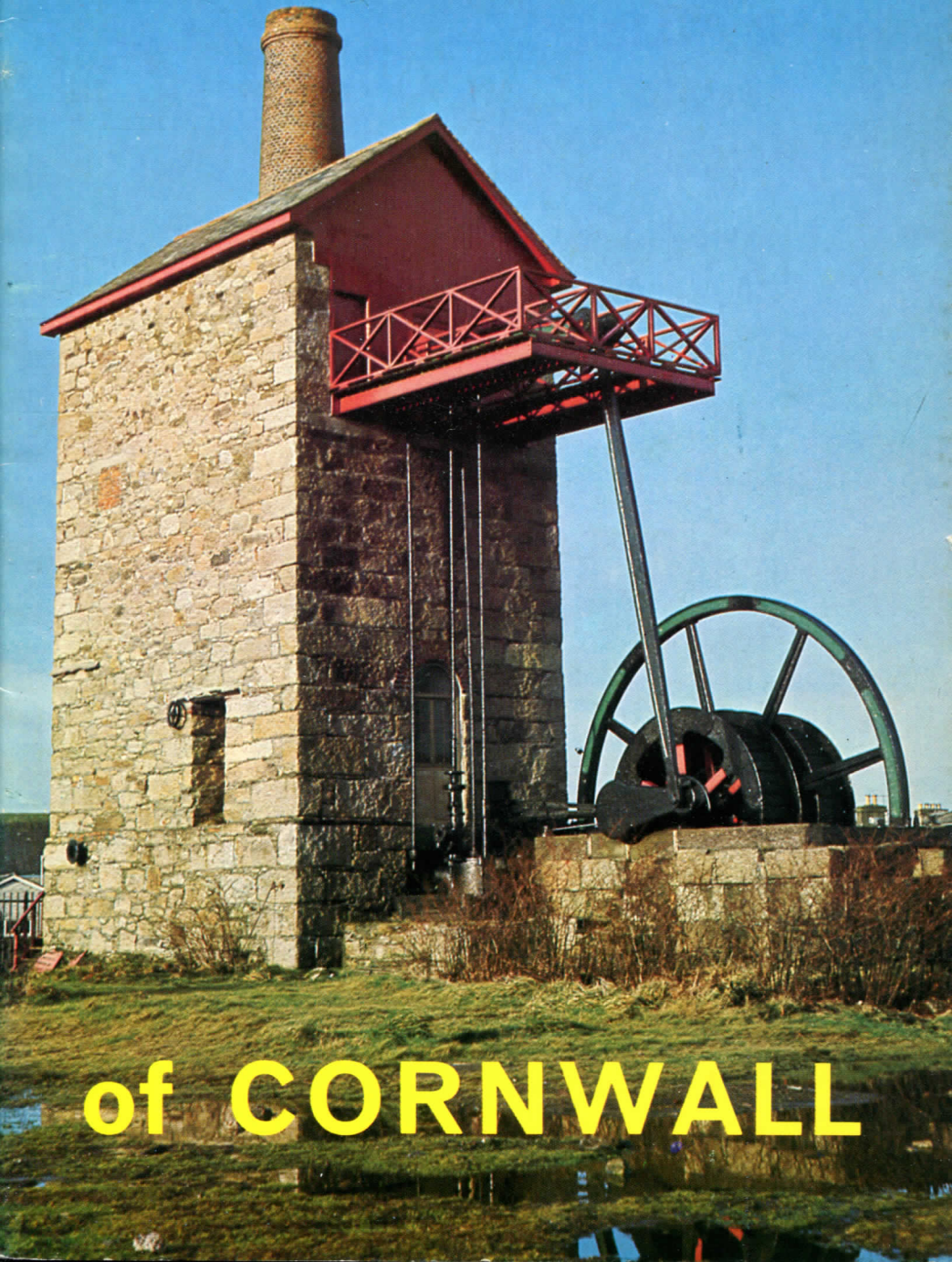
INDUSTRIAL ARCHAEOLOGY



# of CORNWALL

East Pool whim or winding engine (see also front cover) stands beside the A30 road between Camborne and Redruth. It is now preserved by the National Trust and open to the public.

INDUSTRIAL ARCHAEOLOGY OF CORNWALL

W. H. Curnow

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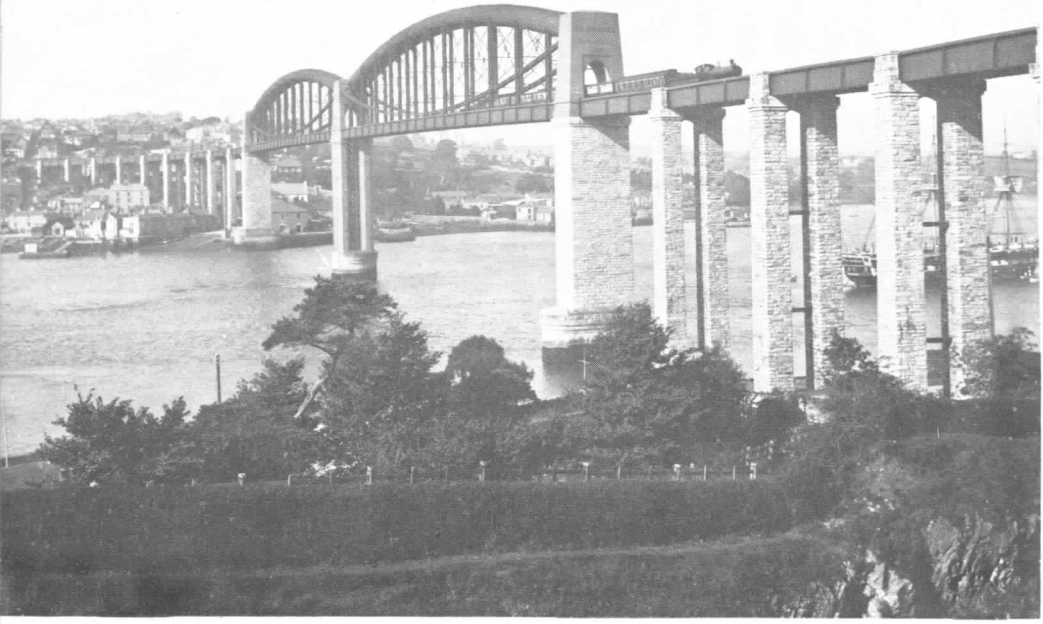

Built by the famous engineer Isambard Kingdom Brunel and opened in 1859, the Tamar Bridge (officially known as the Royal Albert Bridge) carried the GWR main line from Devon into Cornwall and is still the main link connecting the latter county with the rest of Britain's railway network. The two main spans are each 455' wide and the total length of the bridge with its 17 approach spans is 2200'; 3850 tons of iron were used in its construction and in its day it was a major engineering feat. A new road suspension bridge, opened in 1951, now carries the A38 alongside this original bridge.

