THE AUTOBIOGRAPHY OF A NAVAL ENGINEER

PART II

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.

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 understand, 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 (First Lord, 18th December, 1868, to 13th March, 1871) 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, whilst 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.

A circular had been issued 12th 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.

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.

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 6,000 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.

She 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.

At first start off we had chief engineers, seven engineers and assistants, and several Engine Room Artificers. These were early days for the E.R.As. but they did their work well, although many of our engineers were quite opposed to their introduction into our service.

Our Captain appears to have had rather a lack of confidence in the steam steering gear, at all events, whilst steering 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 watch-keepers 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.

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, satisfactorily, 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.

The *Northumberland* was told off in company with the *Agincourt* to tow a huge floating dock to Madeira, where we passed it over to other ships for towage to Bermuda, its destination. An attempt was made to have some record of the power developed on the way by the two ships, but that fell through.

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 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.

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 their names were inscribed on a 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.

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

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* There was a similar mishap in the *Adventure*, but the piston worked as well as ever.

I left the *Northumberland* 17th February, 1871, superseded in the ordinary course, and joined, by choice, the Portsmouth Steam Reserve.

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 afterward 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 before 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.

When I had been three 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.

From there 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.

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 sea-going man-of-war of a set of engines and boilers on that system.

The essential features of that system were tubulous boilers, high pressure steam, and only fresh water used in the boilers.

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' 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' 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 the machinery and boilers were to be approved and signed by Mr. Perkins before the work was put in hand.

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

The two high pressure cylinders were to be 16 inches—the two medium pressure 32 inches diameter, and the low pressure 56 inches diameter. The high and medium pressure cylinders were to be single-acting and the low pressure 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 medium pressure cylinder. The steam was to be admitted first to the high pressure piston, and on the return stroke it would pass to the other end of the casting to the medium pressure piston, and thence it would escape into the receiver. The low pressure cylinder would draw its steam from the receiver and exhaust into the condenser.

The propeller was to be fitted for being raised when the ship was under sail.

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.

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 to pressures, ranging from one (or less) to thirty pounds on the square inch, but now I had to deal with a working pressure of 300 and test pressures up to 400 pounds 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, 1,100 and 4,200 pounds on the square inch.

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 there was the Admiralty at one angle, the Sheffield Co. at another, and the Patentee at the other.

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* 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.

† Dickens refers to the " steam gun " in " Martin Chuzzlewit," Chapter XI.

In my first weekly Report I had to say that a great deal of the 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 for stationery was paid me.

It was proposed by the company to drive some of the valvemotions by loose eccentrics, but recollecting my experience of loose eccentrics 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 jacketting coils were made 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 castings defective ; and in several instances were destroyed in the process of casting the cylinders.

From one or the 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 1,000 lb pressure, down his neck. That ended the test, and the rejection of the cylinder was confirmed. Not only so, but the Company declined, 24th 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 machinery of the *Pelican* were taken by the Admiralty. Several of these fittings were not used, and are possibly lying still in store at Devonport.

I had a good deal of trouble over this work, and in a late Report (6.1.76) some of the difficulties which had to be dealt with were explained. The Admiralty letter in reply (19.1.76) 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, completed and come 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.

My next appointment (7.7.77) 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 Birkenhead—at Laird's works.

There was little for me to do at Laird's. I had an office there and a Boiler Maker to help me. The firm was too reliable to need watching narrowly—with one eye on the specification and the other eye on the work there was little to make a fuss about. Of course some men are careless, but the " other eye " saw that their carelessness didn't interfere with what was done for H.M.S., and where any fitting didn't quite agree with the specification, something perhaps which they thought would be quite as well, the " one eye " soon had that under review.

Now and again whilst 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's for the boilers of the *Pegasus*. The only guide I 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 be fairly 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 tubes 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.

