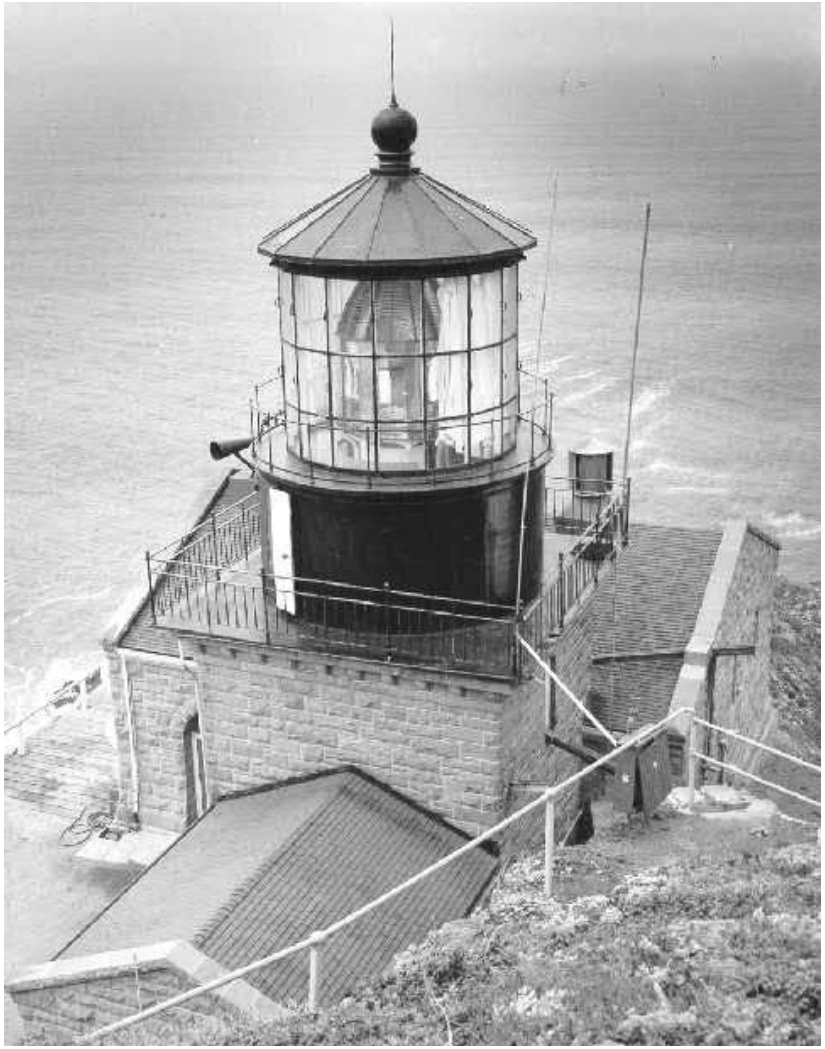
POINT SUR STATE HISTORIC PARK

FRESNEL LENS

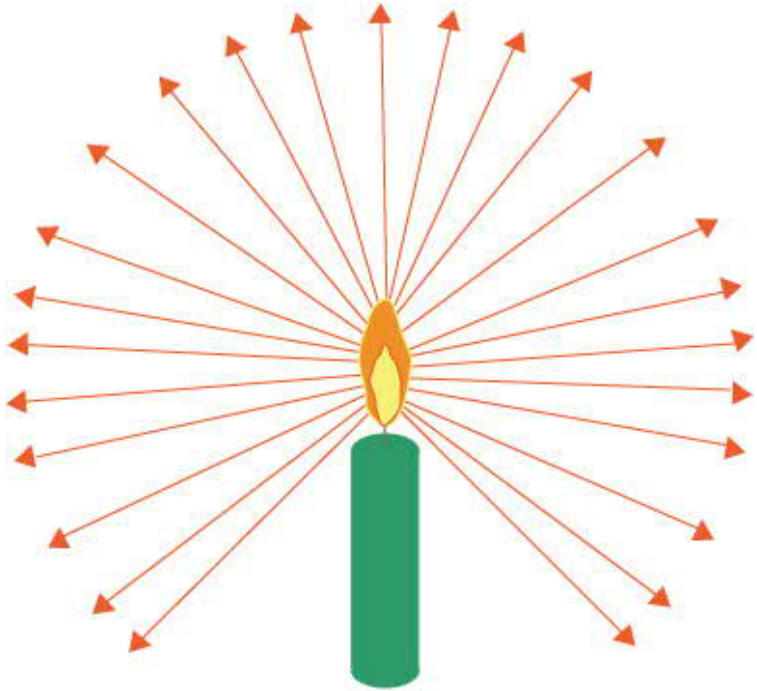
Presented by: Al Friedrich

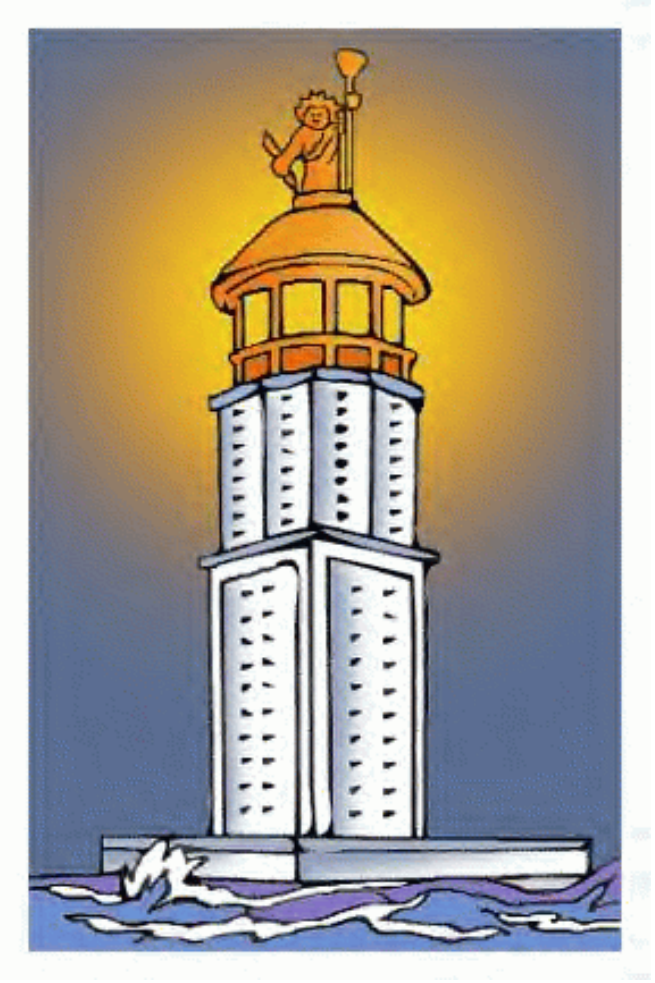
date

Heaven Descended to Earth

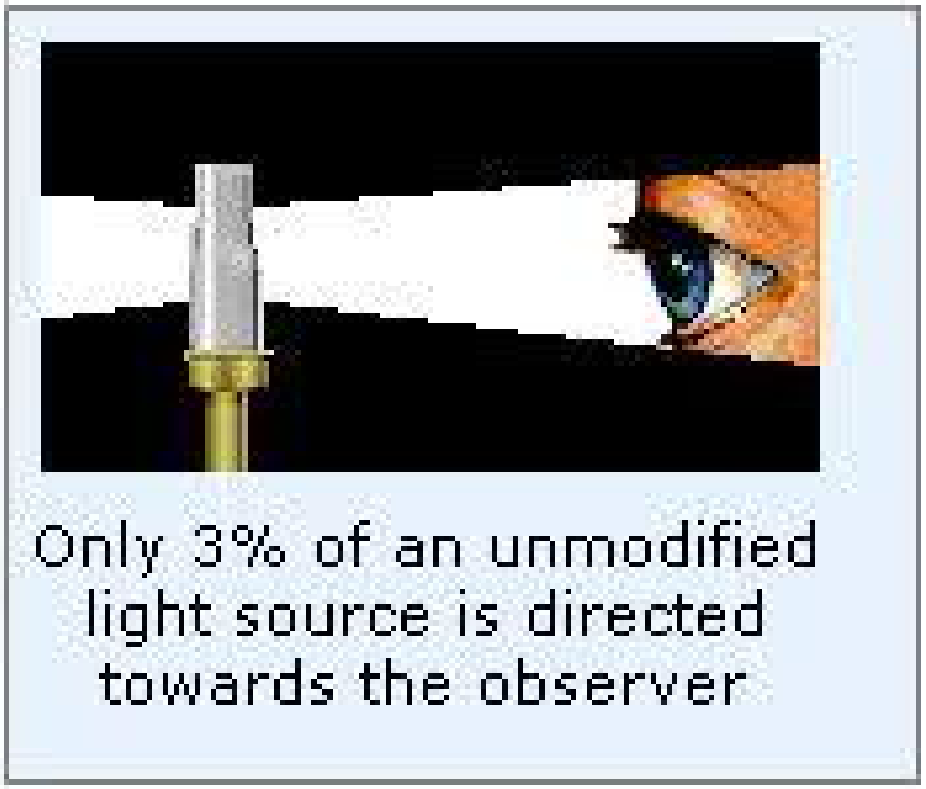


