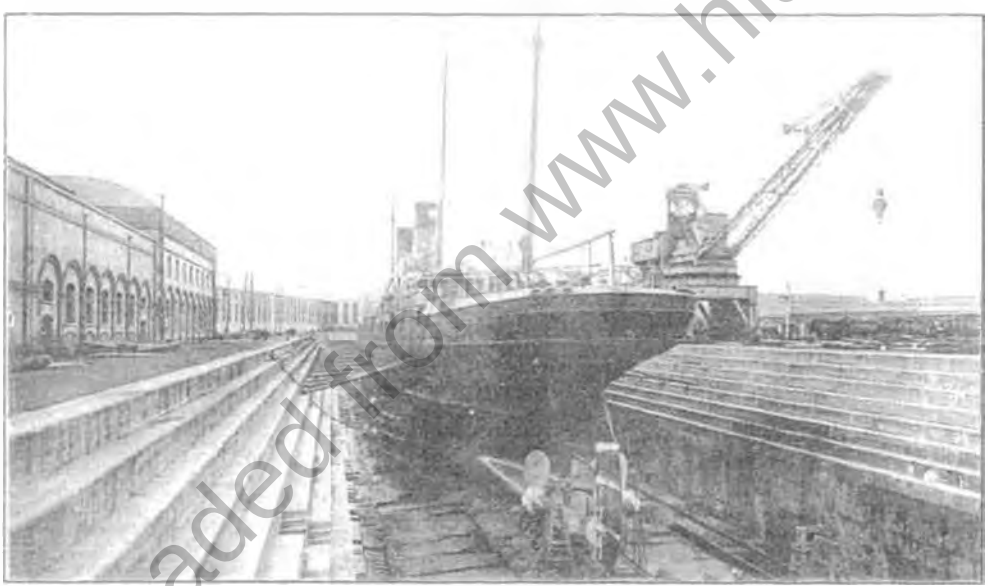
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Southampton University Industrial Archaeology Group

Journal



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No. 7

1998

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Cover photo: The White Star liner "S.S. Teutonic" in Southampton's No. 6 (Trafalgar) dry dock between 1912 and 1921.
Note the stepped sides ("altars") built to receive the "side-shores" supporting the vessel. No. 6 was one of the very last big dry docks designed on this pattern as ships by this time were being built to rest on keel blocks on the floor without the need for side supports.

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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.

Gerald Davies
Gerald Davies' career was in electronics and aerospace systems, which has little in common with his interest in canals and railways which goes back to his childhood days. A Londoner by birth, he has lived in Hampshire and the Isle of Wight for the best part of the last fifty years and spent much of his career at the Royal Aerospace Establishment at Farnborough. He became a member of SUIAG in 1982 and has since broadened his interests and knowledge of IA subjects. During one period of his career he played a major role in the commissioning and operation of the High Down Test Site on the Isle of Wight, where early work was carried out on space rocket vehicles. Since its closure in the 1970s, this site has arguably become the first IA site of the Space Age, and has been visited by SUIAG on their field trip to the island.

Fred Johnson
Fred Johnson lived at Waterworks House, Twyford, until he was nearly twenty. He has been ever grateful for his early exposure to the wide world of Engineering (Civil, Electrical and Mechanical). After attending Peter Symonds' School, Winchester, where he was a keen sportsman and ultimately Head Boy, he went to University at Southampton to read Engineering. On leaving University he saw the widening opportunities in the Motorway future and went to Berkshire County Council on the design and construction of the M4 Maidenhead By-pass. In 1965 he was the Motorway Engineer in Surrey and then moved to the Road Construction Unit where he was involved in the management, design and construction of M3, M2, M20, M25 and Channel Tunnel Approaches. In 1975 he became County Surveyor of Somerset. 1985 was the Centenary Year of the County Surveyor's Society and it was his honour to be the President. He has now retired and is a holder of the OBE. He is a Friend of Twyford Waterworks and has attended a number of Open Days in recent years.

Rodney and Joan Todd
Since retiring from Local Government and the Health Authority respectively, they have made Industrial Archaeology study their main hobby. They both come from the Portsmouth area, and steam train travel, collecting books, listening to jazz and walking are among their other hobbies.

Dr Edwin Course
Edwin Course grew up in the old London Docks, alongside the London River. After war service in the Navy, he qualified as an emergency trained teacher. After a prolonged period of part time study at L S E, he was appointed to the University of Southampton in 1956. His teaching, research and writing have been mainly in transport history and industrial archaeology. The Southampton University Industrial Archaeology Group was a development from his courses in industrial archaeology.

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Southampton University Industrial Archaeology Group Journal

Editorial and Acknowledgements

Welcome to the 1998 edition of the SUIAG *Journal*, the seventh to be published. As usual, the contributions cover a wide range of subjects. Two of the articles are of particular value as they display impressive feats of memory. Fred Johnson's piece is based on his recall of the time of his childhood and adolescence, living in the Superintendent's House at Twyford Water Works, between 1936 and 1952. The fineness of detail is remarkable, including such recollections as the smoking habits of the workpeople in the 1930s. After demobilisation from the New Zealand forces, Philip Armitage had the fascinating task of making the Shell films on Cornish engines, still in their original state. Fortunately the films, which provide a remarkable record of the engines working fifty years ago, are still available. Gerald Davies recently moved to what is usually thought of as the sleepy market town of Petersfield. He was surprised to discover that for some years it was the home of an unusual works, manufacturing rubber products. The piece from Rodney and Joan Todd followed a visit to the Somerset levels, which included the pumping stations at Westonzoyland and Gold Corner. The latter is probably unique for, although it remains in use for drainage, it was constructed at the outbreak of WW2 to supply water for a munitions factory. Finally, my own contribution is a note on the rise and decline of the provision of dry dock accommodation in Southampton Docks.

We are particularly grateful for the help given by Kenneth Brown and Stuart Smith (Cornish Engines), Norman Hanby (Twyford Waterworks), Iain Miles (Somerset pumping stations), Bert Moody and Angela Smith (Southampton dry docks). As on previous occasions, our thanks to Angela Smith for the design and type setting of the *Journal* and also to our contributors. Acknowledgements and thanks for the provision of illustrations are made as follows:-
Philip Armitage collection (Fig 1); British Transport Docks Board [now Associated British Ports] (Figs 25, 34); Edwin Course (Fig 28); Edwin Course Collection (Cover, Fig 26), Gerald Davies collection (Figs 9, 10, 11); Iain Miles (Figs 18, 20); Ordnance Survey (Figs 2, 8, 12, 19, 21, 22, 27, 29, 31); Roy Romsey (Fig 32); Shell (Figs 4, 5, 6, 7); Nigel Smith (Figs 30, 35); Nigel Smith Collection (Fig 33); Rodney Todd (Figs 23, 24); Twyford Collection (Figs 13, 14, 15, 16, 17); Paul White, *Cornwall's Engine Houses* by D B Barton, Tor Mark Press, 1989 (Fig 3).

Edwin Course
December 1998

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Filming Cornish Engines

News in March 1998 that South Crofty, the last of the Cornish tin mines, had closed down, took me back fifty years to that very place when, in 1947, I was there making a film record of some of the still working Cornish pumping engines. This work grew out of an earlier arrangement made between the Shell Film Unit and the Cornish Engines Preservation Society (formed in 1935 and now the Trevithick Society) that the unit would make a record of the great pumping engines at Kew Bridge in London before their work ceased. This was done shortly before I came out of the army and joined the Film Unit as an Assistant Director. The short film was released in one of the unit's cinemagazines in 1947. It was, of course, realised at this time that the few of these machines still working in the country would not be doing so for much longer, which was a pity for, after all, some of them had been working for nearly a hundred years or so and had plenty of life left in them.

The Preservation Society liked what they saw of the Kew engine films and asked if some more recording could be done on the engines in Cornwall before they were taken out of use. This was agreed and, in due time, I was placed with the unit going to Cornwall. After settling into an hotel near Newquay with the director D'Arcy Cartwright, a cameraman and his assistant and a couple of electricians with lighting gear, we set to on covering three working pumps in the Camborne area and three in the clay pits near St Austell.

When I actually saw these enormous machines and heard the sounds they made as they beat out the steady repetitions of their pumping strokes, I experienced something I had never come across before in the engineering world, and I was much taken with it all.

When our producer Geoffrey Bell came down to see what we were doing, I did my best to persuade him that we ought to make a definitive documentary about the origins of these great machines and the way in which they had contributed to the development of much industry across the past hundred years or so. And that I was just the man to do this job.

One of the nice things about the Shell Film Unit was that they took some notice of this sort of argument. Shell's interest arose out of its policy of making educational films that were not company or product specific, and directed towards the creation of general goodwill and a wider understanding of a variety of subjects, mainly in the fields of mechanics and science, among educational establishments, students, municipal authorities and other groups of people in the "non-theatrical" field, and without any immediate or traceable return. These aims were generated in the 1930s with the advice of John Grierson, the father of the documentary film, and remain the same today for the Shell Film Unit, which continues its production of films with the addition of "and Video" in its title.

The unit's very first film had been on Croydon Airport. Amongst others, the wonderful film on the genesis of gears, *'Transfer of Power'*, had been made, and the war years had been mainly devoted to making record and training films for government departments. Now the move was back to the original objectives, and the Cornish engine film fitted in well with these.

When we returned to London, further discussion between ourselves and the Preservation Society led to an agreement that a full film should be made, with myself directing but with a fully-fledged director coming along to cover any expressions of inexperience on my part. I didn't mind that. Bill Mason was a good egg and was likely to let me get on with it with the minimum of comment. Our principal technical adviser was to be Dr H W Dickinson of the London Science Museum, who had written some solid literature on steam and Cornish engines, and who described these engines as "comparable to that of the monastic building of the Middle Ages". The location adviser would be Jack Trounson, a mine surveyor and a founder of the Preservation Society.

We were going to use the already shot material, but this would be added to with more location and studio filming, and work on the animation table for explaining the workings of the machines.

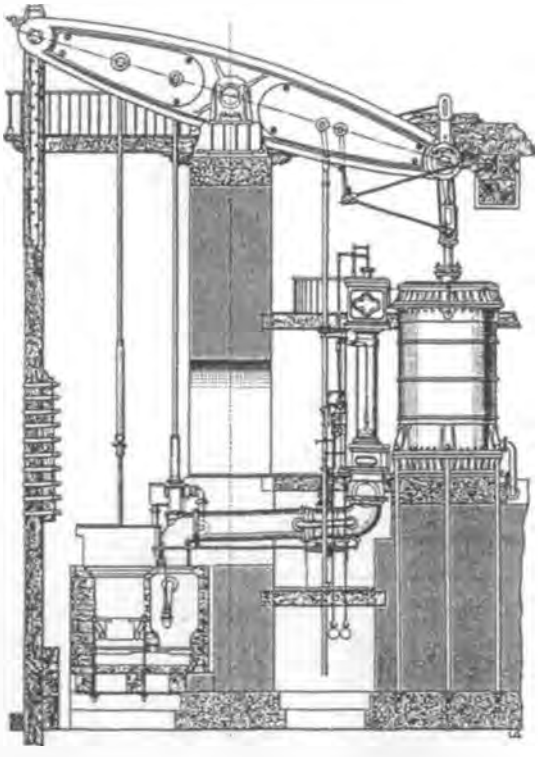


Figure 1: Diagram of a Cornish engine

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Making a film in the Shell Film Unit was exactly that for one individual – researching, writing, scripting, directing the shooting, subsequently editing both picture and sound and, if animation sequences were needed, also sorting that out with the staff animator. It was a wonderful opportunity, with complete freedom to do one's own thing in the way of making the film, with no heavy supervision from a producer beyond an original agreement of objectives and occasional viewings and discussions about how it was all coming along.

But first there was research to be done and production plans to be made .....

I had never heard of Cornish engines before this. Industrial history hadn't exactly been a high profile study in the 1930s, and the term Industrial Archaeology hadn't been invented. So it was off to the British Museum reading room and the Science Museum library to read up what it was all about, and sitting at a desk to work out how the information could be brought together to produce a treatment for a film, and then to get down a scheme for putting it all on to celluloid – or, in those days, the just-coming-in less inflammable acetate film.

The history revealed all those early developers of the use of steam for raising water that tended to flood out mines: Savery, Papin, Newcomen, James Watt and, ultimately, Cornish engineers such as Sims, Woolf and Trevithick with their introduction of the expansive use of steam.

It was interesting to speculate about what the course and timing of steam engine development in general might have been, had the demands for more economical working of the pumps in Cornish mines not been so outstanding. The mines were getting deeper and wetter and, as there was no coal to be found in the Duchy, the fuel to raise steam for the pumps had to be imported at considerable cost across the sea from Wales.

The first eighteenth century Newcomen pumps consumed coal at an enormous rate. The later Watt engines with their separate condensers brought a greater economy, but it was the Cornish engineers who got the coal consumption right down by the expansive use of steam under pressure. It was Trevithick's Cornish boiler, and the much higher pressure that it could withstand, that enabled the Watt engine to be dramatically improved into the Cornish engine. These quickly took over most of the pumping in the Cornish mines and in due course worked in many other parts of the world.

Once again the team moved to Cornwall, this time to an hotel in the centre of Camborne, across the road from the roller skating rink. A tolerant head waiter fed us on double helpings of unrationed roast chicken and veg for the next few weeks, and day by day provided us with some fine and varied packed lunches.

