

THE MEMOIRS OF MATTHEW McINTYRE

(Inspector of Machinery, Royal Navy)

(Served 1854–1889)

This autobiography was 'discovered' and submitted for publication by Lieutenant-Commander N. J. B. Morrison, R.N. It was originally contained in a letter sent by Matthew McIntyre to Commander C. Edgar Smith and published in Vol. 5, Nos. 2 and 3 of the Journal in 1951. It is reproduced here in a slightly abridged form.

Biographical Note of the Author

The writer of these autobiographical notes, Matthew McIntyre, was born in 1837 and joined the Navy through the work of Chief Engineer George Murdoch, who in 1859 was sent on a recruiting tour to the North. He was thus one of the group of 103 naval engineers familiarly known as 'Murdoch's Hundred' or 'The Murdochites'. His career is fully set out in his notes. His retirement in 1889 led to no lessening in his interest in engineering and he was a familiar figure at

the outings of the Institution of Naval Architects. He was a fair mathematician and spoke German and Modern Greek. In later life he took an interest in the work of the Presbyterian Church, Brunswick, Camberwell; his house was in Crofton Road in that district. At the age of 87 he made the journey by bus to Purley, walking up a hill 200 feet high without distress. Though handicapped in later years by deafness he retained his faculties until his death at the age of 93 in February, 1931.

The story begins in 1854 with my apprenticeship which lasted till 1859—part of it with 'Tam' Kirk in Sword Street, Glasgow, and part of it with Cook of Tradeston, Glasgow.

Five years and a bit of pretty hard work and long hours—6 to 6—Saturdays to 2—and when to that I voluntarily added evening lectures, there wasn't much spare time left.

Shortly after my apprenticeship was over an opportunity offered of entering the naval service and I took advantage of it; passed the necessary examinations, educational and medical, and was appointed acting 3rd Class Assistant Engineer to the *Asia* Portsmouth Steam Reserve—Supernumerary—17th August, 1859.

During my service in the Steam Reserve at Portsmouth I was employed on the gunboats, left over from the Russian War, which were hauled up on the slips at Haslar.

H.M.S. 'Meander'

After about 6 weeks there I was appointed to the *Viper*, a small gun vessel on the West Coast of Africa, and was ordered a passage in the sailing frigate *Meander*. There were four or five of us going out; but I don't remember what our messing arrangements were, except that they were rough enough to please a parcel of navvies.

It so happened that our crew consisted largely of darkies, 'Kroomen' from the West Coast of Africa, who had brought one of our ships, the *Trident*, home, as most of her own crew had died of yellow fever.

Whilst the *Meander* was lying at Portsmouth, with these darkies on board, the *Victoria*, a wooden line-of-battle ship, was launched by the young Queen Victoria; and the darkies were mightily delighted with the view they had of Her Majesty.

Our first day out of Portsmouth turned out a wild one—we got as far as Portland, but had to come back to Spithead—we had the first of the gale in which a vessel called the *Royal Charter* was wrecked on the Welsh coast with a great loss of life, 26th October, 1859. If you happen to have Dickens' *Uncommercial Traveller* you will find some account of the wreck in the opening chapters. We got away at last and going down channel it came on to snow. The darkies had never seen snow, and we were much amused when one of them dashed down the ladder exclaiming . . . 'By golly, Massa, him rain flour' and declaring that he would save some to show his people at home.

I was on board the *Meander* about 3 months and a half, 4th October '59 to 20th January '60, and at Ascension I was transferred to the *Arrogant*, Commodore's ship, for passage to the *Viper*.

H.M.S. 'Arrogant'

In the *Arrogant* there was a small break down. One of the eccentric straps 'fired' on the pulley while turning the engines by hand; and the bolts securing the rod to the strap gave out, broken and bent. Fortunately the rod was not seriously damaged; and there was a nice little lathe on board, so after a few hours, the damage was made good.

When we fell in with the *Viper* she was preparing to go home and as I had just come out (my traps were all on deck ready for going to my ship) the Commodore cancelled my appointment and kept me on the Station. He appointed me to the *Archer* which I joined 22nd April, 1860.

H.M.S. 'Archer'

The *Archer* was, I think, a full rigged ship and a splendid sailor. Her engines were horizontal; jet condensing; geared, so that the propeller made 3 revolutions to one of the crank shaft, and the propeller was fitted for being raised out of the water when the ship was under sail. There were two rectangular, tubular boilers, fitted with vacuum valves to prevent collapse; safety valves loaded to 10 lb on the square inch; and brine pumps were fitted to reduce the density when necessary, as the pressure was usually too low to blow out. The safety valve load, it is true, was 10, but the working pressure was usually 6 to 3 or less. The pressure gauges were mercury with wooden floats.

The machinery was in a sad state. Pistons were leaky, slide valves leaky, one boiler very leaky, and even the lubricators were leaky and, as for the bearings, they clitter-clattered all the day long, but kept going when needed.

There were no link motions, only single eccentrics loose on the shaft, with a stop for ahead or astern position once the engines were started, but the slide valves had to be moved by hand at first. This gave us no difficulty until we were on our way up the Thames to pay off when we found the eccentric of one engine fixed by rust on the shaft (we had been using water to cool the eccentric pretty freely) and had to work the slide valve of that engine by hand when going astern.

A few weeks after I joined the *Archer* the paymaster made some remarks about me which I resented, and brought the matter to the notice of the Captain. The paymaster got a wiggling and I was lent to another ship for a couple of months with the idea, I suppose, of letting our tempers cool down a bit. My certificate tells me that I was lent to do duty from 28th June to 20th August, 1860, to H.M.S. *Falcon*, and my memory tells me I was pretty comfortable on board, and a couple of drawings I have left seem to show that I had not been idle when there. But there were no breakdowns to record. When I returned to the *Archer* there was nothing to be done but to shake hands with the paymaster and let bygones be bygones.

