

THE WIND AND WATERMILL SECTION
of
The Society for the Protection of Ancient Buildings

The objects of the Wind and Watermill Section are :

1. To stimulate the interest of the public in the preservation of wind and watermills.
2. To provide technical advice on questions relating to the repair of wind and watermills.
3. To make a detailed survey of wind and watermills as a permanent record with historical data of all mills in this country.
4. To encourage the craft of country milling.
5. To give financial help wherever possible.

The minimum subscription is 10s. a year, but donations are warmly welcomed and should be sent to :

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TIDE MILLS

PART TWO

by

REX WAILES

No. 3

S·P·A·B

2/6

PEMBROKESHIRE: The mill at *Pembroke* is situated on the Pembroke River on the bridge behind the castle (Pl. I); it is a five-storey stone and slate building which without doubt replaces an earlier mill. The interior construction is of pine from a wreck on the South Pembrokeshire coast, some of the timber is from the cargo and some from the ship itself, the ship's wheel now serving to control the sluice. The four pairs of stones are driven by a wood and iron undershot wheel 20 ft. diam. by 12 ft. wide with wooden buckets (see Fig. 5) mounted on an iron shaft 9 in. sq. It is served by a pond one mile long by about 150 yds. wide using fresh as well as tidal water, and when full giving a head of nearly 12 ft. It reached the limit of its output when it drove a 30 H.P. dynamo in addition to the stones.

Carew Mill is a stone and slate building situated close to the ruined Carew Castle on the Carew River. In appearance it much resembles Pembroke Mill six miles away, and replaces an earlier and very much smaller mill of which an old print exists. There are two undershot wheels of wood and iron with wooden buckets on iron shafts 9 in. square; both are 16 ft. diam., one being 5 ft. 6 in. and the other 7 ft. wide (see Fig. 6). They each drive 3 pairs of stones on the first floor and are fed by a pond of 25 to 30 acres giving an 11 ft. head. Both this and Pembroke Mill are semi-tidal; they are said to have been built by some Frenchmen who came over to help Prince Llewellyn in his fight with the "wicked English" and are still called locally the French Mills.³⁹

ANGLESEY: Miss Lucy Williams writes:—

X
Felin Heli near Tre'go ("Tregero," "Treyrgoe," "Tregoe") is the property of the Hon. Lynulph Stanley, inherited from the ancient family of Owen Penrhos, Holyhead, whose documents form the Sotheby MS. Collection at the National Library of Wales. It was connected originally with the ancient house of Trigo (now a farm) in the parish of Holyhead, in Welsh "Caergybi," i.e. (St.) Cybi's castra. The actual mill is not standing, but part of the dams and culvert remain and Felin Heli cottage is still inhabited. The mill pool is seen as in 1817, but is now marshy. The building of the embankment for the Telford road probably made the sides at Felin Heli less effective. On a rock close to the cottage are the ruined walls of the oat-drying kiln where I found some blackened oats in the wall. It has not been working within living memory.

The two documents relating to Felin Heli in the Sotheby collection are catalogued as follows:—

1524. Dispute between John ap Res ap Ll. ap Hulkyn and Robt. ap Res and Wm. ap Ewnlli ap Ll. Lloyd concerning the mill dams called . . . melyn helu in Kaerkeby parish.

1657. Deed between (1) Robert Wynne of Treyrgoe esq. (2) Henry Lloyd of Bodwine and John Owen Penrhos Issa gent. Bargain and sale for six months of Treyrgoe and y Plas ymhenrhos y velin in Llanfawr and Holyhead and "the old" yr hen velin hely and melin Porth y Pistill in Holyhead.

Felin Wen is near Llanfair-yn-neubwll Church and formerly was connected with Plas Llanfair farm. The mill was built on a rock at the south side of the

³⁹per Mr. Ivor Philipps.

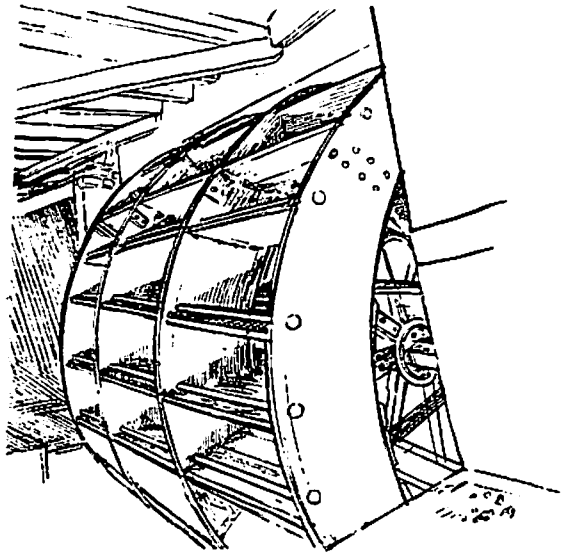


FIG. 5. PEMBROKE MILL, Water Wheel.

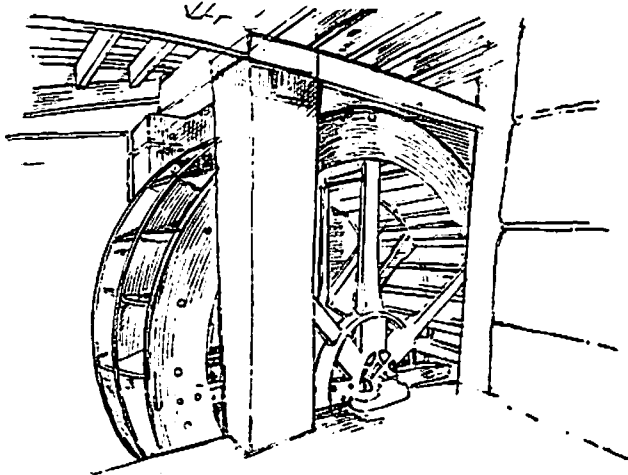


FIG. 6. CAREW MILL, PEMBROKESHIRE, Water Wheel.

creek, across which a rubble dam was built enclosing some acres of sea at high tide. The sluice and wheel were beside the rock and the miller's house, etc., close by, but detached. The mill was used for grinding corn till about 1870 and was worked day or night according to the tides. It was last worked by two brothers, one of whom acted as miller and the other tilled the land attached.