Pharos Lighthouse at Alexandria

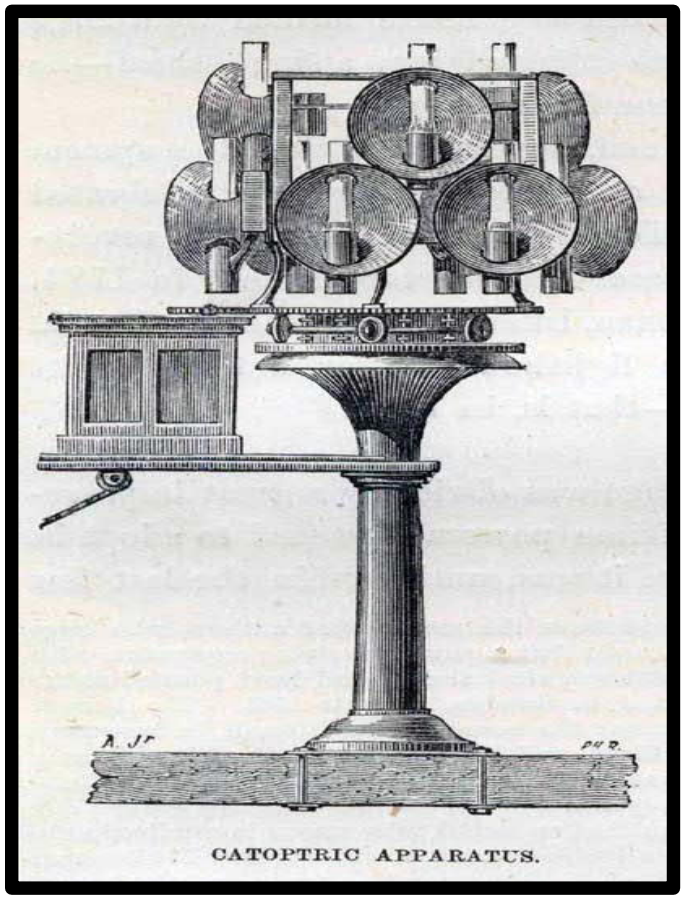




Open Flame – 97 % of light lost

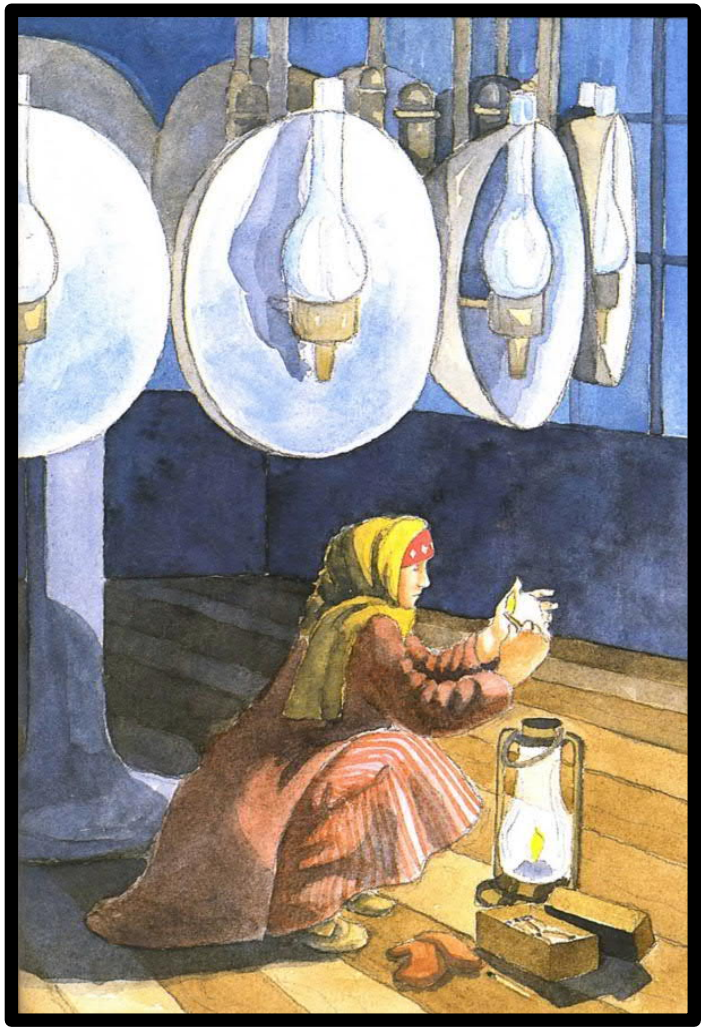


Catoptric Optic - 1784

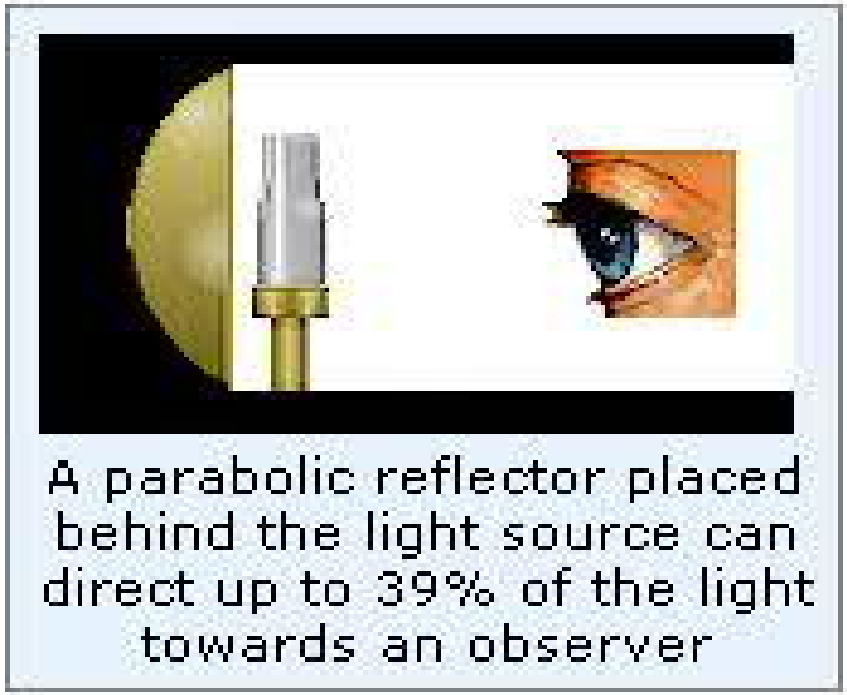


