CHAPTER VI.

LIGHTHOUSES OF IRELAND DESCRIBED.

ABOUT four miles and a quarter south-west from Cape Clear, the southernmost point of Ireland, in lat. 51° 23′ 18″ and long. 9° 36′ 25″, stands the *Fastnet* (or Fastness) *Rock*, with its beautiful lighthouse.

From certain effects of lights, and more particularly when the sun is in its vernal equinox, this rock, when seen from the shores of Cape Clear or the adjacent islands and headlands, presents "a peculiarly spectral appearance," easily mistaken by strangers for that of a large ship under sail; and this appearance may possibly, as Mr. Sloane suggests, have originated the old fable that every May morning the rock sets sail, cruises round the Darsey Island, visits the Bull, Cow, and Calf Rocks, its kith and kin, and then settles down again in its time-old position.

It was long credited with the remarkable property of being just nine miles from everywhere. This mistake was easily exposed by the Ordnance Surveyors;

ing a white occulting light (three occultations every minute), which has a sea-range of twenty miles.

Off *Godrevy Island* the fine iron screw-steamer *Nile* was totally wrecked on the 30th of November 1854, and all on board, crew and passengers, perished. This and other similar calamities led to the erection (from Mr. James Walker's designs) of the present lighthouse, which was first lighted on March 1st, 1859, and displays a couple of lights—a white light, flashing ten seconds, and a fixed red light, both visible for fifteen miles. Cost, with adjoining buildings, £7,331, 4s. 5d.

The light-tower is built of rubble stone bedded in mortar. Octagonal in shape, and eighty-six feet high, it is planted on a rock of considerable size, where numerous wild plants relieve with their greenery the prevailing aspect of desolation. In the summer season it is a favourite resort of excursionists from Penzance and St. Ives, as many as a thousand persons visiting it on a Whit Monday.

This lighthouse indicates the position of the dangerous reef called "The Stones," near St. Ives. It was designed by Mr. Walker, engineer to the Trinity House. Cost £7,082, 15s. 7d.

Passing the lights of Padstow, Hayle, and St. Ives, we see before us the *Seven Stones* lightship, and find that we have completed our survey of the coast of England and Scotland.

We proceed to inspect that of Ireland, beginning at Fastnet, on the south, in lat. 51° 23′ 18″.

but credulous folk are still ready to maintain that such was originally the case, but that the last time the rock returned from its cruise, it made some mistake in resuming its former position. Another tradition exists among the people of West Cork, that the Fastnet Rock was picked out of Mount Gabriel, where a lake is pointed out as filling the cavity caused by its removal; and some are convinced that articles thrown into this lake will duly reappear by some underground and undersea passage on the Fastnet Rock. Yet again, it is said that the remarkable gap or breach in Mount Gabriel was caused by the devil's voracity in biting a mouthful out of it, which, finding it unpalatable, he dropped where, in later ages, it has been known by the name of the Fastnet Rock.

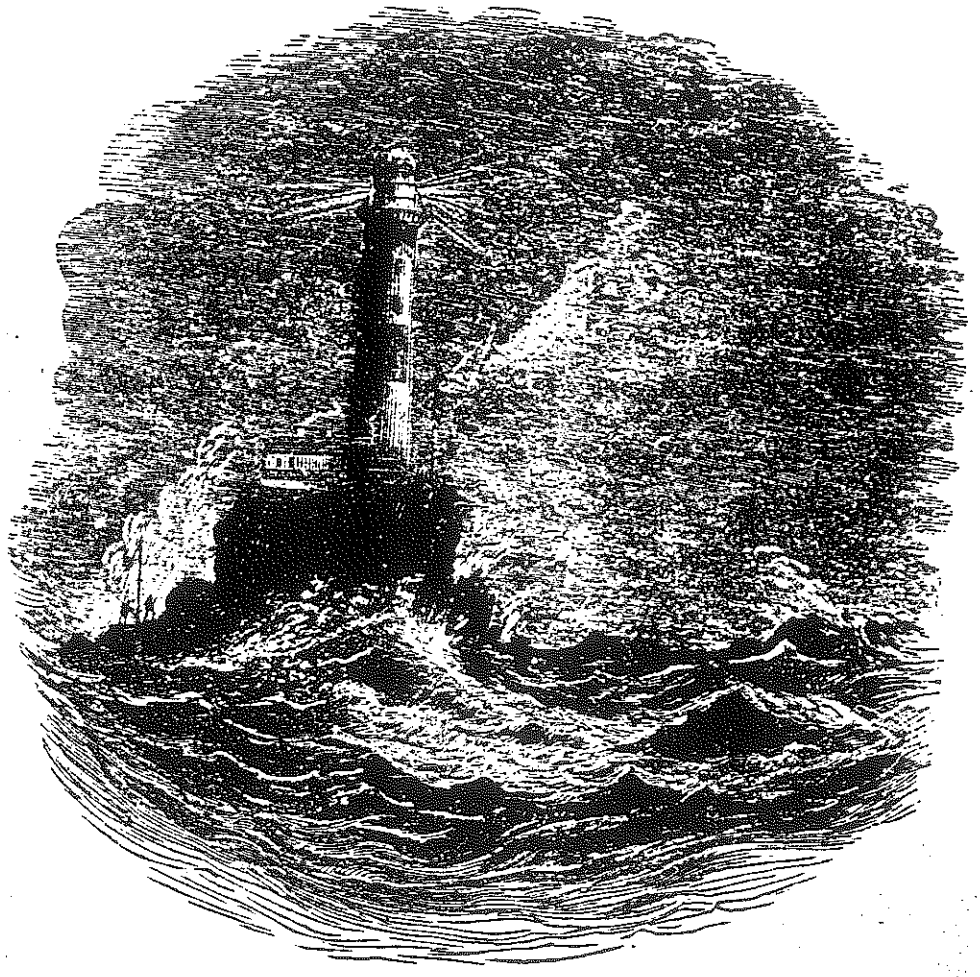
Apart from this traditional glamour, the rock is interesting from its picturesque character, its solitariness, and because it is the last bit of the old country seen by the emigrant who is bound for other shores—whence it is often called *Tear Erin*, "the Tear-drop of Ireland," summoning up the tears of those who longingly "look back to that dear isle they are leaving."

The lighthouse on Cape Clear was so frequently obscured by mist and fog as to be of little service to shipping; and it was decided, therefore, in 1848, to erect one on the Fastnet Rock. The design was furnished by the late Mr. George Halpin, and consists of a tower composed of a casing of cast-iron plates, with flanges and stiffening ribs, the lower story of which is

partially filled in with masonry, leaving space for a coal-vault, and the other stories lined with brickwork; the floors are of cast-iron plates laid on radially disposed girders, which unite and rest on a central hollow column, and bind the tower at each story. Of these there are five, twelve feet high, measured from floor to floor, the internal diameter of the tower being twelve feet also. The height from base to gallery is sixty-three feet nine inches, above which rises a well-proportioned lantern, uniting apparent lightness with the requisite strength. "It is hardly necessary to observe that the management of the different portions of this tower to meet the heavy shocks of wind and sea was an effort of no ordinary engineering skill; and although differences of opinion may exist as to the fitness of such structures for lighthouse purposes, there is, perhaps, no other method by which a lighthouse could be placed in such a situation so speedily or economically."

The cast-iron plates were all landed on the rock by June 1849; and thenceforward the laborious and difficult undertaking was prosecuted with so much energy that on the first night of January 1854 the lamp of the Fastnet was able to be lighted, and its bright flashes shot across six leagues of the great Atlantic. The apparatus is dioptric, of the first order of Fresnel, revolving once a minute. Its focal plane is one hundred and forty-eight feet above the sea; but the building itself, which is painted white, with a broad

horizontal belt of red midway, is ninety-two feet in height from base to vane. In 1867–9 it was cased round its base with metal plates for twenty-four feet up, and between this casing and the outside of the tower rubble masonry grouted in cement was filled in solidly. The



FASTNET ROCK LIGHTHOUSE.

dwellings of the keepers and their store-houses are, like the tower, of cast-iron. Cost £18,947, 15s. 11d.

In this vicinity we meet with another important lighthouse—one of the finest structures of the kind in

the world—that which crowns the summit of *Gally Head*, a precipitous cliff near Cape Clear, in lat. 51° 31′ 50″. It was erected, or at least completed, in 1878, from the designs of Mr. John S. Sloane, C.E., late engineer to the Irish Lighthouses Commission. Besides the handsome circular light-tower, sixty-eight feet in height—with the focal plane of its lantern one hundred and seventy-four feet above the sea—which stands enclosed within a substantial stone wall, there are dwellings for the keepers on an exceptionally complete scale, each with its separate approach and garden, also engine-house and gasometers; the whole walled in very neatly, and covering a very considerable area.

If the Gally Head Lighthouse be, as is asserted, unequalled in its appointments, it is probably unequalled in the power of its illuminating apparatus, which is constructed on the system of Mr. John R. Wigham of Dublin, so well known from his services in connection with lighthouse illuminants. Briefly speaking, its light may be described as proceeding from a quadriform arrangement of gas-burners, used without chimney glasses or any interposing medium. Each burner has an illuminating power of one thousand two hundred and fifty-three candles; and the great beam of light yielded by the whole combination is about [illegible] high by three feet wide. This beam or luminous column reaches the mariner every minute in the form of a group of six or seven flashes, lasting for

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THE FASTNET ROCK LIGHTHOUSE

THE ROCK LIGHTHOUSES on the south and west coasts of Ireland are the pride of the Service; first-class stations set amongst scenery of unparalleled grandeur. What the Eddystone, Wolf Rock, and Bishop Rock are to Trinity House, and Bell Rock and Skerryvore are to the Commissioners of Northern Lighthouses, the Fastnet, Bull Rock, Skelligs, Inishtearaght, and Blackrock Mayo are to the Irish Lights. Each of these rock stations set in the wild Atlantic has its own individuality and beauty, and for the lightkeeper its own particular problems.

The Fastnet

The Fastnet, a pinnacle surrounded by deep water on all sides, situated about four and a half miles south-west of Cape Clear, Co. Cork, is probably the most famous of the rock stations. It is divided into two main parts, the Fastnet Rock proper which rises to a height of 98 feet above low water, and the rock known as the Little Fastnet which lies to the south of the main rock from which it is separated by a channel 30 feet wide. Parts of the main rock are steeply precipitous. The rise and fall of tide is about twelve feet and the tidal currents may reach a speed of three knots. Landing is difficult: C. W. Scott, the Commissioners' Engineer from 1900 to 1930 estimated that a step-out landing was only possible on about twelve tides a year but this may be an exaggeration.

In 1810 there was a lighthouse on the highest point of nearby Clear Island. By 1848, however, it was recognized that this light was too far inshore to guard the outlying dangers and it was at such a high elevation that it was frequently obscured by fog and mist.

Eventually, after the loss of an American ship, the *Stephen Whitney* with almost one hundred lives, in November, 1847, it was decided to build a lighthouse on the Fastnet rock. It is essential to mark the Fastnet properly: it is very often the first landfall of the voyager from America to Europe, and contrariwise it has been called 'the tear-drop of Ireland' for it is the last sight of land for many Irish emigrants to the U.S.A.

The people of West Cork have many traditions and folk-stories about the Fastnet, or Fastness as it was once called. One has it that Satan picked the Rock out of the nearby Mount Gabriel and hurled it into the sea: the proof of this is a small mountain tarn which is the resultant cavity. Another story is that about the time of the vernal equinox the Rock sets sail and after a cruise during which it visits the neighbouring Bull, Cow, Calf, and Heifer Rocks, returns to its original anchorage until the time for its next yearly sail comes round again. This legend arose from a fanciful resemblance of the Rock to a ship under full sail.

George Halpin, when designing the new lighthouse, decided to place it on the top of the rock, at a point some 83 feet above low water spring tides. He designed a tower made of cast iron—this was the new Iron age—63 feet 9 inches high and 19 feet 6 inches in diameter at the top. It was composed of plates averaging more than an inch in thickness flanged all round on the inside, with a central cast iron column 12 inches in diameter running through the centre of the tower. This column was intended to accommodate the weight-trunk, the driving weight of the machine for rotating the lenses. There was an inner brick lining and a cast iron internal winding staircase. The lantern was 27 feet 8 inches high and 12 feet in diameter. The total height of the tower and lantern was 91 feet and the top of the whole structure was 173 feet above low water. The light was a fixed dioptric apparatus of the first order. The oil was stored in tanks on the second floor, and the keepers were accommodated in a single storied three-compartment house on the north-east side of the tower. Four dwellings were erected on the mainland at Rock Island at the entrance to Crookhaven for the keepers'

families. The light was exhibited for the first time in 1854. The total cost of the station including the shore dwellings was about £20,000.

Unfortunately, before ten years had elapsed it had become abundantly clear that the tower was not strong enough to compete with the Atlantic. In gales from the north-west, west, and south-west heavy seas broke right over the rock, making the tower tremble to such an extent that crockery was sometimes shaken off the tables in the tower. Large portions of rock were carried away from the south cliff, and blocks of stone were torn off the face of the cliff and thrown to the top of the rock, one of which weighed almost three tons. A 60-gallon cask of water lashed to the gallery 133 feet above high water was washed away, and it was frequently impossible for the lightkeepers to cross from the tower to the dwelling.

Various steps were taken to make the tower secure. One of these was to fit an external casing or petticoat around the base of the tower as high as the second floor, the space between this and the original casing being filled in with masonry. In addition to this the loose and projecting portions of the top of the rock were removed and the hollows filled in with concrete. The 'chasms' were filled in similarly so as to present a smooth rounded surface to the seas in order to offer less resistance. The lower storeys were filled up solid, and the dwellings abandoned as such, the upper storeys of the tower being fitted as dwellings and stores.

This was in 1865. Between the years 1862 and 1866 a lighthouse had been erected on the Calf Rock, the second smallest of a nearby series of rocks known prosaically as the Bull, the Cow, the Calf, and the Heifer. This tower was also of cast iron, and it was ordered that similar steps be taken to secure its safety.

The work on the Fastnet was completed in 1868 at a cost of £6,000 which brought the total cost to about £27,000. The original cost of the lighthouse on the Calf was the not inconsiderable sum of £30,000.

Matters proceeded satisfactorily enough until 1881, when the whole of the Calf tower above the strengthening casing was carried away in a November gale. The keepers fortunately escaped, having

taken refuge in the base of the tower. They were marooned on the rock for four days. In the same gale the glass of the Fastnet lantern was broken by the sea and one lens considerably damaged. This was the writing on the wall: it was obvious that cast iron lighthouses were unsatisfactory to say the least, and in any case the Commissioners[1] had already come to realize that the station as it stood was inadequate, and that the importance of its position as the principal landfall light on the south-west coast warranted any expenditure necessary to make it as powerful as possible.

William Douglass, a member of a famous family of lighthouse engineers, was now the Board's Engineer. He made a special survey of the Rock and submitted two models to the Board, one showing the Rock as it was and the other as it would be when the new lighthouse was built, together with an estimate for carrying out the work. This estimate amounted to £70,387, which seems an extraordinarily modest sum today, particularly when one realizes that it included £10,000 for building the s.s. *Ierne* as a special tender for the work. The s.s. *Ierne* continued to give excellent service to the Commissioners until 1954, when she was replaced by the present *Ierne* at a cost of £296,155. As for the Fastnet station itself, at present day prices it would probably cost about £2,000,000 to erect.

Douglass proposed to build a granite tower about 50 feet roughly north-west of the old tower. This was the hardest part of the Rock and in a position where the tower would receive the heaviest seas before they rose to their full height. It was to be 42 feet, subsequently increased to 52 feet in diameter at the lowest course, and 147 feet high: the focal plane of the light being 160 feet above high water spring tides. The bottom of the lowest full course was to be 6 inches below high water. Below this ten partial courses were to be built, the side of the rock to be cut in steps to receive them. Douglass's estimates were approved and the work was shortly sanctioned by the Board of Trade. The contract for the supply of granite was

[1] In 1867 the Dublin Port Act had been passed, altering the constitution of the 'Corporation for Preserving and Improving the Port of Dublin', appointing and incorporating the Commissioners of Irish Lights and transferring the lighthouse powers to the latter body. The original Corporation became the Dublin Port and Docks Board. (See Appendix I.)

secured by Messrs. John Freeman & Sons of Penrhyn, Cornwall. Each stone was dovetailed into those around it and cemented into the stones above and below, like a Chinese puzzle, so that if it were desired to remove any one stone the courses above it would first have to be removed, and even then it would be necessary to break off the dovetailed joggle of the course below it. This system virtually bonds the structure into a monolith.

