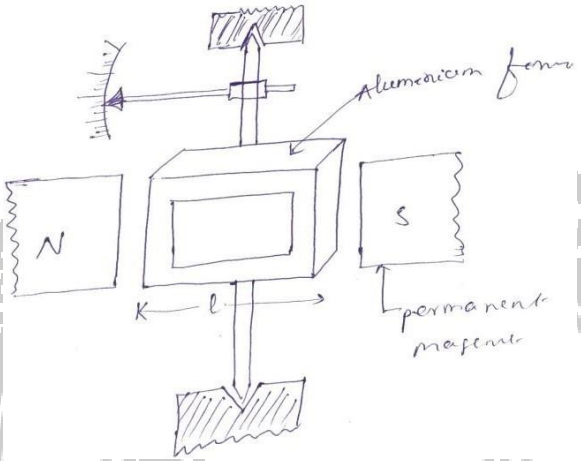
Permanent Magnet Moving Coil (PMMC) instrument

One of the most accurate type of instrument used for D.C. measurements is PMMC instrument.



Construction:

A permanent magnet is used in this type instrument. Aluminum former is provided in the cylindrical in between two poles of the permanent magnet (Fig. 2.7). Coils are wound on the aluminum former which is connected with the spindle. This spindle is supported with jeweled bearing. Two springs are attached on either end of the spindle. The terminals of the moving coils are connected to the spring. Therefore the current flows through spring 1, moving coil and spring 2.

Damping: Eddy current damping is used. This is produced by aluminum former.

Control: Spring control is used.

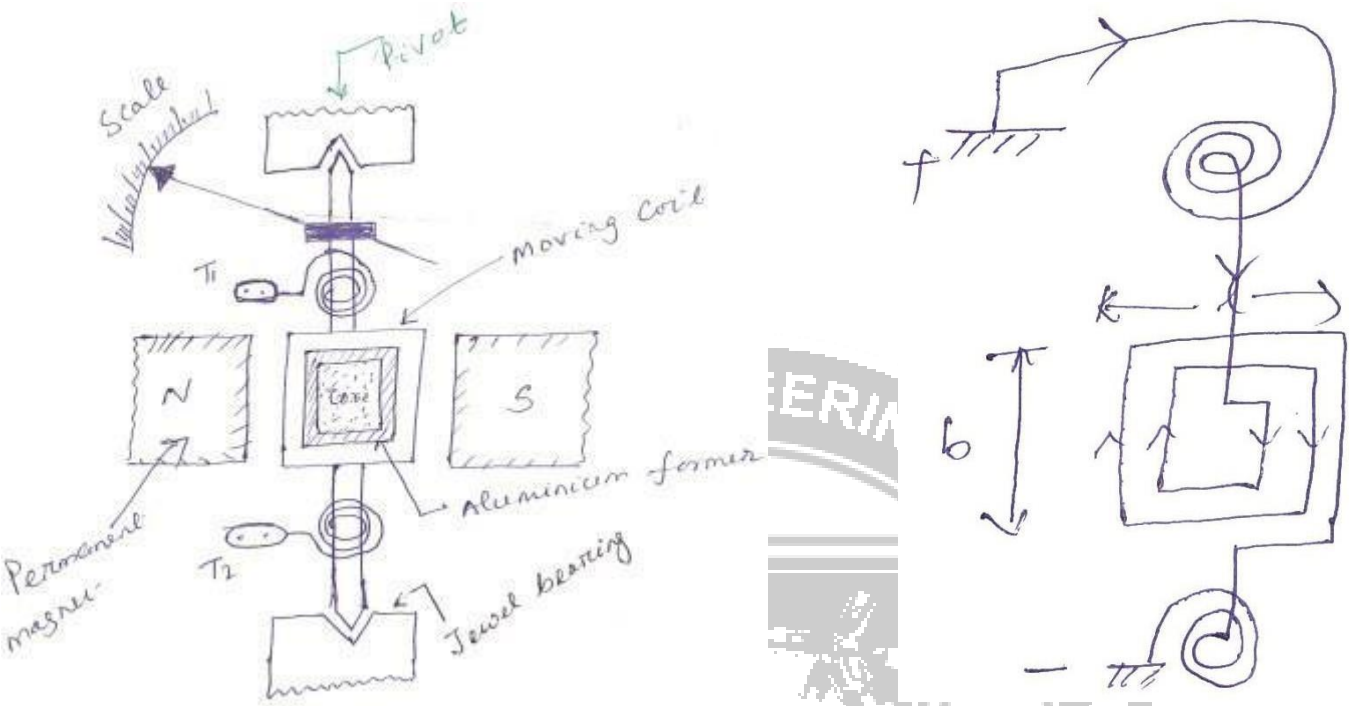


Fig. 2.7 **Permanent Magnet Moving Coil (PMMC) instrument**

Principle of operation

When D.C. supply is given to the moving coil, D.C. current flows through it. When the current carrying coil is kept in the magnetic field, it experiences a force. This force produces a torque and the former rotates. The pointer is attached with the spindle. When the former rotates, the pointer moves over the calibrated scale. When the polarity is reversed a torque is produced in the opposite direction. The mechanical stopper does not allow the deflection in the opposite direction. Therefore the polarity should be maintained with PMMC instrument.

If A.C. is supplied, a reversing torque is produced. This cannot produce a continuous deflection. Therefore this instrument cannot be used in A.C.

Torque developed by PMMC

Let T_d =deflecting torque

T_C = controlling torque

θ = angle of deflection

K=spring

constant b=width

of the coil

l=height of the coil or length of coilN=No. of turns

I=current B=Flux density

A=area of the coil

The force produced in the coil is given by

$F = BIL\sin\theta$ (2.4)

$\theta = 90^{\circ}$

When

For N turns, $F = NBIL$ (2.5)

Torque produced $T_d = F \times \perp_r$ distance (2.6)

$T_d = NBIL \times b = BINA$ (2.7)

$T_d = BANI$

$T_d \propto I$

Advantages

- Torque/weight is high
- Power consumption is less
- Scale is uniform
- Damping is very effective
- since operating field is very strong, the effect of stray field isnegligible
- Range of instrument can be extended

Disadvantages

- Use only for D.C.
- Cost is high
- Error is produced due to ageing effect of PMMC
- Friction and temperature error are present.