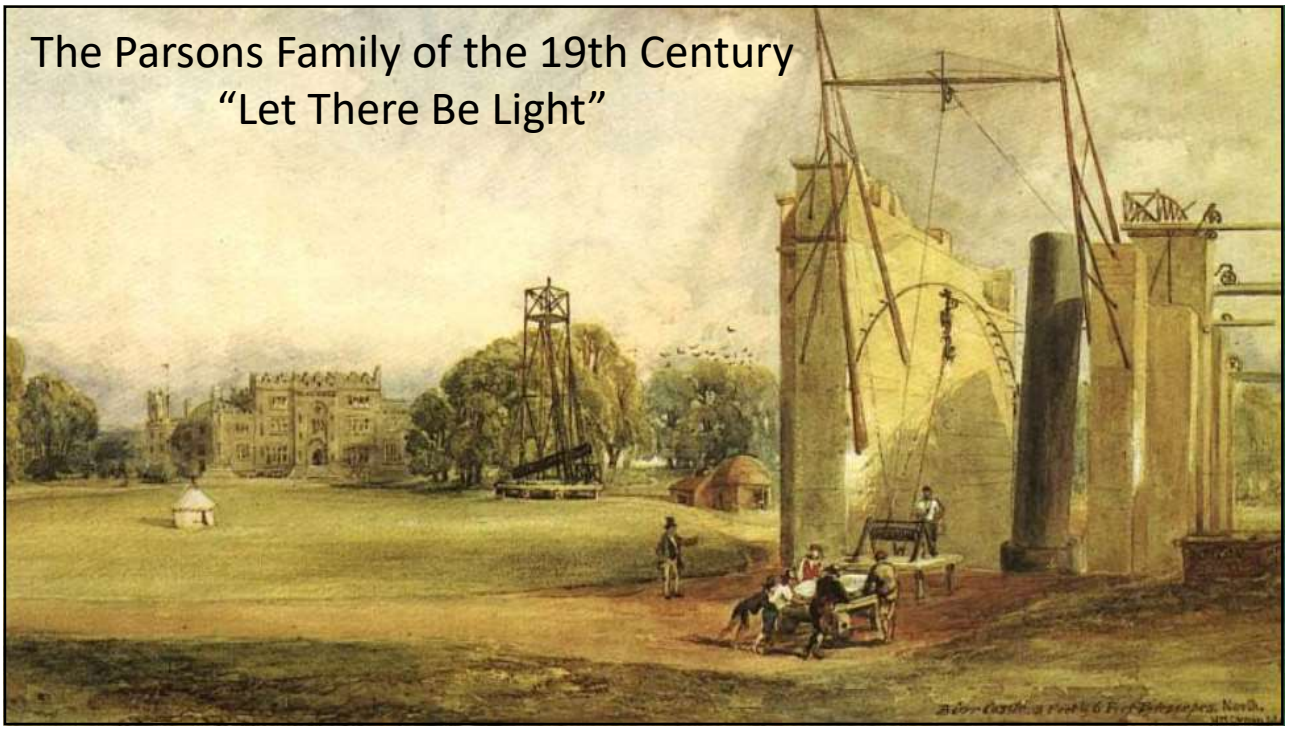

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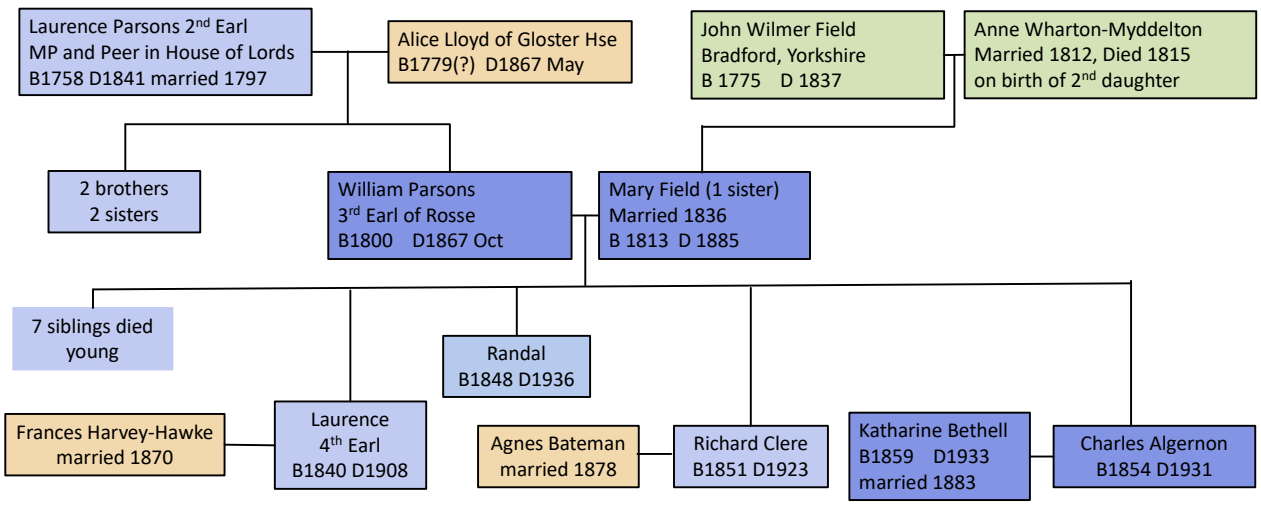
2

Agenda - The Parsons Family of the 19th Century

- Family Tree
- Laurence Parsons – Second Earl of Rosse and Alice Lloyd of Gloster House
- William Parsons – Third Earl of Rosse and Mary Field of Heaton, Bradford
- Telescope building
- Raising a family amidst a centre for Science and Industry
- Charles Parsons' brothers
- Charles's formative years
- Charles Parsons and Katharine Bethell
- Development of the Steam Turbine for Electricity and Ship Propulsion
- Searchlights and more telescopes
- Life in Newcastle-Upon Tyne
- The Great War
- Charles's achievements

3

The Parsons Family Tree



4

Laurence Parsons – 2nd Earl of Rosse (1758–1841)

- Undertook works to Birr Castle & gardens (River Camcor)
- Major workshops & foundry to support farming
- Elected MP for Kings County 1790 – 1800.
- 1785 Founding member of the Royal Irish Academy
- **Married Alice Lloyd of Gloster House in 1797**
- 5 children – **William, John(died 1828, age 26)** Jane, Laurence & Alicia - home tutored
- Charles Messier (1730–1817) listed over 100 Objects in 1781 incl. nebulae & clusters
- William Herschel (1738 – 1822) and his sister Caroline (1750 – 1848)
- 1834 Published a book 'An Argument to Prove the Truth of the Christian Revelation'
- **Predicted that much would soon be discovered in the science of astronomy**

5

Gloster House

Home of Alice Lloyd Glasderrymore
Born here in 1776
10kms south of Birr

Alice died in 1867 in Brighton having moved there with Laurence in 1836, when the 3rd Earl married.

Now operating as a wedding / events venue

6

Laurence Parsons – 2nd Earl - Demesne improvements

Bridge over River Camcor, circa 1821-1825
Earliest surviving example of a single-span, multiple wire cable, suspension bridge in Ireland
Civil works to create the lake and waterways

7

William Parsons 3rd Earl of Rosse

Parliamentary Duties amid turbulent times

- Elected MP for Kings County 1821 – 1834
- 1839 Lord Norbury of Durrow killed on 3rd Jan (father of brother Laurence's wife Elizabeth Toler).
- 1943 Predicted in a speech to the Parsonstown Agricultural Society that due to over-population and sub-division of small tenant holdings, "a year of scarcity would at length come, and with it the visitation of the most awful famine".
- The Famine Years 1845 – 1852 through his role as Lord Lieutenant for the King's County, instigated 18 divisions for the purposes of setting up relief committees.
- Helped with the building of the Birr Workhouse for accommodation of labourers
- Lived in Birr throughout the famine (with exception of duties in House of Lords)
- Worked to increase relief schemes through increasing local employment.

8

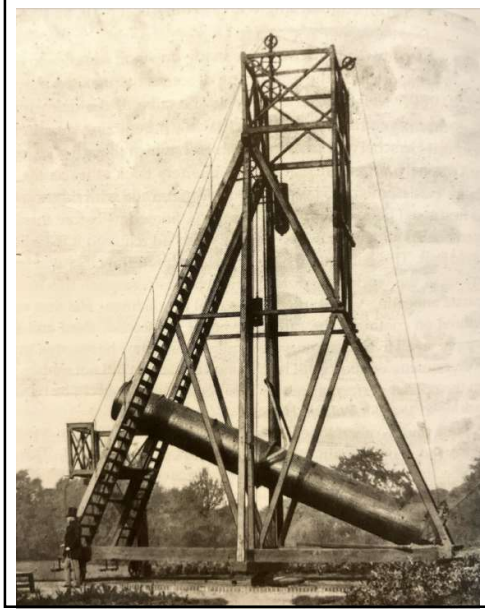
William Parsons 3rd Earl of Rosse

Developing interests in science and engineering:

- Following TCD (1821), he and John studied in Oxford University 200 years ago
- They both graduated from Magdalene College in 1822.
- Active membership of the Royal Society with Caroline and nephew, John, Herschel
- Royal Astronomical Society 1824, making friends with Charles Babbage and others
- Royal Irish Academy from 1832–William Rowan Hamilton and Thomas Romney Robinson
- British Association for Advancement of Science from 1843, he gave the presidential address at a meeting in Cork in 1843 at which many leading scientists of the day attended.
- A key question of the time was the origin of stars and the role of nebulae in their existence

9

William Parsons – Early Telescope Building



William decided to build reflecting telescopes in 1826
Following in the footsteps of William Herschel
Experiments with small mirrors 6” dia., 2’ focal length
Diversions enroute to Westminster to inspect other foundries
Machine / tool makers such as Henry Maudslay 1731-1831
Offered a job as foreman on a visit to the North of England!
John Ramage (1788-1835), Aberdeen, 15” dia., 25’ focal length
William built a 36” dia., 27’ focal length telescope
Located on a rotating base and counterweighted deck

10

Building the Telescope – Polishing the Speculum

6.13 Watercolour painting of the Birr Castle workshop by Henrietta M. Crompton – showing the mast to which a watch dial was attached

Testing of the mirrors

Near the foundry

Watch on pole over castle tower

The need to capture more light – was it possible to make a larger telescope?

Considerably more effort and resources needed to take this on.

What was William to do?.....

11

Mary Field 1813 - 1885

Father John Wilmer Field, Mother Anne Wharton Myddelton

One sister Delia

Mother died when Mary was one, shortly after birth of Delia

Family came from Bradford, near Leeds

Family home was Heaton Hall with lands also in Shipley

Painting of Mary Field circa 1839

12

Mary Field 1813 – 1885
Scientific Influences

Who were the people who shaped and informed Mary, and her sister Delia?

