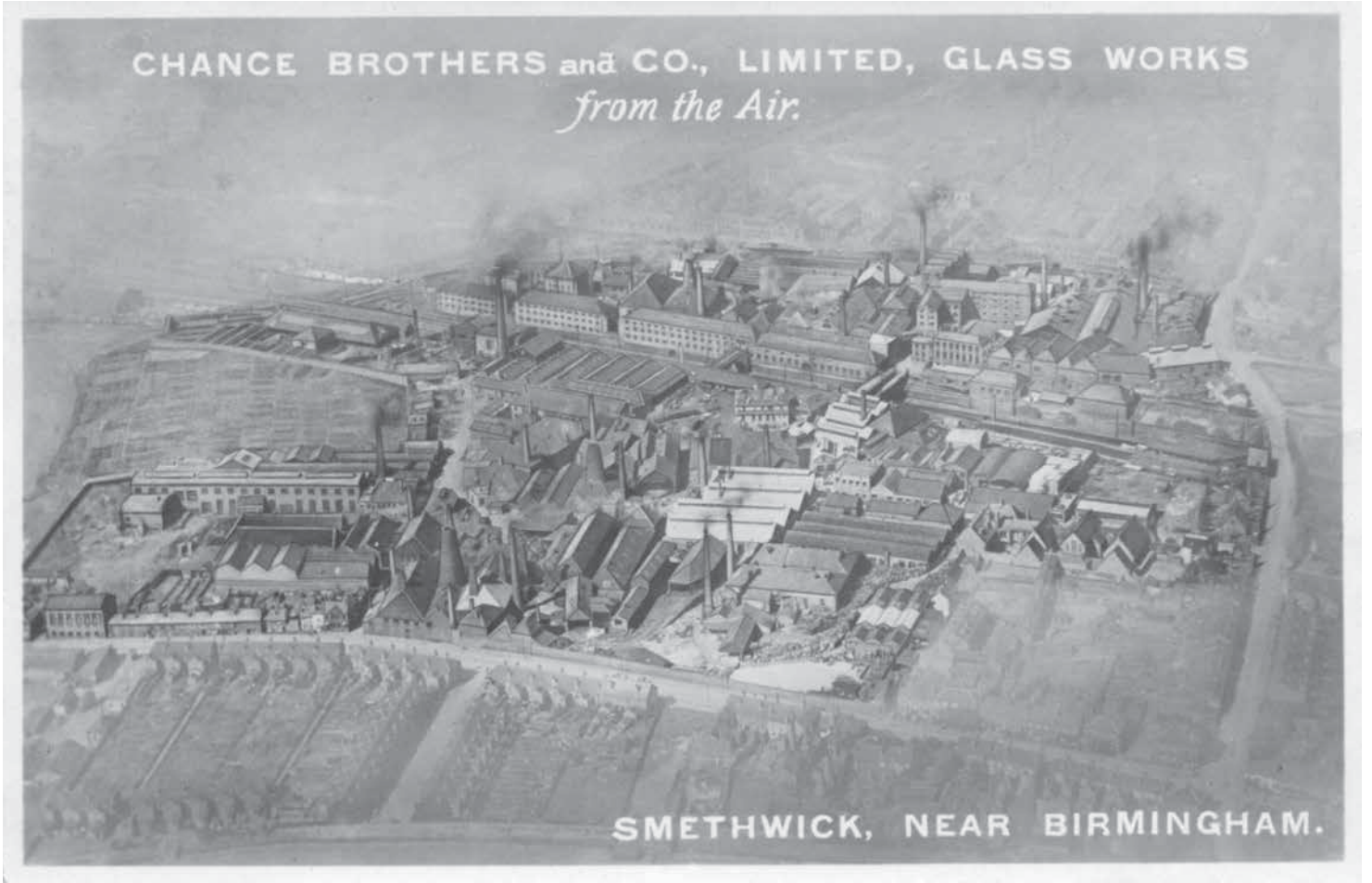


The Crystal Palace *Don't forget - you have a glass in your hand.* LONDON



CHANCE BROTHERS and CO., LIMITED, GLASS WORKS  
*from the Air.*

SMETHWICK, NEAR BIRMINGHAM.



# Exhibiting To The World

Extracted from: *Light On The Forelands* by Ken & Clifford Trethewey, Jazz-Fusion Books (2022)

## The Great Legacy Of Prince Albert

The Great Exhibition of 1851 offers businesses the chance to display their wares; Chance Bros and the Cheesewring Granite Co take up the opportunity; The Crystal Palace gives impetus to the manufacture of glass improving both quantity and quality of supply.

### Showing The World What Can Be Done

In April 1851 the minds of Henry Knott and his son George were focused upon the possible impact that the unexpected loss of George's brother John would have upon the family and their tenure of the lights. They had no thought for the extraordinary structure that had appeared in Hyde Park and was rapidly nearing completion for its formal opening by Queen Victoria. The Great Exhibition of the Industry of All Nations was the vision of her beloved consort Prince Albert, but it had been a major headache for a little known company from Birmingham as the building was almost entirely made of glass.

The manufacture of sheet glass was a process still relatively new to England having been introduced only in 1832 and it was achieved entirely by hand within just four companies. One company, from Smethwick, was Chance Bros & Co and when the skeleton of the transept was complete in December 1850, they began glazing the structure using a gang of 80 men working from ingenious, mechanical glazing wagons. They were

putting in upwards of 18,000 panes of glass each week and each pane measured 49 in (124 cm) by 10 in (25 cm) and the final tally was 293,655 panes in the year when, ironically, the Window Tax was abolished.

1851 was also the year that the Chance Brothers became a major lighthouse engineering company when James Timmins Chance pioneered the placing of lighthouse lamps inside an optic of Fresnel lenses to increase the light output. This new piece of engineering, known as a First Order Dioptric Lens,<sup>1</sup> was given a place in the vast open space of the western nave and one wonders whether the casual visitor would have recognised its significance. But if the Chance Brothers had a place at the heart of the

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<sup>1</sup> Terminology in this area is fraught with inconsistency. Many writers use the word lens to mean the entire apparatus of glass surrounding the light. More strictly, an apparatus is usually made up of both lenses and prisms. Lenses should be treated differently from prisms. A lens causes light to bend (refract); a prism can both refract and reflect light depending upon its size and shape and where it is used. A catoptric apparatus employs the reflection of light; a dioptric apparatus employs the bending of light. A catadioptric apparatus employs both refraction and reflection. The power of an apparatus is described by its order, with first being largest.



Crystal Palace, then the Freeman Brothers were not so fortunate. They were not producers in the same sense of the word, yet Trinity House could not exist without their product – granite.

Outside the west end of the Crystal Palace, the Freemans exhibited an obelisk of granite extracted from their quarries at Lamorna in the west of Cornwall, the same quarries that had been chosen to supply stone to St Mary's on the Scilly Isles for use on the new Bishop Rock lighthouse that was just beginning to cling to its reef. Unlike Lamorna, the Cheesewring Quarry is not known to have supplied stone to a lighthouse project, but industrial archaeologists have been eternally baffled by the single large block that has all the characteristics of a lighthouse block, that was abandoned when almost complete due to a fault in the stone.

The founding owner of that quarry, John Trethewey, was also exhibiting a little farther to the north of the obelisk. The Cheesewring Granite Company had sent a beautifully carved ionic column 30 feet tall and it became a star attraction in winning a gold medal for its quality of material and execution. Like Henry Knott, John Trethewey was our three times Great Grandfather yet in 1851 they were worlds apart.

