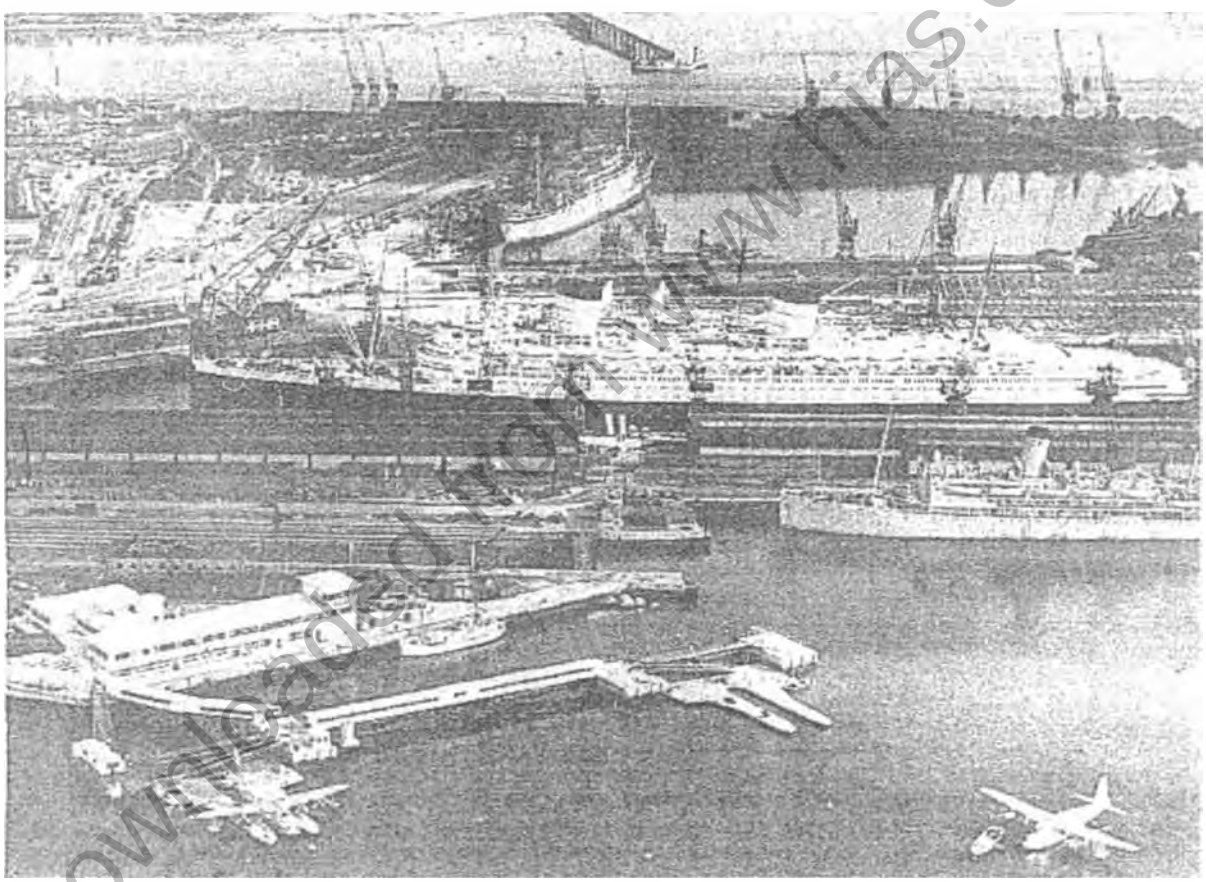
ISSN 0967-3474

Southampton University Industrial Archaeology Group

Journal



Downloaded from www.hias.org.uk

No. 9

2000/2001

Millennium Edition

Downloaded from www.hias.org.uk

Cover photo: Aquila Airways – Southampton's flying boat terminal at Berth 50, with the "Queen Elizabeth" in Ocean Terminal and the Trafalgar Dry Dock (No. 6) beyond the pre-fabricated marine terminal on the left. The four brick piers to which the walkways are attached (built originally in 1924 to moor the floating dock – see Journal 7) can still be seen in the year 2001, but plans for reclamation and redevelopment of this area will see one of the last remaining historic structures in the Eastern Docks demolished.

Contents

Contributors i
Editorial and Acknowledgements ii
Waltons of Mere – a department store in a small country town
by Michael Tighe 1
A Career in Building as Related to Industrial Archaeology
by Tony Daffey 7
Aquila Airways
by Norman Hull 13
Steam Engine Valve Gears
by Dr Martin Gregory 17
The Story of the Mayflower Theatre
by Bill White 22
New Zealand Industrial History – a Journey Back in Time
by Philip Armitage 27
SUIAG Publications ..... inside back cover

The Contributors

Philip Armitage
The writer, now retired, was a documentary film director and later a producer of informational publicity for industry and the Civil Service. Born and educated in New Zealand, he married and settled in the UK after military service with the New Zealand forces in Africa and Europe.

Tony Daffey
Tony Daffey was educated at the same school as Jack Straw (the Home Secretary) and Noel Edmonds (the television presenter) but we will not hold that against him. He has been a member and keen supporter of SUIAG for about fifteen years. You will get a general idea of his life and interests from his contribution. He was a keen semi-pro musician, on saxes and clarinet, for sixteen years and his final public performance was an invitation to sit in with the Kenny Ball Band on bass saxophone.

Dr Martin Gregory
Martin Gregory's interest in the history of steam and the steam engine goes back over 40 years. It has led him to research and build models of many varieties of steam plant. He has been a member of SUIAG for over 30 years and also works on the history of Stirling Engines and Sewing Machines.

Norman Hull
Norman Hull has had ten years of retirement in which to reflect on the two halves of his working life. After leaving Taunton's School in 1947, the first 20 or so years were spent in the travel transport industry in Southampton. This period included National Service in the Royal Air Force and a spell with Aquila Airways. The second half, until retirement in 1991, was as a Customs Officer in Northampton. He regularly attends flying boat reunions in Southampton and this interest expanded into marine aviation research. He published a book on Aquila Airways (*Eagles over Water*) in 1994, all copies of which have now been sold. A second book is currently under way and is due to be printed in 2001.

Michael Tighe
Michael Tighe is a retired banker and one of the "founder members" of SUIAG. He edited the *Gazetteer of Hampshire Breweries* [Hants Field Club / SUIAG 1971] but now concentrates on an in-depth study of the history of Mere, in Wiltshire. He is interested in the early textile industries of Wessex.

Bill White
Bill White is a Sotonian, living and working in the city in the construction industry, starting as an apprentice bricklayer at the University. He is a founder member of SUIAG – currently holding the position of Honorary Chairman – and of the city's archaeological society, and been involved in many of the historical projects in the area. His many interests include collecting records, jazz, railways and researching the history of Southampton's cinemas.

Downloaded from www.hias.org.uk

Southampton University Industrial Archaeology Group
Journal

Editorial and Acknowledgements

Welcome to the 2000/2001 edition of the SUIAG *Journal*, the ninth to be published. In this edition all but one of the contributors are members of SUIAG. The character of the contents is rather different from normal, tending towards oral history rather than formal historical accounts. In particular, the pieces by Phil Armitage and Tony Daffey are, to some extent, autobiographical. The less formal style of presentation has been spared the rigours of punctilious editorship which would have damaged the character of the contributions. Phil Armitage's piece belongs to the period leading up to WW2 in New Zealand while Tony Daffey's is concerned with post-war Britain. Michael Tighe writes about another aspect of the history of the small town of Mere in Wiltshire. His last article was about manufacturing industry; this time he describes the surprising development of a large scale retail business. Martin Gregory concentrates on a feature of steam engines which has a special relevance to the engine at Twyord Waterworks. Bill White considers the story of a theatre which he has known for many years. Finally, Norman Hull, an ex-Sotonian now living in Northampton, writes on the history of Aquila Airways, the company that operated the last flying boat service from Southampton in the 1950s.

We are grateful to everybody who has advised on the compiling of the *Journal* and in particular to Geoffrey Thornton of New Zealand for his helpful comments on Phil Armitage's article. For the design, type setting, and scanning of photographs again we would thank Angela Smith. Acknowledgements and thanks for the provision of illustrations are made as follows:-
Philip Brannon's *Picture of Southampton* [pub. 1850] (Fig 24); Tony Daffey (Figs 5, 6);
Martin Gregory Collection (Figs 10 – 22); Norman Hull (Fig 8); *The Flying Boat Era* by David Lowe (Fig 34);
Ordnance Survey (Figs 25, 26); Angela Smith (Figs 9, 28, 30 – 32, 36, 39); Nigel Smith Collection (Front cover, Figs 7, 23, 27, 37); Geoffrey G Thornton (Figs 33, 35, 38); Michael Tighe Collection (Figs 1 – 4);
Bill White Collection (Fig 29).

Edwin Course
January 2001

Downloaded from www.hiag.org.uk

Published by Southampton University Industrial Archaeology Group

© Copyright 2001 individual authors and
Southampton University Industrial Archaeology Group
All rights reserved

Editor: Dr Edwin Course

ISSN 0967-3474

Produced by Angela J. Smith

Waltons of Mere
- a department store in a small country town

A paper in Journal No. 8 described the rise and fall of industry in Mere, a little town in the SW corner of Wiltshire. While never an important market town, Mere developed over the centuries a thriving nucleus of small shops, serving both town and immediate neighbourhood. At first these shops tended to be all-purpose, with the more important ones describing themselves as both drapers and grocers, but gradually specialisation crept in from the mid-eighteenth century and, by the early 1900s, Kelly's Directory listed some 45 different retailers in the town, many of them little corner shops, but some more substantial, and including a newly formed Co-operative Society. Amongst them, however, was one which had grown into a form unusual in such a small community.

In 1811 there was an auction of *"a spacious dwelling house, recently built malthouse with shop adjoining to the East, with offices & rooms for drying and storing of bacon, cheese, &c"* of which the proprietor had been James Jukes, deceased; these we can positively identify as being sites 1 and 2 on our plan. With almost 90% certainty it can be claimed that Jukes had succeeded the Pitman family – traders since the 1660s – in 1793, and had established a grocery business, specialising in the Wiltshire staples of bacon and cheese. In 1818 the properties are advertised once more, though now the house & bacon house, with the malthouse, built 15 years before, are occupied by William Snook and house, shop warehouse, stabling, etc are occupied by Mr Charles Card, linen draper.

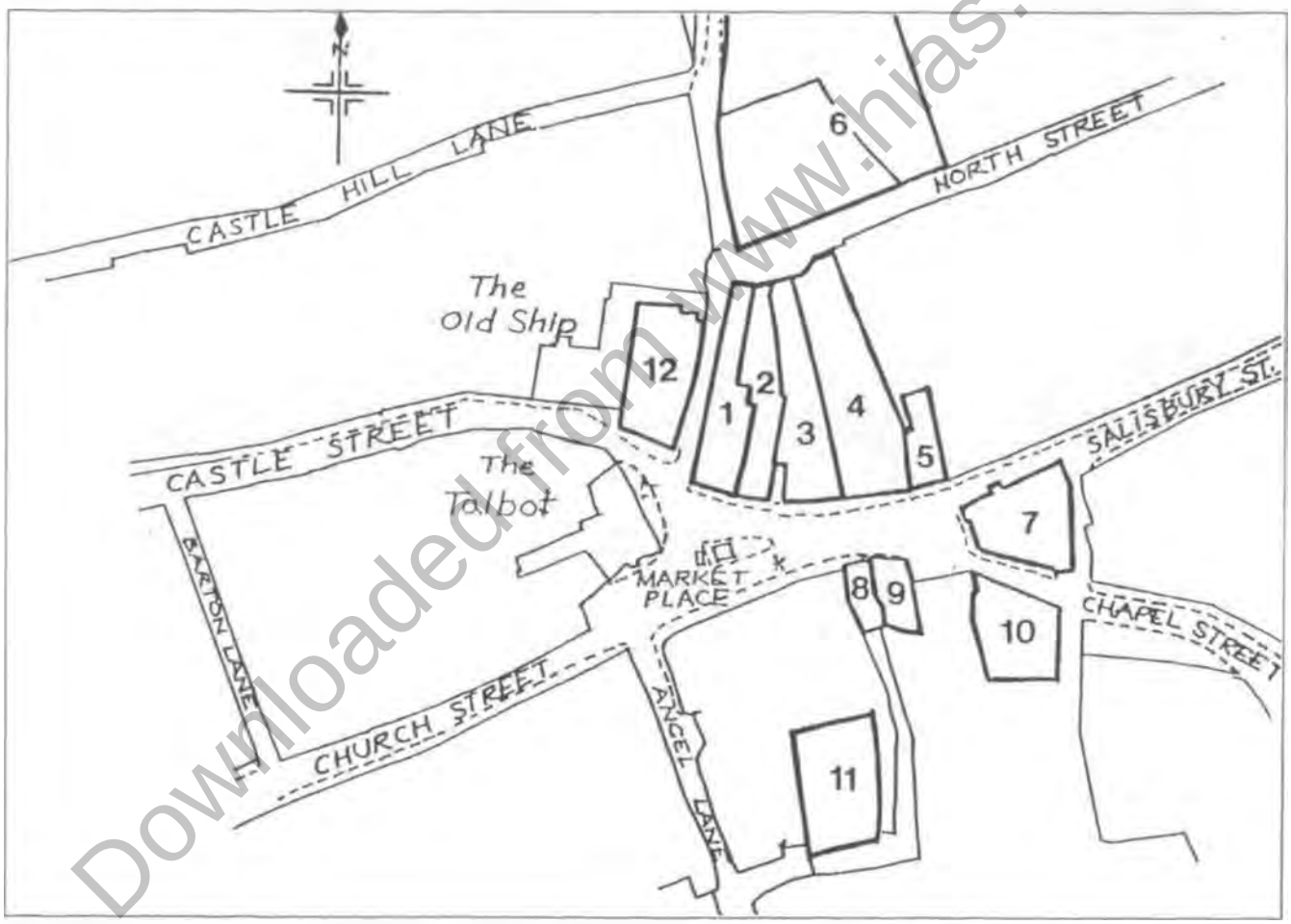


Figure 1: **Waltons – sites occupied by various departments**

1. Card's original shop
2. PO etc, now "Cullingfords"
3. Henry Hindley's house, now "The Bun Shop"
4. The old White Hart, later outfitting, etc
5. Legg's premises – now "Jacksons"
6. North St. land – transport, etc
7. The Triangle
8. Athoe's
9. Applin's
10. New Post Office
11. Furniture workshop
12. Wilts & Dorset Bank

Charles Card was born in 1796, son of a wealthy Gillingham farming family, and had married in 1816, Anne, daughter of John Jupe, a prosperous linen merchant and his wife Anne from the very prosperous Bourton family of Maggs – almost a dynastic marriage, in fact. This young man had access to considerable family capital and, whilst we do not know just when he bought the site, we know that he owned it all by 1848, and in the 1840s his

Downloaded from www.hias.org.uk

Jupe in-laws bought the house next door – 3 on the plan – as a residence. This house, incidentally, is the one occupied in the previous century by Henry Hindley, the linen merchant referred to in Journal No. 8. Few records exist of the business in Card's time, other than billheads proclaiming him *"London & Manchester Warehouse, Linen and Woollen Draper, Tea Dealer, Grocer &c, Family Mourning, funerals furnished"*, to which by 1856 had been added glass, china, patent medicines and perfumery, haberdashery, etc. At the 1848 Tithe Apportionment he is shown as the owner not only of plots 2 and 3, but also of No. 6, the other side of the lane at the back, a building which is referred to in another document as "candle house" – a possible reference to the 1660 trade of Richard Pitman. The business sounds pretty imposing but, at the 1861 Census, Card is shown as employing just five people, though this may well have excluded family participation.



Figure 2: Billhead produced by William Barnes for Charles Card

Card befriended another young man in the town – William Barnes, the Dorset poet, who had just set up his school at Mere. The two corresponded after Barnes had moved to Dorchester, and Card sent his sons there to Barnes' school. Barnes, amongst his many talents, was a skilled engraver and in his papers at Dorchester Museum is the only known copy of a billhead he printed for his friend showing what we have to assume is the frontage of the shop at the time – we know that it was rebuilt later in the century.

Mere originally had no bank, but Lloyds Bank plc has a note that in 1814 there was a banking office in the town called Card's Bank which, in 1836, was taken over as an agency by the Wilts & Dorset Bank and became a full branch in 1842; Charles was at first agent and then Manager. In 1851 his son Edward Austin Card was recorded as a bank clerk; he took over from his father as Manager from 1859 to 1884. Whilst originally the bank must have been within the shop, in 1848 Charles bought the site – No. 12 on the plan – across the lane. Here, in 1858, he built a properly designed bank office with house over, which he leased to the Wilts & Dorset who finally bought the freehold in 1879 and which now, under the name of Lloyds/TSB, is the town's sole bank.

Charles Card retired in 1864, dying in 1875: between them, he and Edward Austin had built up a substantial property portfolio in Mere. He leased the buildings to a partnership of Isaiah Child and John Walton, with an option to purchase for £1,800. This partnership was short-lived and, in 1868, the option was exercised and the partnership dissolved, the business continuing as "John Walton & Co". Once again the business was in the hands of a very young man, Walton having been born in 1842 near Barnard Castle, son of a landowning family there. He proceeded, using borrowed money – some at 10% – to embark on an ambitious expansion. He bought from Card the two neighbouring houses – No. 4 on the plan – built on the site of the old White Hart Inn when it closed on the ending of the coaching trade. In 1875 he also bought Card's private house – No. 3 on the plan – which had been the Jupe's home and was now to be lived in by Walton and his wife, daughter of a local farmer, and their growing family – 16 children, of whom 9 died in infancy. The following year, the corner site was rebuilt at a cost of £1,650 and the house – No. 2 on the plan – where they had been living, was incorporated into the shop, becoming the Post Office, which eventually became the Telegraph Office and later the telephone exchange. Walton was appointed Postmaster. In 1898 a large brick warehouse was built on the base of the old malthouse; this still stands, with its iron hoist projecting, and rooms which still bear traces of their use for bacon smoking.

As well as expanding on the main site, Walton now commenced to buy up other premises, including potential competitors. In 1894 he bought the premises opposite [No. 8 on the plan] of George Athoe, a very old business, and transferred his ironmongery business there; next door to it was another grocery, Applins, which was bought in 1940 and amalgamated with the ironmongery.

By the turn of the century the billheads proclaimed:- *"General drapery; Silks velvets &c; Furs & Macintoshes; Dress making; Millinery & Mantles; Shawls & Umbrellas; French, Merino & Fancy Dresses; Prints & Calicoes; Black Stuffs & Mourning Goods; Linen, Blankets & Counterpanes; Flannels & Flannel Shirtings; Hosiery & Gloves; Groceries & Provisions; Ironmongery & Tinware; China Glass & Earthenware; Cutlery &*

Downloaded from www.nias.org.uk

Electro-plated Goods; Oils, Colours & Paperhangings; Agricultural & Garden Seeds; Lamps & Heating Stoves; Carpets & Hearthrugs; Cocoa Matting & Floor Cloths; Post, Money order & Telegraphic Office; Stationery of all kinds; Fancy Goods; Woollen Drapers, Tailors, Liveries, Hats, Boots, Complete Outfitting; Furniture Carpet & Bedding Warehouseman; Removals by road or rail". At this time Walton issued an illustrated catalogue, running to 300 pages, with a 30 page supplement. Obviously not everything was kept in stock and the more recondite items were obtained to order, but it was still an amazingly wide range for a small town shop.