Governess and tutors – Susan Lawson and her husband John

Her father – John Wilmer Field who a successful entrepeneur & businessman

Her cousin E. Field, daughter of Joshua Field, who lived in John Smeaton's house

The late John Smeaton (1724–1792) is known as the father of Civil Engineering

Some 300 years before Mary, John Field from Bradford area (1520 – 1587) was the first to publish an almanac in 1557 in England using the Copernican system for the planetary movement around the sun.

Industrial development and population growth in Bradford

Close to her Uncle - Major Richard Wharton Mydelton who fought against the Napoleonic Armies in the Iberian Peninsular war and later at Waterloo

All of which prepared Mary for a position of leadership in science and industry in an unstable Europe

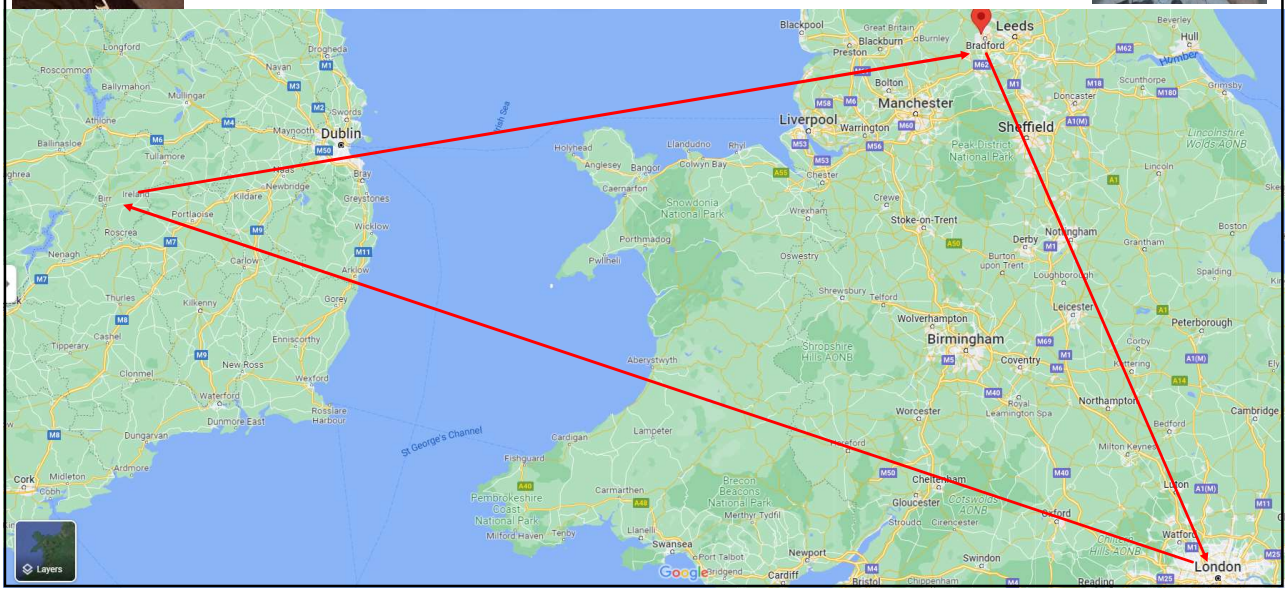
13

Mary Field meets William Parsons

- Mary living in London for most of the year from the age of 14 from 1827
- William attending parliamentary duties from 1821 to 1835 during the summer season
- William also active in various scientific institutions with meetings in London
- A chance meeting at one of the learned societies in the 1830's perhaps, followed by a walk in Hyde Park, the rest is history
- What persuaded Mary to relocate to Birr in the middle of Ireland?
- Married in Hanover Sq. church, London, April 1836
- Formed a partnership that transcended themselves as individuals

14

William convinces Mary to travel to Birr Castle



15

Mary's Arrival at Birr Castle in 1836

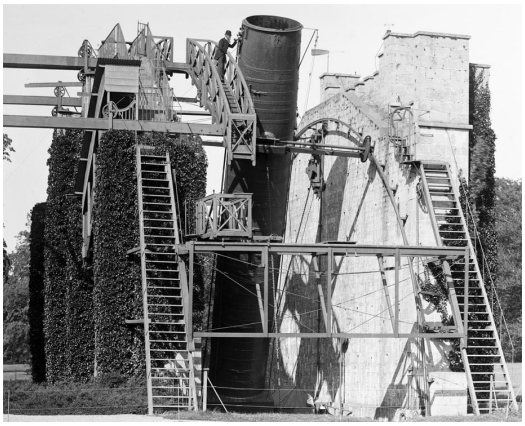
- A scene of devastation following fire of 1835
- Centre of the old castle was destroyed
- Major Wharton-Myddelton called upon for assistance in rebuilding and repair of the castle
- Mary active in metal-work. She designed new gates to castle and oversaw their manufacture

16

Mary Field – and Photography

Mary's photographic laboratory

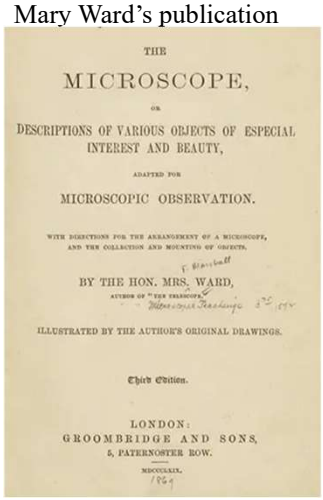
Mary recorded progress…..

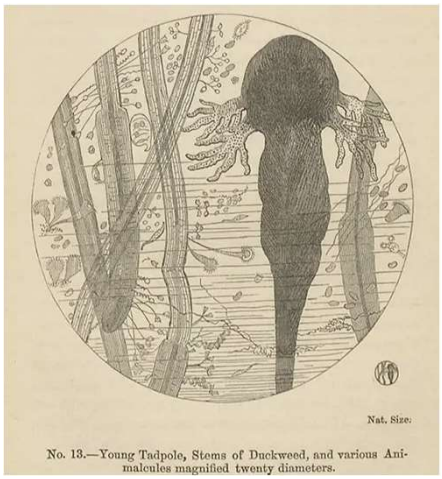


17

Mary Ward – accomplished scientist – telescopes and microscopes

Mary Ward's publication

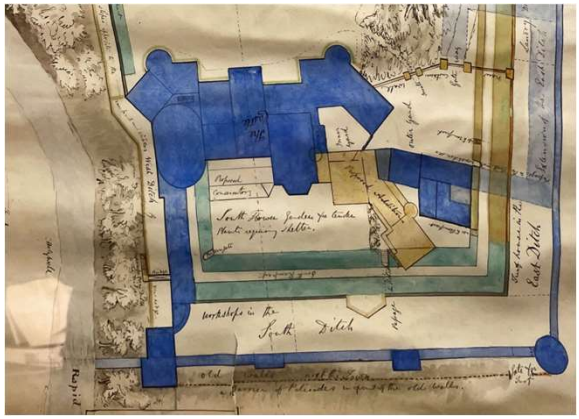

THE
MICROSCOPE,
OR
DESCRIPTIONS OF VARIOUS OBJECTS OF ESPECIAL INTEREST AND BEAUTY,
ADAPTED FOR
MICROSCOPIC OBSERVATION.
WITH DIRECTIONS FOR THE ARRANGEMENT OF A MICROSCOPE, AND THE COLLECTION AND MOUNTING OF OBJECTS.
BY THE HON. MRS. WARD,
AUTHOR OF "THE TELESCOPE."
ILLUSTRATED BY THE AUTHOR'S ORIGINAL DRAWINGS.
Third Edition.
LONDON:
GROOMBRIDGE AND SONS,
5, PATERNOSTER ROW.
MDCCCLXII.


Nat. Size.
No. 13.—Young Tadpole, Stems of Duckweed, and various Animalcules magnified twenty diameters.

Mary Ward, maternal cousin of William
Renowned scientist and best friend to Mary Field
Died at the age of 42 tragically falling from a steam driven carriage

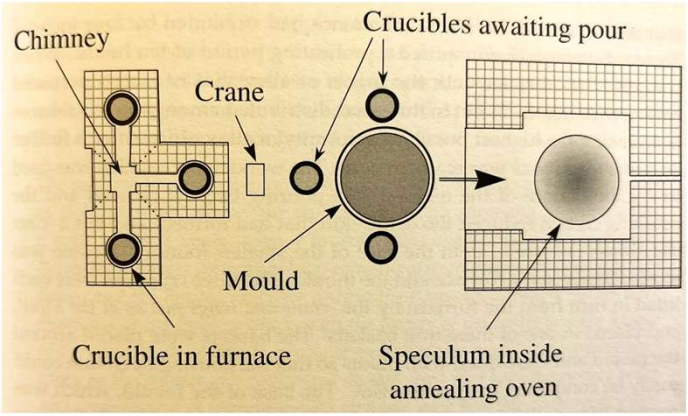
18

Where were the workshops and foundry located?



19

William Parsons – Early Telescope Building



The planning of the foundry was critical to the melting, casting and annealing of the alloys.

A lot of turf needed to heat furnace to achieve temperatures needed for the smelting process – over 750^{O}C

No shortage of turf near Birr!

But who cut the turf, dried it and transported it to the Castle foundry?