A Rotating Refector–Lamp Driven by a Clockwork

Abbie Burgess – Maine 1853



Reflector – 61% of Light Lost

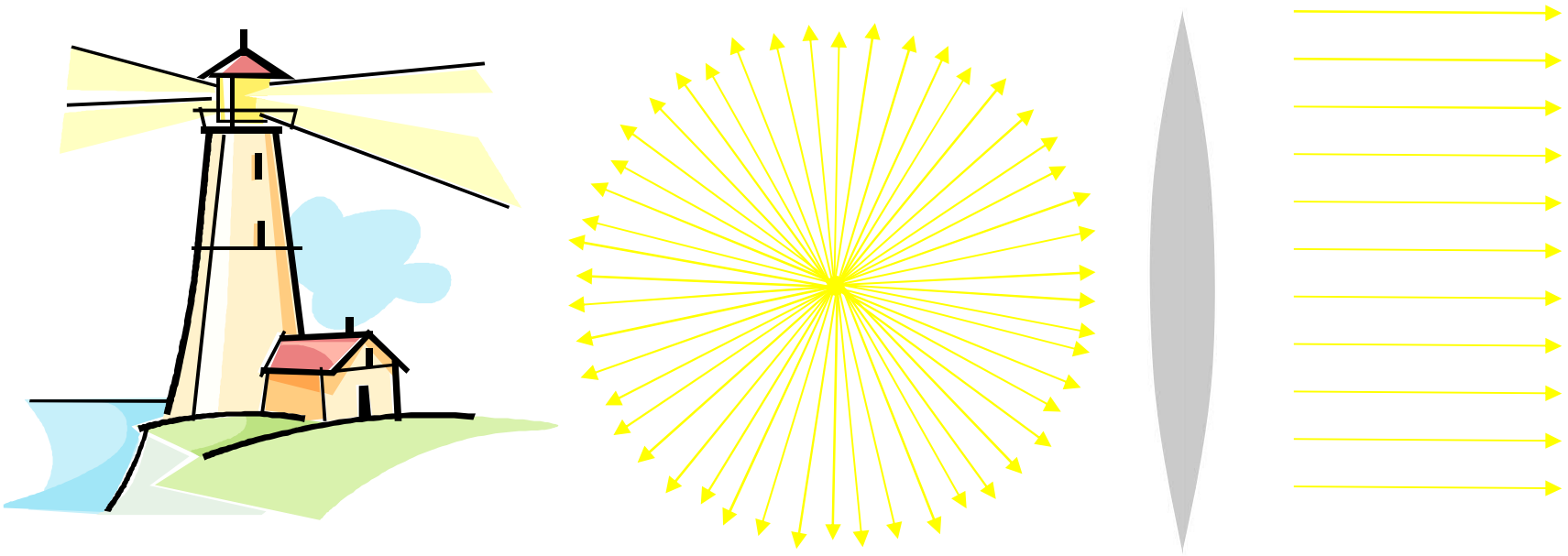


A parabolic reflector placed behind the light source can direct up to 39% of the light towards an observer