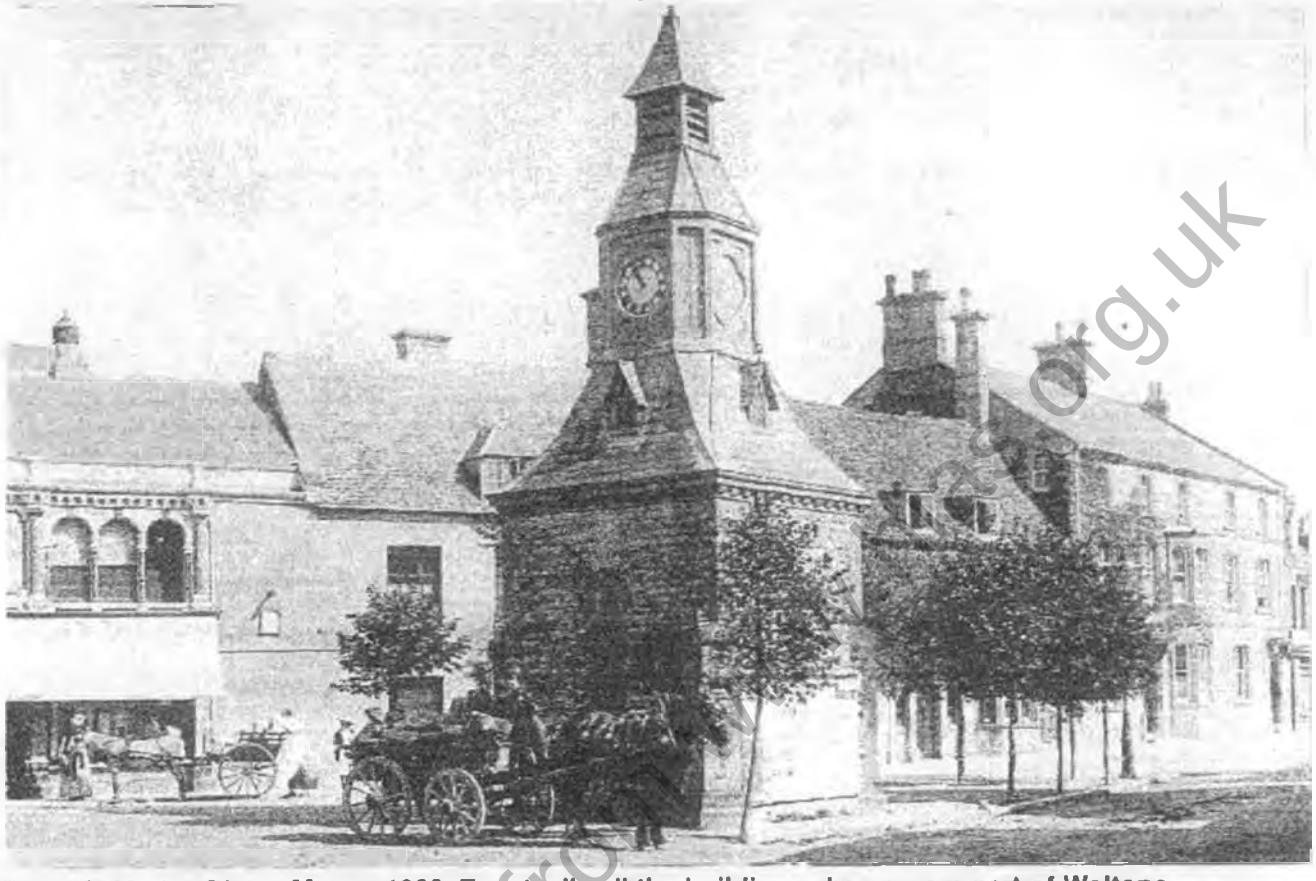


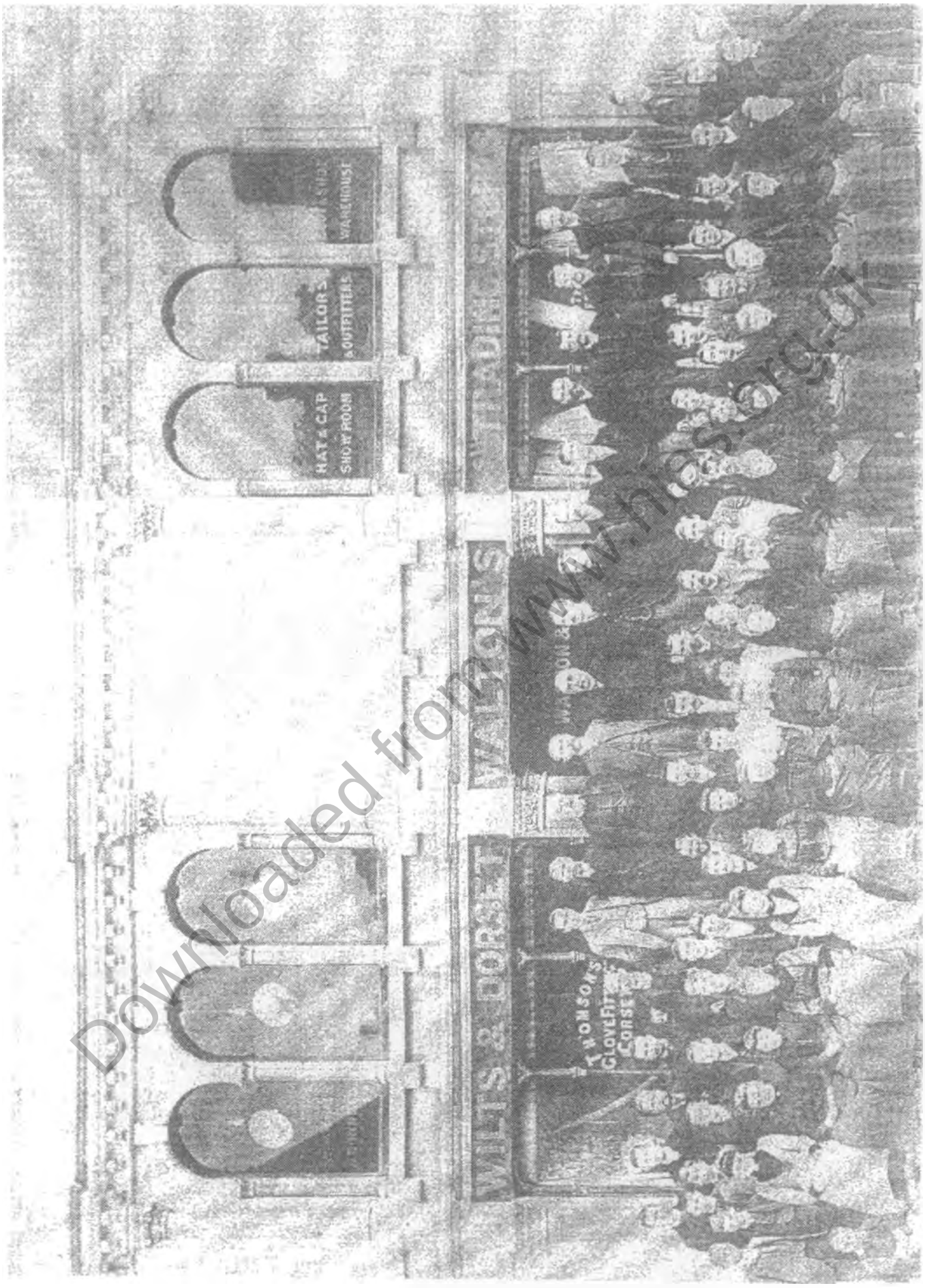
Figure 3: Market Place, Mere, c1880. Eventually all the buildings shown were part of Waltons. Original shop extreme left.

Downloaded from www.mere.org.uk

Not only was all this trade carried on at the main shop in Mere, but branches were opened in the neighbouring villages of Maiden Bradley, where there was a bakery, Bourton, Zeals, East Knoyle, Sedgehill and Longbridge Deverill; the last two were not very successful and were closed. Waltons were always ready to have their own name put on stock. There is a very fine mangle which proudly announces its provenance; at the other end of the scale, the *"Goss"* souvenir china sold in the stationery department to tourists had *"Waltons of Mere"* printed on its base.

This was just the retail side. An undated billhead is obviously for the wholesale side of the business, as it refers to 2-month credit terms – the retail shop proclaimed its policy as cash only, though pretty obviously the "carriage trade" would have run accounts. The firm is advertised as The Wilts & Dorset Stores, and announces itself as *Wiltshire Bacon Curers, Cheddar & Stilton Cheese Factors, Tea Merchants & Blenders, Dorset & Irish Butters*. Though this trade must have been mainly with the smaller local businesses, the list of branches opens with "London" – so far it has not been possible to trace where this was, or what purpose it served.

Walton commenced furniture making, orginally in premises in Wincanton; later property acquisitions brought this activity to Mere. Not much is yet known about its early days; there was a strong tradition of cabinet-making in the area – sometimes attributed to the influence of Chippendale while working at Stourhead – and Waltons capitalised on this with excellent results. The business earned a high reputation for the quality of its reproduction furniture; a number of pencil drawings survive illustrating the kind of furniture made. There is a tradition that showcases were made for Windsor Castle; certainly much work was done for the large houses locally. The cabinet works was a two-storied building at the rear of the ironmongery department. The ground floor housed furniture vans, etc, with the workshops above; included were plumbers and a tinsmith, who made milk churns amongst other things. There was even a powder store, where black gunpowder for blasting was kept – and occasionally used unofficially for firework making! Behind the furniture works were garden plots cultivated by Waltons staff.



Downloaded from www.hias.org.uk

Figure 4: A staff photograph in front of Walton's store, c1900

While Card had employed only 5 staff, a turn-of-the-century staff photograph shows some 75 – 40 of whom were men – and the firm must have been by far the largest employer locally. Around 10 staff and apprentices lived-in, and it seems likely that, as a matter of policy, local recruitment was avoided where possible.

In 1898 a limited company was formed, the ordinary shares being kept within the family, with £7,000 being raised by a public issue of 5% debentures; publication of balance sheets or profits was refused as neither necessary or desirable. Until 1909 no minutes were kept of meetings, either. This does not help the historian!

John Walton died at his son-in-law's house in The Avenue at Southampton in 1909, and was followed in the business by his son Duncan who was a worthy successor. Expansion continued. The little watchmaker's shop of a German emigré had been bought and the business merged. A barber's shop – No. **5** on the plan – was also bought and became the stationery department; later it housed the local pharmacy which, in different hands, had been on Castle Street before acquisition by Waltons. In 1921 a medieval building on an island site, the Triangle – No. **7** on the plan – was bought and used for the antique furniture department which had become of importance, with part being let to a tea-shop. Eventually petrol pumps were installed there. In the 1960s the whole building was demolished for road-widening – only a few years before the opening of a bypass! In 1931 the large Union Workshouse at the west end of the town, designed by Gilbert Scott, came on to the market and was bought and a very profitable laundry set up there; the premises was also used for furniture storage – an important business which had been scattered round various rented buildings.

The company had only horse transport until 1913 – 17 horses and 19 vans. A 30cwt Thornycroft van was then bought; in 1928 it was sold to the local fire brigade which used it for many years. Nearly all of the bodybuilding for Waltons' vehicles was done 'in house'. By October 1914 Duncan Walton was able to say that the more he saw of motor transport the better he liked it, and he was convinced that in time it must supersede the horse-drawn vehicle! By now Blériot had flown the Channel, but the Board was not to see that it would finally be motor transport which would lead to such changes in everyday life that stores like Waltons would become a thing of the past. In 1920 the gradual abandonment of horses was agreed, though they were still advantageous on some routes. As late as 1933 it was felt that the installation of petrol pumps on the forecourt of the old Union building offered little prospect ... this now houses the only garage selling petrol for 5 miles around!

The 1930s were the peak of the company's prosperity. Virtually everything was stocked, the only apparent exceptions being butchery and off-licence sales ... John Walton was a member of the local Temperance Society. Both men's suits and women's fashions figured largely. As well as the various branches, delivery rounds – which included the taking of orders – were made daily within a four-mile radius, three times a week to villages eight miles to the south, and weekly within a 10-mile distance. Great emphasis was placed on service, and though the firm advertised itself as a "cash" stores, a centralised counting house (linked to all departments north of the street by a Lamson cash railway which worked until 1948 and is remembered by generations of children) administered monthly accounts for the considerable middle class clientèle of the area. Indeed, Waltons was regarded as somewhat "superior" by many of the locals.

At its peak, Walton's store dominated the centre of the town. It was entered by double doors in the centre of the frontage of site **1** on the plan, with the grocery department in front. A main staircase in front of the door gave access to all the first floor departments; these were interconnected on both ground and first floor. Furniture, haberdashery, fashions, shoes, etc, were in this western end of the site. Next, in site **2** on the plan, was the Post Office and stationery, with the Post Office counter at right angles to the street, and the sorting office behind; a stair here led to the Telegraph Office, where a full-time telegraphist was once employed, and which at one time also housed the telephone exchange. On the ground floor of the next house [No. **3** on the plan] was the Boardroom, with fine polished floor and old fireplace; the original elaborate ceiling remains above the modern suspended ceiling in what is now a charity shop. Above were various departments, and a large staff flat on the top floor. Mens outfitting and fashions were in what is now a Chinese takeaway and the neighbouring house [No. **5** on the plan], and finally came the pharmacy. Not only were all these buildings linked at ground and first floor, but there were also basements running under all of them, some used for storage and others as selling space; not only were these damp, they also offered a security risk, as was proved when an attempt was made to rob the Post Office in the '60s. Behind the frontage thus provided there was a large amount of storage and warehouse space. The first floor rooms at the rear are still called the Old Counting House, and this was their function. Some 15 office staff were employed there at old stand-up sloping desks, with gas lighting. Despite the advertised emphasis on cash trading, there were a very large number of charge accounts, and it was not unknown for even a reel of cotton to be charged.

As well as the main store, there were also the ironmongery on the south side of the Square [**8** and **9** on the plan], the cabinet works behind [**11**] and the old Union building in Castle Street, housing the laundry and the furniture warehouse. In addition, of course, the four country branches still operated. It is no wonder that the total

Downloaded from www.hhs.org.uk

work force is believed to have been over 150; an outstanding achievement in a town with a population of about 2,000. Unhappily, as we will see, by 1950 the writing was on the wall, and the next 30 years were to see a drastic decline and the virtual disappearance of the empire which the Walton family had built.

One might have imagined that the existence of such an emporium as Waltons would have resulted in an absence of competitors, but this was not the case. Over fifty other shops can be identified which were trading during the twentieth century. Kelly's Directory of 1935 lists 3 grocers, 5 bakers, 4 butchers, 4 dairies, 2 shoeshops (plus the town's only multiple, a branch of Frisby's), 6 motor/electrical engineers, 2 tailor/outfitters, 1 chemist and various smiths. In addition there were 5 general stores listed, which is known to be an understatement, as many little "corner" shops do not appear. Many of these various shops were on a fairly small scale, but at least one grocer, Stone, was substantial and thought by some to be superior to Waltons.

Walton's major competitor, however, was the Mere and District Co-operative Society Limited, established in 1890, dealing in provisions, grocery, hardware, boots and shoes, meal and corn, bacon, brooms and brushes, drapery, millinery and patent medicines: in 1892 a steam bakery was installed. Their premises were in Salisbury Street in a variety of shops now converted to other uses, and post-war they had a travelling shop. In their literature, of course, much is made of the dividend. Whilst the Society was promoted as neither political nor sectarian, the very fact that they made such a point of this invites enquiry. Major instigators of its formation were the Rutter family, the town's solicitors and at that time also its doctor, who were all very prominent Quakers. The Walton family, on the other hand, were strongly Anglican, and though there are few positive indications, one detects from time to time that the two parties had little in common, and it seems likely that the Society may have been formed in direct competition with Waltons.

The outbreak of WWII saw Mere served by a variety of shops, including one which would have graced a far larger community, and nearly of them survived the War. However, Walton's 1948 brochure was much slimmer than the early ones, and less detailed, though promoting the same wide spread of products. There was by then no commitment to daily deliveries, though representatives called and delivered within a 15-mile radius. On the other hand, much was made of the fact that there were now various bus companies serving the town, and it was the availability of transport that was to spell the end for such a business.

The War had been the occasion of many social changes which were to revolutionise the retail trade. The comfortable middle class which had been at the core of the customer base of stores such as Waltons had been seriously eroded, the young began to have serious spending power, and young married women continued in employment. All this had a great effect on shopping habits. The growth of regular bus services, soon to be followed by wide car ownership, opened the horizons far beyond Mere, and brought Salisbury, Bath, Yeovil and Bournemouth within reach. Meanwhile Waltons, running the Post Office, was delivering to its own customers a constant stream of mail order catalogues offering wider choice, easier credit and lower prices than local traders could provide. Yet another change was the opening in the mid 1960s by the proprieters of one of the small general stores of the town's first self-service store, under the "Vivo" banner.

The second half of the twentieth century saw a gradual shrinking in all the retail trade of the town for reasons such as these. Nearly all of the small general shops closed, and even the high quality grocery of Stone's became a private house. This was all typical of the general erosion of the small trader in the face of competition from the various multiples and super-stores; while Mere itself was ignored by the latter, they were to appear in nearby Gillingham, Wincanton and Warminster.

In no way could Waltons have continued in the face of such changes in shopping habits, but they were also to become victim to "third generation syndrome". John Walton and his son Duncan were strong and tough, though fair, business men, but this characeristic was not to be passed on to Duncan's son John, who became Managing Director in 1943. A kindly and considerate man of great charm, he had lived in the shadow of his forbears and was regarded as the "young lad" by the departmental heads. Suffering from poor health, he resigned in 1948; there was no replacement with the vision and ability to face the serious challenges which were to be faced. From 1960 onwards a phased programme of disposals was carried out with various departments being sold as going concerns; some continued on their original sites, while others moved elsewhere in the town. One or two remain to this day, but drapery, outfitting, furniture, antiques and footware have gone, with the sole active relic of Walton's – the Post Office – combined with papers, cards, sweets, etc. In the years before the final winding-up of the Walton business, Mr Andrew Young became general manager in 1970; by the late 1980s the Post Office/newsagents was the core business, and Mr Young took this over, moving it to newly adapted premises across the road – site **10** on the plan – where it remains today, still displaying the original name – the sole reminder in the town today of such a proud business.

Michael Tighe

Downloaded from www.hias.org.uk

A Career in Building as Related to Industrial Archaeology

Building Surveyors are the physicians of the building industry. They are trained to detect and remedy faults in existing buildings and can also design and supervise the erection of new buildings, usually where no great architectural input is required, and they draw up schemes for altering or extending premises. Most owners, with a large portfolio of property, employ building surveyors to look after it for them. I worked as a building surveyor, under various job titles, for fifty years until retirement and this article recalls the way in which industrial archaeology, often in its very broadest sense, brushed up against my career.

I have never married, so there has been a large space in my life for hobbies and interests which have landed on me from all directions – jazz of all eras, pipe organs of all types, motor racing as a spectator, canals, including hotel boat holidays for fifteen years and industrial archaeology. It does not stop at these basic subjects. For example, jazz leads to other forms of music; organs operate in cinemas and on fairgrounds; motor racing means knowing about cars; canals generate an interest in railways; and IA, of course, points you on many specialist routes. A serious knowledge of photography and its processing has helped in recording these subjects.

In its strictest definition, one pictures the industrial archaeologist prodding about in a field of long grass, looking for the remains of brickwork that might indicate the existence of a factory many decades ago. My dictionary defines 'industrial' as: *"relating to, derived from or characteristic of industry"*. It defines 'archaeologist' as: *"one who studies man's past by the analysis of the material remains of his cultures"*. If, like me, you believe that the past started yesterday and you combine the two definitions, one can make IA apply to almost anything, including people. From a newly produced railway engine to buildings occupied by ladies of the night. All the following examples that I have met up with in my job are, in my opinion, IA-based – but please feel free to argue. No spare time visits are included ... and there were plenty of those.

Early Memories

Before moving into the full-time employment section, may I please explain how this interest began to make itself felt. I was born in 1931 and my memory – not unheard of but unusual – starts when I was eighteen months old. At two years, I remember the GWR trains going along the edge of the beach at Teignmouth and the River Teign estuary. Later significant matters were: attending the funeral of George V (royalty and coffins both being industries), seeing the Crystal Palace fire and the opening of the Dreamland pleasure park at Margate. My mother and father were both keen on dance bands and the music hall (my grandfather had a permanent Friday night box seat at the Holborn Empire), so we often went to the Ilford Hippodrome and the Stratford Empire as well as the Odeon Cinema at Ilford where they featured London bands – like Billy Cotton and Jack Jackson – as an entertainment package along with the two films. The Havana, at Romford, was the nearest cinema with an organ. The organist got the sack after complaints (not from me) that he played too loud, I recall.

The Ford Motor Company started at Dagenham in the early 1930s making their car engines. Two other firms came over with them from America – viz Briggs Bodies, who also originally built the Ford factory at Swaythling, and the Kelsey Hayes Wheel Company, who made the wheel assemblies and oil pans. Both were later bought out by Ford. My father worked for Kelsey Hayes and played in their cricket team, with me in tow. Factory security in those days virtually did not exist so, on away matches and with no great interest in cricket, I used to have a good look around at places like Thames Board Mills, Plesseys (of Sten Gun fame), the Bata Shoe Company and Hornchurch RAF Aerodrome. At the latter, I was nearly landed on by a Hawker Hart on one occasion. I also watched dozens of civilians being trained on the Purfleet Rifle Ranges in anticipation of the coming war. At home matches I had the run of the plant and got to know everybody. This included the gatekeepers, with missing limbs and their stories of the First World War, to the operators of the sixty feet high presses. The presses had enormous gear wheels at the top with CINCINATTI around the edge, in giant white letters. All these places were new then but now form part of industrial history. Hence my earlier remark about the past starting yesterday. There were two brothers working at the factory whose father was the police inspector at Tilbury Docks. We used to visit them for Sunday afternoon tea and go aboard the P & O liners whose home port it was. It was in the ships' kitchens that I met my first cockroach – swarms of them, in fact.

In respect of the Second World War I have disregarded such things as air raid shelters, bombs, crashed planes, shrapnel, dog fights and a German fighter pilot who parachuted down alive but with eighteen bullet holes in him, because they are categorised, in my head, as matters of war not industry. However, when the flying bombs and rockets started arriving, in 1944, I was evacuated for the summer holiday to a village near Warrington – and IA really arrived. It was here that I first encountered the Manchester Ship Canal, its ships and its bridges, the Anderton Boat Lift, the Liverpool trams, the Mersey Ferry and the Belle Vue complex at Manchester. Life was never the same after this. The architect who was in the process of designing Gatwick airport lived in our village, so he and I had some interesting conversations.