The only other exhibit that represented the 'lighthouse industry' was a small, barely noticed model of the Maplin Sands lighthouse. This had been built on the new concept of a screw pile and James Walker, the Chief Engineer of Trinity House, had encouraged the inventors, Mitchell & Sons, not only to attempt to build the real thing in 1838, but also to exhibit the concept to the world at this international exhibition.

The success of the Great Exhibition set in motion a competitive trend with France, as each exhibition strained to outshine the previous one. Occupying the now standardized six months from May to November the Paris Exposition of 1855 inevitably featured lighthouse innovations designed and manufactured by French companies who dominated this niche market, whilst contributions from British lighthouse manufacturers were minimal.

In 1862 it was the turn of Great Britain to stage an International Exposition and they chose the site now occupied by the Natural History Museum in South Kensington to build a huge and impressive complex that has largely been forgotten. The correspondent for the *London Evening Standard* visited the Exhibition at the end of the 5 shilling days (Saturday 16 May) and as he walked through the machinery displays on the eastern aisle of the western annex he paused to



ABOVE: The small model of the Maplin Sands lighthouse , a pile structure that set the pattern for other Thames lights such as Chapman and Mucking.

BELOW: In contrast, the large obelisk made at the Cheesewring Quarry under the direction of John Trethewey for display at the Great Exhibition.







ABOVE: The British Nave at the Great Exhibition of 1851 contained a beautiful catadioptric lighthouse apparatus mounted on a pedestal.

admire the work of Mr. Frederick Hale Holmes. He wrote:

*“This gentleman has, from small beginnings, much opposition and many sneers, steadily pursued his project to the end. His magneto electric machine and regulator is now in daily use transmitting a brilliant light through a dioptric lens manufactured in England only by Messrs Chance of Birmingham. After some time in France working unsuccessfully with that country’s innovators, Holmes quit in 1856 and came to Trinity House in London. The Deputy Master allowed him to assemble his apparatus at the experimental lighthouse at Blackwall and it proved to be a complete success. Holmes was then offered the opportunity to transfer it to South Foreland, where with minimal difficulty it operated continuously for nine months. It was then transferred to Dungeness, where it is today and the exhibit shown to the visitors is an exact facsimile to demonstrate the brightness of the light.”<sup>2</sup>*

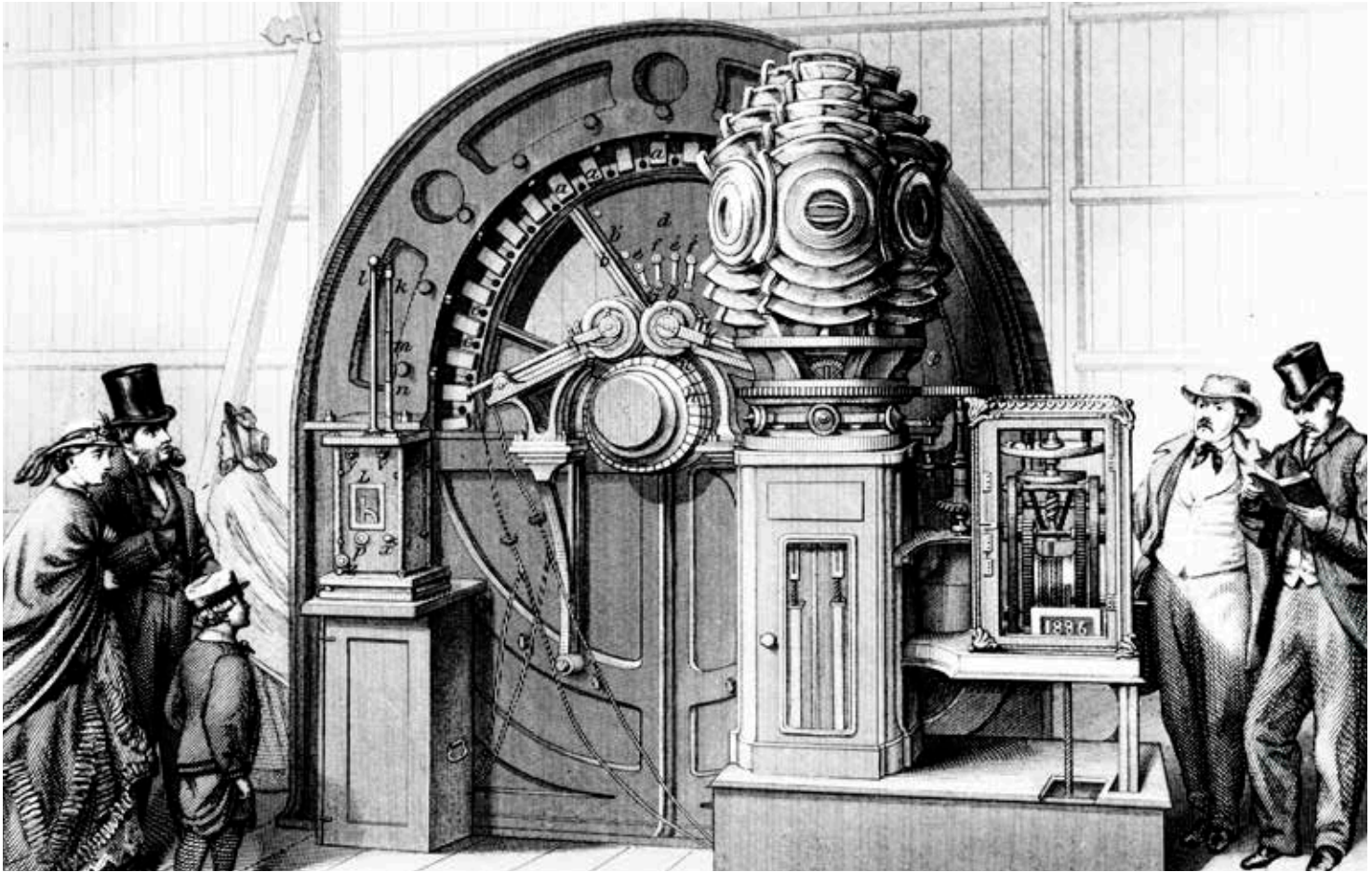
Both Trinity House and the Northern Lighthouse Board had stands at that exhibition.

Five years passed and the clock ticked towards the opening of the International Exposition in Paris on the 1 April 1867. Sixteen years had elapsed since the first great exhibition in Hyde Park and this latest event attracted the largest participation from those with a growing interest in safety at sea. On this occasion there were both indoor and outdoor exhibits and Great Britain and France vied with each other in their efforts to outshine one another with a realistic lighthouse. The French, as always, were attracted to the beauty of the structure, whilst the British wanted to demonstrate their electric light.

After the event was over and 15 million visitors had enjoyed the experience, a report was submitted to Parliament summarizing the British involvement and the words of that report best describe what Trinity House had done. Trinity House sent for exhibition a series of very interesting electric and other lighthouse apparatus, fog signals, models of light vessels, buoys and beacons. Space for the lanterns, models, buoys etc was found in the main building, but in order to show the electric light as used in lighthouses it was decided to show it at the same height as would ordinarily be done on the

<sup>2</sup> *London Evening Standard* Monday 19 May 1862.