I was much amused one day when the Engineer-in-Charge asked me to let him know if I found anything wrong; my difficulty was to find anything right. However, I reported one of the crank head lubricators leaky, and next day I found him busy soldering up the leak himself, evidently tender towards his juniors. By and by something went wrong with him and he was suddenly sent home for the disposal of the Admiralty. Then we had a Chief Engineer; and he certainly made things hum. It was seven days a week then, and long hours every day; but we, the juniors, got tired of that, and to guard against surprise, when inclined to rest a bit, the stoker who was standing by to assist as necessary, had orders to say 'Here's the long straight edge, Sir', when he saw the senior Engineer in sight, and if the Chief came along he had to announce the 'short straight edge, Sir'. In two or three months we got the engines in something like good order, but unfortunately there happened to be a ball at St. Helena while we were there, and our chief had to be helped on board when he came off in the early morning, and that led to his being superseded. After that we had James W. Steel, Chief Engineer, and he remained in charge until the ship paid off at Woolwich.

After engine repairs we had boiler leakage to contend with and many a swear word could be heard as one of us after the other tried to locate the leak in the starboard boiler. It was a box boiler, flat bottomed, resting on cement; and the bottom inside was pitted all over as far as one could examine. The

pits varied from pin holes to patches as big as the palm of one's hand. We had prongs made to drop into the big hole, if we could only find it. But the search seemed fruitless. At last, one of our number, a big Cornishman, dammed the leak and threw the prong from him in disgust. Luckily for us it dropped into the hole, and we soon had a huge poultice of red and white lead clapped over it and secured from the tubes overhead.

The question of density of the water in the boilers was then, and for many years afterwards, considered a very important one, and 15 by our hydrometers was the established standard. As the water could not be blown out at our working pressure, we were fitted with brine pumps, but that seemed a clumsy plan and after a little discussion we blank-flanged the pumps and, I fancy, let the water run into the bilge and reduce the density. On one occasion we gravely discussed letting the density go, and possibly choking up the leak by deposit; but that was (i) clean against orders, and (ii) the possible deposit an uncertain quantity, so we decided to go on with our usual routine. But one difficulty we had there which had not been anticipated by the powers that were. Our hydrometer was marked 55 degrees; but the sea water was 80 degrees, and the atmosphere anything up to 98 or more. How then cool the water down to 55 degrees? Failing an ice machine we devised a new scale, and carried on.

The squadron on the African Coast were there to do what they could to stop the slave trade. The *Archer* was too deep in the water to go up the rivers, but sometimes she went up a little way into the larger rivers, such as the Calabar, Cameroons and Congo.

Once we anchored at the mouth of the Congo River to wait for a vessel, some distance up, which was believed to be a slaver. We got yellow fever on board and had to go to St. Helena to recruit. In our absence, 'our' (?) slaver fell an easy prey to an American man-of-war, some of whose crew spending the night on shore, heard where and when the slaves were to be taken on board, and the necessary steps were taken to trap the lot.

In the Calabar River we had the misfortune to carry away the upper valve of one of our air pumps. If I remember rightly, it broke in two, but we worked hard, night and day, with coffee occasionally to keep us awake, until the repair was completed and we had got out of the river safely.

We were unlucky too in the Cameroons River, for we ran on a bank there, and there was some chance of our toppling over as the tide fell, but the spare spars were got out and we were shored up until the tide flowed and we pulled off into deep water. When on the bank the pressure on the starboard bilge was so great that the injection pipe got broken and the water was flowing into the ship pretty freely. To make matters worse the top of the Kingston spindle had been broken off long before and no attempt had been made to repair it. However, we got hold of what was left of the spindle, got a spanner end through the cutter hole, and with the help of block and tackle, closed the Kingston valve, and we were able to bandage the pipe and stop the leak.

We had a big breakdown one day. We went after a ship which we hoped should prove a slaver, with its £5 a head prize money. We had the engines going faster than ever before and the big Cornishman had commandeered all the cook's slush to help the fires, when a jolt, followed by a series of crashes, brought us all to our feet. Of course the engines were stopped at once, and we were soon all gathered on the platform. We found the big driving wheel had been stripped of most of its teeth, which were of wood, and the ship had perforce to continue the chase under sail. Fortunately we had a spare set of teeth in rough, and we soon had all the available carpenters at work fitting them in place, and shaping them to our marks.

We overhauled the stranger, but she had no slaves on board just then, and we had our repairs to comfort us.

Comparing the dates and notes on my different papers I see that some time in 1861 the title of 3rd Class Assistant was changed to 2nd, that of 2nd Assistant to 1st, and that of 1st Assistant to Engineer.

The *Archer* paid off at Woolwich in October, 1861, and I had six months in the steam Reserve there, enjoying home life; and, to quote the certificate, 'conducting myself with sobriety and attention to my duties', but my duties were few and simple so they were easily attended to.

H.M.S. 'Adventure'

From there I was appointed, April 1862, to the *Adventure*, a sort of mongrel troop ship—horizontal engines, jet condensing, four boilers, single screw fixed on the shaft, two bladed, Griffith's pattern blades.

Very early in the commission it was found that the crank shaft and propeller shaft were not in line. So much of a bend, so to speak, was there that a bucket held under the stern gland was soon speckled with particles of brass rubbed off the surfaces of casing and tube at the forward end. The defect was partially made good but occasional fractures of the coupling bolts were caused, I fancy, by the shafting being still somewhat out of line.

Canada

One of our early trips was to St. John's, New Brunswick, with the wives of some of our soldiers in Canada. It was a wretched voyage for them as we had very heavy weather part of the time and for their sake we lay-to for several days. We finished up that voyage by running ashore in the fog; and the poor women were in a terrible state of excitement. The pilot, who had no idea where the ship was, until that moment, when he recognized the glimpse he had of the land, soon got the ship into a better position. But . . . what damage had been done? She was making no water, thanks to the fore peak being filled with some mixture of cement and pitch, and we went on to Quebec, where we had a diver down to examine. He brought up such a doleful tale of the hole, that the Captain was urged to have the ship docked there and repaired. As that meant a detention of 3 months or more, for the winter of 1862 was just coming on and the ice would soon bar our way out, the Captain didn't like it. So, the lower deck over the damage was shored down, the bulkhead below was shored up, and a huge mat was secured over the hole, and we made for home. Heavy weather washed away our mat, together with the small gun for signal purposes we had on the forecastle, but we got home and into dock at Woolwich. What we saw, when the water was pumped out of the dock, was a surprise. There was a clean cut through the stern at the 12ft mark, and the stem and keel were torn away to about 20 ft aft. The hole was sufficiently big for me to walk in off the blocks, sideways.