Agustin Jean Fresnel

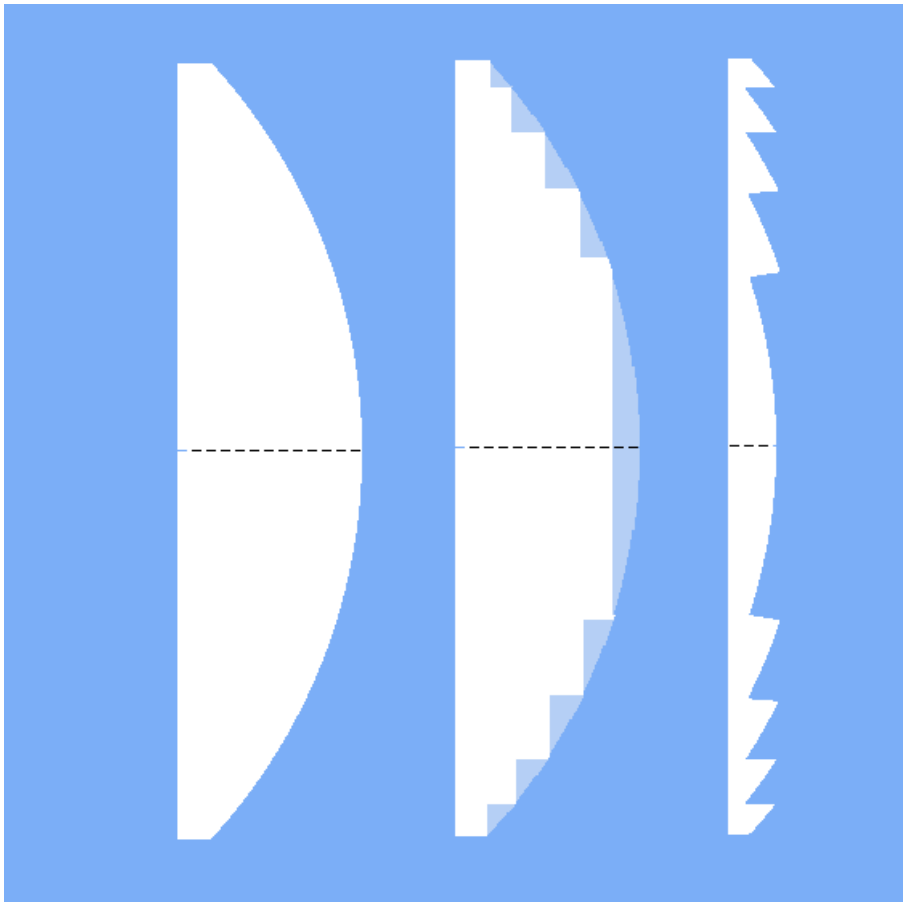
1788-1827

Biconvex Lens –Lost more light than Reflectors



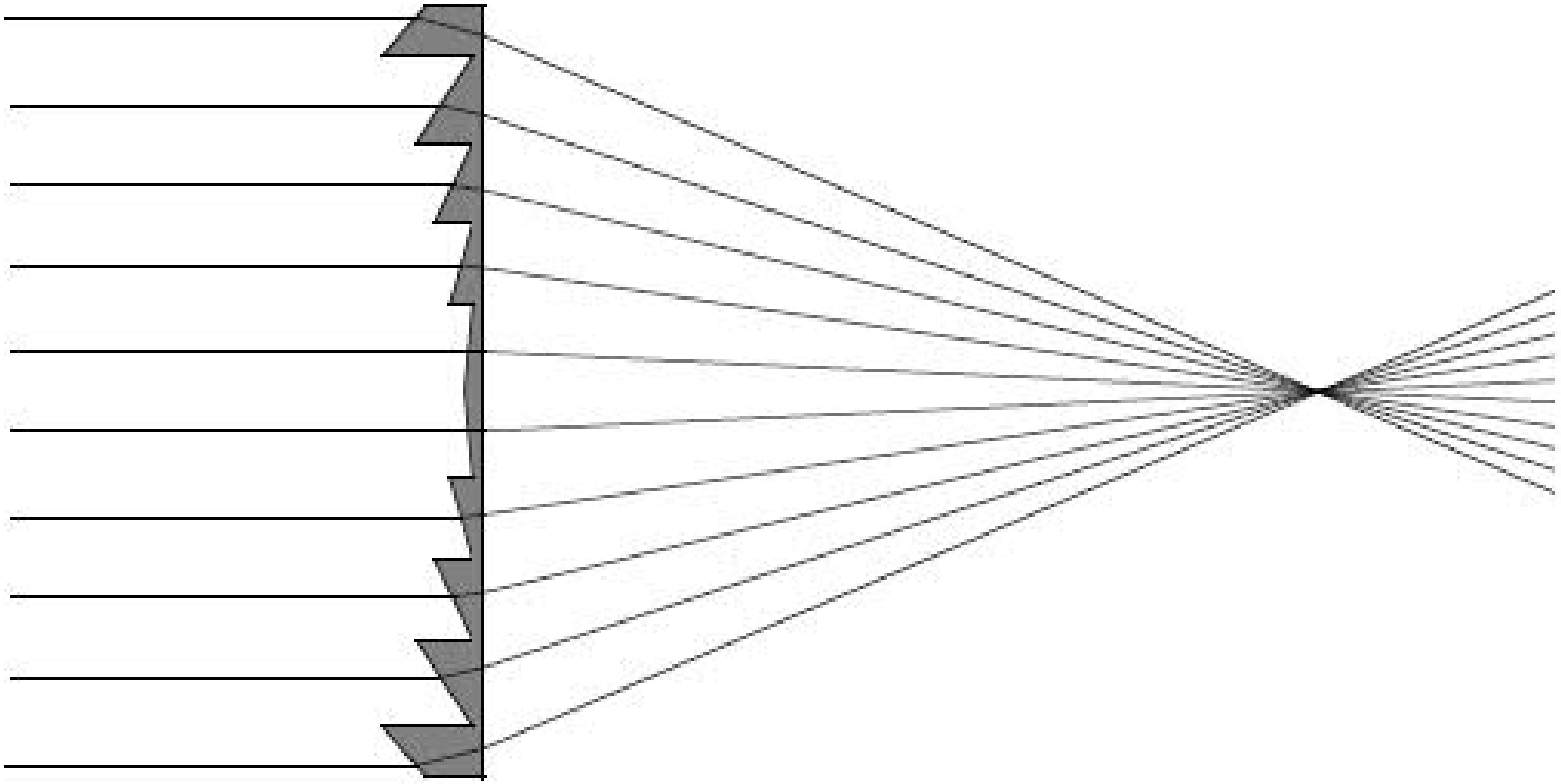
A lighthouse wants to collect as much light as possible (large diameter lens) and send it out in a beam. This means the lens must have a short focal length (thick lens), so it can be placed close to the light source.