Downloaded from www.hias.org.uk

In the fifth form at Brentwood School we did a geography exercise, using the 1" Ordnance Survey map, concerning the aluminium works at the Dalgarrog Reservoir in North Wales, and how it came to be there. We also noted that, in 1926, the reservoir dam had burst. We drew our conclusions and sent the report to the factory manager who, very kindly, replied with his detailed comments. In the next school holiday, the war having ended, we were in North Wales so I took myself off to Dalgarrog and, unannounced, banged on the factory gate. The manager was impressed at my initiative and I was given a highly interesting tour of the site, its works and the laboratory – in effect my first IA venture, although the term IA was unknown in those days. In the late forties a group of university historians, mostly from Cambridge I believe, began to emerge who were keen on promoting a new subject they had been looking into called the economic history of Britain, which later became industrial archaeology. In the sixth form, I was lucky to have one of these gentlemen as a teacher in this subject. He was called Jim Rennie – an appropriate surname. Economic history covered the agricultural and industrial revolutions and, amongst several other subjects, a detailed study of the canals and railways. Jim is now dead but certainly not forgotten by any of us whom he taught.

A career begins in London

So you have now read the run-up to my first employment and I am sorry it is rather wordy, but it needed to be explained. Having left school, I opted for a career as a building surveyor because, apart from its appeal, it had a wide range of potential employers and looked suitable for a change of job about every three years. My first position, as a trainee, was with a large firm of architects in the City of London. A lot of our work involved rebuilding ancient war-damaged buildings. In those days, due to massive shortages, all steel and timber required a government licence before it could be obtained. They had many well known clients including the Scammell lorry factory in Watford. I watched the chief engineer hand over a large fairground tractor for £9000 cash – which was a lot of money in those days – fully signwritten and with ancillary trailers. At Vickers Armstrong in Weybridge we surveyed and took levels on the whole of the Brooklands motor racing circuit, which was beyond economic use as such, in order to decide how much of it could accommodate new factory buildings. Our staff reported direct to (Sir) George Edwards, probably Britain's greatest aircraft designer. We extended the Jensen and Nicholson paint factory at Stratford wherein the older parts of the site were particularly interesting. They had a plant for manufacturing cochineal, the crimson dye, by crushing beetles.

I next moved to the Building Department of the North Thames Gas Board at Fulham, which was formed from the recently nationalised Gas Light and Coke Company, one of the greatest limited companies ever known. North Thames covered an important and extensive area from Maidenhead to Southend, which contained many examples of historic gasworks and offices, and its administrative organisation was used as the pattern for all the other newly formed gas board areas in the country. Beckton Gas Works, east of London, was the largest in the world and also included an important by-products complex, which manufactured such things as aspirin. Since the middle of the nineteenth century there had always been a tradition of competition between the gas and electricity companies and rivalry between the different gas companies. Upon nationalisation the differences disappeared and the first task we were given was to rip out all the gas lighting in the showrooms and to replace them with electrical fittings. Our Fulham site, apart from the giant gas works and Thames coal wharf, included the Board laboratories and the appliance-testing workshops. The laboratories were housed in Imperial House, named after the original gas company for the area. Many London street names also came from the old gas companies and their directors. Imperial House, until the early 1930s, was a biscuit factory. They sued the Gas Light and Coke Company over the amount of coal dust that was getting into their products. A new factory was built for them on the Great West Road on the condition that they used gas to bake their biscuits. The Building Department workshops contained some superb tradesmen. For example, we used to make a lot of the office furniture for staff at manager level and above, all french polished. The vans had nine brush coats of paint and were signwritten. Apart from maintenance and alteration works to all non-engineering gas works buildings, the surveyors looked after all the showrooms and offices and several hundred houses, including the one in which Nell Gwyn, the famous orange-seller, used to live. On every outside visit we saw or were involved with buildings of historic and industrial interest. I also became convinced that the whole of the gas resources should be switched to producing electricity – but that is another story.

National Service and beyond

National Service then called and I went into the Royal Engineers to qualify as a Clerk of Works in the School of Military Engineering at Chatham, and was posted to Germany. In Germany I was responsible, assisted by eight German civilian technical staff, for works to British army installations and married quarters in an area, along the River Rhine, from Kleve (from whence came Anne of Cleves) to the outskirts of Dusseldorf. It was at Dusseldorf that I first became interested in the Schnellbahn (meaning fast track) system of trams. They were similar to the new Sheffield and Croydon set-ups but in place forty years ahead of them. When Dr Beeching started his railway slashing, I felt that many of the redundant lines could have been replaced with Schnellbahns but the knowledge, money and union co-operation were not available at the time. My main contribution to the

Downloaded from www.hias.org.uk

industrial landscape was to assist a German consulting engineer in building a Bailey Bridge refurbishment plant, consisting mainly of giant, heated, chemical cleaning tanks. If it is still there, it must surely warrant IA status by now. In the Territorial Army I had a stint of blowing-up disused tin mines in Cornwall but, fortunately, we destroyed nothing of significance, except our eardrums.

Next I joined the civil engineering section of a large chemical manufacturing works at Dagenham. This was all very weird, with such things as registered drug addicts being locked in their processing plants each morning, by Customs and Excise, to make morphine and similar stuff. They became drug addicts due to absorbing the chemicals through their skin. The workers in the rock iodine plant were confined to the job for life because, if they left it, they immediately broke out in enormous red, itchy, blotches. We had a number of animals, in the veterinary area, which we were not allowed to talk about. This also applied to some of the scientists who were very edgy about some of the work they were doing. Walking along one of the factory roads, you would hear a bang and a manhole cover would go flying into the air followed, in quick succession, by the rest along the run. Somebody had flushed the wrong chemicals down the drain and somebody else had lit a 'fag'. We obtained the contract for supplying caffeine to Pepsi-Cola who were about to start producing in this country and we quickly bought out a large farm in Norfolk, which grew poppies for us to manufacture chemicals, on which to build the necessary extensive factory for this and other new products. I was one of a three-man team sent to draw and organise it and to recruit other technical staff. I did the drainage, which involved the use of 48" diameter stoneware pipes. Their manufacture tested the pottery town of Stoke-on-Trent to its limits. With the help of a structural engineer I also designed a vast brick outer walled warehouse with maximum uninterrupted floor space and minimum roof supporting columns. I used vee-shaped marine glued plywood for the lightweight roof and, when the glue had dried, demolished all the reinforced concrete columns that, in theory, were no longer needed and ... held our breath. It is still there, another unusual contribution to future IA but unkindly labelled by Lloyd's, our insurers, as 'Heath Robinson'. Our site engineer used a 1926 'chain-drive' Frazer-Nash car for his everyday transport and was having some trouble with the final drive. I happened to know that Archie Frazer-Nash, the designer of it, was on holiday at a hotel on the coast so I drove over and asked if he would be interested in coming to have a look at it. He was delighted to do so and soon advised how the problem could be put right. A memorable meeting for all concerned. My landlord at my digs in a marvellous country cottage at Old Costessey, near the site, had served in the Great War and his brother was shot dead next to him in the trenches. He was a manservant by profession, having served the Werner family at Luton Hoo and Bernard Shaw, the playwright. His father was the miller at the mill which used to exist in Hammersmith Broadway. I own one of the flour bags. We were situated on the River Wensum and had a boathouse, with a rowing boat in which I would go fishing with the 83 years old gardener Billy, from next door, who used to row the Lowestoft lifeboat as part of the crew.



Figure 5: The 48" diameter stoneware pipes on the Norwich site in 1957.

In the London County Council, at County Hall, I was with a section of surveyors who administered some of the specialist sections of the London Building Acts, particularly means of escape in case of fire. We covered the Westminster area which included Mayfair and Soho. Again, I will only pick out one or two examples of a fascinating three years. An important aspect of the job was that I carried a warrant that allowed me to get into any building, at any time. Even the police did not have this facility. A complete refurbishment of the Café Royal in Piccadilly Circus was being done, which needed me to do a complete survey of the whole building and its fittings, before our requirements could be set down. A wonderful building where, behind the scenes, much had been left untouched since it was built. Charles Forte had his famous office on the roof, with Eros in direct view, which I also inspected. We could not have Charles getting trapped on the roof if the building caught fire.

Each morning we were open for callers, with or without appointment – mostly well known architects who wanted to discuss schemes involving new or existing buildings. One of them wrote in a well known architectural journal that the Westminster surveyors were amongst the most friendly and helpful people he had ever met but, once they had had their say, there was nothing left to design. One day Oliver Hassell, the famous stage producer and partner of Ivor Novello, walked in to talk about an idea for arcading the pavement along

Downloaded from www.ihas.org.uk

both sides of Bond Street. Unfortunately, it would have broken just about every clause and byelaw in the book, so we had to patiently put him off the matter. Another morning, in came Ronnie Scott, one of Britain's top saxophone players. My boss turned and said to me "do you know this gentleman?" I explained who he was and Ronnie bowed deeply towards me. He had come for permission to start his first, later to become world famous, jazz club in Frith Street. I ensured that he got his permission by return of post.

The Duke of Gloucester, who was an architect, used to pop in and I also became quite friendly with the queen's hairdresser for state occasions, who had a salon in Brook Street. I helped her with getting the empty upper floors suitable for use and, strangely, an unidentified half case of whisky arrived at my home address shortly afterwards with just the words "sincere thanks" on it. I also met and did the same for Vidal Sassoon, the famous hairdresser, over a similar problem with seating in his basement. Another type of enterprise had its eighteenth century 'workshops' in Shepherd Market. I was having trouble with a known pimp about the property he owned, where he had been carrying out building work without permission. He would not give me his proper name, so I took him to court using his nickname only and obtained a conviction including a fine. The Deputy Clerk of Westminster City Council telephoned to congratulate me but said "If you get the money, let me know. He owes us hundreds".

To Essex and Hampshire

I then joined the South Essex office of a group of surveyors who looked after all the Essex County Council property in that area including the courts, police, fire brigade, schools, libraries, clinics and so on. I became good friends with many influential people, mostly because they wanted me to get their offices painted! We were accommodated in the stables, that we converted, of a private mansion which was erected in 1905 for Samuel Williams & Co, the well known civil engineering contractors who built some of the Thames docks. Two mainline IA matters come to mind. The fine smock mill at Upminster was falling into unsympathetic disrepair and the County had no money allocated to it, so I had a chat with one of the national wood preservation companies and got them to clean it up, impregnate the woodwork and do a few repairs, for the publicity. The Education Department asked me to go and look at a large, disused and massively overgrown orchard that they owned, to see if it could be converted into a playing field. In the middle of the jungle I came across a 250 years old tumbledown cottage, where the grower used to live, that had been forgotten about. It was a one up, one down with a mud ground floor and a large ladder for access to the upstairs bedroom. To my amazement, there was an eighty years old lady crouched over the cold water sink. She told me that she had been born there and lived rent free. I immediately made arrangements for her to be moved into one of our old peoples homes. A couple of weeks later I called at the home and the superintendent told me "you have a fan – Miss Ford wishes she had met you twenty years ago". Sadly, nobody was interested in preserving the building or taking it on, so I demolished it. That action still bothers me, slightly.



Figure 6: Upminster Windmill, near Romford, Essex, in 1962.

My father who, by then, was working for the Ford Motor Company, was asked if he would like to move to their Southampton plant, to sort out some problems they were having, and agreed to do so. I moved as well and obtained a post at the County Land Agent's Department in Winchester. We were, amongst other things, responsible for 250 farms and smallholdings, running various public spaces and undertaking land drainage contracts. The farming side largely resulted from a 1900 government initiative to provide rented 70 acres plots, with a house, etc, to enable young farmers to get started. Other farming land was also held in reserve for road improvement schemes. Where they existed, the farmers disliked ancient barns and spent their time trying to persuade the county council to replace them with steel and asbestos clad ones.When they succeeded, at the request of the County Planning Officer we had to specify that they were sprayed with cow dung to tone down the bright grey colour of the new asbestos. The tenants were not that bothered about granaries so we managed to

Downloaded from www.hias.org.uk

preserve one or two of those. The county had an excellent policy of offering to take over, from landowners, any area of natural beauty or a viewpoint on which the public tended to trespass. They would then fence it, signpost it and patrol it with a mobile uniformed warden. I well remember humping a level up the 850 feet high Beacon Hill at Highclere Castle, twice, to survey the proposed fence line. Lord Porchester, who lived at the castle, was our committee chairman and the Land Agent had to visit him to get some papers signed. During the meeting, his study door opened and a little old man shuffled in wearing a blue blazer, a cap and carpet slippers. Porchester looked up and said "Oh, hallo daddy". It was the Earl of Carnarvon, whose father helped discover Tutankhamen and is buried at the top of Beacon Hill.

On to Bristol and the Midlands

Then to Bristol Corporation with 45,000 houses and flats. I was in an office of sixteen building surveyors who were carrying out a programme of modernisation to the older housing stock – mostly Victorian terraces. The corporation also had an excellent policy of buying older, freehold, houses from senior citizens, where the property had fallen into disrepair due to the owner's lack of funds, with a guaranteed place for the owner in an old peoples home. I thoroughly enjoyed this job. I lived in theatrical digs and met many well-known artists and speciality acts, thus we had plenty of conversations about the music hall. Not forgetting that Bristol is a very civilised and historic city. There is something very satisfactory about surveying a run-down property, preparing the drawings and turning it into a little gem. When the word got around that these were on offer, the tenants out on the housing estates, with grown up children, who were sick of living there, soon formed a queue to get back nearer the city centre. What surprised me, with the more expensive 19th century houses that we owned, was the poor quality of construction and workmanship behind the classy façades. One of the contracts I undertook was to convert the oldest known doss house in the country – 18th century – into a proper hostel. In stripping it out, the builder had to use workmen who could hold their breath the longest. We also had a long disused Bristol glass factory and kilns, which nobody knew what to do with ... and it is still there waiting for someone to 'preserve' it, so I see.

Then, rather a challenge for a Londoner, I joined the South Midlands Estates Department of the National Coal Board. Real IA had arrived. We worked the Warwickshire, Leicestershire and South Derbyshire coalfields, comprising twelve pits, covering all buildings as far as the Lamp Room – beyond which the civil engineers took over, when it became 'below ground'. I was also responsible for all the closed colliery sites, two mines rescue stations, the Homefire smokeless fuel plant at Coventry, 4,000 miners' houses and 84 farms. My boss concentrated on mining subsidence repairs, which came mostly from the private sector. When you have a whole street of terraced houses sink sixteen feet in four months, head-scratching is essential. I remember returning home, one weekend, and saying to the sky "I hope they never discover coal under Chandlers Ford!". Fortunately, the housing community quite welcomed the arrival of some mining subsidence, under them, because they used to end up with a completely refurbished and redecorated property.

All new staff, including the ladies, had to form a group to spend a day underground at one of the collieries to get some idea of what the industry was all about. The colliery chosen for our group was working an 18" high seam so it was quite a cosy experience, with three ladies and three chaps, crawling along on our stomachs. It also had pit pony stables and they too had timesheets, as well as the miners. I could write a small book about my stay with the NCB but here are one or two, quick, stories. The Ashby Canal ran through our Works Depot, near Moira, and it included a number of canal buildings. Just as I arrived in the job, the depot manager was busy demolishing the buildings or their interiors to make the site more efficient. He did not realise what he had done! One of my senior surveyors then announced that he intended to demolish the Moira Furnace. I hurriedly put a stop to that and arranged a television feature on it which eventually resulted in it being properly preserved. Historic coal mining relics were being destroyed all over the area and there was little I could do about it. The local museums had no room and the Preservation Society era had not yet really started. Fortunately, one pit, at Coalville, has now been turned into a tourist attraction.

Our headquarters was situated, near Ashby-de-la-Zouche, in a Civil War front line mansion with its own church. At lunch time I used to take my colleagues on walks along the local disused canals and railways and also searches in the woods for old bell pits, of which there were many in that area. Our church was only used once a year, for the carol service, but we had a vicar and an ancient pipe organ. The carol service was looming and the organist was ill so a dance band pianist, who worked in our office, agreed to stand in. He went to the church and was playing some boogie-woogie, to get his hand in, when a loud, booming, voice bellowed out "ONLY THE GREAT WORKS!". He thought God had spoken but it was, in fact, the vicar pointing out that the only section of the instrument that would operate, out of three, was 'The Great' as that part of pipe organs are called.

Still with the heavy industries, I went to the Development Corporation of Corby, Northamptonshire and its mighty steelworks. Corby had become a New Town and housing was being erected at a rate of knots together

Downloaded from www.hias.org.uk

with the speculatively built factories to go with them. There was also a 'new' town centre. As an industrial town, Corby really started in the early nineteen-thirties, when hundreds of workers were moved *en bloc* from Scotland, by steelmakers Stewarts and Lloyd, into the recently erected houses and steelworks to process the iron ore that was readily available all around. Practically all the population were Scots but many of the younger ones had never been to Scotland.

Although the end of the steel works was on the horizon, hence one of the reasons for the new factories, all Corporation staff had to have spent one day touring the complex so that they could absorb some of the industrial history, and the heat, of the town. Mining was done by the opencast method, using the largest draglines in Britain. The biggest buckets could hold a double decker bus. We got involved in trying to reclaim some of the exhausted land by laying impregnated earth and mesh, rollered to make it suitable for house building within four years.

Our General Manager was a recently retired brigadier from the Royal Engineers and he looked for support from the members of his staff who were ex-sappers, like myself. He called me in one day and said that the ancient town cross had to be moved from outside the local pub, where it was becoming insanitary due to misuse, to a place near the church which, interestingly, had a central altar. He said our consultant architect had quoted an exhorbitant price for doing it, stone by stone, and asked me, as Works Manager, how much I could do it for. I told him a quarter of the architect's figure so he said "Get on with it and I want it done in the best traditions of the Royal Engineers". I merely stuck two RSJs under it, wrapped it in mesh, craned it into a low loader and plonked it onto a new base at its required location. I arranged with the local primary school, by the pub, to have an hour off lessons to watch us doing it and wave goodbye, and the press got some unusual photographs. The worthy brigadier went a bit ashen faced when he heard about it and rushed to see what was happening but, in view of his earlier instruction, he tactfully made no comment.

Notoriety at Harlow!

Harlow New Town, my next port of call, had all the facilities of a good town but very little character. The chairman of the local camera club, who had moved there from Leytonstone, East London, told me he did not enjoy living there. I said it had got everything – a theatre, sports facilities, lots of shops and fresh air. "It is just not like Leytonstone High Street" he informed me. "Leytonstone High Street is not like Leytonstone High Street any more", I replied. The chairman of our Finance Committee was an interesting man to deal with – he was the only taxi driver with a knighthood and he was Jewish so he had three distinct advantages over me when it came to financial negotiations. I had 17,000 housing units and vertical streets (tower blocks) to look after and had a penthouse flat seventeen floors up. My staff included a direct labour force of 250 tradesmen with a very bolshy collection of shop stewards. On one occasion, I had the 'nerve' to instruct the whole workforce to do more work and less talking and ended up as a headline in the *Sunday Mirror* "Boss Tells His Chatty Workmen to Shut Up". I used to get on well with the National Union of Mineworkers' stewards, because they knew I was working for the benefit of their members, but the Harlow lot did not seem to realise it. What has this got to do with IA? It is a good example of the human side of industrial history. Most of my men had moved to Harlow with a family background of East London Victorian factory and building site conditions, and their resentment had not yet gone. However, most of the workers who had signed on at the large, new, factories, like Gordon's Gin, Elastoplast and Philips, were becoming happy enough. I speak from my knowledge of them as housing tenants.

Speaking of workers' housing, which is all part of IA, tower blocks were not very popular with them, especially those with small children or elderly relatives. It is interesting that tower blocks in the private sector, where the occupiers chose to live in them, are well liked. I enjoyed living in my flat: at that height you could see a lot that was going on in the town, which was not the case at ground level.

Harrow and Ascot

At Harrow-on-the-Hill I lived in Lincoln House, built in 1865 to commemorate the death of Abraham Lincoln. The landlord, who occupied the ground and basement flat, was 93 and had just given up driving his Morris Minor. He had a massive collection of historic books and had owned the magazine, *The Spectator*, for 25 years. He caught pneumonia and his doctor, who lived in the flat below mine, put him in hospital but they did not know that he drank half a bottle of whisky a day. Unfortunately, in a coma and with his weakened state, the withdrawal killed him. A few days later the "vultures" from the book-selling world then descended.

My work with the council made me responsible for all their buildings but, surprisingly, there were not many of great interest. We had a set of preserved 15th century farm buildings but virtually nothing, other than skeletal timbers, was left of them except a tithe barn which had been restored and converted into a community hall. The peg tiles had been re-used and I had one, in my office, with a cat's paw imprinted in it. Whether this was a tradesman's mark or a feline trespasser before firing, nobody knew. We also had a 14th century, moated, manor house, called the Bishop's Palace, containing some of the original woodwork. One of my clerks of works lived

Downloaded from www.hias.org.uk

there as caretaker. We also owned Breakespear House which was supposed to have been built on the site of the palace lived in by Nicholas Breakespear, from Hertfordshire who, as Adrian IV, became the only English Pope, in 1154.