The ship must have struck the rock and mounted up until its way was stopped. One of the engineers who happened to be on the forecastle at the moment, when he saw the high land over the fog in front of the bow, made for safety, didn't wait to get down the ladder, but jumped down to the deck. He declared the deck met him. He expected to jump about 6 or 7 feet, but didn't have more than 2 ft to go!

Whilst at Woolwich under repair, I was examined by Mr. Trickett, 30th October, 1862, for promotion to 1st Assistant. My commission (5/- stamp) reached me some 12 months afterwards.

West Indies

When ready for sea we were employed carrying troops of sorts, mostly West Indians, between the West Indies and the West Coast of Africa, and, as our bunker capacity was comparatively small, and our coal consumption per I.H.P.

comparatively large, our speed was limited. But we had the satisfaction of completing the voyages across, without re-coaling for the first time in troopship history.

On one of our voyages we loaded up coal on deck, but the weather bade us make haste to get it into the furnaces, and we did. On another occasion we had to pull up short of coal near Teneriffe, and wait until some could be brought, but if I remember rightly, a passing schooner, laden with wood, was brought alongside, some of the wood bought, and we reached harbour safely. It appeared afterwards that the coal we had would have sufficed, but the Captain thought well to keep a little in hand.

China Station

We returned to Portsmouth to refit and after a few months we left for China. Our voyage out was rather tedious—an attempt was made to reach Ascension under sail from one of the West African ports, but the ship could do nothing under sail against the South East trades and current, and we ultimately made for Bahia for coal, thence to Rio de Janeiro and the Cape of Good Hope, coaling at other convenient ports on our way to Hong Kong. The machinery gave us no trouble and we jogged along pretty comfortably all the way out.

We made rather a stir in Hong Kong harbour for we fouled a number of ships lying there, on our way in after dark; carried away a lot of their spars and some of our own, finally bringing up with the figure head of our last opponent(?) through the bottom of our port cutter.

When we had settled down to our work on the Station we had plenty of it, but our trips were short ones, and the machinery kept going pretty well. We sent our slide valves on shore at Hong Kong Yard on one occasion to be faced up; with one or two of our engineers to lend a hand. On another occasion we were docked at Hong Kong and the propeller, which had worked loose on the shaft, was taken off, re-bushed and re-keyed.

A little bit of 'farget' caused us a good deal of annoyance on one voyage. We lost the vacuum completely, and much of our time on watch was spent trying to find the leak. This went on for several days, until we accidentally found that the bilge injection cock had been left open. It appeared that the bilges had been smelling badly, and a lot of sea water had been run in to wash them out. Then the bilge injection had been used to clear out the water and the cock forgotten to be closed.

Japan was in a very disturbed state on our first arrival, and no officers were allowed on shore in plain clothes. Two military officers, who had come from Hong Kong on board of us, went out for a stroll one day at Yokohama and were cut down on the highway by one of the two-sworded gentlemen and killed. The alleged murderer was afterwards beheaded at Yokohama while we were lying there, but I did not care to attend the execution.

On another occasion when we were lying at Yokohama we were witnesses of the great fire which swept over the native town and wiped it out clean. There was absolutely nothing to show, two days afterwards, where the shops or houses had been, except the big safes built of brick in which the valuables were kept to protect them in case of fire. On that occasion, unfortunately, there was some loss of life among the prostitute girls on the Island where they were kept.

We had the Admiral on board for some days having a look round the Station. We took him through the Japan Inland Sea, but the route was an uncertain one as the only guide they had was an old Dutch track chart—we stuck on a bank and as the engines were working badly just then the condenser doors were taken off and we found a great quantity of small pebbles which had got in with the sea injection. When we had cleaned them out, it was found that we were clear of the bank with plenty of water under us. It appeared that the

bank was a shifting one and during the night the current had moved it elsewhere. A Japanese fisherman undertook to pilot us into safety for some ridiculously few follars, but he valued much more the certificate of his pilotage from the Admiral. In the end he had the dollars and the certificate; and a bag of biscuits was thrown into his boat as 'cum-shaw'.

Hong Kong fever was rather rife one summer and most of the engineers on the *Adventure* were down with it, myself amongst them, and engineers had to be lent from elsewhere to run the ship. There were no deaths, but the effect was very bad, both on the patients and on those who escaped. One of the latter went off his head for a while, crawled through one of the ports, while we were in harbour in Hong Kong in the night, and went overboard; but the ridiculous thing was the fact that he was a good swimmer, and as the water brought him to his senses a bit he made for one of the Chinese boats (sampans) which brought him alongside and the quartermaster helped him on board. He had to be invalided home ultimately for insanity. His Irish friends reported him dead, but there is some reason for believing that his friends kept him in hiding, to prevent him breaking out as a crazy Fenian.

I am informed that in Hong Kong cemetery in Happy Valley there is a memorial column to the 42 Engineer Officers who died on the Station from 1857 to 1867. It contains the names of 1 in 1857, 8 in 1858, 4 in 1859, 2 in 1860, 6 in 1861, 7 in 1862, 3 in 1863, 7 in 1864, including 4 drowned in the wreck of the *Racehorse*, 1 in 1865, 2 in 1866, and 1 in 1867—a pretty serious rate of mortality, especially in the earlier years.

It was commonly said that the China Station was the dumping ground of the 'Queen's Hard Bargains', that is the tipplers, or such as had been court-martialled, and that they were sent out there in batches as opportunity offered. I have no doubt that there was some truth in that oft-repeated assertion, but there was little misconduct during the 3 years I was on the station. The old 'Devil-may-cares' had been weeded out by death, or sickness, or court-martial, and the dumping had all but ceased.