Because of the demands put upon them, the engines we were to film in the Camborne area were extremely large. But at least they were static and predictable in their behaviour unlike, for example, a fishing trawler subject to the whims of the weather and the inclinations of the ship's crew and the fish. An engine was not going to move away while we were lining up for a shot of a vital part such as a cylinder, a beam or an exhaust valve. However, the main problem was to get shots at all of some parts of these machines, each of which took up four floor levels in the close confines of its engine house. In one case we had to get a hole knocked in the side of the building through which a shot could be taken of some otherwise inaccessible vital part.

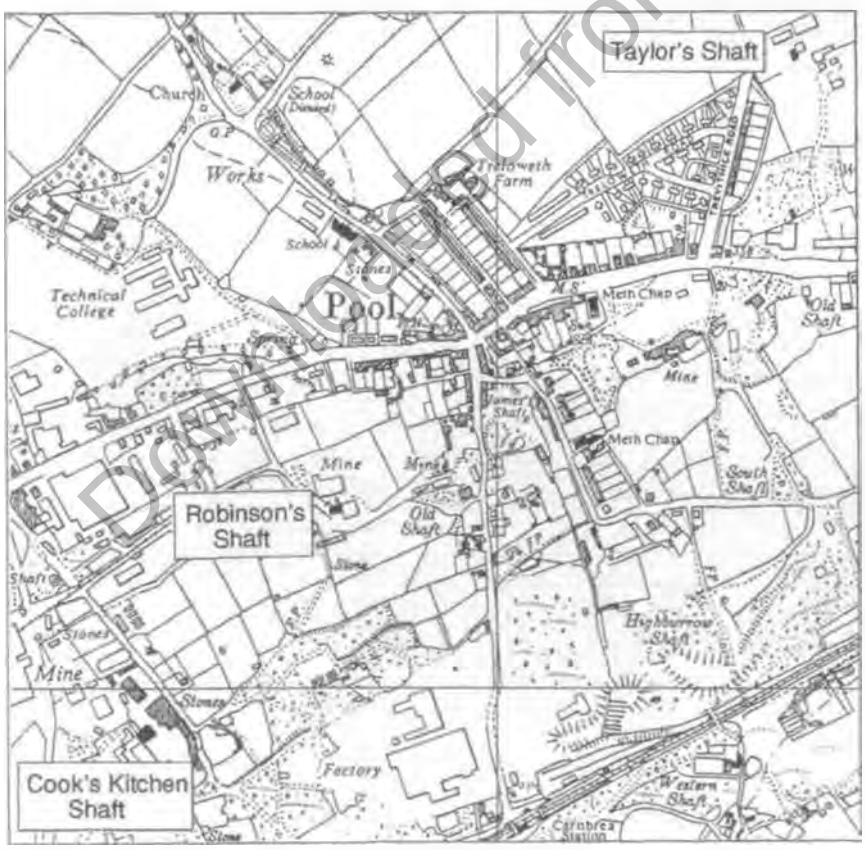


Figure 2: Extract from a pre-1930 Ordnance Survey 1:10,560 map showing the shafts in the Camborne area where filming took place

In those days, of course, we were shooting on professional 35mm film, in black and white, and our cameraman Stanley Rodwell was a veteran of many years' experience who, before the war, had been a member of the film team sent overseas with King George V's tour to South Africa. His personal camera was a hand-cranked

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French Debrie and, as he wound away smoothly and at exactly the right speed, he would intone his personal guarantee of "every frame's a Rembrandt". A lot of the work was also done using the very portable British Newman Sinclair clockwork-driven camera.

We did not record any synchronous sound, and especially no speech, for Shell films finished up with many different commentary languages, and having to dub in unlimited sorts of synchronised speech would make life too awkward. Separate sound recordings were made for putting into the final film with its commentary. This was just before the advent of commercial tape recorders. I think our main sound was done on wax disc, and I personally made recordings of some noises on one of the early wire recorders. Not the best of sound quality, on that wire!

The requirement was to film something of everything, to show clearly what it was and how it worked, and to get the best out of it as a photographic composition. Subjects were covered from every conceivable angle, and often at considerable length. Film stock was the least of the location expenses. It was better to have too much, rather than too little, when it came to editing work back in London.

An engine ran at only a few cycles a minute, so there was ample time to see each part going through its business. The most complex piece of filming was to cover in detail the sequence of movements the engineman and the various parts went through while an engine was being started up by hand.

We were using quite a few kilowatts of lighting for the engine-house interiors, and it wasn't long before we realised the supply voltage was often too unsteady for satisfactory film photography. Holmans, the big mining equipment suppliers, agreed to lend us one of their generators, and this had to be used on more than one of the working sites.

One of the three machines we worked on in the Camborne area was the engine with an 80 inch cylinder diameter at South Crofty's Robinson's shaft. It had been built in 1854 and was the oldest engine still at work. There were four Cornish boilers for this engine, one of them always stood off for maintenance. Usually the engineman also did the stoking. Then there was the 90 inch engine at nearby Cook's Kitchen shaft, unusually in an engine house of early reinforced concrete instead of the usual granite, and also nearby the East Pool and Agar mine engine at Taylor's shaft, installed in 1924. This was also 90 inch and "massively proportioned", built as many other engines had been by Harvey and Co at their Hayle Foundry, in 1892.

The present South Crofty workings were ultimately 400 years old, and had been formed in 1906 from a consolidation of three former mines. One of these, South Wheal Crofty, began sinking the Robinson's shaft in 1900, and down this one day Bill and I descended almost 3000 feet in free fall in an ore skip accompanied by our adviser Jack Trounson. Like so many of Cornwall's mines, this one had begun as a copper mine and turned to the deeper tin ores when the copper began to run out.



Figure 3: Taylor's Shaft engine house and chimney stack

At the time I found it difficult to comprehend, and still do, that the wooden pump rod for Robinson's shaft descended from the surface ultimately to 2010 feet, which is around four times the height of the British Telecom tower in central London. This enormous rod raised water at five strokes a minute and in seven stages by means of plunger pole pumps of 15, 14 and 10 inches diameter. At 57 gallons a stroke, that is over 400,000 gallons a day (1·86 million litres). We shot some of this rod, but eventually I did not use it in the film.

After examining some drilling in hand at a working face, we set off along a long and wet tunnel occasionally lit by an electric bulb, finally to emerge in a vast cavern which was part of the adjacent East Pool and Agar mine. The cavern floor was strewn with great boulders, and most of the walls and the ceiling were out of sight.

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"This is part of the East Pool workings that collapsed years ago and stopped the mine working for a long time," we were told. "They took out too much too far of what was a pretty rich lode." Jack swept his light around what appeared to be one of the darker parts of the universe. "Bits still fall off from time to time," he enthusiastically told us, and we shrunk a little while waiting for something to fall on our heads.

"In 1922 they started to sink a new shaft further to the north. That became Taylor's shaft, which took the 90 inch engine that you're also going to film."

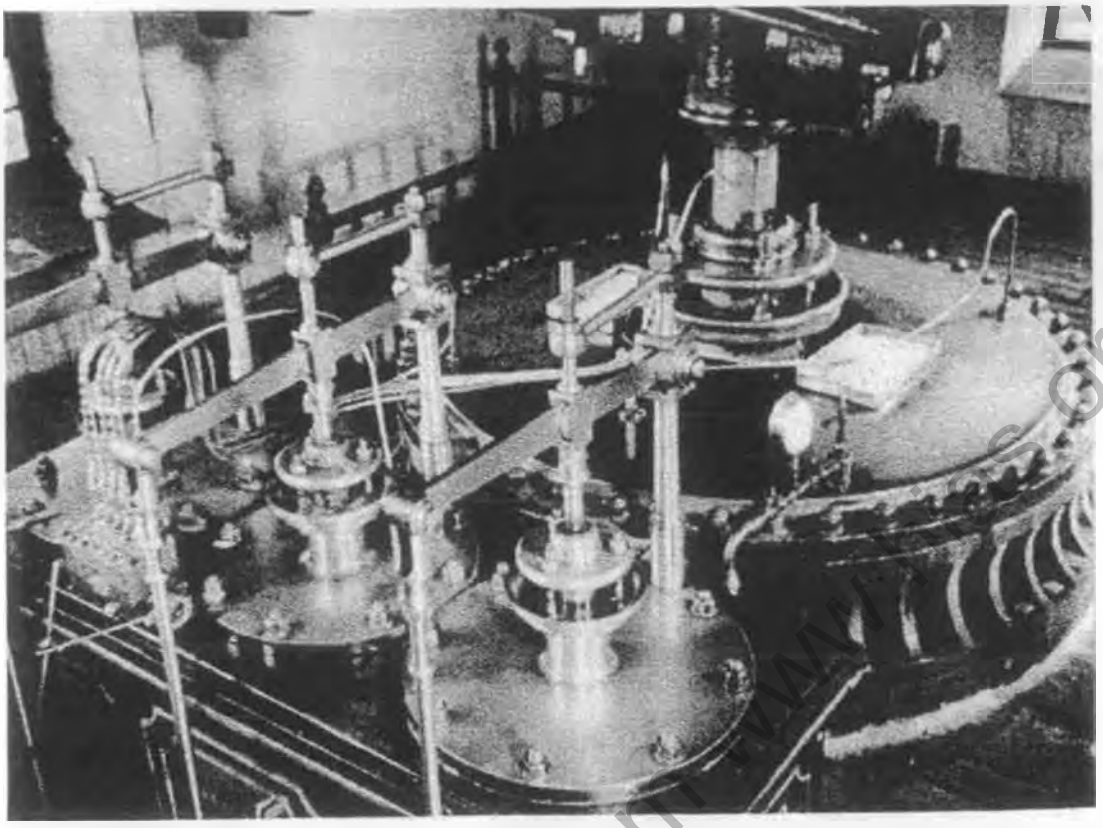


Figure 4:

Cook's Kitchen shaft with steam pressure gauge connected to upper cylinder

The Taylor's engine, we discovered, was, at 90 inches, even larger than the Robinson's engine, and its pump rod was 1700 feet with seven lifts of plunger pumps of 18 inch maximum size. In 1938 this rod had broken. The great iron beam jumped out of its stools and the piston rod was bent. We hoped it wouldn't do it again while we were there.

Every day we received a telephoned report on the quality of the previous day's filming – the "rushes" – which we daily sent to London by train. And day by day we pressed on with the filming, picking the good weather for exterior work which included, as well as both general and particular shots of the engine houses, the filming of such places as the small port of Portreath on the north coast, into which much of the coal for the engines' boilers had been brought across from Wales.

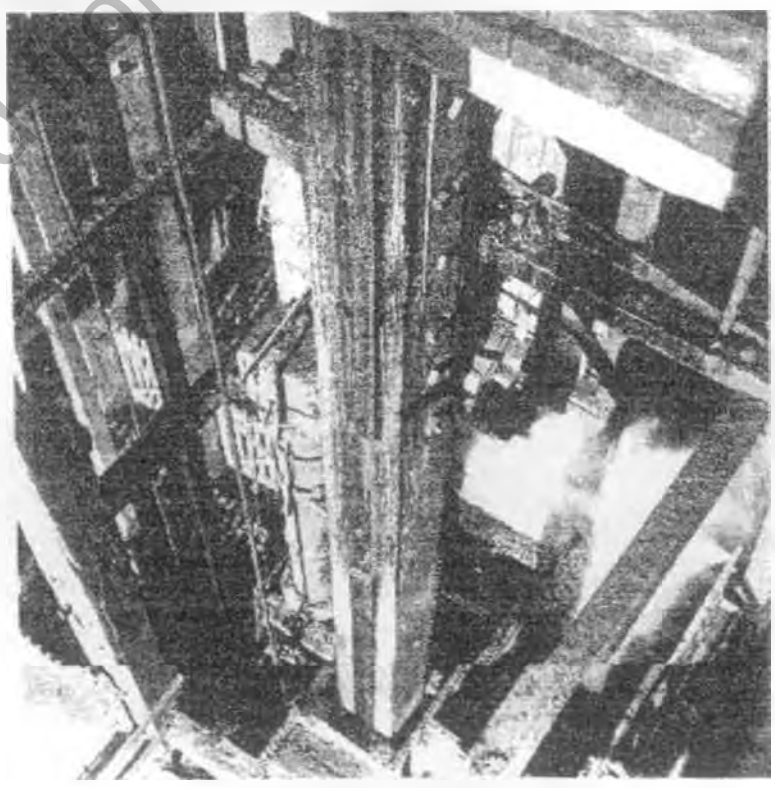


Figure 5: The great pump rod at Robinson's Shaft

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Sitting on an old stone wall in the grass above the cliffs one day, eating my lunch and picking at some white crystals on the inside of the stones, I asked Jack what they were. "Oh," he said, "that's arsenic. If I were you, I wouldn't get it in the sandwiches."