Through the courtesy of Mr. T. G. Owen, agent to the Penrhos estates, I have heard of the site of a former tide mill belonging to Ty Mawr Farm Llanfair-yn-neubwll which was worked by a tidal river till about 1770, when a neighbouring landlord built an embankment at the river's mouth to reclaim land and cut off the tides from the mill pond. In the 1769 survey the extent of Ty Mawr mill pool was 9 acres. The railway now runs across the site and there is no mill to be seen there.

There is a "Felin Heli" marked on the seashore near Port Dinorwic, Carnarvonshire, but I have no information about it.

CHESHIRE: The earliest reference to the tide mills at *Bidston* (in the Wirral peninsula), seems to be in 1759, when a notice appeared⁴⁰ of the sale by auction of "a large set of Tide Water Cornmills at Bidston, etc. . . . Also an Iron Slitting Mill situate and worked by the said Pool, etc." The mills were at the head of Wallasey Pool and at that time belonged to William Penkett, a wholesale and retail grocer. In 1745 there is a reference to his brother, John Penkett, slitter of iron at Bidston, but not to the mills. The corn mill had four 18 ft. diam. wheels and the pool gave a head of over 10 ft. The output of the mills was 250 quarters of wheat and 200 quarters of oats per week, the storage capacity was 1,600 bushels and the buildings were 36 yards long, 8 yards deep and four storeys high. A river float of 30 tons and a sloop of 15 tons were used for transport. The slitting mill was worked from the same pool by two 18 ft. diam. wheels. It had three double and three single rolling mills and two furnaces, and the capacity was 18 tons of rod iron and 5 tons of hoops per week. In 1777 an advertisement⁴¹ appeared to announce that "Bidston Mills are now working in all their branches viz.:—slitting, rolling and tilting of iron and steel, rasping and chipping of dyeing woods, manufacture of 'tobacco stems into Spanish' and grinding of corn.

"Bar iron, rod iron, hoops and rolled iron of all sizes sold at Peter Rigby's Warehouse North side of the Old Dock. Likewise dyeing woods rasped in the log."

In 1781.⁴² "Brice Grant, Slitter, late foreman to Mr. Wilson of Lymm, begs leave to inform the Public that he has taken and entered upon the Slitting Mill at Bidstone in Cheshire, which he intends to work in all its branches, etc." The mills are shown on Burdett's map of 1771. The date of closing and further details are unknown.⁴³ The area is now built over.

TECHNICAL DETAILS.

Broadly speaking the east and south-east coast mills are of timber, the south coast of brick and the south-west and west of stone. The largest and finest by far is Three Mills, Bromley-by-Bow and the smallest, Wacker Mill, Antony.

Water Wheels: There are three main methods of construction: the wooden compass-arm wheel as at Beaulieu (12 ft. 4 in. by 5 ft. 6 in.), the wooden clasp-arm wheel, the largest being at Wootton (about 24 ft. by 6 ft.), and the smallest

⁴⁰ Williamson's *Liverpool Advertiser*, 23rd Feb., 1754.

⁴¹ Williamson's *Liverpool Advertiser*, 10th Dec., 1777.

⁴² Williamson's *Liverpool Advertiser*, 7th June, 1781.

⁴³ *Trans., Hist. Soc. of Lancashire and Cheshire*, Vol. LXXVIII, pp. 111-116.

or twin racks and pinions with ratchet stops (see Figs. 10 and 11) may be used and these methods are the most usual. At Carew the rims fit on to tapers on the arms and are lifted up off them and canted over out of gear; while at Eling (Pl. II) one nut has a removable taper-dove-tailed segment of three teeth held in place by a pin.

Stones: In general the stones are situated on the first floor of the mill; but at Beaulieu (Pl. VI), Antony Passage and Wacker Mill, Antony, they are on hursts on the ground floor. Three Mills, Bromley-by-Bow and Eling have

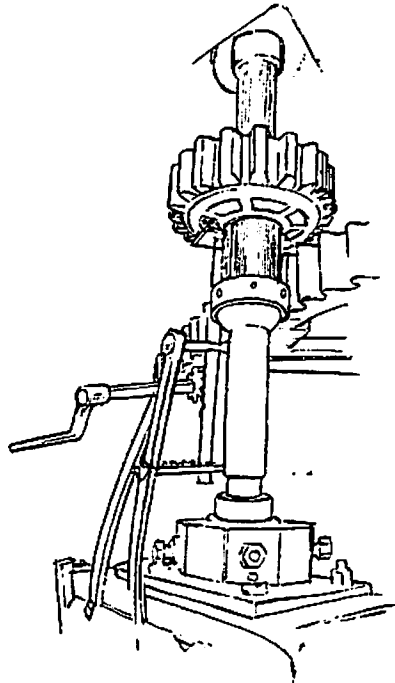


FIG. 9. WOODBRIDGE MILL, SUFFOLK, Vertical Shaft.

modern iron furnishings to some of the stones, the former of Fairbairn's design and the latter by Armfield; at St. Osyth one pair of stones has a home-made wheat cleaner incorporated in the hopper (see Fig. 2).

Sack Hoists: The greatest ingenuity has been expended on the sack tackles. In most cases the slack belt type is used and the drives to it are varied. A crown wheel on the upright shaft is the most usual method (Pl. VII); compass arm wheels are to be found at Thorrington, St. Helens and Wootton, and face gears (called "twistgears" in Cornwall) at St. Osyth (Pl. VII) and Wacker Mill, Antony (Pl. VII). A face gear at Beaulieu has been abandoned; to supplement the remaining power hoist, a hand hoist has been substituted. The winding drums are 6 in. diam. on the first floor and 17 in. diam. in a lantern in

the roof (see Fig. 12). The latter is, appropriately enough, the lantern pinion once used with the face gear; the sack drum is 5 in. diam. At Stambridge a hand hoist is also to be found; it consists of a wheel 5 ft. 6 in. diam. round which the handrope goes, while the sack chain drum on the same axis is 6 in. diam.; it is known to the men as the "mandraulic." Pembroke has a modern

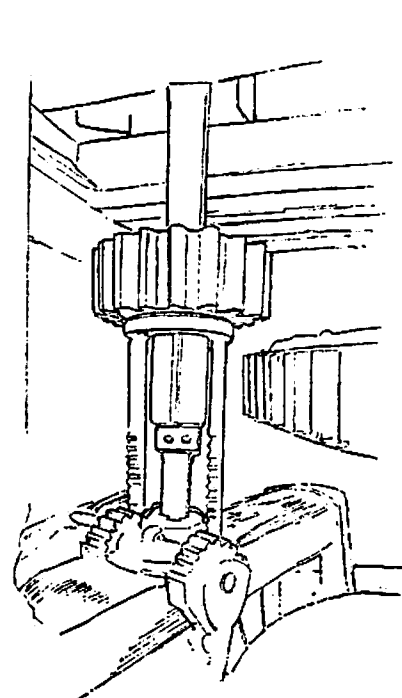


FIG. 10. WOOTTON MILL, ISLE OF WIGHT, Stone Nut.