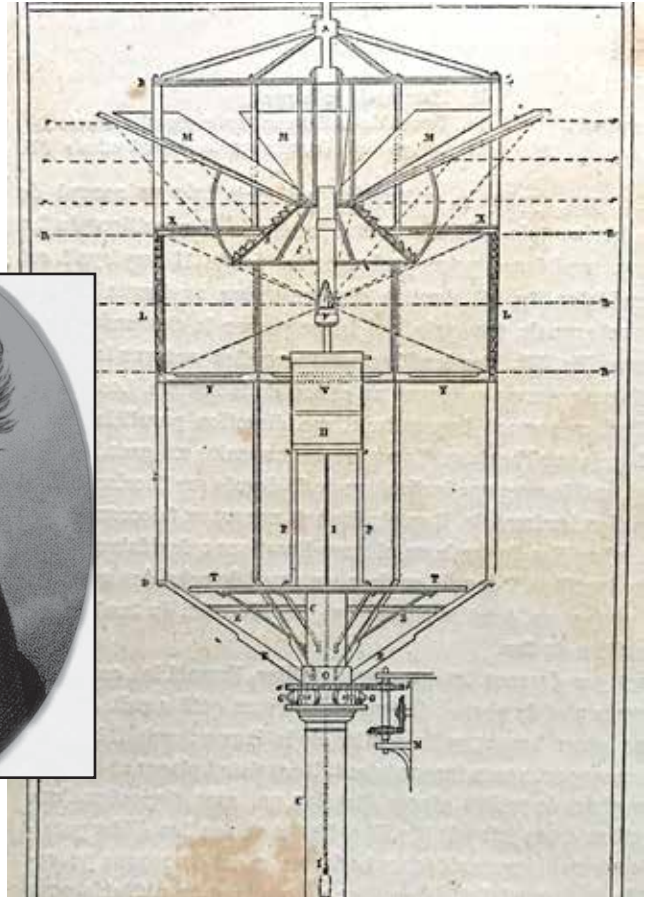
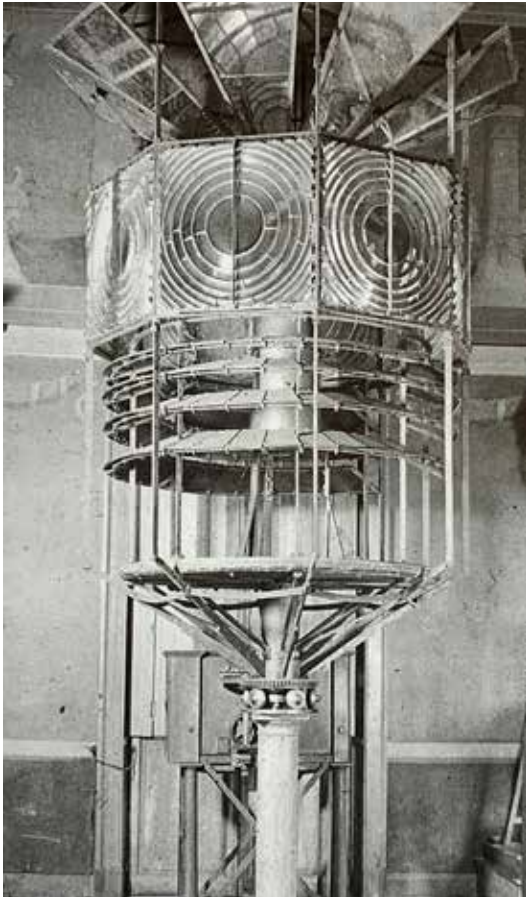
ABOVE: A 19th century engraving depicting the magneto-electric generator, by Frederick Hale Holmes, at the Great Exhibition, London, 1862, shown powering a lighthouse light. Holmes carried out trials with electric light for Trinity House at the South Foreland Lighthouse. Frederick Hale Holmes (Born 1812) a Professor of Chemistry at the Royal Panopticon of Science and Art and pioneer of electric lighting.

coast. A scaffold was erected upwards of 180 ft (55 m) and the lantern placed upon the top. Owing to difficulties with the machinery, it was not until the 22nd May that a light was shown, but from that date onwards it was exhibited for two hours each evening. On account of its height the light could not be seen from the Exhibition site, but it was very conspicuous over Paris and for a greater part of the surrounding country. The lighthouse 'scaffold' wasn't built without some difficulty, but the British wanted it painted for which the French contractors demanded an enormous price due to the perceived risk involved. The idea was abandoned, but a hut had to be built for the machinery together with a platform and handrails at the lantern for which no budget had been allowed. The Trinity House contingent was led by Elder Brother Captain E. Cole RN who charged a fee for his services of £105, but it would seem that there were Trinity House light keepers among them and at least one of them was John Ellis whom we will meet again (see p214).

In a separate part of the report, a comment is

made about the significant improvement by the French since 1862 in automatically regulating the carbon electrodes at the source of the light to such an extent that it was now performing well in many French lighthouses.

This background of technological change over sixteen years was engulfing the Knotts like a flood tide. They should have been aware of the 1851 Great Exhibition and they were certainly present when Michael Faraday visited the South Foreland lights, but they probably did not realise the importance of what was actually happening and the implications for the family. Museums and not Exhibitions are now the resting place of so many of the inventions that the Knotts and their contemporaries had to contend with. The Holmes Magneto-Generator from Souter Point now rests in the Science Museum alongside the carbon electrode mechanism from South Foreland, but South Foreland's own magneto generator from 1871 is in Edinburgh, safely ensconced in the National Museum of Scotland.



The optical apparatus designed by Augustin Fresnel (inset) for the French lighthouse at Cordouan of 1823. A design derived from this was used in South Foreland Upper Light in 1843. Although it was an important stage in the development of lighthouse optics, the use of mirrors was undesirable and once the technology of glass manufacture had improved, this style of design was quickly superseded by newer designs that included only lenses and prisms and were large enough to create the intensely bright lights required for the most important lighthouses.

### The Genealogy of the Optic

If the British led the world in lighthouse building thanks to the work of John Smeaton at the English Eddystone (1759) and Robert Stevenson at the Scottish Bell Rock (1811), they lagged behind in the field of lighthouse illumination. In France, the French Lighthouse Commission benefitted from the genius of Augustin Fresnel (1788-1827) whose brilliance soon led to his elevation to the post of Secretary to the Commission. It was he who took up the challenge to create lights as bright as his mind by means of magnification of the light of a burner through complex geometries of glass lenses and prisms.

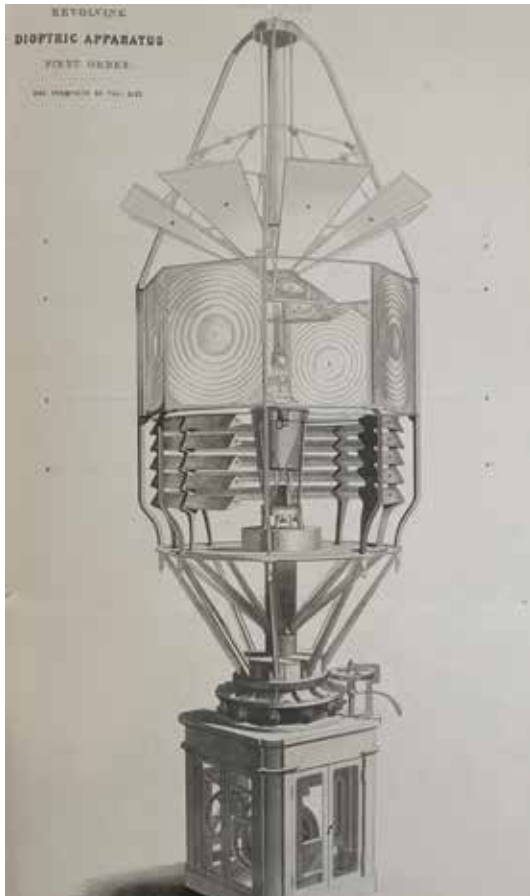
Despite Fresnel's design accomplishments, the biggest difficulty was in the manufacture of the glass components needed to make his wonderful optical equipment. In the whole of Europe, only one man, Francois Soleil was capable of manufacturing these intricately curved glass elements with the precision and quality necessary for the devices to

work successfully. Indeed, he himself was restricted in developing his business because France was lagging behind Britain in developing the industrial infrastructure he needed. (One example was the slow replacement of horse-driven machinery with steam engines.)

