OA OQ

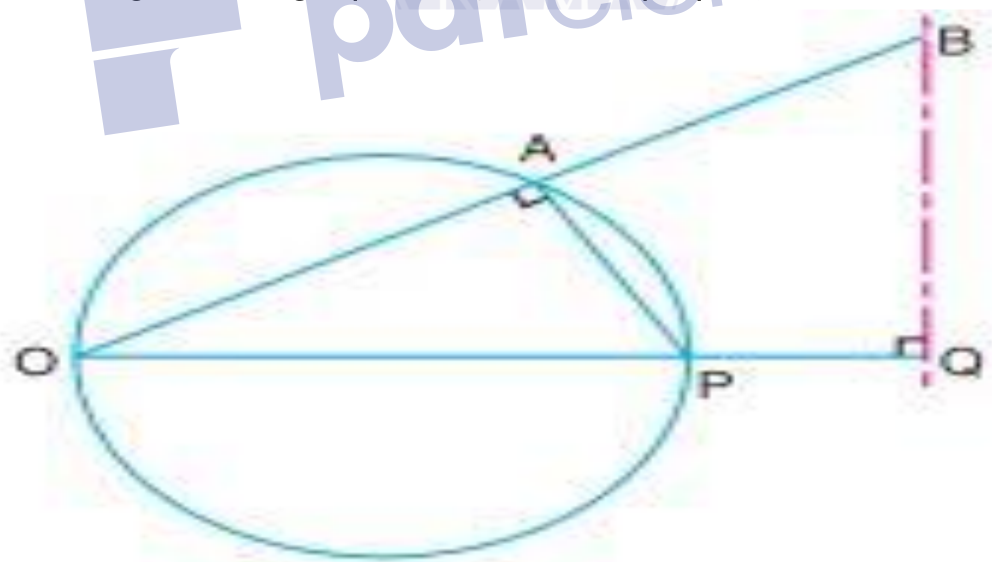
OP OB=or OP× OQ= OA× OB

Or OA OB

OQOP×=

But OP is constant as it is the diameter of a circle, therefore, if OA× OB is constant, then OQ will be constant. Hence

the point B moves along the straight path BQ which is perpendicular to OP.



1.Peaucellier mechanism. It consists of a fixed link

OO1 and the other straight links O1A, OC, OD, AD, DB, Bcand CAare connected by turning pairs at their intersections, as shown in Fig. The pin at Ais constrained to move along the circumference of a circle with the fixed diameter OP, by means of the link O1 A. In Fig.

AC= CB= BD= DA; OC= OD; and OO1 = O1 A

It may be proved that the product OA× Obremains constant, when the link O1 Arotates. Join CDto bisect ABat R.

Now from right angled triangles ORCand BRC, we have

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AC= CB= BD= DA; OC= OD; and OO1 = O1 A

It may be proved that the product OA× Ob remains constant, when the link O1A rotates. Join CD to bisect AB at R.

Now from right angled triangles ORC and BRC, we have

$$OC^2 = OR^2 + RC^2 \quad \ldots(i)$$

and

$$BC^2 = RB^2 + RC^2 \quad \ldots(ii)$$

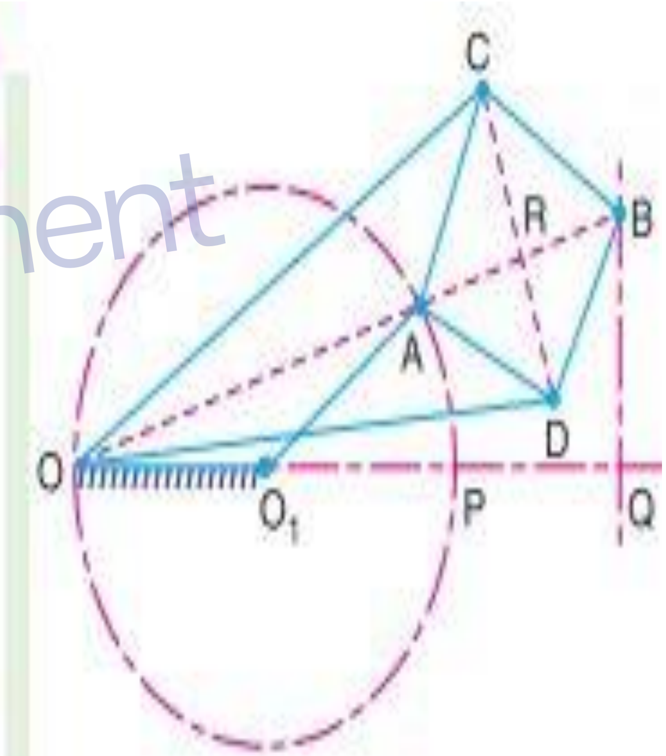
Subtracting equation *(ii)* from *(i)*, we have

$$OC^2 - BC^2 = OR^2 - RB^2$$

$$= (OR + RB)\,(OR - RB)$$

$$= OB \times OA$$

Since *OC* and *BC* are of constant length, therefore the product *OB* × *OA* remains constant. Hence the point *B* traces a straight path perpendicular to the diameter *OP*.



2. Hart’s mechanism.

This mechanism requires only six links as compared with the eight links required by the Peaucellier mechanism. It consists of a fixed link OO1

and other straight links O1 A, FC, CD, Deand EFare connected by turning pairs at their points of intersection, as shown in Fig.

The links FC and DEare equal in length and the lengths of the links CDand EFare also equal. The points O, Aand Bdivide the links FC, CDand EFin the same ratio.

A little consideration will show that BOCEis a trapezium and OAand OBare respectively parallel to *FDand CE.

Hence OAB is a straight line.

It may be proved now that the product OA× OBis constant.