20

Building the Leviathan Telescope 1842 – the Speculum

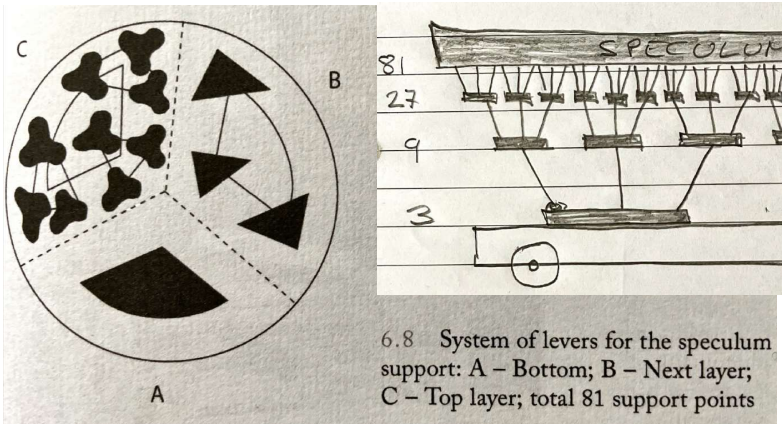
Making a reflective mirror of 6’ diameter raised the stakes in all stages:

1. Casting the speculum
2. Cooling the cast
3. Supporting the mirror
4. Polishing
5. Transporting
6. Mounting
7. Maintaining reflective surface

21

Building the Telescope – Supporting the mirror

- The 3-legged stool versus the 4-legged table – which one spreads the load evenly?
- Advised by Romney Robinson and Thomas Grubb



6.8 System of levers for the speculum support: A – Bottom; B – Next layer; C – Top layer; total 81 support points

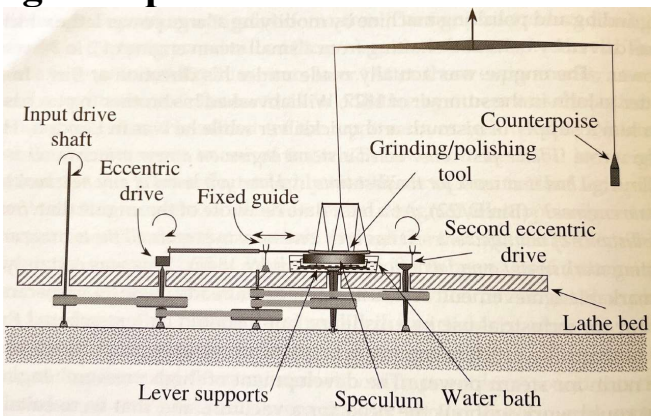
22

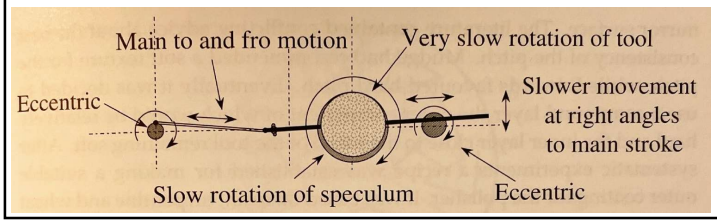
Building the Telescope – Polishing the Speculum

The polishing process requires:

- repeatable motion
- Ability to adjust rotational movement
- Adjustable weight

Solution: Use a steam engine!

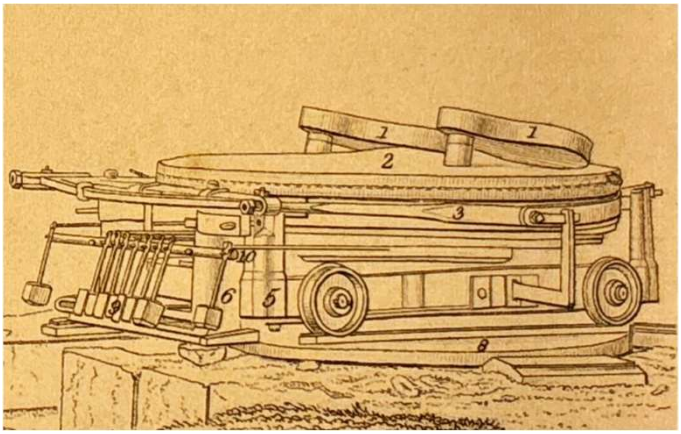


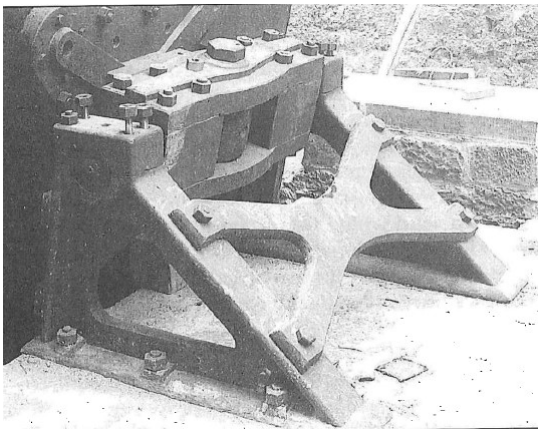


23

Building the Telescope – Mounting the Mirror

A universal joint was attached to the carriage that transported the mirror

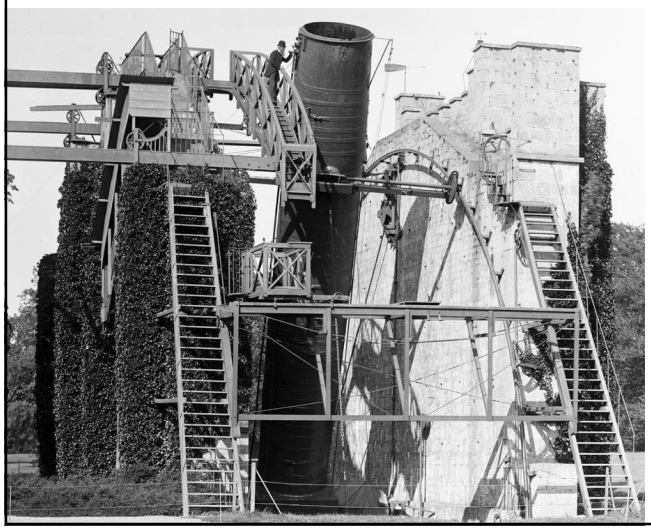




24

Building the Telescope

Where Does One Stand to make the observations?



- 53’ focal length
- Mounted between 2 massive walls
- Observation deck to travel with scope
- Newtonian reflector eyepiece at top

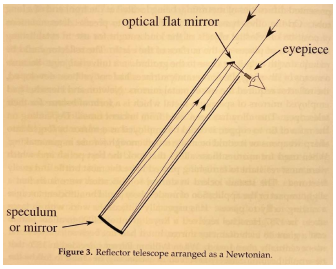
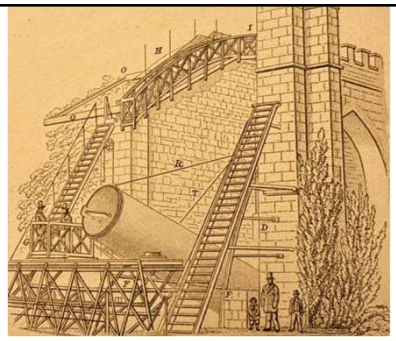
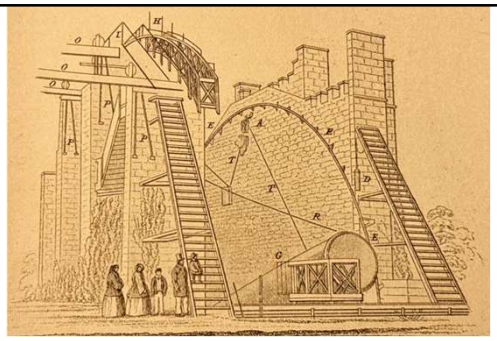
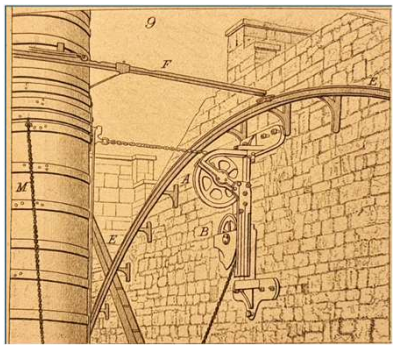


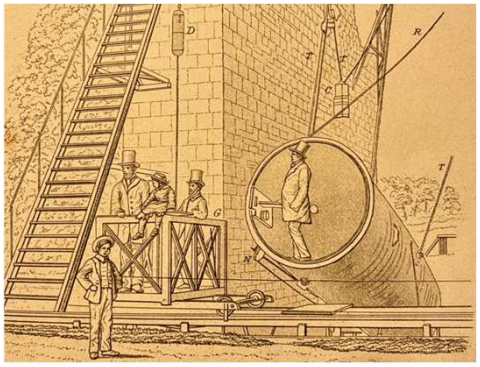
Figure 3. Reflector telescope arranged as a Newtonian.

25









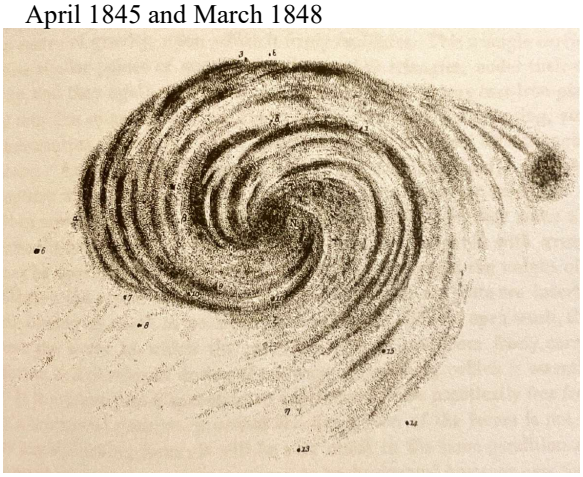
26

27

Capturing image not possible using photography – all hand drawn

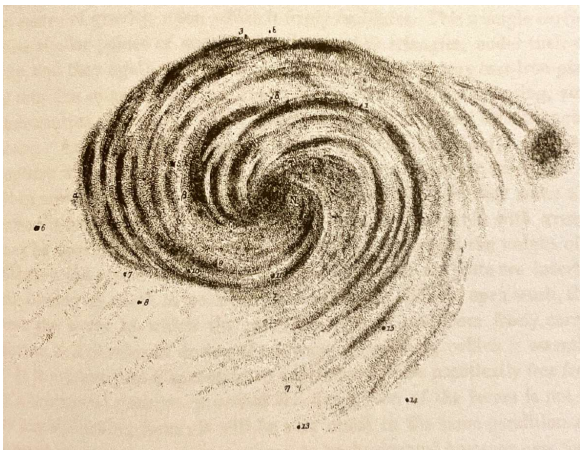
Modern photograph of Whirlpool Galaxy, M51

M51 Galaxy as observed by William Parsons
April 1845 and March 1848



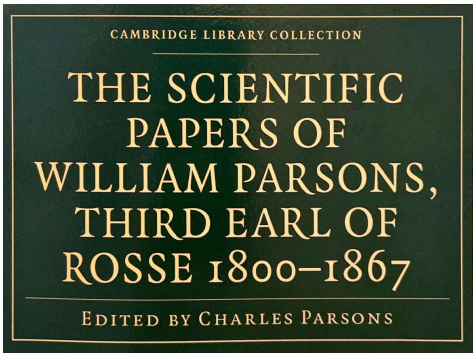
28

Inspiring Vincent van Gogh !