Sections of the tower six to eight courses in height were erected at the contractor's Cornwall yard. When approved the stones were dismantled and shipped to Ireland, the top course of each section being kept to form the bottom course of the next setting. Meanwhile the Commissioners had been looking round for a suitable place for a shore depot and stone yard. They had originally thought that Schull Harbour, being at the nearest railway terminus, would be the best place, but exorbitant demands were made for renting ground there and it was eventually decided to enlarge the premises they already owned at Rock Island in Crookhaven Harbour. Rock Island soon developed a very busy aspect: two new keepers' dwellings were built, together with barracks for the workmen, a masonry store, a quay wall, cranes, gantries, magazines, and a pier and tramways.

In spite of bad weather the work on the Rock proceeded. The partial ring courses and the foundation were ready for the first solid course by the end of August 1899. At this point Douglass was unfortunately compelled by ill-health to resign, but before he did so he had designed the entire masonry, the landing and setting gear, and the designs for stairways and doors. He was succeeded by C. W. Scott, who designed the lantern and optical apparatus.

In midsummer 1903—four years from the date of commencement of building the tower—the last masonry course, No. 89, was laid and the tower was ready to be crowned by the optic. As Scott says in his book, *The Fastnet Rock Lighthouse*, the greatest credit is due to all who were concerned in building this almost faultless specimen of masonry on such an exposed and isolated rock. A sad footnote to the operation was the death of James Kavanagh, the highly skilled mason foreman

who had by his own desire lived on the rock almost continuously from 1896 to June 1903. He came ashore at the end of June complaining of feeling ill and died of a stroke early in July. He resolutely refused ever to go ashore while any work on the Rock was going on. His grand-nephew, J. Kavanagh, is now employed as a building tradesman by the Commissioners.

Living on the Rock cannot have been easy. We are told that sometimes as many as three men slept in a bunk: they were all turned out at five a.m. and 'compelled to wash themselves thoroughly' and then to wash out the barracks. Three serious accidents occurred. Two men each lost an eye, one of them receiving as much as £45 compensation. A rigger on the Rock sustained a broken leg. He brought a claim against the Commissioners and was awarded £350 on the grounds that he was totally and permanently incapacitated; however, soon afterwards he was found to be an active member of the crew of a coal-boat. A labourer's wage at this time was 2*s.* 6*d.* per day, with an extra shilling per day when on the Rock.

The Optical Apparatus

One of the most attractive features of the Fastnet is the double balconies, one outside the service room, the other in the usual position outside the lantern itself. The lantern proper was built and set up in the workshop of Messrs. Chance Bros. Ltd., Smethwick. The light is a 'biform four-sided apparatus', both tiers of which consist of four square panels. In the centre of each tier was placed an incandescent petroleum vapour burner, devised by C. W. Scott and manufactured in the lighthouse Depot at Kingstown, now Dun Laoghaire. The Commissioners in the first instance decided to have a biform rather than a monoform apparatus for several reasons, but mainly because that if by accident one burner failed the light was not totally extinguished. The whole apparatus was floated on a mercury bath designed by Scott. This latter system had been already adopted for Howth Baily, Blackhead, Maidens, and for lighthouses in the sister Services.

On 14 September 1903, the s.s. *Ierne* went up to Kingstown to take delivery of the pedestal and apparatus, the latter consisting of the mercury trough, float, and revolving table. The weather, however, was unreliable and it was 8 October before it appeared likely that heavy articles could be safely landed on the Rock. However, this was safely accomplished, all the cases were landed, and the mercury trough, float, and trimming stages were hauled up to the base of the old tower and lashed to it, apparently securely. Unfortunately, at 10 p.m. on Saturday, 10 October a violent gale from the south-south-east sprang up very suddenly and in a few hours the seas were breaking clean over the rock. They carried away the mercury float, the lower trimming stage and its brackets, and portions of the cornice. There was no option but to remove the whole of the remaining portions from the Rock and return them to Birmingham to be completed again in the workshops. This set-back cost the Service about £1,000, as it was not possible to replace the new light before the following May (1904). As it was not considered advisable to trust the temporary lanterns during the winter, the old Fastnet pedestal and rotation machine were erected in the new lantern and a light steel frame carrying four facets of three reflectors each were erected on it.

In March 1904 J. Kavanagh, the son of the old foreman, went off with four labourers and a plumber to demolish the old tower, which was taken down as far as the casing added in 1867. It was then roofed and used as an oil store as it still is. The plumber's job was to connect up the rain-water tank in the service room to the wash-basins and sinks, but he, poor man, was frightened out of his wits and had to be taken off by lifeboat next day. However, his successor was made of tougher metal, and he completed the work satisfactorily. The temporary light gear was removed, the gallery railings were erected, and the new light was exhibited for the first time in July 1904. At this point J. W. Tonkin, then junior draughtsman in the Engineer's department, later Engineer-in-Chief to the Commissioners, was sent down to iron out some timing defects in the clockwork machinery.

The Inspecting Committee went out from Crookhaven on 21

July 1904 to see the new light in operation and were more than satisfied with what they saw. Sir Robert Ball, the Scientific Advisor to the Commissioners, was also present, and part of his report reads as follows:

It was about eleven o'clock when the *Alexandra* was headed round to return to Crookhaven. By this time the night had become much darker, for the moonlight had disappeared and there was occasional rain as well as haze.

As to the beams of the Fastnet during all the time of our return to harbour,

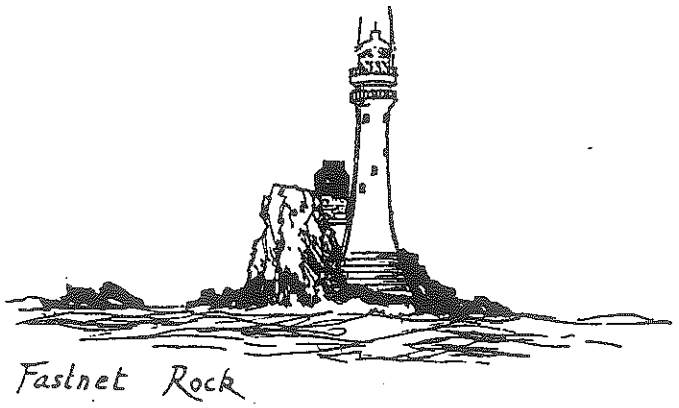


Fig. 12.

I cannot describe them otherwise than by saying they were magnificent. At ten miles' distance the great revolving spokes of light, succeeding each other at intervals of five seconds, gave the most distinctive character possible. Almost before one spoke had disappeared the next came into view, but the effect was doubtless in part attributable to the haze. It was a most beautiful optical phenomenon. Each great flash, as it swept past, lighted up the ship and the rigging like a searchlight. After the ship entered Crookhaven harbour, and the direct light from the Fastnet was, of course, cut off, the glow of each successive beam showed in a most striking manner over the highland that bounds the harbour.

He went on to say

The next day, July 21st, we landed on the Fastnet Rock, and I had the opportunity of inspecting the superb structure which produced the effects I have endeavoured to describe.

It seems to me hardly possible to over-estimate the advances in lighthouse construction which may be expected from the flotation of the lenses in

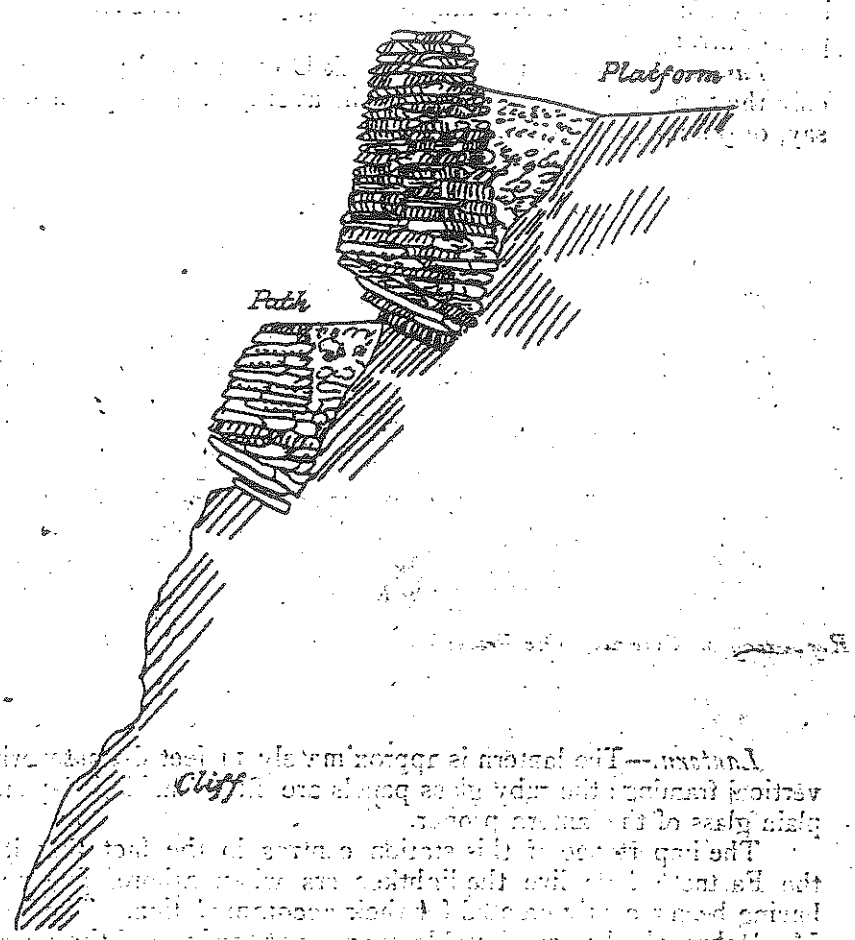
mercury. By this method of support the friction is reduced so as to be no more than an inconsiderable fraction of its previous value. Hence it follows that by flotation on mercury the rotation may be made several times as rapid as was previously possible.

The source of light in the Fastnet is the new and most successful incandescent burner. By reason of its splendid brightness, and its compact size, that definiteness and intensity is produced which I have tried to describe.

In conclusion I may say it is a matter of congratulation to every one concerned that the Fastnet is now at length provided with a monumental tower and a superb light, well worthy of the position of this lonely rock as being, from the navigator's point of view, the most important outpost of Europe.

The Commissioners had every right to be proud of their new Fastnet Lighthouse. Not only was it technically ahead of its time but it was, and remains, the highest and widest rock tower in the British Isles and one of the most beautiful lighthouses in the world.

This platform is supported by a dry stone retaining wall of most peculiar construction—thus



The platform is reached by flights of steps, partly built and partly cut in the rock.

The roofs of the cells are formed by each course of stones projecting inwards over the one beneath till they meet in the centre, the final aperture being closed by a single flat stone, which in some cases is pierced by a circular hole.

The pinnacles of living rock have all been rudely sculptured into the form of a cross, and there are besides several curious monumental pillars and other interesting remains. There are numerous springs of fresh water near the top of both peaks which are clothed with thick grass and sea pinks, where not actually perpendicular, on which innumerable rabbits feed.

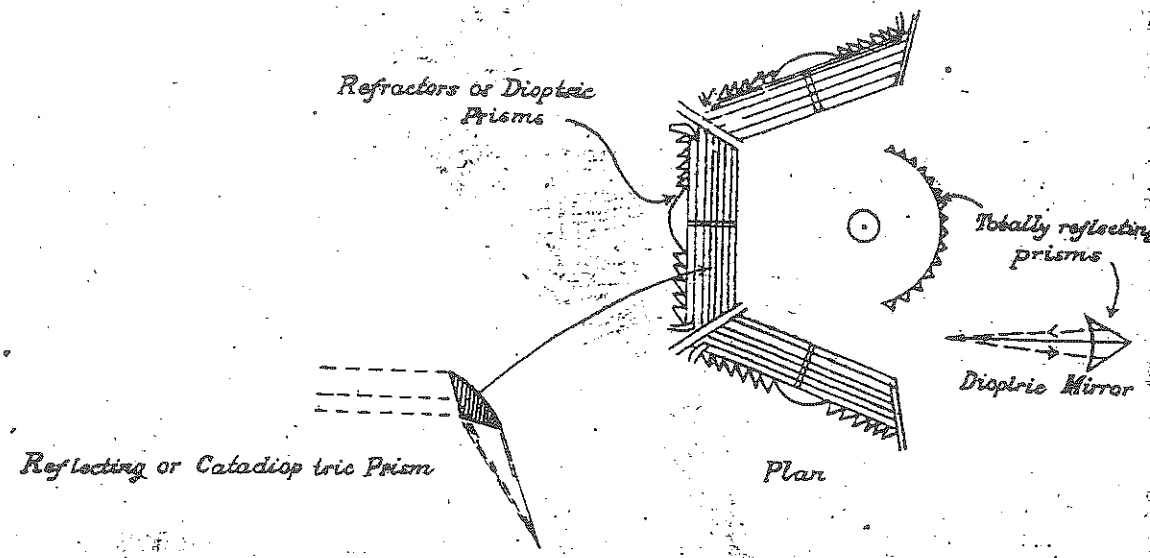
CROOKHAVEN LIGHT.

Leaving the Skelligs we returned to Valentia and, after dropping the men from the Tearaght and Great Skelligs, steamed round to Crookhaven which was reached soon after midnight. This part of the voyage gave a good opportunity of seeing, from a mariner's point of view, all the lights visited on this trip and described in this report.

Thursday, 4th May 1905.—Crookhavan is a small, well protected harbour on the eastern side of the promontory terminated by Mizen Head. The entrance to the Harbour is marked by Rock Island Lighthouse, showing a fixed white light of 2,000 candle power to seaward and up the harbour, with an intermediate red sector of 750 candle power.

Optical Apparatus.—The optical arrangement consists of a fixed dioptric apparatus of three panels, with upper and lower catadioptric prisms. Immediately behind the light is a set of totally reflecting prisms (*see* sketch showing diagramatic plan of arrangement).

Lamp.—The lamp used is a 6-wick Douglass old pattern pressure lamp, but only the two outer wicks are used. The average consumption of oil on a fair night, say, of 9 hours, is 2 gallons 1½ pints.



Lantern.—The lantern is approximately 11 feet diameter with horizontal and vertical framing; the ruby glass panels are fitted inside independent of the outer plain glass of the lantern proper.

The importance of this station centres in the fact that it is the depôt for the Fastnet; here live the lightkeepers when ashore, fine new family quarters having been recently erected for their accommodation. The keeper of the light, Mr. Rohuo, also has comfortable quarters at the base of the tower: in this case his wife receives a salary as his assistant.

FASTNET WORKS.

Landing Stage.—In order to render the construction of the Fastnet Lighthouse possible, a safe receiving station for granite stone and materials and stores had to be selected in its vicinity. The Harbour of Crookhaven offered the necessary facilities, so a pier was constructed, alongside of which steamers could lie at all states of the tide in moderate weather.

Ship and Engines.—The S.S. "Ierne" was also specially designed and constructed at a cost of £10,000 for the work of taking the massive dressed granite blocks out to the Fasnet and landing them there. Her engines are by Blackwood and Gordon, Glasgow, of twin screw, compound type.

On the pier thus constructed at Crookhaven a powerful steam crane was erected for unloading the blocks from the ships which brought them from the quarries in Cornwall, and for loading them into depôt, and thence on to the "Ierne" to take out to the rock. Smithies, store rooms, and workshops of all descriptions were located close to the pier, but have now all been removed. The blocks, when landed at Crookhaven, were stacked under the gantry there, to see that they fitted exactly before being taken to the rock.