To manage the range of brightnesses required in different locations Fresnel devised a system of optic size that was related to the focal length of the whole apparatus, one that placed a first-order optic larger than one of the fourth-order. Starting with the smallest optics, Fresnel, in co-operation with Soleil and others, was able to establish a manufacturing procedure that provided optics for the growing needs of lighthouses around the coasts of France, whilst constantly striving to build ever larger ones for the most demanding applications.

Fresnel's first milestone success was to install his largest optic to date in the magnificent French lighthouse at Cordouan. Pleased though he undoubtedly was, his quest for perfection highlighted the fact that the optic, whilst perfectly





ABOVE: The optic used in 1844 at Skerryvore was very similar to Fresnel's design at Cordouan. Though successful for its time, it was quickly superseded by better designs with mirrors replaced by prisms.

adequate in its central section, still lacked the glass components at the top and bottom to collect stray light that would be otherwise wasted. Fresnel resorted to the use of arrays of mirrors at the top and bottom. The design was such an advance that other lighthouse builders used it as a blueprint for their own works, placing their orders with Soleil and Co. One of these was the great Scottish lighthouse engineer, Robert Stevenson, who was now in charge of all lighthouse building in Scotland under the Northern Lighthouse Board in Edinburgh. Hearing of the French progress, Stevenson travelled to Paris where he met Fresnel and to Bordeaux where he inspected the Cordouan apparatus. Later he would send his son, Alan, to Paris to work for several months in the workshops and design offices.

It was not long after his success at Cordouan that Fresnel caught tuberculosis and died in 1827 aged just 39. He was frustrated to the end that glass manufacture had not progressed sufficiently for him to complete his goal of installing a working first order catadioptric apparatus using just lenses and prisms.

Following Augustin's death, his brother Leonor took up his responsibilities and, having suitable qualifications, he too was appointed as Commission Secretary. It was he who welcomed Alan Stevenson to France in 1834 and supervised Stevenson's training in the design and manufacture of glass elements suitable for use in optics. Stevenson took his knowledge back to Scotland and used it to successfully install new dioptric equipment into lighthouses at Inchkeith (1835) and the Isle of May (1836).

After the completion of the Bell Rock lighthouse the Scottish authorities realised that it was indeed possible to mark the most dangerous rocks with lighthouses, and their attention turned to the next most dangerous location in Scotland - Skerryvore. Provision of the building was legally enacted in 1814, but the enormity of the challenge resulted in a delay to the start of the operations until the 8th of July 1834. A survey of the rocks commenced in the autumn of that year. Finally, Alan Stevenson was appointed superintending engineer at the end of 1837 on the 8th of December. The work would last until 1844 and see the construction of Britain's tallest lighthouse. Furthermore, it was lit with the now standard 4-wick oil burner designed by Fresnel/Arago and the light magnified by a large 'first order' optic similar to the one originally installed at Cordouan. Besides using Soleil and Co for making the glassware<sup>3</sup>, Stevenson established a strong relationship with a firm of engineers, Cookson & Co<sup>4</sup> in Newcastle upon Tyne, for the manufacture of the gunmetal frameworks to hold the elements in place, as well as all of the ancillary equipment for a mounting platform and rotating mechanism.

The successes being achieved in Scotland were not wasted on the English and, with James Walker now in charge as Chief Engineer to Trinity House, the Corporation finally awoke to the advances being made elsewhere, rather than in England and Wales. Walker's first act in redressing the imbalance was to order a similar design of optic for South Foreland. Later, when it was decided to use South Foreland for experiments with electricity, the optic had to be removed and was updated with a new design that now had no mirrors in its design but only lenses and prisms, making it a true catadioptric.

<sup>3</sup> Chance Brothers, glass manufacturers of Smethwick, had begun to establish their business making glass of sufficient quality for lighthouses in 1832.

<sup>4</sup> In 1845 the precision required proved too much for the company which ceased its work in this field.





The images on this page add context to the Fresnel designs just discussed. All photos taken in the Wick Museum, Scotland. ABOVE LEFT: A perfect example of the base of the Fresnel design on the opposite page is shown here. The entire weight of the optical machinery rests on a base with rollers that are driven by a clockwork motor. ABOVE RIGHT: At the bottom of the optic is a group of prisms surmounted by the bull's eye arrangements. At the top are the mirrors designed by Fresnel. BELOW: Before electricity, multi-wick burners were at the focal point. Note venting was necessary for heat and gases to escape.





## The Man Who Made A Model Lighthouse

Sometime in 1862, George Knott was reporting for duty on the famous Eddystone lighthouse. The journey from Plymouth had been unmemorable in the quite calm conditions, but the short trip in a small boat through The Gut - that turbulent stretch of water between the two reefs - was always said to be perilous. This was no exception.

It all happened in a flash. George Knott had no recollection of what he did, but the other keepers, who were on hand to help him, weren't needed. With his heart pumping frantically George took stock of his surroundings and was surprised to find himself standing upright on the rock. The dinghy was bouncing around several feet beneath him and Smeaton's tower soared 72 feet (22 m) overhead. The crude steps on which he stood were smooth and slippery with seaweed and it was hard to visualise the rock being underwater and often swept by raging gales.

While George and his colleagues were concentrating on getting onto the rock without injury the outgoing keepers were busy with the stores. The keepers' sea chests, carefully wrapped in waterproofed sailcloth, were swinging through the air backwards and forwards between the tower and the dinghy with practised dexterity. The food supplies and other essentials were piled inside the lighthouse storeroom door, and very soon the outgoing keepers were shaking hands and taking their turn to jump into the waiting boat for the voyage home to Plymouth.

As the dinghy made its way clear of the rock and back to the Trinity House tender *Diligent*, standing a safe distance to leeward, George took one last, long look at the tiny vessel, no bigger than a Plymouth trawler, and waved to the crew on deck before mounting the first of the iron rungs to climb to the door of the lighthouse.<sup>5 6</sup> As he did so George glanced up and noticed the date '1759' carved into the stone above the door, but his thoughts were interrupted by the helping hand he was offered from the open door above him.

The spiral granite staircase was damp and creepy and after a few complete turns they emerged into the Tank Room. There was little to say about it as

it was simply that, a store room for the water they would use in the kitchen and the oil they would burn in the lamp and it was lined around the circumference with kegs fitted in between the large tanks, yet there was one thing that George could not help noticing: there was no window. On one side of the room was a straight wooden ladder and Joe directed George to climb it. As George ascended the ladder he passed through a hatch in another stone floor and came out in a second Store Room. Here were stacked the barrels and boxes containing everything that they would need to sustain them and enough to last twelve weeks instead of the eight they were due to spend there - just in case the worst should happen. Of course there were a lot more boxes waiting to be sorted and put in their rightful place so that the items in them could be easily found when they were needed. George was relieved to see his sea chest was also there, as he had completely forgotten about it in the excitement of the transfer.

*Bert can unship and stow the lifting gear while we have a look up top*, Joe said with a wink.