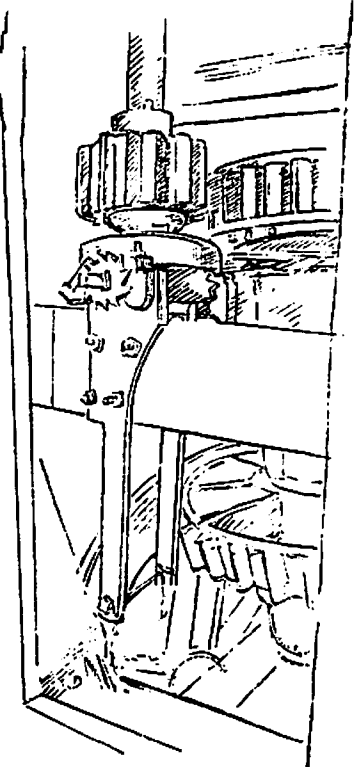


FIG. 11. ST. HELEN'S MILL, ISLE OF WIGHT, Stone Nut.

method: the sack chain drum has a V pulley and throws over on one side to a male V friction driving pulley, and on the other side to a male V brake lever. The most curious of all is at East Medina Mill: here a single dog on the top of the upright shaft engages with a single dog on the bottom of a vertical winding drum. A cord raises a counterweight and lets the drum down into engagement. Another cord releases a catch and allows the weight to fall and raise the drum out of engagement. There is an automatic knock-off in the roof worked by the sacks themselves.

The history of tide mills has yet to be written and it is in the hope of furthering that end that this incomplete collection of notes has been put together.

The paper was illustrated by upwards of 80 lantern slides.

The author acknowledges the great help he has received from many quarters in preparing the paper. Much of this help is acknowledged in the text but he would like to add the names of the late Mr. Ethert Brand and Mr. F. G. Perry. Mr. T. B. Hennell who prepared the drawings illustrating the text has added a distinctive touch. The Editors of *Engineering, Milling and Power Transmission* are thanked for the loan of blocks used in the plates, made from the author's photographs.

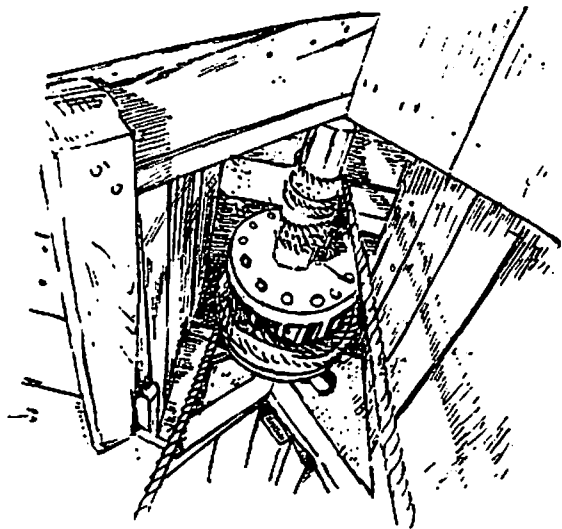
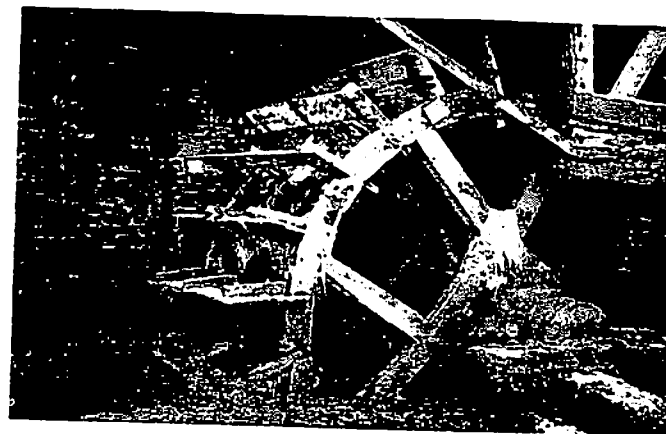


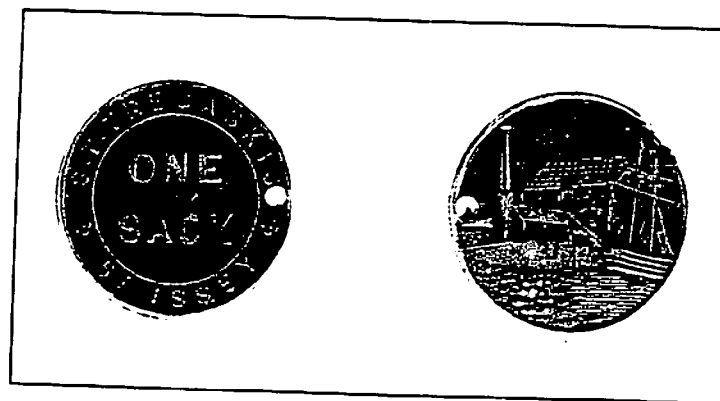
FIG. 12. BEAULIEU MILL, HANTS., Sack Hoist.

DISCUSSION.