Fresnel Lens Reduces Lens Weight



Fresnel had the idea that because refraction occurs at the curved surface, the rest of the glass is unnecessary. If you remove the non-essential glass and flatten the remaining glass segments, you get a Fresnel lens.

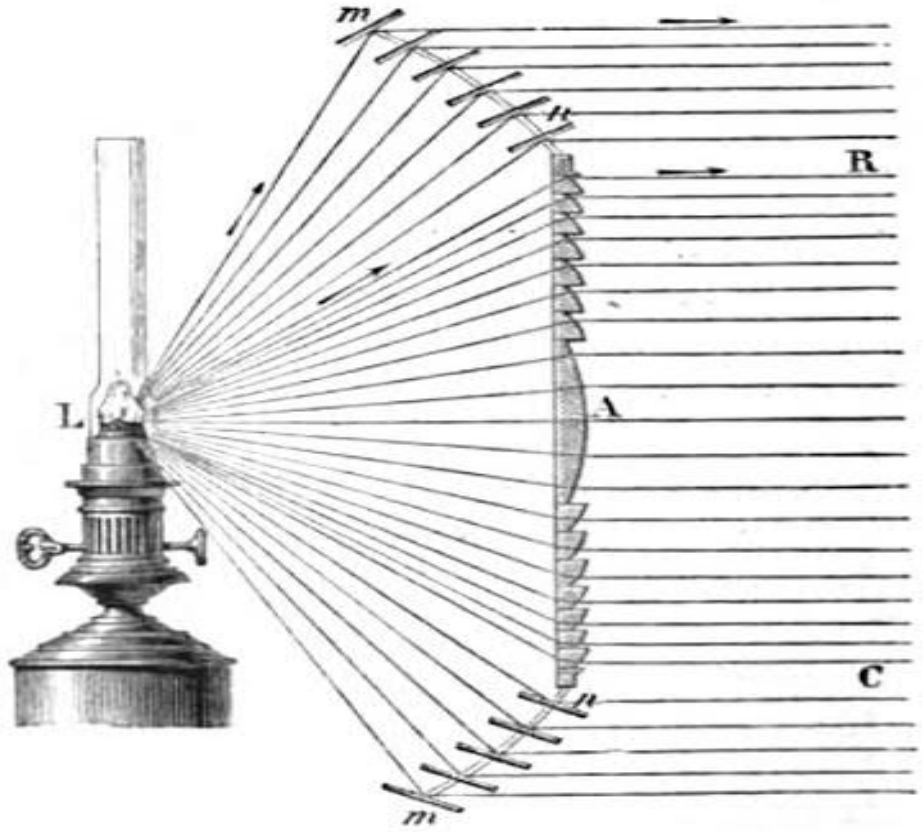
Fresnel Lens



First Working Prototype Worked

Fresnel Experimental Lens Prototype - 1821

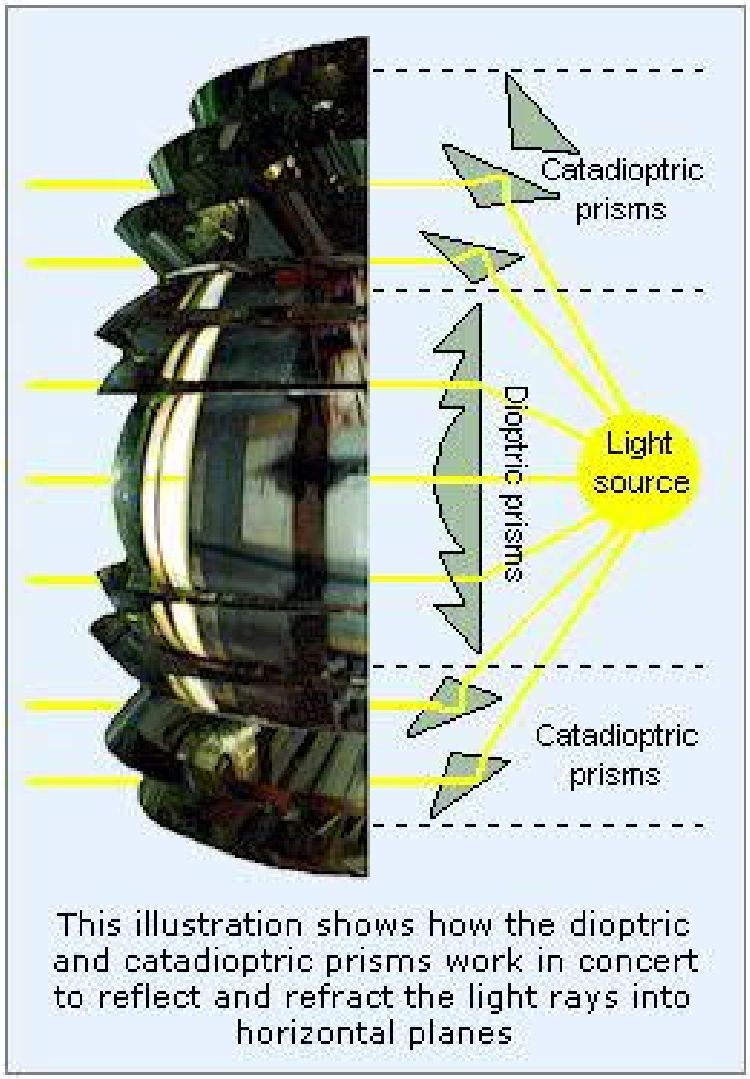
Fresnel Lens - 1822



Fresnel Lens - 1823

The first lens installed in the Cordouan Lighthouse by Augustin Fresnel.