THE FASTNET.

The Fastnet, owing to its unique position, is probably the most important lighthouse in the world, as it is the land fall aimed at by all ships coming from

the new world by the southern route. In construction and illumination, it is the latest outcome of modern science and cost £84,000.

"The Fastnet Rock lies S. 87. W. mag. 5¼ miles from Cape Clear Light-house. It is generally of compact schist, with thin strata of a softer kind with small veins of quartz. It lies E. N. E. and W. S. W., and consists of one rock about 360 feet long by 130 feet broad at low water, nearly perpendicular at its western extremity which rises to the height of 103 feet.* To the S. W. of this is a rugged mass of rock about 230 feet long and 90 feet wide and 20 feet high, leaving a passage about 30 feet wide between it and the high rock with other small detached rocks off it. The Fastnet is very bold and steep-to, at ½ a cable off, except at the N.E. and E. where, at the distance of two cables, there is a small sunken rock with only 12 feet "The Row Rock"—(from Chart of Fastnet Rock, S.S. "Ierne").

From 1840 to 1903 an iron tower existed on the top of the rock, built by Sloan and Halpin. But owing to the dangerous way the softer veins of killas or clay slate were being worn away, and the necessity of continually having expensive protective repairs done to the fissures and crevices in the upper portion of the rock, it was decided to have the foundations of the new tower on the hard greenstone which outcrops nearly vertically to the W. N. W. just above high water level.

In this rock, ring channels were cut to receive the dovetails on the granite blocks forming its foundations, which were also dovetailed into one another.

The new Fastnet tower rises from H. F. L. in a graceful elliptical curve up to the gallery round the service room, which lies immediately beneath the lantern, the focal plane being 160 feet above H. W. L. A second gallery surrounds the lantern. The base of the tower up to 60 feet is solid, then comes a 9 feet by 9 feet water tank, of fresh drinking water brought on each visit of the tender. Entrance to the tower is gained by a gun metal door, fixed flush with the batter of the tower, and which opens on to a level terrace and platform cut in the side of the rock some 15 feet lower than its summit.

Immediately within the outer metal door, is a second stout teak door, both of which are built in the thickness of the wall, which is here some 10 feet thick; this gives access to the *first floor*. In this compartment, in addition to a semi-rotary pump connected to the fresh water tank immediately below, is the reserve coal store, about 10-ton capacity. Ascending by a clock-wise metal spiral staircase, *compartment* 2 is reached. This contains magazine with 4 oz. charges of guncotton (about 4,000 kept in stock), store for spare glass for storm windows, etc. In the *third compartment* there are five 140-gallon oil tanks, all connected with six cisterns of 300 gallons each, placed in the base of the old tower on the top of the rock, the oil flowing by gravitation from the one to the other.

The floor of this compartment is therefore almost level with the base of the old tower. In the first instance, oil is received and landed in casks, and filled into a 40-gallon sump tank let into the concrete close alongside the top of pier and derrick, from which it is pumped up by a hand semi-rotary pump.

Ascending the tower to the *fourth compartment*, we came to a spare bed-room, with two beds, lockers, etc.

The *fifth compartment* is a larder and storeroom.

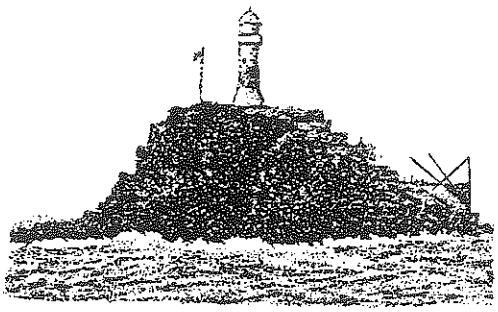
The *sixth compartment* (kitchen) contains a range for cooking and sink with rain water, laid on from gallery of tower, and forms the keeper's general living room.

The *seventh compartment* is similar to the fourth and contains four beds (beds are of iron tube, with spring bottom, one over the other).

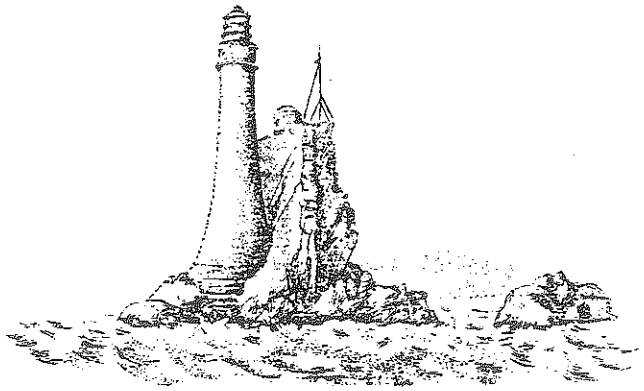
The *eighth compartment* or service room, contains the Marconi Telegraphic Apparatus, shelves with signalling flags, etc., and forms the general office room of the light-house. A gallery runs round the tower at this level, from which signals to passing ships, etc., can be made either by day or night. It is occupied on the land side by a bucket latrine.

The eight floor forms the base of the lantern, in the centre of which is the pedestal of the optical apparatus standing 7 feet high and 8 feet diameter. Within the base of the pedestal is the clockwork for revolving the superstructure.

* Mr. Foot says 87 feet—the difference is probably between highest and lowest tides.



Old Fastnet Lighthouse.
From the South.



The Fastnet
From the W shewing fissure which
rendered old Tower unsafe
CAPE CLEAR IN DISTANCE

G.S.C.P.O.—No. 42, P.W.S. 7-9-10. 53. LITHO.

carrying the bi-form, four-square lenses. The clock requires winding every 15 minutes as the barrel round which the main wire rope passes (being only about 3 inches diameter and 9 inches wide) cannot take more turns of the wire. A single weight of 5 cwt. is suspended from it working down the central shaft of the tower. The total weight of the revolving parts is upwards of 10 tons. The speed of rotation (one complete revolution in 20 secs), is rendered possible by their flotation in a mercury trough containing 15 quarts of mercury.

Power is communicated from the clock to the frame carrying the lenses by means of a vertical shaft, fitted with spur wheels and pinion, the former working into cogs on the inside of the base plate.

Within the pedestal, two air receivers and two wrought steel oil bottles stand, connected up with the lamps in use at a pressure of 60 lbs. per square inch. A spare oil bottle, ready in case of a breakdown, is also kept on this landing.

The oil is pumped up from the oil store at the base of the tower into a small 4½-gallon tank on this floor, and filled into the oil bottles or containers by measure, the average consumption being one pint per hour. On either side of the tower at this level are small compartments, communicating by double doors with the second gallery round the tower, and from these compartments the Electric Explosive Fog Signals are worked (described later on).

Ascending within the pedestal into the apparatus, the simplicity and compactness of this form of lighting immediately becomes apparent.

Lamps.—The two incandescent oil gas lamps, each with a single No. 4 Welsbach Mantle, stand one above the other about 6 feet apart. See page 16 and Plate II.

The objects of the dual lamps are twofold—

(1) These burners cannot be satisfactorily regulated by cutting off the supply of oil; so in thick weather, in order to increase the power of the light, the two lamps are used. In clear weather either one or the other lamp can be used alone.

(2) The mantles are somewhat delicate, but if treated with average care the consumption for the two burners is only seven per month; nevertheless, should one suddenly collapse, the light is practically extinguished, hence the necessity for having the light and lenses in duplicate, as it is most unlikely that both mantles would collapse simultaneously.

The great advantages are obvious: firstly, simplicity, compactness of the whole plant, and freedom from the danger of gas exploding, the gas being generated only as it enters the lamp. Secondly, the light is absolutely unimpeded by any part of the burner or lamp in its passage to the lenses. Thirdly, the focal plane of each light can be regulated to a nicety.

The above is fully indorsed by the keepers actually using it at the Fastnet, the light having now been in use over a year (first lighted May 1904) and never once failed.

Fourthly, the diameter of the mantle being so small, any horizontal divergence required can be obtained by designing the lens accordingly.

The action of the incandescent oil lamp has already been described on page 6 so need not be repeated here.

The Lenses.—The Bi-form Dioptric Apparatus, and all mechanism connected therewith, was built by Messrs. Chance & Co., and consists of eight lenses, mounted on a quadrilateral frame, one set of four immediately above the other. They measure 6 feet diameter and the revolving portion stands 15 feet high.

Character of Light.—The flash of $\frac{1}{6}$th sec. from these lenses recurs every 5 secs. one complete revolution occupying 20 secs. The maximum intensity of the flash is 750,000 candle power.

There are no upper or lower catadioptric prisms in this system, the bi-form, double apparatus doing away with the necessity for such. The lenses are hyperradient of 1,330 mm.

Lantern.—The lantern of 17 feet diameter, the biggest hitherto constructed, has diamond panes with helical framing.

To the edge of the iron roof the jibs of the fog signals are pivoted. On the top is the ventilator and vane connected to a copper wire rope lightning conductor

which runs down the face of the tower, and over the top of the rock to a terminal copper plate bolted to the face of the rock as near low water as can be.

Fog Signals.—The Explosive Fog Signal of one discharge of 4 ozs. of gun cotton every 5 minutes is arranged for by means of Sir James Douglas's Trinity House Explosive Fog Signalling apparatus, full description and plan of which is given on page 73 of Mr. Ashpitel's Report. This is here reproduced for facility of reference:—

"*Trinity House Explosive Signals.*—To the roof of the lighthouse lantern is attached a light wrought-iron crane, the jib of which is promptly raised and lowered by a worm wheel and pinion worked by a hand wheel inside the lantern. When the jib is depressed, the lower end reaches near the gallery outside the lantern, where the lightkeeper suspends the charge or charges of gun cotton with their detonators already attached to the electric cable or cables which are carried from the end of the jib to a small dynamo-electric firing machine placed inside the lantern. After suspending the charge or charges the light-keeper returns to the lantern when he raises the jib to the upper position where the charge or charges are fired nearly vertically over the glazing of the lantern, and thus without causing any fracture of the glass."

At the Fastnet there are two such moveable cranes, the jibs of which are fixed to the north and south sides respectively. There is a peculiarity with regard to this installation which deserves notice, *viz.*, in consequence of this lighthouse being fitted with Marconi Wireless Telegraph Plant, it was considered inadvisable that electric currents should be generated in both apparatus at the same time, in case the guncotton explosive signal should be discharged accidentally by a Marconi wireless current, or in case the current generated by the magnet to dynamo, used for firing the fog signals should affect the delicate mechanism of the wireless plant. To avoid such a contingency, regulations lay down that the two plants are not to be used at the same time, and to ensure this being observed, both apparatus are furnished with duplicate locks, but with a single key, which can only be withdrawn when that lock is securely closed. By this means it is impossible for the two instruments to be opened at once.

As has already been stated, there are two charging boxes or cubicle, one on either side of the lantern, access to the upper gallery being obtained through these by means of double doors.

It is admitted that the siren fog signal is the most effective, all things considered, but in consequence of the Bull Rock 30 miles distance being so fitted, to avoid confusion the Fastnet has the explosive signals.

Staff.—There are six men attached to this lighthouse, of whom four are on duty and two ashore. Once a fortnight, weather permitting, unless specially called for, the tender pays them a visit and makes the exchange of men. On the occasion of my visit, Mr. Twohig, brother of the keeper of the Skellig light, the principal keeper, was in charge, and by his courtesy and intelligence made my visit particularly instructive and pleasant.

Owing to the sea being perfectly calm, I was enabled to inspect the foundations of the tower in a way that is not often possible.

GALLEY HEAD LIGHTHOUSE.

Situation.—Intermediate between the Fastnet and Old Head of Kinsale is Galley Head Light, situated on a rocky headland dividing Clonakilty Bay on the east from Roscarbery Bay on the west; access to it is obtained by a ten mile drive from Clonakilty, the nearest railway station.

It is a group flashing gas light, showing 6 or 7 flashes in rapid succession once every minute. This light is especially interesting showing "how the old order changes giving place to the new," namely, the old cumbersome coal gas plant giving place to the simple and compact incandescent oil gas.

At present the installation comprises—

(*a*) Coal gas making plant, consisting of four furnaces burning about 2 cwt. of coal a day; one furnace is found to supply sufficient gas for all ordinary

The Fastnet Rock Lighthouses

CHAPTER I

THE BUILDING OF HALPIN'S LIGHTHOUSE

IN the year 1810, when the control of Irish Lighthouses was vested in the Corporation for Preserving and Improving the Port of Dublin, the only sea lights on the south-west corner of Ireland were situated, one on Loophead, at the mouth of the River Shannon, another on almost the highest part of Clear Island, and a third on the Old Head of Kinsale. In 1826, however, two lighthouses were erected on the Great Skelligs, and in January, 1848, the Corporation of Trinity House gave their statutory sanction to the building of a lighthouse on the Fastnet Rock, and the extinction of the light on Clear Island, on the representation that the old light was too far inside the outlying dangers, and at so high an elevation that it was very frequently obscured by fog.

The Fastnet Rock, which is a pinnacle surrounded by deep water on all sides, is situated in 51° 23′ 18″ north latitude, and 9° 36′ 25″ west longitude, about 4½ miles south-west of Cape Clear, and has two portions showing above high-water mark: the Fastnet proper, 340 ft. from north-east to south-west, by 180 ft. from north-west to south-east at low-water mark, rising to a height of 98 ft. above low water at the south-west corner; and the Little Fastnet, to the south of the main rock, and separated from it by a channel 30 ft. wide, having a length from east to west of 240 ft., a width of 60 ft., and rising 21 ft. 6 in. above low-water mark. There is also a dangerous peak, with 11 ft. of water over it at low water of spring-tides, 400 yards north-east by east from the main rock, and a half-tide rock 60 ft. south-west of the Little Fastnet.

The south side of the main rock is precipitous, and in parts slightly overhanging, but it rises gradually at a slope of 2 horizontal to 1 vertical from the east, and a slope of roughly 1 horizontal to 2 vertical from the north and west, the top measuring about 120 ft. from north-east to south-west, by 60 ft. from north-west to south-east.

The rock consists of hard clay slate, with the strata inclined at a high angle, and of varying degrees of hardness, some of them converted into a hard quartzite or helvin, containing veins of quartz and some large quartz crystals, and belongs probably to the Lower Silurian System. Some of the softer strata have been eaten away,

forming narrow chasms extending upwards almost vertically, and penetrating as much as 14 ft. in from the face of the harder strata, while one on the north and another on the south side, rising from below low-water mark to a height of about 30 ft., probably meet in the middle.

The tide rises 12 ft., and the currents round the rock at spring-tides attain a velocity of as much as three knots.

It is a very rare occurrence for the water to be sufficiently smooth to enable men to step out of a boat on to the rock, repeated not oftener than an average of about twelve tides in the year. There are two places at one or other of which such landings are most often practicable: one at the east, and the other about the middle of the north side.

A cast-iron tower was designed by Mr. George Halpin, Engineer to the Port of Dublin Corporation, in 1848, and the work of erection on about the middle of the top of the rock, at an elevation of 83 ft. 3 in. above low water, ordinary spring-tides, was commenced in the following year.

The cast-iron casing was 63 ft. 9 in. high from base to gallery, 19 ft. in diameter at the bottom, tapering to a diameter of 13 ft. 6 in. at the top, composed of plates flanged all round on the inside, and fastened together by 1 in. bolts, the vertical joints running through from bottom to top, and the alternate plates breaking joint horizontally. The thickness of the plates varied from $1\frac{3}{8}$ in. at the bottom to $\frac{7}{8}$ in. at the top. This casing was tied across by four cast-iron floors bolted to the outer casing and to a central cast-iron column of 12 in. diameter running through from base to lantern floor, this column being intended to serve as the weight trunk for the driving weight of the machine for rotating the lenses.