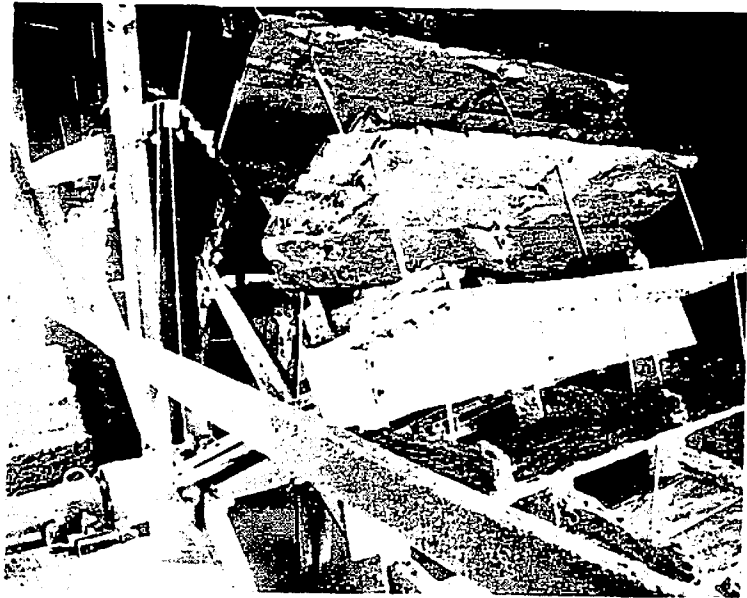
MR. W. M. M. SHEPPERD, Chief Engineer, Three Mills Distillery, speaking of the tide mills at Bromley-by-Bow, explained the method of operation. He pointed out that the sluice gate was controlled for the amount of water that was required. The wheels ran about 16 r.p.m. which varied with the tide, the chief trouble being with the tail water especially at flood tide. The working head was usually from 10 to 12 ft. They reckoned to get from 10 to 12 h.p. on each stone. They made all their gearing themselves, using Ilex oak—an evergreen British oak which would stand the wet. There was great trouble in getting it; and they had to search around for the trees. The tide would run



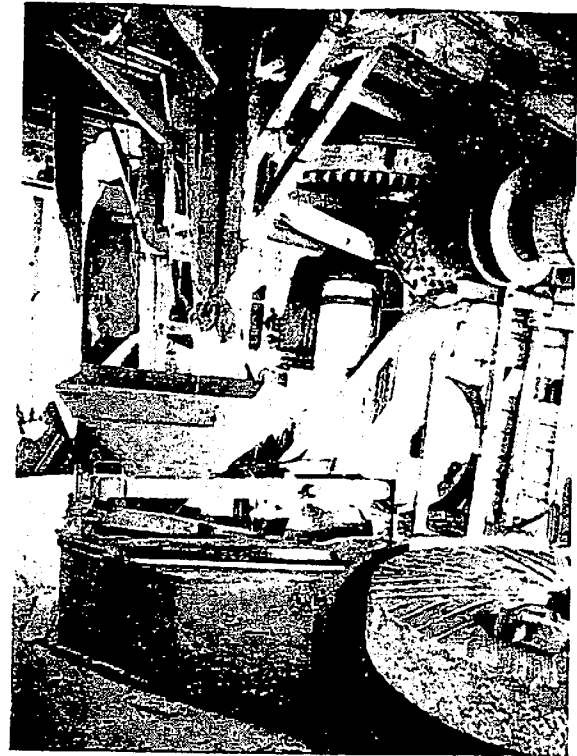
BIRDHAM MILL, SUSSEX, outside wheel.



ST. ISSEY MILL, CORNWALL. Sack token.



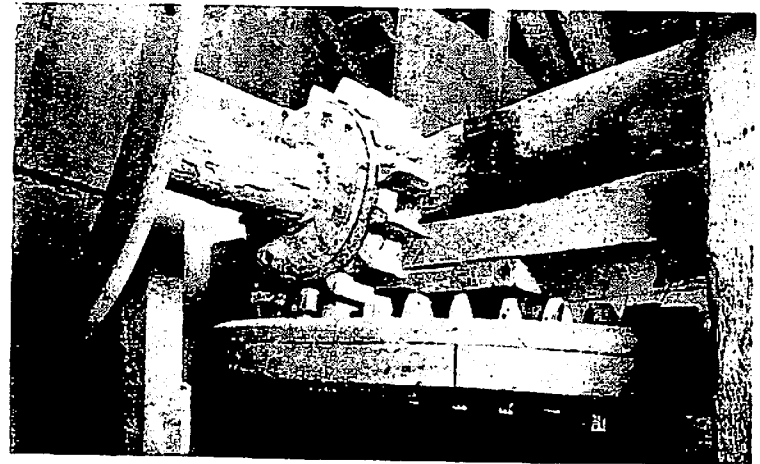
EAST MEDINA MILL, WHIPPINGHAM, ISLE OF WIGHT.
The water wheel.



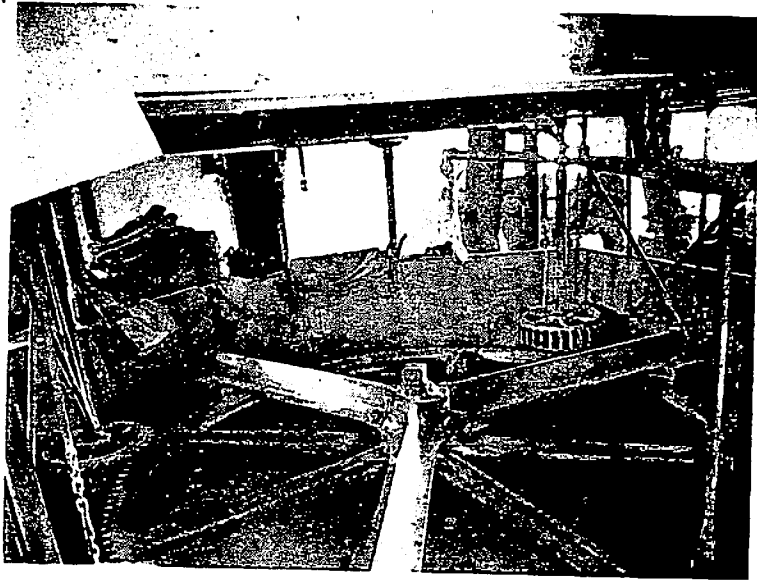
ST. OSYTH MILL, ESSEX, showing sack hoist drive, a pair of stones and a runner stone turned over for dressing.



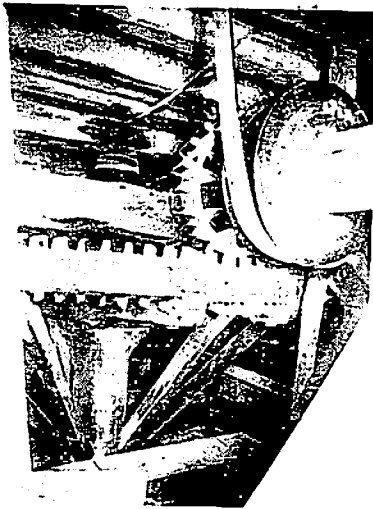
BEAULIEU MILL, HANTS., showing the stones on a hurst with the great spur wheel below and the upright shaft between.