While I was on the Station a group of twelve came out on one of the P. & O. ships, which all but foundered on the way, in a typhoon, but which was saved, thanks largely to the naval engineers on board, for the engineers of the ship were in a state of funk and helpless. There is no doubt that the ship had a narrow escape, the seas were washing over her, the engine room and stoke-hole were flooded, and fires out—steam was available from the donkey boiler, but the pump suction was choked, and the passengers were reduced to bailing the water out of the engine room with buckets, but they could hardly expect to keep the ship afloat by such means. The outlook was desperate, when one of the naval engineers volunteered to cut the donkey suction pipe as far under water as he could. This was done, and the stream of water from the delivery led to a cheer from the well-nigh hopeless folks on board, and as the seas subsided, the water below was gradually pumped out, until the fires in the main boilers were available, at least on one side, and the main engines were got to work.

I am not sure of the name of the engineer who acted so timely and to such purpose, but am under the impression that he was a namesake of my own—Angus McIntyre. At all events, Angus kept his head, and did his best by his quaint remarks to keep up the spirits of his fellows in distress.

That group of Engineers Officers was spoken of afterwards as 'The Twelve Apostles' to distinguish them, I suppose, from another group of forty, who had come out some years earlier, in the *Sanspareil*, and who were nicknamed 'The Forty Thieves'.

Seniorities

I was a good deal surprised on entering the Service to find that the Assistant

Engineers had no place in the List of Naval Officers, so I set to work and for 3 or 4 years collected all the published notices of Engineer appointments, courts-martial and deaths which came under my notice and, when in company with other ships, I exchanged details with their Engineer messes. In the end there was a goodly collection and at Hong Kong I had a book bound and ruled to my liking and posted the names in it. The publication of the excellent Engineers' Navy List by Spry of Devonport rendered unnecessary any further collection of names on my part, for he had gone to work in a different way, and had got the details from the Admiralty.

On one occasion, whilst the compilation of mine was in hand, a group of engineer officers arrived at Hong Kong from home, and in the usual way I sent the details of our mess on board and asked for theirs, asking them to correct the details I had of their seniorities. That led to some trouble with the supposed senior, who had been posing as such all the way from England, but who in reality was junior to some of the others, and my figure showed his proper place. He was indignant, but I heard no more about it. As a matter of fact, he had been tried by court-martial and lost some time, and I had had the list of courts-martial in my hands shortly before.

The Price of Progress

At that time, naval engineers were simply workmen in uniform, necessary evils and treated as such. But that has all been changed and the change is due to the persistency of the more far-seeing among them, and by the growing importance of their profession. Every step in the change has been forced upon the powers that be and accepted, just as one accepts the inevitable.

I was examined for Engineer at Hong Kong 18th January, 1866, by John Oliver, who was then the Inspector of Machinery there. He was very fond of keeping possession of all drawings produced by the examiners, but he listened to reason, and I got mine back after something of a protest, and he endorsed my certificate 'highly creditable'. My promotion to Engineer came about 12 months afterwards, with seniority 3rd December, 1866; and I see there was another 5/- to pay for the stamp on the Commission.

The engineers of the *Adventure* decided one year when at Hong Kong to have a big Christmas dinner, and each one of us invited another engineer of his acquaintance from one of the other ships in harbour. I forget how it happened, but we counted thirteen. That would never do, so we invited the boatswain, a gentlemanly, good-looking Warrant Officer, to join us. Our next hitch was mess traps, and we thought the Paymaster would lend us some of the saloon traps for the occasion, but he, like all his kind, refused.

Our 'comprador', or Chinese Hong Kong dealer who makes a business of supplying the mess with sundries and who happened to be on board just then, was referred to. He was told the number to be dined and in a couple of hours or so he had a boat load alongside comprising linen, crockery, glass, silver and everything we could possibly need for the occasion. After that the paymaster could go hang, and I have the 'comprador's' photo still in my box.

We had the troop deck forward to ourselves, the boatswain got the flags and decorated the place, two or three of the stokers, dressed in their Sunday best white, made excellent waiters; we had an hour or more extra lights, and we were all happy. One or two of our guests were perhaps a little too happy, but they were all got safely on board their own ships.

The *Adventure* was paid off at Hong Kong 27th May, 1867, and her engineers with a number of others were ordered a passage home in the *Urgent*. There were some twelve or fourteen of us, and we took duty in turn with the engineers of the ship, one or two at a time. Our voyage lasted nearly four months, and we were pretty comfortable; little to do and plenty of time to do it in. We got up a

concert on the way, a sort of Christy Minstrel affair, which was quite a success. We had an excellent flute player (Henry Coller) amongst us, and I remember that my English concertina helped in the programme. Black faces, white shirts, and red sashes made up the costume. Unfortunately, towards the end of the voyage, one of our number, whose turn it was for duty, got into trouble, but I don't remember how that ended.

The *Urgent* arrived at Portsmouth in September, 1867, and after a few weeks home leave I joined the Devonport Steam Reserve, where my first experience partook of the comical.

Steam Reserve—Devonport

I suppose my chin was not so clean shaven as it ought to have been when presenting myself for the first time in the Inspector of Machinery's Office. His greeting woke me up to the enormity of my offence for before I had time to say a word he stuttered out: 'Ge-ge-get your mu-mu-muzzle lashing off'. It was the first time I had heard the phrase applied to the chin, but I quite understood, for I remembered how the old guns used to be made fast with 'muzzle lashings' to fixings overhead to keep them in safety when the ship rolled.

I may explain here that a year or two after that a gentleman with a fine beard and moustache (Mr. Childers) became First Lord of the Admiralty and took great interest in naval matters. His attention must have been called to the incongruity of the head of the Department wearing a handsome flowing beard, while no officer or man in that Department was allowed to wear any. At all events a circular was issued 24th June, 1869, giving permission for beards to be worn.

Part of my time in the Devonport Steam Reserve I was in charge of the machinery of the old paddle steamer *Pike*, side lever engines, where, as my predecessor warned me, there was ample biceps practice, for the slide valves were stiff to move and had to be manipulated at starting. She was practically a derelict, but I kept her going a while. There was a Fenian scare that winter (1867-8) and we lay for a while up near Saltash to watch the floating magazine and the Bridge.

A circular had been issued in October, 1863, raising the educational status required for the future entry and advancement of Engineer Officers, and a series of examinations were held with that object in view. They were known as 'Woolley Examinations' after the name of the then Director of Education for the Admiralty, Dr. Woolley, LL.D. The first examination was held 14th June, 1864, and afterwards in June and December annually. I presented myself for examination in December, 1867, immediately after my return from China and was successful in obtaining a first class certificate. This was regarded, in respect of promotion, as equal to one year's sea service, and it gave me my promotion to Chief Engineer some months sooner than would otherwise have been the case.