My last five years were spent at Ascot, with the Institute of Building as their Technical Officer. We worked on a beautifully wooded 17 acres site in a house that was rebuilt, and lived in for eleven years, by Field Marshal Lord Roberts, of Boer War fame. Due to his many colonial exploits, he preferred to live in a tented camp that he had built in the grounds, rather than in the house. The house later became a Royal residence occupied by two of Queen Victoria's grand-daughters. It has a private footpath, in perpetuity, leading directly on to the platform of Ascot Station, which I used many times. The most interesting job that I had, amongst many, was as secretary to a panel of senior Fellows who, each year, awarded medals to building industry site managers for outstanding management of a nominated building contract. These were mostly for new projects, like the London Stock Exchange and the giant Meadowhall Shopping Centre outside Sheffield, but also included some for building restoration. One of these concerned the Granada Television Studios in Manchester where the large contract involved the introduction of a studio tour, including a cinema organ, in the existing canal warehouses that were already being used as studios, without interrupting any of the television programme filming, including Coronation Street. It was an excellent job and is a recommended visit when you are in Manchester. It obtained a bronze medal for the site manager. The restoration of the Samuel Webster and Wilsons brewery at Halifax into offices, which had been closed for 40 years and left just as it was when they shut the doors, received a commendation. The refurbishment of the wonderful, 100 years old, Lyceum Theatre at Sheffield got a Silver Medal. The rebuilding of the famous, Victorian (listed) railway hotel, the Midland, at Manchester earned a Gold Medal.

The best contract during my five years was the rebuilding of the west roof of York Cathedral after its spectacular fire involving the 400 years old softwood construction. The work was done by the cathedral labour force, of really top of the range tradesmen, but in hardwood this time. The panel and I were the last people to leave the under-ceiling scaffolding which, it was hoped, would not need to be re-erected for another 200 years. They were awarded a special Gold Medal. The workmanship and the decorative finishings were amazing.

Having reached the end of my tales, I hope you have found this anecdotal version of industrial archaeology to be reasonably interesting. I am sorry it reads rather like a lengthy telegram!

Tony Daffey

Aquila Airways

Aquila was Britain's last flying boat airline and, because of this, a little special in my eyes. It was the airline that cared, both for its passengers and its employees, and I was part of this scene which is now recalled with considerable emotion. The airline, which operated from Southampton, was started by Wing Commander Barry T. Aikman, DFC, in 1948 just as B.O.A.C. (British Overseas Airways Corporation) began disbanding its own flying boat services.

Barry won his DFC by flying Sunderlands during the Second World War and, after leaving the RAF, he joined the Lancashire Aircraft Corporation. However, it was his love for flying boats that provided the spur to form his own company. Furthermore, he believed there was scope for these comfortable and safe aircraft to fly to destinations inaccessible to land aeroplanes.

The first aircraft obtained by Aquila were "Hythe" class flying boats which were bought from BOAC at knock-down prices that also included spares. A further stroke of luck for the new airline was being able to purchase an almost new Solent Mk. III flying boat from the Civil Aviation Authority. This aircraft, named *Sydney* and registered G-AKNU, gave sterling service until 1957 when it crashed on the Isle of Wight – with all but 15 aboard losing their lives.

The first major involvement for Aquila was the charter to operate on the Berlin Airlift in the late summer of 1948. The need to fly supplies into that city arose out of worsening east/west political relations, and the flying boats were used up to the beginning of the winter when Lake Havel at Berlin froze over.

The flying boats flew from Finkenwerder on the River Elbe near Hamburg, to Lake Havel at Berlin. A total of 265 flights were mainly made by just two aircraft. A regular cargo carried was salt which, for some reason, did not have the same corrosive effect on the marine aircraft as it did on land aeroplanes. By way of a change, one flight saw no fewer than eleven and a half million cigarettes freighted into the beleaguered city. Aquila Airways earned over £55,000 revenue from its first operation.

Downloaded from www.hias.org.uk

Back in England Barry Aikman was busy making arrangements for a proposed service from Southampton to Madeira. Apart from the need for a London office for passenger bookings, there was also need for traffic and engineering facilities at Southampton. The former was established in part of a purpose-built terminal at Berth 50 in Southampton Old Docks, whilst engineering was based at Hamble on the east side of the Southampton Water.

Many well known people of the era embarked and/or disembarked at Berth 50, and the destinations of the flying boats were almost as varied as those of the large passenger ships normally associated with Southampton. The air traveller booking with Aquila could fly to Jersey, Marseilles, Capri, Madeira and Las Palmas. By far the most popular was the route to Madeira, which expanded into a network that took in Las Palmas and Lisbon where a marine terminal was built at Cabo Ruivo. In the late 1950s it became possible to fly direct from Southampton to Las Palmas once the larger and faster Solent Mk.IV aircraft came into use.

In 1949, when the service to Madeira first started, Aquila was using "Hythe" class flying boats, which were much smaller and slower than the Solents. Amongst the passengers on the first flight were the actresses Rosamund John and Constance Cumming. Later flights saw Sir Winston Churchill and a young Margaret Thatcher on board Aquila aircraft.

The airline operated only one Sandringham flying boat. This was registered G-AGKX and named *Himalaya*. It did own another Sandringham (G-ANAK), but this aircraft was damaged beyond repair in 1954 and consequently written-off. This happened at the engineering base at Hamble, and it was here that an ex-RAF "Seaford" was refurbished and emerged like a new aircraft to be registered G-ANAJ and named *City of Funchal*. This flying boat made the prestige proving flight to Capri and also to Genoa and Santa Margherita. Other services were operated to Montreux, Pollensa Bay and Corfu, but it was the one to Madeira that was the success story with two return flights a week in the peak season. In 1957 Aquila carried about a third of the tourist traffic to the island.



Figure 7: Short S45 Solent MkIII G-ANAJ *City of Funchal*, Southampton, 1954

Charter flights were a regular feature. These could be either short haul or over distances covering many hundreds of miles. The longest haul was one made by RMA *Hudson* when it flew from Southampton to the Falkland Islands and back in 1952. This flight was well reported at the time, and again later by a Southampton newspaper in 1982 when British forces were leaving the port to recapture the islands.

All charter flights arranged had to be slotted in between regular scheduled flights – these being flown whether fully booked or not. One such charter flight involved carrying a full ships's crew, the trip terminating at Hull where the aircraft alighted on the Humber estuary. On another occasion the flying boats were used to carry the cast, technicians and equipment needed in the making of the films *'The Master of Ballantrae'* and *'Moby Dick'*. Several of the stars involved in these films were passengers.

Following a take-over bid in 1953 by Britavia, capital became available for expansion and, in 1955, the airline purchased two Solent Mk.IV aircraft from Tasman Empire Airways Ltd. Crews were sent out to ferry these flying boats from New Zealand back to the UK. On arrival they were registered G-ANYI *Awatere* and G-AOBL *Aotearoa II*. The latter flying boat had been christened by the Queen at Belfast in May 1949 when she was Princess Elizabeth – and before the aircraft first went out to New Zealand. Incidentally, it was these two aircraft which made possible the direct flights to Las Palmas.

Not every flight, however, was free of incident. Once when Janet Brown and her husband Peter Butterworth flew to Pollensa Bay, Majorca, the aircraft they were on struck a rock on take-off. Everyone on board was safely taken off and the flying boat returned to Southampton after major repair work had been completed.

As well as passengers there was usually mail and freight carried. Overseas editions of some of the major daily newspapers were flown to Madeira. From the island came lace and flowers. The main item flown to Las Palmas was machinery for tankers that called there for fuel and water. From Genoa came imports of parts for Vespa motor scooters which had a factory in the UK at Bristol.

Downloaded from www.hias.org.uk

In the decade that Aquila was in existence there were occasional incidents such as the one when G-ANAJ was so severely storm damaged at Santa Margherita that it had to be written off. This loss proved how difficult it was to obtain replacement aircraft of a type no longer being manufactured. A replacement for G-ANAJ, however, was finally obtained, it being G-AHIN *Southampton* – which became a popular choice with passengers and crew alike.

The loss at Santa Margherita, plus expenses incurred in connection with delayed scheduled flights, became factors that contributed to the decision that brought about the end of flying boat services in 1958.

In total the company had no fewer than nineteen flying boats on its books – though not all at the same time. The peak was probably reached when four Solents were in use and together offered the air traveller a degree of comfort compatible with other aircraft then in operation.

When Aquila ceased its operations, a new airline was formed in Lisbon to take over the service from that city to Madeira. The two Solents which had come from New Zealand, plus *Southampton*, were at first acquired for this purpose but, before being actually put into use, the new company obtained Martin "Mariner" flying boats from America. One of these later met with disaster when it fell out of the sky without trace and all aboard perished including two ex-Aquila pilots, one of whom was Jim Broadbent who, pre-war, had set a solo flight record from the UK to Australia only to see Jean Batten clip a full 24 hours off his time barely a week later. The Portuguese company stopped operating after the loss of the "Mariner", and air connections between Madeira and mainland Portugal were not restored until an airport was built on the island.

Out of a total of 336,573 people who visited Madeira between 1949 and 1957, some 58,345 arrived by flying boat. This was just over 17% and regarded as 'new business' for the island rather than taking trade away from the passenger ships of the era.

Some personal memories

I started employment with Aquila Airways as a Traffic Assistant and, by the time I left, I had been promoted to Traffic Officer. In this higher grade I had to possess skills required for dealing with freight and passenger handling for either inward or outward flights. Generally this entailed liaison with H.M. Customs, Immigration, local forwarding agents, taxi operators, Post Office and – highly important – other staff. Close attention had to be given to the documentation. Much of the work was similar to that involved with the passenger liners – the difference being the scale of operation.

There was a varied range of export freight – day-old live chicks, Great Dane puppies, daily newspapers and the Royal Mail. Homewards, the flying boats brought imports to Southampton – flowers which were sent on to Covent Garden and Mail. Usually the system worked like clockwork so a rare lapse stood out. In 1955 Aquila purchased two Solent Mk IV flying boats from TEAL. The first to arrive was *Awatere* – G-ANYI – and it seemed proper to prepare the import entry that treated the aircraft as "British returned goods". When the aircraft was examined, this applied to the airframe but not to the radio equipment which was of American origin. Technically an offence had been committed and so a formal request had to be made to the Collector of Customs & Excise in order to submit an amended form of import entry. This was granted and a small fine had to be paid. Obviously this error was not repeated when the second flying boat arrived from New Zealand.

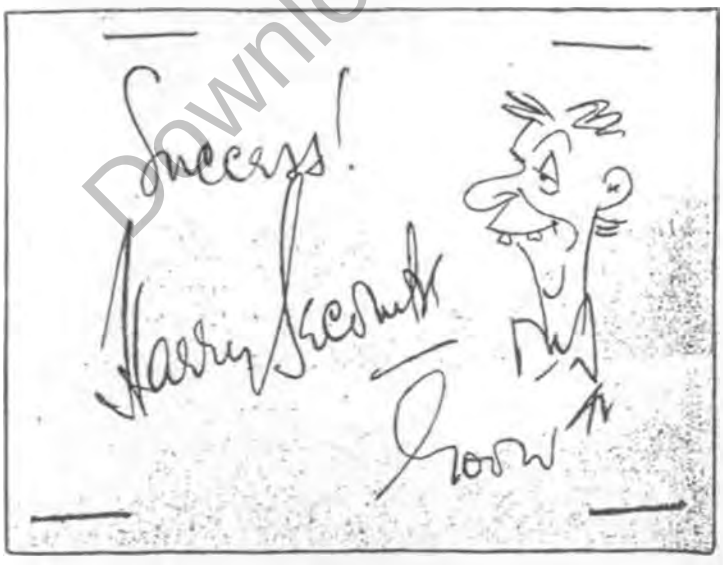


Figure 8: Harry Secombe's signature from the author's autograph album

It was usual for new members of the staff to take a flight in a flying boat: often this happened when a test flight had to be made. However, in 1953 a Col. Miller had purchased a number of flying boats that once belonged to BOAC and he was in the process of transferring them from Southampton Water to Poole Harbour. Such a flight took place on 7th July 1953 and this was my initial flight. The pilot, who had been a captain with Imperial Airways and BOAC, was a brother of Sir John Alcock. Many years later I have been able to read Graham Coster's book called *Corsairville*. This is the story of how "my pilot" had to make a forced landing on a muddy creek in the Belgian Congo. This was in a C-class flying boat called *Corsair*.

Although Aquila's accommodation at Berth 50 did not have a VIP lounge, it was still possible to afford "that something extra" when a celebrity was

Downloaded from www.hias.org.uk

on the passenger list. Here my memory is jogged by being able to refer to my modest autograph album and first pages looked at were signed by stars who appeared in the film *Moby Dick*. In addition to technicians there were John Huston, the director, and stars like Leo Genn, Richard Basehart, Ossie Morris, Bernard Miles and Edric Connor boarding flights at Southampton. From the equestrian world came Col. Harry Llewellyn, gold medallist in the 1952 Helsinki Olympic Games, and Harry Carr, the one-time Queen's jockey. Then it was back to the entertainment world for the likes of Terry-Thomas, Trevor Howard and the composer Richard Addinsell. Other favourites were Beatrice Lillie and Gracie Fields, who flew to Capri with her husband Boris Alpervici. Last and by no means least came Harry Secombe, then more noted for his part in the Goon Show. His later successes were of special interest as I could claim that I had once met him.

Aquila was truly an international airline that carried over seventy thousand passengers and earned a rightful place in the history of Southampton Docks and marine aviation.

For the romanticist, the historic rôle Southampton played in the development of marine aviation has to be recalled. From the Supermarine service to the Channel Islands to the huge 12-engined Dornier DO-X in 1929. From the Schneider Trophy successes to the Boeing 314 and the Sikorsky S42, also from America, in 1939. Then came Imperial Airways, BOAC, Aquila and the Princess flying boat. If all this is history then Aquila's aircraft wrote their page of it when RMA *Hampshire* made the first flight to Madeira and RMA *Southampton* the last Aquila flight to Lisbon.



Figure 9: The former BOAC/Aquila terminal at Berth 50, photographed in 1991. It was demolished in 1994

All are names firmly linked with an era that is still associated with the United Kingdom's history of marine aviation.

Norman Hull

(Reproduced from "Vintage News", the Vintage Aircraft Club Annual Magazine, Issue 1996 - 97, by kind permission of the author, with additional personal memories)

AQUILA AIRWAYS LTD

Short S25 Sunderland "Hythe" Class Flying Boats

Registration	*Name*	*Aquila Regd*	*Out of service*	*Notes*
G-AGER	*Hadfield*	6.12.48	26.7.56	Film *Moby Dick*. Scrapped at Hamble.
G-AGEU	*Hampshire*	19.1.49	1953	Berlin airlift. Destroyed 18.8.53
G-AGHZ	*Hawkesbury*	January 1949	1949	Dismantled for spares 1/52 at Hamble.
G-AGIA	*Haslemere*	23.7.48	9.2.51	Berlin airlift. Dismantled for spares 7/52.
G-AGJJ	*Henley*	5.2.49	7.1.52	Dismantled for spares at Hamble.
G-AGJK	*Howard*	5.2.49	7.1.52	Dismantled for spares at Hamble.
G-AGJL	*Hobart*	24.3.49	7.1.52	Dismantled for spares at Hamble.
G-AGJM	*Hythe*	7.2.49	7.1.52	Dismantled for spares at Hamble.
G-AGJN	*Hudson*	25.2.49	21.1.53	Scrapped Funchal after storm damage.
G-AGKY	*Hungerford*	10.1.49	28.1.53	Lost float in So'ton Water, sank under tow.
G-AGLA	*Hunter*	January 1949	Scrapped 8/49	
G-AHEO	*Halstead*	23.7.48	10.11.49	Berlin airlift. Dismantled for spares.
G-AHER	*Helmsdale*	October 1949	Scrapped 1/52	
Short S25 Sandringham Mk.1 Flying Boat				
G-AGKX	*Himalaya*	May 1949	Scrapped 8/53	Converted from Mk.III Sunderland.
G-ANAK	Not named	July 1953, damaged beyond repair, Hamble,11/54 before entering service.		
Short S45 Solent Flying Boats				
G-AHIN	*Southampton*	17.6.57	5.12.58	To Lisbon 12/58. Scrapped 1971.
G-AKNU	*Sydney*	16.11.51	15.11.57	Crashed Isle of Wight.
G-ANAJ	*City of Funchal*	25.6.53	26.9.56	Written off at Santa Margherita.
G-ANYI	*Awatere*	17.1.55	October 1958	To Lisbon, Scrapped 8/71.
G-AOBL	*Aotearoa II*	12.4.55	October 1958	To Lisbon. Scrapped 5/71.

Downloaded from www.hias.org.uk

Steam Engine Valve Gears

with particular reference to the Hathorn Davey engine at Twyford

Introduction

From the earliest days of the Newcomen engine, engineers have striven to improve the efficiency of the steam engine. To make a workable steam engine, a mechanism must be devised to admit live steam to the cylinder to act on the piston and to exhaust the spent steam at the end of the stroke. Newcomen's engine used valves derived from plug cocks. The steam engine of James Watt, and its development as the Cornish engine, used drop valves (Fig. 10) opened by a lever and closed by gravity (a weight). By using separate steam inlet and exhaust valves operated by separate levers and gear, the admission and exhaust of steam could be controlled independently of each other and a more efficient engine produced. Watt and Cornish engines operated slowly, up to 10 strokes per minute. When rotative engines were developed they operated at higher speeds, 20 to 30 revolutions per minute. For them different valves such as the slide valve were suitable but they removed the ability of control admission and exhaust separately.

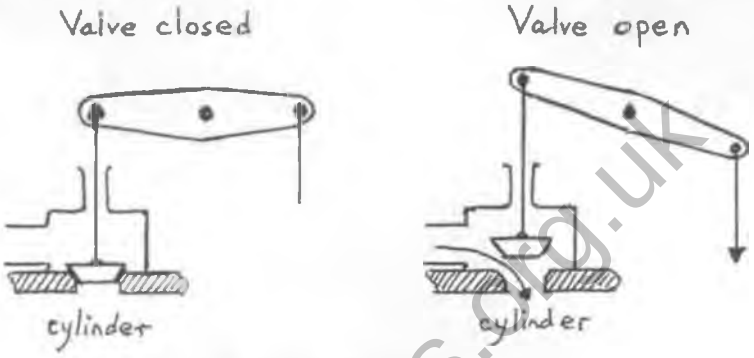


Figure 10: The drop valve

In America, George Henry Corliss [1] in the 1840s developed the oscillating rotary valve (Figs. 11 & 12) and the valve gear to drive it. In the second half of the nineteenth century large stationary steam engines operating up to 60 revolutions per minute nearly always had Corliss valves and their associated 'trip' gear. In the twentieth century Corliss valve gear continued to be used on slow speed engines such as the pumping engine at Twyford. However, it could not be modified to operate at the speeds required for the 'high speed' engines used for electricity generation.

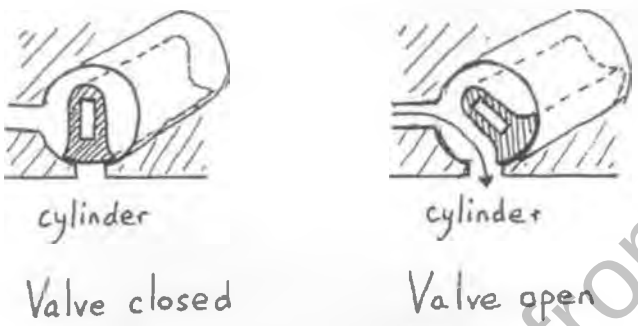


Figure 11: The Corliss valve

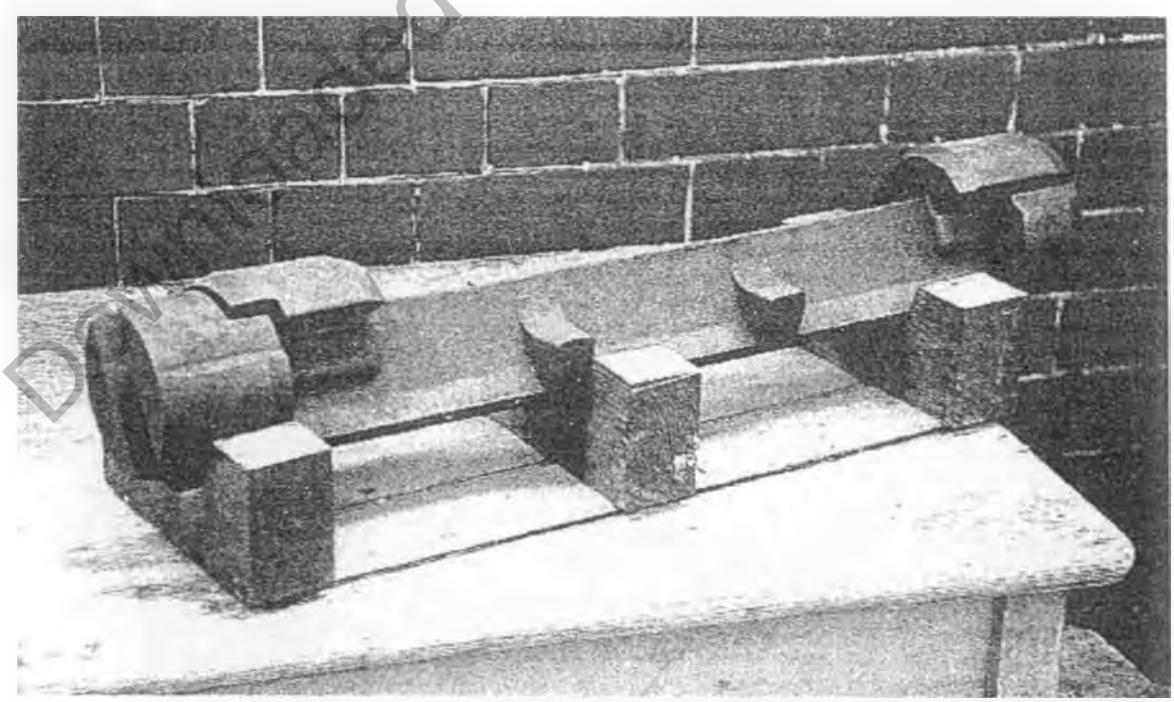


Figure 12: A Corliss inlet valve at Twyford

Downloaded from www.hias.org.uk

Improving the efficiency of the steam engine

In the reciprocating steam engine, steam is admitted to push the piston from one end of the cylinder to the other and is then exhausted as the piston returns. This cycle can be displayed on a graph of steam pressure (vertical axis) against volume of steam (horizontal axis). The volume is determined by the position of the piston (Fig. 13). The cycle is:

- **A** inlet valve opens, steam enters cylinder and pushes piston back to
- **B** where the inlet valve closes. As the exhaust valve opens the pressure drops to
- **C** after which the piston moves back, expelling the spent steam, to
- **D** where the exhaust valve closes. As the inlet valve opens the pressure rises to A and so on.