FRONTISPIECE: Engine-houses and their attendant stacks, in greater or lesser degree of ruin, are widespread throughout the old mining districts of Cornwall. They comprise the most widespread example of industrial archaeological remains in the county, although wind and weather – plus the seemingly inevitable damaging hand of man – reduce their number and condition year by year. Seen here is the engine-house of Giew Mine, alongside the B3311 road between Nancledra and St. Ives.

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FOREWORD

Today we think of Cornwall as a tourist area pure and simple; a century ago, however, this was very far from the case. Cornwall was then industrial to a remarkable degree. As a result the county is a rich field for industrial archaeology.

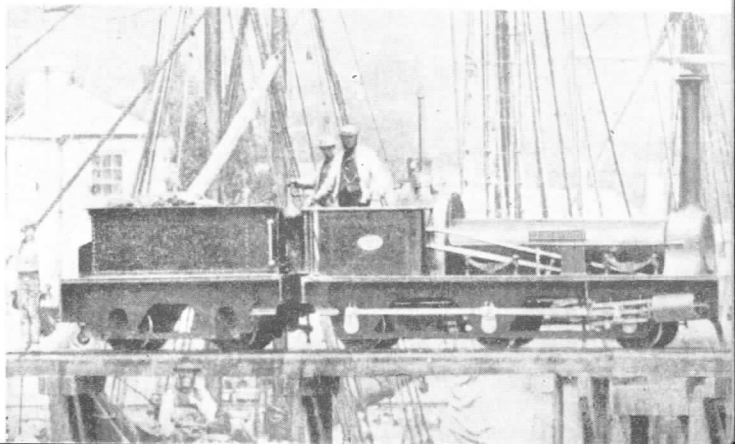
The extractive industries have always predominated here in this rocky south-western tip of the British Isles: metal mining; quarrying of slate and granite and roadstone; the production of china-clay. Coal alone was Cornwall without; had there been collieries here, both landscape and history west of the Tamar would have been different indeed. The first named extractive industry was far and away the most widespread and important. There are innumerable mine sites in the county with surface remains of one sort or another, ranging from deserted moorland 'setts' with only a few crumbling walls left, to large groups of engine-houses that once held pumping, winding or stamping engines. Everywhere in Cornwall there are engine-houses—a symbol of the county which is unforgettable—and it is inevitable that mining remains feature very largely in any consideration of Cornwall's industrial archaeology. Mention of mines summons up to most people a vista of ugly slag-heaps, pithead gear and industrial detritus: but how different from this most of the outlying old mining districts of Cornwall are in reality. As an instance take Wheal Coates on the steep cliffs by Chapel Porth on the north coast; or the remains of the engine houses at Trewavas Head, west of Porthleven; or nearby Rinsey. All these, of granite or other local stone, are mellowed by time and undoubtedly are an embellishment to the scene.

Alongside mining as the predominant industry of Cornwall, there came into being ancillary activities and industries, such as tin smelting, arsenic production, chemical manufacture etc., all of which have left their mark on the scene. Nor does this exhaust all thetypes of old industrial sites of interest to be found west of the Tamar: there are mineral railways and archaic tramroads associated with mining; water mills and mills operated by the power of the tides; the remains of foundries and engine works, some of which were once of world renown; gunpowder works and lime-kilns; and on the maritime side, a variety of harbours many of which have now passed entirely into history.

Although this is the first publication on industrial archaeology in Cornwall, an enormous amount of historical research and writing has been devoted to the individua aspects of this subject in the past ten years. This is evident in the bibliography suggested as further reading appended hereto and I am grateful to various of the authors whose works are listed for the use of illustrations. It is a curious fact that a decade ago there was only one book in print on the subject of Cornish mining—which forms the principal subdivision of industrial archaeology in Cornwall. Today there are almost a dozen, covering mining, smelting, pumping engines etc., and all without any duplication of fact.

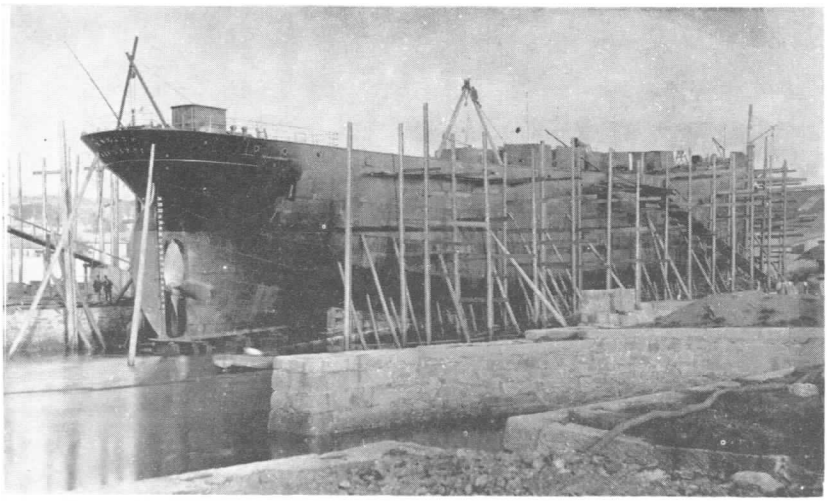
The de Dunstanville monument, erected in 1836 in memory of the well known Cornish mine- and land-owner of that name, stands on the 740′ high summit of Carn Brea near Redruth. Constructed of massive granite blocks, it is the principal industrial monument in Cornwall, and a reminder of the county's industrial hey-day. There was formerly a wooden staircase inside which led to the top for viewing purposes.