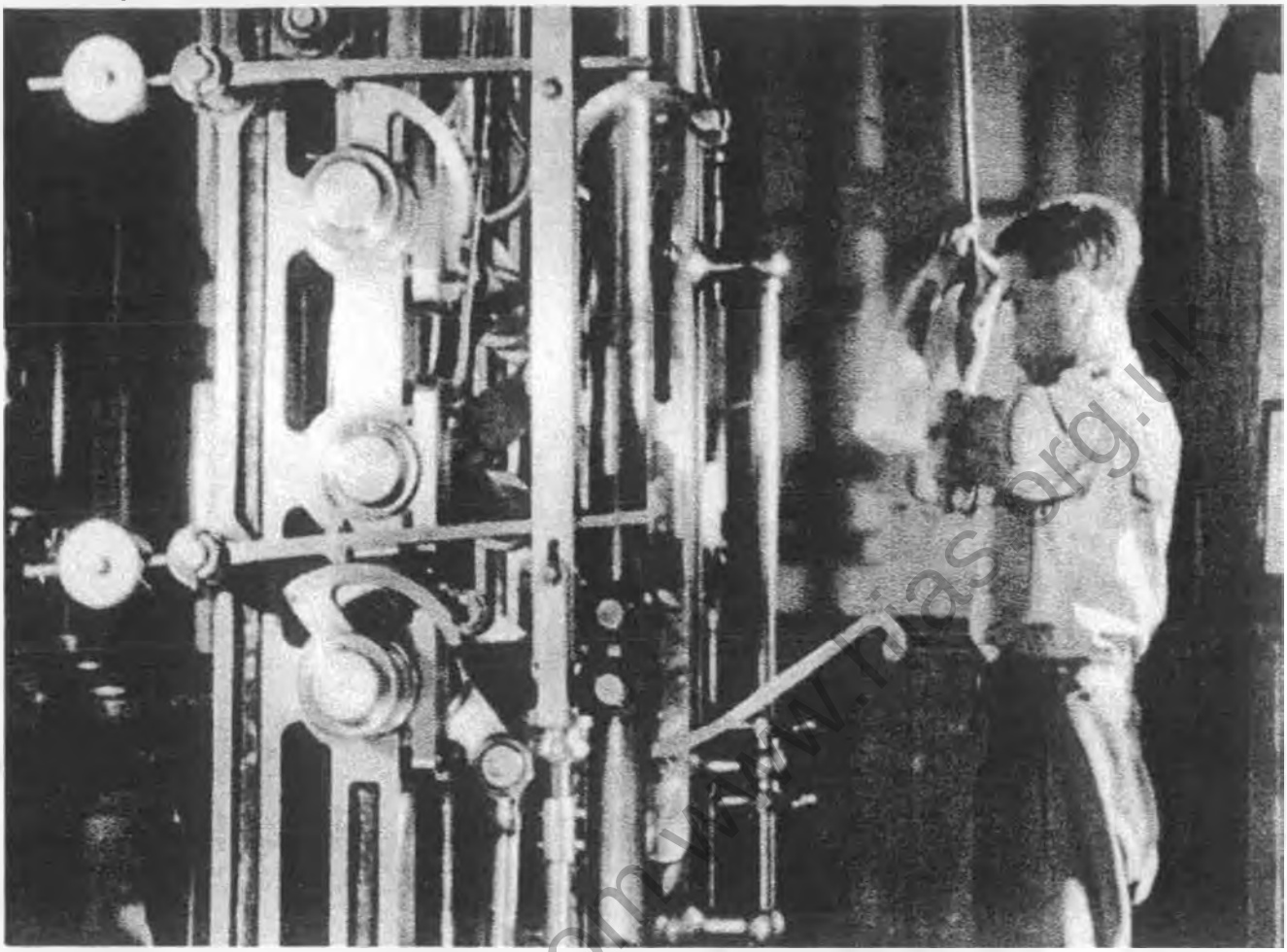


Figure 6: Starting the engine by hand at Taylor's Shaft

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So we moved on to the clay pits near St Austell and filled in, with more detail, the shooting done on the earlier location. The engines filmed were not of the size of the others at Camborne. They were used to shift the clay suspended in water from the bottom of the pits to distant settling areas. The Parkandillick engine had a 50 inch diameter cylinder, with a 10 foot stroke. That at Greensplat was 30 inches with a 9 foot stroke, but our favourite was the little 22 inch, 6 foot stroke rotative engine at Rostowrack, which had a 3-ton connecting rod from the end of the beam to an enormous crank which drove a gear train and ultimately horizontal rods which operated remote pumps. The engineman rocking it back and forth to get it started was something to watch (and to film). Once started, it had to keep going without any of the pausing between strokes of the reciprocating engines, and it ran very briskly at up to 22 strokes a minute.

The help we received from the Cornish businessmen, engineers and the engine drivers while we were doing all this work cannot fail to be acknowledged, even after all this time. They couldn't do enough to keep us going on what they realised was a recording of part of the history of Cornish engineering, and we certainly enjoyed doing it for them.

But now it was back to London for months of editing and animation work.

Editing is a lonely business, done mainly on one's own in front of a movieola machine which, in those days, showed through a lens the moving images of a length of film being run through at whatever speed one chose. Slowly the bits are selected from the piled cans of positive film – the negative is untouchable, in the safekeeping of the negative cutter. Longshot, mid shot, closeup, according to what the plan calls for to create the story, or to some sudden inspiration that takes one on for several days and finally works out or falls flat on its face. All the chosen bits are spliced together on the jointing machine, and when there is enough there is a viewing in the unit's projection theatre, and further adjustments are made and new ideas injected until it is thought fit to show to the producer who, for our film, was by now Arthur Elton, himself a pioneer in writing about old industry.

At that early stage, and in those times, there was at first no sound and no commentary with this cut film. Judgement was on visual merits with knowledge of what commentary and sound effects would eventually be used to put over the desired information, hopefully to confer understanding and, where appropriate, to add a suitable emotional response, perhaps of surprise, or wonder.

At later stages in the development of the cut copy, sound effects, now transferred to film, would be chosen and synchronised with the picture, and perhaps a commentary track spoken by oneself just to give the idea of it, and "double track" viewing indulged in. In the meantime the animation would have been in progress in the animation studio, and the diagrams developed on film of the workings of a Newcomen engine, a Watt engine and the Cornish engine.

When at last, as director, one was personally happy with it all, and with the producer's final agreement, the commentary would be recorded in a Wardour Street studio, received as a track on film to be matched in alongside the visual and the sound effects. The commentator for *'The Cornish Engine'* film was an actor in BBC radio programmes. Here I learnt a lesson never to be forgotten. I had wanted a bit of a regional accent, but found that a deliberate accent is always too strong if all one wants is a bit of a natural burr. Our actor couldn't burr at all – and what is finally heard is his natural voice.

The special effects opticals were made by the film labs, such as fade-outs and fade-ins, and cut into the visual, and the whole lot checked for cross synchronisation. By now there would probably have been at least three sound effects tracks, the commentary track and the separate visual. So it was back again to Wardour Street to the dubbing theatre where all the sound tracks were melded together with levels controlled according to requirements. This produced a finished and properly balanced combined sound track for the film. Today, probably, it would all be done on tape ... possibly with even the visual on video tape.

An effects track only, without any commentary, was also produced, for the use of overseas Group companies when putting on their own language commentary.

After further checks and approvals, the cut copy of the visual went off to the negative cutter, who matched up the pieces according to the edge numbers on the cut print.

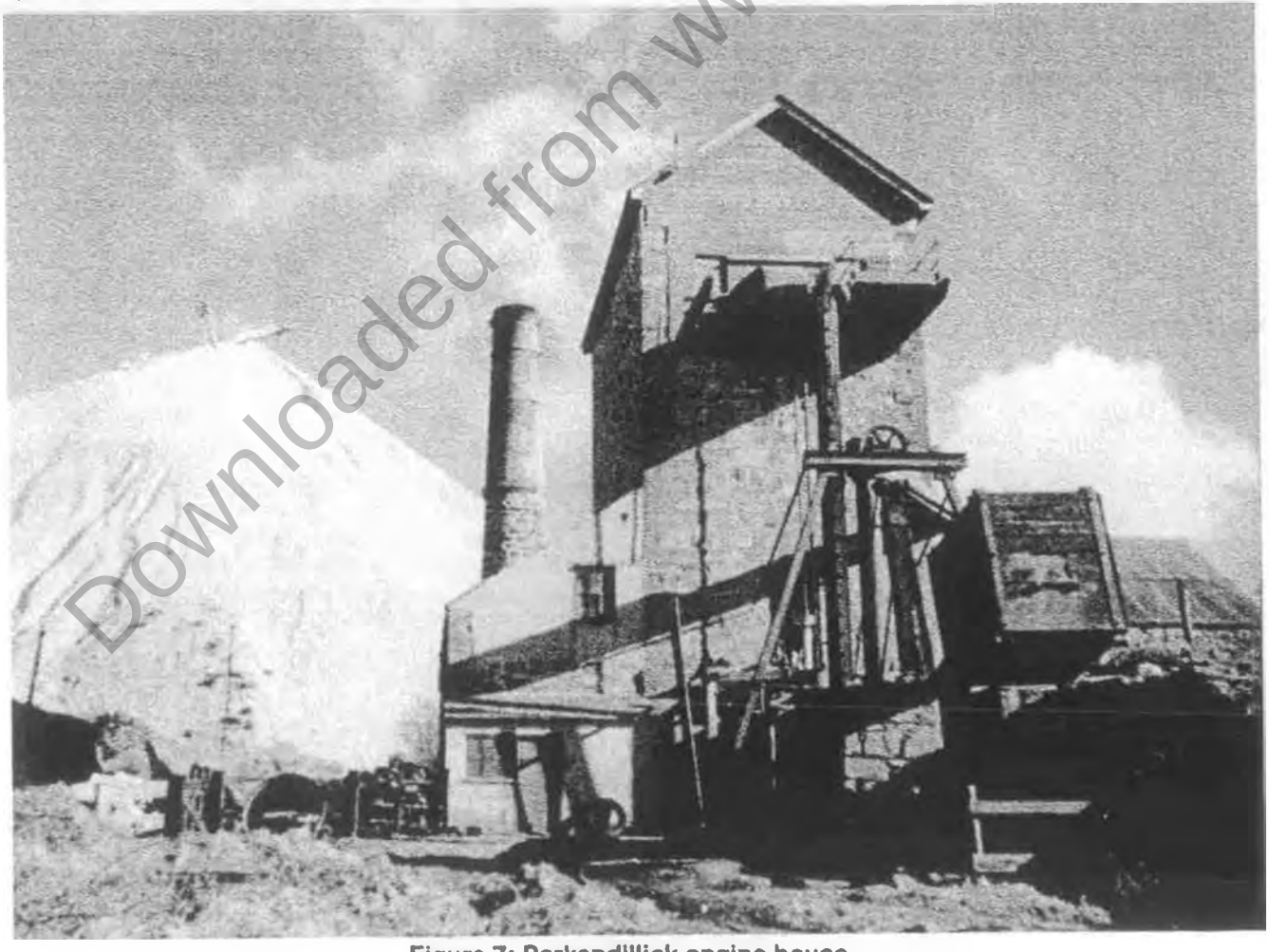


Figure 7: Parkandillick engine house

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Usually at this stage the director/editor could put his feet up and wait for a copy of the finished film to come back from the laboratory. This was not my luck, for there was such an excess of spare film on the cutting room floor that it was decided a series of short and mainly silent films of the engines operating should be made up for study purposes. I cut six of these, one for each engine we filmed, showing various aspects of running, and the starting-up procedures. These are the issued "record" films.

After all that, even now I feel I could assemble a film on a Cornish engine in one day flat. But there are things I wouldn't do today. The film was a great success in its time, short-listed for the British Film Academy best documentary film award in 1949 (although not the winner), and written up in publications as an example of "good grammar" in the art of film making. But for today I don't think it is brisk enough, or arresting in terms of what we have now become accustomed to, by constant exposure to visual conventions. In today's editing you can wake up in bed and in the next shot be seen getting out of a car miles away. That time ago you would at least have had to be seen dressing or having breakfast and getting into the car, rather than making such a sudden jump. We have learnt by experience often to accept as read what goes on in between key events, and expect to get on with the story.

Anyway, we had our film on Cornish engines. It was premiered more or less simultaneously in London and at a meeting of the American Institute of Mining and Metallurgical Engineers in California, and later shown on a very rainy day to a full house of Cornish mining and other engineers and businessmen in Camborne.

A small hardback book was produced, mainly written by Dr Dickinson, and published for Shell by Art and Technics, London, entitled *"The Cornish Engine; A chapter in the history of steam power"*. Issued in 1951, this gives a printed description with illustrations of the coverage of all the films.

'The Cornish Engine' and record films are available for purchase as VHS video tapes from the Shell Film and Video Unit, Shell Centre, York Road in London and also at Cornish Engines, Kew Bridge Steam Museum and even in Australia!

For the record, it can be added that the Robinson's shaft 80 inch engine completed its century after working on four different locations from 1854 to 1955. South Crofty donated it to the Cornish Engines Preservation Society, which exists today as the Trevithick Society. The Cook's Kitchen 90 inch worked on a total of three locations, until the 48 ton beam broke in 1950, falling across the mouth of the mine shaft. It went for scrap and electric pumps took over.

Taylor's 90 inch at East Pool and Agar had been put there in 1924 from an earlier location, and it ceased work in September 1954. It was purchased with funds provided by well-wishers in the U.S.A. for presentation to the Preservation Society. It remains on site in its engine house.

The Rostowrack rotary we filmed was also preserved by the CEPS, together with another rotary, a 30 inch whim (winding) engine at East Pool which we did not film. And the small Greensplat 30 inch in the clay pits was the last of the Cornish engines to work in Cornwall, when it finally stopped in 1959.

In 1967 the National Trust took over all the CEPS preserved engines. And now, as reported at the beginning of this paper, the last of all the tin mines in the country has closed down. However, it now may be reopened by a new company, so it is to be hoped it won't after all be the end of an era in industrial history.