H.M.S. 'Northumberland'

From the Steam Reserve I was appointed to the *Northumberland* when she was commissioned at Devonport, 10th August, 1868. She was one of a group of 6000 tons armoured ships which had lately been built, and this was her first commission. It was quite a change for me, from the small mess-berths and small engines of the *Archer*, *Falcon* and *Adventure*, to the unusually large mess-berth and large engines of the *Northumberland*. The mess-berth was so roomy that I was able to have my harmonium there comfortably, where it sometimes helped the Saturday evening 'wives and sweethearts' concert.

At first start off we had two chief engineers, 7 engineers and assistants, and several Engine Room Artificers. These were early days for the ERAs but

they did their work well, although many of our engineers were quite opposed to their introduction into our service.

Northumberland was fitted with Penn's horizontal trunk engines below, and five masts with sails above. The engines were jet condensing, with ten boilers, pressed I think to 25 lb on the inch, and outside of the main engine room there were *steam capstan* engines and *steam steering gear*.

Our Captain appears to have had rather a lack of confidence in the steam steering gear; at all events, whilst steering with the steam wheel, he kept the tiller ropes bent on the hand wheel, with the result that the large hand wheel went flying round in sympathy with the tiller, as it swung to and fro in control of the steam gear. After a while the tiller rope carried away, and then the steam steering gear came into its own, and the hand gear was ignored.

On the official trial trip little regard was paid to the density of the water in the boilers. Density at that time was pretty much of a fetish, not only in the Instructions, but also by most engineers, so the Chief Engineer, knowing that the density had been far above the regulation density, was rather anxious to examine the inside of the boilers, and called me to be a witness of what was there. He had the doors over the furnaces taken off, and on the furnace plating we saw . . . nothing! We looked at each other, and looked again inside, but the furnaces were absolutely clean. I'll leave you to fill in the expletives, but I made a note for future guidance as to density.

Very early in the commission a peculiar click at one end of the forward cylinder, for which we could find no apparent cause, troubled all the engine room watchkeepers continually. At every opportunity we had, the small door on the cover was taken off, and one or other of us got inside regardless of the heat, to find the cause of the click. It was so hot at times that we had to have the fan blast blowing on our faces to keep the perspiration from blinding us. These incursions had sometimes amusing interludes. One would rig up a sort of staging on top of the trunk to examine more fully than was otherwise possible, and would have a variety of tools with him. Bear in mind that the cylinder was, I think, 10 feet in diameter inside and the trunk was 3 feet in diameter—a false step on the staging would overbalance the whole thing and staging, tools, lights and examiner would slide over the trunk and down the side of the cylinder in an unexpected hurry.

It was decided to open up the piston and then it was discovered that one end of the packing ring had been striking the body of the piston. But why striking? It was concluded that when the piston passed one of the steam ports, the entering steam impinging on the packing ring forced the end of the ring against the body of the piston.

On this occasion the junk ring got broken, but was not rendered useless—in fact it was as useful as ever, but curiously enough when we wanted to signal the mishap to the Flagship, we discovered that the word 'junk' could not be signalled, as one of the letters had no equivalent flag.

There was a threatened breakdown one day which made us rather anxious—we found the front of one of the hot-wells buckling to an alarming extent, keeping time with the stroke of the air pump. As we were at sea we shored it up from the front of the cylinder, until we got into harbour. On opening up, we found that the corner bracket ribs had given out—cracked, but as everything else appeared to be sound, long stay bolts were put in to support the front, and these proved sufficient, for we had no signs of weakness afterwards.

Coal v. Coal

About that time the North Country coal owners were anxious to have their coal used in the Navy, and after a good deal of experiment and discussion orders were issued in April, 1869, to modify the furnaces, so as to use, satis-

factorily, a mixture of two-thirds Welsh and one-third North Country coal. Consequently we got out rough templates for what we wanted, and had a boat load of rough fittings made at Pembroke Dock, during one of our visits to Milford Haven, and fixed them in our furnaces.

Loss of H.M.S. 'Captain'

The one event which, during my service on the *Northumberland* horrified everybody was the loss of the *Captain* during the night of 7th September 1870. The Channel Fleet at that time comprised six big ships. The *Northumberland* was the leading ship of one column with, I think, the *Captain* immediately following, and the Fleet was cruising together off the Coast of Spain. The night was stormy, and some of our sails were blown away, but in the morning the worst was feared when the *Captain* was not to be seen. The Fleet was scattered for search in all directions, but only some bits of wreckage were picked up. The *Inconstant* had been sent to search in shore, and brought back one officer, the gunner, and a few men. The ship had turned over in the gale, under sail, and gone to the bottom with nearly all on board. The boat which saved the few had floated off the deck, and the gunner, who had gone up to see that his guns were properly secured, was just in time to dive out through the port as the ship turned over. All the engineers perished, and I think it worth while to quote their names from the Memorial plate, which was first placed in one of the rooms of the Engineers' Club at Portsea, but subsequently attached to a marble slab and fixed in the Dockyard Church at Portsmouth:

George Rock	Chief Engineer
William C. Moreton	Engineer
Peter Baldwin	Engineer
Frederick Pursell	Engineer
John H. Willis	Engineer
George H. Barnes	Engineer
George P. Gardiner	1st Class Assistant Engineer
Frederick J. Baron	1st Class Assistant Engineer
Thomas W. Curtis	1st Class Assistant Engineer
Alfred Purkis	2nd Class Assistant Engineer

Among the officers lost on that occasion was Captain Cowper Coles, who designed the *Captain*, and was there to see how the ship behaved.

I left the *Northumberland* 17th February, 1871, superseded in the ordinary course, and joined, by choice, the Portsmouth Steam Reserve.

Steam Reserve—Portsmouth

At Portsmouth the Inspector of Machinery (John Oliver) took me into his office and employed me re-arranging the questions set for the examinations of Engineer Officers of all ranks for promotion, collating the reports relative to Welsh versus North Country Coal and preparing a revised Form of Engine Room Register.

