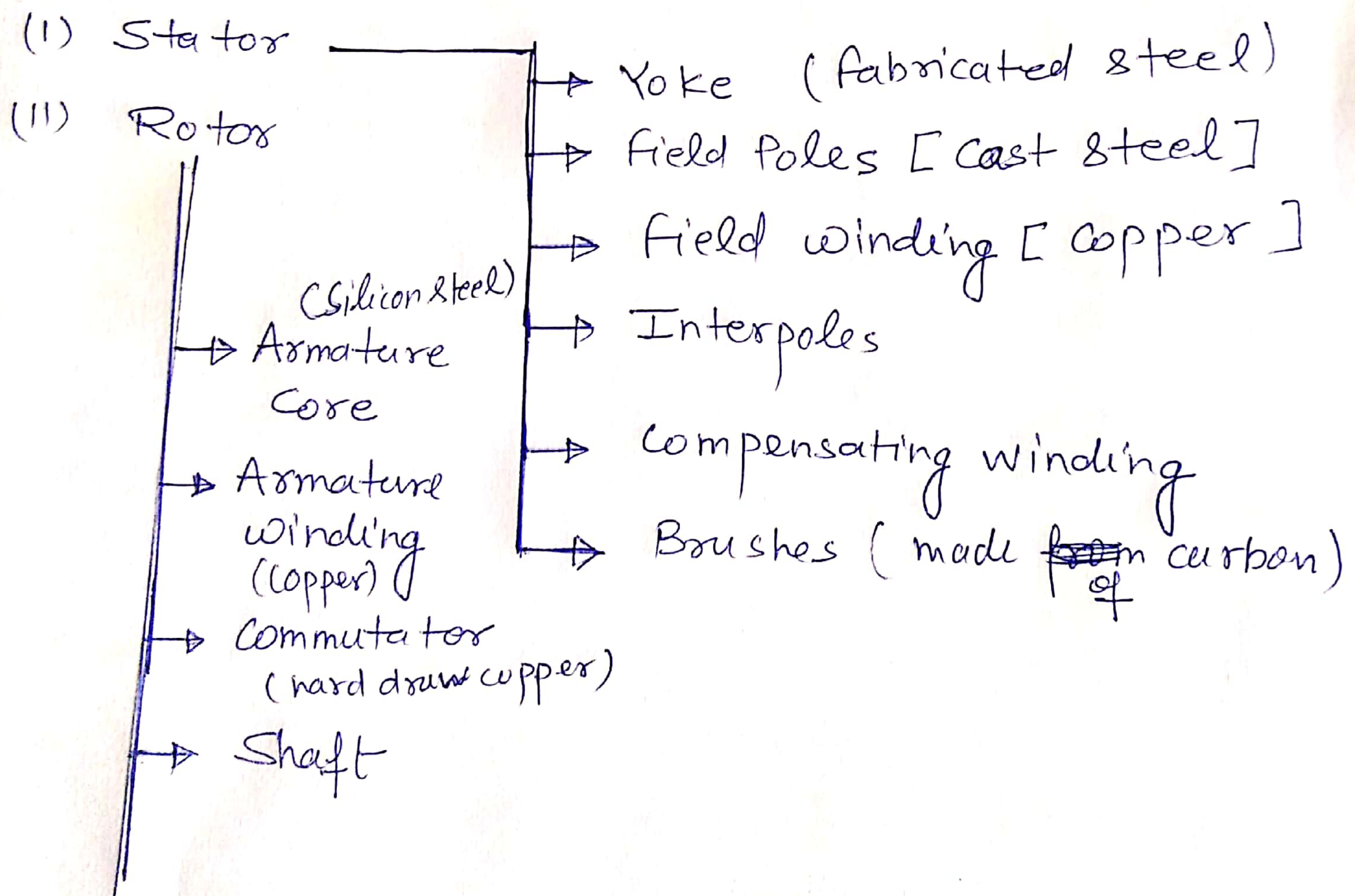


5.1 Construction of DC Machine:-

DC Machine has mainly two parts -



1a. Function of Yoke:- Yoke has two functions -

- (i) It provides path for the pole ~~core~~ flux and carries half of it i.e. $\Phi/2$
- (ii) It provides mechanical support to the whole machine.

1.b Field Poles - It consists of pole core and pole shoe. The pole core is made from (1.5mm) thick cast steel but the pole shoe is laminated and fixed to the pole core.

Pole shoes provide mechanical strength and support to field winding.