The lower tier of plates had an internal flange 7 in. wide, which was secured to the rock by 32 bolts sunk 2 ft. into the rock. The base inside was filled up solid with rubble masonry for a depth of 3 ft., and lining walls of masonry 3 ft. 6 in. thick were carried up to the first floor. The entrance door was on this floor, with a cast-iron staircase giving access to it outside the base of the tower and not sheltered in any way. From the first floor to the top a brick lining was built varying in thickness from 2 ft. 9 in. at the bottom to 9 in. at the top, leaving an air-space of 5 in. between the brickwork and the cast-iron casing. Cast-iron internal winding stair-cases gave access from one floor to another, and a bold projecting gallery ran round the outside of the tower at the level of the lantern floor, supported on cast-iron brackets.

The lantern was 27 ft. 8 in. high from gallery to top of ventilator on domed roof, and 12 ft. in diameter inside the glazing; the blocking, astragals, sills, rafters, and neck of dome being of cast-iron, and the plating of dome and ventilator of copper. The total height of the building was 91 ft., and the height above low-water mark 173 ft., the height of the focal plane being 148 ft. above high-water mark.

The castings were supplied by Messrs. J. & R. Mallet, of Dublin, and the erection was carried out by the Corporation's own men.

The optical apparatus consisted of the upper and lower prisms of a fixed light

dioptric apparatus of the 1st Order, with a revolving central belt composed of eight annular lenses, each subtending an angle at the principal focus of 45° horizontal and 57° vertical. This belt was revolved at a speed of one revolution in sixteen minutes by means of a weight-driven clock, and gave a characteristic of a weak fixed light only visible from a short distance, except in very clear weather, with a flash of about 38,000 candle-power in the centre of the beam recurring every two minutes, the duration of the flash being about fifteen seconds.

The apparatus was supplied by Messrs. W. Wilkins & Co., of London, and the four-wick burner and mechanical pressure lamp by Messrs. Chance, of Birmingham.

The oil was stored in tanks on the second floor of the tower, and the keepers were provided with accommodation in a single-storied iron house, divided into three rooms on the north-east side of the tower. Additional accommodation was provided by the timber barracks, erected for the protection of the workmen during the construction of the lighthouse, and a timber water-house, which were situated on a lower level immediately to the north-east of the iron house.

A timber derrick-mast and jib, and a hand-winch, were erected at the north-east extremity of the rock for landing men and stores, and flights of steps were cut in the rock leading from landing-place to the tower and dwellings, while two iron ladders led down to the north landing; but no attempt was made to improve the landing-places so that it would be safer to bring boats alongside. Three dwellings were built on the mainland at Rock Island, at the entrance to Crookhaven, for the accommodation of the lightkeepers' families.

The tower was finished in 1853 and the light exhibited for the first time on January 1st, 1854.

The cost of the station was £17,390, not including the shore dwellings, which brought up the total cost to about £20,000.

CHAPTER IV

A NEW LIGHTHOUSE PROJECTED AND SANCTIONED

IN November, 1891, the Irish Lights Board resolved that the light on the Fastnet was not sufficiently powerful for its very important position and must be improved by replacing it with a biform oil light of the most powerful kind, having the same characteristics as the existing light. They accordingly applied for the statutory sanction of the Elder Brethren of Trinity House to the undertaking on November 23rd, stating that, in order to carry this out, it would be necessary to build a new tower, but that the Commissioners considered that the importance of the position as the principal land-fall light on the south-west coast of Ireland warranted any expenditure that might be necessary to make it the best possible light.

The Elder Brethren accorded their sanction on December 7th, 1891, stating that they concurred with the Irish Lights Board that the Fastnet, being the principal land-fall light on the south-west coast of Ireland, should be made as powerful as circumstances would permit.

In March, 1892, the Board of Trade sanctioned the expenditure of a sum of £500 on an accurate survey of the rock and the employment of stonecutters to thoroughly examine and test the nature of the rock on the proposed site, and other possible sites, for a new tower, at the same time provisionally sanctioning the proposed scheme. Mr. William Douglass immediately put the survey in hand, which was completed and two models of the rock made to a scale of 10 ft. to the inch by the end of that year. One of the models showed the rock in its then existing condition, and the other as he proposed it should be when the new lighthouse was completed and the old one removed. These models he submitted to the Board, together with an estimate, amounting to £70,387, including the sum of £10,000 for a specially built steamer to be used for landing the materials.

He proposed to build a granite tower 42 ft. in diameter at the lowest course and 147 ft. in height, with the focal plane of the light at 159 ft. above high-water mark, ordinary spring-tides, and the bottom of the lowest course 6 in. below high water. The position of the centre of the tower to be 52½ ft. west 14° south of the centre of the old tower. A landing-pier to be built at the north-east end of the rock and a level causeway, 33 ft. above high water of ordinary spring-tides, formed along the north side from pier to site of tower, with rails laid on it so that the stones, etc., could be readily removed on trucks from the landing to the site. A second level causeway to be formed leading to the door of the tower, 56 ft. above high water, and the top of the rock to be levelled to a height of 75 ft. above high water on the

north side of dwellings and 8 ft. higher on the south and south-west. As soon as the new tower was completed the old tower to be removed.

The site is on the hardest portion of the rock on the north side of the stratum of slate in which the large western chasm has been formed by the sea. Being on the extreme west end of the rock the tower would receive the blow of the heaviest seas before they rose to their full height, and would be perfectly safe even if it should be found necessary to remove the upper part of the rock down to the level of the first complete course. The lower courses would only form a facing on the west side, the rock being cut in steps to receive them.

This scheme was approved of by the Board, and the sanction of the Board of Trade was requested to the necessary expenditure on January 2nd, 1893.

Subsequently the writer, who was then Assistant Engineer to the Commissioners, was sent down to make an examination of the old tower in December, 1894, and having had openings made in the brick lining of the three upper storeys of the tower, found that the plates appeared to be in a good state of preservation and the horizontal joints tight, but the vertical joints in the two top storeys were weeping and the bolts greatly wasted, fully 50 per cent. of those in the top storey and 25 per cent. of those in the second storey, which were visible from the openings made, having actually been broken in two by the working of the joints. None of the bolts in the horizontal joints nor of those in the vertical joints of the third storey appeared to be broken. Mr. Douglass at once requested permission to re-bolt and re-line the tower throughout, using $1\frac{1}{8}$ in. turned bolts and riming out the holes to take them as a driving fit, the new brick lining to be carried up against the inside of the plates and flushed up with Portland cement instead of leaving a 5 in. air-space as was done before.

This was at once sanctioned by the Board of Trade after consultation with the Elder Brethen, and the work was put in hand without delay and completed in July of the same year, 1895.

The entire brick lining was renewed as well as the bolts of the three upper storeys, but the bolts in the fourth storey from the top were not touched, as they proved to be in good condition, being protected by the outer casing. The cost of these repairs amounted to £675.

The fog-signal firing jibs, moreover, were altered so as to increase the distance of the position in which the cotton-powder charges were fired from 6 ft. to 15 ft. from the face of the rock, as it was thought that the explosion of the charges at the shorter distance might have a prejudicial effect on the rock.

Much correspondence and negotiation took place between the Commissioners, the Board of Trade, and Trinity House, and finally the Board of Trade sanctioned the necessary expenditure for building the new Lighthouse on November 28th, 1895.

CHAPTER V

THE DESIGN OF THE WILLIAM DOUGLASS TOWER

MR. DOUGLASS was forthwith instructed to put the work in hand without delay, and the drawings for the new tower were commenced immediately, Mr J. Middleton and Mr. S. W. Nugent being engaged as draughtsmen for this work.

When the drawings for the tower were begun and some quarrying had been effected on the site for the foundation, Mr. Douglass decided to increase the diameter of the base of the tower from 42 ft. to 52 ft., and not to commence the complete courses of masonry until he reached a height of 20 ft. above the foundation of the lowest course, at which level the diameter would be 40 ft. The ten lower courses to be only partial rings forming a facing to the natural rock, and gradually increasing in length on the face from 40 ft. to 80 ft. as they went up. Subsequently three additional courses were found to be required below these, each 2 ft. deep, the radius of the lowest being 28 ft. 3 in. and the length on its face 15 ft. The foundation of this course is 6 in. below high water of ordinary spring-tides. The partial ring-courses extend to 26 ft. above this foundation; then follows a complete portion of solid masonry, comprising twelve courses and 21 ft. 9 in. in height; the next five courses are 8 ft. 9 in. high, and contain a central water-tank, 9 ft. in diameter, with a capacity of 3,250 gallons, divided into two compartments by a central 9 in. brick wall 5 ft. high, to enable one side to be cleared without wasting the store of water in the other side; on top of this is a complete course, 1 ft. 9 in. thick, forming the floor of entrance-room at a height of 57 ft. 9 in. above high-water mark. All the partial ring-courses and the first three solid courses are 2 ft. deep, the next fifteen courses up to and including the entrance-room floor are 1 ft. 9 in. deep, and above that level the remaining courses are 1 ft. 6 in. deep, except the two balconies, which are thicker. Above the entrance-room floor the masonry of the tower extends for a height of 88 ft. 1½ in. divided by granite floors into eight rooms. The entrance-room is 11 ft. 8 in. in diameter by 8 ft. 9 in. high, and has a manhole in the floor giving access to the water-tank, with a raised curb and gun-metal cover bolted down on an india-rubber ring; a pump for drawing water from the tank, with a divided suction-pipe to draw from either or both compartments; a coal bin and space for the storage of such articles as will not suffer if the salt water makes its way in. It is lighted by a single window on the north side and has a heavy teak entrance door, hung 6 ft. in from the face of the tower, and opening inwards, protected in bad weather by a heavy pair of gun-metal doors, of the usual Trinity House dattern, opening inwards and forming a curved surface flush with the wall of the

tower when closed. The opening through door-frames and passage in wall of tower is 3 ft. wide by 6 ft. 9 in. high.

The first floor room is the lower store-room, 12 ft. 4 in. diameter by 9 ft. high, and contains the magazine for storing the cotton-powder charges for the fog-signal and shelving for general stores. The magazine is enclosed by a partition wall 2 in. thick formed of expanded metal plastered on both sides with 2 to 1 Portland cement mortar, the expanded metal being wired on to a framework of 2 in. by 2 in. by $\frac{3}{16}$ in. angles let into floor and ceiling; an oak door, two copper ventilators and a small window glazed with plate-glass $\frac{1}{2}$ in. thick, outside of which a light can be placed to illuminate the magazine at night, are fitted in the partition wall. Two windows are fitted in this room, looking out north-east and south.

The second floor room is the oil-room, 13 ft. diameter by 9 ft. high, fitted up with a bench against the wall, 2 ft. 6 in. wide and 12 in. high, built of white glazed bricks, with a top slab formed of Keen's cement, on which stand the oil-tanks, two slate tables surrounding and supported by the cast-iron central column which forms the weight trunk and runs through from entrance room floor to lantern floor, also a pump for forcing oil from the tanks up to a small supply tank in the lantern. The floor is laid with ceramic mosaic pavement, and there are two windows looking out south-west and south-east.

The third floor room, 13 ft. 8 in. diameter by 9 ft. high, is fitted up as a spare bedroom for the use of workmen or other temporary inhabitants of the tower, and contains a stack of four bunks formed of steel tube framework with diagonal spring-wire mattresses, two side by side and two above them, with a partition between them and behind the head of the bunks formed of two single sheets of compo-board, painted with white enamel; the furniture is completed by wardrobe, lockers, shelves, and a rail with sliding hooks for hanging clothes on, and the floor is covered with cork carpet. The well-hole of staircase is enclosed by a partition wall of expanded metal and cement plaster with oak door, constructed in a similar manner to the magazine; the outside of the door and frame is sheeted with Uralite fireproof sheeting. There are three windows looking out north, east, and west.

The fourth floor room is the principal store-room, 14 ft. 4 in. diameter by 9 ft. high, fitted with presses and shelving, and a special felt-lined cupboard for storing the detonators for the fog-signal charges. The floor is covered with ceramic mosaic, and the staircase well enclosed in the same manner as in the room below, while there are three windows looking north-east, north-west, and south-east.

The fifth floor room, 15 ft. diameter by 9 ft. high, serves as the kitchen, has enclosed staircase well, and ceramic mosaic floor, and is fitted with a cooking range, a circular table surrounding and supported by the central column, washing-up sink of white glazed stoneware, dresser, shelving, bookcase, etc. There are three windows looking out north, east, and south. The smoke flue from range is oval in section, and is carried up vertically—lying flat close to the wall—inside the tower to the level of the lower sill of lantern, where it is twisted through an angle of 90°.

CHAPTER VI

THE MASONRY FOR THE TOWER

IN February, 1897, 170 tons of small blocks of Dublin granite, each 18 in. by 12 in. by 6 in., at £3 12*s.* per ton, were ordered to be used in building the landing-pier and platforms, and filling up weak spots in the foundation of the tower. The drafts round the edges of these stones were to be accurately dressed, and the beds and joints roughly punched inside the drafts so as to leave no projecting portions.

The supply of the granite for the tower was divided into two separate contracts, each of which were secured by Messrs. John Freeman & Sons, of Penryn, Cornwall. The first contract included a supply of 450 tons of small squared blocks, 18 in. by 12 in. by 6 in., and courses 1 to 28, that is the whole of the partial ring-courses and the complete solid courses up to the base of the water-tank, the entire habitable portion of the tower being comprised in the second contract. The reasons for this division of the work were that as the lower courses would soon be covered with green weed, the colour of the stone and fineness of grain would be comparatively unimportant so long as a good hard granite was procured for the face stones, while the internal stones of the solid portion might be allowed to consist of coarse-grained granite. This lower portion could therefore be accepted from firms with less experience of this class of work than would be required for the upper portion, and a lower price obtained on account of the greater competition. The whole of the upper portion had to be of a good hard, fine-grained granite of uniform colour, free from black marks and all other defects, very finely dressed, both inside where it forms the walls of the rooms, and on the external face.

The beds and joints throughout were specified to be roughly punched or picked, with wide margins chiselled dead true, the bed joints being left $\frac{1}{4}$ in. wide, and the end and back joints $\frac{3}{16}$ in. at the margins, the punched portions inside the margins being worked slightly hollow rather than full. Lewis holes were to be cut vertically over the centre of gravity of each stone, and every stone was to have its arises protected by timber casings during transport. The stones were to be delivered alongside the quay at Rock Island, and slung to the crane by the contractor, the landing being performed by the Commissioners' men.

The first sixteen courses have vertical faces, with weathered offsets in front of the stone next above them, raised $\frac{3}{4}$ in. above the bed, and varying in width from 8·63 in. on the lowest course to 4·98 in. on course 16 as they follow the curve of the ellipse; from the top of course 16 upwards the face of the stones is cut to the curve of the ellipse. The backs and ends of the thirteen partial ring-courses are battered 1 in 10, and the rock is cut out to fit them fairly close, or, where it is wanting, built up to them with

the small blocks. Each of these courses is of uniform width from end to end, and has a projecting dovetail on top 2 ft. wide, where it rises from the top bed, and 2 ft. 0·62 in. wide on top, by 3 in. high, following the curve of the face of the stone, and fitting into a dovetail groove in the bottom of the next course, which is 2 ft. 0·62 in. wide at the bed, and 2 ft. 1·24 in. wide at the top of groove. Similar vertical dovetails connect the ends of adjacent stones. The bottom course of all is sunk 3 in. into the rock, and has a batter of 1 in 10 on its face. The widths of these courses on their lower beds vary from 5 ft. 6 in. on number 1 to 6 ft. 8½ in. on number 13, and their lengths were governed by the condition of the rock, several spare stones being obtained in case it should be found necessary to cut away more rock than was anticipated when the beds for the foundation were cut, and five or six of the courses did require some of these additional stones. The ends of these courses are all battered 1 in 10 to house into the rock against which they butt, and the closer was supplied with one end cloven, to be cut to the correct size on the rock after the other stones of the course were set.