*No, we're not there yet*, Joe replied to the unspoken question in George's eyes, as his hand reached out to grasp the rope 'handrail' of the next ladder that would take him upwards.

Now this was better, here was a space that was recognizable as a living quarter. There was a stove on one side with a cooking range. There was a rough wooden table and three equally rough wooden chairs. There was a dresser for utensils and crockery and not a lot else.

*That table is supposed to be the one used by Smeaton*, Joe said waving his arm towards it.<sup>7</sup> *They say that's where he wrote his book*<sup>8</sup> and this is where we'm due to spend a lot of our time, Joe said taking a pipe from his waistcoat pocket.

*I used to bring clays out with me, but I broke so many that the wife said I'd be better off with a briar, so she bought me one! Never without it now*, he added, looking at it lovingly.

George pointed to one of the windows with its cill more than two feet deep.<sup>9</sup> *Well at least we can see the sea from here. My wife would have had a vase of flowers on there - quick as flash.*

*Oh! You'll see the sea alright. There'll be days when 'er is out there looking in at 'ee*, Joe responded. *We get some real blows here. Worst ones are from the south east when the water goes right over the top. You can feel the tower*

5 1861 Census RG09 Piece 1556 Folio 76 Page 1 printed on another page, was handed to the Truro District and therefore was probably passed to the Harbourmaster at St. Mawes as their first port of call after spending census night at sea.

6 A complete description of Smeaton's tower is given in *The Lighthouses of Cornwall and Devon* by Ken Trethewey.

7 Smeaton's Tower by L. H. Merrett page 11 reprinted in pamphlet form from Maritime History Volume 5 No.2.

8 Smeaton's Narrative of the Building (1792).

9 L. H. Merrett page 7.



shudder, as if her's bin hit in the stomach. Winces she does. We've told 'em ashore every time we get it, but they takes no notice. Tells us that nothing will happen to the tower. If she goes 'er'll just fall over like an old candle. Can you believe that? Joe was really going ahead now. It must have been a favourite topic.<sup>10</sup>

Where do we sleep then? George interrupted, making towards the wooden ladder.

The final floor before the lantern was really strange. There were only two bunks against the wall, but because the wall was curved so were the bunks.

How do you sleep in that? George asked incredulously.

Oh! You'll get used to it. You sleeps on your side with your knees pulled up. S'easy really, Joe replied whilst poking the pipe he had lit from the stove below.

But why only two, there's three of us, George persisted.

Well, Joe sucked on his pipe, that's Trinity for you. They says one keeper's on watch, so 'ee don't need a bunk. Obvious ain't it?<sup>11</sup>

The tour had only taken twenty minutes so far and there was now nothing left to see except the lantern. As George entered the bottom of this glass miracle, flooded with sunlight, he grabbed the handrail and mounted the tiny metal steps to the narrow circular walkway that encircled the incredible lens. It had been put there in 1845 and had replaced a bank of twenty four reflectors each with its own oil lamp using a cylindrical wick which drew the oil up through itself. George knew by experience just how difficult these were to keep clean. The reflectors were meant to be spotless, but it was a constant battle against the smeech from the oil, blackening the surfaces.

Joe broke into George's quiet contemplation by saying, *There's only one lamp, look, in the middle there. Ain't that marvellous? Cuts our work down.*

It would be interesting to know whether either keeper knew that they were looking at a dioptric lens. It had been invented in France in 1822 by Augustin Fresnel and it had been here in the Eddystone since 1845, just nine years after Trinity House had fitted the very first one in the new Start Point lighthouse.

Fresnel had noticed that light beams bent a little when shining through thick glass, so he used a bulls-eye lens for the centre and surrounded it with concentric rings of prismatic glass with each ring projecting a little beyond the previous one. The effect of this was to capture the errant

beams escaping from the centre and to bend them horizontally into a single beam.

Inside the lantern, but below the optic, there was enough room to use as a service room. The need for preparing wicks and refilling oil reservoirs was something which Smeaton hadn't anticipated, but it was convenient to have a place to work which was at the same level as the gallery. There was then no need to constantly ascend and descend ladders.

George ducked under the low doorway and followed Joe out onto the gallery. It took a few moments to orientate himself, but Joe led him around to the point where they had a clear view into Plymouth Sound. It was a magnificent sight on this sunlit day with only a slight breeze to bother them and Joe was soon pointing out the prominent landmarks. Rame Head on the north side was distinctive, shaped almost like a pyramid with its pimple of a chapel perched right on the apex. It was just possible to make out the white lantern of the Plymouth Breakwater Lighthouse, but behind it and way over to its right lay the forest of masts of the Channel Fleet.

The sight prompted Joe to speak. *There'll be plenty of ships to watch from 'ere. It's the men o' war that fascinate me. Once you've seen a brig or a ketch, you've seen 'em all, but one o' them black hulls bristling with guns.....well!*

He sucked on his pipe admiringly and blew out a cloud of smoke that was instantly whipped away by the breeze.

*After a while you can pick 'em out. Not by name o' course, although sometimes they comes quite close to us and I puts the glass on 'em. Agincourt is a favourite and like Northumberland she 'as five masts, but it's darn difficult to tell t'other from which. One of 'em is in the Fleet now, but I couldn't see 'er name as we passed. Of course Warrior is often in and out. Joe paused for a moment looking quizzically at George before continuing, If you don't know 'er you soon will. She's a beauty. I likes to try and make models of 'em with me knife. We get some pretty fair driftwood past 'ere sometimes.*

George had stopped listening as Joe rambled on, but when he said that, he looked at Joe, who was still lost in his reverie. Making a model? Now there's a thought.

George turned away from the view of the coast and looked seaward and was immediately captivated by another magnificent sight. Hundreds of gannets had gathered in a brilliant white cloud that wheeled and spiralled upwards less than half a mile from the reef. Out of this cloud individual birds streaked downwards at great speed, their black tipped wings held straight back as they sliced into the sea

10 L.H.Merrett page 9.

11 L.H.Merrett page 11.





ABOVE LEFT: George Knott with his prize-winning model of the Smeaton Eddystone lighthouse in which he served from 1862-5. The model is made in sections corresponding to each floor of the lighthouse and is complete in every detail.

ABOVE RIGHT: The model is presently part of the collection of the National Maritime Museum.

BELOW LEFT AND RIGHT: Two sections showing the internal detail. The real beds are still in the lighthouse on Plymouth Hoe.







ABOVE LEFT: George with his model of North Foreland lighthouse where he ended his career at the turn of the 20th century.

ABOVE RIGHT: The model (in 2021) remains in the family's possession.

LEFT: George with his model of Bull Point lighthouse where he was its first Principal Keeper in the 1890s.

BELOW: The model is today in Plymouth City Museum.



with barely a splash in their attempts at spearing a mackerel.

By the autumn of 1865, George Knott had lost count of the number of times he had made the two-hour passage back to Sutton Pool from the Eddystone Reef on the Trinity House tender *Diligent*. He had developed a friendship with the members of the crew and they all knew George well, but this would be the last time. The skipper, Giles Hopkins, knew what was going through George's mind as he stood beside him in the port side waist looking back towards the fascinating stone pencil that stood erect on a horizon that was constantly rising and falling.

George was thinking about his time on the rock. There had been good and bad days. He had seen the sea, azure blue and as smooth as glass, yet he had also seen it smashing itself into white foam on the red granite reef. He had felt the tower shudder to its foundation, and any keeper who denied a fleeting moment of fear that it was about to fall would have been called a liar. The Superintendent, Mr. Ditcham, had been told about these occurrences, but he had simply repeated the possibility of a structural survey.