29

William Parsons 3rd Earl of Rosse



1862 – 1867 Chancellor Dublin University – TCD

Continuing his role in education, learning and sharing

Presidential address1843 to the Cork meeting of the B.A.A.S. – 'The Love of Truth'

All of William Parsons papers have been collated in a book by his son Charles in 1926

30

Retirement Years – Adventures Continue

- Spending more time in Brighton and Isle of Wight
- William suffering from bronchitis (possibly from living next to a foundry?)
- The sea air helped and frequent sailing in a ‘small’ yacht
- Bought their 1st yacht ‘Themia’ 150 tons displacement
- Expeditions to Cherbourg, Land’s End, Ireland via John O’Groats
- 2 years later, acquired the ‘Titania’ 180 tons, an iron-clad from Sir Robert Stephenson
- William wrote to Sir John Burgoyne on the advantages of iron-clad ships for the Navy
- Lived near the sea in Monkstown, Dublin, for last 2 years of his life, developing a tumour on his knee
- William died in 1867 at 67, a massive loss, only 6 months after his mother who had reached 90
- Mary moved to London to live at 10 Connaught Place, 3 doors from where Charles was born in number 13!
- She died in 1885 aged 72, having lived the remainder of her years between Bradford and London

31

St Barnabas Church, Heaton, Bradford
Memorial windows for Mary Countess of Rosse, who died 22nd July 1885, erected by her 4 sons.
Street names in Bradford similar to Birr!

32

William Parsons – recognised by his peers
Fellow and President of the Royal Society.
1855 Napoleon III appointed him as a Knight of the Legion of Honour.
Chancellor of Trinity College Dublin 1862-67

John's Hall in Birr – built in 1833 by 2nd Earl in memory of William's brother, John, who died of scarlet fever at age of 26

With canon from the siege of Sevasatpol 1855 during Crimean War, presented to people of Birr in 1858

33

So as the sun set on the careers and lives of William Parsons and Mary Field. A new dawn was rising for their children. And in the same way that they played such a formative role in the advancement of science and engineering, so too did their offspring.

We now turn the lens of our attention towards the contributions of Charles Parsons and his brothers to developments in the shipping and power generation industries that quite literally reshaped our world.

34

The children of the 3rd Earl and Countess of Rosse

From left to right - William, John, Laurence and Randal

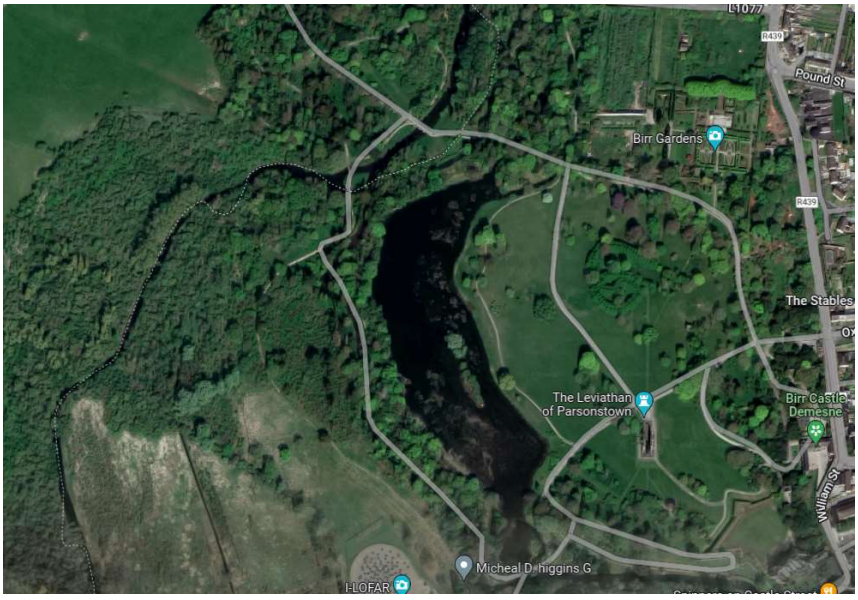
- William and John passed away at 11 years of age
- Alice died at 8 years of age
- 3 sisters and 1 brother died within days of birth
- The heart-break for all must have been difficult
- In the end, 4 boys grew to adulthood –
  Laurence, Randal, Richard and Charles

35

Growing up in the Birr Castle Demesne

The gardens are watered by the river Camcor, flowing on its way to the north to join the Little Brosna river via the electricity generating turbine house, installed in the 1890's.

Hydro-electric turbine house



36

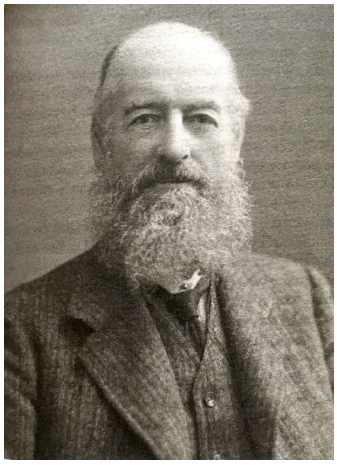
Sailing with Mum and Dad

The acquisition of the 'Titania' ship, probably had an influence on Charles although he would have been only 6 years old.

37

Laurence Parsons 4th Earl, 2nd child (1840) & eldest son

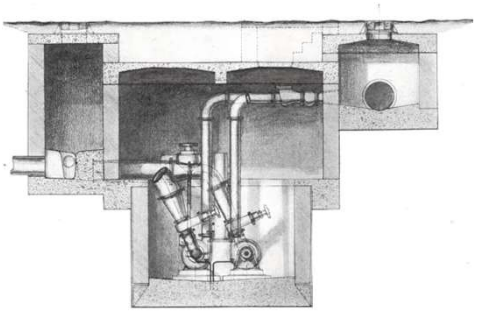
- Educated at Trinity College Dublin, graduating in 1864
- Followed his parents' interest in Astronomy
- Took over his mother's photographic laboratory
- Took the first photographs of the Moon
- The first to accurately measure temperature of the surface of the Moon
- Followed his father as Chancellor of Trinity College Dublin 1885-1908!
- Was a close supporter of his younger brothers in all they did
- Fellow of the Royal Society and the Royal Astronomical Society

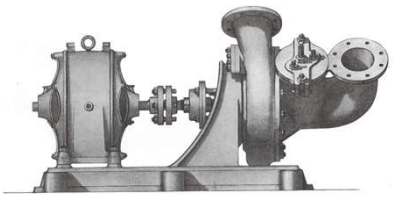


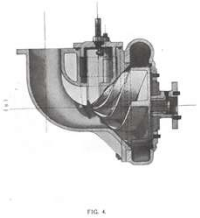
38

Richard Clere Parsons 10th child (1851)

- Educated at Trinity College Dublin 1869-73 - Studied maths and civil engineering
- Apprenticeship at Easton and Anderson in Erith Kent where he researched the performance of centrifugal pumps and ships propellors, applying for patents and receiving the ICE Miller scholarship for a published paper in 1877.
- His design for a screw propellor included both rotary and fixed blades.
- Moved to Leeds circa 1878 to join Kitsons' Airedale Foundry as a partner. Charles joined him in 1881.
- Responsible for water supply & drainage systems in major cities St.Petersburg & Buenos Aires
- Invented the stereophagus pump, shown here.
- Married Agnes Bateman, had 6 children, one of whom, Arthur David Clere, joined Charles in Heaton







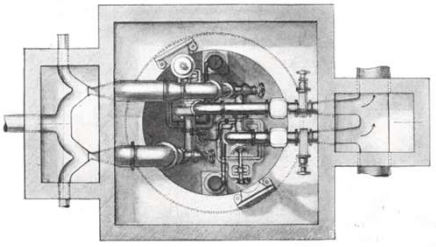
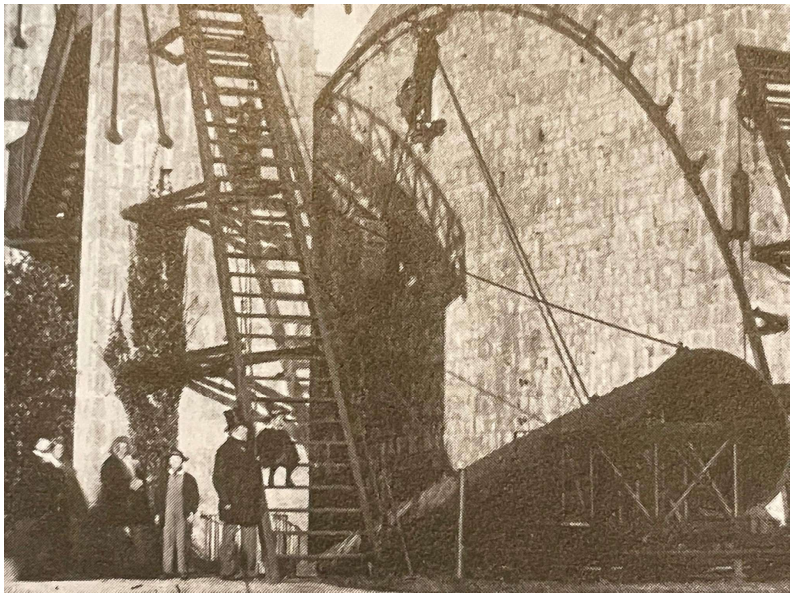


FIG. 7.

39

Richard and Charles in their mother's photographs



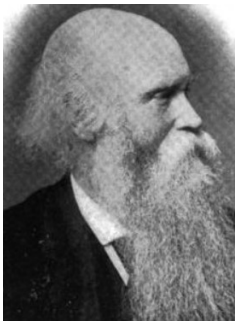
Charles sitting on the steps to the viewing platform of Leviathan telescope with Richard standing next to their father.

