Wind and Water Mills

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The editors will be pleased to consider contributions of articles and drawings for inclusion in future issues.

'BOUNCING BESS' TOWER MILL
Rowington Green, Warwickshire
by W.A. SEABY

If we accept the post mill at Pinley Nunnery (1348)[1] and another recorded as on the road to 'Nonold Gate' (1636)[2], both sites originally in Rowington although Pinley now comes under Shrewley, we can account for at least eight windmills working within the parish[3] between 1300[4] and the later nineteenth century.

Although the ground at Rowington is relatively high, mostly between 300 and 400 feet O.D. (91 - 122m.), the water shed streams are small and sluggish so, as might be expected, windmills here predominate over watermills. There is evidence for at least four windmills having been sited on Rowington Green from the later years of the eighteenth century. Three of these were given fancy names: 'Grinning Jenny' at Windmill Farm[5], 'Tom-o-the -Wood' near the house called The Felden[6], and 'Bouncing Bess' (perhaps the second of that name), the only brick tower mill and the only one on the Green to have survived into the present century (Grid Ref. SP 205702)[7]. It stands at the highest point approximately 420 feet (128 metres).

The tower mill seems to have been built by 1789 when Yates completed his survey, published as a one-inch map of the county in 1793. A windmill is shown, conventionally as a post mill, in this position, so one cannot be absolutely certain that it was a tower mill at this date since no documentary evidence has yet been traced recording its erection. Both Yates's map and Sherriff's map of 'Twenty-five miles around Birmingham', published in 1796, show another mill slightly to the west of Bouncing Bess which is likely to have been a post mill, but it is not seen on the preliminary O.S. map of 1814, on Greenwoods's map of 1822 or on any subsequent map. This windmill could have been the discarded forerunner of Bouncing Bess. Just possibly it was a former locality for Tom-o-the-Wood or Grinning Jenny, neither of which is shown by Yates or Sherriff in the positions they occupied latterly.

John Bradbury (1750 - 1835) who in a lease of 1818 is styled 'Miller and Farmer', then aged 68 and living at the adjoining Quarry Farm, was an early owner of the windmill. But from at least the mid-1820s John Barnett is givien as miller in the Rowington baptismal register, since he and his wife had numerous offspring although not all of them out-lived childhood. In the 1841 Census Barnett, aged about 50, is the only miller recorded at Rowington; he was living there with his wife Sarah, aged about 40, and six children from the age of 15 to one year. Although it is not absolutely certain that Barnett was miller of Bouncing Bess, John Bradbury being obviously too old to work the mill by himself in 1825, the other two windmills seem to have been owner-occupied, David Buffery at Grinning Jenny and Thomas Avern (who died aged 79 in 1852) at Tom-o-the-Wood. Furthermore both the post mills from advertisements and other evidence were known to have been declining trade when the Tithe Apportionment was made six or seven years later.

The property, and certainly the milling, had passed to William Bradbury before 1845 according to the directories and as given in the Tithe Schedule of 1847; and, although only styled as a farmer in the 1841 Census he is put down as farmer/miller in the 1851 and 1861 Census returns. From hereon the directories give some idea of the change of occupier during the later years of the nineteenth century. W. Bradbury's name occurs in 1863, John King in 1872 and 1876. Thomas Avern, presumably a grandson of the miller who had died during 1852, appears in 1880 and 1882. E. Andrews is recorded as mill manager and John Bradbury as farmer/miller in 1883 and 1884, with William Hibberd also in 1884. James M. Bryan took over from about 1887 to 1892 with T.M. Bryan, presumably a relative, given as miller and corn dealer, The Mill, from 1893 to 1895.

From an estimate for work to be carried out on the mill dated 30 November 1886 (see below) we learn that John Bradbury, supposedly a grandson of the former John, was then owner. Thereafter deeds and documents of title still extant trace

the conveyance of the brick tower on Rowington Green to its present owner-occupier. On 24 November 1896 Bradbury sold the mill, then working solely under steam, to Thomas F. Smith of Turner's End Farm who was already in occupation as miller. In November 1916 when it is believed to have ceased milling altogether the tower and paddock were conveyed to John W. Ryland of Shakespeare Hall close by. It was this same owner who wrote Records of Rowington in two volumes, in the second of which on page 140 there is reference to 'Bouncing Bess' as being in existence in 1821. On 1 November 1933 the executors of the late J.W. Ryland sold the old mill by auction when it was bought for £220 by John Wheatley; and in March 1934 it was purchased by H.E.Wilson who also occupied Shakespeare Hall. Thereafter it descended by inheritance to his son, Lt.-Col. Edward C. Wilson. In 1977 Mr. John M. Jennings, Birmingham solicitor, purchased the property, and during 1978/9 the architect, Mr. David H. Robotham of Warwick, supervised the modification of the mill body, converting it into the core of a unique residence in which John Jennings and his wife, Jennifer, now live.

