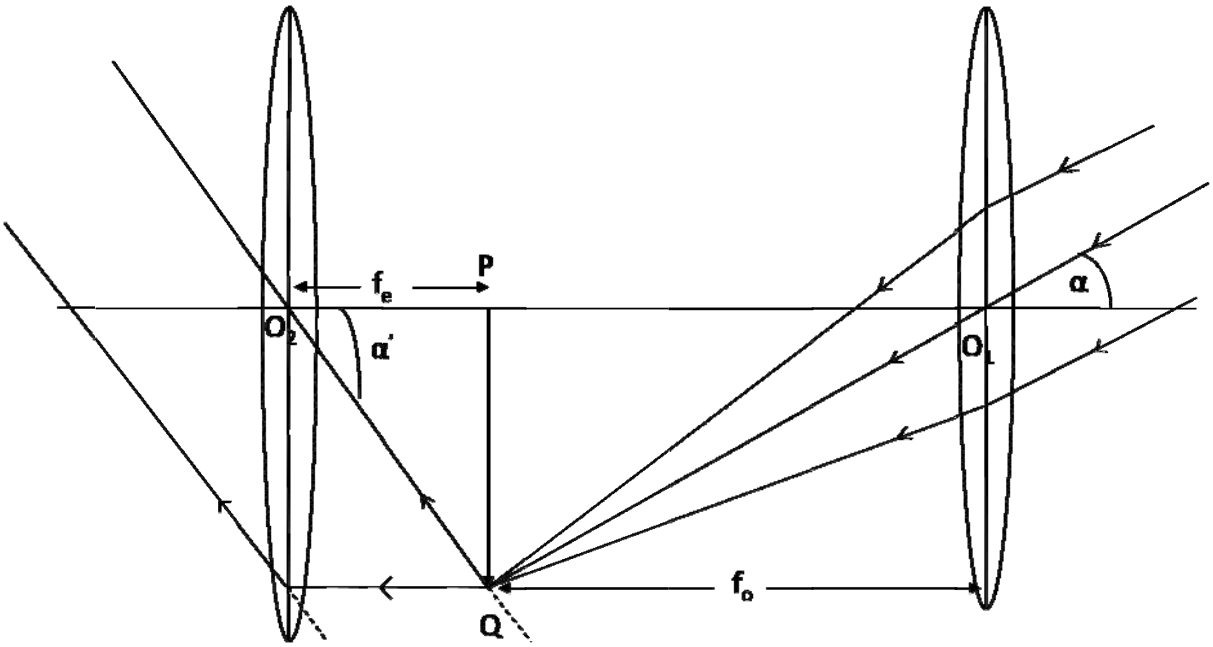
Astronomical Telescope

Telescope: Instrument used for seeing distant object.

Astronomical telescope: This is used mainly for astronomical studies i.e. for seeing stellar bodies. The final image is inverted with respect to the object.



Length of the tube= $O_1P+PO_2 = f_o + f_e$

$$\text{Magnifying Power} = \frac{\text{angle subtended by the image at the eye}}{\text{angle subtended by the object at the objective}}$$

$$M_n = \frac{\alpha'}{\alpha} = \frac{\tan\alpha'}{\tan\alpha} = \frac{PQ/O_2P}{PQ/O_1P} = \frac{O_1P}{O_2P} = \frac{f_o}{f_e}$$

Distinct vision: The eye piece is so adjusted that the final image is formed at least distance of distinct vision from eye.

$$\text{To find magnifying power } (M_d): O_1P = f_o, O_2P = u < f_e, O_2P' = D$$

$$\therefore \frac{1}{f_e} = \frac{1}{u} + \frac{1}{-D}$$

$$or \frac{1}{u} = \frac{D + f_e}{Df_e}$$

$$\text{For distinct vision } M_d = \frac{\alpha'}{\alpha} = \frac{\tan\alpha'}{\tan\alpha} = \frac{PQ/O_2P}{PQ/O_1P} = \frac{O_1P}{O_2P} = \frac{f_o}{u}$$

$$M_d = f_o\left[\frac{1}{f_e} + \frac{1}{D}\right] = \frac{f_o}{f_e}\left[1 + \frac{f_e}{D}\right]$$

$$\text{Length of the tube } L = O_1P + O_2P = f_o + u = f_o + \frac{Df_e}{D + f_e}$$