A personally interesting incident occurred whilst I was at Birkenhead. An old messmate of mine happened to mention that a recent circular put an end to the charge pay which, hitherto, had been paid to the Engineer when appointed for charge, although the machinery was still in the contractor's hands. This woke me up a bit for no charge pay had been paid me whilst I was at Sheffield. I sent on an application at once for the omitted charge pay down to the date of the recent order, and got it—found a cheque (over £30 I think) waiting me one morning, a very welcome prize.

My promotion to Chief Engineer (another 5s. 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 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.

Early in 1878 I was much surprised over a letter from the Engineer-in-Chief telling me 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 old Committee, appointed 5th June, 1874, comprised :—

Admiral G. Elliott, M.P., Chairman.
Captain C. M. Aynsley, R.N., Capt. of the Steam Reserve, Chatham.
John Trickett, Chief Engineer, Devonport Dockyard.
Chas. Tookey, an analytical chemist
David Phillips, an Engineer

with Edwin Watson, clerk at the Admiralty, Secretary.

About a year afterwards, on 18th March, 1875, Admiral Elliott was appointed Commander-in-Chief at Portsmouth, and Captain Aynsley took over the Admiral's place as Chairman, and Mr. Trickett retired from the Committee, retired, I think, from the Service, at the end of March, 1875.

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 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.

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 Aladdin'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.

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.

Meanwhile, Mr. Phillips had patented a method of applying zinc in boilers for their protection ; the Admiralty expressed strong disapproval of this, and probably his indiscretion hastened the decision to dissolve the Committee.

And there was one other Report they made which deserves notice. They were so much impressed by what they saw of the Perkins' engines, they reported strongly in favour of a trial and proposed, 19th September, 1874, that they should obtain sets of Perkins' patent machinery for a land engine, a tug, and a small man-of-war. This last was put in hand but as described it fell through.

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.

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.

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.

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 to 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 ca' canny.

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.

The boilers of the five 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 several Dockyard tugs were also specially treated with respect to zinc and density. The *Grinder* (2 boilers), *Locust* (1 boiler) and *Sheerness* (2 boilers) all jet condensers, and the *Malta* and *Sampson* surface condensers and each having two boilers. 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.

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.

But this was not realized for a long time and the Committee was spoken of contemptuously, especially in the ranks of the Mercantile Marine, and I had rather an amusing experience of this.

I went down to the Docks one day with one of the Glasgow Weirs to see a boiler in which he was trying some experimental treatment. In the train on the way back we were joined by a Board of Trade Surveyor, and some remark led him to abuse the Boiler Committee in the usual way. He didn't know I was one of the abused, and presently Mr. Weir said " This has gone far enough, let me introduce you to one of the members of the Boiler Committee." Silence . . . that you could hear. However, he waited for me at the terminus and apologised for what he had said, but I assured him that it was all taken in good part, for we were too much accustomed to hear unkind remarks about our doings, or our lack of doing, to take any notice of them.

When the work of the Boiler Committee was concluded I was retained at the Admiralty to see that the Committee's recommendations were carried out. My appointment on the staff is dated 1st April, 1880.

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.

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 Navigation 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.

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 down 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 seven left in April, 1917. These seven 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	Retired Inspector of Machinery. Still alive in 1926
Matthew McIntyre	Retired Inspector of Machinery.

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

Philip Blanch	Died 23.3.20
Lawrence Steele	Died 6.9.19
Peter Eckford	Died 24.2.21

To go back to the *Northumberland* for a moment. It had been the custom when an officer left the ship, to make a rough, very rough, allowance for what his share might be of mess property, perhaps no allowance at all. So when we formed the Engineers' Mess of the *Northumberland* it was agreed that a proper statement should be prepared, showing, from time to time, the position financially of the several members as respects the mess. Hence when three of us were appointed elsewhere the following statement was drawn up by the Caterer and our shares of the Balance of Assets were paid to us by him and we parted good friends. The Engineers who took our place each paid some 10s. more than we severally received.