So much for the ownership and millers at present traced. We have very little knowledge of the building as a working windmill but we can make some inspired guesses. The sails were almost certainly four commons, and luffing appears to have been by tailpole with cartwheel attached at the end to assist in winding the boat-shaped cap. This wheel is believed to have finished up in the orchard of the Smith's farm at Turner's End during the present century. The windshaft, brake wheel and wallower have long since disappeared; they may well have been removed soon after the mill had ceased by the last decade of the nineteenth century, since they would only have added strain on the cap and main shaft, especially in bad weather, once the mill had come solely under steam power.

A few copy letters and estimates regarding work on Rowington Mill by the millwrights, Robert and his son, Alfred Henry Summers of Tanworth-in-Arden, are extant. I am indebted to Mr. D.T.N. Booth, a fellow member of the Midland Mills Group, who not only traced them, when he was making his survey of Warwickshire watermills, but who sent me transcripts, as well as other detailed costings relating to windmill repairs in the western midlands. Those for Rowington are here set out in full.

Tanworth, Hockley Heath
November 30th 1886

Rowington Windmill

Sir,

I beg to say that I have estimated for the work as follows. For a new peak runner stone 4' 4" diameter, faced, furrowed, delivered at the mill, the irons out in*(?put on), the old runner put down as a bed stone and the bush put in and curbing round the stone and put ready for work. Also for putting and fitting on a plank circle underside the crown wheel fixed on with bolts and nuts turned up and a new friction pinnion and necessary repairs to the sack hoist.

The whole of the above work will cost £18 10s. If you will favour me with the order I will put it in hand and do it at once. The expense of the sack hoist will be the same whether the wheels are geared or put to a friction hoist. The latter will be the best as the cogs are always breaking by striking into gear. The friction hoist will lower the sacks down as well. Waiting your order which shall have my best attention.

I am, Sir,
Your obedient servant
Robt. Summers

J. Bradbury Esq.

Calculations:

new stone	£4	14s.
Facing and furrowing	£1	5s.
Carriage of stone	£1	10s.
Corn	£1	15s.
Putting in	£2	2s.
Curbing		15s.
Carried down	£12	1s.

Sack Hoist

timber		15s.			
making	£2	8s.			
turning chain roller		3s.	6d.		
line pulleys and frames		7s.	6d.		
frame roller		10s.			
lever		7s.		£6	9s.
fixing	£1	10s.		£12	1s.
	£6	9s.	contract took at	£18	10s.

If wheels are geared

40 cogs 1/9	£3	10s.		
19 " "	£1	13s.	3d.	
	£1	10s.	altering bevel	
	£6	13s.	3d.	

Say £7 5s. 0d. either way for gearing or friction

Stones etc.	£10	10s.	0d.
	£ 7	5s.	0d.
	£17	15s.	0d.

Estimate sent in £18 10s.
N.B. this should be put with the letter that was sent for the estimate.

On the night of 9 June 1888, during a violent thunderstorm, the sails (and cap?) of Rowington windmill were damaged. Although a copy of the letter accompanying the estimate for repairs as submitted by Summers exists, the actual report on the damage cannot now be traced. A search has been made amongst the large volume of documents from Campbell, Brown and Ledbrook (successors to Brabazon Campbell), now housed at the Warwick County Record Office, but without success. The estimate sent to Warwick, soon after the accident, is likely to have been for an insurance claim in the first instance.

Tanworth, Hockley Heath
June 15th 1888
Too late for post
Sir,

I beg to say by instructions received from Mr. Bradbury I herewith enclose a report and cost of the damage done to Rowington windmill by lightning on the ninth instant.

Trusting that it will satisfy all parties interested as I have very carefully and impartially gone through it in detail.

I am, Sir,
Your obedt. Servt.
Robert Summers

Brabazon Campbell Esq., High Street, Warwick

Whether the claim failed or whether it was agreed 'by all parties' to work the mill solely by steam power from this date is not quite certain, but the late H.E.S. Simmons, who discussed the matter with the grandson of Robert Summers[8], wrote in his notes:'For a short while after the loss of the sails the mill was worked by a steam engine; eventually it was bought by Thomas F. Smith of Turner's Green who used it first with steam and later with oil, and finally the mill closed down, etc.' However, certain small repairs had been carried out four months after the storm damage as set out on the copy of this account.

Ordered September 13th 1888	£	s.	d.
4 sheets of wire to dressing machine and brushes strengthened	1	16	0
regearing pinion	3	0	0
wedging both wall boxes, and shouldering spur wheel cogs	0	12	0
new wheel to tail pole, old spokes to be used	5	10	0
	10	18	0

contd.