The solid courses consist each of either three or four complete concentric rings of stones, with a centre stone which is sunk half its depth into the course below and rises to half the height of its own course; these centre blocks are alternately 6 ft. 6 in. and 4 ft. 6 in. in diameter, and the projecting 12 in. of the alternate courses are cut as a dovetail so as to grip the rebated tails of the rings of stones immediately surrounding them. The latter rings have their outer faces cut to form vertical dovetails to grip the tails of the next ring outside them, and the outer or facing ring, in addition to being dovetailed to the ring inside of it, has similar bed and joint dovetails to those on the partial ring-courses. This construction is adhered to up to course 30, except that the centre blocks are omitted and the inside rings cut out to an inside diameter of 9 ft. from course 25 to course 30 to form the water-tank, and courses 26 to 30 consist of two rings only, while course 30 has two ring dovetails each 1 ft. 2 in. wide on its top bed, one on the outer and one on the second ring of stones, to bond it to the entrance floor course. This floor consists of three rings, the stones of the two outer rings being laid alternately header and stretcher in addition to having the two ring bed dovetails and the usual vertical dovetails. The floor surface is cut with a fall of 2 in. towards the door.

The walls of entrance-room, courses 32 to 36, consist of two rings of stones, each having bed and joint dovetails, the former being stopped 6 in. from the jamb faces of door and window openings.

Above this level every course except the floors consists of a single ring of stones with bed and joint dovetails which gradually decrease in width 2 ft. to 10 in., maintaining a uniform depth of 3 in. and a uniform splay.

The lower store-room and oil-room floors are composed of two rings and a circular centre stone cut in two on a diameter, and the upper floors of a single ring of long narrow stones, and a circular centre stone divided in two on a diameter, except the service-room floor, in which the centre circular stone is in four pieces and

the ring stones are carried out to form the lower balcony. All the divided centre stones have vertical dovetails connecting the two or four parts to one another and to the tails of the ring stones, while they rest in a splayed rebate cut in the latter.

This system of dovetail joggles absolutely bonds the entire structure into a virtual monolith, as no stone can possibly be extracted until every stone above it has been removed and it is lifted in a vertical direction, and even then it must break off the dovetailed joggle of the course below it, as the cement used in the bed flows into and completely fills the space between the male and female dovetails. It is the same system as that which has been adopted in the later Trinity House rock towers.

The total number of stones in the tower is 2,074, having a nett cubic content of 58,093 cubic feet and a weight of 4,300 tons. The gross measurement on which the contractor was paid amounted to 72,624 cubic feet; 8,220 cubic feet being in the partial ring-courses, 34,033 cubic feet in the solid portion up to and including the entrance floor, and 30,371 cubic feet in the habitable portion. The gross measurement works out just 25 per cent. in excess of the nett, and is calculated on the smallest block with six plane faces, four vertical and two horizontal, out of which each stone can be cut. The weights of the individual stones vary from $1\frac{3}{4}$ to 3 tons. In addition to this 4,500 cubic feet of small squared blocks were used to fill in holes in the foundation and the space between the rock and tower, up to the level of entrance gallery, making a nett total of 62,600 cubic feet.

The entire tower was erected in sections of six to eight courses at a time in the contractor's yard in Cornwall and inspected there by either Mr. Douglass, the writer, or Mr. Foot, the Resident Engineer, before shipment, the top course of each setting being retained to form the bottom course of the next setting, and the gun-metal shutter frames were all fitted in their places when the courses were erected in the contractor's yard, so as to reduce the amount of stone-cutting to be done on the rock to a minimum. The stones were set in the yard on strips of sheet lead in the position they would occupy when set permanently on cement beds. No Inspector was kept by the Commissioners in the contractor's yard, and no stones were definitely accepted until after a thorough examination on delivery at Rock Island, but it was not necessary to reject any of the stones delivered.

CHAPTER VIII

THE PREPARATION OF THE ROCK AND BUILDING OF THE SOLID PORTION OF THE TOWER

IN August, 1896, James Kavanagh, the Board's retort setter, who was a good all-round mason, was sent to the rock to start the preparation of the landing-place at the east end of the rock, and the foundation for the new tower, also the erection on the rock of stores for building materials and a barrack for the workmen.

A small boiler and steam-winch capable of hoisting one ton direct from the barrel were obtained and erected at the east end of iron dwelling to assist in landing cement, sand, etc.

Schull Harbour, at the terminus of the nearest railway, was originally decided on as the most suitable place for a shore depot and stone-yard, but it was found to be impossible to obtain suitable ground there, except at a hopelessly extravagant rent; consequently it was decided to build a quay at the west end of the Commissioners' premises on Rock Island, in Crookhaven Harbour, and to use for the depot the land belonging to the Fastnet shore dwellings which are situated there; the quay to be 125 ft. in length, formed by facing up the existing rock, which runs in a straight line, and has a depth of three fathoms in front of it at low water of spring-tides.

In May, 1897, Mr. F. R. Foot was appointed Resident Engineer, and at once proceeded to Rock Island to take up his duties. He had been previously employed by the Commissioners as Resident at the building of the New Island and Bull Rock Lighthouse Stations, both of which he had completed to the entire satisfaction of the Commissioners and their Engineer.

Before the *Ierne* was built and ready for work the steam tug *Knight of the Cross* was chartered for six months in 1897, and again for six months in 1898, to attend on the work and take out the workmen and materials to the rock, Mr. H. Maunders, the junior officer of one of the Commissioners' steamers, being given command of her.

During 1897 the pier, workshops, and barrack at Rock Island were built, part of the stone-yard gantry erected, and the magazine commenced; while on the rock a masonry store, barrack for workmen, and water-tanks were built, the pier and tramway nearly completed, and a small part of the quarrying for the foundation of the tower carried out. The sea, however, was so rough during the latter half of the summer that the men were very seldom able to get down to do any work at the foundation.

In 1898 a number of Cornish quarry-men and stone-cutters were brought over and succeeded in completing most of the heavy quarrying and in cutting out the beds

for a considerable number of the lower partial ring-courses. The tramway and pier were completed, the big steam landing-winch and boiler erected, further accommodation for the workmen built, and a good deal of work done at the boat-landing. On shore the pier was completed, steam wharf-crane erected, gantry and buildings finished, and courses 1 to 13 were unloaded and stacked in the stone-yard.

The magazines were completed and work commenced on the first keeper's dwelling.

The work on the rock was started again at the end of March, 1899, and, the *Ierne* having now been handed over by her builders and Capt. D. P. Fleming appointed to command her, it was hoped that an early start would be made at setting the big stones of the tower. Constant bad weather, however, delayed the completion of the cutting of the rock for the lowest courses, and at the end of May Mr. Douglass went down to personally superintend the work and see whether his great experience of similar work would not enable him to push it on somewhat more rapidly. By June 8th the foundation of the first course was ready, and, being a fine day, the *Ierne* was moored close to the rock and the landing-gear thoroughly tested by landing heavy loads of small granite blocks, sand, and water direct from the ship. On the 9th the first two stones were landed and set, but, an accident occurring to the landing-gear, no more could be done that day. On the 13th the remaining two stones of the first course and three of the second course were landed and set; six stones on the 16th, three on the 22nd, and seven on the 27th, completed the first four courses, and, the weather again becoming rough, and all hands now thoroughly understanding the work, Mr. Douglass returned to Dublin, and, having overtaxed his strength at the rock, was compelled to take several weeks' sick leave.

The partial ring-courses were completed, and the foundation was ready for the first solid course by the end of August, and during September this course, No. 14, consisting of 73 stones, was completed, the best day's work for the season being the landing and setting of 22 stones on the 2nd of this month. The total number of stones for the year was 268. The weather having completely broken at the end of the month, no further attempt was made to set more stones, but the gear was removed, and a good deal more rock-cutting was done during the next two months. All the stone up to and including course 22 had been delivered by June of this year, but no more was received till twelve months later, owing to some heavy falls of rock in the Carnsew quarry making it impossible for the contractor to get the right class of stone until the slips had been cleared away.

Mr. Douglass returned to the office to resume his work at the end of September, but soon knocked up again, as he had completely overworked himself, and after making two further attempts to resume duty, he finally resigned in September of the following year, to the great regret of the Commissioners and all concerned in the undertaking, as there was probably no man in the world so well fitted by experience to carry through this important and difficult piece of work. He had, however, so thoroughly mapped out the methods to be employed in the completion of the masonry that the

writer, on whom devolved the duty of carrying on the work, found it quite unnecessary to depart from the lines he had laid down in any important particular.

Before he resigned he had designed the entire masonry, together with the landing- and setting-gear, down to the minutest detail, and laid down the outlines of the designs for stairways and gun-metal door, windows, and storm-shutters, with the assistance of Mr. S. W. Nugent, as Mr. Middleton had obtained a better post elsewhere after the first six months.

The lantern and optical apparatus, the temporary light arrangements, and the various fittings of the tower, were designed by the writer, with Mr. Nugent's assistance.

Work was again commenced on the rock in April, 1900, and a good start was made on the 25th of the month with 25 stones of course 15 landed and set.

The work of setting the stones proceeded with fair regularity, as far as weather permitted, up to September 11th, one favourable week having been lost at the end of August owing to the failure of the contractor to deliver the stone up to time.

The best days' work for this season were on May 25th and 26th, on each of which 31 stones of course 18 were landed and set. The writer was present on the rock on the 17th of this month, and witnessed 28 stones being landed and set in $4\frac{3}{4}$ hours, another 2 hours being occupied in grouting the joints.

The last course to be set was number 35, making 21 courses, composed of 939 stones, set during the season. There were 42 days on which stones were landed and set, giving an average of over 22 stones each day.

Mr. Douglass was able to land on the rock at the end of September, and expressed himself as highly pleased with the progress made, and the manner in which the work had been executed.

The steam-hoist on top of the rock, and hoisting-derrick on upper rock gallery, and the old tubular steel landing-mast with elm topmost and long setting-jib, were used this season; and a new boiler of larger capacity than the first was installed to drive the landing-winch.

As the work proceeded all spaces between the face of the tower and the rock up to the level of the entrance gallery were filled in with rubble masonry set in cement mortar.

CHAPTER XI

THE COMPLETION OF THE MASONRY

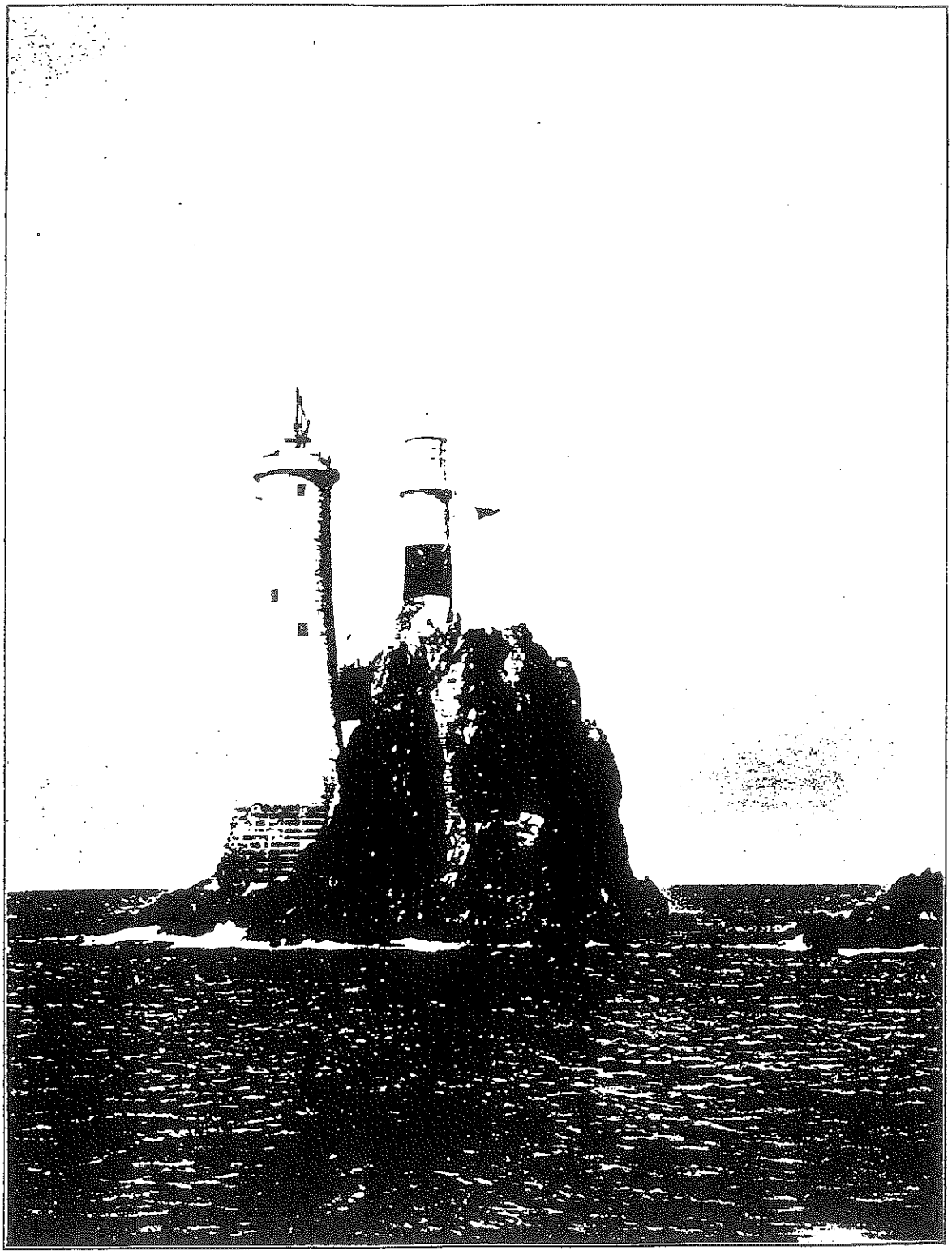
THE *Ierne* returned to the Fastnet at the beginning of March, 1903, and landed the temporary light apparatus, which was erected at once, and the light exhibited on May 19th; but, owing to continuous heavy swell, it was impossible to land any stones until the 26th, when course 87 was set, and the last course, No. 89, was completed on June 3rd.

The setting of the entire masonry of the tower had thus been completed in one week under four years, half of the 1902 season having been lost through non-delivery of the stone by the contractors owing to causes which appear to have been entirely beyond their control. Not a single stone was lost or seriously damaged, the only damage of any kind being that about sixteen stones had very slight chips knocked off their arrises, the bulk of these occurring at the contractor's yard, as only six were chipped during the building of the tower on the rock. All the chips were cut out and small pieces cemented in to make good the defect, and it would be practically impossible to find any of the damaged stones now, even by the most careful scrutiny of the face of the work. The entire stonework is of exceptionally good uniform colour and texture, and the amount of dressing after the stones were set, owing to the two surfaces at a joint not coming quite fair together, was very small. Every course was carefully checked on its completion, and the greatest variation from the figured dimensions on the drawings on any course is $\frac{1}{4}$ in. in the diameter. A steel tape trammel working round the steel setting-mast was employed for these measurements, and gave results true within a maximum error of $\frac{1}{16}$ in. Checked by a plumb bob suspended from the top of the tower, the variation from the vertical is under $\frac{3}{16}$ in.

The very greatest credit is due to Mr. Douglass and every one concerned in the drawing office, the contractors' yard, on board the *Ierne*, and on the rock, for this almost faultless specimen of masonry that has been erected on this isolated and exposed rock.

The foreman, James Kavanagh, who lived on the rock by his own desire continuously from ten to twelve months every year, from August, 1896, to June, 1903, when he completed his work, having set every stone of the tower with his own hands, came on shore at the end of June complaining of illness, and died of apoplexy on July 6th.

The number of men living on the rock during the summer months varied from eleven to fifteen, in addition to the foreman, four to six additional hands being landed on the rock on any day that stones were set. But in 1899, when the rock was being cut for the foundations at the same time that stones were being set, as many as twenty-two men lived on the rock, not counting the light-keepers.



THE FASTNET FROM THE SOUTH-WEST, AUGUST, 1902

CHAPTER XIV

THE ERECTION OF THE LANTERN AND THE LOSS OF SOME APPARATUS

THE entire optical apparatus and lantern were constructed by Messrs. Chance, of Birmingham, and the first consignment, consisting of the lantern floor and blocking of lantern, arrived at Schull in July, 1903, just four weeks after the last course of masonry had been set. The steel setting-mast had been removed in the interval, and a light derrick put up for use in the erection of the lantern, while the cast-iron weight trunk and other internal fittings had been erected.