However, there had been no dramatic or drastic incidents on the reef involving the loss of a ship or a life and for that he was thankful. George had been quite sorry to say farewell to Joe Steer, his Assistant Keeper, for they shared a lot in common. Joe had given up his efforts at making models of the warships he saw, for want of accurate drawings of them. Instead he had transferred his talent to sketching and water-colouring pictures of them, and George had to admit that some were really very good.

George who was now the model-maker. He had decided, almost from the day of his arrival, that he would attempt to reproduce an exact replica of their working home – Smeaton's Eddystone Light. It had taken him two entire years to finish it, but it was now safely at home, secured into its hand-made carrying box that had carefully brought the model ashore in the bottom of the boat. Fortunately a photograph survives of this wonderful creation and one description of it comes from the notes of a grandson, who actually owned it.

On Saturday 20th October 1934 Frederick Goldsack Knott addressed a meeting in North Devon in which he said, the model stands about 4 feet 6 inches [1.4 m] in height. It is made precisely to scale of mahogany and sycamore and consists of a perfect representation in miniature of this famous tower..... Each floor of the structure is detachable and reveals a model of every fitting and piece of furniture to be

found in the lighthouse itself. The granite blocks which form the base are faithfully portrayed in miniature being both dovetailed and keyed.<sup>12</sup>

In the quiet times between watches every keeper brought to the tower his own solution to the hours of relaxation and it usually involved a handicraft of some sort. Painting and sketching, wood carving, tapestry, marquetry, ships in bottles even small pieces of furniture were attempted and gave enormous satisfaction to both the giver and the receiver. George Knott's exact replica of the tower he lived in, down to the very last detail at half an inch to the foot, became quite a celebrity as he was persuaded to exhibit it in local exhibitions of artwork and handicrafts.

George had made the model, it is said, from driftwood collected at the rock, but anyone who has visited the rock, as my brother Ken has done, will look at that suggestion in disbelief. It is not impossible, but it is very unlikely simply because there were two specific woods used and scavenging for driftwood is an entirely random activity, let alone a hazardous one. It is my opinion that he collected off-cuts known as 'chips' from the boatyards near his cottage in Cattedown. In those days off-cuts were sold for firewood, essential for kindling the cooking range or lighting a rare fire in the parlour. It would have cost a penny or two, but was much more definite and readily available, especially if there really were *two* models<sup>13</sup> – one at home and one on the light. The model was finished in July 1865 when it appeared in public for the first time at an exhibition in Plymouth.

### George's Model Goes On Display

When the committee first began planning the Devon and Cornwall Working Classes Industrial Exhibition for 1865 they were expecting to use the Devonport Guildhall, but by April that had proved to be impossible due to planned building work. Mr. Roach, a Plymouth builder, offered his own new premises in Union Street with rooms spread over three floors, but after careful consideration that was thought to be unsuitable. The meeting held towards the end of May heard that an ongoing trade dispute would very likely make the erection of a temporary building impossible, but that is exactly what happened. On the 6th June the contractor reported to the committee that the

<sup>12</sup> Frederick Goldsack Knott was born in Barnstaple in 3Q/1891 to Herbert Knott & Dinah

<sup>13</sup> Persistent family rumours imply there were indeed two models. This is discussed on p180.



building would be finished by the end of the month, but its location was not stated. On Friday 14th July it was formally opened at 2 p.m. with a choral concert. On Saturday (15th July) the exhibition committee were busily engaged in the final arrangements for the opening of the exhibition to the public on Monday 17th July. An enormous list of exhibits was published and George's model was described as follows;

*Of the Albert Bridge there are three models in the exhibition, one 28 feet long by Mr. Weeks of Stonehouse, another by Mr. Rossitter of Stoke, who also shows a model of Stoke Church of which he is the Beadle. Mr Knox (sic), one of the lighthouse keepers at the Eddystone, contributes an admirable model of that structure; made on the scale of half inch to the foot during the spare hours on the lighthouse itself.*

This list, which cannot be shown in its entirety, is astonishing to someone with an amateur experience of model making, perhaps inherited from George himself, but just to see that enormous model of the Albert Bridge, which had been opened only six years previously, would never be forgotten. Indeed, few of the models would be forgotten, made with a skill difficult to find today. George's model was making its very first public appearance in a field between the Hoe and Leigham Terrace, later named Leigham Street. It was here on the evening of Wednesday 20th September 1865 that Earl Morley presided over the closing ceremony following a piano recital in the hall during the afternoon.

Earl Morley's closing speech is worth highlighting as he deputized for the Earl of Mount Edgcumbe as President of the Working Men's Institute. He repeated the chairman's opening remarks that the idea had only been suggested at the beginning of the year based on the concept of the two great London Exhibitions of 1851 and 1862. Everyone agreed that this was a remarkable achievement. He inevitably drew attention to the overall desire to 'educate the working classes' and this exhibition made nonsense of the widely held belief that a man's toil left him little leisure and even less inclination. He held out the desire that all classes could encourage and learn from one another and perhaps even emulate one another to the national good. Fine words indeed

At the prize-giving George's model of the Eddystone lighthouse entered in Class 4 for Architectural Models was awarded a First Prize silver medal (second prize was bronze and third prize was white metal). A number of the prize winners had entered model ships, but one model that attracted particular attention was that of the Devonport

Column made from different coloured marbles found in local quarries. The Eddystone model became the precursor of three more and it would travel everywhere with George as he had only just begun his travels as a Principal Keeper in the service of Trinity House.

Twelve years passed before George was persuaded to enter his model in the Bideford & Devon Fine Art & Industrial Exhibition in Bideford's Public Rooms which opened on Tuesday 16th October 1877 and ran for nine days excluding Sunday (21st). The first public intimation of the exhibition came in June, and by August it had become a firm intention. Students, mechanics, workmen and workwomen were invited to submit their work for assessment by the Exhibition Committee who had 'great pleasure' in offering medals, prizes and certificates for work in a very wide ranging number of categories, which unfortunately even included 'stuffed birds.' It was the now familiar attempt by the middle classes to encourage the working classes to improve their situation in life by learning crafts and skills. There were large numbers who did exactly that and George Knott was included among them.

In 1877 he had been the principal keeper of the Bideford Bar Light which was on the other side of the Torridge Estuary from Bideford. He had been there for more than ten years, but sadly he was never inspired to make a model of it in spite of its curiosity and unique design.

The presentation of prizes was completely opposite to that of the exhibition in Plymouth as it came at the opening of the exhibition rather than at the end. This gave the visitors to the exhibition the opportunity to see the opinion of the committee of judges and, no doubt, they may have come to their own judgements. The list of awards published in the *Exeter & Plymouth Chronicle* was very far from comprehensive, but it listed Mr. Knott for a bronze medal for his model of the Eddystone light, whilst Mr. Frayne received the silver medal for his stuffed birds.

At Braunton, there is a suggestion that the light keepers were involved in the running of the Braunton lifeboat, and it was known that there was a model of it as it was listed in Catherine's Will. However, it has recently come to light that he had made a model of that lifeboat which may have been inspired by his success at the Bideford Exhibition.<sup>14</sup>

He went on to make a model of both the Bull Point Lighthouse (1879-1888) and the North Foreland

<sup>14</sup> In the care of Dover Museum presented by Walter Knott's Family.



ABOVE: A model of the Douglass Eddystone lighthouse built in 1882 has been on display in the entrance hall to Trinity House for many years. The authors believe a similar location was formerly used to display George Knott's model of the Smeaton tower (see p176).