40

Charles Parsons – Born 1854, Early Influences

- The Leviathan telescope from 1845 and in continuous use throughout Charles's early years.
- Repair and maintenance of the 6' specula an ongoing feature of continued observations to 1878
- Home Tutored by world renowned scientists including:
  - Sir Robert Ball from 1865-67 – an 'indefatigable' observer all night long
  - Charles E. Burton from 1868-69 – an expert in making mirrors for telescopes
  - Ralph Copeland from January 1871 to 1874
  - John Dreyer from 1874 to 1878 – although Charles by then studying in Cambridge

Robert Ball

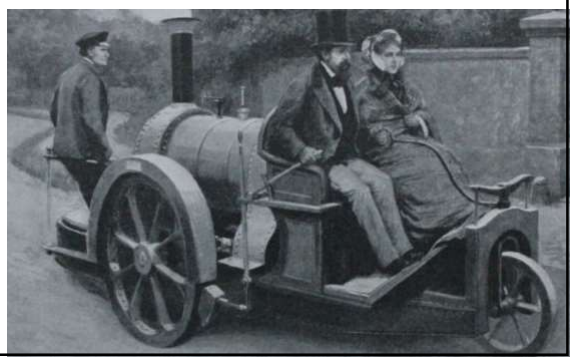


Ralph Copeland

41

Charles Parsons – Early Influences

- Influenced by:
  - his mother - accomplished photographer, chemist, ironmonger, sea-farer
  - his father, William, 3rd Earl of Rosse, Chancellor of Trinity College Dublin 1862-1867
  - his oldest brother, Laurence, 4th Earl, who graduated from Trinity in 1864
- Assisted in the manufacture of a steam driven vehicle with Richard Clere in the foundries of the castle
- Witnessed at the age of 15 the tragic death of renowned scientist Mary Ward, his Mum's close friend in 1869
- Entered Trinity College Dublin 1871 for 2 years
- Moved to St John' College Cambridge 1873–1877
  11th Wrangler in Mathematics



42

St. John's College Library, Cambridge

- Moved to St John' College Cambridge 1873–1877
- 11th Wrangler in Mathematics
- Special collection of letters written by Charles Parsons to his brother Laurence Parsons held in the archives

43

[PRICE ONE SHILLING]

Lists of Past Occupants of Rooms in St John's College

COMPILED BY

G. C. MOORE SMITH M.A.

Late Scholar of the College

AND PUBLISHED BY

THE EDITORS OF THE *EAGLE MAGAZINE*

Cambridge

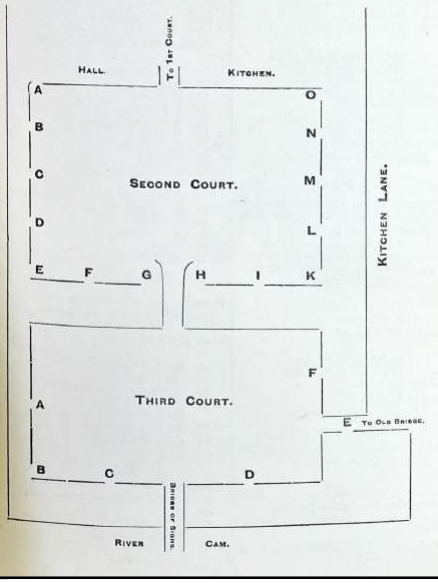
E. JOHNSON TRINITY STREET

PRINTED BY METCALFE AND CO. LIMITED ROSE CRESCENT

March 1895

SECOND AND THIRD COURTS.

PLAN OF STAIRCASES OF SECOND AND THIRD COURTS.



SECOND COURT 23

c 30 Hon M Henniker
c 32 Hon W C Henniker

J Bather
G C Mellor (? T V M)
M 43 G Hazlerigg
44 E Carr

M 51 H F Bather

*a*S Butler

J H Lorimer
M 62 R Trousdale
64 W Almack
65 *b*A Marshall
L 66 Mr T Gwatkin
M 66 (? G) Allen
67 C F E Allen
69 J B Taylor
71 W M Bankes
73 Hon C A Parsons
77 E S Morse
79 R Coote
80 T Clarke
82 E T Woodhead
85 L E Wilson
87 Dr L E Shore
92 Prof A Macalister

C 3 [70]

Formerly *The High Chamber on the l. in the middle staircase, N. side over the Gallery.*

c 20 Mr J Smith (? till c 23)
Mr (? W) Spencer (? till c 29)
c 30 Mr T Crick (till 42 +)

R Eyton (?)

R R Carr
Mr (? E W) Cook
M 52 Mr W L Newham
53 G A Festing
56 H C Shaw
57 G D S Kent
58 A Evans
61 F Harris
64 W Bonsey
L 65 J W D Hilton
67 E Drew
M 69 (? M C R) Cotes
L 70 M P MacGillicuddy
M 70 W H Gwillim

a Author of *Erewhon*.
b Professor of Political Economy 1884.

E 74 W H Ward
E 75 C K Cooke
L 78 Mr C E Graves

C 4 [71]

Formerly *The High Chamber on the r. in the middle staircase, N. side, opposite No.* 70.

c 20 (? J or W) Vaughan
Duke of Buccleugh
L 27 *c*Hon G A Brodrick
c 30 (? W) Chambers

Mr J W Inman
Plomer (? admitted)
M 41 W M Grapels
44 *d*Lord Burghley

P W Curtis
Mr G Bainbridge
55 Hon W W Clive
57 H Hoare
61 J FitzHerbert
63 R H Morgan
L 67 W E Pryke
M 67 L T Haggin
E 68 T A De la Rue
M 72 H D Bonsey
73 W Gripper
76 W J Lee
79 R R Davies
82 J L A Paton
83 Mr Fredk. Watson
84 J L A Paton
87 T Nicklin
90 W J Fox
92 W H Bonsey
93 H J Robinson

D [66]

Formerly *The second low Chamber adjoining to No.* 63.

Gay
Palmer (with No 66)
(afterwards united with E 3)

E 1 [41]

Formerly *The Library Keeper's Chamber under the Library, on the l. hand of the Library stairs.*

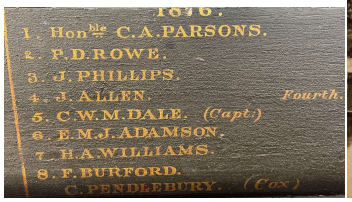
(?) 28-30 W Hewson

c Afterwards Viscount Midleton.
d Marquis of Exeter.

44

An active sportsman

A bow-side member of Lady Margaret Boat Club rowing bow in 1876 and 3 in 1877



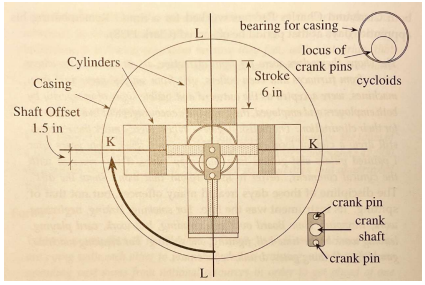
45

College rooms

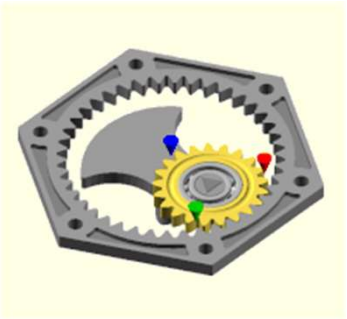
- Room 73 on second floor
- Overlooking courtyard
- His room was strewn with ‘models’
- of engines of a rotary nature

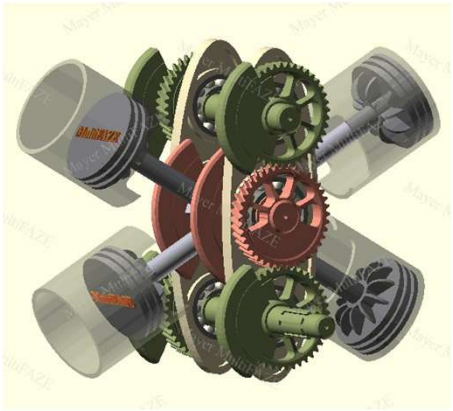
46

Epicycloidal 40 hp engine – developed in Armstrong & Co



Patent 4266-1878 in Elswick follows patent 2344-1877 while at Cambridge



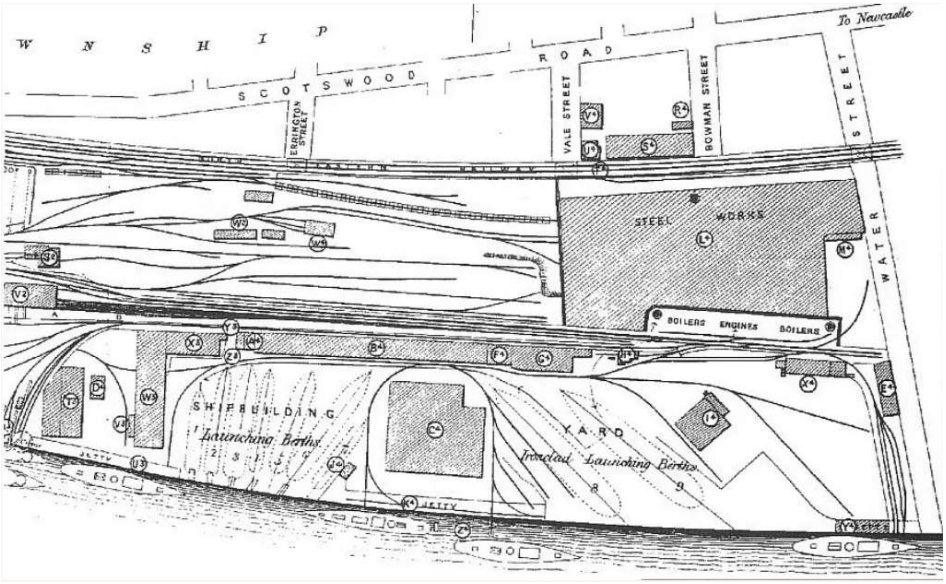


47

4 years apprenticeship in W.G. Armstrong & Co., Elswick 1877-81

Reference letter from William Armstrong dated 3 June 1881, bearing testimony to Charles's "high theoretical knowledge, constructive abilities and promising business qualifications"

Observed many of the complex processes involved in the manufacture of large machinery being fitted to large ships



48

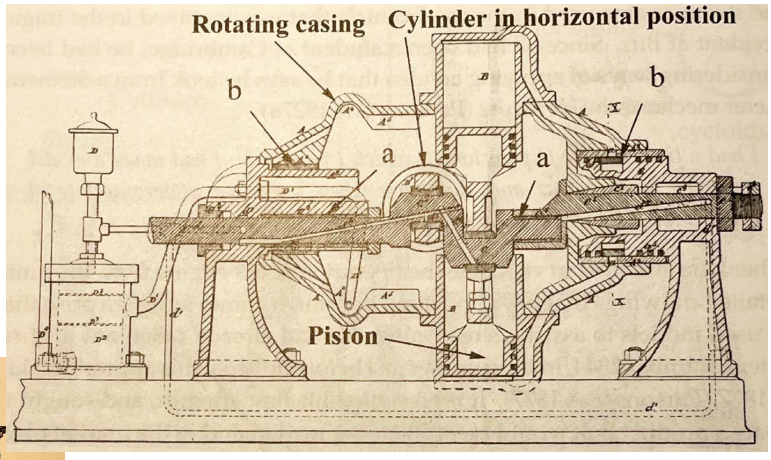
Epicycloidal 40 hp engine – Manufactured in Kitsons Leeds

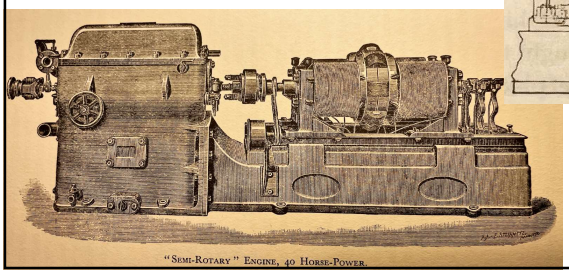
Charles Parsons joined Richard at Kitsons in Leeds in 1881 on completion of his apprenticeship at Armstrongs

Spent 2 years there with his brother.