WACKER MILL, ANTONY, CORNWALL.
Sack hoist drive utilizing a "twist" or face gear.



PEMBROKE MILL.
Great spur wheel and stone nuts.



WOODBIDGE MILL, SUFFOLK.
Sack hoist drive.

the mill for 7 to 8 hours. The water could not be used both ways; as soon as the tide had turned the gate closed. There had to be about 2 ft. difference between the head and tail. The pond never got so low as the tail. It had to rise from 6 to 8 ft. The minimum head was from 12 ft. 6 in. to 5 ft.—the difference between the highest and the lowest. It was not allowed to run slow.

Replying to DR. R. S. CLAY, Member, who asked, "Supposing you go on till it reaches a height of 5 ft.; it doesn't come up through the same opening?" Mr. Shepperd replied that it did. In the 1928 flood, he continued, they could not use the wheel. They got two periods of 7 hours in the 24 and worked round the clock, the periods varying according to the tide. It also depended on the amount of work they had to do. Principally they ground maize, barley and wheat. Asked whether some of the incoming tide could not be used, Mr. Shepperd stated that when the tide came up to three-quarters it would be level with the down-coming water. There were five rivers there, and necessarily a great deal of water was required. They had cast iron shafts, he added, and when they broke they put in steel shafts. He had been down to the foundations of the mill which was built on timber; the whole mill rested on that and they were the original piles. The piles were still in perfect condition. Some old rods were pulled out in 1933; they were in the front of the mill but that was all dismantled and gone. As to lubrication, there were covers over the bearings and they put in heavy oil.

MR. E. KILBURN SCOTT asked if they employed their own mill-wright to cut the teeth.

Mr. Shepperd replied that they did, and that there was no trouble when a breakdown occurred. They employed four ordinary carpenters. The length of time that the teeth lasted was from 40 to 50 years. As to the age of the wheels, the oak arms must have been there at least 150 years. Some of the floats were of wood, which were finished off with narrow pieces, elm boards being used. They had no governors on them; they were all controlled by the men by the sluices. He did not think that a governor on the water wheel would be of much use. The man had to be there to watch the grinding to see the result. He added that if any Members would like to visit the mill at any time they might do so; it would give the owners great pleasure to let them see it.

MR. A. TITLEY raised the question of the age of tide mills. The Romans had the reputation of having introduced the ordinary water wheel, and if that were so they might also have introduced the idea of impounding the tide-water on the coast. He did not think that any people in this country were likely to have originated the idea up to the 15th or 16th centuries.

Many of the water mills mentioned in Domesday were upon merely trickles of water. Some of the mills perpetuated the place names. There were many mills mentioned in Domesday which now existed—the names, at any rate—in the form of large works. Several mills appear to have taken fresh water as well as salt water. Perhaps a small country mill situated on the coast grew into a tide mill in course of time; as more power was wanted the power of the tide was added. That seemed to him to be an interesting line of investigation. In one case, we are told, an attempt was made to couple a gas engine to a water mill. Was the man who did this an engineer? He (the speaker) could not imagine a gas engine with hit and miss governing agreeing with anything, though he

had known a beam-engine work amicably coupled to a water wheel for many years. He (himself) had had to scrap this engine and put in a direct current electric motor in its place. It was an attractive proposition because when the water wheel could not give enough power the deficiency could be supplied by electricity. On the other hand, when there was a flood the motor became a generator and electricity was pumped back into the mains. It was a pretty proposition but he never had the opportunity of carrying it out fully.

MR. A. STOWERS noted that several times the area of the mill pond was given at 30 acres. Was there any relation between the area of the pond and the power or the size of the mill? Probably at the present time it would be difficult to measure up the areas because of the alterations which had since taken place. Mention had been made of Millbank at Southampton. Was Millbank in London the site of a tide mill?

MR. WAILES said that Millbank at Westminster perpetuated the name of the old windmills which Milton was taken to hear by his daughter when the poet was blind. As far as he knew the pond acreage was pure coincidence but he had not gone to the length of verifying by measurement the figures given to him or quoted.

Mr. Wailes remarked that as the coasts were the first civilized parts of the country a tide mill seemed to be the most obvious thing. As soon as they had sufficient ability to build anything like a mill they would discover what sort of tide there was. He thought it was probable that many of the mills had become tide mills in course of time after starting as mills driven by fresh water only, which were stopped when the tide rose. Their origin, there was reason to believe, was fairly early. Formerly, they were not distinguished as tide mills; they were called simply water mills.

CORRESPONDENCE.

MR. RHYS JENKINS, Past President, wrote:—Mr. Wailes concludes his paper by describing it as an "incomplete collection of notes," but he has found a far greater number of mills than I expected he would, and he is to be congratulated. No doubt as time goes on information about other mills will turn up, but it is certain we shall never be able to make a complete list of tide mills in Great Britain.

The nature of the mill at Dover mentioned in Domesday Book has been the subject of a good deal of discussion. I have long thought it must have been a tide mill, although one felt that the date was early for such a contrivance. Now, however, that the author has given us Woodbridge Mill with the date 1170, reason for doubt seems to be removed.

Turning to the London mills. The Templars were a powerful body, but I think they were compelled to give up their mill on the Fleet River because the impounding of the tide water along the valley was found to be a nuisance. Possibly it was after this that the Temple Mills on the River Lea were built—these were important mills but their history has not been worked out.

As to London Bridge Waterworks—it was stated by Henry Beighton that the gear for raising and lowering the water wheels was but seldom used, as the wheels would run in almost any depth of water, and in either direction according to the current.

I had been hoping that the author's research would have revealed more information about the Plymouth mills, in particular about the two paper mills set up by Denis Manes about 1684. My own search, years ago, led to nothing.

At the foot of page 16 we read that:—"The mill eventually closed as men could not be got to follow the tides and work round the clock." This statement points out one of the difficulties in the utilization of the power of the tides. I remember, forty years or so ago, discussing the matter with the miller and his men at Walton-on-the-Naze. They seemed to have no particular objection to a timetable that varied from day to day, but then they had grown up to it and had no experience of any other.