The work done by the steam is proportional to the shaded area enclosed by **ABCD** whatever the shape of **ABCD**. This form of diagram was first used by James Watt and is known to engineers as an 'indicator diagram'. Taking an indicator diagram by measuring the steam pressure as the piston moved down the cylinder, was a routine check on the correct operation of an engine.

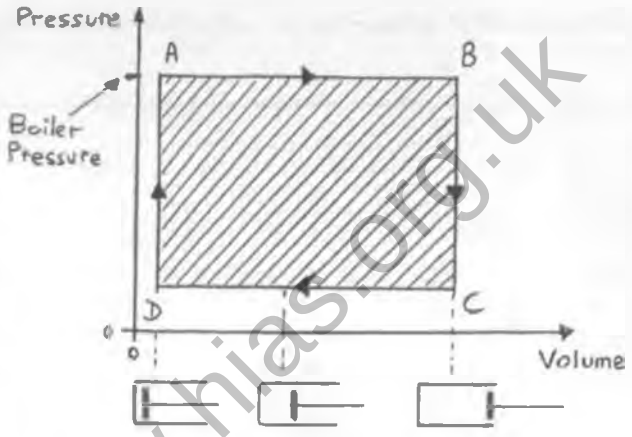


Figure 13: The 'indicator diagram'

To improve the efficiency, valve gears were developed to enable the proportion of the piston stroke for which the valves were open to be controlled by the governor, or manually by the engineer. To see why this is desirable we return to the indicator diagram. Figure 14 shows an indicator diagram for an engine in which the steam is only admitted for the first quarter (**AB**) of the piston stroke. After the inlet valve closes, the steam continues to expand, pushing back the piston to **C** when the steam fills the cylinder. As the steam expands, the pressure drops. The exhaust valve then opens and the piston returns (**CD**) removing the spent steam. The work done by the engine is still proportional to the shaded area **ABCD**. The area enclosed by **AB'C'D** is the same as **ABCD** so an engine with two thirds of the cylinder volume but admitting steam for the whole stroke would do the same amount of work. The first engine, admitting steam for only ¼ of the stroke, uses much less steam than the second engine, admitting steam for the whole stroke, and hence is more efficient.

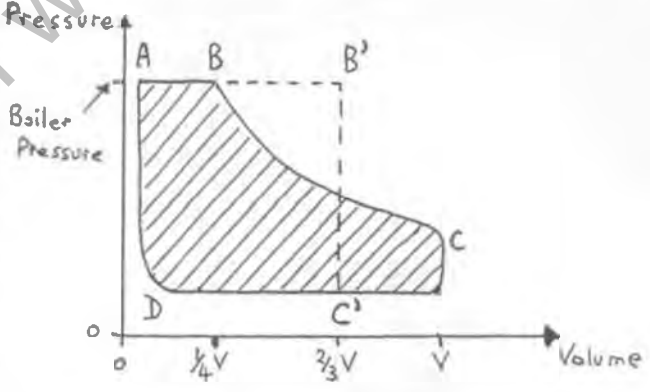


Figure 14: An indicator diagram for an engine with expansion of the steam

When the load on the engine increases, the inlet valve stays open longer (Fig. 15) so taking more steam from the boiler but doing more work. The indicator diagram encloses a larger area.

The argument above would suggest that the most efficient engine would have a very large cylinder and only admit steam for a very short time at the start of the stroke to get maximum expansion of the steam. This cannot be done as the steam cools as it expands. It cools the cylinder and may condense in the cylinder. Reheating the cylinder for the next stroke uses more steam and thereby lowers efficiency. Condensate in the cylinders can wreck the engine as water is incompressible. The solution to this problem is the compound engine which spreads the expansion over two or more stages. At Twyford the Hathorn Davey engine is a triple expansion engine; the steam expands through three cylinders in turn, each cylinder being larger than the previous one. By splitting the expansion over three stages, the temperature drop in the steam is smaller per cylinder so less heat is wasted reheating the cylinders. Between each pair of cylinders the steam passes through a reheater to ensure it does not condense in the next cylinder.

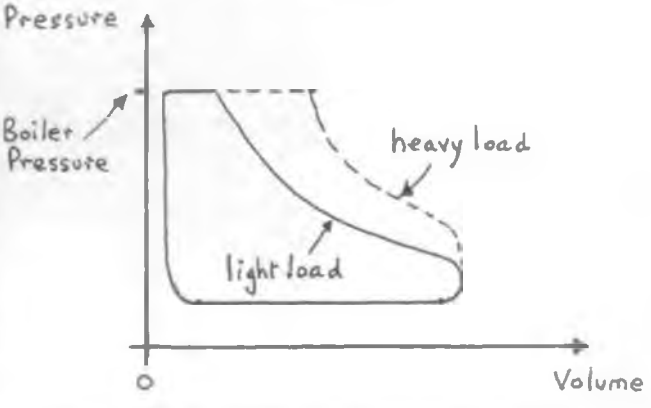


Figure 15: The effect of variations of load on the indicator diagram

Downloaded from www.nias.org.uk

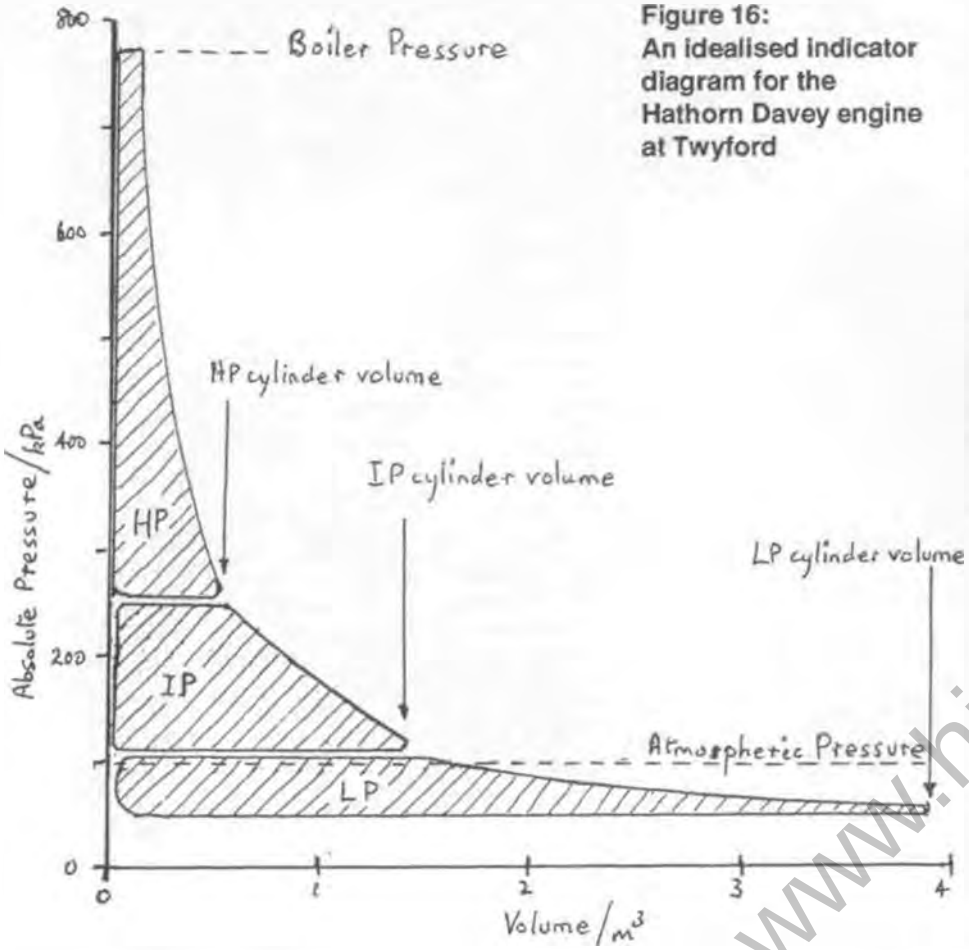


Figure 16: An idealised indicator diagram for the Hathorn Davey engine at Twyford

Figure 16 shows an idealised indicator diagram for the engine at Twyford with steam cut-off at ¼ stroke in the high pressure cylinder and expanded over 20 times before leaving the low pressure cylinder for the condenser. (The diagram is drawn for 100 p.s.i. gauge (780 kPa absolute) boiler pressure and 50 kPa absolute in the condenser). Note that steam is admitted for only a portion of the stroke for each cylinder, leaving the steam to expand for the remainder of the stroke. The exhaust valve is open for nearly all of the return stroke. The envelope of the areas for all three cylinders looks like the idealised diagram with a very short admission time and a very large expansion of the steam. Since each cylinder drives a pump directly, each should do equal work: thus the three shaded areas in Figure 16 should be the same. Checking the correct valve setting at Twyford is a job which would have been done regularly by the engineer so that adjustments could be made as required.

Valve gears

We now know the problem which the valve gear must solve. It must control the points at which the inlet valve opens and closes independently of the points at which the exhaust valve opens and closes. Also it must change the point at which the inlet valve closes to match the load on the engine, deriving this response from the governor which keeps the engine running at constant speed.

G. H. Corliss himself devised several trip valve gears to operate his valves, and variants of them were used right up to the end of the slow speed reciprocating steam engine era. Many engineers invented improved or different valve gears to drive Corliss valves. One such was patented by Alexander Craig (patent number 2245, 29th May 1876), an engineer of Mountpottinger, Co. Down and later of Londonderry, N. Ireland. Figure 17 shows Craig's gear as drawn in his patent specification. It is applied to drop valves which are opened by the gear and, on release, fall under gravity to close the valve. An application of Craig's trip valve gear to drop valves is on a single cylinder beam engine built by Victor Coates & Co. of Belfast in 1884 for Jameson's Distillery, Bow Street, Dublin [2].

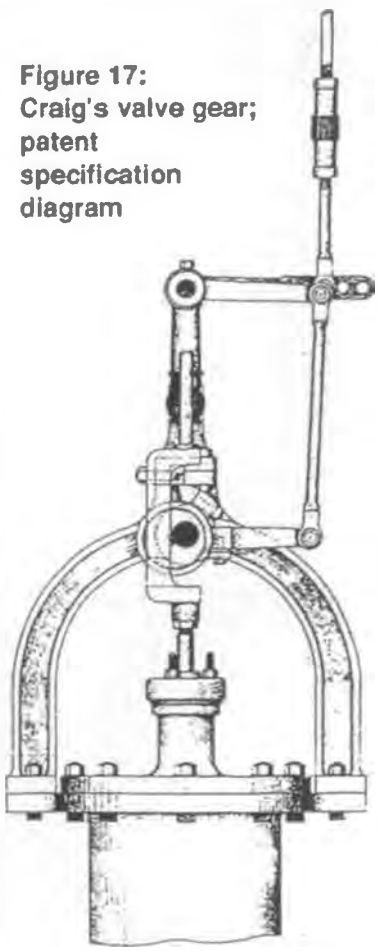


Figure 17: Craig's valve gear; patent specification diagram

The trip valve gear fitted to the Hathorn Davey engine at Twyford is a derivative of Craig's gear arranged to drive Corliss valves. Craig's patent would have expired in 1890 even if he had renewed it past the 7-year renewal date to its maximum of 14 years. The principle of his mechanism survives in engines built by Clayton, Goodfellow & Co. of Blackburn and by Hathorn Davey & Co. of Leeds. John Harrison, William Loynd and Richard Henry Clayton of Clayton, Goodfellow & Co. patented their 'improvements' to drive Corliss valves in 1893 (patent number 3647, 18th February 1893). This version can be seen on the Ellenroad mill engine [3] rebuilt by Clayton, Goodfellow & Co. in 1920 (Fig. 18). The Hathorn Davey version is identical in principle and operation and can be seen at Twyford and Kew Bridge Steam Museum.

Downloaded from www.nies.org.uk

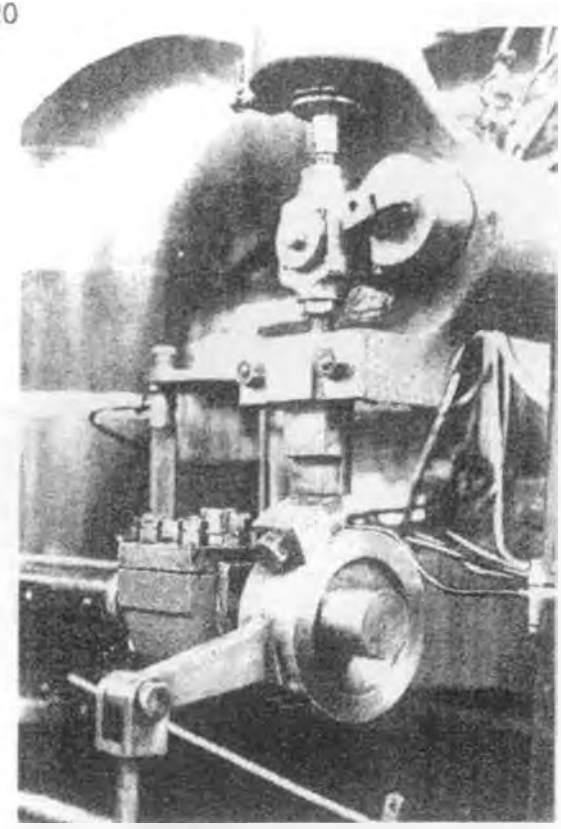


Figure 18: Harrison *et al* valve gear on the Ellenroad Mill engine

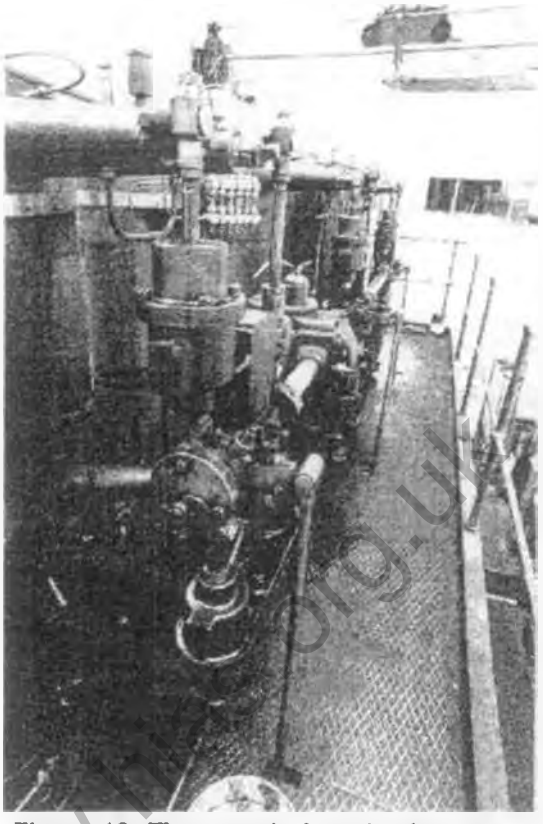


Figure 19: The camshaft and valve gear on the Hathorn Davey engine at Twyford

Downloaded from www.[illegible].org.uk

Hathorn Davey's version of Craig's trip valve gear

At Twyford the valves are all in the heads at the ends of the cylinders. For the three double-acting cylinders there are six inlet and six exhaust valves all operated from a single camshaft alongside the cylinders (Fig. 19). The camshaft is driven via three pairs of gears from the crankshaft and rotates at the same speed as the crankshaft. A single cam and roller operates the exhaust valves at each end of a given cylinder. The inlet valve eccentric for each cylinder carries two tappet levers, one for each end of the cylinder. So, how do they operate?

Figures 20 and 21 show the valves at the top of the cylinder. C is the valve chest and V the Corliss valve opened and closed by moving lever W up and down. The operation of the exhaust valves is shown diagrammatically in Figure 20. The operating rod is connected to a bridle carrying two rollers which grip the cam on the camshaft. As the camshaft rotates, the valve is opened and closed. An operating rod at the bottom of the bridle controls the exhaust valve at the bottom of the cylinder.

The gear for the inlet valves is more complex as it has to vary the point in the stroke at which they close (the point of 'cut-off'). The valve is opened by the combined motion of the eccentric rotating with the camshaft, and the tappet lever T. The valve is closed by the spring and dashpot when the operating rod clears the tappet. From the same eccentric, a separate tappet, spring and dashpot operates the inlet valve at the bottom of the cylinder. In Figure 21, the first diagram shows the valve closed. The spring has pushed the operating rod down and the tappet is off to the right hand side. As the eccentric rotates, it carries T down, to the left, and subsequently up to raise the operating rod and open the valve. This is shown in the second diagram. When the eccentric rotates further, T moves right again allowing the operating rod to fall off the edge of T at the point of cut-off (third diagram) and close the valve.

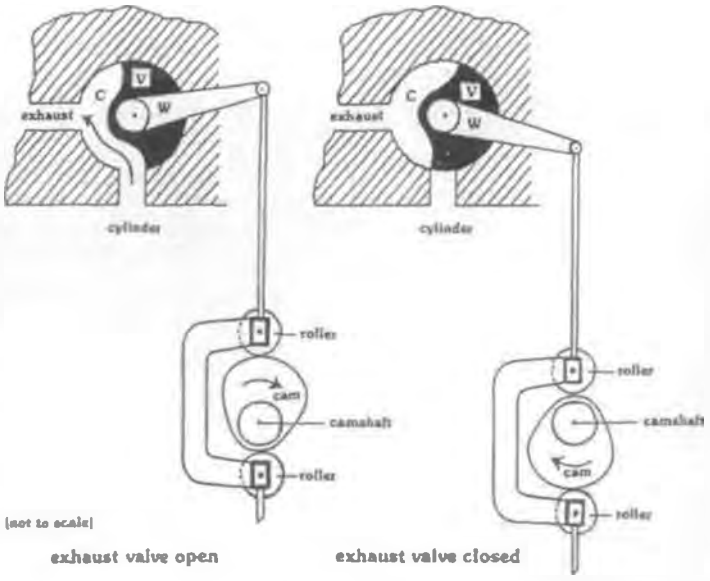


Figure 20: Hathorn Davey's version of Craig's valve gear; the operation of the exhaust valves

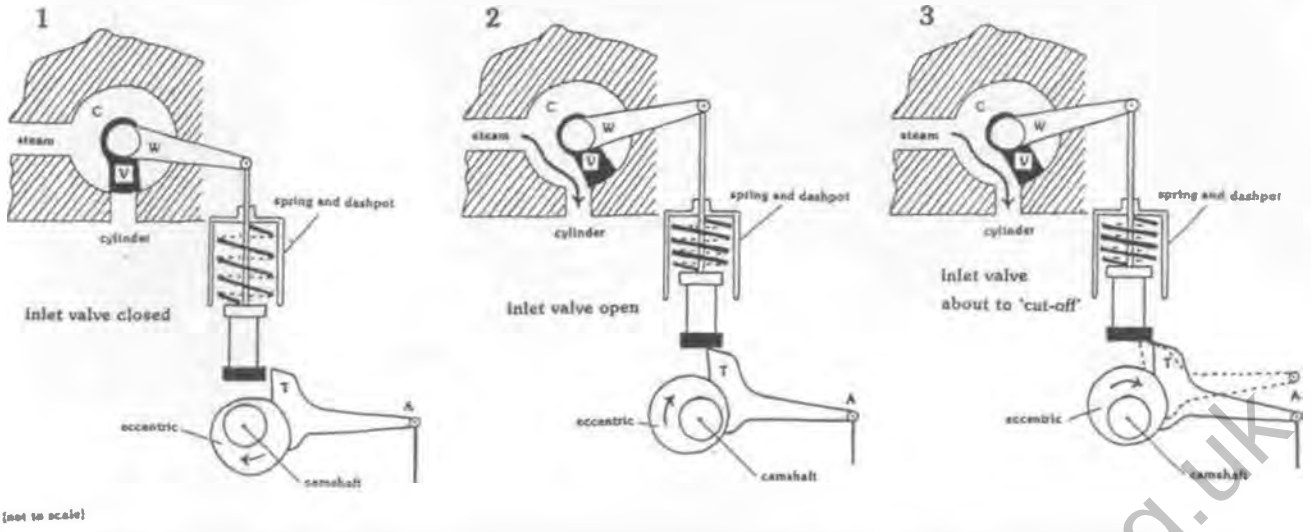


Figure 21: Hathorn Davey's version of Craig's valve gear; the operation of the inlet valves

On the high pressure cylinder, the end A of the tappet lever T is connected to the governor by a rod. When the engine slows down due to an increase in load, the governor linkage moves the point A up (the dotted position in the third diagram). With A raised, the eccentric has to rotate further to release the valve operating rod from T. Thus steam is admitted for a longer portion of the stroke and the engine develops more power, and speeds up. The movements of the ends A of the tappet levers of the intermediate pressure and low pressure cylinders are controlled manually. They are adjusted by the engineer to balance the work done by the engine.