40 units were produced

Pressurised lubrication system – a first but not patented




"Semi-Rotary" Engine, 40 Horse-Power.

49

Katharine Bethell 1859-1933

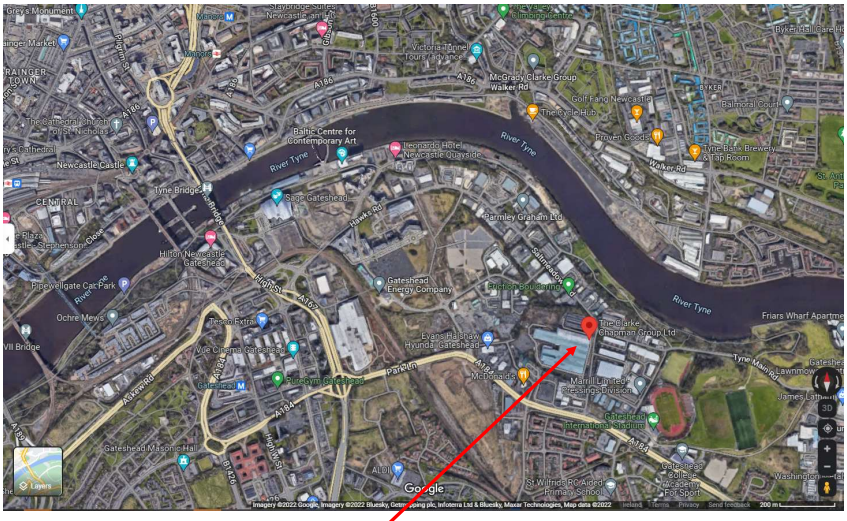
- From Rise, north of Hull
- Daughter of William Bethell and Maria Elizabeth Beckett
- Youngest of 12 children
- Met Charles in 1882
- Charles was staying with Richard Clere in Headingley, Leeds
- Married on 10 January 1883 in Bramham
- Caught rheumatic fever while observing model torpedoes pulled by salmon line on fly-rod!
- Travelled with Charles across the USA for 5 months in late 1883 - early 1884
- On return to England, moved to Newcastle, staying first in Corbridge
- Within a year moving to Elvaston Hall, Ryton 1885 close to home of John Simpson
- Rachel (1885) and Algernon (1886) were born

50

51

Clarke Chapman and Parsons Co. 1884 - 1889

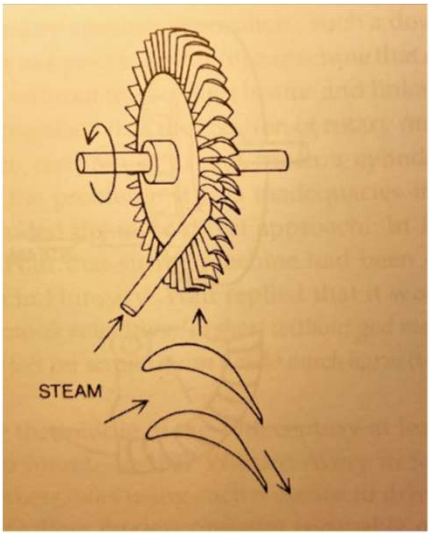
- Joined as a junior partner
- Shared patent rights
- Set up Sunbeam Light Company
- Making arc lamps for ship lighting
- Power generation for the lighting required but from where will the electricity come?



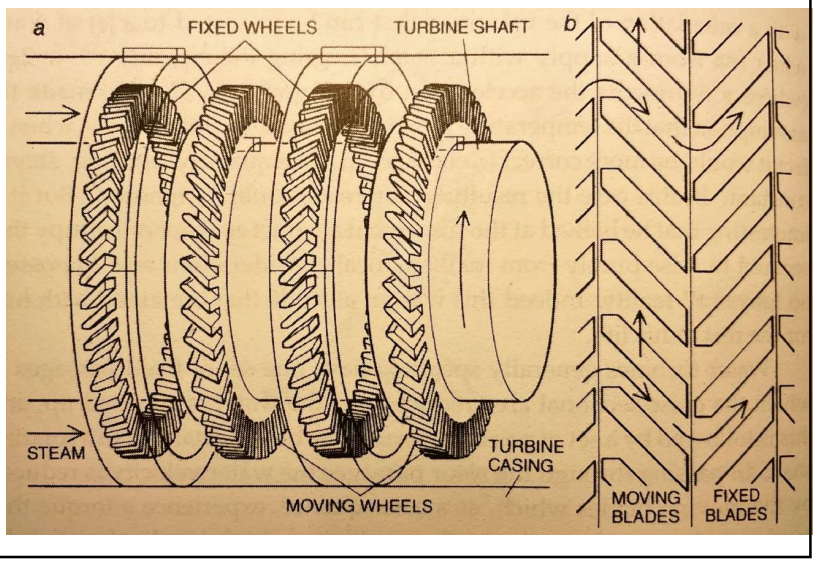
52

Charles's development of steam turbines – grossly over-simplified!

An impulse turbine similar to what Charles used in driving a torpedo



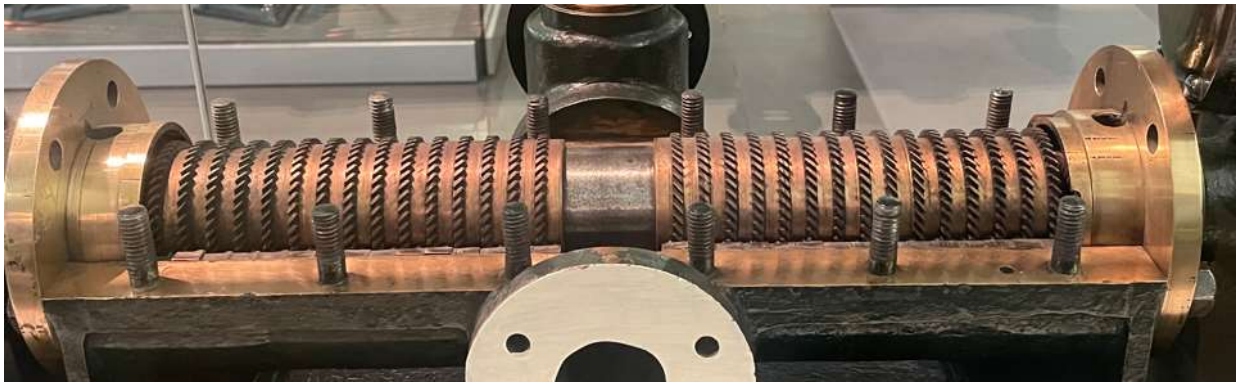
The combined reaction impulse turbine bladed wheel



53

Science Museum Kensington

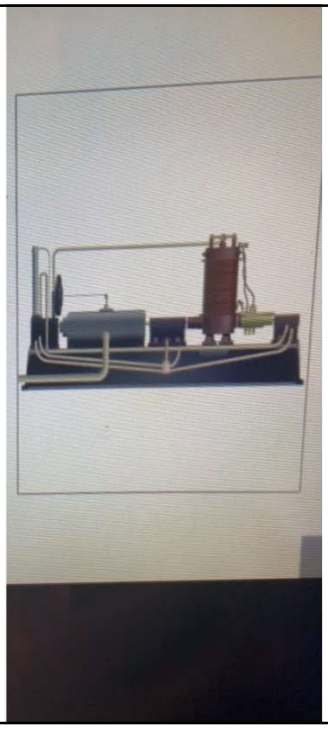
The first Parsons turbine 1884 showing the centre supplied steam connections.
This is a parallel flow 'axial' turbine.