MR. J. BRYANT, the Colchester millwright, wrote regarding Barrow Hill Mill, Essex:—"The structure of the mill stood on a brick foundation and was timber-framed, weather-boarded and painted white. The water wheel was 16 ft. diam., 8 ft. 6 in. wide, with wooden floats and drum boards. The shaft was oak, 22 in. square, with wing gudgeons in either end. The driving machinery was as follows:—Pit wheel on shaft driving into wallower on upright shaft. Four ft. higher was the spur wheel driving four stone nuts. These drove four pairs of French burr millstones 4 ft. diam.; but they seldom drove but three pairs at a time as they generally had one pair up to dress them. When we did the mill up 60 years ago we made and fixed a silk dressing machine and elevators for carrying meal and corn to the machine and different bins. Previous to that everything had to be hoisted by sack chain and the flour was dressed through a bolter. This did splendid work and drove about 200 revs. You could get four sacks of fine flour through in an hour, 20 stone to the sack. The tide gates were built of solid pitch pine and cross boarded. They would open full width to bank on either side and close to V-shape when the ponds were full and they did not leak a gallon a tide. I have never seen any other system and I am certain there is no other plan can beat them. As to the ponds there were two, a large one about 80 yards long and a smaller one. The water had to flow under the roadway through a brick arch. This roadway was made to allow waggons and tumbrels to cart manure and chalk for the farmers to put on the land. I have seen three barges up at a time. They had to pay 7/6 for toll each time, or if loaded back with hay or straw 15/-. This used to be a help to the miller. The measurements of the ponds were about:—

large one 80 yd. x 40 yd.

small one 30 yd. x 20 yd.

On the side of the small pond was a good smock tower mill driving 3 pairs of stones 4 ft. diameter, French burr. The spur driving gear was very awkward. It was overhead and the spindles were crooked 7 ft. long, so when you took a pair of stones up for dressing you had to stand on top of the runner and lift the spindle with nut on right out and lower it on to the floor."

Of Fingringhoe Mill, Essex, Mr. Bryant wrote:—"About 45 years ago I put a new pit wheel on which weighed 30 cwt. and it ran splendidly and balanced. You will understand there are two shafts through, coupled together with a claw clutch, one about 12 ft. and the other about 9 ft. Formerly there was only one shaft and 1 wheel at the northern end and they drove four pairs of millstones. Afterwards the 9 ft. length was added and another pit wheel fixed, a hurst built, and three extra pairs of stones added. This is the length

that tilted up owing to the clutch being half worn out. It could not possibly tilt the water wheel as it weighs 6 tons. Another item: some few years ago another firm put a new pit wheel on weighing 2 tons and this was the cause of the trouble. I had a long job offered me, so was not able to fix this last wheel. I do not know if you have noticed, but if you get gearing from the north it weighs 25 per cent. more than it does down in East Anglia. I have proved it for years. I got my wheel made at E. R. & F. Turner, of Ipswich, and they turn out a splendid clean casting, but they have done away with their moulding machine now owing to space required for other work and lack of orders for wheels."

MR. F. W. H. SHEPHERD wrote:—"Salt Mill, New Fishbourne, had a friction-driven hoist. Arranged on the star morticed arms of the crown wheel was a wooden cone about four feet in diameter, which engaged a smaller elm cone on the end of a 6 in. wooden barrel. The bearing of the cone end of the drum was carried on a hinged beam which was held out of contact by a weight. The hoist rope connecting to a compound lever arranged to bring the cones in contact. It was easily worked, the hand rope being held even to the tipping into the bins. On release, if the chain halter was off the sack the chain was sufficient to run the drum back and land on the ground floor. The wallow wheel at Salt Mill was cast iron morticed and fitted with beech cogs, the pit wheel being cast iron. The mortice wheel was fitted by my family (but just when I do not know), as I remember seeing the pattern. This was fitted, I think, to save the pit wheel teeth, which appeared to have been worn probably by an original rough cast iron toothed wheel."

MR. H. DONEY, the last owner to work St. Budeaux Mill, wrote:—

"With regard to your query as to paper mills in Plymouth, I have gleaned the following:

In Whitfield's *Plymouth in Times of War and Peace* I find but one reference to a mill and that refers to Millbridge Mill; this was accompanied by an excellent photograph of the mill taken just previously to its demolition.

In Bracken's *History of Plymouth* there are a number of references to mills, and I have extracted the following:

It was Sir Pierre Edgcumbe who was responsible for building Millbridge Mill, and certain corn Mills upon the said work in 1525 across the old Stoke Damerell Fleet.

"Sir Fraunces Drake knight beganne to bring the River Mewe to the towne of Plymouth wch being in length about 25 myles he with greate care and diligence effected and brought the rivr into the towne the xxIIJth day of Aprile the next after. Presentlie after he sett in hand to build sexe greast mills two at Wythy in eek buckland psh, thother by the towne."

He was already lessee of the town mills at Millbay."

MR. J. FOSTER PETREE, Member of Council, wrote:—"Some 15 or 18 years ago, there was an attempt on the Mersey to revive the principle of the tide mill, although not by impounding water. A waterwheel plant was constructed on a pontoon and was tested by being lashed alongside the training ship "Conway," off Rock Ferry, where the tidal current runs at about 6 knots. How the power was utilised, or what became of the plant, I do not recall."

ESSEX. *Walton-on-the-Naze*. This was in the hands of the Stone family. "one branch held the mill for 100 years from 1400 to 1500. Mr. John Archer held it from 1832 to 1886. At one time he had 19 pairs of stones in use and did a big business with the North of England. He had 3 or 4 vessels which brought him coal and took flour, etc., back. Mr. Archer set his 6 sons up in mills".—B. H. Stone, 1947.

Eight pairs of stones were driven by one undershot water wheel. "These stones were arranged in a circle round the spur wheel on the upright shaft and were underdrift".—W. O. Horsnail, 1943.

Thorrington Mill. Has been restored and is used for storing material for yachts, etc.—E. M. Gardner, 1956.

LONDON. *Westminster*. There was a tide mill on the waterway between the Isle of Thorns and the north bank of the river.

London Bridge. See "The Water Supply of Greater London", H. W. Dickinson, London: The Newcomen Society.