The speed of the engine is controlled by a "centrifugal" governor driven by, and mounted on, the vertical shaft connecting the crankshaft to the valve camshaft. The governor is suspended from the top pivot A shown in Figure 22. When the speed rises, the governor rotates more rapidly so that the balls move outwards, raising the bottom collar and central weight.

The horizontal shaft **BB'** links the governor to the valve gear of the high pressure cylinder. A lever on this shaft slots into the collar on the governor and rotates shaft **BB'** in proportion to the movement of the governor collar (the change in engine speed). A double-ended lever on **BB'** carries two rods to control the tappet lever positions on the inlet valve gear of the high pressure cylinder. Thus movement of the governor collar controls the cut-off and hence the power of the engine. The governed speed can be varied by adjusting the position of the counterweight **C** on the lever at the end of **BB'**. "Hunting", or the cyclical rise and fall of engine speed as the governor changes, is minimised by fitting a hydraulic damper **D** to the end of the governor control lever.

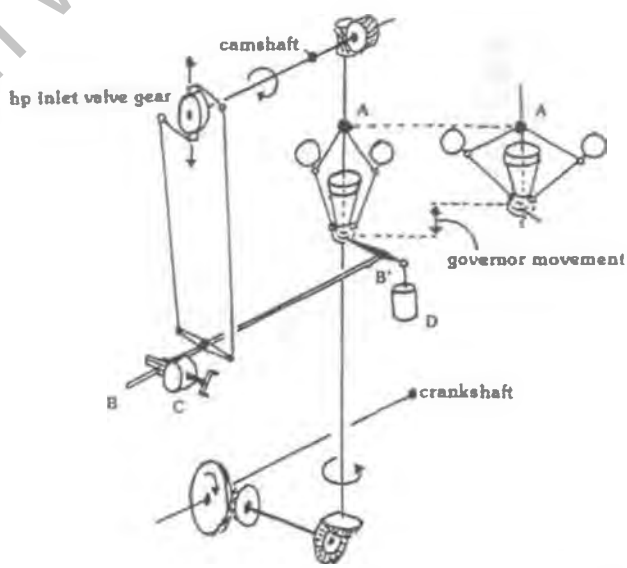


Figure 22: Hathorn Davey engine; the governor and its linkage

The Hathorn Davey engine at Twyford is a representative of the final and most efficient form of the reciprocating steam engine. When commissioned in 1914 it had an efficiency more than ten times higher than that of the Watt engines of 130 years before. Much of this improvement was due to higher boiler pressures and superheating, but the other large step forward came with an understanding of the expansion of steam and the invention of valves and valve gears to make use of that expansion.

Martin Gregory

References

(1) Sawyer, William D., Corliss, Man and Engine, *Stationary Power, 10*, 1994 and *11*, 1995.
(2) Bowie, Gavin, The Millhouse Engine in Jameson's Distillery, *Industrial Archaeology, 9* pp265-277, 1972
(3) The Ellenroad Engine House, Elizabethan Way, Milnrow, Rochdale, OL16 4LG.

Downloaded from www.hrs.org.uk

The Story of the Mayflower Theatre

Construction

Of the many venues of entertainment in Southampton, the "Empire" of the 1920s is the last of the city's many theatres – changing its name to the "Gaumont" during its cinema period and now the "Mayflower".

The "Empire" opened on 22 December 1928 with a production of *Winona*, an import from America and due to go on to London's theatreland, which it never made. Called *White Eagle*, a musical play of frontier life in the wild west, it had been produced in America as *The Squaw Man* and also turned into an early film.

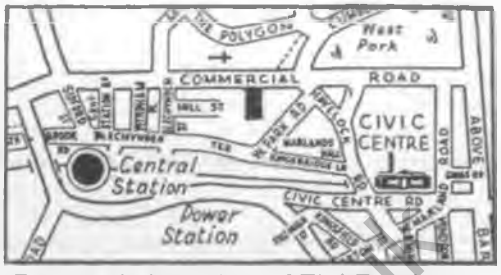


Figure 23: Location of The Empire Theatre in Commercial Road, Southampton

The "Gaumont", which started life as the "Empire" (not to be confused with the theatre between French Street and Bugle Street), was operated by Moss Empires and was the largest and most up-to-date theatre in the South, with seating for 2,300 people in the stalls, grand and upper circles. The stage was large, with the opening being 26ft high, 80ft wide and 40ft deep – ideal for the many spectacular productions that appeared there later.

The auditorium was decorated in the classical style; the colours of a delicate grey and silver, and the seating upholstered in rose-du-barry velvet with the curtains of velour picked out with gold.

This colour scheme changed through the years. The walls were once red and are now green. The seating was square to the stage and it may be that the architects had the cinema-goers in mind with just two pillars obscuring the sightlines in the stalls. The circle was suspended by a steel girder – said to be the longest girder in use in a theatre in Great Britain.

The dressing rooms in the stage area were considered comfortable and spacious, each floor having a bathroom with hot and cold water, while the "STAR" rooms had their own facilities and telephone. There was also a lift and a laundry for their use.

Above the stage the framework from which the scenery is hung is 62ft high, which makes the heaviest curtains, lighting or scenery easy to fly in a professional production. The original lighting console was capable of providing 100,000 candle power and was better than many installations in London theatres. It operated four colour battens, footlights, focus spots and stage lights, and was said to be easy to operate.

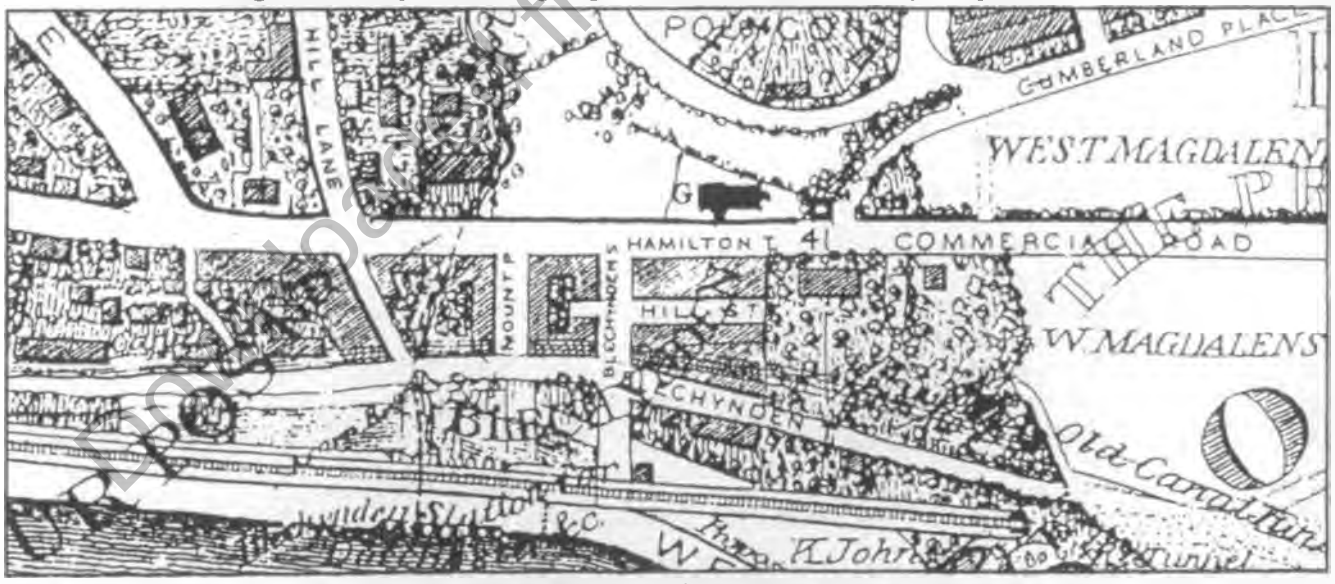


Figure 24: Commercial Road and surrounding area about 1850, showing Hamilton House (below No. 41)

The "Empire" was built on sloping land running from Commercial Road down the slope towards the line of canal, later the railway. The frontage was originally the Turnpike Road which took travellers from Southampton to the West and skirted the tidal waters which sometimes flooded the area.

There were many Georgian houses built along this road. *Hamilton House* was the largest, and parchment documents suggest a date of 1722. Catherine, a daughter of the Rev. Anthony Hamilton, bought the house in 1809. The house had extensive grounds and a feature of the gardens was a lake, flower gardens, an avenue of trees and winding paths. Over the next 100 years, three other families owned the house until Thomas Saunders

Downloaded from www.hias.org.uk

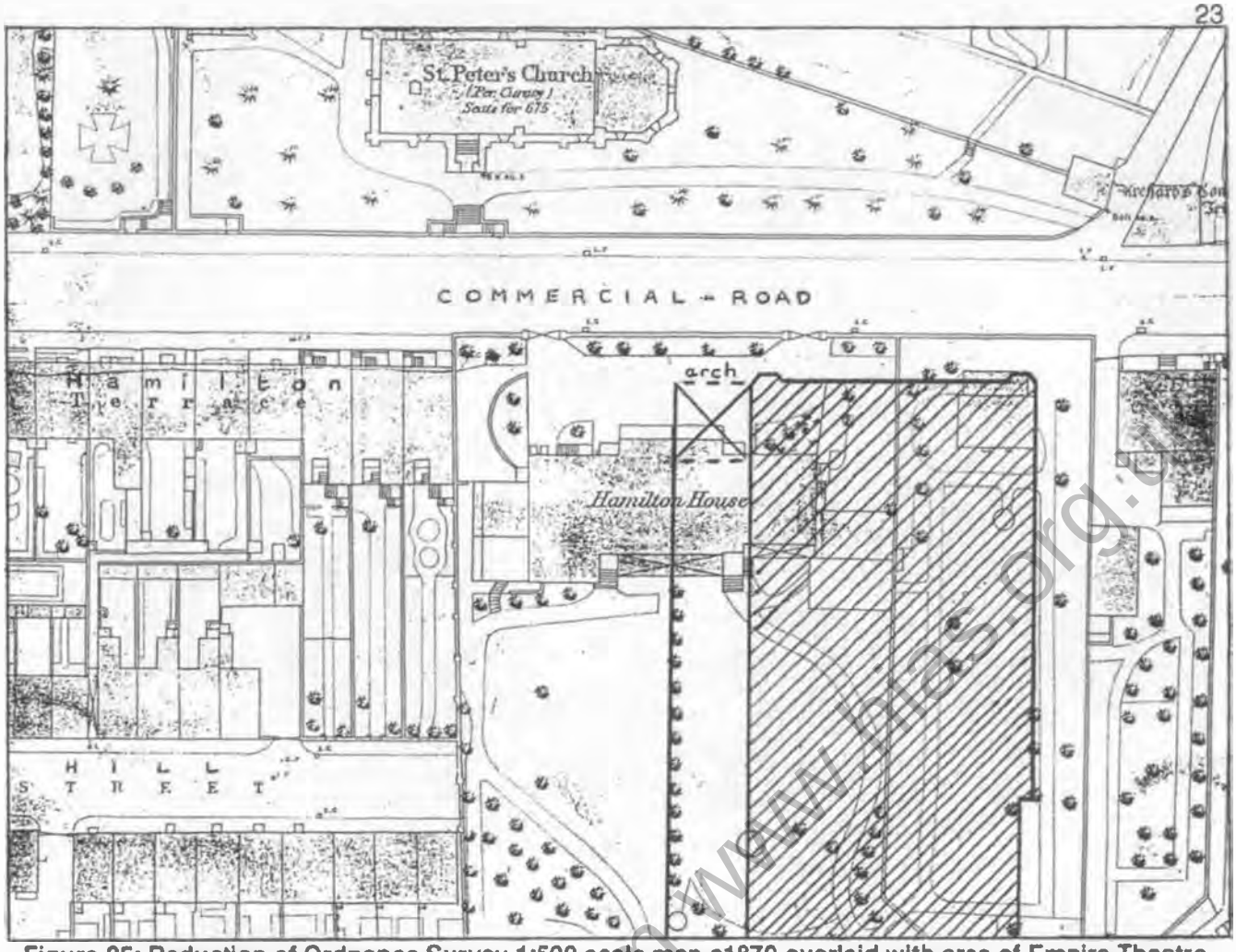


Figure 25: Reduction of Ordnance Survey 1:500 scale map c1870 overlaid with area of Empire Theatre

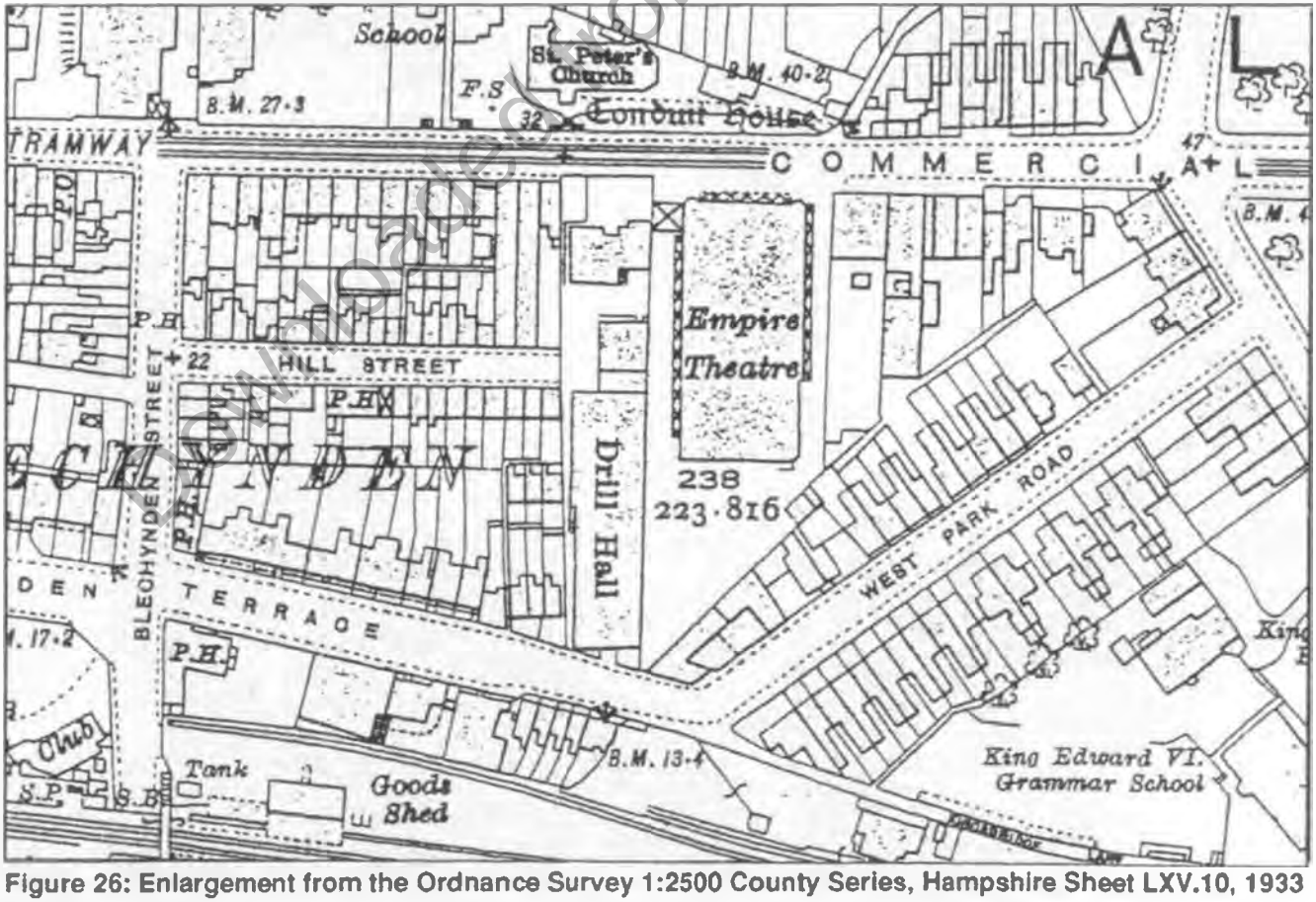


Figure 26: Enlargement from the Ordnance Survey 1:2500 County Series, Hampshire Sheet LXV.10, 1933

Downloaded from www.HALHRG.org.uk

sold it to the Territorial Army in 1910. Several army units had their Headquarters there and the house was shared with a Church Army Labour Home.

The Theatre used half of the Hamilton House site, and the Hamilton Villa property next door was also bought, which literally cut Hamilton House in two. The building was designed by W & R Milburn, F.R.I.B.A., and the main contractors were W Moss & Sons Ltd of Cricklewood, London – the bulk being built in 1927 under the watchful eye of Mr Louis J Clayton, who was the Clerk of Works. Seven artesian wells were discovered during construction and there were many setbacks and one fatality which was not publicised at the time owing to theatrical superstition. The main building was built of brick with a frontage of Portland stone which, apart from the advertising canopy, has changed little. Wood panelling and marble slabs were a feature of the foyer, and tiled floors – now covered by carpets – decorated the staircases.

There was a roof garden and a large iron gantry which proclaimed the Theatre's name. The car park had a capacity for 300 cars, which would have been adequate with most people arriving by walking, buses or using the trams which ran past the front entrance.



Figure 27: View westwards in Commercial Road, 14 May 1932, with the Empire Theatre advertising Layton and Johnstone, the coloured piano/vocal duo (G N Southerden photo)

History

The "Empire" theatre continued with a menu of plays with famous actors and actresses, mostly coming from runs at London theatres – Matheson Lang in the *Chinese Bungalow*, Sybil Thorndike and Lewis Casson in *The Squall*, and *Lilac Time* were examples of shows in these years. For the Balletomanes, the appearance of Anna Pavlova in *Le Lac des Cygnets* (Swan Lake) filled the theatre to capacity, the audience thrilled by the dancing of this famous ballerina.

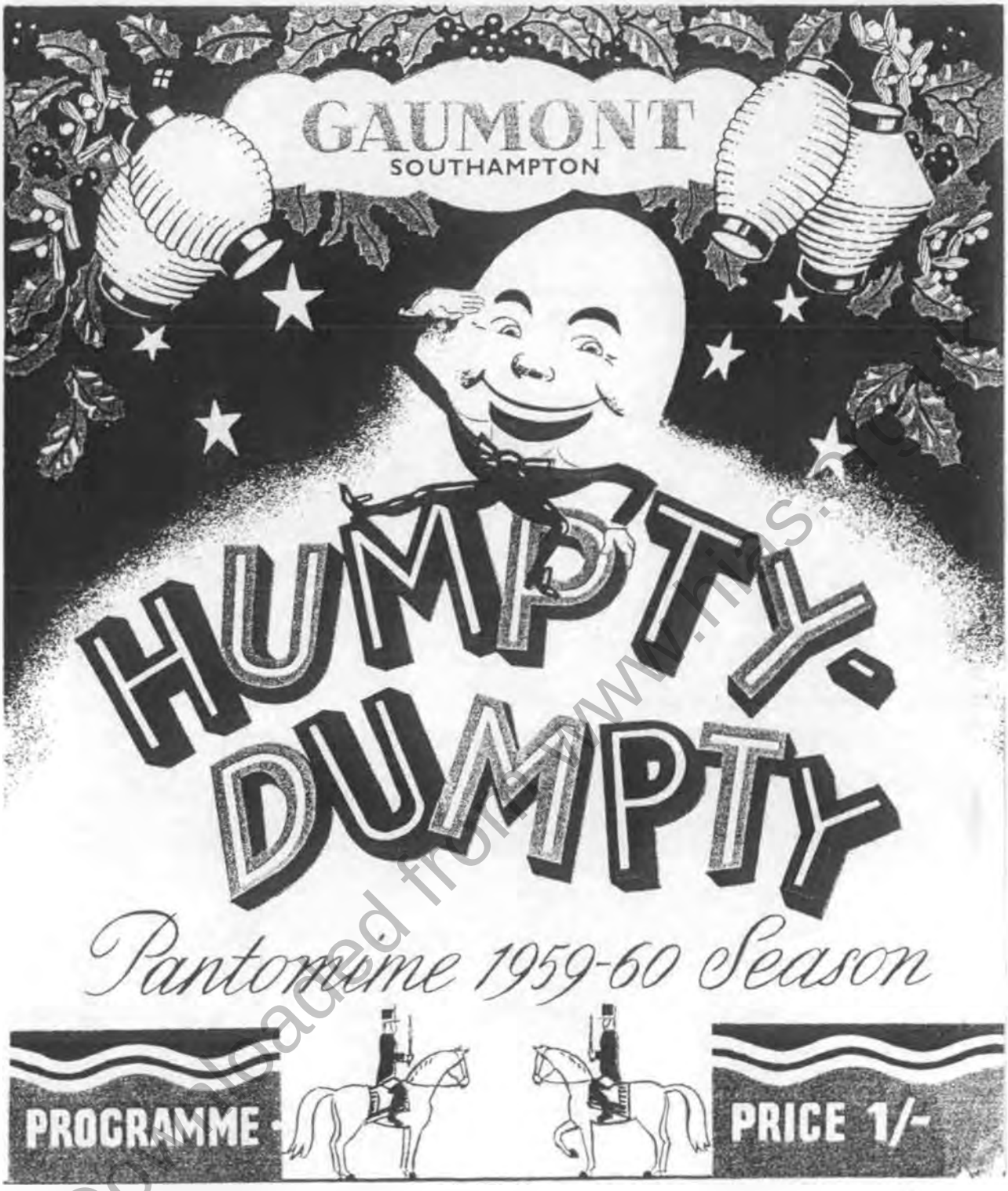
In 1931 it was announced that there was to be a special "TALKIE" season of films lasting for five weeks. Al Jolson's remark "You ain't seen nothing yet" had changed cinema-going now that sound was available, and the many early musicals promoted this new invention. This season of films proved so popular that they became an established feature, from then on alternating with stage shows.