To see Cornish engines working "in the flesh" today, go to the Kew Bridge Steam Museum in London where engines of 90, 65 and 64 inch cylinder diameter are steamed at weekends, or Crofton in Wiltshire where two 42 inch engines work on occasional weekends. In Cornwall, the 50 inch Parkandillick engine is worked occasionally on compressed air, and a little rotary at Levant, with a 27 inch cylinder, steams on most days in the summer. The massive engine houses, too, standing empty all over Cornwall, are today being conserved for future generations to enjoy.

Philip Armitage

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Editorial Note: It is planned to show some of the films of Cornish Engines made by Philip Armitage at the SUIAG meeting on Monday 7 June 1999 at Boldrewood Lecture Theatre 1, University of Southampton, 7.45pm

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The Rubber Industry in Petersfield

The attractive market town of Petersfield in East Hampshire, depicted so vividly by the artist Flora Twort, does not immediately conjure up visions of a prosperous, though not large, manufacturing industry. However, in the years prior to the Industrial Revolution, when textile manufacture became centred in the North, Petersfield and the surrounding area was estimated to have over 1000 persons engaged directly or indirectly in the woollen trade. Perhaps more relevant to this story were the various local tanneries processing leather for clothing and footwear. Today, like many small towns, Petersfield has acquired the ubiquitous "Industrial Estate", consisting of many small units with but one major undertaking, a subsidiary of an American cosmetics empire.



Figure 8: Extract from 1970 1:10,560 Ordnance Survey map showing factory in Petersfield

However, it is the period from post World War I up to the mid 1980s which is of immediate concern in this instance. Throughout this period, the ITS Rubber Company and its successor operated on a site adjoining the former Midhurst branch of the LSWR. It was entered from Sandringham Road, a turning off Station Road (part of the A272 trunk road). The site, now a small housing estate, can best be seen from the Tilmore Road bridge over the London to Portsmouth main line railway. Initially the main products of the Company were rubber soles and heels. These were claimed to give longer wear at a cheaper price than the then extensively used leather hide though, later, the need to diversify resulted in novel additions to the range of products.

The Company was formed by two brothers, Arnold and Moss Levy, in 1919 on the above mentioned site which had previously been occupied by a laundry and small power station. The Levy brothers were natives of Krottigen in Holland, but after arriving in England, had been very active in the Sunderland district, Arnold being the author of a book entitled *"The History of Sunderland's Jewish Community"*. An early involvement in the "leather and grindery trade", as boot and shoe manufacture was known, took them to the USA. Here the ITS Rubber Co of Ohio, owned by Messrs Ingwar, Tufford and Smith (hence ITS) was manufacturing a moulded rubber concave-convex heel for the mass produced footwear of the day. Arnold Levy saw the potential market for this product in the UK and negotiated a licence to manufacture and distribute their product range. The relevant patents, relating to methods of injection moulding, were held in the name of Mr Tufford who also joined the board of the UK company, which commenced manufacture at the Petersfield Works in 1920, employing a mainly local workforce.

The Company prospered, and processes were further developed enabling it to manufacture a wide range of footwear components under the trade name of "ITSHIDE". It competed with other well known makes such as the North British and the Phillips Rubber Companies. In 1931 the Company changed its name and traded as the Itshide Rubber Company. Signs carrying this name adorned the factory buildings and could be readily seen from the main railway line by passengers en route to London or Portsmouth. The factory quite naturally became known as the "Itshide Works" and for many years was a major source of employment in the town. A severe drought in 1921 drove the Company to sink boreholes on the site until water was found at a depth of 150 metres. A water tower was erected into which the well water was pumped, acting as the main supply of cooling water for the injection machines and associated processes. These could use up to 60,000 gallons per hour at peak times.

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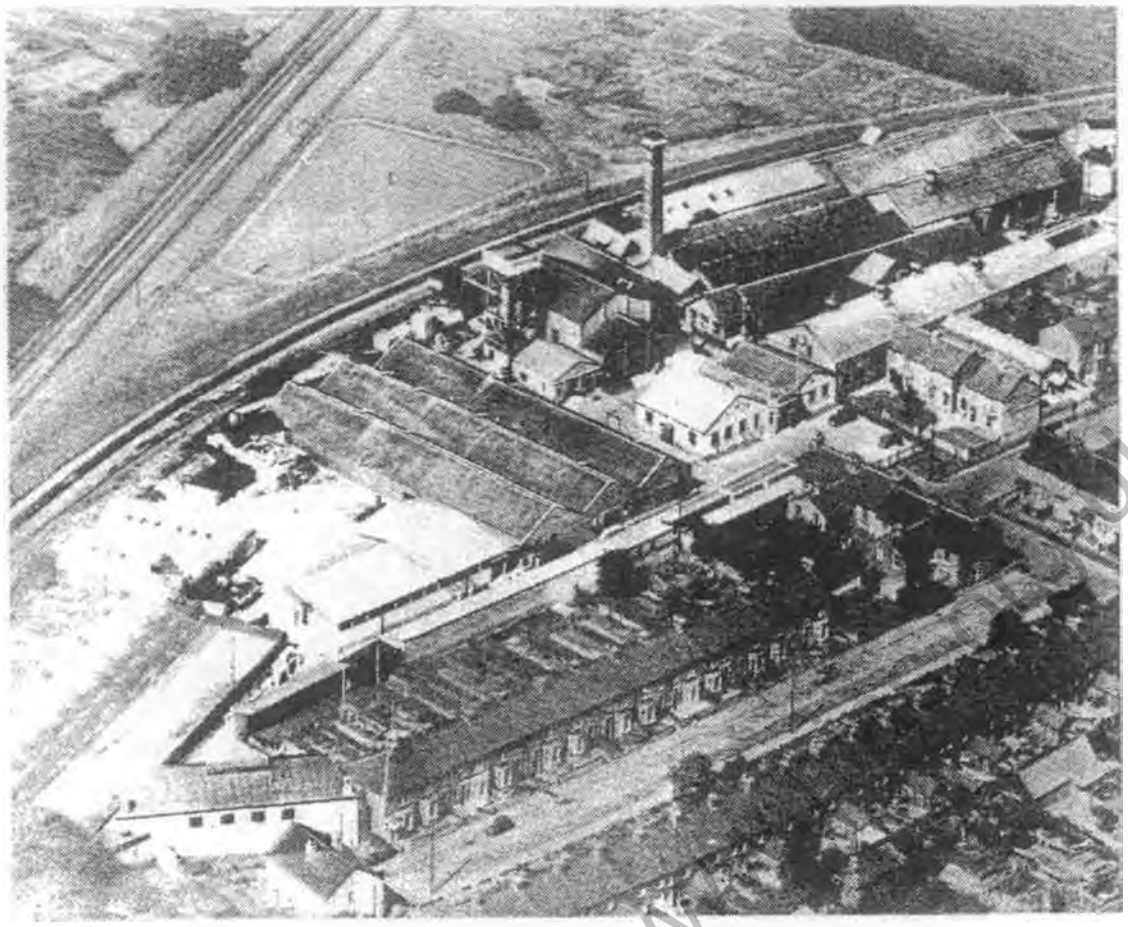


Figure 9: Aerial photograph of I.T.S. Rubber Limited factory

In 1927 the Company decided to diversify into the realm of constructional toys, dominated between the Wars by Meccano, whose competitors at that time lagged well behind. Despite the versatility of Meccano, which enabled many complex structural and mechanical models to be assembled, the nature of the product, mainly perforated metal components, precluded the construction of realistic model buildings. At that time the only toy suitable for this was Lotts Bricks, which consisted of a range of composite stone blocks which could be cemented together with a water soluble adhesive. This was a somewhat messy operation, not favoured by parents of young and inexperienced modellers!

The approach adopted by the Itshide Company was to use a range of interlocking rubber bricks and accessories, the interlocking being achieved by moulded spigots and holes in a manner similar to that subsequently used by LEGO. Roof panels with simulated tiles were available. A variety of doors and windows were provided to construct a range of very realistic model buildings which could be readily dismantled and rebuilt at will. The individual bricks being made of solid rubber, the models were relatively heavy when compared with today's plastic LEGO buildings. However, they certainly met the needs of the modelmakers of the time with whom they proved very popular in what was essentially a niche market.

A separate company known as Minibrix Rubber Co was formed to handle this product. It was marketed by the Premo Rubber Company Ltd which already marketed a



Figure 10: Page from a 1930 Trade Fair catalogue

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range of domestic rubber products, such as brushes, bathmats, etc. A progressive range of Minibrix sets was available, numbered from 0 up to 7, containing a wide variety of bricks, half bricks, angles, lintels, pillars and balustrades, enabling more and more sophisticated details to be incorporated into even larger models. Later in 1934, an additonal range known as Tudor Minibrix was introduced, in black and white, enabling mock timbered houses to be modelled – rather a nice touch!

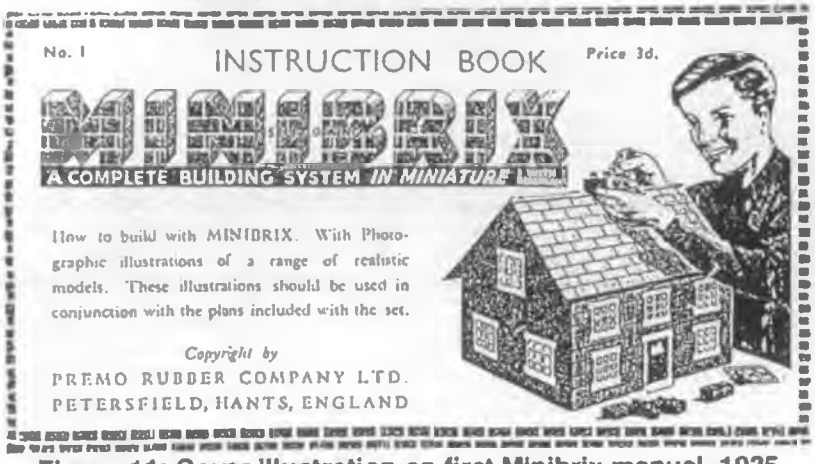


Figure 11: Cover illustration on first Minibrix manual, 1935

As later with LEGO, advertising was promoted by displays of large models in shop windows and toy exhibitions around the country. To this end a model of Buckingham Palace was constructed using some 14,000 individual pieces, which when complete weighed nearly 2 cwt, measuring 68" x 27" x 17" high. This model was widely exhibited and was eventually shipped to Canada, in connection with a Royal visit by King George VI and Queen Elizabeth, just prior to the outbreak of hostilities in 1939. It never returned.

Throughout the War Years, production of Minibrix was suspended, though footwear products continued to be made at Petersfield, using largely synthetic rubber. The Company also received, from 1942 onwards, contracts from the Government for rubber components for military equipment such as tank tracks, instrument suspensions, mines and torpedoes, together with medical equipment. On the footwear side, special soles were designed and manufactured for commando boots, the demand for which continued into the 1950s with the subsequent Korean War.

Minibrix production was restored late in 1947, with some items appearing in pastel colours. More attractive packaging was introduced in line with post-war trends. By 1953 the advertising, previously only depicting boys as modelmakers, started to include members of the fair sex, thereby breaking down another of the old barriers!

In 1959 the Levy family's controlling interest in the two Companies was bought out by Colston Ltd, better known for their range of automatic washing machines. Inevitably a review of operations by the new owners resulted in product rationalisation, with new methods of manufacture being introduced. This in turn led to a range of new products, some of which were later abandoned. Minibrix survived this review, but with the rapidly increasing costs of labour and raw materials, and intense competition in the 1960s from LEGO and other plastic construction kits, manufacture ceased in 1976.

Although the Petersfield Works continued in footwear production through the late 1970s and early '80s, the workforce was progressively reduced. By 1984, the Works was becoming very dated and unsuited to new production methods. A proposal was made to move the business to a new site on the industrial estate, then taking shape on the south west outskirts of the town, but this was not implemented. In 1985, the Colston Group sold the rubber companies to one David Evans who decided to move the operation to Corsham in Wiltshire where he owned premises. However, in 1987 he was taken over by Webco Ltd, a large manufacturer of safety harnesses, seat belts, etc. who subsequently transferred manufacture to their factories in Scotland, dropping the Itshide identity.

The Petersfield Works was totally demolished and the site given over to housing development, the location having become predominantly a residential area. Examples of Minibrix buildings can still be found in toy museums up and down the country, eg the Edinburgh Museum of Childhood. Some sets also exist in private hands, despite the tendency for rubber to perish with age, as was discovered when seeking locally made artefacts for the Petersfield Town Museum, due to open in 1999.

Gerald Davies

Acknowledgment

The author is indebted to Mr Wilf Burnham of the Petersfield Area Historical Society who undertook much of the research into this subject (see PAHS Bulletin of Spring 1997, Vol 5 No 3)

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Memories of Twyford Waterworks 1936 – 1952

Introduction

All the activities listed in this article are recalled from the memory of a now retired Engineer who, as a youngster, grew up in the stimulating environment of activity and construction at Twyford Waterworks and who was, from an early age, allowed the freedom to talk to the men and to learn valuable workshop skills and, above all, learn about engineering. It is worth noting that a boy growing up today would be barred from the premises under the 'Health and Safety at Work Act'.

The Work

In the period prior to the Second World War, Twyford Waterworks was a busy place which provided employment in a truly rural area. The various additions and alterations to the buildings, wells and pumping machinery, as well as the maintenance of machinery, of the property and surroundings, required a force of workers with a variety of skills and, as much of the work was manual, a devotion to hard work. Today it is increasingly difficult to understand the techniques and the changes which occurred in the fifty-odd years from the start of the works until the development of electric pumps.

These notes are intended to illustrate the nature of the work and mention some of the human aspects of the tasks and people involved in producing potable water of an extremely high quality from chalk aquifers.