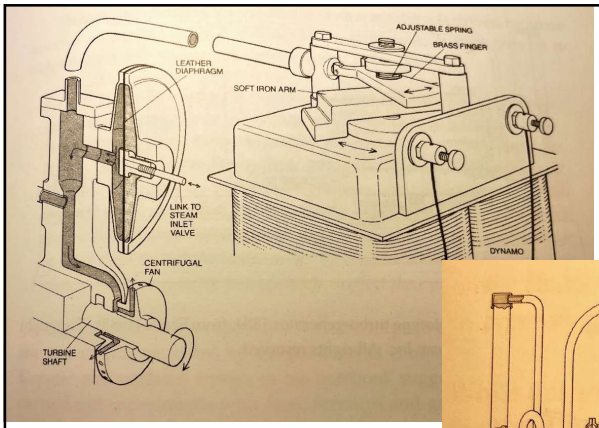
54

Science Museum Kensington

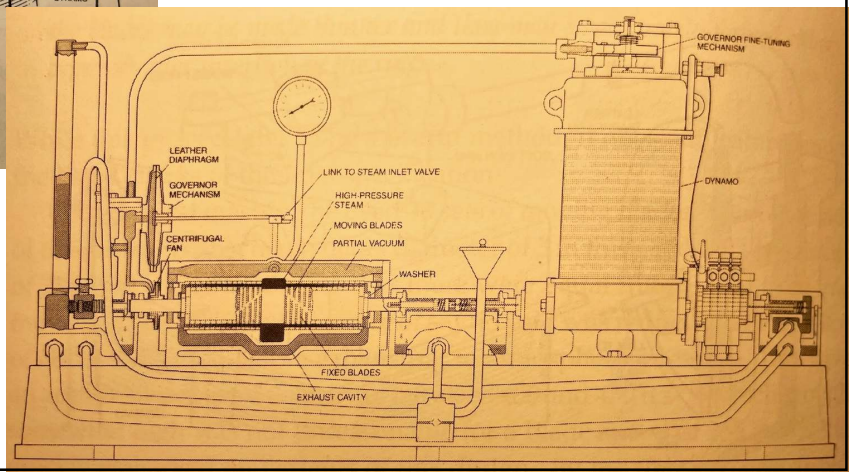
visual simplified motion picture



55

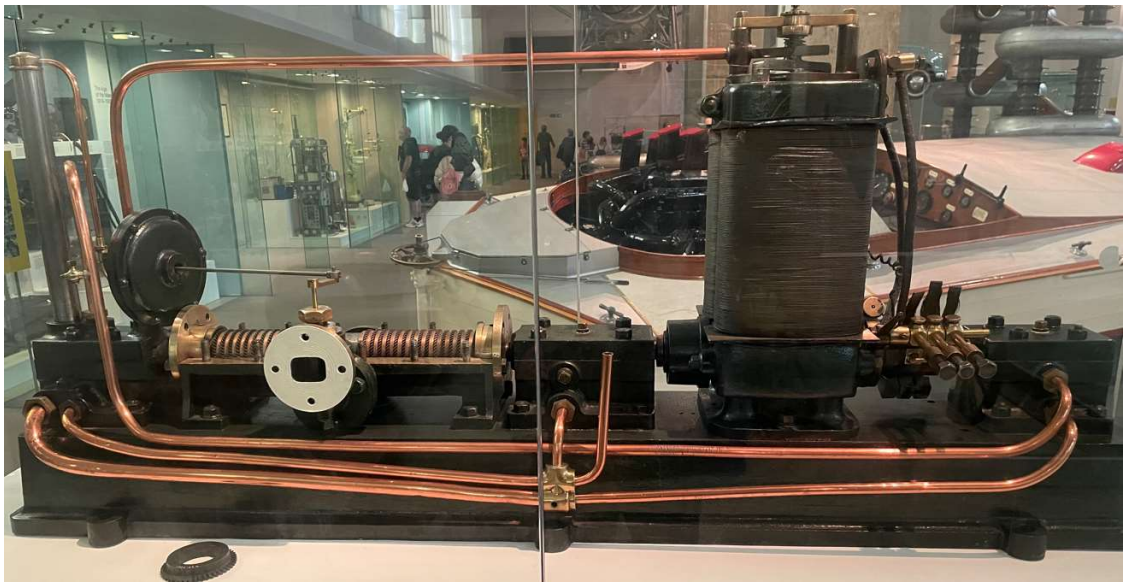


The 1884 prototype Turbo-Generator and the ingenious steam governor needed to match energy supplied to demand by regulating steam input in response to voltage output (as measured by magnetic field on top of armature windings)



56

The first Parsons Turbine built in Clarke Chapman & Parsons Co. 1884



Located in the Science Museum Kensington

57

Early mobile generator – all stages of industrial revolution shown

EARLY PORTABLE STEAM TURBO DYNAMO. (1886.)

Horse-power
Coal
Steam
Electricity

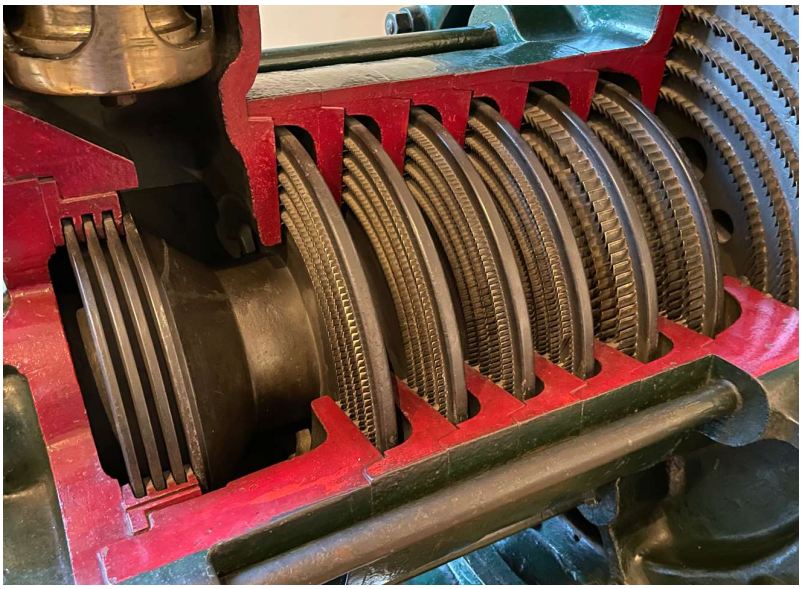
Power for lighting at an
ice skating rink Jan 1886!

58

Design and manufacture of Turbine Machinery is complex

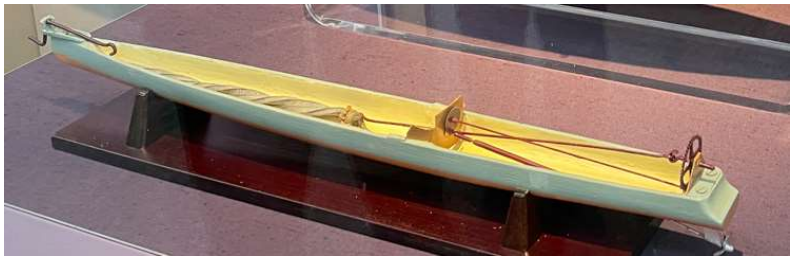
So many parts required to be cast, with micrometer accuracy needed. Really pushed the boundary for skilled trades-people in the manufacture of these machines.

This is a radial flow turbine developed during the years Parsons did not have access to the patents for the axial flow turbine.



59

Using Turbines to drive ships – Focus shift in 1892



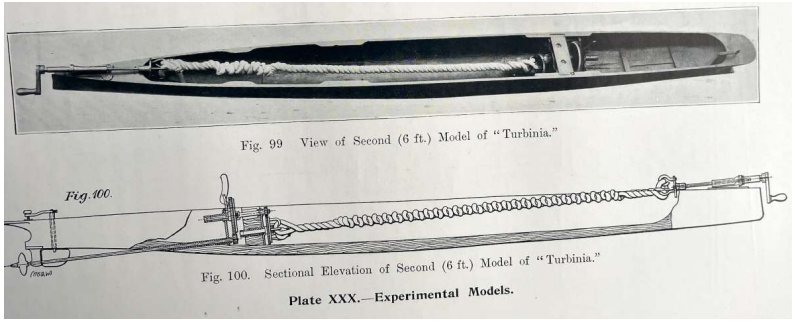


Fig. 99 View of Second (6 ft.) Model of "Turbinia."

Fig. 100.

Fig. 100. Sectional Elevation of Second (6 ft.) Model of "Turbinia."

Plate XXX.—Experimental Models.

Royal navy needed faster destroyers to improve defences against torpedoes

John Simpson encouraged Charles to develop a 'fast' ship - 1892

Setting goal for development of the Turbinia

Diamond Jubilee review of the fleet 1897

5 years to develop turbines, propellor screws, the boat itself and the boiler plant.

And in true CA Parsons fashion, they went out and did it!!

60

The Turbinia on dry land in the Discovery Museum, Newcastle-on-Tyne

61

Casings and Gears

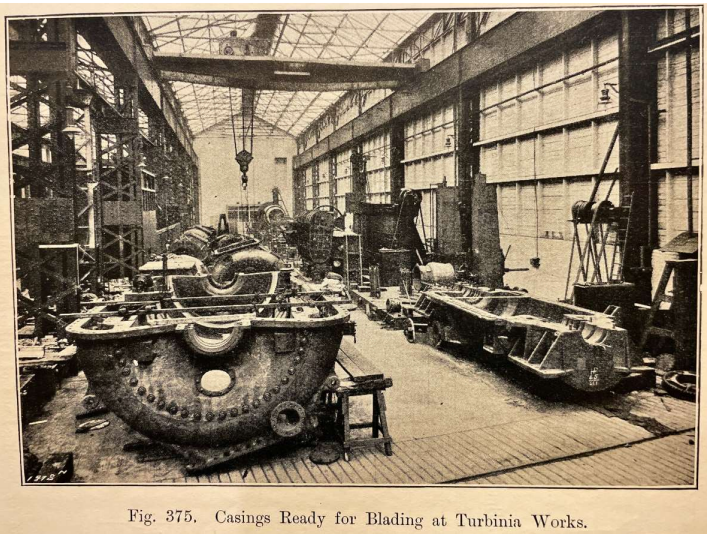


Fig. 375. Casings Ready for Blading at Turbinia Works.

Obtained the funding and established manufacturing practices for high-speed Turbine Generator sets - this had never been done before.

Developed the ‘Creep Cutting’ method for making helical gears

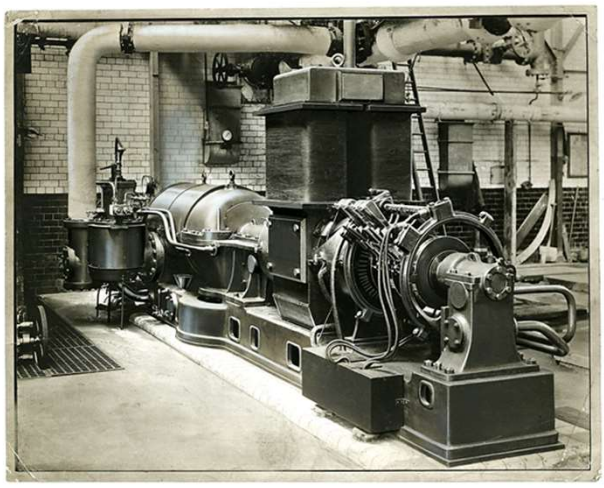
62

Charles' letters to Laurence

St John's College archives letters span from 1890 to 1905.

In 1894, Parsons patented the principle of the "exhaust turbine" ie using a turbine to take the waste steam from a reciprocating steam engine or factory process.

The first turbine on land to use solely waste steam without a second supply was this unit, machine number 814, a 250kW DC turbine-generator supplied to A Guinness & Sons Co in Dublin installed in 1904. It took waste steam from the heating vats at the brewery rather than from other engines.



I suppose I shall have to go to Guinness' Brewery when they get the 1st plant connected up & under steam, they are waiting at present for the pipes which they are doing themselves, they hurried us tremendously for the plant & when it arrived our man after erecting it had to come back to Newcastle till they had the pipes ready.
I shall be delighted to run down for a day or two & will let you know.

63

Powering Transport – The London Tube

Parsons Steam Turbine Generators powering the electrified train / tram networks

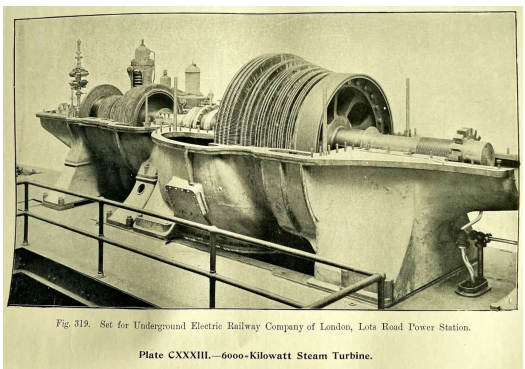


Fig. 319. Set for Underground Electric Railway Company of London, Lots Road Power Station.

Plate CXXXIII.—6000-Kilowatt Steam Turbine.

Mind the Gap and

Mind the 3rd Rail!