1.c Field Winding:- The pole is excited by a winding around the pole core, called field winding or exciting winding. Flux is produced by field winding.

1.d. Interpoles:- These are fixed to the yoke in between the main poles of dc machines. Interpoles are used for improving voltage commutation.

1.e. Compensating winding:- To eliminate the effect of armature reaction, compensating winding is used for only large dc machine.

1.f. Brushes:- These are housed in box-type brush holders attached to the stator end covers or yoke. A small spring keeps the brushes pressed on commutator surface.

II.a Armature core:- It is made from 0.35 to 0.50 mm thick laminations of silicon steel to keep down the iron losses. It serves the twin purpose of

- (i) housing the armature coils in the slots
- (ii) providing the low reluctance path to the magnetic flux $\phi/2$

II.b Armature winding:-

The armature winding is made from copper.

It consists of large number of insulated coils, each coil having one or more turns.

These are placed in slots and connected in series and parallel depending upon the winding.

The armature windings are two types

- (i) Lap winding. $[A = P]$ No. of parallel path = No. of poles
- (ii) Wave winding $[A = 2]$ No. of parallel path (A) = 2

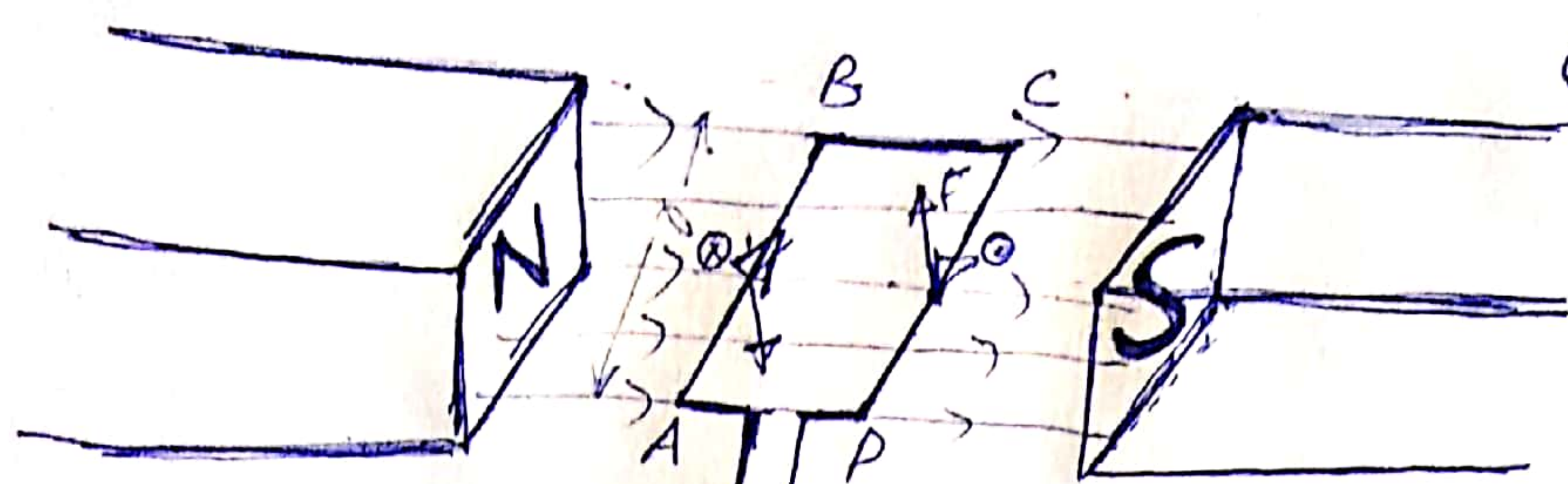
(III).c Commutator:-

It is of cylindrical structure. It converts ac into dc in case of dc generator and converts dc into ac in case of dc motor. It acts as mechanical rectifier.

(II)d shaft:- Hub H of commutator and spinder in big machines or armature core in small machines and bearings are mounted on the shaft.

5.2 Principle of dc motor:-

⊗ → into the paper
⊙ → outward from paper



Commutator segment

$$F = I B l \sin \theta$$

force in segment
CD → upward
Force in segment
AB → downward

A machine that converts dc power into mechanical energy is known as dc motor. its operation is based on the principle that when a current-carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction of the force is given by Fleming's Left hand Rule.

Commutator helps ^{the motor} in to produce the unidirectional force or torque on the armature conductors of a motor.

"The conductor under any pole must carry the current in the same direction at all times"