That particular work was intended by the Inspector of Machinery to be a preliminary to an appointment to the Steam Reserve Drawing Office. The Officer holding it then was an invalid, and was known to be very seriously ill. But the best laid schemes . . . ! Before the vacancy occurred I was appointed first to the *Monarch* (29th November, 1871) in Reserve at Portsmouth and a few days afterwards to the *Mosquito* (2nd December, 1871) in which the machinery was being put on board at Pembroke.

The machinery for the *Mosquito* was constructed by Maudsley, and I attended at their works for several weeks noting the weights of the machinery ere it was sent off. When that was done with I went down to Pembroke to see it put on board, and was able to have some small alterations made in several of the

fittings, on the principle that as I was to be responsible for the working, whatever would keep that working should be attended to in time.

I had good reason afterwards to believe that there had been some wire-pulling to get me away as far as possible from Portsmouth just at that time. But, meanwhile, as I had earned the good opinion of every Captain under whom I had served and had received unsolicited promises of furthering my interest, I used these promises to some purpose, for I was recalled from Pembroke and appointed to the Steam Reserve Drawing Office 16th February, 1872.

There, I had to attend all the Measured Mile and other steam trials with the Inspector of Machinery (John Oliver) to see that the reports of these trials were properly prepared for his signature, to see that the drawings in the office were kept in proper place and order, to examine the Engine Room Registers which came into office, and, in general, to assist him in his clerical work. A proposed new form of Engine Room Register had by that time been approved, and part of my duty was to compile Instructions as to how it should be filled up.

The reports relative to trials of North Country and Welsh coal were now all got together, and went to show that the Welsh coal was undoubtedly the best for war purposes. The Inspector of Machinery was fully convinced of that and so reported to the Captain of the Steam Reserve.

Moving On

When I had been 3 years in the Steam Reserve Drawing Office, the then Captain of the Steam Reserve, Captain Waddilove, my old China Captain, thought three years was long enough in one appointment, and so I was booked to move on.

I was appointed, 18th February, 1875, to the Royal Naval College as Assistant Instructor of Physics. This was a pleasant surprise for me, but there was some misunderstanding over the appointment. It appeared that my training was not of the kind desired by the then President for this duty. I was very sorry, but there was no help for it, and after a few weeks I was appointed, 11th March, 1875, to superintend the construction of the machinery for the *Pelican* at Sheffield.

H.M.S. 'Pelican'—The Perkins System

A Committee, appointed in June, 1874, was then inquiring into the cause of the deterioration of ships' boilers, and they were so much impressed by the absence of corrosion in boilers worked on the Perkins' system that in August, 1874, they recommended a trial should be made in a small seagoing man-of-war of a set of engines and boilers on that system.

The system was patented and the Yorkshire Engine Co. at Sheffield held the exclusive right of working the patents. Several designs and tenders for engines and boilers on the Perkins's system had already been submitted to the Admiralty, but weight and price caused them to be rejected. After some further correspondence the Company's tender for Engines and Boilers on the Perkins's system was accepted by the Admiralty for H.M.S. *Pelican* but subject to the condition that all working drawings as well as the general arrangement of machinery and boilers were to be approved and signed by Mr. Perkins before the work was put in hand.

The essential features of that system were tubulous boilers, high pressure steam, and only fresh water used in the boilers. The proposed engines were to be horizontal*, triple compound, surface condensing, with high, medium and low-pressure cylinders, driving a three-throw crankshaft, cranks 120 degrees

*But not quite—the cylinders were to be inclined upwards in a small degree towards the ship's side but were all to be on one side of the ship.

apart. One high and one medium-pressure cylinder were to be bolted together tandemwise to drive the after crank, a similar pair to drive forward crank, and the low-pressure cylinder to drive the middle crank.

The two high-pressure cylinders were to be 16 inches diameter, the two medium-pressure 32 inches diameter and the low-pressure 56 inches in diameter. The HP and MP cylinders were to be single-acting and the LP double-acting—stroke 24 inches.

The tandem pistons were on one casting and their common piston rod was to work through a stuffing box in the end of the MP cylinder. The steam was to be admitted first to the HP piston, and on the return stroke it would pass to the other end of the casting to the MP piston, and thence it would escape into the receiver. The LP cylinder would draw steam from the receiver and exhaust into the condenser.

There were to be two tubulous boilers of a special construction, and distillers were to be fitted to ensure a full supply of fresh water. The propeller was to be fitted for being raised when the ship was under sail.

I had heard from my father of the Perkins Steam Gun* in which steam of very high pressure was used to propel the bullets, but I hardly expected to meet a Perkins in the flesh. Hitherto my experience had been limited from 1 (or less) to 30 lb on the square inch, but now I had to deal with a working pressure of 300 and test pressures up to 4000 lb on the square inch. So one of the first things I did was to apply for pressure gauges suitable for testing up to 80, 250, 1100 and 4200 lb on the square inch.

Perkin's Problems

The work at Sheffield on the patent engines did not go on smoothly. The atmosphere was a fractious one and reminded me very much of the triangular duel described by Captain Marryat in one of his sea novels. Here was the Admiralty at one angle, the Sheffield Company at another, and the Patentee at the other.

In my first weekly report I had to say that a great deal of work was in hand but that no drawings had been signed by the Patentee.

As there was likely to be an unusual amount of correspondence I applied for stationery in kind. Some was sent me and eventually an allowance of £1 quarterly was made.

It was proposed by the Company to drive some of the valve motions by loose eccentrics, but recollecting my experience in the *Archer* I called attention to the objection to such a fitting and double eccentrics were substituted.

The slide valves were all of piston design, and the packing rings of pistons and piston valves were to be made of Perkins patent metal, the use of which was said to ensure an almost entire absence of friction, wear and leakage. But it was very brittle, and it was not quite clear at first how much should be cut out of the rings to give the necessary spring; consequently, in fitting together, many of them got broken.

The boiler tubes were also a source of trouble—some failed under test; others were not in accordance with the specification; and, in the case of others, misunderstandings arose as to the necessary dimensions.