Fresnel Lens - 1827

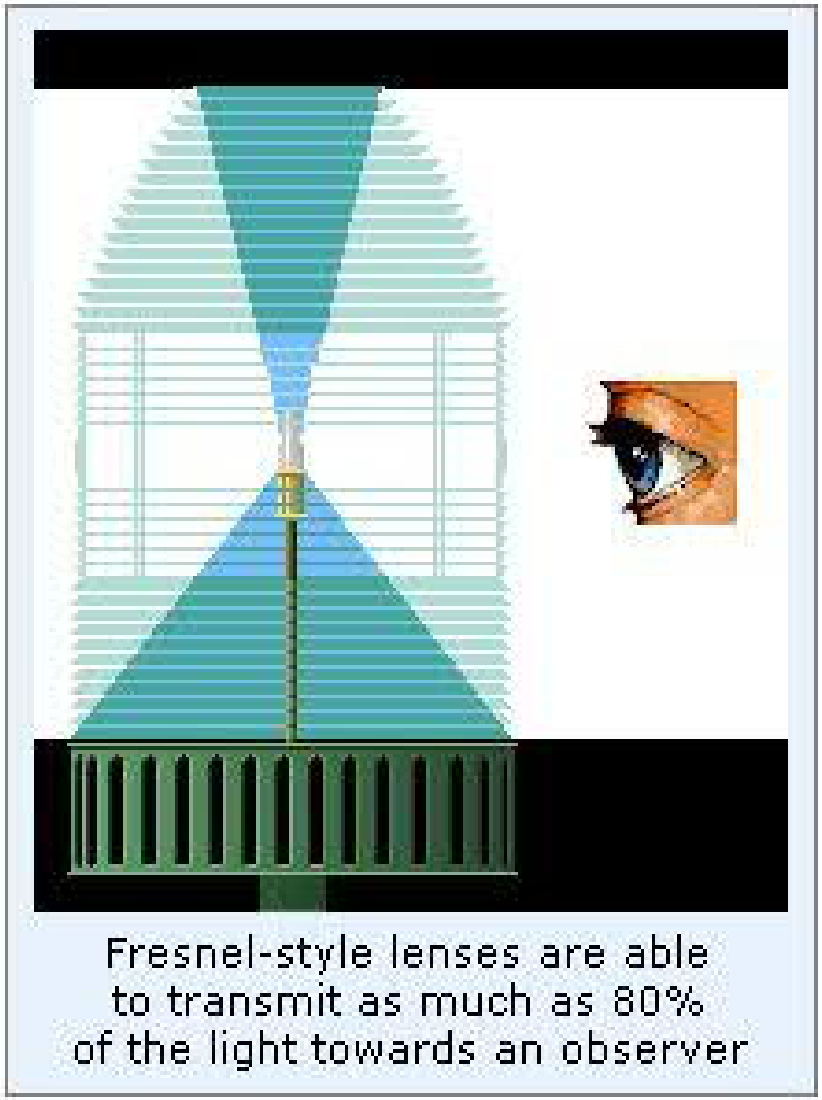


Fresnel Lens

Bend = Dioptric Prism

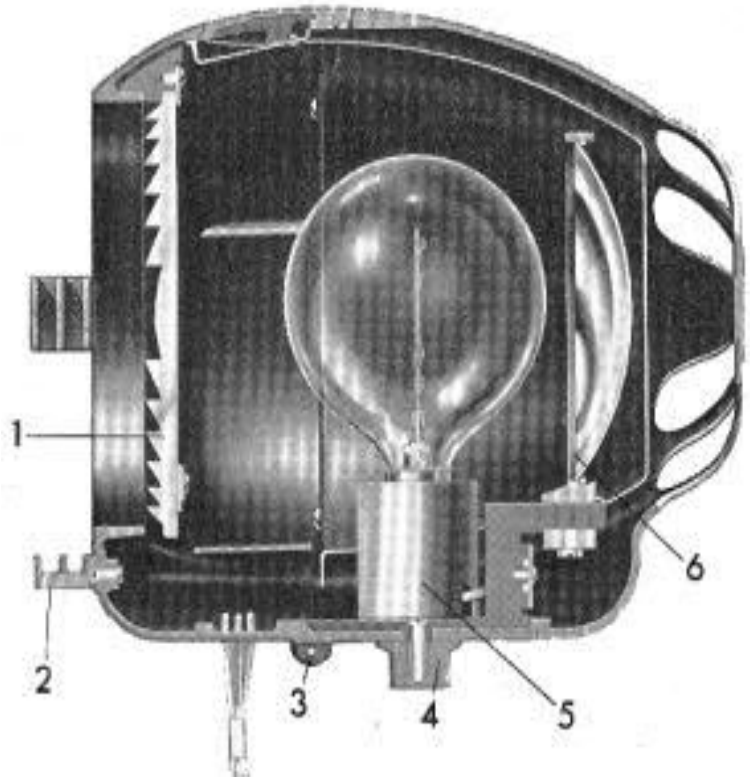
Bend & Reflect = Catadioptric Prism

Fresnel Lens – Only 20% Light Lost



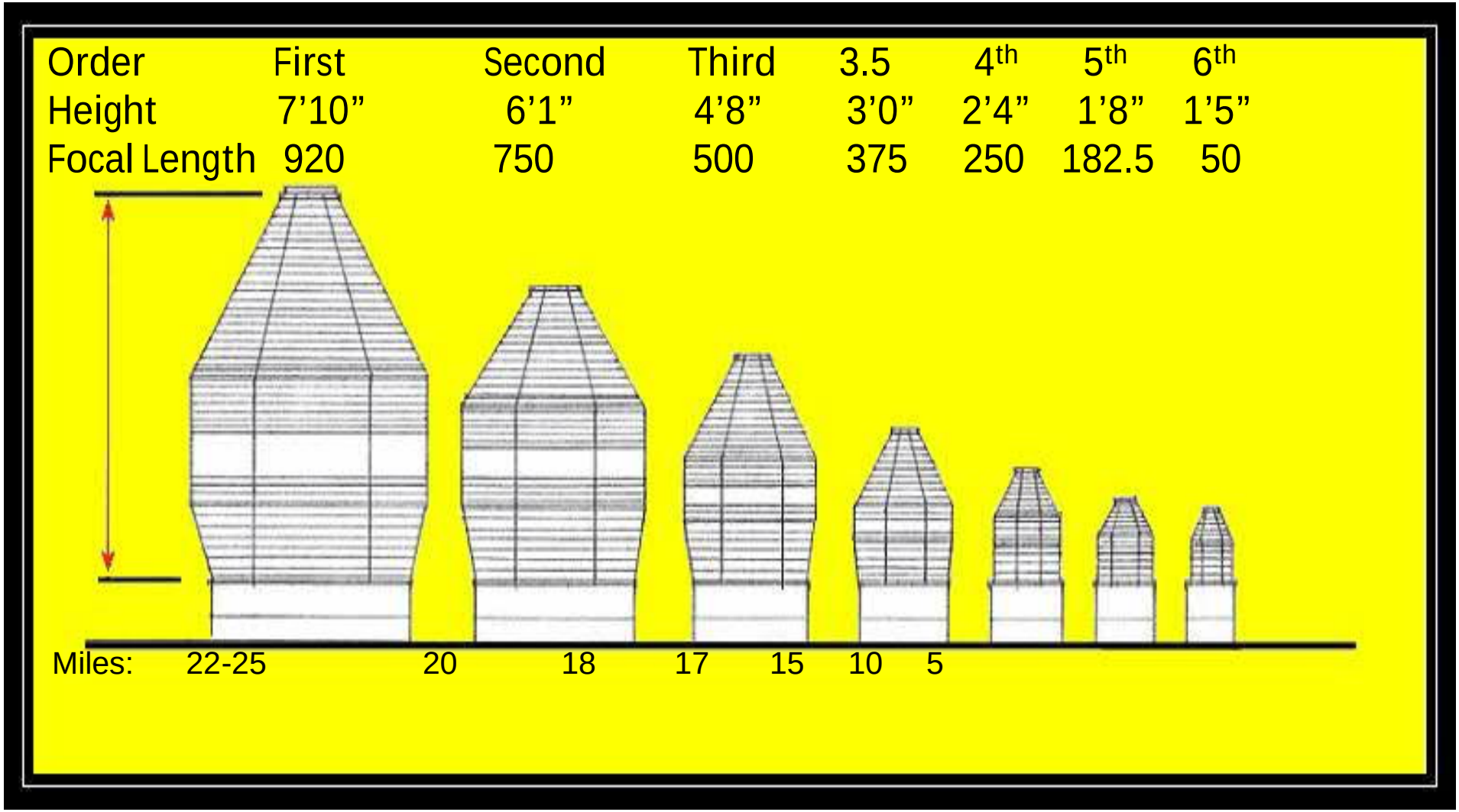
Fresnel Lens – Used Today

Truck Tail Light

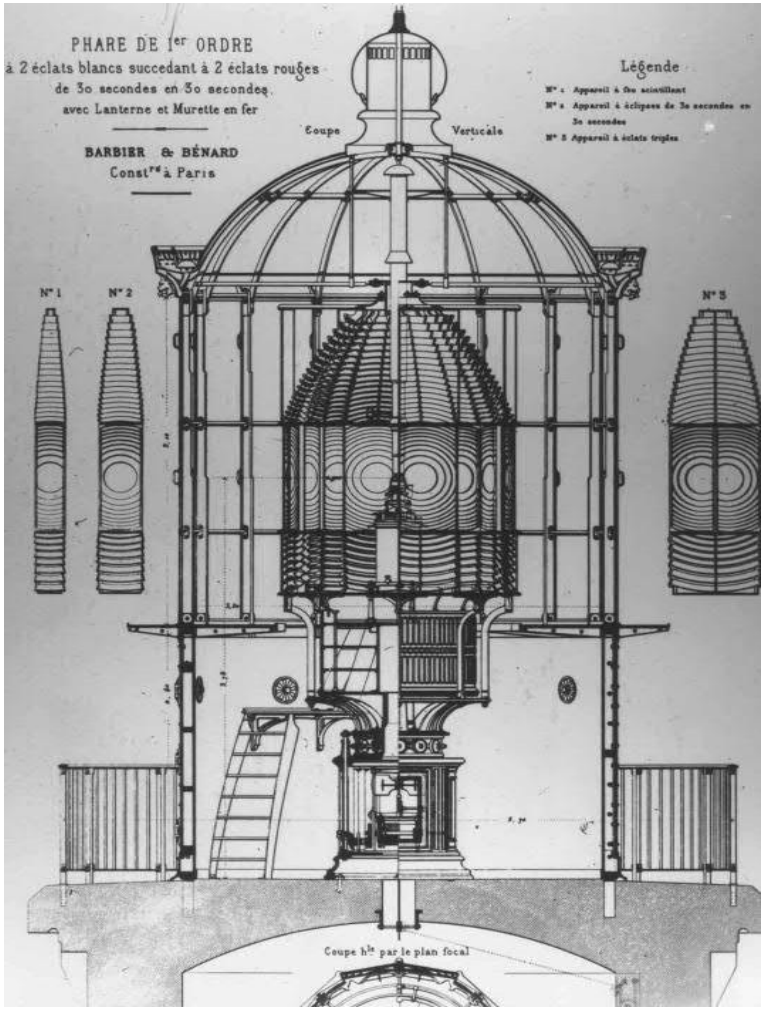


Theater Lantern

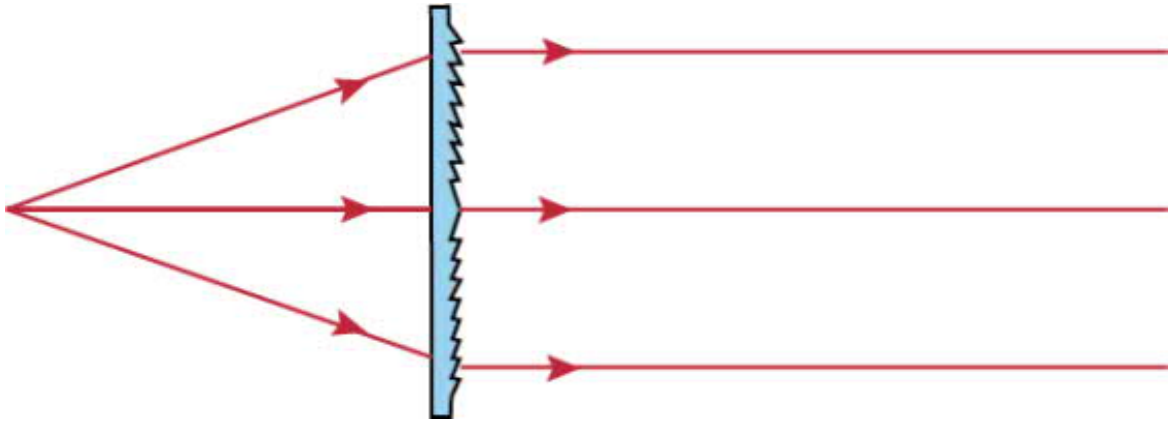
Fresnel Lens Sizes



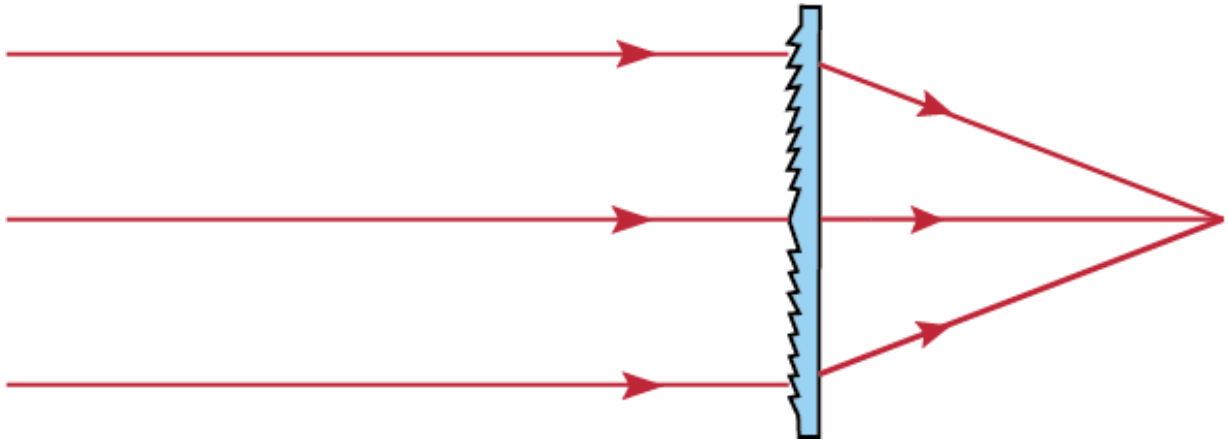
Rotating Powered by Weight



The lens Works in Both Directions



Light Collimation of a Point Source with a Fresnel Lens