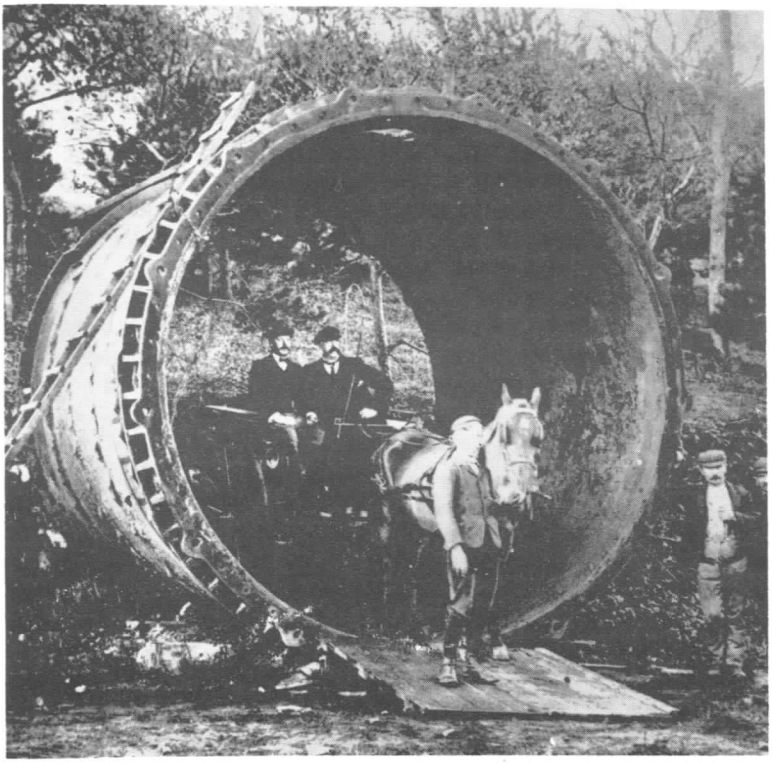
The little harbour of Pentewan, south of St. Austell, was the seaboard terminal of the Pentewan Railway. This 2′ 6″ gauge line, opened to traffic in 1826, carried primarily china-clay and china-stone, and closed in 1918 after a somewhat chequered career. It achieved some slight distinction in being the only narrow-gauge line in Britain able to boast of a locomotive with tender (illustrated below). Silting from river-borne clay waste and from sand brought into the harbour entrance by storms crippled Pentewan's maritime trade and it is now several decades since the last trading vessel called there.



Hayle, tucked in the innermost part of St. Ives Bay, is one of the most varied and interesting localities in Cornwall with an industrial past. Here there have been iron foundries and engine works, the smelting of both copper and tin, a railway terminus and a busy harbour kept free of silting by sluices and training arms. In this aerial view of the harbour (opposite), looking west, there is much of interest. The prominent railway viaduct, once of wood, marks the part of Hayle so-called because it is the site of Harveys' famous foundry. Its counterpart, Copperhouse, was named after the smelting works there: it lies to the right, at the head of the eastern of the two inlets together making up Hayle's harbour. The lock-gates installed to make this a canal or floating harbour can be seen, now carrying a railway siding serving the electricity generating station on the towans by the harbour entrance. Next to this were the sidings at the end of the old Hayle Railway (opened in 1839), the main or passenger terminus being in Foundry Square by the White Hart Inn. The survivors of Harveys' once very extensive foundry buildings and stores can be seen, together with the line of quays they built. The area within the embankment on the western inlet is a tidal sluice pond utilised to keep the main shipping channels clear of silting. At present coasters of about 800 tons can use Hayle, although with the decline in maritime traffic there are fewer vessels entering each year. At one time small sailing vessels traded to Grigg's Quay at the head of the western arm of the estuary, within sight of St. Erth, but this area is now too shallow even at high water to be used by any vessel.

Below: the s.s. *Ramleh* during construction in Harveys' shipyard.





Cornwall possessed several important iron foundries in the last century. Apart from smaller ones at St. Just, St. Austell, Charlestown, St. Blazey, Tuckingmill, Redruth, Wadebridge and elsewhere, the three largest were Perran Foundry, Copperhouse Foundry and Hayle Foundry. The first of these was at Perranarworthal on an arm of the Fal, between Truro and Falmouth, where its extensive buildings (now a grain store and mill) can still be seen. Copperhouse Foundry, at the eastern end of Hayle, was on the site of a copper smelting establishment there (hence the name) by a continuation of the same company. These foundries were builders of mine, marine and other engines on a large scale but both were eclipsed by Hayle Foundry, owned by Harvey & Co. Established soon after 1780, this was active for more than a century and was by far the largest of its kind anywhere in the south-west of England. Machinery was made here destined for mines and water-works in many countries abroad, as is detailed in D. B. Barton's *The Cornish Beam Engine: its History and Development* (1965). In fact, it is no exaggeration to say that the name of Harvey, and of Hayle Foundry, became known throughout the world for their pumping machinery. Many an English, Welsh or Scottish colliery or water-works utilised their machines, as well as innumerable mines abroad: they even