The operation of Twyford Works may be divided into several distinct activities viz:- attendance on pumping machinery, stoking boilers, cleaning and watching filters and chlorinating plant, winning chalk, lime burning and slaking, maintenance of all equipment, outside maintenance of the grounds and buildings, coaling the bunkers, sludge disposal and special works.

The first three operations were carried out on a three shift basis – 6am to 2pm, 2pm to 10pm and 10pm to 6am, with operatives working a week at each shift, changing over each Sunday. They were assisted by relief men from the outside gang who also covered for holiday and sickness. These became full-time replacements when shiftmen left or retired. In the thirties all other men worked a forty-eight hour week, but after the war the working week was reduced.

The attendant on the pumping machinery – "The Driver" – was required to oil journals, watch for any signs of malfunction on both diesels and steam engines and check all the gauges and meters, ensure the petrol gas plant functioned, keep records of events and start the Yew Hill booster when required. Over the years names changed, but some of the drivers were Sid Dumper and his brother Len, who later moved to the Otterbourne station and who both lived on Waterworks Road, Otterbourne, Bill Waldren from Twyford who lived in the village and moved to the new houses owned by the Corporation on Hazeley Road, Alfie Stroud who lived opposite the school in Twyford, Joe Found, brother of Fred Found the filterman, who both lived at Northfields.

The stoker's tasks were to coal up the fire and keep steam up to the right pressure, control the ash and clinker in the fires to prevent them becoming "black" but making sure that the coal was fully burnt and to look after the direct current electric generator. As with many, now past, activities there was an art in firing a boiler, shovelling the coal on the grate in the right place and forcing the fire at the right time.

In the years before and during the war, few houses had an electricity supply (the big effort to supply rural areas with electricity came about 1947), consequently most wireless sets operated with high and low tension batteries. The latter were 1·5 volt lead / acid batteries and required regular recharging. Hence the switchboard for the generator had connections from a rheostat which was always connected to a series of batteries on charge for the workers' wireless sets.

Stokers included Jimmy Padwick who lived in Twyford and had been in the outside gang, then in the lime kiln, Bill (Shep) Cousins who lived originally at Hazeley Camp (and whose widow attended the Open Day in October 1994), Mr Laverack, who originally worked as a boiler cleaner removing dust by a vacuum cleaner and descaling boiler tubes with a scrabbler and who lived in Colden Common, and a Mr Rose whom I believed lived at Morestead and who originally was the lime slaker.

The filterman's task was to vacuum scrub filters and steam clean filter bags. He also had to check the degree of alkalinity of the outgoing water supply and ensure the correct dosages of chlorine and ammonia were passed in to the water as well as the continuous supply of activated carbon to counter any minor oil pollution and taste problems. Another task was to check the rain gauge and percolation gauge daily. As already mentioned, Fred Found was a filterman and another was Archie White who latterly became the Union representative and always smoked "St Bruno" tobacco in his pipe.

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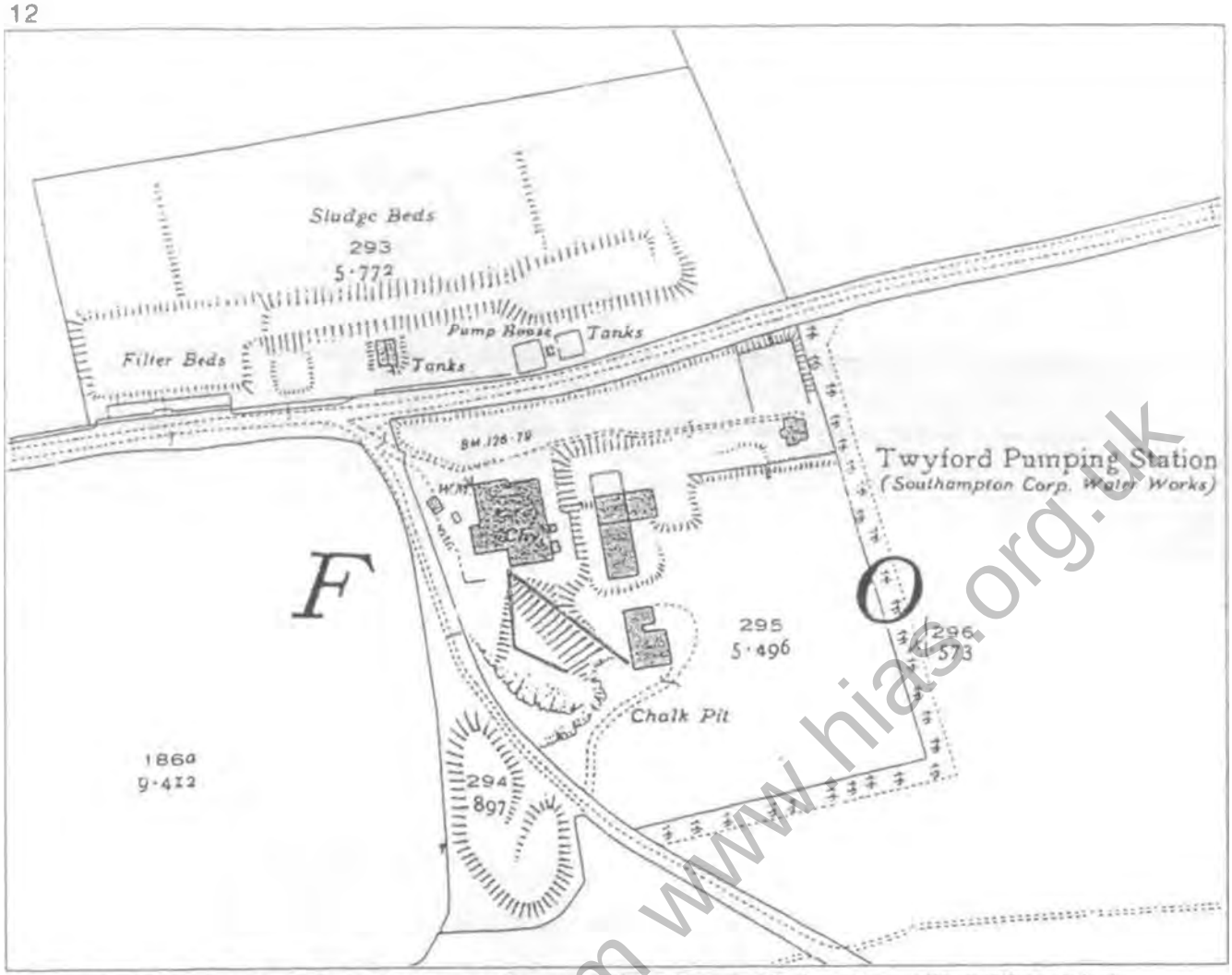


Figure 12 (above): Extract from Ordnance Survey 1:2500 County Series plan, with 1939 revision, of Twyford Pumping Station showing the two inclines
Figure 13 (below): Surviving section of rope-worked incline



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Before the 1939-45 war, lime was produced from chalk excavated from the pit. Chalk was pecked out on ledges and dropped to the pit floor where it was loaded into jubilee skips. The skip was pushed along a track to a turntable at the bottom of the lower incline and hitched onto a hawser which ran up the incline to a pulley behind the next turntable sited at the bottom of the second incline. The hawser was connected to the winding drum driven by an hydraulic motor in the kiln house. By this means blocky chalk was hauled up and loaded into the kiln where it was fired. The resulting quicklime was then removed from the cooled kiln and placed in the slaking drum which allowed the transition from quicklime (CaO) to cream of lime (CaOH) to occur. After agitation the cream was drained to the paddle mill and the slag removed. This slag was disposed of by tipping into a disused part of the chalk pit from the side off the second incline. The cream of lime was then added to the water raised from the wells near the "bellmouth" of the incoming pipe in the mixing tank. When lime burning took place, the fire was started in the grate with timber and maintained with coal. It was important to keep the temperature up so that all the gases were driven off and to ensure a complete burn, which was demonstrated by flames emerging from the chimneys. During firing an attendant was present at night.

Frank Barstow was one kiln loader and burner in the late 1930s and Mr Rose, who later became a stoker, was the lime slaker. The people who worked in the chalk pit were numerous and somewhat itinerant, but one outside man was Jimmy Lashley, son of Henry who had been a sign writer and painter in Twyford. Jimmy was a keen racing cyclist and, by some accounts, a clever conjuror. Frank Barstow was a good golfer who won a number of silver spoons in competitions. Unfortunately he was wounded and lost an arm in the war.

Clearly so much machinery required extensive maintenance and regular overhaul. The fitting shop, which was a vital part of the works, comprised a vertical single cylinder steam engine which drove an overhead pulley system. This system enabled belts to drive a vertical drilling machine, a milling machine, a rotary whetstone, a metal hacksaw and a long bed screw cutting lathe. Prior to the war many inventive works were undertaken and even forging was done in the boilerhouse. However, as new materials and improved welding techniques were developed, more specialist work was done elsewhere and the fitting work concentrated on routine maintenance activities. Typical work on the steam engines was the fitting of new bearings in the journals, refacing foot valves of the well plungers, general valve maintenance and decarbonisation on the diesels where there were regular overhauls and latterly (maybe because water softening ceased) there was a need to descale water jackets with hydrochloric acid. When really major problems occurred outside normal hours the Superintendent was called out but, over the years, despite the continuous running and increased demands due to the war effort, major failures of machinery were infrequent.



Figure 14:

Charles Gunson in the Engine Room at Twyford

People in the fitting shop were led by the foreman in charge of the whole works, Bill Read who lived in Northfields came originally from the Isle of Wight. Charlie Gunson, who came from Lincolnshire, was the main fitter: he was a very clever innovator who, in his spare time, ran a smallholding at Colden Common. Various other people assisted in the workshop and there were a number of apprentices. Maybe the most outstanding was Charlie Cooper, the son of an outside man at Otterbourne. When he completed his apprenticeship, he went into the Army where he developed his skills further and came back to the New Works at Otterbourne as the main fitter. Joe Found's son, Bert, was another apprentice.

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The work of the outside labour force was varied. It included such maintenance activities as scything and raking up the grass, painting all roofs and railings with bitumastic paint as well as painting joinery and timber work, mowing the lawns with an early hand pushed Greens' mower, cutting banks with a sickle, weeding paths and hosing down the blue bricks near the works doors, all with the intention of keeping the dust and dirt away from machinery and water tanks. Also there were a series of routine activities for these people including washing out the settlement tank on the opposite side of the road where the deposit from the washout from the filters was collected, pumping up diesel oil to the header tanks from storage across the road, hauling and weighing in coal to the boiler house from the storage piles and a series of other such activities including planting trees. Another function was to extend the bounds of the filter sludge settlement beds.

As mentioned earlier, workers progressed from this gang to inside shift work and therefore some names are repeated. They included young Bill Cousins and his father old Bill,; the latter was a dab hand with the scythe but very deaf and therefore often worked on solo activities: Eddy Found, son of Fred Found who, after the 1939 War became a prison warder. Larry Links, who lived in Twyford, worked outside after he left the contractor which built the filterhouse extension in 1936. An old timer in the late "30s" was Sam Woodman from Colden Common who must have been born about 1875. He had a classical "Garibaldi" droopy white moustache and smiling eyes and was very tolerant of the spirited 4 year old son of the Superintendent. On one occasion as he bent down painting the iron railings with green bitumastic paint, the "Nipper" removed the spare brush from his paint kettle and painted the seat of his pants. For his pains "Nipper" did not receive the usual admonishment of "I'll tell your father"; instead he was tied by Sam's wide belt to the railings for a period. Tom Brown was another old timer, who had been a head gardener, and was a wealth of information and supplier of plants, who helped out in the war years. When required the outside men augmented the gangs carrying out special works.

"Special works" is a term which covers a miscellany of activities which were carried out by the regular or augmented labour force. The Corporation owned a large tract of land to the south, east and west of the works where adits and aquifers allowed surface water to reach the wells. This necessitated restrictions on farming activities. In the mid thirties it was decided that the land owned by the Corporation should be fenced and therefore "the gang" erected many hundreds of yards of concrete post (a very early variety) and strained wire fence.

About 1938 a "bad sample" of water was found and it was suspected the cause was due to the deep collection pond which existed across the road. The exact role of this pond is now obscure but it is thought it was used to collect the tail waters from the steam condensers and the effluent from the sewage plant. Whatever its function, it was cleaned out thoroughly, all the water and sludge being removed by hand using a bucket and winch system, and the hole refilled. At the same time further along the ditch on the north side of the Hazeley Road, to the west of the works, a new series of concrete clinker beds were constructed so that all waters were filtered from bed to bed thus aerating any effluent before discharge of water to the ditch.

It was also at this time the activated carbon plant was installed in the slaking shed of the kilns to ensure all traces of oil were arrested. At an earlier date the sludge settlement tanks and pump house were built across the road to enable improved collection and lagooning to operate in the "Putty Beds" or sludge settlement fields. The collection tanks were pumped out weekly and the lime deposit was hosed into the outfall suction pipe at the bottom of the conical tanks. A feature of this area was the way that young trees sprouted from seed everywhere, particularly silver birch, and the other feature was the preponderance of rabbits that burrowed everywhere.

Whenever any major activity outside normal routine was undertaken, extra personnel were brought in from Otterbourne under the control of Bert Mears. He always seemed to be a smiling person to me, the young son of the Superintendent but, in retrospect, he might be considered the old school "Navvy Ganger" who could achieve excellent results with a variety of simple winches and machines. Examples of his work, achieved with a floating raft comprised of oil drums and timber baulks, can still be seen on the River Itchen training works at the Intake at Otterbourne. If specialist brickwork, carpentry or electrical works were required, then the appropriate man was called up from Otterbourne or wherever he was working.