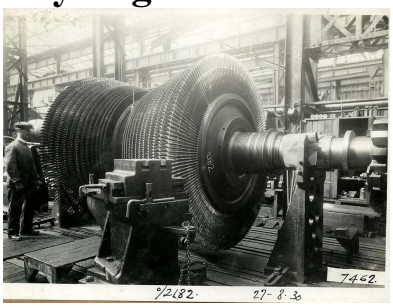
By Thomas Robert Way (1861-1913)

64

Building a design and manufacturing company of global relevance

Obtained the funding and established manufacturing practices for high-speed Turbine Generator sets - this had never been done before.

Fig. 395. The Pattern Shop.



65

47-TON STATOR BEING CONVEYED THROUGH THE STREETS OF PORT MELBOURNE TO THE POWER STATION *of the* VICTORIAN RAILWAY COMMISSIONERS

One of two Parsons 3-phase Alternators 14,000 kw. maximum continuous capacity at 1,500 r.p.m., with 0·95 power factor. Overload capacity 15,000 kw. for 2 hours

66

Grubb Parsons Telescope Company - Heaton Works 1925 -1984

67

Delivered some of the largest telescopes in the world up to the 1980s

Note that the polishing machine used on the 154" (3.9m) Anglo-Australian Telescope mirror is using similar machinery to that developed by the 3rd Earl of Rosse!
But telescope building is the subject of another talk…….

68

'Lady Parsons was herself an engineer of ability and had the distinction of being an Honorary Fellow of the North East Coast Institution of Engineers and Shipbuilders. At the time of her appointment she was the first lady to be elected an honorary fellow or honorary member of any British engineering society. She was also a founder of the Women's Engineering Society.'

(Heaton Works Journal, December 1933)

69

The Great War 1914 - 1918

Women's Support During the 1st World War

"The Munition Girls"

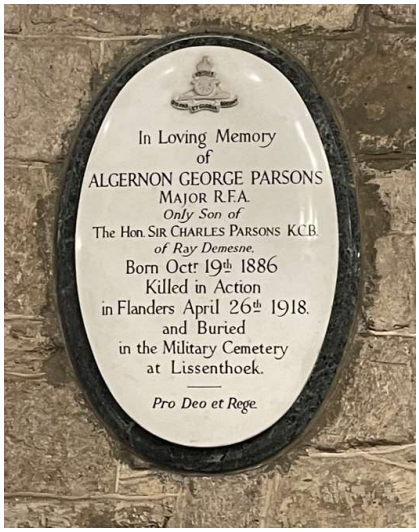
Katharine Parsons at the Victory meeting of the Northeast Institute of Engineers & Shipbuilders 9th July 1919:

"It has been a strange perversion of the women's sphere to make them work at producing the implements of war and destruction, and to deny them the privilege of fashioning the munitions of peace."

70

The Great War 1914 - 1918

William Edward Parsons 10th June 1918
From head wounds received on 10th June 1915



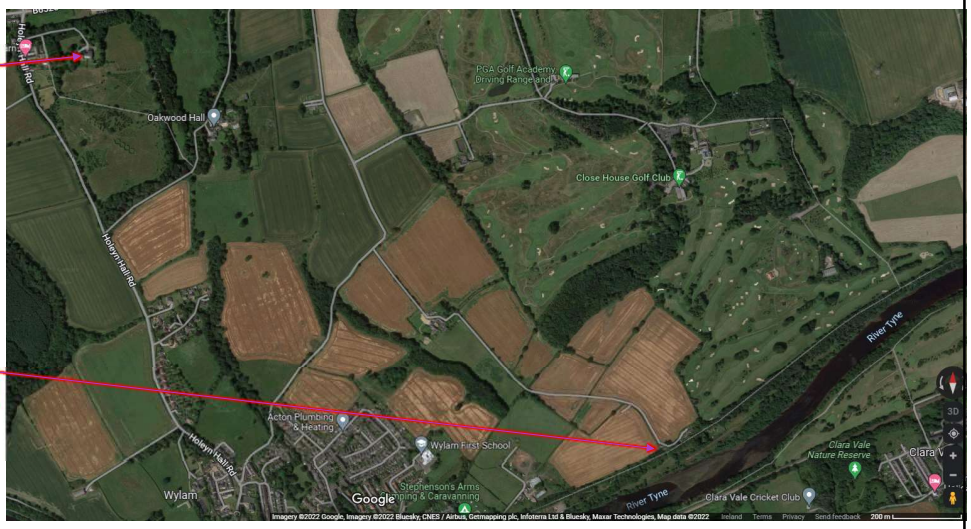
The only surviving photo of Algernon Parsons as an adult. It was taken at Sandhurst Officer Academy in 1906 when he was 19.

71

Holeyn Hall, Wylam – also birthplace of George Stephenson

Holeyn Hall, home of the Parsons family

Birthplace of George Stephenson



72

Charles and Katharine country home in the Ray Demesne, near Kirkwhelpington

Ray Demesne

Sweethope Lough – trout fishing

St Bartholomew's Church – burial place for Charles and Katharine

73

The country home at the Ray Demesne - Kirkwelpington

No longer standing

74

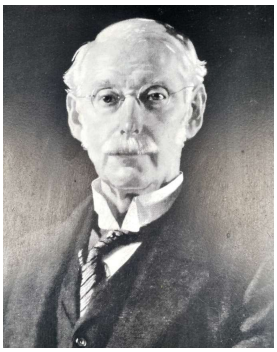
St Bartholomew's Church, Kirkwhelpington
Burial Place for Charles and Katharine Parsons

75

Westminster Abbey Memorial Window

76

Charles Parsons (1854-1931) Achievements (some!):

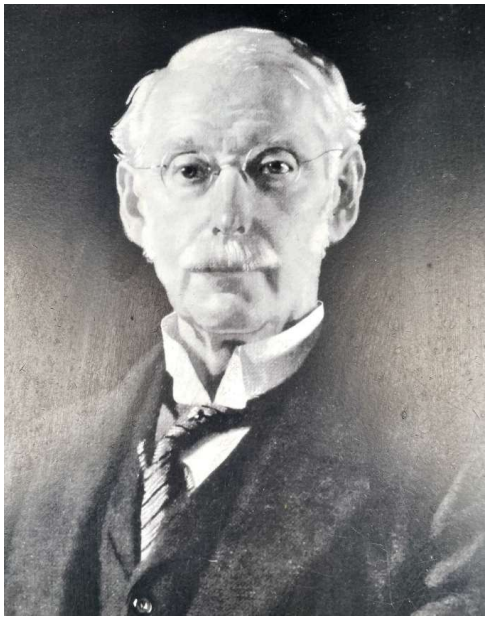


- World's first steam turbine-generator in 1884 - basis for 70% of world's electricity in following 100 years.
- His steam turbine was the first to provide levels of reliability which reciprocating steam engines couldn't (key achievement of the 1880s) and achieved performance levels far above the best reciprocating steam engines (in the 1890s).
- His directly connected electricity generator able to run at turbine speed (4,800 to 18,000 rpm) while "fast" reciprocating steam engines ran at 350 revs/min with belt drive to the generator.
- He built the world's first power station Forth Banks 1888 powered by steam turbines.
- Created C.A.Parsons & Co 1889. Obtained the funding and established manufacturing practices for high-speed Turbine Generator sets - this had never been done before.
- Developed the first radial flow steam turbine 1889 (with patent constraints on axial flow units).
- Developed first steam turbine powered ship - Turbinia 1894. Designed the engine and the hull.
- Founded the Parsons Marine Steam Turbine Co. and established manufacturing processes here.
- Persuaded the Royal Navy to accept first turbine powered naval vessels HMS Viper & Cobra 1898
- Designed the world's first axial flow compressor 1900.
- Developed the engines for first turbine powered merchant ship TS King Edward 1901. Larger ships followed.
- By 1904, the Royal Navy specified that all new high-speed or high-power ships should use turbines.
- Designed the engines for the world's first turbine battleship HMS Dreadnought 1906.
- Designed the engines for the world's first giant turbine passenger liners RMS Mauretania and Lusitania 1907.
- Between 1896 and 1907, Parsons had companies making land turbine-generators or marine turbines under licence.
- Developed marine gearing - essential for turbine powered ships 1909 and the method of cutting the gears – 'creep cutting'.
- Oversaw many landmark designs during his life - turbine-generators up to 50 MW, ships up to the RMS Empress of Britain 1930
- From 1907 until he died, every ship which held the Blue Riband for fastest crossing of the Atlantic used Parsons turbines.

Thanks to Geoff Horseman for assistance in preparation of this presentation.

77

Charles Parsons (1854-1931)



Distinctions (some!):

- Knighthood Commander of the order of the Bath 1911
- Order of Merit O.M.1927
- University of Cambridge 11th Wrangler - Maths Tripos
- Fellow of the Royal Society FRS
- Honorary President of Inst. of Naval Architects
- President of Northeast Coast Inst. of Engineers & Shipbuilders
- President of Inst. of Marine Engineers
- President of Junior Inst. of Engineers
- Honorary Member of Inst. Of Electrical Engineers
  - Faraday medal 1923
- President of British Association for Advancement of Science
- President of Inst of Physics
- Freedom of Newcastle-upon-Tyne 1914
- President of Literary and Philosophical Society 1919

78

References and Credits

- William Parsons 3rd Earl of Rosse – Astronomy and the Castle in 19th Century Ireland – edited by Charles Mollan
- Kent's Mechanical Engineers' Handbook – Power – 11th Edition 1936 – Section 8 Turbines
- Sir Charles Parsons and Steam – Sir Frank E. Smith KCB FRS First Parsons Memorial Lecture 1936
- Scientific Activities of the Late Hon. Sir Charles A. Parsons – Gerald Stoney FRS 25th Nov 1937
- Turbinia – the story of Charles Parsons and his Ocean Greyhound – Ken Smith 2nd Edition 2009
- Letters from Charles Parsons to Laurence - 4th Earl 1890 to 1905
- The Science Museum – Birr Castle - https://birrcastle.com/
- From Galaxies to Turbines – Science Technology and the Parsons Family – W Garrett Scaife
- Ruth Baldasera – Archivist (retired) for Siemens –who has produced a series of 6 podcasts: https://thecommonroom.org.uk/programme/explore-online/pioneering-minds-podcasts/
- Parsons Turbine – Alex Richardson 1911
- Charles Parsons – Rollo Appleyard 1933
- Evolution of the Parsons Land Steam Turbine – Geoff Horseman – 2019 Parsons Memorial Lecture
- The Steam Turbine – Charles Parsons 1911 Rede Lecture
- Engineering Science Before, During and After the War – Charles Parsons October 1919 AAAS