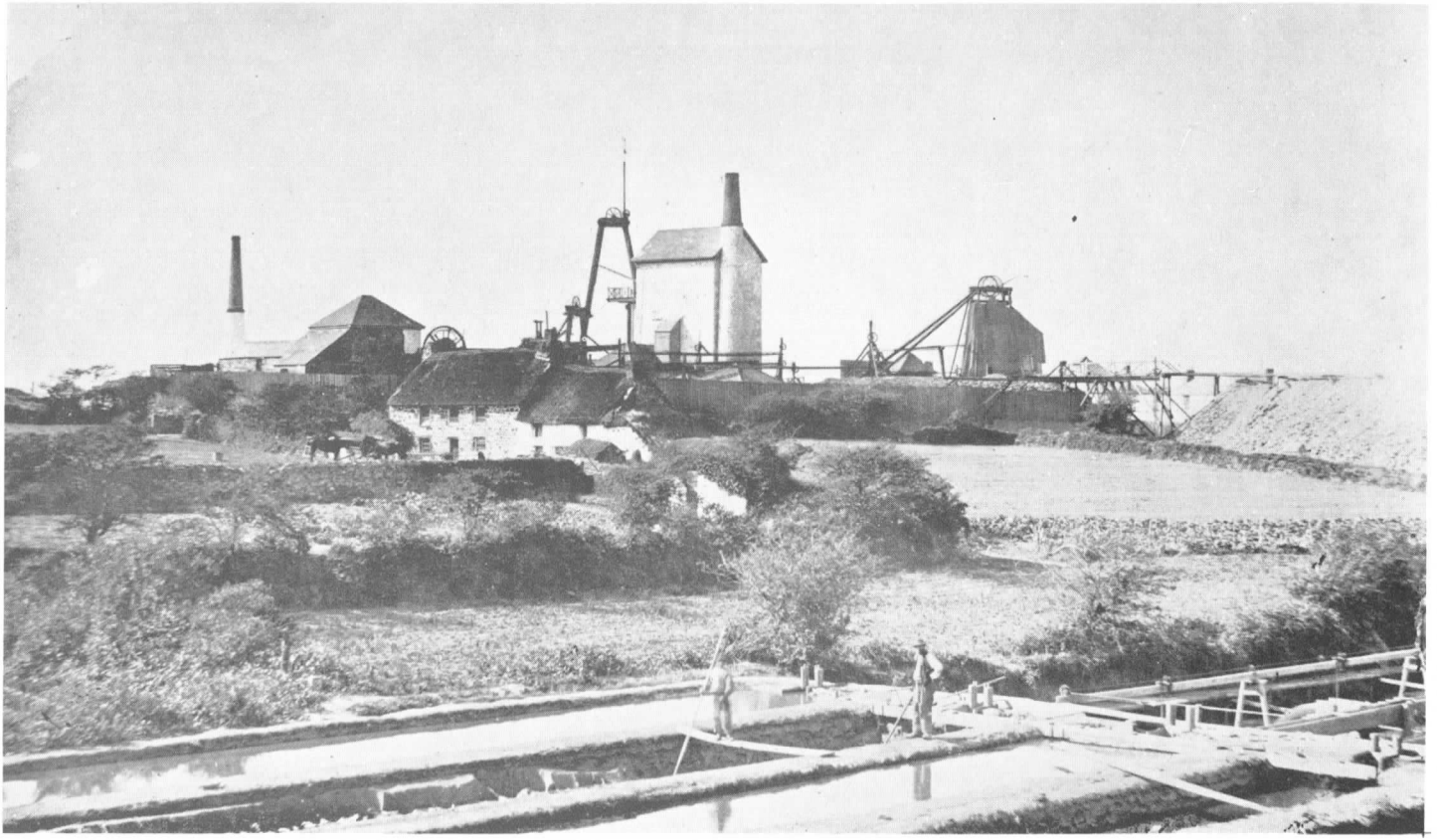
supplied irrigation engines to the Pasha of Egypt and pumping engines to Turkey. Their crowning achievement was the manufacture of giant pumping engines for the Dutch government in the 1840's, for draining Haarlem Meer. These engines, the world's largest in their day, were concentric compounds, with cylinders of no less than 84″ and 144″ diameter. One of the latter was found, after casting, to be faulty and this massive piece of iron (weighing almost 25 tons) was later set up beside the road by the Foundry. Its size can be gauged from the 'set piece' opposite, with a pony and trap accommodated within it.

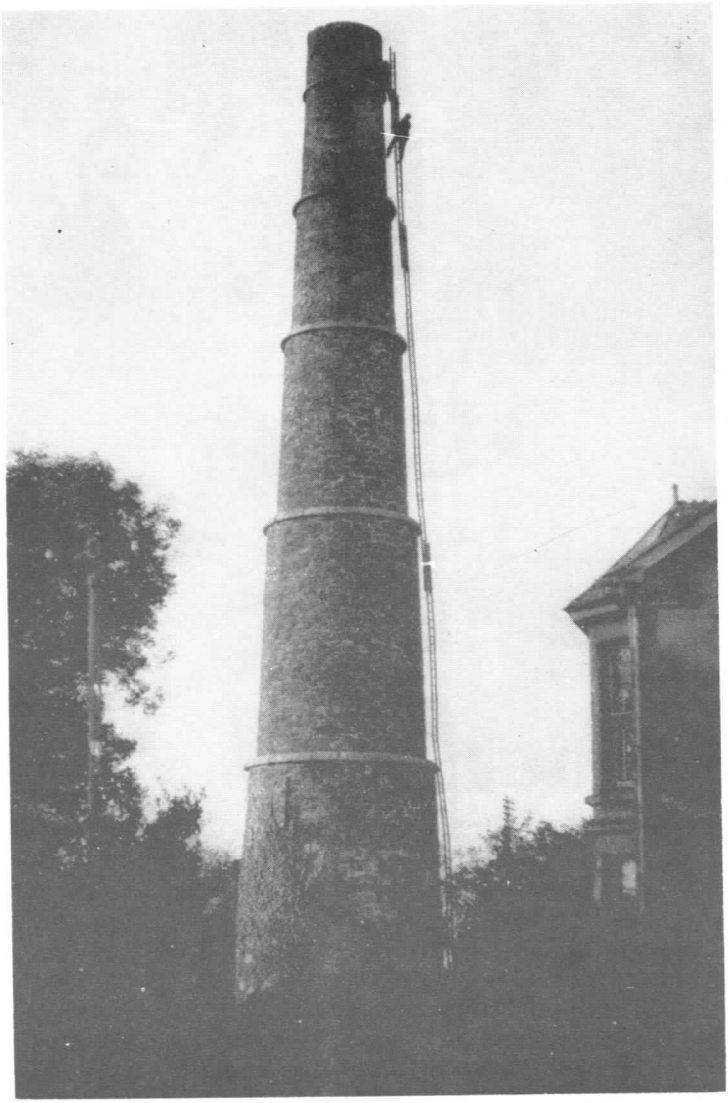
Harveys were timber and general merchants as well as carrying on a most extensive trade linked to the mines. They were also ship owners and the proprietors of Hayle harbour. At first the latter was in joint ownership with the Copperhouse Company, and law suits between these two rival concerns were frequent, Hayle being the most important mining port in west Cornwall. Copperhouse Foundry closed down in the 1870's and even Hayle Foundry, despite its extensive foreign trade, was seriously affected by the mining depression after that date. In 1885 the company decided to extend their interests to include iron shipbuilding and thus make better use of their capacity. They turned out numerous tugs and other small craft, including some for use on the Rhine, whilst their largest venture was a tramp steamer of no less than 3,800 tons, for Liverpool owners. This vessel, the s.s. *Ramleh* (illustrated on a previous page) was easily the biggest craft built in Cornwall But Harveys' essay into shipbuilding on a large scale was not a success: it was an industry in which there was fierce competition and the company was handicapped by the size of vessel it could construct at Hayle, where silting was a recurring problem. There was also trouble with unionism which the individualistic proprietors of the company were not