The lightning-conductor had been carried up as the work proceeded, and attached to a brush fixed to the top of setting-mast, but was now being connected by copper tape with all the metal fittings.

The erection of the lantern was proceeded with at once on its arrival, but the work was much delayed by bad weather, which rendered it impossible to work at the outside of the lantern, and it was not until September 24th that the riveting up of framing and roof was completed, the glass fixed, and all in readiness for the erection of the lighting apparatus. A section of the framing was left out on the north-east side to enable the pedestal and apparatus to be taken into the lantern.

The demolition of the old tower had been proceeding from time to time during the summer whenever hands could be spared to work at it, and the dioptric apparatus, lantern, and gallery course had been taken down, and were sent to Kingstown in the *Ierne* when she went up on September 14th to get the pedestal and apparatus, which were then delivered by the contractor. The steamer returned on the 26th, having been delayed for some necessary engine-room repairs, and lost one fairly fine day on which she might have been able to land part of the pedestal if it had arrived in time. It was, however, only a doubtful landing, and on the 26th the sea was again very rough, and remained unfit for any attempt to be made at landing the big cases until Thursday, October 8th, when the sea went down, and the weather showed every sign of giving them a good fine spell. As it was now so late in the season, and the opportunities of getting fine enough weather to land heavy articles were certain to be few and far between, it was decided to risk landing the entire pedestal, with mercury trough, float, and revolving table, on the one day, and then leave the men on the rock without any interruption from the steamer to get all into position as quickly as possible. It was anticipated that not more than three or four days of fine enough weather for landing cases were likely to be got, but the weather appeared to be settled, and it was probable that very little risk would be run by landing more cases than could be got into the lantern at once, and that if this course were not followed

there would be no chance of getting the light completed before the end of the year. As there is never any favourable opportunity of landing heavy cases from December to March, this would mean deferring the work till the following spring, and another season's work with the steamer would mean a big additional expense.

All the cases were therefore landed, and such small articles as could be stowed in the base of the tower were placed there. The mercury trough, float, and trimming stages were hauled up to the base of the old tower and securely lashed; the sections of the pedestal hoisted into the lantern and erected in position; and the revolving table and cornice were lashed to stanchions and eyebolts on the upper rock gallery, near the door of the new tower, on Saturday evening, October 10th, ready to be hoisted into the lantern the first thing on Sunday morning. On this evening there was a fresh wind from S.S.E., with a fairly smooth sea, and no appearance of any real break in the weather, and when the men went down for a final examination of all lashings, etc., at 10 p.m., no heavy sea was anticipated; but shortly after midnight a violent gale from S.S.E. came on very suddenly, a tremendous sea got up in an incredibly short space of time, and at 4 a.m. was going clean over the rock.

The sea broke the mercury float on top of the rock, and carried away the revolving table, the lower trimming stage, the brackets for supporting same, and portions of the cornice.

Mr. Foot was immediately instructed to take the first opportunity to remove the whole of the remaining portions from the rock, and return them to Birmingham, to enable the missing and damaged parts to be replaced, and the whole fitted together again complete in the workshops. All was taken off safely by October 27th, and the lantern closed up and glazed.

As it was not considered advisable to trust to the temporary lanterns during the winter months, the old Fastnet pedestal and clock were rapidly erected in the new lantern and a light steel frame carrying four faces of three reflectors each erected on it. This apparatus was landed on October 31st, and the light from it exhibited on November 12th, the reflectors being removed from the temporary lanterns and used on this new temporary light. Some little difficulty was experienced in getting the machine to keep time, as its speed had been increased by 50 per cent., but the addition of some lead weights to the rising part of the governor made it all right and it then kept better time than it had done formerly with the old apparatus.

The total cost of replacing the damaged and missing portions of pedestal, including transport backwards and forwards, and labour removing from rock and landing again, amounted to about £300. But if the weather had remained fine for one more day the new light might have been exhibited about the end of December, and fully £1,000 saved. After a most careful investigation, the Commissioners decided that it had been well worth while to run the risk, and that every proper precaution had been taken to make the risk as small as was possible under the circumstances.

During October and November the ceramic mosaic on the floors of store-room, oil-room, kitchen, and service-room was laid, and the permanent furniture fitted into

its place. The two top rooms of the old tower were also taken down and the cast-iron plates sent on shore, the brick lining being used to build up the platform on top of the rock. The *Ierne* returned to Dublin to lie up on December 2nd, and the last of the workmen came on shore in the lifeboat on the 17th.

During a heavy gale at the beginning of January, 1904, several seas struck the bottoms of temporary lanterns, bulging them slightly upwards, and shaking some of the wedges out of the framing.

A fitter, carpenter, two labourers and an engineer from the Marconi Wireless Telegraphy Company, were sent out to the rock on the 20th to secure the temporary lanterns and to erect the wireless telegraphy plant and the signal-flag masts on the roof of the lantern, and to repair the landing which had been damaged by the sea.

These jobs were completed by February 4th, but the men could not be taken off until the 25th, owing to continuous bad weather. They all came on shore then except Mr. Rickards, the Marconi Company's Engineer, who remained for some months on the rock to instruct the light-keepers in the use of the telegraph apparatus and to experiment with various aerials.

Several attempts were made to utilise the metal-work in the tower in lieu of an aerial wire, but though this was found to answer admirably as a receiver, it was not successful as a transmitter. Consequently a vertical galvanised steel wire has been fixed at the north-east side of tower stretched from the upper gallery to the window of lower store-room, supported by six gun-metal brackets with porcelain insulators, which answers very well.

From this time the rock has been used as a regular Lloyds' signal station, receiving flag-signals from passing ships and telegraphing the messages ashore to the Brow Head signal-station.

The light-keepers perform all the signalling and telegraphy, and Lloyds pay to the Irish Lights Board the expenses incurred in keeping an additional keeper at the station.

CHAPTER XVI

THE ERECTION OF THE LIGHTING APPARATUS

ON April 21st Mr. Foot and the *Ierne* returned to Crookhaven with the apparatus and pedestal, the lost and damaged portions having been replaced. Additional workmen were landed the following day to get the landing- and hoisting-gear in order, and to refit the temporary light in the outside lanterns. This light was exhibited again on the night of April 29th, and the apparatus for the winter temporary light was at once removed from the lantern and the side of the lantern opened up again to admit the permanent apparatus, the contractor's foreman, who superintended the erection of the lantern and apparatus, returning to the rock on that day.

The first opportunity of landing any of the big cases occurred on Sunday, May 8th, when the six segments of pedestal, floor-plate, and clock were landed, and the erection commenced on Monday, on which day a couple of cases of small parts were landed.

On the 16th Mr. Foot had to go away on sick leave, and on the 17th the remainder of the pedestal, with the mercury trough and float, were landed.

On the 20th the lower tier of lenses and the trimming-stages were landed, although they were not quite ready for them on the rock. On the 27th a lamp-fitter went out to erect the burners and fittings, and all the lenses were up in their places by May 31st.

Mr. Foot returned to duty on June 6th, a good deal better in health, but he did not succeed in really shaking off his illness, which was caused by exposure on the rock, for several months.

On June 7th Captain Fleming resigned his command of the *Ierne* in order to take up his duties as captain of the T.S.S. *Alexandra*, the Commissioners' new steamer, which was then just ready for launching, and he was required to put her into commission as speedily as possible. He had remained in command of the *Ierne* during the whole period of building the new Lighthouse, and was responsible for the landing of all stone and materials, and had assisted Mr. Foot in both the rigging up of the derricks on the rock and in the superintendence on the rock when the big stones were being landed and set, as it was impossible for one man to keep his eye on both the landing of stones on the pier and the setting of them on the tower at the same time.

Mr. L. Brady, the junior officer of one of the other Irish Lights' Steamers, was put in command of the *Ierne* till the completion of the work.

Over a fortnight was spent working at the clock because it could not be got

to run at a regular speed, owing to the fact that it had been lying in its case for over a year, and the bearings had got corroded, and it was not till June 25th that it was keeping fairly good time, and the contractor's foreman fitter was able to return home. By this time the lamps and burners were ready, and the writer went down on the 27th, and had the new light exhibited on that night and the temporary light extinguished. Everything worked well, but there were a few small details which he found requiring further adjustment in order to obtain the best results, and get over a variation of about two seconds in the minute in the speed of revolution of the apparatus.

It was a beautifully fine night, and no difficulty was experienced in landing on the rock shortly after midnight; but as twilight lasted all night, and there was a brilliant full moon, the light did not show off at all at its best. The next night, however, was very thick, with alternating periods of heavy rain and very thick driving mist, and the great penetrative power of the light showed up to great advantage, illuminating the mist in a most wonderful manner. In weather of this kind the large surface of the lenses from which the light is shown enables it to illuminate and pierce the mist in a much more effective manner than a rather more powerful electric beam thrown from lenses of much smaller area can do; as if two beams of equal total intensity are shown from apparatus with a considerable difference in the area of the dioptric panels, the large one will generally be found to possess a very considerable advantage in thick weather, when the lights are nearly obscured, the larger number of rays, although each individual one is of less power, having a better chance of some few of them finding their way through the unhomogeneous mist. This is probably the reason why the big triform and quadriform gas-lights on the Irish coast, although of no very great power, show up so well in haze and mist.

The whole of the temporary light gear was taken down and removed from the rock by July 9th, and the erection of the gallery railings was then proceeded with.

The work of taking down the old tower had been proceeding steadily whenever the men could be spared from the more important work on the new tower; but it proved a most difficult and tedious job, as the brick and cement lining put in when the tower was rebolted in 1896 proved most difficult to cut out, having set into an exceedingly hard and tough mass. If the tower had been pulled down in 1896 it would not have taken one-third of the time to do the work.

Mr. J. W. Tonkin, one of the draughtsmen in the Engineer's Office, was sent down to get the final adjustments of the clock and apparatus right, and when he left on July 16th the apparatus was going very well, the maximum variation being under five seconds in the hour. The lamp-fitter came off on the same day, having completed all the work in connection with the burners.

CHAPTER XVIII

THE COMPLETION OF THE WORK

DURING the months of August and September the level platform on top of the rock was completed and the old tower was taken down to the top of the outer casing, at which level the alternate plates had to be cut through, and a concrete roof was put on at this level with sheets of expanded metal embedded near the bottom skin of concrete. A manhole of sufficient size to enable the oil-tanks to be taken in and out was formed in this roof with a cover bolted down on an india-rubber ring so as to be watertight; and a portion of the old weight trunk was left projecting 10 in. above the roof, on which was fixed a cast-iron ventilator with twelve 3-in. air-inlets or outlets, under each of which is an india-rubber ball in a guide which will float up and close the inlet if the ventilator should be submerged by a sea. An earth closet was formed on the lower balcony by fixing an iron frame covered with expanded metal plastered on both sides with cement plaster between the two galleries, fitted with a glazed teak door and a Moule's patent earth closet.

In the angle behind this a meat-safe was fixed, and a vertical sun-dial secured on the outside of the lantern blocking on the south side.

Two painters were at work also during these two months, cleaning up and painting the ironwork and oiling and varnishing the woodwork, while the fitters were engaged dismantling the winches and boilers. These were removed off the rock at the end of September and beginning of October, and several attempts were made to remove the solid steel top-mast of landing-derrick, which is not required any longer, a short elm mast being now stepped in the steel tube lower mast for use with the hand-winch and long light derrick. These attempts were continued whenever an opportunity appeared to make it possible up till the middle of October; but on no occasion did the sea remain smooth for long enough to get it off, at least two hours of smooth water being required for the operation, only a hand-winch being available.

Finally it was decided not to waste any further time over it, so it was secured in a groove cut in the tramway gallery, by concreting it in such a manner that it can easily be cut out whenever an opportunity offers for taking it off.

The gantry and temporary timber buildings at Rock Island were dismantled during the summer and autumn months, and brought up to Kingstown by the *Ierne*, along with the cast-iron plates of the old tower and the plant from the rock.

The steam wharf crane at Rock Island was the last thing to be taken down. The whole of the old metal and the steam hoisting-plant have been sold by tender; the setting-mast and gear have been taken into store, for use at any future Rock Lighthouse; the gantry crane will be used for handling buoys at a buoy depot,

and the *Ierne* will be retained in the service to attend on the southern rock stations of the west coast in place of the *Moya*, which has been sold, for which work the former is particularly well adapted.

The second shore dwelling was completed about the same time as the work on the rock, and the *Ierne* made her last trip with old plant and gear to Kingstown, on November 18th, after taking the last of the workmen off the rock. She was then docked to have new liners fitted to her shaft bearings, her engines and boilers overhauled and put in thorough repair, her bottom cleaned and coated, and handed over to the Inspector's department to take up her new duties as attending steamer on the southern rocks.

The staff of keepers at the Fastnet Rock numbers six—four at a time being on the rock, and two on shore. Two men are changed at each relief, which is carried out by the attending steamer, whose head-quarters are at Castletown, Berehaven, and whose sole duty is the attendance on the Fastnet, Bull, Roancarrig, Skelligs, and Tearaght Lighthouses. The reliefs are made twice in each month, if the weather allows, so that each keeper spends alternately a month on the rock and a fortnight on shore. One man has to be kept on watch during the day-time to look out for fog and to signal passing ships, and two at night—one to attend the light, and the other to signal and look out for fog. As soon as fog is seen coming on, another man is promptly called up to work the fog-signal.

The annual cost of maintenance and repairs of the station amounts to about £1,000, not including any share in the cost of steamers, office, and district stores expenditure, or travelling expenses of keepers going from one station to another. Of this sum £200 is re-paid to the Commissioners by Lloyds for the services of the additional keeper employed for signalling ships, which sum includes a share of the office expenses, etc. The cost of oil, mantles, etc., for the light is about £45, and that of ammunition for the fog-signal about £260 per annum on an average.