The cylinders were to be jacketed by means of coils of piping cast in the metal of the cylinders. In Perkins' own engines where the cylinders were vertical the coil was a continuous spiral, but here, where the cylinders were very nearly horizontal, the jacketing coils were made up of a series of parallel rings joined at top and bottom by short connecting pieces. These coils were troublesome to make so as to bear the prescribed tests; they indirectly rendered some of the

*Dickens refers to the 'steam gun' in *Martin Chuzzlewit*, Chapter XI.

castings defective; and in several instances were destroyed in the process of casting the cylinders.

From one or other of these causes several cylinders were rejected. On the last occasion the Admiralty Inspecting Officer (Mr. James Steel) came down to see the test applied to the coil after it was cast in place. After a few seconds of the pumping, Mr. Steel put his head inside the cylinder to see the result and he got a stream of water, at something like 1000 lb pressure, down his neck. That ended the test, and the rejection of the cylinder was confirmed. Not only so, but the Company declined, in April, 1876, to go on with the work and the contract was eventually cancelled, 2nd December, 1876. Such of the fittings as were considered suitable for the new machinery of the *Pelican* were taken over by the Admiralty. Several of these fittings were not used, and are possibly lying still in store at Devonport.

I had had a good deal of trouble over this work; and in a late report (6th January, 1876) some of the difficulties which had to be dealt with were explained. The Admiralty letter in reply, signed by the Controller himself, wound up with: 'I am satisfied that you have performed your duties as Inspecting Officer in a highly creditable manner under very difficult circumstances'.

The work at Sheffield was ended, and it only remained to see those parts, which the Admiralty had taken over, complete and sent to Devonport or to the works of the new contractors for the machinery so that as far as possible they could be worked on.

But the patentee was far from satisfied and I had to prepare a full report, for the information of Their Lordships, as to the difficulties of construction, the probability of success when completed and the advantages of such machinery for Her Majesty's Service.

There was no doubt that Mr. Perkins was years ahead of his time in high pressure work, and his machinery had worn well in his own factory; but that was altogether a different thing from work at sea, and it was felt all round that a further attempt in that direction could not be recommended.

H.M.S. 'Pegasus'—Ashore

My next appointment (7th July, 1877) was as Overseer of the construction of the machinery for the *Pegasus* and to assist the Chief Engineer of the *Iron Duke* whilst her machinery was under repair at Laird's works in Birkenhead.

Now and again while at Birkenhead I had to go and inspect some other work in the neighbourhood, especially when the financial year was drawing to a close, and it became important to know how much might safely be paid on account to the firms who had the work in hand.

A rather interesting question was raised here as to the minimum diameter and weight of the gunmetal tubes supplied to Laird for the boilers of the *Pegasus*. The only guide we had was the specified diameter and a table of weights supplied by the tube makers; and so long as the average weight of the tubes in a delivery agreed with the table, no exception could fairly be taken. But some of the tubes, although of proper weight, were so small in diameter as to make it doubtful if they could be expanded satisfactorily to fit the holes in the tube plate.

I visited the tube works and discussed with their Manager the limits of diameter and weight which would ensure the tube being suitable for the work in hand. In the end the Admiralty approved of my proposed limits; a good many had to be rejected, and I had some credit for the action taken.

My promotion to Chief Engineer (another 5/- stamp) reached me at Birkenhead some time in August, 1877, with seniority 8th July. Curiously enough it had been overlooked at the Admiralty that I was entitled to a year's time in respect of promotion on account of my first class 'Woolley' and I was passed over. Of course I inquired why I had been passed over, and in the end my name

was put in its proper place, or very near it, sandwiched between two others who had been promoted 8th July between one dated 7th July, another dated 9th July. Instead of twelve months advance I had to be content with five.

The Boiler Committee

Early in 1878 I was much surprised over a letter from the Engineer-in-Chief telling me that he had selected me as one of the members of a departmental Committee to continue and complete the work of the Boiler Committee about to be dissolved. I was very doubtful about entering on such work. However I came up to London, discussed the matter with Mr. Wright, the Engineer-in-Chief, and with Mr. Oliver, the then Admiralty Engineer Inspector, under whom I had done some work in China, and decided to face the music, which was then rather discordantly braying round the old committee.

The official letter is dated 19th March, 1878, and states that 'Their Lordships have determined to dissolve the existing Committee appointed in 1874 to enquire into the causes of the deterioration of boilers and to propose measures which would tend to increase their durability'. Further, 'that a limited Committee of which the Engineer-in-Chief would take the direction, had been appointed to continue and complete the investigations', and I was directed 'to come at once to the Admiralty and place myself in communication with him'.

A formal appointment followed a few days afterwards 'for temporary service at the Admiralty', dated 1st April, 1878.

The new Committee, appointed 19th March, 1878, comprised:

James Wright	Engineer-in-Chief of the Navy
James Bannister	Engineer Assistant to Surveyor of Dockyard
Wm. Weston	Admiralty Chemist
James Ireland	Chief Engineer, R.N.
Matthew McIntyre	Chief Engineer, R.N.

with Edwin Watson, from the old Committee, Secretary.

Experiments of many kinds were in hand, especially a large number at Sheerness, where Mr. Ireland (a dear friend of my own) had had charge of them under the old Committee, and continued in charge of them. I spent some days with him to hear what had been done, and what was proposed to be done. But there were so many details and they were so mixed up that it was hopeless to attempt to understand them without further study.

The old Committee had spent four years going over the ground, had carried out an enormous number of experiments, had examined a large number of witnesses, had reports from many shipbuilding firms and shipping companies, and yet with all the information they had gathered together, little, so far as I could see, had been done to stay the corrosion of our boilers.

To help my study of the experiments in hand there were two huge blue books—one of some 400 pages containing all the reports made by the old committee, a digest of the evidence given by the several witnesses, tables showing the results of experiments and photographs of specimens of corrosion. The other blue book, of 850 pages, contained a complete record of the proceedings of the Committee, of the places visited, the evidence given by engineers and others who were called, and of information supplied by engineering firms, shipbuilders and shipping companies. And I gather from my old notes that I spent a good many Sundays at home poring over their details.

The Committee had submitted three reports, the first in November, 1874, the second in April, 1875, and the third in August, 1877. In this last report they proposed to continue the inquiry and submitted a paper showing how cheaply(?) the work could be carried on.