prepared to tolerate. In 1900 the foundry and shipyard were sold off, with Harveys continuing the merchanting and shipping sides of their business. Today they continue as timber and fuel importers, builders' merchants, and still are owners of Hayle as a harbour.

Above: The dressing 'floors' at South Frances Mine, near Camborne, about 1880. The preparation (or dressing) of tin ore was a long and complex process involving various stages in its preparation ready for selling to the smelters. Numerous women and children were employed in this, until the later years of the industry when self-acting—the Cornishman's term for automatic—machinery was introduced. South Frances was one of several mines to the south of Carn Brea which were originally worked for copper and later, in the 1870's, began to produce tin, primarily exploiting the Great Flat Lode. The surface remains of the mine and of the adjoining West Basset and Basset Mines, are outstanding today in being so little disturbed since abandonment.

Opposite: A view of South Crofty Mine, at Pool, in the 1890's. This shows the white-washed house containing Palmer's sixty-inch pumping engine and to the left a small single-storey building housing a horizontal whim, of which the winding drum can be seen. The wooden structure to the right covers the headgear and landing brace (platform) of another shaft. The thatched cottage is said to be the birthplace of Richard Trevithick Junior, the engineer.



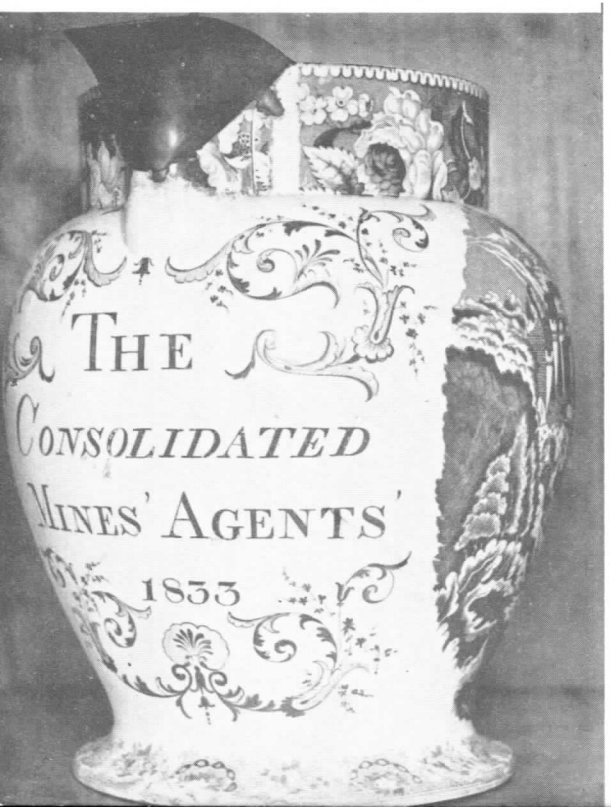


One of the best known industrial monuments anywhere in west Cornwall must surely be Pednandrea Mine stack in Redruth. Originally this stepped structure was 140 feet high, built of killas (clay-slate) except for the four topmost sections—later removed—which were of brick. It served the boilers feeding the successive seventy-inch engines which carried out pumping at this mine; the first from 1825 to 1827 erected by Arthur Woolf. This stack, close by the terminus of the old Redruth & Chasewater Railway is now all that is left of Pednandrea Mine.

The most interesting mineral railway in Cornwall was the Redruth & Chasewater Railway built in 1824, which ran from Redruth through Carharrack and the main copper mines of Gwennap, down through Bissoe to the newly formed port of Devoran on Restronguet Creek. There was a branch from it at Lanner summit and another (proposed but never completed) to Chacewater. The line was horse-worked up to 1853 when three locomotives were put into service, working the line until its closing in 1915. The railway lost one of its principal sources of traffic, copper ore, after the slump of the late 1860's after which date mining in Gwennap was never widespread. This was financially disastrous for the line which had hitherto been a profitable undertaking. Although coal (for mine engines, household use, and for tin smelting) continued to be carried up the line in considerable quantities each year, the Redruth & Chasewater had a very threadbare existence for the last forty years of its career.

The massive granite sleeper blocks to which were bolted the rails are still in position on many parts of the route, one row being visible here on the embankment where the line crossed the Bissoe valley near Twelveheads. Stone sleeper blocks had the advantage that they were indestructible, even though buried, and unlike the usual wooden cross sleepers, left a smooth central path for the horses working the line. In all, something like one and a half million tons of ore and two million tons of coal passed up or down this stretch of line, one which many passers-by might now fail to notice. At the far end of this embankment, up trains—usually laden with coal—were divided. Severe gradients began here and trains were split in two halves for subsequent upward working.

Not all the relics of Cornwall's industrial past are to be found in the field. In the County Museum at Truro are displayed many and various 'artefacts' such as miners' dials, tin ingots, smelting marks, models of mining machinery, etc., etc., which bring industrial archaeology to life. Illustrated here is a superb set of copper miniatures of the tools—picks, hammers, gads, axe, shovel and borers—used by a Cornish miner in the last century. Below is a beautifully decorated Staffordshire pottery jug used for holding ale or punch for the agents (captains and managers) in the count-house of Consolidated Mines in Gwennap. Dated 1833, it is a valuable relic, recalling the heyday of what were the Duchy's greatest copper mines and of the once famous dinners for which count-houses were known.



