

Darwin, Horace

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 Horace Darwin

Photo focusing p1r

The object is to make 2 points one on each side of
 a lens move in such a way as always to remain
 at conjugate foci. PR $P'R'$ are the foci of
 2 cells, alike in all respects. The poles R & R' are
 connected by a bar with a slot in it. (see picture over)
 through which the pivot at O passes - at O PRP' are
 constrained
 to keep in a
 straight
 line



$$PO = h \quad P'O = r' \quad RR' = L$$

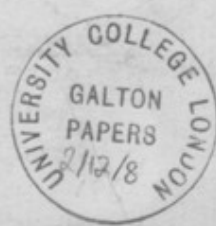
$$RO = r \quad R'O = h'$$

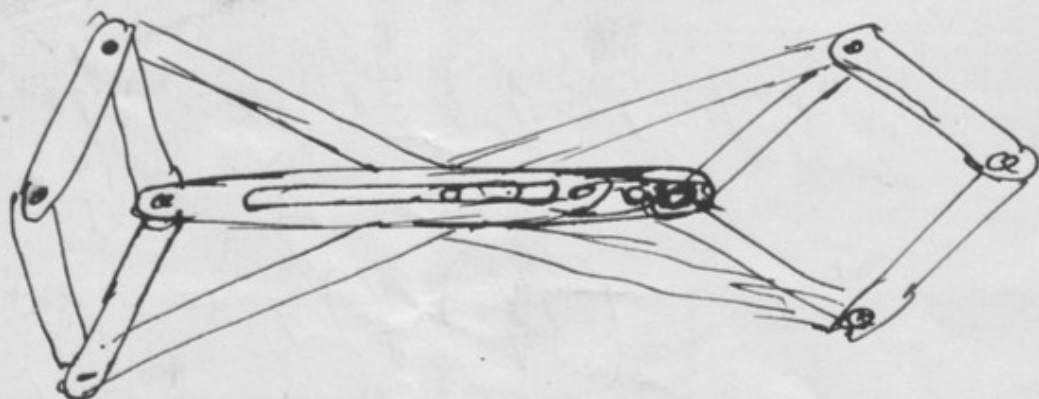
$$r = \frac{k}{h} \quad r' = \frac{k}{h'} \quad \text{where } k \text{ is a constant}$$

$$L = r + r' = k \left(\frac{1}{h} + \frac{1}{h'} \right)$$

$$\frac{1}{h} + \frac{1}{h'} = \frac{L}{k}$$

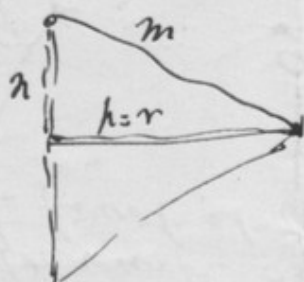
Hence if $\frac{k}{L}$ is the focal length of the lens
 h & h' are conjugate foci.





$$k = \frac{1}{2} r$$

$$\frac{k}{L} = \text{focal length of lens}$$



$$k = \frac{1}{2} r^2 = \sqrt{m^2 - n^2}$$

$$L = \frac{\sqrt{m^2 - n^2}}{\text{focal length of lens.}}$$

(the length of the connecting link R.R')