Light Collection of Collimated Light with a Fresnel Lens

Point Sur Light - 1889

1st Order Fresnel Lens
Flashing – 15 seconds

1889 – Red & White
1925 – White

Pigeon Point Lighthouse Fresnel Lens

Point Pinos Light - 1855

Point Pinos Light - 1855
3rd Order Fresnel Lens
Fixed - Occulting

Point Sur Light – 1889 to 1911

Kerosene Wick Lamp

Point Sur Light – 1911 to 1939

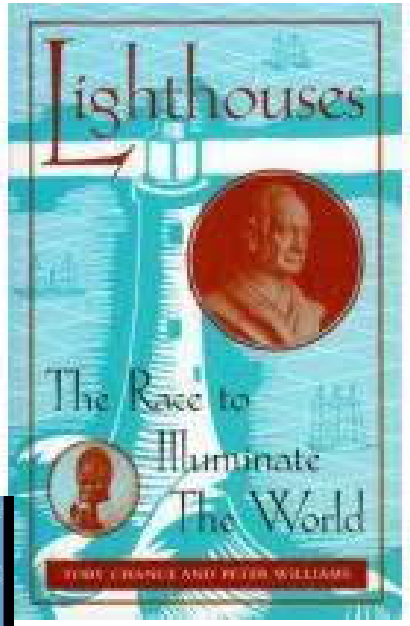
Incandescent Oil Vapor Lamp

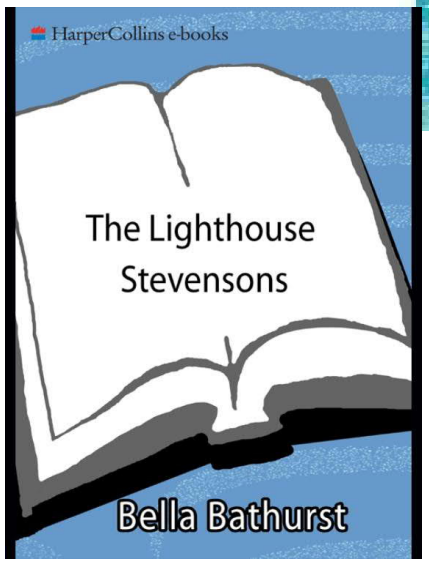
Point Sur Light – 1939 to 1975

Electric
Incandescent
1,000 Watt Bulb

Fresnel Lens Acceptance

Trinity House & Northern Lighthouse Board stuck in reflector mindset (1822-1850) Robert Stevenson skeptical of merits of Fresnel lens over reflectors, but Alan Stevenson accepted Fresnel lens over reflectors.





Looks A Lot Like Fresnel's Lens

Skerryvore Light
1844 – Scotland
Alan Stevenson

Fresnel Lens & Lighthouse Links

beachbum.homestead.com
colorado.edu (Ellen Ch. 3 – Mirrors and Lenses)
cordouan.culture.fr/accessible/
dailykos.com
fresneltech.com/pdf/FresnelLenses.pdf
lighthousefriends.com
newenglandlighthouses.net
photographers-resource.co.uk
seguinisland.com
terrypepper.com/lights/index.htm
themes.pppst.com/lighthouses.html
trinityhouse.co.uk

The Light is On