In retrospect, it is apparent that the Corporation Water Engineer, Mr Joseph Hawksley, and his staff were constantly forward-looking and examining ways of matching the growing demand for water in the Southampton and surrounding areas. At Twyford in 1935/6 the pumping machinery was increased by the addition of Ruston & Hornsby diesel engines, together with an extension of the filtration plant and filter house. Contractors excavated the new filter tank with a small steam operated crane and bucket, and the chalk excavated was hauled by horse and two-wheeled tipping cart across the road to form a tip at the east end of the putty bed bank. All the concrete was mixed by hand using what might have been either a "Benford" or "Wingate" rotary mixer and wheelbarrowed into place. The extension to the filterhouse encroached slightly onto the grass tennis court constructed by Mr Stone but there was still sufficient room to mark out a doubles court. At about this time the

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supply of water to the well heads was augmented by excavating an adit system under the downs towards the Twyford reservoir. It is believed this was undertaken by miners and the spoil heap is still visible across the lane on the west side of the chalk pit.

Also about this time Twyford reservoir was extended by contractors Arthur Monk of Warrington who, after the War, carried out several motorway contracts. In the late thirties steeplejacks altered the top of the chimney by removing the brick corbelling and renewing some of the steel bands.

Twyford Waterworks at War

After 4th September 1939 things moved very fast. All the windows of the engine rooms were bricked up and brick blast doors were built around entrance doors. Special plates were made to put over the chimneys of the lime kilns to prevent the flames from showing at the end of the "Burn", but this system did not work so the kilns were closed. Three Air Raid Shelters were dug on the Downs for people to withdraw to when raids occurred. An air raid whistle alarm, operated by steam, was installed above the boiler house; the alert was a series of short blasts and the "all clear" was a long single blast.

Soon after the outbreak of war a section of National Defence Corps soldiers in the charge of a sergeant were assigned to guard the works. A guard room was built on the lawn to the north of the workshop and a floor and bunkroom was constructed in the stoking area of the new part of the lime kilns with a galley and mess area in the old part. Each night, for some weeks in the autumn and winter of 1939/40, parades were held and sentries were mounted around the grounds with a sentry box at the gate. Later on the soldiers resumed their regimental name and were redeployed elsewhere. At the start of the war camouflage experts were called in to advise on the protection required for all the pumping stations.

At Twyford it was decided that the "L" shaped belt of fir trees which enclosed the site was a landmark that would be apparent from the air and therefore part of it should be felled in two places to break up the continuity. At the same time it was advised that the Old Works Building at Otterbourne, which had a white rendered face, should be camouflaged by hanging trees over the face. Hence the trees at Twyford were felled and hauled to Otterbourne and hung by steel ropes down the face of the building. Subsequently, when the trees rotted and lost their evergreen foliage, they were removed and the whole building sprayed with paint in a more usual camouflage style. Some of the trees were used to camouflage the chalk pit at Twyford.



Figure 15: Otterbourne Engine House as camouflaged in World War Two

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Late in 1939 two members of staff from the head office and their families were evacuated from their houses in Southampton and billeted at the Waterworks House, Twyford, with the Superintendent and family. For a short while there were six adults and five children dwelling in a house with four bedrooms but, as no air raids took place early in the war, these evacuees soon returned to their homes.

Later, Acton County School was evacuated from London to a large house in Morestead and two boys were billeted at Waterworks House for several years.

At about the time of the withdrawal of the soldiers (early in 1940) the Local Defence Volunteers (LDV) were formed and some arms, including a machine gun (0·300 calibre) of Czechoslovakian origin, were supplied to the works. As there was no mounting for the machine gun, Charlie Gunson made a tripod stand and it was placed on the lawn in front of the disused guard room during air raids. The LDV very quickly became the Home Guard and the Superintendent became Lieutenant Johnson in charge of the Waterworks Unit at Twyford and the other stations. Training exercises were held with the Twyford Village HG in the charge of Lieutenant Jock Matherson. A firing range with a proper butts and rising targets was built at the foot of the scarp slope to Twyford reservoir. Firing platforms were constructed at 100, 200 and 300 yards where Lee Enfield rifles, tommy guns, sten guns, lewis guns and pistols were practice fired. It was noticeable that evening parades adjourned at nine o'clock and Sunday morning by one o'clock, no doubt in good time for thirst quenches at the "Dolphin".

Elsewhere on the Downs two piles of large logs were stacked and these were used as targets for firing Boys Rifles, a Blacker Bombard and Mortars. With the departure of the army sentries the Home Guard took over guarding the works and initially the Twyford Reservoir; two members of the guard were Henry Lashley (referred to earlier) and Ruben Dumper, both in their seventies. On one occasion the guard at the reservoir discharged his rifle accidentally when unloading it: the sound of the shot was heard over a wide area and forces were called out to investigate the source.

Until September 1940 the war front left Twyford works undisturbed except that younger men who were non key-workers were called up for military service.

Most of the shift workers were over the age for conscription; some had seen service in the 1914/18 War. Another change was the introduction of women cleaners in the engine rooms, one of whom was Mrs May Smith who lived at Hazeley Camp. In the Battle of Britain things were less calm for several evenings in late September when aerial dogfights occurred over the area. A German Junkers 88 crash-landed on Hazeley farmland and a Hurricane fighter crashed in the Hensting direction. After the "All Clear" it was possible to collect handfuls of cartridge cases from the roof gutters on the filterhouse roof. Bombs fell in the vicinity of Bourne Lands, Twyford, but the nearest bomb to the works caused a crater in the field to the west of the putty beds.

During the Blitz on Southampton damage was caused to water mains and the local storage reservoirs. This in turn caused alteration in pumping regimes as alternative reservoirs were called upon to supply water via different trunk water mains. The maintenance of supply for fire fighting was a major task and caused many difficulties for the mains superintendent in Southampton, Mr Waterson.

In 1943 American and British forces started to build up in the Southampton area and with these increased forces so the demand for water grew. Many of the local beechwoods close to roads around Hampshire became military camps and water supply was often by water bowsers which were filled at the works. On one occasion prior to "D-Day" a high-ranking US Army Officer met the Superintendent, presumably to talk about supply of water in quantity. He enquired whether the water was chlorinated and observed that "he liked to taste the chlorine". Mr Johnson replied that "it was chlorinated but I don't like to taste the chlorine." After D-Day the demand for water increased and it is understood that supplies of water were taken to France to supply the Allied Invasion Force. It was at about this time that the volume of water supplied from the works at Otterbourne, Timsbury and Twyford exceeded, for the first time, twenty million gallons a day.

In the post-war years further developments took place; the earlier of the two triple expansion steam engines was dismantled and pumping capacity was replaced by the installation of electric pumps. High tension mains electricity was installed to supply a transformer and a mercury arc rectifier in a new building. As the role of the Corporation as a supply authority widened to take over some small Rural District Council supplies, and demand for water grew further, new trunk mains were installed and plans developed for new sources of water. These sources were further afield and were to rely upon a network of submersible electric pumps in deep boreholes. The energy efficiency, the simplicity and the increased supply potential of such an arrangement sounded the deathknell for the Twyford Waterworks machinery of the past fifty or so years.

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The Mechanical Superintendent: Frederick Johnson 1899 - 1963



Figure 16: Mr Frederick Johnson, receiving the British Empire Medal from the Prime Minister, Mr Harold Macmillan

He was born in Sheffield, the seventh son of a General Storekeeper. At an early age the family moved to the village of Norwell in Nottinghamshire where his father owned a small farm.

In his early teens he worked in the garden of "The Big House". Despite his father's wishes he left school, instead of going to the local grammar school, to take an apprenticeship at the engineering firm of Worthington Simpson in Newark. He cycled daily to work and completed his time as a mechanic and, at the age of 21, became an erection engineer after a spell in the London Design Office. In 1921 he was working in Dublin during the Black and Tan riots. Thereafter he was involved in the installation of plant all over the United Kingdom and was sent to install plant in the power station in Havana, Cuba, in 1924. On return to Britain he became a "Trouble Shooter" who was sent at short notice, by telegram, to anywhere in the country. He came to Otterbourne to install the magnificent Worthington Simpson triple expansion steam engines and subsequently appointed to succeed Mr Stone as the Mechanical Superintendent for all the Corporation's pumping stations.

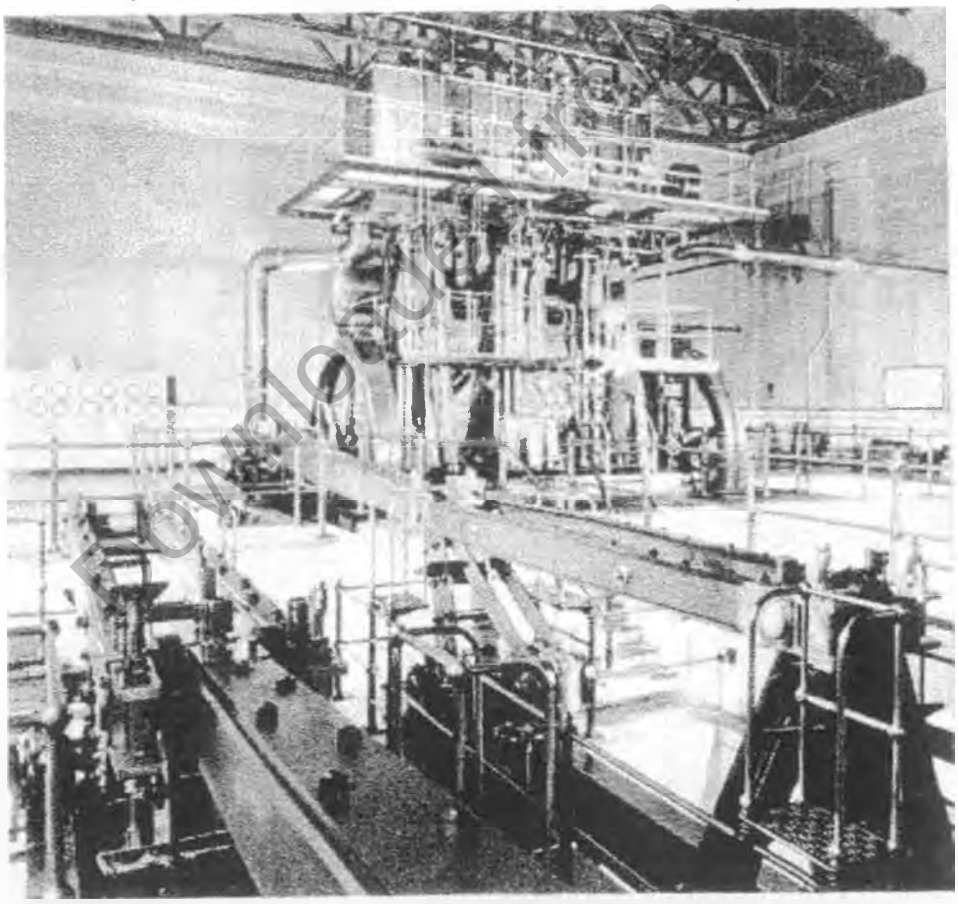


Figure 17: Worthington Simpson Engine installed at Otterbourne Pumping Station by Frederick Johnson in 1926

Throughout his life he was always interested in scientific developments and his proudest boast was that he had installed or worked with engines commencing with the beam engine and extending through: triple expansion steam engines, steam turbines, vertical marine diesels, horizontal marine diesel and electric motors. His regret was that he had not worked with a gas turbine. He was always proud of the work achieved for the construction of the Otterbourne River Intake and the River Itchen training work and landscaping. He had many sporting interests including game shooting, cricket where his loyalties were torn between Yorks and Notts, and which he still played occasionally in his fifties. In later years his great love was Bowls. In the late 1950s he found great pleasure in following the

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interests of his Grandson, Stirling. On Saturday mornings he would disappear to some corner of a Waterworks with the youngster who would be shown the machines, the filters and lorries or the vans. He would have been very proud to know those excursions would have supported the theory that "A man likes to do what he enjoyed doing before he reaches the age of five" since the grandson is now a highly qualified Engineer, a Fellow of the Institution of Mechanical Engineers and the owner of a successful Engineering Company in the Midlands. Frederick Johnson was awarded the British Empire Medal in 1953 in recognition of his service to the water industry.

Memories of Transport

In the thirties most people came to work on a cycle or, as it was termed, a "push-bike". Some walked and a few had motor bikes. Charlie Gunson had a motorbike and a side-car. The Corporation supplied the mains inspector, Mr Bullpit, with a motorbike and side-car. His brother from head office in Southampton delivered the wages each week and he drove a three-wheel motor cycle van. Deliveries of aggregate, which it is believed came from Hall & Co's pit at Highbridge, were transported in the early days by steam lorries. Coal was delivered from the goods sidings at Shawford Station in Bedford lorries. About 1947 Bedford lorries hauled coal direct from the South Wales pits at a lower cost than delivered by rail to the sidings at Otterbourne or Shawford.

In the thirties motor cars were rare. From the early thirties Mr Johnson had a motorcar to get around the pumping stations. His 1937 Ford 10 was used until 1952. It was purchased for £126, driven for 350 000 miles and was fitted with five replacement engines, two gear boxes and rear differential. In 1952 he was allowed £325 against a new Ford Prefect (in the time of double purchase tax). The only other persons who came to work in a car until well after the war were Sid Dumper, who owned a Ford 8 vintage 1935–1937 which he kept in immaculate condition, and Charlie Gunson who progressed from his motorbike to a Hillman 10 on which he carried out all maintenance including the running and re-honing of new white metal bearing shells.