APPENDIX I

WORKING DAYS AND NUMBER OF STONES SET EACH DAY

9	June,	1899,	2	stones of	Course		1
13	„	„	2	„	„	„	1
			3	„	„	„	2
16	„	„	2	„	„	„	2
			4	„	„	„	3
22	„	„	2	„	„	„	3
			1	„	„	„	4
27	„	„	7	„	„	„	4
29	„	„	12	„	„	„	5
9	July,	„	14	„	„	„	6
13	„	„	12	„	„	„	7
24	„	„	6	„	„	„	7
27	„	„	16	„	„	„	8
28	„	„	3	„	„	„	8
29	„	„	14	„	„	„	9
2	August,	„	3	„	„	„	9
			13	„	„	„	10
4	„	„	1	„	„	„	10
			2	„	„	„	9
9	„	„	6	„	„	„	10
10	„	„	22	„	„	„	11
14	„	„	23	„	„	„	12
16	„	„	23	„	„	„	13
17	„	„	1	„	„	„	13
2	Sept.,	„	22	„	„	„	14
7	„	„	21	„	„	„	14
11	„	„	7	„	„	„	14
15	„	„	2	„	„	„	14
29	„	„	12	„	„	„	14
25	April,	1900,	25	„	„	„	15
27	„	„	18	„	„	„	15
28	„	„	28	„	„	„	15
30	„	„	26	„	„	„	16
9	May,	„	26	„	„	„	16
16	„	„	13	„	„	„	16
17	„	„	28	„	„	„	17
18	„	„	27	„	„	„	17
25	„	„	31	„	„	„	18
26	„	„	31	„	„	„	18
29	„	„	25	„	„	„	19
30	„	„	25	„	„	„	19
31	„	„	28	„	„	„	20
1	June,	„	28	„	„	„	20
13	„	„	25	„	„	„	21
18	„	„	24	„	„	„	21
26	June,	1900,	29	stones of	Course		22
27	„	„	5	„	„	„	22
28	„	„	23	„	„	„	22
4	July,	„	24	„	„	„	23
5	„	„	23	„	„	„	23
6	„	„	28	„	„	„	24
9	„	„	10	„	„	„	24
16	„	„	17	„	„	„	24
17	„	„	24	„	„	„	25
18	„	„	21	„	„	„	25
19	„	„	22	„	„	„	26
20	„	„	18	„	„	„	26
23	„	„	18	„	„	„	27
24	„	„	18	„	„	„	27
25	„	„	18	„	„	„	28
26	„	„	18	„	„	„	28
11	August,	„	18	„	„	„	29
13	„	„	18	„	„	„	29
15	„	„	18	„	„	„	30
16	„	„	18	„	„	„	30
24	„	„	28	„	„	„	31
25	„	„	12	„	„	„	31
4	Sept.,	„	26	„	„	„	32
5	„	„	26	„	„	„	33
6	„	„	25	„	„	„	34
7	„	„	26	„	„	„	35
3	July,	1901,	4	„	„	„	36
4	„	„	13	„	„	„	36
5	„	„	10	„	„	„	36
11	„	„	2	„	„	„	36
			19	„	„	„	37
13	„	„	10	„	„	„	37
23	„	„	16	„	„	„	38
26	„	„	11	„	„	„	38
29	„	„	16	„	„	„	39
30	„	„	18	„	„	„	40
31	„	„	16	„	„	„	41
2	August,	„	18	„	„	„	42
3	„	„	20	„	„	„	43
5	„	„	16	„	„	„	44
22	„	„	25	„	„	„	45
23	„	„	16	„	„	„	46
24	„	„	17	„	„	„	47
28	„	„	15	„	„	„	48
29	„	„	15	„	„	„	49

WORKING DAYS AND NUMBER OF STONES SET EACH DAY—*continued.*

24	Sept.,	1901,	18	stones	of	Course	50
30	„	„	15	„	„	„	51
10	October,	„	17	„	„	„	52
5	May,	1902,	17	„	„	„	53
6	„	„	16	„	„	„	54
7	„	„	16	„	„	„	55
8	„	„	13	„	„	„	56
9	„	„	15	„	„	„	57
13	„	„	16	„	„	„	58
			2	„	„	„	52
14	„	„	16	„	„	„	59
20	„	„	16	„	„	„	60
22	„	„	16	„	„	„	61
23	„	„	14	„	„	„	62
9	June,	„	13	„	„	„	63
10	„	„	12	„	„	„	64
		„	2	„	„	„	59
11	„	„	16	„	„	„	63
16	„	„	17	„	„	„	66
17	„	„	16	„	„	„	67
1	July,	„	12	„	„	„	68
2	„	„	12	„	„	„	69
			11	„	„	„	70
3	„	„	12	„	„	„	71
			12	„	„	„	72
			2	„	„	„	66
8	July,	1902,	16	stones	of	Course	73
11	„	„	12	„	„	„	74
12	„	„	12	„	„	„	75
			12	„	„	„	76
15	„	„	12	„	„	„	77
			12	„	„	„	78
17	„	„	15	„	„	„	79
			3	„	„	„	73
18	„	„	14	„	„	„	80
21	„	„	29	„	„	„	81
30	„	„	12	„	„	„	82
			13	„	„	„	83
1	August,	„	12	„	„	„	84
			12	„	„	„	85
11	„	„	12	„	„	„	86
26	May,	1903,	12	„	„	„	87
29	„	„	18	„	„	„	88
2	„	„	18	„	„	„	89

14	Courses consisting of	268	stones set in	1899.
21	„	939	„ „	1900.
17	„	327	„ „	1901.
34	„	492	„ „	1902.
3	„	48	„ „	1903.

TOTAL.—89 Courses, consisting of 2,074 stones, having a nett cubic content of 58,093 cubic feet (72,624 cubic feet gross), and weighing 4,300 tons, landed and set in 118 working days, to which must be added 4,500 cubic feet of granite blocks, 18 × 12 × 6 in., used to fill in holes in the foundation, and the space between tower and rock up to the level of the entrance-gallery. This makes a total of 62,600 cubic feet of masonry, weighing 4,633 tons.

APPENDIX IV

COST OF THE WORK

IT was not considered that it would pay to employ time-keepers to keep an accurate record of the exact number of hours spent by each man on each part of the work, or the exact quantities of sand, cement, consumable stores, etc., to be debited to each portion, consequently an accurate detailed statement of cost cannot be given.

The following approximate statement, however, has been compiled from the accounts and from Mr. Foot's notes on the approximate amount of time, quantities of materials, etc., and may be taken as being a true statement in round figures.

The total cost is almost exactly £90,000, to which must be credited the amount obtained by the sale of some of the plant, plus the selling value of the *Ierne* handed over to the Inspector's Department, viz. £6,000. Deducting the cost of dwellings and magazines at Rock Island, the dismantling of the old tower, the formation of new landings and platforms on top of the rock, the temporary light, and other items not directly connected with the building of the new tower, the total comes out under £79,000, which is at the rate of £1 5*s.* 3*d.* per cubic foot of masonry in the tower.

The cost of the stone delivered alongside the quay at Rock Island, including the small squared blocks, averaged 8*s.* 5½*d.* per cubic foot nett; cement about 52*s.* per ton, and sand about 5*s.* per ton. The sand was obtained by the *Ierne* from the tailings of old copper mines near the shore at Ballydonegan Bay at the entrance to Kenmare River, which could only be approached in unusually fine weather; the steamer's expenses are not included in the cost.

The original estimate prepared in 1892 amounted to £64,000, after allowing for sale of steamer, plant, etc., but this only provided for a tower containing 47,000 cubic feet of masonry, whereas the tower built contains 62,600 cubic feet, and was based on prices of labour and materials ruling at that date, which were very much below those obtained between 1896 and 1904, when the work was in hand.

A supplementary estimate prepared when the work was half done amounted to £91,500, including magazines and dwellings, which were not included in the original estimates, and making no allowance for sale of plant, etc.

A considerable amount of work done at pier and landing-place was washed away by the sea several times before it had time to set hard, and large quantities of sand and cement were washed off the rock or spoiled by the sea.

As it was intended from the first to retain the *Ierne* in the service on the completion of the work, much more has been expended on her upkeep and repairs than need have been spent if it had been intended to sell her on the completion of the work; and she was thoroughly overhauled and all defects made good at the expense of the Fastnet Works before being handed over. The *Ierne* was also employed on several occasions for work totally unconnected with the Fastnet Works when other steamers were not available.

The unfortunate accident in the quarries, and the failure to get any other contractors to assist in the supply of stone, contributed largely to the cost of the work. At the very least £3,000 would have been saved if it had been possible to obtain all materials within the contract times, which would have brought the cost of the tower works down to less than £76,000, which is at the rate of £1 4*s.* 3½*d.* per cubic foot of masonry in the tower. This compares favourably with the published statements of the cost of other rock towers, viz.: The Great Basses, £1 6*s.* 7¼*d.*; Wolf Rock, £1 8*s.* 2¼*d.*; Bell Rock, £1 19*s.*; and Smeaton's Eddystone, £2 19*s.* 11½*d.* Skerryvore, 138 ft. high,

cost over £83,000, which is £1 8*s.* 4*d.* per cubic foot. The gross cost of the Fastnet, not deducting the value of plant disposed of, and including the shore dwellings, etc., comes out at £1 8*s.* 7*d.* per cubic foot of masonry in the tower.

All the items in the following statement, such as lantern, tower fittings, etc., include the cost of erection, etc., except for the proportion of the steamer's expenses and labour in the shore depot, which are inserted as separate items.

Wicklow Newsletter Sat. July 11, 1903

OBITUARY

Mr. James Kavanagh, Wicklow.

It is with much regret we announce the death of Mr. James Kavanagh, Summerhill, which took place on Monday the 6th inst., on the Rock Island off Skibbereen. The deceased who had been in the employment of the Irish Lights Commissioners for over a period of thirteen years, was engaged at the Fastnet Lighthouse in carrying out some extensive repairs for the past seven years and the work was just completed when the deceaseds illness came.

Mr. Kavanagh who was a native of the town of Wicklow and connected with a very old family, did not experience failing health until quite recently, being always a man of robust constitution. It was only a fortnight before his demise that he felt in an unusual state of health, and his condition began to grow alarming on Friday last, when his son John who was working with him, had him removed to the shore dwellings on Rock Island, where he had both medical and spiritual attendance. Father McSweeney being constantly with him and administering the last Rites of the Catholic Church a short time previous to his death. Cerebrial syncope set in, and on Monday morning the deceased passed away. The intelligence of his death came as a very sudden blow to his family in Wicklow, who had only been acquainted of his illness a day or so prior to his death. The greatest sympathy is felt for the widow of deceased and her eight children the youngest of which is not yet a twelve month old.

The remains were conveyed from Rock Island to Wicklow by the Irish Lights Comissioners tender "Ierne", which arrived in Wicklow Bay at seven o'clock on Tuesday evening. The steamer was expected to arrive somewhat earlier and the Pier was thronged with people awaiting its arrival. As the "Ierne" came in sight off Wicklow Coastguard Station, the ensign was lowered to half-mast. A few minutes afterward the Ierne dropped anchor a short distance from the Pier, and two boats were lowered. Into one the coffin, which was draped with the Union Jack was lowered from the Starboard side of the steamer.

The skiff containing the remains was then towed to the pier, by a smaller one, which was rowed by two of the Irish Lights men, and on arriving at the landing the coffin was lifted from the skiff by four men from Wicklow Coast Guard Station. Viewed from the pier the scene presented was a melancholy one. Over a thousand people followed the remains, along the quay to the deceaseds home.

The interrment took place on Wednesday in Three-Mile-Water. The funeral left Wicklow at three o'clock and was very largely attended. The greatest respect was shown towards deceased, all the business houses being shuttered and business suspended while the cortege was passing through the town. Rev. B. Conroy, C.C. officiated at the grave.

Account of the Fastnet Race 1992

F A S T N E T

Fastnet is known to everyone from its use in BBC Shipping Weather forecasts to describe the sea area lying between Lands End and the southern coast of Ireland; that area where the Atlantic Ocean becomes the Western Approaches to the English Channel. The word 'Fastnet' comes from the name of an isolated rock which lies about 4 miles off of the jagged string of islands that stick out like fingers to form the south-west corner of Ireland. (Point out): FASTNET ROCK; NW of it - MIZEN HEAD; HUNGRY HILL; MOUNT GABRIEL SKULL; ROARING WATER BAY; CAPE CLEAR: historic names that demand respect. This larger chart relates Fastnet to its neighbouring islands: GOAT, LONG, CASTLE, HORSE, HARE, CALF and - I was delighted to see, my namesake - CONEY ISLAND. In the SW corner of Fastnet Rock stands the Lighthouse; showing, perhaps, the first light that might be seen out to Port by a ship on passage here from across the Atlantic. Then, Fastnet Rock is the rounding mark in the World famous yacht race of that name which starts from the Royal Yacht Squadron's line at Cowes, down Channel and round Lands End, across 170 miles of open sea to Fastnet Rock and back to finish at Plymouth.

Now, what are my qualifications for addressing you on this subject? In August 1991 I was selected by the Royal Ocean Racing Club - for whom, since retirement, I help as a volunteer Race Officer - to be flown out and stationed on The Fastnet; together with a companion Race Officer (some of you may recognise Jim Soutar- a Hampshire County Council Engineer- who is often seen in his sparetime job as an RORC Yacht Measurer, and to whom I am indebted for the loan of some of these slides); also a representative of the Commissioner for Irish Lights -Dick O'Driscoll- who came with us to make sure that in the lighthouse we did not inadvertently turn-off the wrong light switch! The chap in blue is our pilot. Perhaps I ought to point out that Fastnet Lighthouse became fully automated in April 1989 and is nowadays normally unattended: hence the desirability to have Race Officers there for obvious monitoring reasons connected with safety, and to time the yachts as they go round because there are class prizes for the first to reach that mark. Our visit was only the second time that Race Officers have been positioned on the Rock; in earlier years the then resident lighthouse-keepers undertook these tasks for the Club.

Then another qualification I have is that I was navigator of the official British Army entry in the 1979 race; the storm conditions of which cost the lives of 19 yachtsmen. You may recall some of the newspaper headlines. In this year's Fastnet I was responsible for the finish line in Plymouth.

As I have mentioned, Fastnet rock lies 170 miles North West of Lands End and the Scillies. To be precise there are two rocks, with a gap between them creating The Fastnet and The Little Fastnet. Then if you look hard at the same scene from a different angle you may see there is a major, vertical, geological fault running through both. Fastnet may one day become four islands! I just don't want to be there when that happens! The larger rock is about 60 x 40 metres and rises 25 metres (80 ft) out of the water at low tide. The tidal range is about 4.5 metres (15 ft). (I use metric dimensions in my talk but I can use Imperial ones if you

prefer). There have been no notorious shipwrecks on the rock although I wouldn't mind betting history could reveal it having given the Armada, Nelson, and many others a nasty turn or two when appearing dead ahead of them on a dark night, or out of the fog. However, the larger inshore islands can lay claim to many shipwrecks, and are so frequently obscured by cloud and poor visibility that, in 1854, money was found to exhibit a light on the Fastnet from a cast-iron tower built on the highest part of the rock. That tower was 27.7m high (91 ft) and cost £17,390. The light gave a 15 sec flash every two minutes but it was visible for only a short distance. Moreover, although the tower was secured by 32 bolts each sunk 60 cm (2 ft) into the rock, it moved noticeably even after being strengthened by the addition of an outer base. Then, the catastrophic failure of a similar structure elsewhere made it clear that a new tower was needed. The present tower, designed by William Douglass for the Elder Brethren of Trinity House, was built in 1899. The tower is 16 metres (52 ft) diameter at the base and displays its light at a height of 49 metres (158 ft) where the external diameter of the tower is 4.7 metres (15ft 6ins). Internally the floors, including the spiral staircase, are typically 3 metres (10ft) in diameter. This tower was to cost £90,000. It was built in 118 days, a quite remarkable achievement when it is appreciated that only on an average of 4 occasions a year is it possible to step dry shod on to the rock from a boat. Until helicopters came into use a few years ago the builders, the crews, all stores, provisions and fuel ... to say nothing of 2074 stones of an average wt of between 1 and 5 tons that were laid in 89 courses... had all to be lifted by a derrick on the rock from a purpose built steam ship - the 'Ierne'. The total weight of masonry is 4,633 tons. The stones are all of Cornish granite, from Penryn, and the building contract required 6 to 8 courses to be pre-assembled ashore before shipment. The stones were landed on this ledge from where a narrow gauge tramway was used to move them to the base of the tower. In this slide you can see the built-in fulcrum points used by the derrick as the building of the tower progressed. The derrick and all its gear are preserved on the rock for future use, if required, although the original steam-powered Donkey engine is no more. For the routine transfer of men the cutter conveying them might be anchored two hundred or more metres off the Rock. Men would sit on a bosuns chair (a disc of wood about the size of a dinner plate with a stout line passing through its centre which would be suspended from a fall which passed over the head of the derrick). At an opportune moment his companions on the rock would heave away; and the man would seldom arrive without a thorough soaking. (Kittiwakes). So it won't surprise you to know that the official, leather-bound visitors book dating from 1895 contains almost exclusively the names of those whose duty required them to visit for an annual inspection. Nor that one year's entry records that - I quote "the inspectors were so impressed by what they saw of the lighthouse from the deck of their ship that they deemed it quite unnecessary to land before assuring the Commissioner that all was in order. They nevertheless would be obliged if the keeper would add their names to the official visitors book" - which he did verbatim, including their observations! On our visit we did not have to turn many pages to add our names and addresses to the book.

My companions and I journeyed there dryshod by helicopter which carried with us all the food, the water, and equipment (incl. 70 kg of radio) that we would need for

a week. Our first task was to carry it all from the landing pad to the accommodation six floors above. In the old days the keepers were required to provide their own food for 28 days plus 28 days reserve. Their wages were 2s 6d per day, plus 1s when on the rock. It was then not unknown for them to be 10 weeks on the rock without relief. It was certainly a relief to us that the helicopter was able to return and take us off after six days. It is not uncommon - even in summer - for a flight to be delayed by seas pouring over the landing pad, which is built out above the original store-house caves, about 24 metres (80ft) above low water springs.

