counter weights to equalise the centripetal force due to eccentric shaft rotation
- casing – to ensure that the discharge part is separated from the suction part, and motor winding is separated from the refrigerant

Scroll compressor



- This type of air conditioner compressor, could handle similar refrigerants to piston compressors.

Identifying this type of compressor is not that easy though. Yes it is normally a vertical cylinder, but rotary compressors share the same shape.



- But if you look closely, scroll compressors have a "cap" like top cover, and the discharge line is on top of the casing. Whereas discharge line for rotary compressors is on the side, slightly lower than the top part