Below: another count-house relic of the past, on display at the County Museum—a graceful ewer from Levant Mine at St. Just.

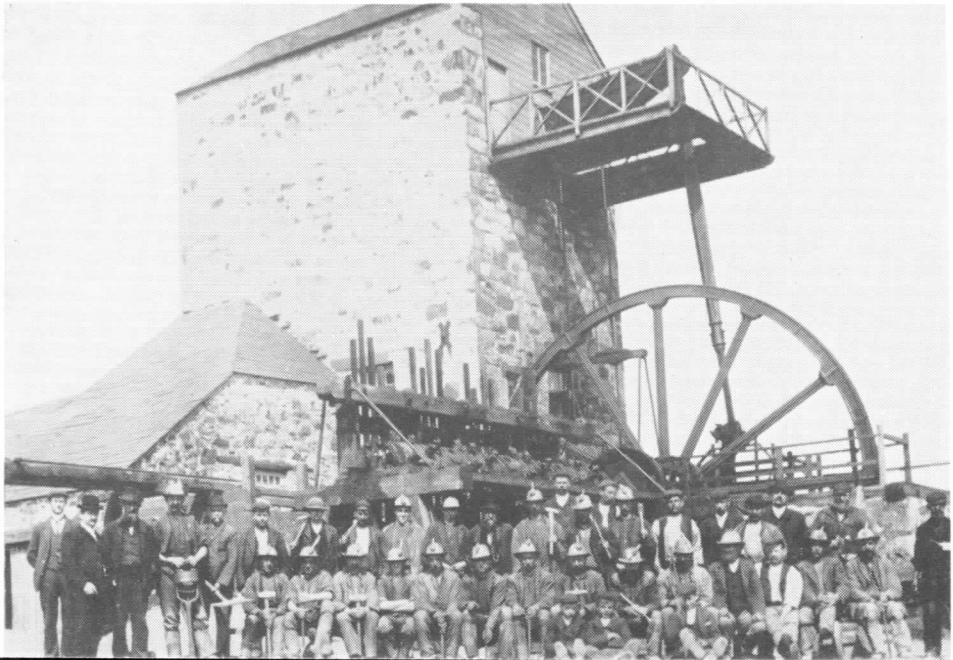
The engine-house at South Phoenix Mine, converted to a dwelling house.

After a mine was abandoned and became derelict, its surface buildings were frequently sold for demolition. All the slates, window-frames, timbers and other accessible brickwork and lighter masonry were removed. Thus on most mine sites all that remained was the massively built shell of the engine-house; even boiler-houses, being of lighter construction and single storey, were removed. A few of Cornwall's empty engine-houses found other subsequent uses, usually as farm out-buildings or in a few cases were converted into dwellings. Two at least are lived in to this day, at Porthtowan and near Terras in the Fal valley. The engine-house illustrated here is at South Phoenix Mine near The Cheesewring on the moors north of Liskeard. Built in 1853, this three-storey structure at first contained a fifty-inch engine (built at Tavistock) but was subsequently converted to form mine offices and stores during a later re-working of the mine. Later again it became a dwelling house. The open end of the 'bob' wall at the rear (where the beam or bob of the pumping engine 'emerged) was built up, adding flues in this wall and fireplaces at the same time. The three chimney pots of this conversion are visible. Presumably the kitchen and parlour were on the ground floor where the cylinder once stood, with bedrooms on the second floor (known to engine men as the middle chamber) and the third floor (or bob loft). From the bedroom windows of the old bob wall end, one could look straight down into the depths of the engine shaft—which doubtless served to take also all the domestic drainage.

Opposite: The several engine-houses on the headlands at the end of the fine stretch of sands north of Perranporth were notable landmarks, familiar to all who knew this part of Cornwall in the pre-war years, which fell victim to what now seems needless demolition during the early years of the war. Penhale was one of the mines here, working a lead lode which crosses Ligger Point and which has been worked at intervals since the eighteenth century with but little success. The larger house contained a sixty-six-inch engine (erected here in 1868 and removed to a mine near Camborne in 1879) whilst the twenty-four-inch winding engine can still be seen in the smaller house beyond. In one of the earlier workings at Penhale the ore was shipped off from the exposed Hoblyn's Cove immediately to the north. Beyond, on Penhale Point itself, formerly stood the striking engine-house of the sister lead mine of Wheal Golden, also a victim of military demolition.

Below: Midway along the coast road that runs from St. Ives to St. Just stand the remains of Carn Galver Mine. They lie close beside the road on the seaward side, beneath the boulder-strewn slopes of Carn Galver itself. This photograph of the mine was taken sometime late in the last century and shows the twenty-inch winding engine with flywheel and cage (or winding drum), the house for the forty-inch pumping engine (centre), and a stack which probably served the accompanying stamps engine. All these were erected in the early 1870's, the last main period of working of this tin mine.

This group of mine workers, each holding a particular tool of his trade—engine-men, shaft-sinkers, pitmen, tributers, tutworkers, etc., etc.—is posed beside the stamps engine of Ventonwyn Mine, near Sticker, in or about 1907. The bob of this rotative engine, its sweep (or connecting) rod, and the spidery flywheel are typically Cornish.