KENT. *Stonar and Ebbsfleet*. Stonar had belonged to St. Augustine's from a time prior to the reign of Canute, and it was of importance to the monks to maintain their entrance at Ebbsfleet so as to avoid dues and restrictions imposed by their jealous neighbours of Christ Church who controlled the Sandwich entrance. The hostile relations between the two monasteries seem to appear in 1266 when the abbot's water mills (at Stonar) and Ebbsfleet were burnt by the men of the town and of Sandwich (Thorne's Chronicle, tr. Davis, p. 249).

There was a mill at "Hippilisflete" in the closing years of the thirteenth century (Black Book of St. Augustine, 54) and one or more at Stonar (*ibid.*, 18, 21). The Sandwich records of 1365 state that in this year there was a great inundation and that the town of Stonar was almost destroyed.

The water mills at Ebbsfleet and Stonar must have been tide mills and they were probably placed on opposite sides of the northern entrance.—From "Archaeologia Cantiana", Vol. LIII, p. 77. F. W. Hardman, LL.D., F.S.A., and W. P. D. Stebbing, F.S.A., F.G.S.

Sandwich. At Sandwich there was a mill on the Delf in 1488, at that time run by fresh water, but by 1538 salt water drove it and in 1562 a "Mr. Adrian" was employed to make a new water mill, on a site chosen by the Mayor and Jurats—possibly the Dutch expert later employed on plans for the Haven.—Dorothy Gardiner, F.S.A., "Historic Haven", pp. 215-16.

SUSSEX. *Bishopstone*. Built in 1729 under a private Act of Parliament, on land owned by the Duke of Newcastle, by John and William Woods and John Challen. The mill has been pulled down.—E. M. Gardner.

Sidlesham. Old photographs show that this was originally a timber-built tiled structure. A later addition in brick and tile, and a chimney for the steam plant dwarfed the original structure.

Burpham. A tidal mill used to be situated on the Boundary Brook immediately to the East of the Camp, close to the West end of the present bridge . . . To this day, though the mill itself has long disappeared, the field above its site through which the Boundary Brook flows is known as "The Pens" and those below as "The Shuttles".—Elliott & E. C. Curwin, Sussex Arch. Soc. Coll., 63, 1922.

HAMPSHIRE. *Fareham*. A photograph shows the mill from the tidal side with a railway bridge behind. The mill buildings are of timber with tarred weatherboards and tiled roofs, and the mill house to the right is of brick with salt glazed

headers. The mill was destroyed in 1923, only the arches on which it stood remaining.—R. L. P. Jowitt, 1952.

Lymington. A map c.1680, shows the pond but not the mill, by inference the mill would have been there then. A deed of 1661 conveys the site of the mill pond and the adjacent Salters . . . on a lease for 2,000 years at a rental of one penny per annum and describes it as ". . . containing by estimation five acres". The site of the mill is now part of the Lymington railway station yard, and the mill was demolished when the Lymington and Brockenhurst railway was constructed c.1857. A drawing shows a weatherboarded and tiled building with an outside open float wheel.—J. W. Beagley, 1952.

Eling Mill. Causeway and mill were built in 1418 by Thomas Middleton, who took a lease from Winchester College; the causeway had to be rebuilt in 1741 and again in part in 1756, and £1,400 of damage was done by a storm in January, 1887.—T. F. Kirby: "Annals of Winchester College" (Frowde, 1892).

DEVON. *Dartmouth.* The earliest mention of the Dartmouth tidal mill is in deeds of about 1250. It first belonged to the lord of the manor, but was soon leased to private millers. There was a corn and a grist mill, and as the spring tides rise sixteen feet, a good power was available for some centuries. Within fifty years houses were being built on ground reclaimed on the westward or landward side of the dam (still called Foss), and in 1344 the Hawley family built a wharf projecting from the dam into the harbour between the gullet or inflow and the mill sluices. Considerable further reclamation of land took place at the end of the sixteenth century, and this must have interfered with the free flow of the tide in the creek. The Borough Council bought the mill rights in 1740 and the mills were worked up to 1815. In 1816 an Improvement Act enabled the Council to fill up the mill pool, which extended over a quarter of a mile beyond the dam up the creek. A new main road, a market and several streets of houses soon occupied the site of the pool, and only faint indications remain of any mill buildings. The Foss is still an important though narrow highway.—Percy Russell, F.S.A., 1956.

A map of 1619 shows the Mill Pool and the mill with two wheels.

Stonehouse, Plymouth. It appears that in the 17th year of King Henry VIII, Sir Peter Edgecumbe, Knight, the lord of the manor of East Stonehouse, was minded to construct a causeway by which the water of the upper part of Stonehouse Pool or Lake, was to be impounded for the purpose of working a corn mill about to be erected by Sir Peter. "One parcel of our land in Estilake, otherwise called Dedlake within the Manor aforesaid, containing in itself from the middle of the salt water running between Este Stonehouse and the Manor of Stoke Damerel aforesaid, in length one hundred and sixty four feet and in breadth forty feet, to erect, raise, construct and build one wall or work called a Causeway, for certain corn mills to be newly built and constructed upon the said wall or work . . ."; the construction of this causeway proved "very comodyous and pleasant for the said John Wyse and all his tenants dwelling yn Stoke Damerel", forming as it did, the only means of crossing Stonehouse Pool on foot. The causeway or bridge, with its three arches and the mills built over them, are shown in the old map of Plymouth Haven, drawn in the reign of Henry VIII, and engraved in Lysons, Devon. It remained with his (John Wyse's) descendants until, in 1667, it was sold to Sir William Morice.—From "The Western Antiquary", Nov., 1886, Vol. VI, No. 6, p. 143. Contributed by R. Dymond, F.S.A.

The Manor Mill of Tremarton Castle. The grand old keep of Tremarton Castle stands on a strip knoll overlooking the river Lynhow, and below it a creek runs up into the country on which the Manor mill is situated. It is an ancient mill and a

tidal one. A part of the creek has been enclosed and furnished with sluice gates; the tide flows into it and fills the mill pool at high water, driving the machinery on the fall and rise. I have known this mill working since 1860, but on visiting it during the summer of 1916, I found it had ceased working. The first notice I have of it is an account of repairs done to it in 1462-3, a copy of which is annexed. [Here follow various items of expenditure for repairs to the mill. Exchequer K. R. Bundle 461. No. 21 (1462-3)].—From "Devon & Cornwall Notes and Queries", April, 1924, Vol. XIII, Part II, p. 94, H. Michell Whitley.