The roll of the many famous names of the entertainment world who performed there was endless, including Jack Buchanan, Gracie Fields and Harry Lauder; Gertrude Lawrence and Leslie Howard in *Candlelight*; the American Tallulah Bankhead, Ivor Novello, Nellie Wallace, Sybil Thorndike, Jack Hulbert and Cicely Courtneidge, George Robey and Sonny Hale, all icons of the acting profession.

The films shown were too many to be listed, but mention of one *Snow White and the Seven Dwarfs* reminds many of us of the days before World War Two. It was during WWII that film shows became dominant at the "Empire", the theatre productions travelling between theatres being curtailed during the War.

The Moss Empires contracted their operation to the forerunners of the Rank Organisation who were showing films nationally. The "Empire" escaped serious damage from bombing and, in the run-up to D-Day, was used as a venue for continuous film shows for the troops involved in the liberation of Europe.

Downloaded from www.hias.org.uk



Downloaded from www.rhs.org.uk

Characters

Virago (A Wicked Witch) ..	.. GUEST JAMES
Fidelia (A Good Fairy) ..	ROSAMUND DICKSON
Pompey (The Court Chamberlain)	RONALD RICHARDS
Casimir (King of Carolia) ..	TOMMY COOPER
Princess Marigold (His Daughter)	.. PETULA CLARK
Captain Valentine (His Bodyguard)	EDMUND HOCKRIDGE
Humpty Dumpty	.. BETTY JUMEL
Neptune (King of the Sea) ..	.. FRANK CARIELLO
Neptune's Daughter (Ballerina)	.. EVA KENNEY
Martha (A Mere Mortal) ..	.. DEREK ROY
Sentries, Shopkeeper, Innkeeper etc.	

Figure 28: Programme cover and cast list for pantomime1959/60

Eventually the theatre came under the control of the Gaumont – British Film chain and, in January 1950, the "Empire's" name was changed to the "Gaumont". Also in 1950, big-time theatre returned with the stage production of *Annie Get Your Gun* and then came a period when films and live shows became popular at this venue. Laurel and Hardy appeared as part of a variety bill, and the dancing of Alicia Markova, Beryl Grey, Nadia Nerina and Margot Fonteyn thrilled another generation of ballet lovers.

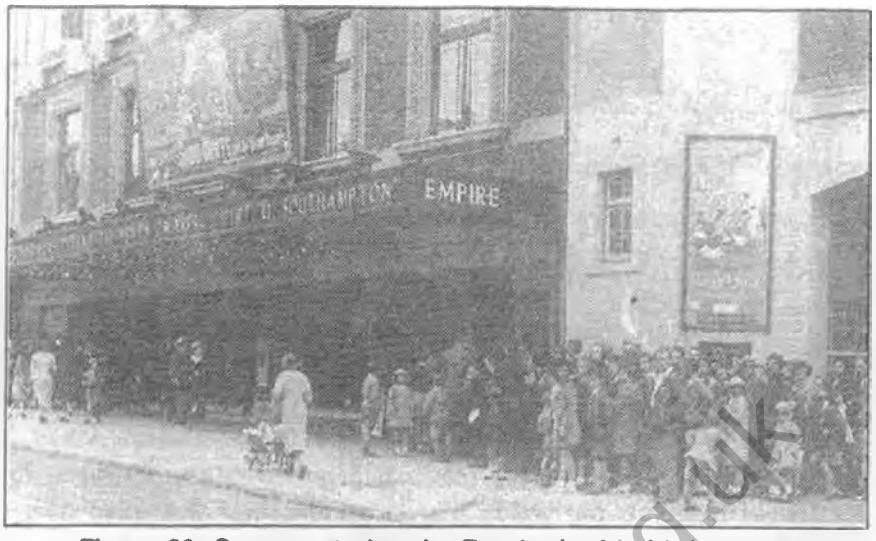


Figure 29: Queue entering the Empire in the thirties for the Disney film *Snow White and the Seven Dwarfs*

The Jazz world was represented by Ella Fitzgerald, Count Basie, Oscar Peterson and many others, the last being Buddy Rich. Tony Hancock, Jimmy Edwards, Ken Dodd, Julie Andrews and others appeared here, not always at the top of the bill. Morecambe and Wise on 14 November 1955 were way down the bill, the headliner being Alma Cogan.

The pantomimes were most enjoyable, one example being *Humpty Dumpty* starring Tommy Cooper, Petula Clark, Edmund Hockridge and Derek Roy. Who can forget Les Dawson who not only made the audience laugh, but most of his fellow actors too. Opera, Boxing, Wrestling and Royal Galas all entertained and then the new audiences, the teenagers, shouting and screaming to Bill Haley and the Comets, Buddy Holly, Cliff Richard and the Beatles.

In 1978, fifty years of the theatre were celebrated with speeches and a birthday cake – and who better to top the bill than "The Two Ronnies". With falling audiences for film shows, there was a period when only the circle was used and, with only 670 seats, this was quite a small number for this type of theatre. There was a proposal to change to Bingo, but the "Gaumont" closed in 1986.

The last production was *Carousel* put on by the Southampton Musical Society, who had contributed many productions at the theatre – and the last rainy night seemed to be the end of the "Gaumont".

However, with a change of management and a complete refurbishment at a cost of £4m, the theatre re-opened in February 1987 with a new name, the "Mayflower". This was chosen after a public competition to suggest names. Only stage productions were to be presented, the last films being shown in 1993 as part of a "Rock Movies" theme and the projectors sold in 1995.

The building is now Listed by the Department of the Environment as a "Building of Architectural Interest", and we hope this will safeguard its future as the finest theatre in the south of England.

Bill White



Figure 30: Tickets for early '60s "pop" shows at the Gaumont

Downloaded from www.rias.org.uk

New Zealand Industrial History

- A Journey Back in Time

Now we are upon the millennium, we can regard the 20th century as we once did the 19th in terms of what are considered to be the origins of today's industrial archaeology. So it has occurred to me that I might legitimately reminisce about personal encounters with industry in New Zealand sixty and more years ago, at a time when that country was approaching its first hundred years of development, first as a Colony and then a Dominion. Much of what I saw then has become today's Industrial Archaeology, or at least its Industrial History. So this is sort of a journey back in time.

I was born in New Zealand early in the years of the First World War and was there most of the time until I moved in 1940 to North Africa with the New Zealand armed forces. Our family came from England in 1910 and father started working as an electrical engineer in Auckland. One of my earliest recollections is of riding in a horse bus from our home down to the ferry terminal on the north side of Auckland harbour, across from the city.

Development on our side of the water was still growing even in those days, nearly eighty years after the formation of the colony. Ferries departed from their dock at the end of the city's main street to serve all the settlements along the North Shore. These were busy craft, double-ended for easy reversal of direction, propellered at both ends and driven by steam engines that I always enjoyed watching at work from the open gallery on the deck above. There were times when these boats had to cope with some pretty rough weather, and boarding one of them as it crashed around at the side of the jetty could be a pretty vigorous experience. Our home embarkation point has, with the passage of time, now become the northern terminal for the Auckland harbour bridge, and the mangrove-rimmed beach at the bottom of the road where we lived is now under a multi-lane highway leading to the north.



Figure 31: Sketch map of Auckland area

One of the ferry stops on the North Shore was at Bayswater from where, between 1910 and 1927, a busy steam tramway served the more northern suburbs, including what is now Takapuna City with its good beaches facing the islands sheltering the harbour entrance. Running its eleven-mile round journey on standard gauge rails and pulling up to three trailers, the small engine tore along at alarming speeds, blowing its whistle at every opportunity and stopping on its way to pick up another load of wood for the boiler. And on the other side of the harbour, at Western Springs, there was a large steam beam engine with an enormous 16 ton, 20ft diameter flywheel that, until 1910, pumped the city's water supply. In much later years I went out to this pumping station with my father when he was discussing a matter of electric power. The engine was no longer working, but I

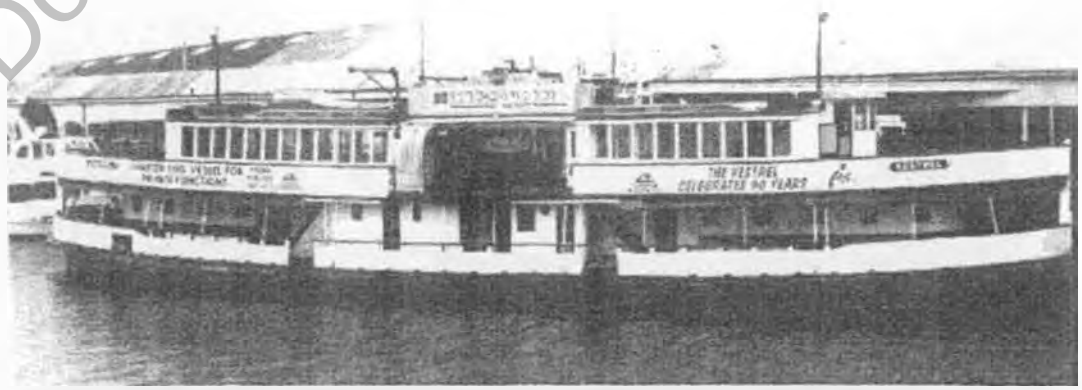


Figure 32: Auckland harbour "Albatross" class ferry *Kestrel* (built 1905), the last of 8 double-ended ferries still in regular service, photographed in 1996. It was converted from steam to diesel in 1959.

Downloaded from www.tinyurl.org.uk

realised what an admirable machine it was, with cast iron columns and beams. I have since looked up its record, and find it was erected in 1877 – twin cylinder double-acting expansion compound and condensing, made by John Key and Son, Kirkaldy in Scotland. The machinery can still be seen in its original building at the Museum of Transport and Technology in Auckland.

The water supply for the city as a whole ultimately came from an installation in the bush-clad range of hills to the west, from completely clear streams, but nevertheless treated with alum to precipitate impurities and passed through sand filters. But many of the usually wooden lap-board houses still kept their own round iron tanks for collecting rain water from the red-painted corrugated iron roofs. Beyond the city limits, on the farms and so on, this was a usual way of collecting and storing water, together with numbers of metal windmills whirling away to work pumps on bore holes.

Up in the higher part of the town there was Partington's old tower windmill, brick-built in 1851, complete with fantail and still grinding corn amidst the shops and offices until the 1940s when it was abandoned and later demolished. It could have been preserved, but in those days when the past was gone it had gone, and all eyes were on the future. Fortunately, in later years in New Zealand, IA preservation has become something of a growing industry.



Figure 32: Grafton Bridge, Auckland (built 1910)

Near the windmill there was, and still is, the high single-arched concrete Grafton road bridge across the deep gully which at that time was full of native bush, but which later carried a major city motorway. When I was about fourteen I had the sad occasion of seeing a man jump off the centre of the bridge, confirming one of its uses as a means of committing suicide. The bridge was one of the first major structures in the world constructed in reinforced concrete, a material that New Zealand pioneered the use of in a number of ways. The main span of Grafton Bridge is 320ft with separate girder spans both ends and an overall length of 950ft. The height above the gully is 147ft. When opened in 1910 it was the largest reinforced concrete arch span in the world.

Electricity came first to New Zealand in Reefton, a mining town in the South Island. In 1888 the lights went on, fed from a generator turned by a water turbine made in Christchurch on the east coast. Wellington, the capital, also had electric street lighting in 1888. Other towns and cities swiftly followed Reefton's example, generating either with water or steam power. Before the turn of the century, Pelton wheels were spinning in many places and by 1908 Auckland was using the waste heat from its refuse destructor to raise steam. The city was at first provided with electricity at 110 volts DC, and later 230 volts AC, for a time with the DC voltage still available. By my time the city had single-deck electric trams which provided a good service, rather substantial objects brought in from England, with wooden seats and swinging backs to adjust for direction, four people across with a central gangway. Power was drawn from overhead wires through a trolley arm. The earlier trams gave no shelter for the driver, and they had an occasional habit of running away down hills. There was a case I remember when a tram came off the rails at a sharp corner and went straight on through the old coaching entrance of an hotel, finishing up in the back yard without doing any significant damage to itself, the hotel, or its passengers. A few of these old trams have been preserved.

Travel to more remote places not served by a train was offered in the daily "service cars", large American cars capable of taking up to six or seven people and some luggage, which was quite sufficient for carrying the few people who might want to travel at the same time. They could be looked on as the motorised equivalent of the stage coaches and horses which in earlier times were provided by the famous Cobb & Co., the coach operator from the USA.

There was also gas in the city and its immediate suburbs, and later it came to our North Shore, at first as street lighting. But in our house it was still the coal or wood range for cooking and paraffin lamps and candles for lighting. By the early 1930s electric stoves were being made in New Zealand.

Downloaded from www.ias.org.uk

Sewage disposal was gradually spreading out from the inner areas, but there were also some pretty primitive facilities. A large sewage outfall was constructed in concrete on stilts above low tide mud of the harbour. The flat top of this structure was about four feet wide, with no guard rails, and about forty feet above the ground. We youngsters used to ride our bikes along this for about a mile to the outfall end.

Sugar had been an import since settlement began, but in 1884 a sugar refining company was set up on the Auckland harbour north shore. The three storey building around a six storey tower was (and still is, with some alterations) constructed with the 1.5 million bricks made from clay dug on the site. Two long wharves were built to take the ships supplying unrefined sugar from overseas. My father was offered the job of managing engineer for this plant, house provided, but to my mother's disgust turned it down because he didn't want to be on 24-hour call. The plant has been there for so long that, although it is still producing, it could be looked on today as Industrial Archaeology.

There was some local shipbuilding, particularly the flat-bottomed sailing scows used for carrying goods and gravel in coastal waters. This work of NZ shipyards became known worldwide, and I once got a trip on a scow on the nearby Manukau Harbour. Many schooners were built from the earliest days of settlement, also square-rigged vessels and, from 1851, steamships. By 1887 there had been 98 iron steamers built.

Auckland was of course one of the major ports of call for shipping from overseas and, rather like Southampton, the upperworks of the great ships beside the docks could be seen from the seaward streets of the city. The city's population between the wars was about 250,000, much the largest in a country of only 1½m people. Today the country's total population is, including Polynesians, almost 4 million. It was from Auckland harbour that Francis Chichester began the first east-west air crossing of the Tasman Sea in 1931, in his Gipsy 1 Moth with a leaky float. In the late thirties the great flying boats began to come in on their early proving flights for passenger services. In December 1937 Imperial Airways' Short S23 *Centaurus*, flying from Southampton Water via Sydney, touched down in a cloud of spray to join the Pan American *Samoan Clipper* on the Waitemata Harbour. Tasman Empire Airways Limited (TEAL) began their Sydney-Auckland services with two C-class flying boats in 1940, and also in 1940 Pan American came in out of the Pacific. Unfortunately the war in the Pacific soon put a stop to all that. After the war the harbour developed as one of the world's greatest yachting centres.

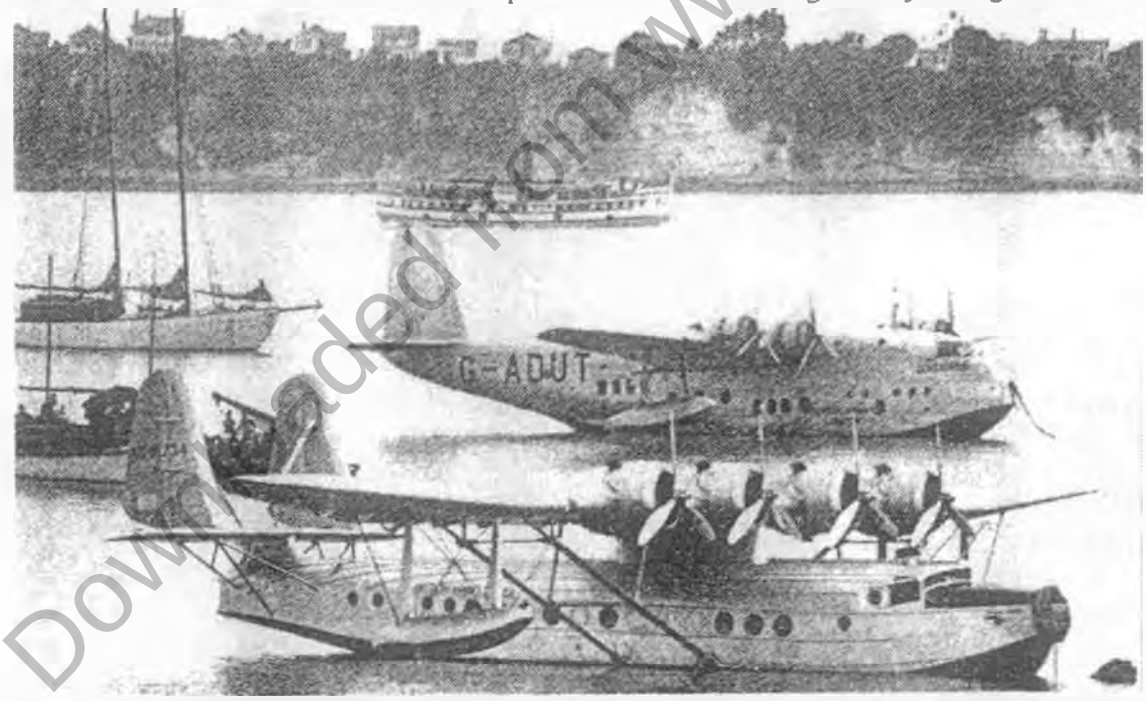


Figure 34: *Samoan Clipper* (front) and *Centaurus* on Waitemata Harbour, December 1937

It is not possible to cover here the whole of my industrial sightings in New Zealand in those early decades of the 20th century. The full IA information can be found in a number of books published over the years, and particularly in *New Zealand's Industrial Heritage* by Geoffrey G Thornton, who spoke on the subject at one of the monthly SUIAG meetings in 1986. Perhaps it was fortunate that my father was an electrical contracting engineer. I got around a great many developments with him on his supervisory visits to new houses, offices, factories, foundries, aircraft hangars, naval installations, highway constructions and broadcasting studios. The development of hydro-electric power was being pushed ahead by the government in both the North and South Islands and, with the spread of cheap electricity throughout the country, installations such as sawmills and farms out in the blue went electric and were able to increase their output.

Downloaded from www.hhs.org.uk

The sawmill, often remotely situated, was always a feature in the New Zealand landscape. First powered by waterwheels, and later by steam, they were often sited near forests being cleared to provide pasture. They supplied what was a major building material in the country and, in areas which had been overwhelmed with gold rushes in the 19th century, sawyers and often the local coal miners remembered the traditions of those earlier days. Some gold mines were still at work in the country in my own time and, of course, there was still coal extraction, and on Kawau Island, near Auckland, where we took some of our holidays, a ruined stone Cornish engine pumphouse with chimney still stands beside the abandoned copper mine it once served.

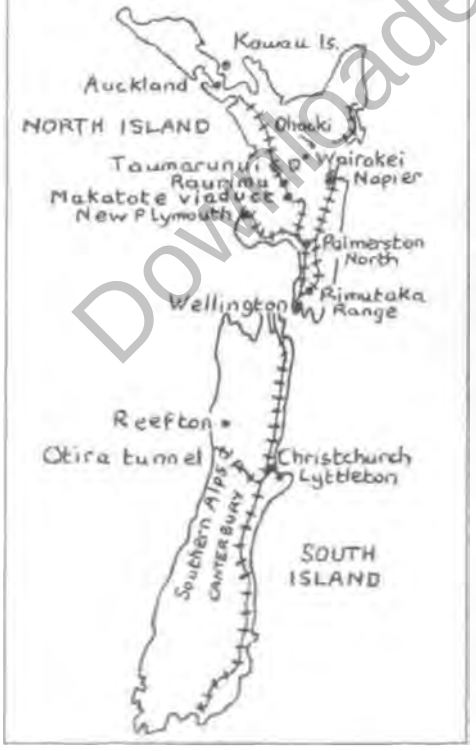


Figure 35: Copper mine pumphouse of c.1847 on Kawau Island

The early models of Fordson tractors began to be used on the farms, and the transport vehicles we used were mostly American, because their ground clearance was greater than the English counterparts. I drove many a Model T Ford around in those days, and had my driving licence when I was 15. I was delighted to be allowed to drive a friend's Morgan 3-wheeler car – yes, one of the originals! There was an enormous variation in the quality of the roads. To the outer limits of the main towns tarmac came to be widely used, with later some concrete. But some secondary residential roads were still in stone chip surface, and the country main roads were covered with some pretty coarse stones. Driving from a to b was usually accompanied by a fair cloud of dust and stone shrapnel. Minor roads and farm tracks were usually just the natural ground surface, with foot-deep wheel ruts and two-foot ooze in the winter. There was a great celebration in Auckland when we achieved a fully tarmaced "scenic" road through the bush-clad ranges to the west of our city.