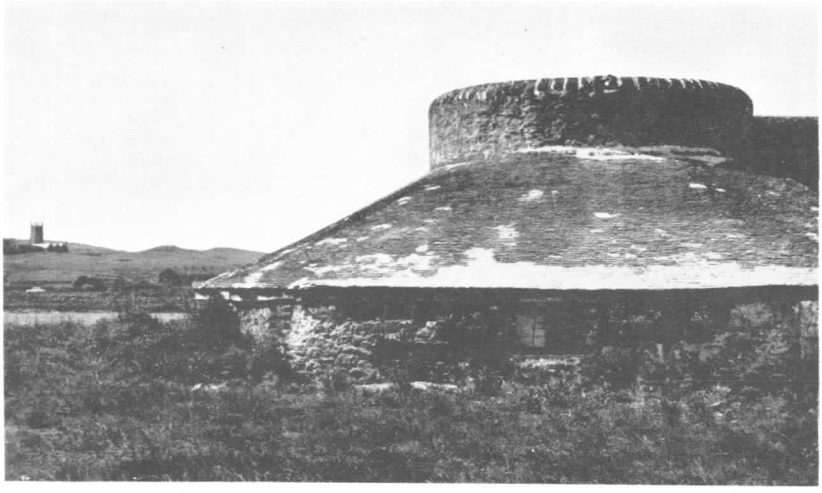
The little port of Charlestown, near St. Austell, is an entirely man-made haven dug out of the open cliffs at a place originally named West Polmear. The name Charlestown comes from the man who projected the harbour here, the local landowner Charles Rashleigh. John Smeaton, the celebrated civil engineer, constructed it, a seven or eight year task commenced in 1791. Inner and outer basins were excavated, with lock gates to enable vessels to lie afloat at all states of the tide. The entrance was protected by a small curved pier and warehouses, cottages, and a shipbuilding yard were also provided. Throughout the nineteenth century, Charlestown harbour was a busy one, crammed to capacity more often than not. Apart from general trade and imported coal, copper ore was shipped off plus a steadily rising tonnage of china-clay and china-stone. Later this latter trade became the *raison d'etre* of the port.

In this view, taken shortly before the First World War, two steam coasters and seven or eight schooners and ketches crowd the outer basin. On the left can be seen two of the gravity shutes provided for loading clay on the east side of the harbour.

Several factors brought about the decline of Charlestown, including the growth of the competing ports of Par and Fowey which had railway connection with the clay producing district. Its severely restricted size also rendered it usable only by small coasting craft such as schooners which were ousted in the 1920's by larger steam powered coasters.

Of Cornwall's various ports which came into existence to serve the mines, Trevaunance was one of the most remarkable. It lay on the open north coast, at the mouth of Trevaunance Coombe, below St. Agnes, and a pier was first built here by the local Tonkin family early in the seventeenth century. As might be expected by those who have seen the fury of winter gales on this exposed shore, open to the Atlantic, its history was one of repeated storm damage and rebuilding thereafter. After something like four successive structures had been washed away a more enduring harbour was built in the closing years of the eighteenth century. This had two short protecting arms, enclosing an area of water sufficient for half a dozen coasting vessels to lie there in something approaching safety. The principal difficulty was in access, for these piers lay directly beneath the cliffs with no easy approach whatever from the landward side. A long inclined shoot was used to load ore downwards from storage hutches on the 'plats' above, whilst for access by foot steps led down the cliff face. Inward cargoes were more of a problem and had to be laboriously raised by horse-worked windlasses projecting from the cliff. This archaic mode of unloading vessels was used throughout the nineteenth century, indeed to the end of the harbour's life soon after the First World War. What would have been a most interesting survival and a considerable tourist attraction, had it lasted to the present day, was damaged by storms and both arms have now disappeared beneath the tides for ever.

Arsenic was a by-product of tin mining which became of importance after about 1870. Cornwall, together with the mining district in western Devon, produced a very large tonnage of this deadly substance each year thereafter. Much of the ore mined in the West Country contained arsenical impurities. Before it could be sold to the smelters, these impurities were driven off in calciners or roasting ovens, and condensed in long zig-zag 'lambreth' flues. The purpose of these latter was to present a large surface area in which the condensate could be trapped and prevent it being carried away into the atmosphere. Nevertheless a lot of arsenic-bearing fumes were blown away from the stacks serving calciners, accounting for acre upon acre of infertile poisoned ground to leeward. The arsenic soot was removed from the lambreths periodically, as is seen here. The workman has cotton wool plugs in his nose to prevent inhalation of the dust; beyond this, few safety precautions were needed despite the extremely poisonous nature of arsenic—in fact the workers were reputed to become quite inured to it. In this state, the white arsenical soot was not ready for commercial use but had to be refined and ground, before being packed into large wooden casks for shipment. There were eight or more arsenic works in the West Country where arsenic was refined, the one at Devon Great Consols, near Gunnislake, being the largest. Another concentration of works existed at Bissoe, near Truro, in the Carnon valley. The remains of these extensive works can still be examined, whilst calciners and flues are also much in evidence on certain mine sites, notably Wheal Busy, near Chacewater; Poldice, in Gwennap; Gawton and Okel Tor, near Calstock. In the valley below Tuckingmill one can also see two 'blackened' arsenic stacks which formerly carried off the fumes from East Pool's calciners there.



Above: On Cornwall's acid soils, lime was a necessity for successful agriculture. Although shell sea sand was used in very large quantities, limestone was burnt in numerous kilns up and down the coast and along the innermost recesses of the estuaries. This is one of a pair of circular type at Carnsew Quay, at Hayle, owned by Harveys. Below: Once quite commonplace, but now rare; a powder-house which forms the sole remaining building on the site of Shepherds United, an old lead mine in the parish of Newlyn East, near East Wheal Rose.

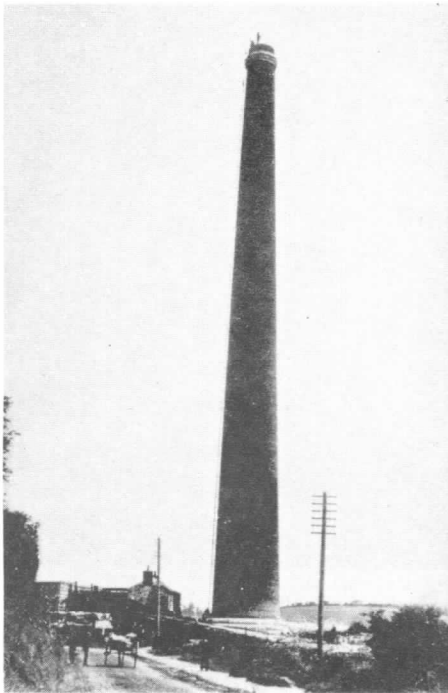
Chyandour smelting works, Penzance

Calenick village and smelting house, near Truro

Tin smelting was, like tin mining, an industry found nowhere in Britain outside Cornwall—except just over the border in Devon—until this century. Stannary regulations laid down that black tin had to be 'whitened' (smelted) in the Duchy and as a result this distinctive branch of metallurgy flourished here and nowhere else. Smelting houses existed in a score or more of places, with the chief ones situated near Penzance, Hayle, Truro, Redruth and St. Austell—most of these towns being appointed ones for the old coinage process. Chyandour and Trereiffe at Penzance; Treloweth at St. Erth; Angarrack near Hayle; Carvedras and Trethellan in Truro, were among the best known of these houses in the nineteenth century.

