A LINKAGE FOR THE KINEMATIC DESCRIPTION OF A CISSOID.

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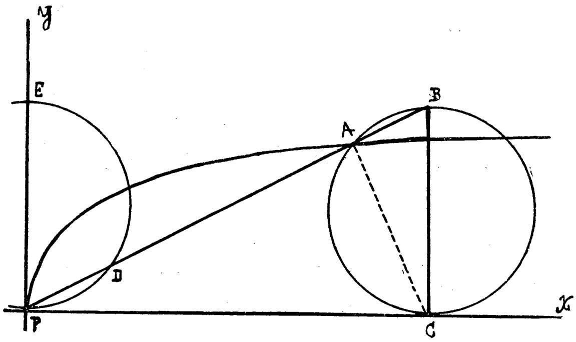
THEOREM. *If a line pivoted on an axis be drawn to the extremity of the diameter of a constant circle, the locus of its intersection with the circumference of the circle as the latter rolls along the axis is a cissoid.*

PROOF. Let BC be the diameter of the rolling circle, at any point in the axis PX as C; PB the line pivoted at P and intersecting the circle at the point A. Draw EP parallel to BC; then connect E and B. Hence,



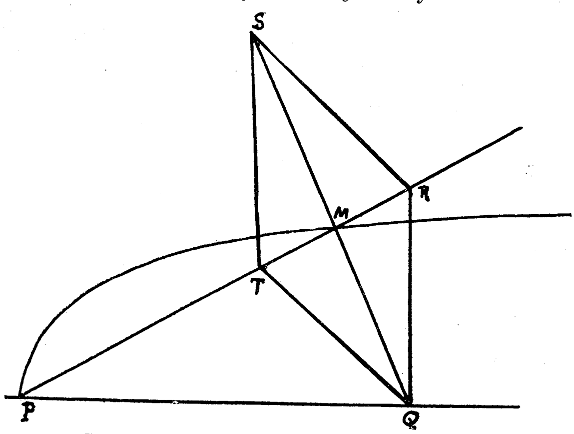
$$EB \parallel PC, \quad \measuredangle EBA = \measuredangle BPC,$$
$$PD = AB.$$

Hence the locus of A is a cissoid.

COROLLARY. *If from the moving vertex of a rectangle having one side constant, a perpendicular be dropped upon the varying diagonal the locus of the foot of the perpendicular is a cissoid.*

For, in rectangle $EBCP$ the side BC is constant, PB the diagonal, and AC is perpendicular to PB.

THEOREM. *If one diagonal of a rhombus be produced and pivoted at a fixed point in an axis, and if the rhombus be moved along the axis in such a way that one side is constantly perpendicular to it, the locus of the intersection of the diagonals is a cissoid.*



PROOF. Let $QRST$ be the rhombus; RQ perpendicular to PQ; the diagonal TR produced and pivoted at P.

Then since QR is constant, $\angle RMQ$ is a right angle, and the locus of M is a cissoid.

The latter theorem suggests a simple method of constructing a linkage for describing a cissoid by continuous motion.