Social Habits

Most workers smoked: some cigarettes – Players Weights, Wills Woodbines, etc; some rolled their own with patent rolling machines – and some smoked pipes, one an old clay pipe. As most people smoked, an odd feature of the "Engine Room" was a permanently burning lighter which stood on the base of the Hathorn Davey engine made out of an old Brasso tin filled with paraffin with a wick through the lid. Many workers spent some leisure time in their "local". In Twyford these were the Dolphin", the "Phœnix", the "Volunteer" and the "Bugle"; the Hazeley people also used the "Shearers" towards Owslebury. Many men carried enamelled tea cans either with ready made tea or, if they were in the works, they could heat their water with steam from a pipe in the boiler house. A memorable feature of lime burning was the way that the attendant cooked his supper: he first placed his long-handled shovel in the fire and, when it was fairly hot, took it out and laid bacon rashers on the shovel then, after a short while, he fried an egg (the aroma is still with the author to this day). The type of lunch for some was "door steps" of bread and a lump of cheese, both of which were carved off with a pocket knife and washed down with strong tea. Father and son working for the Corporation was a feature of the employees at all the works, which may have reflected the better opportunities for stable employment in rural areas.

Twyford Waterworks is full of ghosts of the past to the author. It is doubtful if any of the people mentioned in this article are about today, with the possible exception of Charlie Cooper. Although much of the effort of preserving the Works is aimed at the actual machinery, its very preservation is also a tangible monument to those who installed and ran the works so effectively for over half a century.

Fred Johnson

Editorial Note: 1999 Open and Steaming Days at Twyford Waterworks
Open Days: Saturdays and Sundays – May 1 and 2, October 2 and 3
Steaming Days: 6 June, 4 July, 1 August, 5 September
Open to view every Sunday, 11am to 4pm, May to September inclusive

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Two Pumping Stations in the Somerset Wetlands

Westonzoyland Pumping Station

This pumping station is the oldest steam pumping station to survive in the Somerset wetlands. In 1830 an Act of Parliament was passed to improve certain low lands, the works to be funded by a rate paid by those benefitting from the drainage. John Easton was appointed Commissioner for a term of no more than six years and was required to "view" the works. On completion, an account of all works done was to be given and he was required to state the rate payable. His powers lapsed after the six years and passed to the local gentry.



Figure 18:
Westonzoyland Pumping Station in 1977

A 27 h.p. beam engine and scoop wheel for pumping were erected on the bank of the River Parrett near Westonzoyland (grid ref ST 340328). The scoop wheel has been described as "a water wheel working backwards". In 1834 the *"Taunton Courier"* stated that *"the steam engine at Westonzoyland has kept that side of the moor from being flooded"*.

The 1836 Tithe Map shows the pumping station and house and garden, the house being owned by the Trustees of the Drainage Company and occupied by James Bastable. By 1843 the Heard family was in residence and also in the same year the scoop wheel needed lifting 15 inches. There are no early plans of the site but it is surmised that the beam engine and wheel were near or just below existing ground floor level, with living accommodation above. In 1861 alterations took place when another engine was installed. The old engine was sold for £67 and the Easton and Amos Drainage Machine was installed at a cost of £1 750.

In 1836, after the dissolution of an earlier partnership, James Easton, brother of the original Commissioner, formed a partnership with C.E. Amos. They established an engineering firm that became famous for water pumping machinery which sold world wide. In 1857 a patent was granted for their machine which comprised a pump, set in a cast iron well casing, 12 feet below a twin cylinder vertical steam engine. It is reputed to have raised 100 tons of water per minute by six feet. Eight of these machines were used in Somerset, lasting variously from 75 to 90 years in regular work. One of them was installed at Westonzoyland in 1861.



Figure 19: Extract from the Ordnance Survey 1:25 000 Sheet ST33 dated 1960

The site can be visited throughout the year on Sundays but the "In Steam" days are from April to October, first Sunday in the month, when the 1861 drainage machine can be seen in action. Other things to be seen include a small forge, a works tramway and other steam and internal combustion engines.

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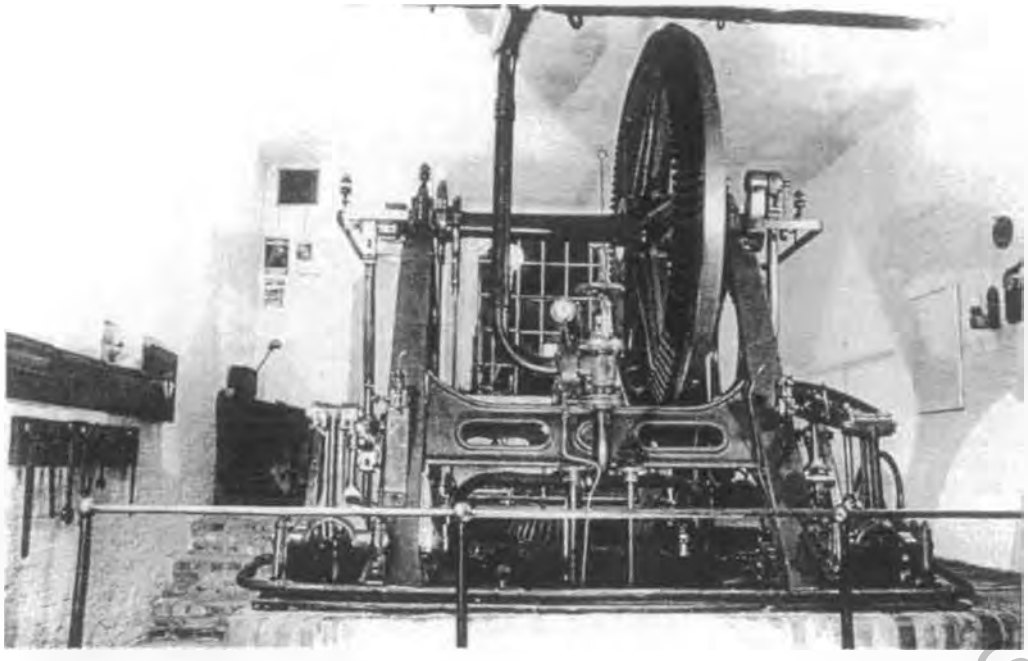


Figure 20: Engine in Westonzoyland Pumping Station, 1984

Gold Corner Pumping Station

South Drain is situated between the River Brue and the Polden Hills. It is 9 miles long and has a catchment area of 45 square miles, three quarters of which lies up to 7 metres below high tide level. The pumping station is the largest and most complicated land drainage pumping station in South West England. It is situated at the junction of South Drain, the Cripps River and the Huntspill River. Prior to its existence the drain flowed by gravity into the River Brue at Bason Bridge, and extensive flooding occurred every winter.

It has a unique history, being built during the Second World War to supply cooling water for a Royal Ordnance Factory. The factory buildings still exist, albeit in use for another purpose, and Gold Corner pumping station remains in use because of its drainage function.



Figure 21: Extract from the Ordnance Survey Routemaster, Sheet 8, showing the positions of the pumping stations

In October 1939 Louis Kelting of the Somerset Rivers Catchment Board, an authority on flood drainage, was asked secretly by the Prime Minister, Neville Chamberlain, to supply 4·3 million gallons of water a day for a new munitions factory to be built at Puriton in the Brue Valley. As far back as 1853 there had been investigations to provide flood relief for this area and this request seemed to be a solution to the problem. £40 000 was immediately supplied by the Government and a start was made on the new drainage channel. The intention was to have a deep channel which would feed by gravity but several major bank slips forced a change of plan. A shallower channel was designed with the pumping station lifting water 8½ feet into the Huntspill River.

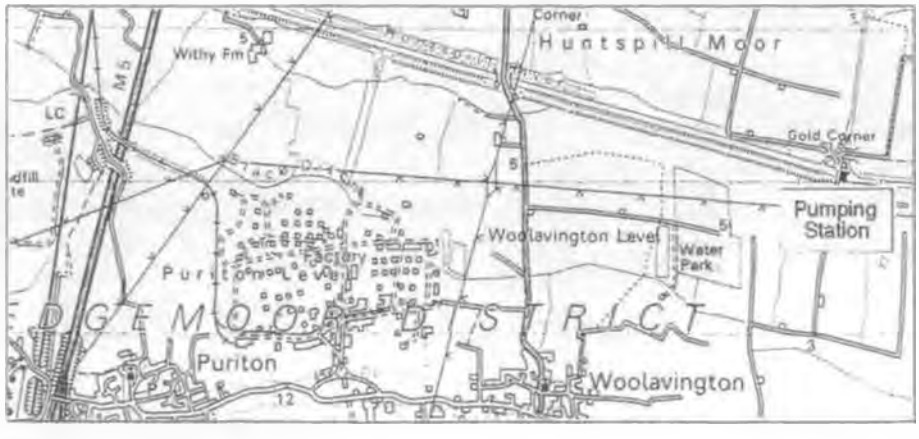


Figure 22: Extract from the Ordnance Survey Landranger map 182, showing Gold Corner Pumping Station and the former munitions factory at Puriton

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Work started in November 1940. The four pump units were installed first of all and the building then erected around them. These are four Sultzer horizontal pumps powered by a 2-cylinder horizontal Crossley oil engine of 240 hp running at 220 rpm. However, the No. 1 pump is now driven by a 315h.p. electric motor and variable speed drive which was installed in 1968.

The pump house is 84ft x 49ft x 25ft. The first pump was ready for work in July 1942 and the station was finished by the end of that year. The total cost of the Huntspill River scheme was £411 594; £61 000 covering the pumping station costs (£26 000 on machinery and £35 000 on building costs). Today's estimate of the entire scheme would be over £7·5m.



Figure 23: Gold Corner Pumping Station

The maintenance of the diesel engines is highly skilled and spare parts are difficult to obtain. An operator lives on the site and at exceptional times there is 24hr pumping. The high water mark level at the seaward end of the drainage channel is shown by a mark just below the eaves level of the pumping station building. There is a fully automatic weed screen with a store to house the decomposing weed. Pumping is needed to control water levels and prevent flooding, to maintain certain water levels at specific dates, to provide water for agriculture and also to maintain low water levels in the South Drain.

The pump capacity is 4·4 cubic metres per second (per pump at 8½ft head). This would, for example, fill the pumphouse in 2½ minutes. The Environment Agency now owns and operates this site.

This area is well worth a visit not only to see the diesel engines but to see this important wetland area which has coarse fishing and canoeing and rowing activities potential.

Rodney and Joan Todd

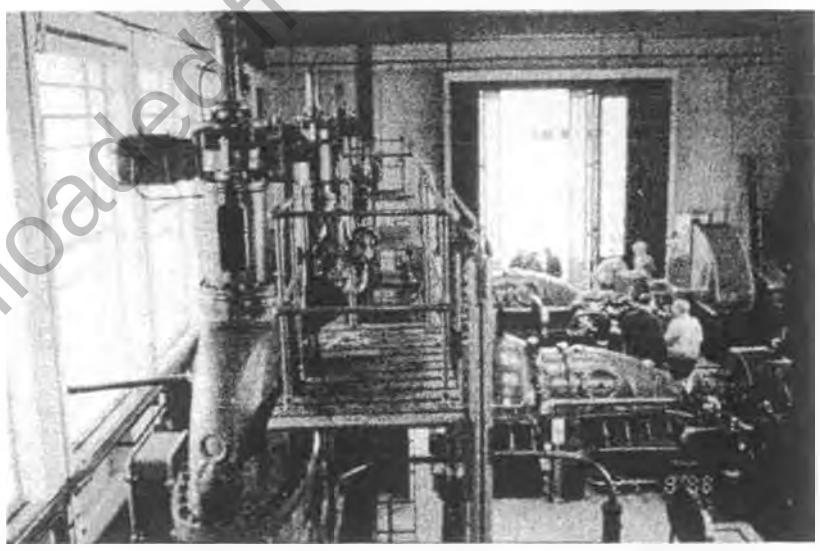


Figure 24: Engines in Gold Corner Pumping Station

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The Rise and Decline of Dry Docks in the Port of Southampton

A port does not determine changes in the demands of traffic but interacts with them and may even anticipate them. For instance, Southampton commenced construction of its first container berth in 1967, in advance of any firm promise of traffic. On the other hand it is necessary to adapt to a decline in demand. For example, the flying boat terminal, built in 1948, lost its traffic in 1958. The Ocean Terminal was opened for transatlantic passengers in 1950. An alternative use for the air traffic terminal was found but, in view of the demise of conventional ocean liner traffic, the Ocean Terminal was demolished in 1983.

Another change, in view of the rise of road transport, was the erosion of the dock railway system almost to the point of extinction. The difficulty of forecasting is demonstrated by recent signs of a revival in rail traffic and, more dramatically, by the escalation of passenger traffic based on cruise liners. However, it may well be that, unlike the reversal of the decline in rail or passenger liner traffic and more akin to the end of the flying boats, there will be no revival in the demand for dry dock accommodation.



