

## Inventors and Engineers

The story of the Great Light involves two brilliant engineers; Augustin-Jean Fresnel who invented the Fresnel Lens and John Richardson Wigham, who invented powerful gas burners. Both suffered fierce rivalry from competitors.



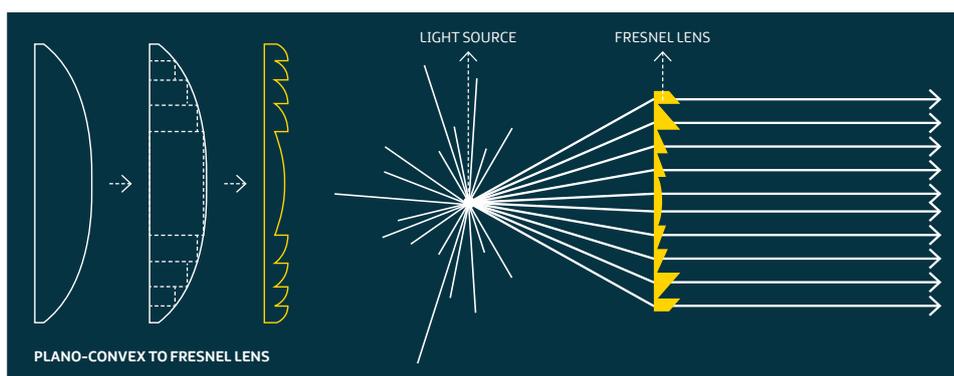
Fresnel

### Augustin Jean Fresnel

Fresnel was born in Normandy, France, in 1788 and died of Tuberculosis, aged 39. His invention would revolutionise lighthouse technology. He became a civil engineer who built roads at the time of Napoleon. He also researched light and optics, helping to establish the wave theory of light.

In 1819, the French Lighthouse Commission asked him to improve the strength of light for lighthouses. The light at the time came from oil lamps with a parabolic reflector behind them. He worked out a way of reducing the thickness of a magnifying convex lens

which reduced its weight. The central 'bull's eye' magnifying the light and rings refracted (bent) the light into a powerful beam. He had to make many prototypes but his invention would revolutionise lighthouse technology and would be used in every lighthouse.



The first Fresnel lighthouse lens was installed in the Cordouan lighthouse in the Gironde Estuary, France, in 1823. Fresnel also invented a way of rotating the lens to produce a flashing light.

### Were all the lenses the same size?

Fresnel lenses were organised into 'orders' based on their focal length, measured in millimetres. The largest was the Great Light's Hyper-Radial lenses. 3326 Fresnel lenses were made but only 30 lighthouses in the world were fitted with Hyper-Radial lenses, (visit [www.greatlighttq.com](http://www.greatlighttq.com) for a map). They were made between 1887-1913 and were difficult and very expensive to make.

Order	Focal Distance	General Use
Hyper-Radial Lens ★	1330	Landfall Lighthouses
Meso-Radial	1125	Landfall Lighthouses
1st Order	920	Landfall Lighthouses
2nd Order	700	Coastal Lighthouses
3rd Order	500	Coastal Lighthouses
3rd Order	400-375	Coastal Lighthouses
4th Order	250	Harbour Lighthouses
5th Order	187.5	Harbour Lighthouses
6th Order	150	Harbour Lighthouses

# The Great Light



John Richardson Wigham

## John Richardson Wigham

John Richardson Wigham was born in Edinburgh in 1829. At 15, he came to Dublin to work as an apprentice at his Uncle's metal working company, Edmundsons & Co. At 19, he took over the company when his uncle died. He became a successful businessman and inventor.

Engineers were trying to make the lighthouse light brighter. John Richardson Wigham invented a gas burner with 108 gas jets that were so hot they were cracking the glass of 1st Order lenses, the largest at the time. Wigham had a larger lens designed by the French manufacturer Barbier – it was called a Hyper-Radial.

The first lighthouse to have his burners and Hyper-Radial lenses was Tory Island lighthouse in 1887.

## What did he invent?

In 1861 he invented the first automated lit buoy which was installed in the river Clyde, Scotland. In 1863 he was asked by the Dublin Ballast Board to develop a way of using gas to produce a better light for lighthouses. His first gas burner was installed in Baily lighthouse in 1865, and then an improved version in 1868. This produced a light 13 times brighter than the brightest light known. He took out a patent for each invention.

His biggest gas burner had 108 jets. Three gas burners were installed in Mew Island lighthouse in 1884, and Tory Island lighthouse in 1887. There was a gas burner for each tier of lenses. On a moonlit night one burner was used, and on a foggy night all three were used producing a really powerful light equivalent to 2,934 candles.

He also designed the optics, which Barbier and Fenestre made. The largest was for Galley Head, West Cork, which had four tiers in 1878.



WIGHAM'S  
108 JET GAS  
BURNER

## Making coal gas



The coal gas was made in the coal house by burning a special type of coal called cannel coal. The gas produced was passed into gas holders, where it was stored until it was needed. The gas holders contained large cylindrical

metal tanks. The gas floated on water within the tank, which expanded in height to the depth of gas produced. When the tanks were full they were 4.3m high. The image shows the two remaining gas tanks on Mew Island.

They stopped using coal gas as paraffin was cheaper to use. The paraffin was also easier to transport. The light from paraffin burners was brighter, producing a light equivalent to 1,210,000 candles.