Light (1888-1890), but compared with Smeaton's tower these were quite small and completely different in style, being more of a diorama in modern terminology.

When George Knott died in 1904 everything he treasured became Catherine's and in her will she meticulously laid out which items her eleven surviving children should receive. The models were not ignored

Inevitably her eldest son Henry Thomas was allocated the model of the Eddystone with its accompanying medals, whilst Frederick Warner was given the model of Bull Point and Herbert Joseph the North Foreland model. The lifeboat went to Walter Goldsack and I will record later where all these precious artefacts are to be found today.

The premature death of Henry Thomas Knott, just months before his mother, caused a change to her will as she had to reallocate those items destined for Henry to other brothers. The model Eddystone went to George Arthur as the next son in line, but that is not where it stayed for by the 1930s it was in the hands of Herbert in North Devon and he is

known to have taken it to local society talks. At his death in 1937 it passed to his son Frederick and it was at his home in Instow that my brother Ken saw it in the 1970s.

Frederick Knott died in 1981 and the model and other precious items of George's career disappeared into a previously unknown family and were thought to be 'lost.' Many years later the model unexpectedly reappeared in the ownership of the National Maritime Museum, where it rests to this day.

The possibility that there was a second model seems very hard to accept, especially as only one appears in Catherine's Will. The source of the story seems to have been Frederick Knott (Herbert's son) and single sources are notoriously suspicious to researchers. However, it is now being repeated by none other than the National Maritime Museum, yet does that make it true?

I can imagine circumstances in which George made two models in parallel, one on duty on the light and one at home, keeping out of Catherine's way, as she dealt with her family work. He might have used one as a prototype, as he worked out how to make each floor little by little. But the hard question is not how or when it was made, but how and when it came into the hands of Trinity House as the story suggests that it graced the entrance foyer of that staid institution. If this was true then the acquisition must have been before 1939 and if it was true then why has there never been a photograph of it in such a favoured location? The story continues that it was lost when the building was badly damaged in the London Blitz of 1940 and this is how that event is currently described by Trinity House.

Knowing that the 17th century Trinity House comprised timber-built rooms connected by wooden stairs and passages, the Elder Brethren had, from the very first days of the war, organised themselves and their staff into trained fire-fighting parties who were on duty both day and night. By late 1940 the paintings stored beneath the Tower of London were showing signs of damp and so another house was found for them in Northumberland. They were temporarily brought back to Trinity House on 28 December 1940 for repairs, and were due to travel north on the 30th.

On the night of 29 December Trinity House fell victim to the most severe of the air attacks on London. When incendiary bombs landed on the wooden beams of the house, fire fighters were able to put out the first fire caused by the bombs, but the shortage of water prevented their efforts to extinguish subsequent fires.



On the morning of 31 December the staff found the whole of the Wyatt building and the offices at the back with their walls more or less intact, but the interiors completely gutted; apart from the separate East Wing the only surviving portion of the building was the basement wine cellar. Many archives, rarities, fine models, hangings and paintings were destroyed, save for the paintings that had been at Bayham Abbey, and some archives and books that had gone to the countryside.

The moment I entered the foyer of Trinity House (17 May 2014) and saw that alcove with its Eddystone display I knew that George's model could have stood there. Yet that can never be stated with certainty. Trinity House admit that they lost 'fine models' without being precise, yet I cannot believe that what was lost was not recorded. Neither do I presumptuously dismiss family stories, as they are so often based upon the truth. I retain the hope that one day I might make a chance discovery and my hope has always been that somewhere in a drawer, or a loft, a pre-1940 photograph exists which captures the foyer with its alcoves and standing in one of them is George Knott's model of Smeaton's tower.

Listed in the catalogue of the National Maritime Museum's collection of Ship Models, Dockyards, Buildings and Topography (ID 2902) it is described in the following words;

*Scale: Unknown. A model of the fourth Eddystone Lighthouse, completed in 1759, made entirely in wood with metal, cork, and glass fittings. The base of the model is realistically modelled in cork depicting the Eddystone reef with two work boats, both with transom sterns. The lighthouse is made from two different coloured woods that show the red and white horizontal bands of the actual lighthouse. The lighthouse splits horizontally into six sections, four of which are at the floor level of each room and depicts the internal structure and room layouts. The lower-most dividing point shows the interlocking stone structure of the lighthouse's foundations. The first floor depicts the lower storeroom and its fittings and equipment. The second floor depicts the upper storeroom. The third floor depicts the living room and its furnishings. The fourth floor depicts the bedroom with its three keepers' bunks. The lantern is glazed on each of its eight sides and the light is depicted with its cover in position. A brass gallery rail encircles the lantern and a tall flagstaff is rigged to it. A weather vane in the form of an arrow is mounted to the top of the cupola. There are a*

*number of operable windows and two doors can also be opened, just inside one of which is a working crane.*

It was publically exhibited for the first time, possibly since 1877, at the Chatham Historic Dockyard in 2012.

## Touching the Past

There is a large proportion of the population who have no room in their lives for sentimentality and there is no harm in that, but a smaller minority of us (and I include myself in that group) are often deeply touched by the sight of an item from the past and would be delighted to own it. These emotions are frequently denigrated by those who say *You can't take it with you when you go*. It simply obliges us to ensure that it is going somewhere or to someone who recognizes its value. That is what museums were born to do and that is where my senses were awakened.

The first of those occasions came in 1968 when I saw a Roman Centurion's helmet in Norwich Castle Museum. It was perfect and had been found in the River Wensum where it had been lost 1,800 years before. The next occasion was in the Maritime Museum at Greenwich when I saw the coat Admiral Lord Nelson was wearing on the day he was shot on the *Victory* at Trafalgar. As I grew older and wiser, the occasions and the items increased as I saw in the Ashcroft Gallery of the Imperial War Museum the Victoria Cross worn by the Royal Navy Captain John Bythesea who commanded my Great Grandfather's ship *Mullet*. Yet not everything can be found in a museum and I now know that the granite column that was exhibited at the Great Exhibition in 1851 by my ancestor and featured in this chapter still exists in a field in Gloucestershire, but the same cannot be said about our lighthouse heritage. We can be sure that the electric arc lamp that was used during Faraday's experiments is hidden somewhere in the bowls of London's Science Museum. Is it possible to say that this is the very device that Henry and George handled on a nightly basis as they removed the spent carbons in exchange for new ones?

One of Mr. Holmes' magneto-generators from South Foreland can be seen on request in the Edinburgh Museum, but it is not the one that Mr. Warner made and installed at Michael Faraday's instruction. It is not the one after which my Great Grandfather was named Frederick Warner Knott, but dating from 1871, it is close



ABOVE: Samuel Stephens Marling was a Gloucestershire mill owner and woollen cloth manufacturer who lived in Ebley in the parish of St. Matthew's, Stonehouse. In 1850 he bought the estate of Stanley Park, just south of Stroud and close to the village of Selsey. It was to his new estate that Marling brought John Trethewey's column from the Great Exhibition and ordered its re-erection in a field where it still stands today.

My brother Ken was shown George Knott's model of the Eddystone light by his grandson Frederick Knott at his bungalow at Instow North Devon. Yet the anguish of its loss and the relief when it was found by the National Maritime Museum will forever be a part of the Knott Family story.