The basis for the industrial economy in New Zealand, since the country became an independent British colony shortly after the treaty with the Maoris at Waitangi in 1840, was grass, which grew all the year round and enabled the continuous production of meat and wool and dairy products. Machinery for the farms and freezing works and dairy factories allowed the meat and butter and cheese to be processed for the feeding of peoples on the other side of the world. To visit a co-operative dairy factory was to become astonished by the vast bulk of butter being extracted from the power churns, and by its further processing, wrapping, and final packing for export in white pine boxes made from the odourless wood of the native kahikatea tree.

Figure 36:
Sketch map of New Zealand



The products were carried in custom-built transport, and the first refrigerated cargo of meat arrived in London in 1882 after a voyage of 98 days on the sailing ship *Dunedin*, which had left Port Chalmers on February 15. In effect everything I saw around me in those days out there – both in the field of private company activity and in vigorous government public works – was a development of, or was supporting, that primary activity. During the later 1920s and into the thirties, despite suffering our share of the great world economic depression, you could still see it all happening before your eyes.

I also saw, although not to realise it at the time, the beginnings of diversity entering the economy. An example is the forests of alien evergreens that were being planted on a private company basis over thousands of acres of the poor land in the centre of the North Island. At first it seemed just a good idea for gathering in a few shareholders, but with the enormously fast growth of the pines it turned out to be one of

Downloaded from www.rnz.org.uk

the country's great assets. Before WWII started, there were a million acres of an everlasting, replaceable crop which could provide pulp and woodchippings, plywood and the expansion of a papermaking industry; and IA for the future.

My own contact with objects that were already industrial antiquities continued in the mid-30s when I was sent to Wairakei, near Lake Taupo in the centre of North Island, to watch over the removal of an ancient Pelton wheel driving an electric generator beside the Huka Falls on the Waikato River. And its replacement – a hydro-electric Francis turbine plant, to serve a large tourist hotel. After the war this small contribution to the hydro-electric supply was replaced by a large government hydro plant embracing the Huka Falls and Aratiatia Rapids and, in the nearby volcanic valley of geysers and boiling mud pools, not far from where I used to play some golf, electricity generation was achieved using the underground volcanic superheated water to generate steam. This electric power from geothermal sources was only the second such in the world and that at Wairakei was the first to use "wet steam". A later geothermal station was completed in 1989 at Ohaaki, north east of Taupo.

In those times there were few large basic industries in the country. Almost everything was imported, and one of the profitable enterprises was to arrive in the country with a handful of overseas agencies and to get down to marketing the products. One of our family friends was the representative for Lucas car products in the country, and much later I found myself working overseas in the Army with the once New Zealand agent for Gilbey's gin.

There were unsuccessful attempts to smelt the west coast ironsands as early as 1849 in New Plymouth and later in Onehunga (see the film *The Piano*) and later this came to be. There were also plans being hatched to develop ores in the South Island and, because of a shortage of suitable coal, to produce steel in electric furnaces. Some car assembly plants were operating, and with a growing radio broadcasting industry we began in Auckland to make some of our own domestic radio sets. And at least we had been rediscovering gold using the modern gold dredge, invented in New Zealand, and were designing and building our own railway locomotives. The first railway locomotive to be built in New Zealand was in 1875. The largest were the K and Ka (dating from 1932) and the later J class.

It was the railways that had pulled the country together. In some parts very rough country had to be dealt with but the first few miles of line had been laid in Canterbury in the South Island, being opened in 1863, and a 1.5 mile tunnel, opened in 1867, was built from Christchurch to the town's port at Lyttleton. Rolling stock and rails were imported from England and ultimately the 3ft 6in gauge was adopted.

The South Island Main Trunk railway was two thirds complete and in use by 1880 but was not finally completed until 1945. A few lines had been built elsewhere, notably a route north of Wellington which led to the famous incline which crossed the Rimutaka Range of mountains to reach the more level Wairarapa country. Opened in 1877, the incline had gradients down to 1 in 15 which no normal locomotive could manage. To cope with such conditions a system originally developed by the English engineer John Fell was used. A double-

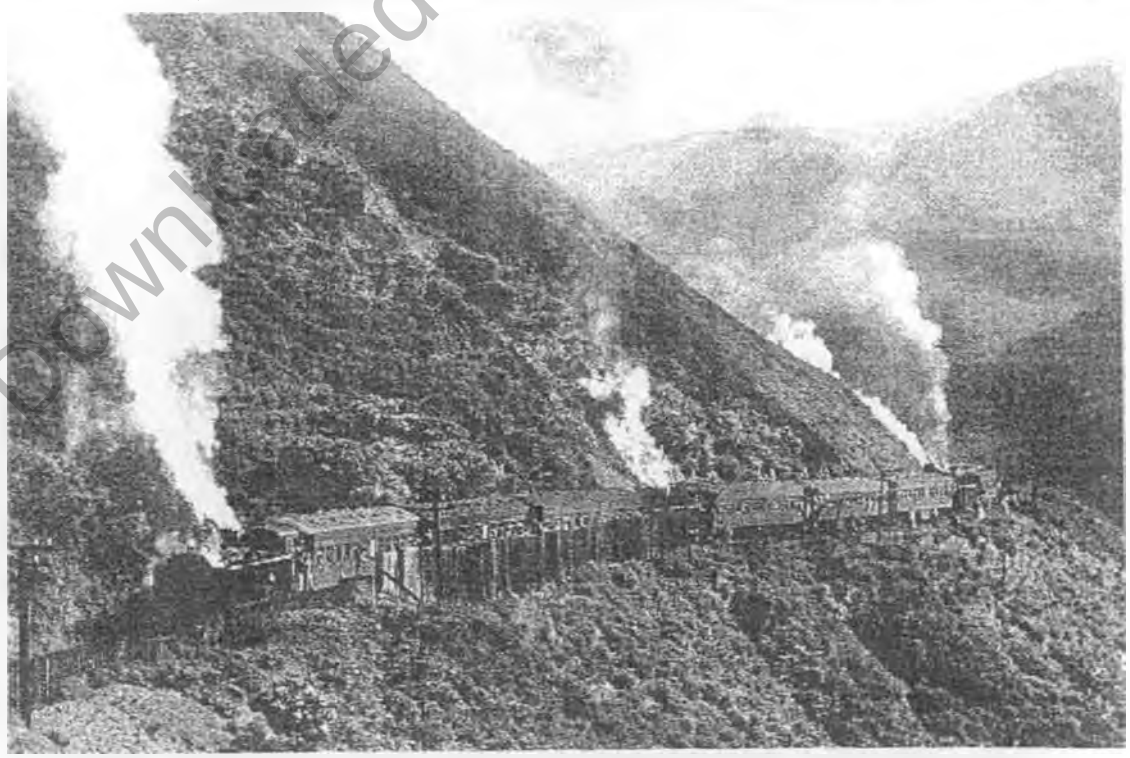


Figure 37: Five Fell engines climbing the Rimutaka Range, 29 October 1955

Downloaded from www.nrs.org.uk

headed centre rail was mounted horizontally between the tracks for traction or braking, and Fell 0-4-2 tank locomotives had an auxiliary steam engine which drove two pairs of horizontal wheels which gripped the centre rail to provide additional traction. As well as its normal braking, each locomotive had a hand-operated brake which worked on the centre rail, and separate brake vans provided additional centre rail braking.

The Fell locomotives worked the incline for almost 80 years, sometimes five of them being used to get one train up the 3-mile climb to the summit at no more than a walking pace. The chunky little engines have been described as "demons of energy", and during the years of their service they were rebuilt several times. The locomotives and their brake vans had originally been imported from Britain. I had one journey over this line, which was in impressive mountain country affected by winds strong enough to have once blown a train off the line. This obstacle continued to be used until the 1950s, when it was replaced by a 5.5 mile tunnel through the mountains. One Fell locomotive has been preserved at Featherston. (The Fell centre rail and Fell braking vans, but not Fell locos, were also used from the turn of the 20th century to 1966 for braking coal trains descending from the mountains in Westland, South Island.)

But the greatest need and the two biggest problems had been the means of achieving communication across the Southern Alps to the coalfields on the west coast, and completion of the link in the relatively unexplored centre of the North Island between Wellington and Auckland, which were separated by over 400 miles of some of the world's roughest country.

It was not until 1908, shortly after New Zealand achieved British Dominion status and only two years before my parents arrived in the country, that the Wellington-Auckland connection was finally completed after lengthy periods of exploration and, initially, opposition by the Maori chiefs to any line crossing their territories. Opening this route was one of the great achievements in railway construction, the principal problems being major changes in levels between plains and high plateaux, and mountain ranges with rivers in extremely deep valleys, in many cases ravines several hundreds of feet deep. The first impasse was discovered at Raurimu in the middle of the North Island, where a spiral of steep gradients through cuttings and tunnels had to be constructed on part of the ascent to the central volcanic plateau. The Spiral is still acclaimed as an outstanding engineering feat.

It was the country's good fortune that its bridge designers and constructors were of the highest calibre. They produced some extraordinary examples of trestle work, of up to more than 300 feet in height, first in timber or wrought iron and subsequently in steel. The New Zealand official yearbook confirms that ultimately, throughout the country's railway system, 2,600 bridges and viaducts were built (today some of the bridges have been replaced in reinforced concrete). The longest railway bridge is in the South Island, 5,665 feet and built in 1939 to replace a wooden structure built in 1873. And the highest is on the east coast line to Napier in the North Island, at 312 feet above the river bed below, and built in 1937. Sometimes in country places road and rail shared the same bridge. Combined road-rail bridges were usually single deck and single track. There were three double deck bridges, two of which remain in combined use. About 40 road/rail bridges were built between 1873 and 1924.

The slender threads with a single track far above the rivers and forest occurred with the regularity of their associated tunnels, and restricted the speed of the trains. Nevertheless the narrow gauge trains could knock up a reasonable speed under good conditions. Drivers always swore they could get 75 mph from a K Class steam locomotive, and even more downhill.

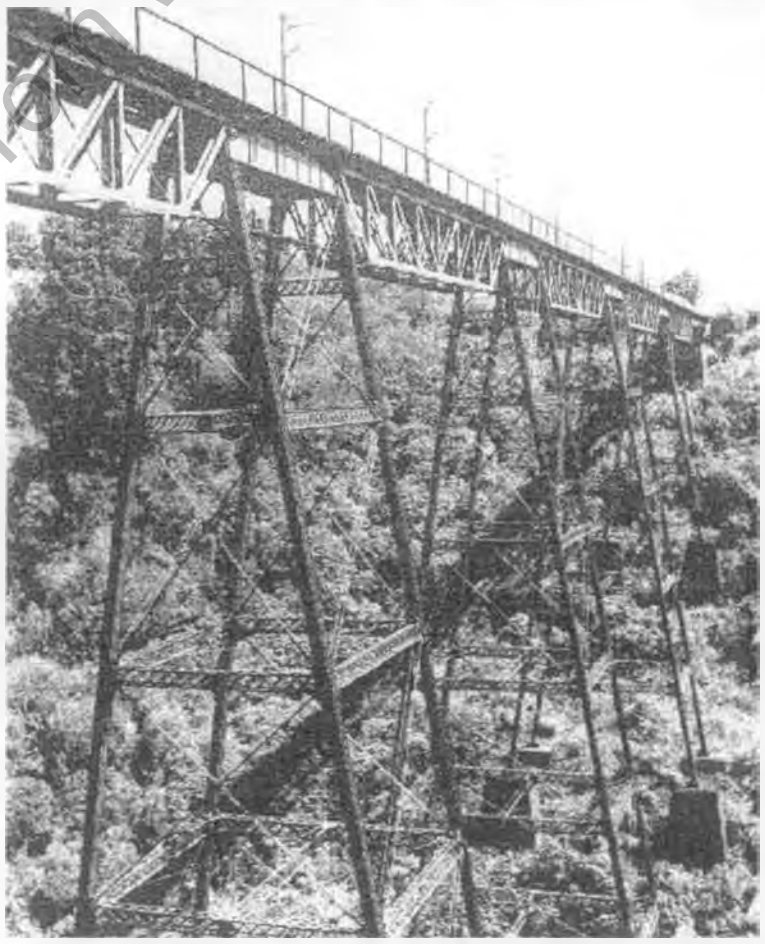


Figure 38: Makatote Viaduct on the North Island Main Trunk Railway (built 1908)

Downloaded from www.nias.org.uk

The K classes, 4-8-4 and weighing 145 tons, were the largest of the NZ steam locomotives and champions of the northern Main Trunk line in the 1930s and '40s. Designed in New Zealand, the class was built to deal with the most trying conditions. A Ka was a sight to behold as it stood gently sniffing in a siding and, when it got going on a good run, any enthusiast allowed to travel on the footplate was told to hang on tight.



Figure 39: An Ab class locomotive preserved on the "Kingston Flyer", near Queenstown, South Island

During the 1920s, at one of the Auckland houses we lived in, I could stand out front in the evening and listen to the locomotive, then probably a New Zealand built Ab 4-6-2 Pacific, hauling the Wellington Limited up the long incline from the city, drawing 300 tons of carriages on the start of its overnight journey to Wellington. Always and suddenly in the deep cutting beyond our road it would run into the Parnell tunnel and be heard of no more in our part of the woods.

Later, after 1932, the locomotive would have been a Ka with a 400 ton load, departing from the new Auckland station, re-sited in 1930, and taking the new loop line along an embankment in the harbour avoiding the long haul up to Parnell.

But in my imagination I can still go with this train, its engine's great headlight showing the way through the farmlands to the south and the Waikato River, and entering the afforested volcanic pumice lands and the Maori King Country. Then around midnight the train would stop at Taumarunui to allow the crossing with the northbound train from Wellington. If you were not in one of the sleeping cars and were already cramped from trying to rest in an ordinary seat, and disturbed by the occasional crash of the single-line tablets being exchanged on the move, your luck would then depend on which train got there first for, in those earlier times, there were no general refreshment cars on the trains. If one had a wish to go on living it was necessary to get off the train and try to reach the station refreshment room as well up in the queue as possible. This was not always so easy. Sometimes the train stopped in a siding and you had to climb down to ground level, cross a number of lines in poor lighting, possibly in the snow or the rain and, if you were lucky, return and try to mount the carriage with both hands full with meat pies and mugs of tea. Taumarunui was one of the "frontier" towns built with the construction of the railway, and earlier had been likened to the Dodge City in the US of the 1870s, but without the cowboys. If both trains arrived at the same time the tussle in the refreshment room was a memorable experience. The King Country was by treaty with the Maoris a non-drinking area, and there was always the story of the man on Taumarunui station sidling up and asking whether you'd like to buy a bottle of whisky, which he described as "cold tea". If you paid a high price for it and then opened your bottle on the train, it always turned out to be cold tea.

Meanwhile an extra engine had been attached to the train and a start made for the Raurimu Spiral, to climb 700 feet in less than four miles direct distance, sometimes with the rear of the train visible out of the side windows and going the other way, slowly and with the noise of the engines putting out maximum effort. And then the volcanic plateau, and the beginning of the run below the high snowclad peaks of the active volcanoes Ngauruhoe and Ruapehu, part of the Pacific "Rim of Fire", and on through the rough mountain country: tunnels and bridges, along the high sides of valleys, across the soaring trestles with the train creeping over them at 3mph, and a stop at Palmerston North to change engines. Then the western route winding through to Wellington, sometimes beside the sea and, around dawn, the city spread out below, with the locomotive sighing its way home and the floor of the carriage covered with rolling mugs and dropped meat pies.

Downloaded from www.nias.co.uk

Those days have now gone, I am told. Later, it was diesel and diesel-electric traction and lengths of overhead electrification, railcars with air conditioning and refreshments, and Daytime Limiteds from which you could see the scenery. And a computerised Traffic Monitoring System to handle the large transportation of freight throughout the system. But the old times are never to be forgotten.

In the South Island the 5.3 mile Otira Tunnel was bored under the Southern Alps, and electrified, by 1923. Twelve years later than that, a friend of mine spent his university vacation working on the construction of an electricity pylon line across the Southern Alps.

And shortly after that, while New Zealand was still "under construction" and before I finally disappeared into the Army, I went off to travel and live among the Pacific Islands for a year or so, where there was no industry at all beyond the growing of coconuts. Although, not so far away across the water, there were the New Guinea goldfields .....

During its first 100 years as a Colony and Dominion, New Zealand achieved a number of world firsts and, within the range of its industry, three might be mentioned. The bucket dredge for gold from flat-land alluvial deposits was first developed in the South Island, driven by steam and then later by electricity. The dredges received international recognition, and around the turn of the century in New Zealand there were 200 at work.

In a somewhat more recreational context, the racecourse Totalizator ("The Tote") was invented in New Zealand in 1880. Racing almost reached the status of a heavy industry in the country, and the Tote was the only legal means of betting on the horses.

It has been said that the 4-6-2 (Pacific) locomotive configuration originated in the New Zealand Railway workshops in 1902. This arrangement was popular in many countries for fast passenger and general duties engines, including the New Zealand Ab, widely used there from 1915 until steam gave way to diesel. The British *Mallard* was (is) a Pacific locomotive.

Those were interesting times although occasionally frustrating for a growing lad. It was not until many years later that I began to appreciate my good fortune in being there at the time.

Phil Armitage

References & Acknowledgements

The Railways of New Zealand, Geoffrey B Churchman and Tony Hurst, 1990, Harper Collins Publishers (New Zealand)
The Story of New Zealand, W H Oliver, 1960, Faber and Faber
Engine Pass, D B Leitch, 1967, A H & A W Reed Ltd, New Zealand
Rail, the Great New Zealand Adventure, Roy Sinclair, 1987, Grantham House, New Zealand
New Zealand, Pacific Pioneer, Philip L Soljak, 1946, Macmillan & Co, New York
When Steam was King, W W Stewart, 1970, A H & A W Reed Ltd., New Zealand
New Zealand's Industrial Heritage, Geoffrey G Thornton, 1982, A H & A W Reed Ltd, New Zealand
This is New Zealand, F L W Wood, 1952, Paul's Book Arcade, Hamilton, New Zealand
New Zealand Official Yearbook
Angela and Nigel Smith
Geoffrey G Thornton

Downloaded from www.lnas.org.uk

SUIAG Publications

Adrian Rance (ed.) *Seaplanes and Flying Boats of the Solent*
1981 **£6.00**

Southern Railway *A Souvenir of Southampton Docks* (replica of publication c.1930)
1982 **£5.00**

Monica Ellis *Ice and Icehouses Through the Ages* (with Hampshire gazetteer) 1982 **£5.00**

Edwin Course *The Itchen Navigation* 1983 **£1.00**

Pam Moore (ed.) *A Guide to the Industrial Archaeology of Hampshire and the Isle of Wight* 1984 (with supplement) **£1.00**

Edwin Course and Pam Moore *The Changing Railway Scene in Hampshire*
1991 **£5.00**

Edwin Course *Twyford Pumping Station* 1997 **£5.00**
(Published by Twyford Waterworks Trust)

Edwin Course *Hampshire Farmsteads in the 1980s* 1999 **£5.00**

Edwin Course (ed.) *SUIAG Journal No.1*
1992 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.2*
1993 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.3*
1994 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.4*
1995 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.5*
1996 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.6*
1997 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.7*
1998 **£4.00** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.8*
2000 **£4.00** (to non-members)

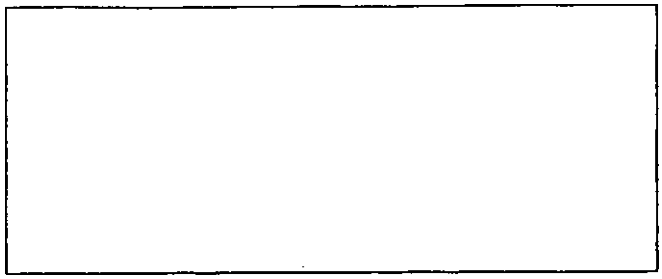
All the above are obtainable from Eleanor Yates, *Publications Officer, SUIAG,*
Danesacre, Worthy Road, Winchester, Hampshire, SO23 7AD
(All prices include postage and packing).
Other publications, including *Shipbuilding in Victorian Southampton* and *Water and Windmills in Hampshire* are out of print.

Downloaded from www.hias.org.uk

Southampton University Industrial Archaeology Group

Southampton University Industrial Archaeology Group was founded in the 1960s from members of University Extra-Mural classes who wished to continue and develop the practice of industrial archaeology. Recording has included surveys of mills, breweries, brickworks and farm buildings. Restoration work is undertaken directly or by associated groups, such as Tram 57 Project, the Hampshire Mills Group or the Twyford Waterworks Trust. In addition to the Journal, the Group publishes a newsletter and also has published several monographs. Lecture meetings are held every month of the year at the University. Current membership fees are £9.00 (Single Member); £13.50 (Joint Membership); £14.00 (Family or Corporate); £6.00 (Out of County).

To join, contact the Membership Secretary:
Keith Andrews, 13 Ashley Close, Harestock, Winchester, Hampshire, SO22 6LR



Contents

Waltons of Mere – a department store in a small country town
A Career in Building as Related to Industrial Archaeology
Aquila Airways
Steam Engine Valve Gears
The Story of the Mayflower Theatre
New Zealand Industrial History – a journey back in time

Downloaded from www.hias.org.uk