The ground floor of the lighthouse contains 2,500 gals of diesel fuel for the generators, of which there are 4, located on the 1st and 2nd floors and of which only one is running at any one time. Up and on the 3rd floor there is a bathroom, complete with salt water loo and shower: quite luxurious although to climb down 4 floors from the Bridge Deck every time nature calls is very good for the waistline. The 4th floor is the crew room; 2 single and one double decker bunk, each semi-circular in shape and much wider at the hips than at the head and toe, quite a novel bed in which to sleep. The 5th floor is the Irish Light's crew-leader cabin. The 6th floor has dry stores and a frig. The 7th is the watch-keeper's bridge with a central stove and sink; the vertical pipe you see is the trunking down which the weights which turned the lantern originally ran: they were wound up daily by hand. That trunking runs the entire height of the lighthouse. Today it carries the electrical and plumbing services. There is a sideboard containing flags and on which sat the radios, a clock and TV set (I refrain from commenting on Irish wiring!). A table and 3 chairs completes the furnishings. Not a lot of room in which to cook, eat and work, particularly when the table used as a desk had to be cleared for meals.

My RORC companion and I worked watch and watch about: the CIL representative kept his own hours although he was a TV addict and our operational radio conversations had frequently to compete with "Neighbours" and the like. We had one main meal a day cooked by whoever and whenever he had the time. This was consumed on occasion as early as breakfast time and on others as late as 2am. We prepared other snack meals for ourselves, although the sight and smell of eggs and bacon being cooked by someone else were often enough to tempt one to reach for the pan again for yet another fry-up!. A memorable meal was a huge crab salad, prepared by Dick, with the crabs less than an hour old and only just fitting into the largest pan in the galley. Memorable too because everything other than claw meat was discarded by him as being too fiddly to prepare!

The lantern is on the 8th floor. The lenses are nearly 5 metres high (15 ft). They weigh 30 tons and float in a pool of mercury. They rotate continuously. If they didn't, neither the electric motor nor the standby motor - each in size about the same as you find in a domestic vacuum cleaner - would be unable to start the lens rotating. And, worse than that, the sun's rays passing through the lens would melt the glass on the opposite side. For that reason there are blinds which must be drawn if it is ever necessary to stop the lens for repair. The glass is always cleaned "on the move". One immense light bulb (of the 4 permanently connected) is

lit at night - the other 3 are in reserve. The light gives off 3m candle power when seen from sea level. Fastnet flashes every 5 secs and is visible for 25 to 28 miles in clear weather.

I really must mention the fog signal which in poor visibility gives four blasts every minute. Notices displayed everywhere remind those on the rock to wear ear defenders at all times because the automated signal can sound without warning. Can you envisage taking a shower, eating and sleeping with them on! The lack of them becomes a hazard for the Race Officer as I found out when timing yachts one night when, unnoticed by me, the visibility closed in just as the main part of the fleet was rounding. I was working 4 radio nets at the time: a race control net, communications with Lands End radio over which timings were passed and from which came numerous Press enquiries, the Lighthouse's own domestic net and, of course, Channel 16- calling/distress- was open. We try to record everything we say and hear on tape, so there is a permanent record of: - "Say again - you are unreadable - Over..... Sorry I still can't hear you, try again - over"! That watch seemed a non-stop nightmare and those trying to call me up must have thought my ears needed washing!

The fog signal was automated only in June '69. The original signal was provided by the simple Irish expedient of exploding a stick of dynamite every 5 min. This later became a manufactured charge: a detonation by day and the same followed by a flash at night. Charges were hoisted out by the keepers on a derrick from the lantern floor and electrically detonated: a fairly hazardous exercise with 35.000 charges held inside the tower (5 tons of explosive): and paraffin lanterns used for domestic lighting.

There is a flagpole on the top of the tower from which we flew our RORC Committee flag: which we subsequently annotated and autographed, and which is now in the Club House in St. James Place. The very top of the tower - 180 feet above sea level - is crowned with a lightning conductor and a ventilator cowl through which fresh air is drawn. Climbing up there it was sobering to learn that on 19th Oct 1983, and following a prolonged strong westerly blow, a sea struck the tower and put several tons of water down through the vent, washing several pints of mercury out of the lantern bearing, and soaking virtually all the keepers possessed: whilst the tower moved sufficiently to dislodge everything fastened to the wall. (Remember: that tower weighs in excess of four and a half thousand tons). The power of the sea is truly awesome: this stanchion on Fastnet was not bent by any human hand.

So how do yachtsmen come to be racing from Cowes, round the Fastnet rock and back to Plymouth - a distance 605nm. Well, in 1925, seven amateur yacht skippers and crews set out from Ryde on the Isle of Wight to race over just such a course. That race was not the first time yachts had raced against each other. (The Royal Thames has records of day races from as early as 1749). Nor was it the first time that yachts had raced in open waters. Two yachts had raced against each other around the Isle of Wight in 1824. In 1851 a certain yacht called AMERICA came from across the Atlantic to win just such a race. I am sure you have heard of that event! American interest in long distance sailing led to a series of races up and down

their eastern seaboard and. in 1906. to a 650 mile race to Bermuda. In 1923 the Cruising Club of America was founded and. in the following vear revived that Bermuda Race which it has run ever since: biennially in even years. But those seven crews that had raced round the Fastnet in 1925 (many having sailed in the Bermuda race the previous year) found Fastnet conditions so challenging that on their return they founded in 1926 - not a Cruising Club - but the Ocean Racing Club. (granted the title of Royal in 1931). And they established the Fastnet as a major - many would argue THE MAJOR - race in the world's yacht racing calendar. Certainly all who have ever competed would agree that it is the Grand National of yacht races. A race which from that day - with the exception of World War 2 - has been sailed in odd years alternate to the Bermuda: the only changes from the original course being that it now starts from the Royal Yacht Squadron line off Cowes. instead of off Ryde: and this years race finished right inside Plymouth Sound at the end of the Mount Battern breakwater. just off the Citadel. instead of out of sight of the public off the Outer Breakwater. Originally Fastnet rock could be rounded in either direction but as the number of yachts competing increased it was logical that it should be rounded to port. i.e rounded in an anti-clockwise direction. (I shall say more about this when looking to the future of the event). For safety reasons. the Race Instructions now elaborate on how the Isles of Scilly - with their numerous outlying rocks. sluicing tides and propensity for fog - should be avoided. No RORC published start time is every postponed or delayed on account of weather: it being regarded as being the absolute decision of each skipper if he should start. or continue with the race. However provision is made for the Race Officer at the start of the Fastnet to reverse the side on which the Isle of Wight is to be passed: and so obviate the need for a large fleet to beat together through the narrow Needles channel in the face of a full gale.

The weather to be experienced in a Fastnet is as unpredictable as any English summer. Competitors will usually experience at least one full gale and. by contrast. can almost be guaranteed periods of calm and dense fog in the English Channel. The waters round the British Isles can be as rough as those experienced in mid ocean. If you ask any experienced seaman: What are the requirements for safety and survival at sea? He will tell you it is not so much size. or even the kind. of vessel but adequate shelter. warmth. food and fresh water for those on board..... and the determination of a crew to press-on.

The 1925 race winner was JOLIE BRISE. a vessel built in Le Havre in 1913 as a pilot cutter. She was to win on three occasions. She is still afloat - owned by the Exeter Maritime Museum. and sailed by Dauntsey's School. This year. to celebrate her 80th birthday she again entered but the weather obliged her to retire.

The first official race in 1926 was won by ILEX owned by one of my own clubs: the Royal Engineers Yacht Club. American yachts have won on 12 occasions. Dutch on 2. Swedish. Brazilian. Australian. French. Belgian and Italian yachts have all won once: so the race does not favour home based yachts.

In 1957. interest in the Race was enhanced with the inauguration of the Admirals Cup for yachts racing under the. then new. International Offshore Rule (IOR). The race that year was a wild. tough one with only twelve Admirals Cup yachts out of

42 finishing the race. This year, breezy but not particularly rough conditions, saw only 15 out of 23 Admirals Cup IOR boats make it to the finish. There is little doubt that the IOR class of boat has become too highly refined for inshore sailing to compete in a Fastnet.

In 1977 the first yacht home - a big yacht - BALLYHOO took 5 days 7 hrs and 4 min for the race. The first Admirals cupper took ten hours longer, and both food and water were running out on many small yachts causing some to retire. The smallest yachts frequently take a week to complete the course.

A record 303 yachts started the 1979 race. That was the year when storm force winds were experienced. Only 88 yachts finished: 23 were abandoned: 136 people were rescued by the air/sea rescue services and 19 yachtsmen died. (You are no doubt aware of the RORC garden memorial to that tragedy in Holy Trinity Church, Cowes. The stones came from Fastnet Rock). I was navigator of the official British Army entry that year- a Nicholson 55 ft yacht. KUKRI - which had twice sailed round the world. We lost our mast when rounding the rock because of a rigging failure. We actually did not need to be rescued: we ran the 80 miles to Cork at 5 and a half knots under the windage of a bare hull without mast or sail. It was certainly a memorable experience.

Following an intensive inquiry into every aspect of that race the RORC considerably tightened its requirements for yacht stability and crew experience. All yachts must meet the strict safety requirements laid down in the Special Regulations of the Offshore Racing Council. A yacht may be inspected for compliance at any time without warning, and the leading yachts in each class almost inevitably are...as they cross the finishing line. Additionally, for the Fastnet the skipper and half his crew must have sailed together, and in the yacht in which they will compete .for at least a total of 320 miles of RORC racing within 12 months of the start. Yachts racing out of sight do so on trust and, after the race the skipper and every crew member is required to sign the yacht's "Declaration" that they sailed fairly and in accordance with the rules.

In 1985 again the wind hardly moderated throughout the race. Only 84 yachts finished, and only three Admirals Cup teams finished with all their three-yachts (Australia Germany and Ireland). That was the year the American maxi yacht NIRVANA established the course record of 2 days 12 hrs 41 min and 15 secs (an average speed of 9.97 knots) ... with ATLANTIC PRIVATEER just 31 seconds behind. And that is another challenge for the Race Officer on the Rock. How to get there before the first yacht arrives. And when will that be? 10 min after arrival, or just when? There is a major prize for the first yacht to go round and always world-wide media interest in the progress of the Champagne Mumm Admiral's Cup teams. In 1991 the first yacht - the Italian Maxi: PASSAGE - gave us two days two hours 29 min and 43 secs to take post: it was a slow race, but it gave us time to enjoy the sun setting over Mizen Head, and see the same rise up over Clear Island before the yachts arrived. It also enabled us to mark the event with some commemorative shirts, the printing of which with the words "Fastnet Lighthouse" and the time of rounding we improvised. We gave these to the club to be auctioned for charity.

The 3rd yacht round was the UK ROTHMANS: we had her in sight for 3 hours as she struggled with the light, variable wind which kept her crew on their toes changing sails. After ROTHMANS came the Swiss: MERIT, who was to beat ROTHMANS to the finish both on real and on corrected time. These are Maxi yachts with a price tag of £ several millions!
Because newer classes (Eg Whitbread 60) can sail just as fast and cost much less money this may have been the last Fastnet for them.
Here is CORUM SAPHIR - an IOR yacht - the first of the French Admiral's Cup team to go round in 91. And, just to show you that tactics can triumph over size and speed, here she is again in company with DUMP TRUCK -a much larger yacht. It was largely the ability of the French team to read the weather that enabled France to win the Cup that year, despite having slower boats. The other yachts are are spectators: another problem for the Race Officer trying to keep his records in order. I timmed and recorded one 'Ghost yacht' that rounded in a pack of competitors in the dark. I feel I should be standing to attention and saluting when I show this slide because it is of APRIORI, owned and sailed by John Dare, Commodore of the RORC. She is here racing under the new International Measurement System (IMS) which seeks to promote competitive seaworthy yachts which, because they have decent standards of accomodation, should have second hand value and so reduce the cost of top level competition. This is ELYSIA, another in the IMS Class. Yes...they do come at you fast when once the main body arrives: usually rated under the popular Channel Handicap System (CHS). Here are 6 yachts, and close together when you recall they have already sailed 350 miles (SIGDUCER, MICHAELS FIRST, TRINCULO, ALCHEMIST, BRIGHT SPARK and KUSIMA). Then an answer to those who question the need to have a Race Officer on the Rock to decide who rounded first: almost calls for a photo finish! (JOGGERNAUT and ASSUAGE). Here is STORMY WEATHER, rounding in 159th place, but sailing as staunchly as she did in 1935 when she was the overall winner of the race that year. She competed again this year, beating her former winning time by more than 6 hours.
There are those who say: most competitors enter to sail 'The Fastnet Race' and only few really 'Race the Fastnet'. The race is a little like the London Marathon. It is certainly a Marathon, and to take part is an experience of a lifetime. So it is good that for each race we witness yachts like DRAGON of the Bulldog Sailing Club and DRAKES DRUM of the Britannia Sailing School go round introducing newcomers to the sport. For them taking part IS sufficient. I have vivid memories of the tail-enders who rounded with the crew all on deck in dinner jackets and black ties firing off champagne corks in celebration as they rounded: A well known British sailing school rounding to "Rule Britannia" played with maximum volume not only through the air but over it so that nobody with a radio switched on could be no doubting their achievement! If you wonder why I have not shown pictures of yachts taking part in this years race it is because, sadly, one is far too busy on the finish line to use a camera before the sails are comming down and crews start to unwind.
232 yachts started the race in 1991, and 253 this year (of whom 40 retired). So we were timing yachts round the rock and over the finish throughout 5 days and nights.

Finally, the future. Will the Fastnet Race survive? There was alarm in many

circles early this year when Yachting World featured the calamity of which I spoke in the beginning: few only at first observing with relief that it was the April issue, published on the 1st of that month! The Admirals Cup has had its problems, of course, but then only 20 of the 253 competing this year were Admiral Cuppers.

There may well be a course change. This year an unofficial entry -a 60 ft trimaran - started 10 minutes behind the fleet and finished half a day before the official winner. She was sailing at a speed of 16 knots: on occassion doing 26! (These are the speeds of todays Whitbread yachts). La Cota was not seen from Fastnet because at that time, and for the previous 36 hours, the cloud base was below the level of the Bridge (less than 50 metres vertically) ...and it was blowing a good Force 6. Now, imagine half the fleet beating out towards Fastnet as the other half return on the reciprocal course ...with closing speeds of perhaps 25 knots ... in such vizibility...and subject of course to Yacht Racing Rules! The thought is that another leg might be added to take the fleet from Fastnet along the Irish Coast to, perhaps, Cork so as to put 25-30 miles between the two reciprocal columns of racers: Fastnet and the Scilly Isles being both left to Starbord.
The Fastnet Race will continue. It epitomises the spirit of ocean racing: it is a race that is open to all. What is the yachtsman racing for? Not profit: for there are no cash prizes. A few go home with cups which they have well earned, but which they have to return for the next race. But every finisher is awarded this plaque which is worth more than anything else to a yachtsman. It is a sign that a yacht has conquered its Everest of sailing.

Just one final story from '91 and then I will stop. In the closing stages of the race we received an emergency call on Fastnet from an Irish replica Viking Longboat that feared it might drift over and bump us: its inboard engine had broken down!

And that gives me the excuse to show you a photograph of the Baltimore Lifeboat going about its business. And serves to remind us all of the debt of gratitude all yachtsmen owe to those who care for their safety: the lifeboatmen and the lighthouse keepers.
Thank you for inviting and listening to me. If you have any questions I will be pleased to try to answer them.
Possible question/answer.
Are we justified in calling our races "Ocean". I consider we are. True ocean - i.e races that actually cross oceans - have of necessity to be few in number: the problem being not the danger or difficulty of crossing an ocean but the practical problem of an amateur crew finding sufficient time and finance to undertake such a race. The British Steel Round the World Challenge started in September and the yachts did not return until May. How many can afford to take that amount of time off work?.