In contra-distinction to the older blowing-houses which used a small form of blast furnace and charcoal fuel, reverberatory furnaces were used for tin smelting proper, using coal as fuel. A typical house (or works, to use the term more usual today) such as Chyandour, had four furnaces,used for both smelting and the subsequent refining processes. This works (illustrated opposite) was closed in 1912, a year or two after this photograph was taken. Calenick smelting house, near Truro, was equally old established but closed down in 1891 during the contraction of the smelting industry in parallel with that of mining. The clock tower of this old works is still to be seen in the village, a relic of one of Cornwall's most famous smelting houses.

Lead smelting in the county has always been very subsidiary to that of tin, and carried on quite separately. Two works alone survived for any great length of time; one, owned by the Michell family of Truro, at Point on Restronguet Creek, (established in 1826 and disused after 1873) and another at Par, owned by J. T. Treffry, worked from 1845 to 1885. The extremely tall stack of the latter works is seen here (below), 225′ high and reputed to be constructed of bricks made from the mud dredged from Par harbour which Treffry also owned. Par stack was one of the landmarks around St. Austell Bay; it was felled in 1907, largely as a result of fears about safety due to the vibrations emanating from trains passing at speed on the adjacent main line of the G.W.R.



Par stack,
about to be felled.

Rostowrack china-stone quarry (see opposite)

Since the decline of metal mining, the production of china-clay has become Cornwall's industrial mainstay. The whole area to the north of St. Austell is now completely bound up with this unique industry, producing either china-stone or china-clay—the latter being by far the most important. On the left we see Rostowrack china-stone quarry near Nanpean. This is one of the oldest in the district and has now been worked to almost 200 feet depth. Also worked by the same company is Rostowrack clay works, part of which is depicted above. The rotative (twenty-two inch) beam engine was used for pumping a clay-and-water slurry out of the pit, produced there by gigantic hoses, into settling tanks. It then went through various drying processes before being ready for sale—extensive coal-fired clay 'dries' being formerly widespread throughout the district. This particular engine, one of several dozen which once worked in the clay pits, was originally built in 1851 and like many another in the locality, started life on a metal mine.

Notable man-made features of the landscape of west Cornwall were the graceful railway viaducts designed by the great engineer, Brunel. Built of Baltic pine on tall granite piers, they looked fragile but were in fact structures of surprising strength. This is one spanning the Carnon valley near Bissoe, on the Falmouth branch of the old Cornwall Railway. In the foreground are the metals of the Redruth and Chasewater Railway, leading towards Devoran. This viaduct was replaced by a re-aligned all-masonry structure in 1932.

Opposite, above: The china-clay 'country' is not particularly rich in industrial archaeology for this is a fairly young and fast expanding industry which tends to obliterate the remnants of its past. In any large scale extractive industry keeping pace with the twentieth century, this is inevitable, as is self-evident in this aerial view of part of Hensbarrow Downs. In the foreground are Caudledown, Goonbarrow, South Goonbarrow, and other pits which were among the first to be opened up—whilst Caudledown began life in the eighteenth century as a tin work. The stacks of at least four old pumping engines and one dry are visible. The long deep chasm from South Caudledown to Goonbarrow (centre, right), now abandoned and full of water, was worked by several companies and their separate areas in it were marked out by boundary wires overhead.

Opposite, below: One of the very numerous smaller clay works was Treskilling, east of Bugle, one of several owned by a company engaged in paper-making. A relic of the past here is this two-cylinder horizontal winding engine with its attendant vertical boiler which have rusted away in the open for years since their shed was dismantled. This engine was formerly used for winding sand up the incline on the other side of the old tip. Note how this has become overgrown—except where eroded on the lower slopes by the run-off of heavy rains—the amount of growth being a sure yardstick to the age of these abandoned tips.

At Tregargus, near St. Stephen-in-Brannel, was a series of china-stone grinding mills worked by water power which have only recently ceased production. Tregargus and the adjacent Trevear quarries which supplied them were amongst the first in Cornwall producing china-stone, used as a pottery glaze. It was ground in large pans, using china-stone for the revolving runners in these, driven by bevel gearing from the wheel. Each of the latter worked four pans, two in each of the buildings to the left and right of the wheel as seen here. One of these fine overshot wheels has now been preserved by a recently formed society.

Another water-wheel in the china-clay district—the Carmears wheel, a forerunner of which operated the incline of that name on the Treffry tram-road. This standard gauge line, running inland to Molinnis, was laid in the early 1840's and was connected via the 1 in 10 Carmears incline with the head of the canal which ran thence past St. Blazey to Par harbour. 2871′ long, this incline negotiated a vertical rise of 325′ and was originally worked by a wheel thirty feet in diameter. In 1874 it was by-passed by the new line of the Cornwall Minerals Railway and subsequently the purpose of the wheel here was changed to grinding china-stone. It was dismantled during the Second World War but the nearby 'Luxulyan Viaduct' remains in the valley below as a monument to the memory of Treffry and his widespread industrial activities.

Recent views of two of the celebrated viaducts on the Cornish main line, as rebuilt towards the end of the last century from the original Brunel timber 'fan' structures. Above: St. Pinnock Viaduct in the Fowey Valley has 'Gothic' masonry piers and is 151' high; the steel girders seen date from 1882. Below: part of the seven-span Blackwater Viaduct close by the former station at Chacewater, east of Truro. Dating from the days of the West Cornwall Railway, it was rebuilt in this form from an earlier wooden viaduct; one of the old piers of the latter is just visible on the left.

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