CORNWALL. *Wacker Mill, Anthony.* The building has now been pulled down. *Millbrook Mill.* Now used as a repair shop for steamers. *Borough Mill, West Looe.* In 1953 was occupied by H. Pearn, yacht builder.—E. M. Gardner, 1956.

Hayle Mill. With reference to the saw mill, this was situated at the other end of the Copperhouse Pool and diametrically opposite to the "Grist Mill". Each Co., i.e. Harvey & Co. and Sandys Vivian & Co. were merchants as well as engineers and ironfounders and each year imported considerable quantities of timber from Norway in their own boats. The Copperhouse Co.'s was stored in the Pool, while H. & Co.'s was stored in the "Basin" near to their saw mill, which was driven by a steam engine. The Copperhouse saw mill was driven by water wheel and a reference to it is in the duplicate letter book now in my possession. This letter is dated Oct., 1859, and addressed to Capt. Ross. "I have now the pleasure to send you herewith tracings of sawing machinery similar in design to the one we have now at work here. No. 1 tracing shows elevators, Plan and End View of a machine capable, with an undershot water wheel 18 ft. diameter 7 ft. wide and with a fall of 3 ft., of driving 16 saws and easily cutting 2,000 ft. of timber in 12 hours. Our price for such a machine including every metallic part complete and delivered here would be £420 . . .".

The purpose of the "Grist Mill" at Copperhouse was to prepare the necessary food for the numerous horses employed by the Company. As a steam engine was installed in the latter days of the Company, I very much doubt the reason for its stoppage as put forward in your paper in the Transactions. Rather do I think its work was done and it was therefore no longer necessary to continue it. I am not quite sure, but I believe the engine installed in the mill was the one built by Copperhouse Foundry Co. and exhibited at the 1862 Exhibition.—T. R. Harris.

ANGLESEY. Since the publication of Mr. Rex Wailes's paper on Tide Mills in the "Transactions of the Newcomen Society", Vol. XIX, several Anglesey tide mills, in addition to those then mentioned by me, have come under my notice, and the records dealing with some actually give the name of a celebrated builder of mills at work in 1578. Rowland Meredydd of Bodowyr, wrongly entered in a pedigree as ob. 1563.

Close to the Menai Suspension Bridge is the church on an island off the Anglesey side. At low tide between the island and the mainland a system of dams is to be seen and this is marked as "Tide Mill pool" in the map contained in the 1819 House of Commons publication relating to the building of Menai Bridge. The history of this double tide mill, Melin Heli, Porthaethwy, is to be found in the late H. R. Davies's "Records of Conway and Menai Ferries". From 22nd March, 1589, Rowland Meredydd paid 4/- Crown rent for the foreshore enclosed by the tide mill and a piece of land at Rhosyr, where a windmill stood. In Pat. Roll 31 Eliz. the tide mill is described as "All those two water mills of ours under one roof called Melyne Holy with their appurtenances in a certain place called Traith Tessilio between the tenement called Tythyn y Caye and the church of Tessilio now in the tenure of Rowland Meredith Esq. And all that weir and fishery of ours within

limits and circuits between flow and ebb of the sea in the township or hard by the township of Porthaethwy". In 1504 to 1617, a nephew of Rowland Meredydd, Jasper Price, vicar of Llanidan, paid the Crown rent of 4/- for the above.

By 1593, the farmers of the Menai ferries from the Crown complained that Jasper Price's corn mills were prejudicial to her Majesty's mills in Caernarvon and to the ferry. The Anglesey people who were formerly obliged to ferry their grain to and fro to Caernarvon for grinding (owing to the lack of rivers in Anglesey) saved much in transport by the erection of the Meredydd-Price tide mill.

In the Bulkeley Papers at the Bangor University Library is the original lease dated 1578, between Sir H. Bagnall and Wm. Herbert on the one side and Rowland Meredydd of Bodowyr on the other, for the site of a salt water grinding mill and place for a weir at Traeth Tysilio and an acre of land necessary for building the mill. In 1602 Jasper Price, in a "bond of obligation" for £120, granted the mills to Sir R. Bulkeley and "seventeen pieces of loose timber appertaining to the said mill together with a slated house built on part of the one acre above mentioned". The rent of 4/- was paid to the Crown by Jasper Price till 1617 and up to 1813 by the Bulkeley family. The double mill probably consisted of two wheels, one operated by the sea flowing into the pond at flood and the other by the ebbing tide. There is no further mention of the mills after 1813. (The other tide mill on the Menai Straits was Felin Heli, at the place now called Port Dinorwic, on the Caernarvonshire shore.)

In Arch. Camb. Vol. III, 1848, Rowland Meredydd is described as "celebrated builder of mills", and a glance at his pedigree (Griffiths' Caernarvonshire and Anglesey Pedigrees) is of interest. He was the squire of Bodowyr and his son Edmund (living in 1620) married the heiress of Traffwll, near the inland sea between Holy Isle and Anglesey, and there was a Meredydd in that locality as far as his great grandson, Job Meredydd of Rhoscolyn (on Holy Isle) living in 1723.

On Holy Isle, on the shore of the inland sea, there had been a tide mill at Tre'rgo since before 1520, the pool being formed by dams joining islands. This was mentioned in my previous list as were the Ty mawr and Felin Wen tide mills close to one another on the Anglesey side, both not far from Traffwll. Within a short distance of Felin Wen, I have traced another tide mill built on the shore close to Cymmeran, the outlet of the inland sea. This mill ground corn till between 1875 and 1900 as did Felin Wen, and remains can still be seen of the mill building, about 21 ft. by 10 ft. interior dimensions, on a rock at the junction of two dams built out on the shore at right angles and diverting the mouth of a stream. The oak shaft with the iron eight-spoke hub remains, though the mill wheel and the rest of the gear have disappeared. By the rings in the wood, the tree from which the shaft was made must have been about 140 years old.

There is a ford across the estuary to Rhoscolyn at low tide (see Ordnance Survey 1841), close to the mill described above, and on the Rhoscolyn shore, near Tyn y Felin, are the ruins of another tide mill, consisting of the remains of a dam across an inlet with the walls of a mill at one end. There is also a dam in the sand at another point at Rhoscolyn, nearer Trwyn y Bar, suggestive of some similar construction.—Lucy Williams.

Sp. Grove - White.