Figure 25: Extract from a British Transport Docks Board map of the Eastern ("Old") Docks in Southampton in 1954 with dry docks 1 to 6 and the piers (on the left) to which the Floating Dock was moored

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Figure 26: Looking north along No 2 dry dock, with No 1 on the left and No 3 to the right

For many years the provision of dry dock facilities was necessary in order to persuade shipping companies to use the docks. This was still thought to be the case in 1965 when an official guide referred to them as follows:-

> "The service available to shipowners for the maintenance, overhaul and repair of ships is one of the advantages which has helped the development of Southampton Docks. Throughout the history of the Docks this service has been one jump ahead of the development of ships needing it, and each of British Transport's six dry-docks now in use at Southampton was in its day an engineering marvel. The latest and largest, the King George V Dock, was designed to take ships of 100,000 tons, and so can accommodate a 'Queen' with plenty of room to spare. Two other dry-docks at Southampton, the Trafalgar and the Prince of Wales, are over 700 feet long and can accommodate all but the very largest liners, while another three smaller docks deal with cross-Channel and coasting vessels."

The guide also referred to the main ship repairing establishments, "the yards of the world famous firms of Harland & Wolff and John I. Thornycroft", which were associated with the dry docks. In fact, when that was written, the decline in dry dock accommodation had begun, as one dock had already been closed. This reflected a decline in demand associated with changes in cross-Channel and coastwise shipping coupled with the need for the space which Southampton's first three docks occupied. Not only was there a decline in conventional shipping, but also, because of the availability of new anti-fouling paints, there was less need to scrape ships' bottoms to remove speed-reducing, marine growths. [In the early days, attention to the copper sheathing which protected ships' bottoms necessitated regular dry docking].

When, in 1842, Southampton's first dock basin opened, both the P & O and the Royal Mail companies insisted on dry dock facilities. These were provided on the south side of the dock basin – No. 1 in 1846, the smaller No. 2 in 1847 and, in response to increasing demand

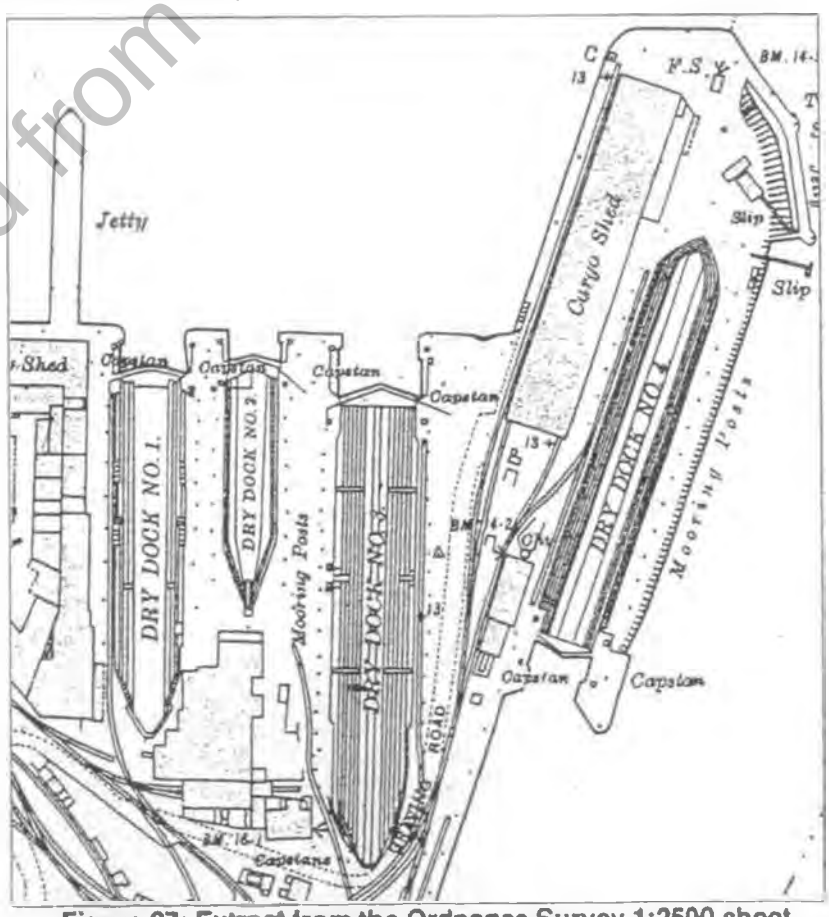


Figure 27: Extract from the Ordnance Survey 1:2500 sheet, Hants LXV. 15, 1933 edition, showing dry docks 1 to 4

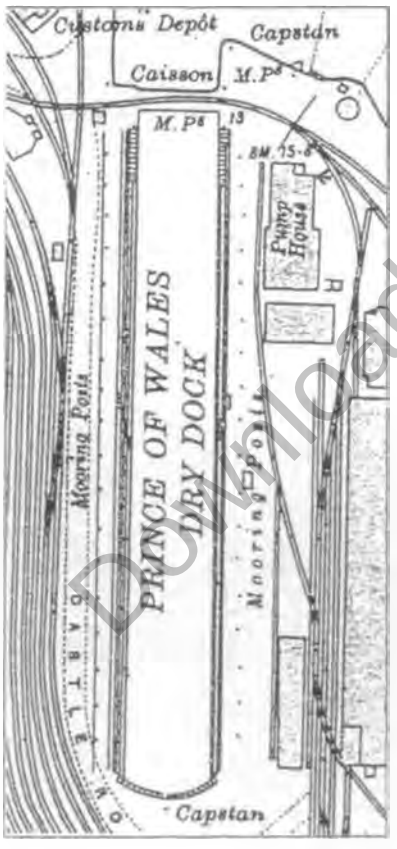
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and larger ships, the longer, No. 3, in 1854. The lengths were 400 ft, 281 ft and 523 ft. In 1879 No. 4 dry dock, with a length of 480 ft, was opened, particularly for the vessels of the Union line and, to avoid problems of access in the crowded dock basin, it was constructed outside the entrance.



Figure 28: Entrance to No 3 dry dock after infilling, with No 4 dry dock pumping station beyond

Traffic continued to expand and the Empress Dock was opened in 1890. There was an official ceremony in 1895 when the associated dry dock, with an entrance in the dock basin, was opened by the Prince of Wales (later Edward VII). It had a length of 745 ft and a width of 91ft, compared to the 523 ft and 80 ft of No. 3, and was claimed to be the largest dry dock in the world. No. 5 was the first of the Southampton dry docks to be named, taking the name of the Prince who opened it.





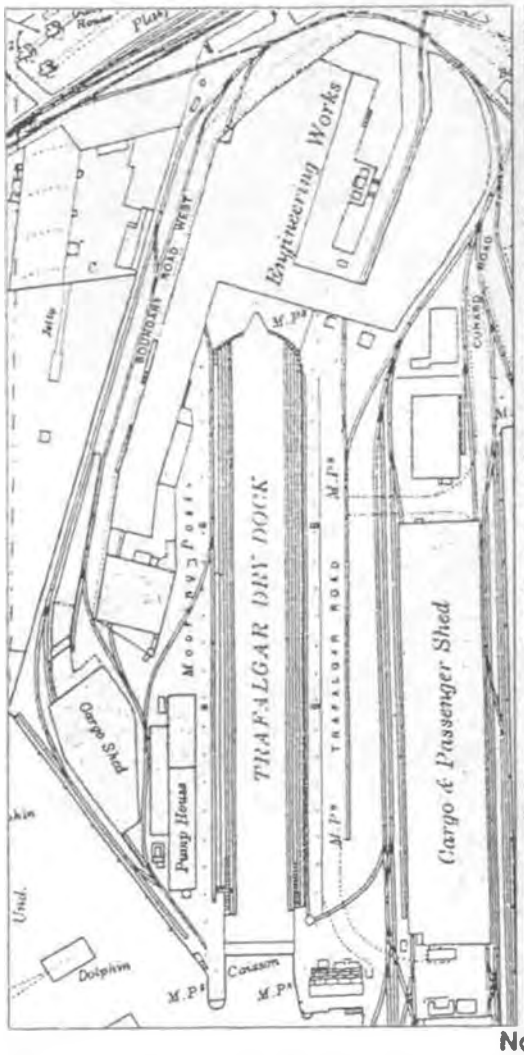
No. 5 ("Prince of Wales") dry dock

Figure 29 (left): Extract from the Ordnance Survey 1:2500 sheet, Hants LXV.15, 1933 edition

Figure 30 (above): No 5 dry dock showing caisson at entrance, the stepped sides ("altars"), keel blocks and 30-tonne dockside crane. Warehouses around the Empress Dock beyond

With a length of 875 ft and a width of 90 ft, No. 6 dry dock was designed to accommodate the transatlantic liners of the future. However the trio of White Star liners – *Olympic*, *Titanic* and *Brittanic* – measured 882 ft by 92 ft so, between 1911 and 1913, the walls of No 6 were cut back. The *Olympic* first used No 6 dry dock in July 1913. The White Star Line moved its home port from Liverpool to Southampton in 1911, and the new White

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No 6 ("Trafalgar") dry dock

Figure 31 (above left): Extract from the Ordnance Survey 1:2500 sheet, Hants LXV.15, 1933 edition
Figure 32 (above right): A 1980s aerial view of No 6 dry dock showing the pumping station (left foreground), the former Harland & Wolff ship repair yard beyond, the "Berengaria" V-shaped bow notch and the dock's two cranes. This area has been designated a car storage compound in 1999.

Star dock basin, free of the traditional constrictive entrance, was used from 1911. Harland & Wolff, who built most of the White Star liners in Belfast, established repair yards adjoining the new No 6 dry dock to continue their maintenance work on the ships. As No 6 was opened on Trafalgar Day, 21st October 1905 – the centenary of the famous battle – it took its name.

Although it was large enough to accommodate the British transatlantic liners, even with an improvised extension it proved an unacceptably tight fit for the German vessels acquired as reparations after the First World War – in particular the *Berengaria* (formerly the *Imperator*). The problem was solved by commissioning a Floating Dry Dock, towed down from the Tyne in 1924. However, after no more than ten years of regular use, the advent of even larger vessels necessitated its replacement.



Figure 33: Aerial view of the Southampton Eastern Docks in the 1920s with a ship in the Floating Dock

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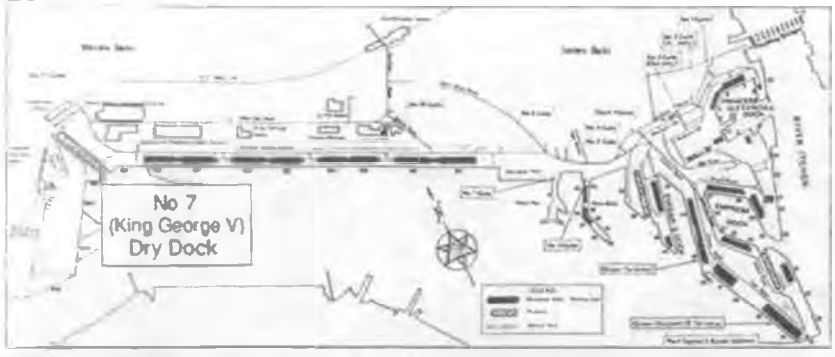


Figure 34: Diagram of Southampton Docks showing the position of No 7 dry dock relative to the Eastern Docks

No. 7 dry dock reflected the requirements of a shipping company, in this case the Cunard Line, which had followed White Star from Liverpool after the First World War. The 'Queens' were at a design stage and, because of the hold-up in her construction, No. 534 (named *Queen Mary* at her launching) did not reach Southampton until 1936. The official opening of No. 7, named King George V, took place in 1933 and the first ship to use it, early in 1934, was the *Majestic* (former *Bismarck*), the largest ship in the world. Whereas the Trafalgar, No. 6 dry dock, was 912 ft long and 100 ft wide, King George V, No. 7 dry dock, was 1200 ft long and 135 ft wide. Although this was quite sufficient for the 'Queens', to see them being positioned in the dry dock was a sight to be remembered. When the 58,000,000 gallons of water was pumped out, they had to settle on the keel blocks which ran along the centre. The foreman shipwright would stand at the head of the dock, directing the placing of the great ship within a tolerance of a few feet.



Figure 35: Paddle steamer "Willow" and a small bulk carrier in No 7 ("King George V") dry dock during 1990

Now No. 7 is the last survivor of Southampton's seven dry-docks, and its future seems secure. As mentioned above, the other six have succumbed to a decline in the demand for dry docking, exacerbated by foreign competition and a need for the land which they occupied. The sites of Nos 1, 2 and 3 were required for the expansion of facilities for handling roll-on, roll-off traffic, following the establishment of the Thoresen cross-Channel service in 1964. Nos. 5 and 6 have given place to standing ground for the growing traffic in vehicles. Perhaps rather late in the day came a public awareness of their significance in the history of the port and Listed Building status was obtained for No 6 dry dock. Their position is rather special; they cannot be demolished like the Ocean Terminal, but are filled in with spoil, leaving their walls intact. The historical significance of the Trafalgar dry dock, particularly in view of its part in bringing transatlantic traffic to Southampton, is beyond question – but what to do with the redundant dry-dock, bereft of its associated repair workshops, remains a problem. For the present, its walls remain intact but obscured by the infilling which makes its site available for storing the products of the Ford Motor Company. In a way it continues to serve the port.

Dr Edwin Course

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JOURNAL No 6, 1997

SPICERS AND THE ALTON PAPERMILL – *Philip Armitage*

ERRATUM: Philip has asked for a correction to be made to a date in his article. Page 22, last paragraph, third line, should read "A document found years later confirms the founding date to be 4th August 1796..." (not 1776).

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Monica Ellis *Ice and Icehouses Through the Ages* (with Hampshire gazetteer) 1982 **£4.00**

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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, Water and Windmills in Hampshire* and *A Souvenir of Southampton Docks* are out of print.

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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

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