The Mercantile Marine were suffering as much as ourselves from boiler corrosion and gladly welcomed the Boiler Committee's investigations and rendered freely whatever assistance they could. But the task of the Committee was a heavy one, there was no Alladin's lamp to rub, opinions differed widely as to the causes of the deterioration, the Committee were apparently too bewildered to say what should be done by way of remedy, and the Admiralty, perhaps, got tired of reports, which showed no way out of the maze.

Meanwhile, a Mr. Phillips had patented a method of applying zinc in boilers for their protection.

Zinc and Density

It was obvious from the reports that zinc properly fitted was an absolute preventive of ordinary corrosion, and it was decided to have it fitted in the boilers of the five Indian troopships, and note the results. When one or other of the ships arrived at Portsmouth after a round voyage to Bombay and back the zinc slabs were removed and new slabs fitted. The old slabs were brought on shore, laid out in order on tables, and it was part of my business to examine them. In this way some thousands of these slabs must have been individually examined. After a time, the zincs having shown their anti-corrosive influence in the boilers, they were renewed as a matter of course, and their connections refitted from time to time so as to maintain metallic contact with the iron work of the boiler.

Concurrently with the trials as to the effect of zinc it was decided to try whether the working density of the water in the boilers could safely be raised. The working density had hitherto been limited to 15–20 (20 being twice that of sea water) by our hydrometers, so we tried successively densities of 20, 25, 30, 35 and 40. In our final report we recommended 35 to 45 in boilers fed from surface condensers and 30 to 35 in boilers fed from jet condensers.

To illustrate the density fetish, the chief engineer of one of the tugs, in which it was decided to try a density of 35, assured me the water at that density would be like soup—I told him to be sure and save me some. When I went down to examine the boiler at the end of the period he was pretty well satisfied of the error of his assurances and was prepared to go any higher we liked. But just then we wanted no higher density tried and I advised him to go 'canny'.

These two lines of investigation, zinc and density, were my special work but there was much else to see to and I had a good deal of travelling to and fro collecting information, noting results, and arranging with the other members of the Committee any experiments to be put in hand.

The boilers of the 5 Indian troopships already referred to were specially treated with respect to fresh water, zinc and density. At the end of every season a report respecting the results of the treatment was prepared for the information at first of the Committee and subsequently for the information of the Engineer-in-Chief; and those reports, together with instructions as to the treatment for the following season, were issued to the Admiral at Portsmouth for the information and guidance of the Chief Engineers. And I may add that these reports were continued to 1889 when I retired.

The four boilers of the *Assistance* troopship were specially treated with respect to olive and other oils used for internal lubrication, zinc and density.

The boiler of the *Buffalo* jet condenser was specially treated with respect to zinc and density.

The boilers of the several Dockyard tugs were also specially treated with respect to zinc and density. The results, in every case, showed that zinc was an excellent preventive of ordinary corrosion, and that a higher density than hitherto, say 30 to 40 was safe and advantageous.

The work of the new Committee ended in 1880 and its report is dated 25th March, 1880. The report describes the completion and the results of the experiments left incomplete on the dissolution of the old Committee. Further, it describes the results of the special treatment of sundry boilers in actual use.

So altogether, the work of the Committee was no child's play, and the results showed that we were adding materially to the life of the boilers of H.M. ships.

This was not realized for a long time and the Committee was spoken of contemptuously, especially in the ranks of the Mercantile Marine.

At Admiralty

On the Boiler Committee my place was at the Admiralty where the threads of the Inquiry could be gathered together under the eye of the Engineer-in-Chief who was the Chairman.

But when the Committee had finished the Inquiry and recommended what should be done for the preservation of the boilers the Engineer-in-Chief proposed that I should be appointed to the Admiralty for a time to see that the treatment of the boilers now adopted should be watched in order to make sure that the instructions were promptly and fully carried into effect. My appointment on the staff is dated 1st April, 1880.

To that end the Engine Room Registers as they came in were marked to me for examination and report. There were some 200 of these every quarter and just at first and for some little time there was a good deal of 'calling attention' to this or that paragraph of the *Steam Manual* when the examination of the Register showed it to have been overlooked—and I am afraid that by the time the 'call attention' had reached the Chief Engineer of the ship it had grown to an intensity which was not dreamed of at the Admiralty.

When the 'calls to attention' slacked off a bit there was other work waiting me. I was associated with Lord Walter Kerr the Captain of the Steam Reserve at Chatham on trials of engine room lamps and we were credited with 'a clear and conclusive joint report'. For a long time I was engaged on trials of navigating lights, bow, masthead and anchor, but latterly one of our Chief Engineers was told off to this work and all I had to do was to gather in the results.

Then for some time the coaling arrangements at the different dockyards were my special work, but these were not completed when I thought I had had enough of it and retired, being then over 52 years of age. Having completed 30 years service I was allowed to assume the rank of Inspector of Machinery on retirement and in the list of these officers, am now (1921) at the top.

Murdoch's Hundred

Some time ago I took the trouble to trace if I could, what had become of the 103 Assistant Engineers who were entered by Mr. Murdoch in 1859. He was then Inspector of Machinery at Portsmouth and was sent to the Clyde to enter a number to fill up the gaps then in the List. There was a press copy of his list of entries in the office at Portsmouth and from that I got the names of all, and was able, by looking over and comparing subsequent Navy Lists to ascertain at least roughly how they had disappeared as time passed. The comparison I was able to make showed that 23 had left the service before 1864, that 9 more had left the service before 1869, 20 more before 1874, 18 more before 1889, 26 more before April 1917, and thus, out of 103 in August 1859, there were only 7 left in April 1917. These 7 were:—

Philip Blanch	Retired Engineer
John Watson	Retired Engineer
James W. F. Findlay	Retired Engineer

Lawrence Steele

Retired Engineer

Peter Eckford

Retired Inspector of Machinery

David Wilson

ditto

Matthew McIntyre

ditto

Of these again 3 or more have died since April, 1917:—

Lawrence Steele

died 6.9.19

Philip Blanch

died 23.3.20

Peter Eckford

died 24.2.21