It was much the same for the smaller models and in particular Bull Point. For a brief interlude in time it rested in our house in Plymouth as our mother Helen (née Knott) fretted about the future of the model that had come to her following the death of her father Frederick Rowland Knott. He had been given it by his father Frederick Warner Knott who had inherited it in the Will of his mother Catherine Knott. It was a difficult problem and it was 1969, the days when old things were out of fashion and the utility items from the aftermath of the war were being swept aside in favour of 'modern' home furnishing. The model now rests in the storerooms of the Plymouth City Museum, out of the public eye but safe.

Another of George's models has recently been found 'safe' in the Dover Museum. It was the model of the Braunton Lifeboat and this begins to reveal the difficulty faced by museums. Often the items they have shouldn't be there. They are not in their rightful place, yet only rarely do the smaller museums loan quite ordinary items so that they

can be exhibited together in their rightful setting. The lifeboat is in Dover Museum simply because it was left to Walter Knott in his mother's Will. Walter lived and died in Dover, so it fell to his descendants to decide its fate. It was Walter's daughter-in-law, Nellie V Jenner, who chose the Dover Museum for its safekeeping together with a telescope reputed to belong to George Knott. The Curator acknowledged its receipt in September 1976 where it resides to this day.

George Knott's last model of his last lighthouse is also safe, but not in a museum. The model of the North Foreland Light is still in the family and in the same way that Lisa Minter, Ken Trethewey and I are all grateful to our mothers for our Knott Family connection, so Neil Pidler can claim the same of his mother Stella Knott.

Stella Knott was born in 1926 to Francis Herbert Knott and Nellie Sanders who were married on Wednesday 16th July 1924 at Hartland Parish Church. Frank Knott, together with his elder brother Fred Knott, were the sons of Herbert Knott and Dinah Heal of Bear Street in Barnstaple and of course in a sense that is where this story began - with the model lighthouses. When their father Herbert died in 1937, Fred had inherited the Smeaton model and Frank had the North Foreland model, whilst our grandfather Frederick Rowland Knott had Bull Point, and Walter Knott had the lifeboat, so at this point I can say (as we used to say in the cinema in the 1950s as the films rolled over again):

*This is where I came in.*

### **The Lighthouse Becomes an Exhibition**

**I**n our daily lives it is extraordinary how many facets of it we take for granted. What would happen today, if mobile phones no longer worked? It has been like that through the centuries, but at a much slower pace and this book has documented a number of them. We have identified a significant need of lighthouses for two hundred years from the late 18th century. They were a part of life's kaleidoscope and we didn't connect the two when satellites began circling the earth in the 1960s. Soon we heard a new phrase - satellite navigation - and gradually it became accepted as a part of life that ostensibly we cannot do without. We didn't understand that ships we never saw on the world's oceans squawked their position to a satellite that flashed it instantly to its receiver in London, Rotterdam or Hamburg. Every nautical mile of its passage was tracked and its arrivals and departures



were known to the minute. More of this story is told in later chapters.

People involved in the maritime industry began to ask questions about the old ways – as they always do – and inevitably the question was asked about lighthouses. Are they really necessary? One by one in the 1970s, lighthouses began to be connected to a console hundreds of miles away in Harwich. The world didn't really notice. A lighthouse was still there, but no one realised that there were no longer keepers on the tower. It only affected 4 or 5 men every few months. Their redundancy didn't distort any graphs. But the point was that the lighthouse was still there, flashing its presence to passing ships. The seamen wanted them, as they marked hazards, like hidden reefs and dangerous shoals. Small local boats valued them more than the international globe trotters and it was not often that a lighthouse came under consideration for switching off.

Unfortunately for us, that fate fell to South Foreland. From the Bishop Rock to the North Foreland passing Lizard, Eddystone, Start Point, Portland Bill, St. Catherine's, Beachy Head and Dungeness, the lighthouses were all considered to be essential, but not South Foreland. Times had changed and so had the necessity for a light. For the second time in its history and both in the same century, a light at the South Foreland was switched off, never to be re-lit. On Friday 30th September 1988 John Blanch was its Principal Keeper and to him fell the responsibility of shutting the tower door one last time. The light was redundant and so was John. The light had gone out.

When it was turned off for the last time and the newspaper carrying the report of its closure was put out for the bin-man to collect, it became yesterday's news and it would not be long before South Foreland would be forgotten. There was talk of demolition to avoid the probability that it would become a decaying eyesore on an internationally renowned location. The White Cliffs of Dover were already in the care of the National Trust, keen to protect the area from the ravages of developers. Now the villagers at St. Margaret's began to voice their concerns that it would be sold for a camp site or a holiday park, but fortunately not everyone saw it that way. The National Trust Agent for the area could visualise the value in keeping it as it was, an integral part of that coastline.

On the 23rd March 1989 Trinity House transferred ownership of the South Foreland light to the National Trust and on the 1st April 1990 it was re-opened to the visiting public, yet there was

something missing that the National Trust was keen to see restored – the West Cottage. Its earlier demolition had destroyed its architectural symmetry, but in rebuilding it James Cooper found himself placating the concerns of the villagers, who did not want to see crowds of pleasure seekers tramping along the Downs to visit this new 'attraction.'

Trust policy to this day remains a low key educational visit and to that end they pursue a quiet, but steady restoration of an original working lighthouse with its integral accommodation. Mrs. Knott's Kitchen was a great success in the newly built West Cottage and if I was to put a name to Mrs. Knott, it would be Catherine. In her time - 1848 to 1862 - as Mrs. George Knott, her domain was the Upper Lighthouse so, I can only wish her well as she revisits her old haunts and refreshes her visitors as she did for Mr. Michael Faraday all those years ago.

## A Final Thought

I hope my reader has enjoyed learning about one unusual family from the past with glimpses of many others who were a part of that past and I hope this story will inspire those in the future to keep searching for that past and to make it come alive once more with new knowledge uncovered from that past.

In the same way that Ken and I have carried the folklore of lighthouse keeping through the latter 20th century only to have 'Cousin Betty' walk into our lives and add to our knowledge, so Lisa Minter is doing the same in the 21st century.

George Knott had a very large family and as 'Cousin Betty' was the granddaughter of Henry Thomas Knott, so Ken and I are the great grandsons of Frederick Warner Knott, Neil is the great grandson of Herbert Knott and Lisa is the great granddaughter of Walter Knott, so there must be others who can claim to be a part of the Knott Folklore. We all share George Knott as our illustrious ancestor and we can only hope that more descendants will discover this book and declare their interest. We would love to hear from them.



ABOVE: The lighthouse on Braunton Burrows was also called the Bideford Bar lighthouse. It was George's appointment after he completed his time on the Eddystone in 1865. Life at this lighthouse for George and Catherine's still growing family is described in detail in "Lighthouses of Cornwall and Devon". George served here until he was appointed Principal Keeper at Bull Point (BELOW).







The story of George and Catherine does not end here of course. Further service took them to three more lighthouses, Bideford Bar and Bull Point in North Devon, and to North Foreland prior to retirement. Their story at the North Devon lights has been told in detail in Ken's book, *Lighthouses of Cornwall and Devon*. The rest is given space in later chapters of this book.

ABOVE: George and Catherine are shown here in the courtyard of the new Bull Point lighthouse soon after George had been appointed its first Principal Keeper. Sadly, the Bull Point lighthouse is no more, having been replaced after the original was severely damaged in a cliff fall in 1974. Full details can be found in *Lighthouses of Cornwall and Devon*.

RIGHT: Catherine Knott (1827-1910), wife of George Knott, photographed in an Exeter studio, probably during her years living at Bideford or Bull Point lighthouses. She gave birth to thirteen children, two of whom died during childhood. Four of them, Frederick, Walter, Edmond and Florence were born in the Braunton lighthouse on the facing page.