	£.	s.	d.
gearing pinion	3	0	0
the two last items done	6	0	0
part of work ordered in first estimate	12	1	0
part of work done to hoist	3	3	0
	24	4	0

See day book

The new sack hoist which was estimated for in November 1886 at a cost of £6 9s. Od. seems not to have been completed in September 1888. Perhaps only repairs to the existing one were made. But the following 'cri de coeur' from the miller, ten years later, suggests that the millwrights may not have installed a new friction drive windlass before the end of the century. Certainly the one found there in 1977 was in a remarkably good state showing little wear. Note the name of the mill at this date.

Memorandum

From T.F. Smith
Miller and Corn Dealer
Rowington Steam Mill,
Warwick

To
Mr Summers
Millwright
Tanworth

Aug. 5, 1896

Dear Sir,

Will you kindly come and put oist(!) up to day as we have a lot to grind and have to carry it up.

Yours truly
T.F. Smith

In possession of the Smith family who still live at Turner's End Farm are a number of account and receipt books, one each of which were kindly presented to the County Museum, Warwick, on 15 July 1977 by Messrs. N. and M. Smith. The Account Book is headed:

ROWINGTON STEAM MILLS
Near Warwick

Dr. to T.F. SMITH, Corn Merchant

Each page has the following cereals, but listed vertically: Indian Corn, Wheat Flour, Bean Flour, Barley Meal, Bran, Sharps, Oats, Beans, Peas, Indian Meal, Cake. SACKS 1/-

Numbers run from 501 (dated Jan. 30, 1906) to 750 (June 1, 1906). Typical entries read:

1 sk Barley Meal	13/-	Mr Badger
3 sks Oats	1/17/6	Mr Huggins
1 sk Indian Corn	14/-	I. Moore, Cock Inn
1 bag Wheat	13/-	
1 sk Bran	6/-	Mr Wale
1 sk Sharps	10/-	Chessetts Wood
2 sk Oats	1/5/-	16 March '06'
½ Beans	8/-	

The small Receipt Book is headed:

ROWINGTON STEAM MILL NR WARWICK

The numbers run from 1556 to 1600 and the dates from 12 May to 26 July 1906. Typical entries read:

1551 Received from Mr Beeve, Chadwick End 2/6 (signed) W. Corbet
1553 Received from Messrs Mitchells & Butlers, Cape Hill, Birmingham
£92/10/11 per cheque

1554 Received from Midland Vinegar Brewery, Aston Cross, B'ham £17/6/- per cheque
Both signed W. Corbet/T.F. Smith

A photograph taken of the mill by R. Hancock in 1911 for the Warwickshire Photographic Survey, now housed in the Department of Local Studies at the Birmingham Reference Library, shows the tower with boat cap and apron over the curb. The original weather boarding had then been sealed over with metal sheeting to save timber repairs, and the hatch at the back of the cap is seen to be closed by a vertically boarded door. If, as has been said, there was once a tailpole in place of the much more usual wheel and chain winding gear all trace of it had gone when Hancock took his photograph[9]. Shown on the far side of the tower are what appear to be a boiler with chimney and, between it and a workmen's hut[10], an early form of oil engine(?) on wheels. Also seen is a lay shaft set at a slight slope from the engine towards the tower behind which it disappears. There it must have been geared to a secondary shaft, which entered the mill through a 'drain pipe' above the doorway, and its pinion would have engaged with the face gear set on the underside of the spur wheel.

It is believed the mill ceased operation and the external prime movers were withdrawn early in the First World War, certainly by the time it was sold to John Ryland in 1916. During the later phases of the war German prisoners occupied the mill plot and the tower was used as their dormitory. Fortunately neither Ryland nor the Wilsons appear to have interfered with the machinery in the mill and, apart from some patching of the roof and securing of the double doors on the ground floor, it remained for over fifty years much as it had been when last in service. Simmons, writing in 1943, states that Mr. Wilson intended converting it into a cottage but the scheme never materialised. And it was not until 1976 that proposals were put forward to convert the tower into part of a house complex and Col. Wilson agreed to sell the property. Although local objections to the scheme were raised, the Warwickshire Planning authorities granted permission for modifications to the mill and erection of circular structures around part of it to form a house, since it was realised that if this listed building were allowed to decay further it might become dangerous and have to be pulled down.

Shortly before the builders, Warwick Construction Company, took over, Mr. Jennings gave permission for a team of enthusiasts from the Midland Wind and Watermills Group to make a survey of the tower for record purposes. We knew he was most anxious to conserve all the existing gear in the area of the ground floor but that the cap and curb would have to be removed, as well as the upper portion of the upright shaft, the sack hoist, and most probably both pairs of stones. Therefore, when measurements and photography were carried out during two week-ends, it was in the upper floors that most of the work was concentrated.

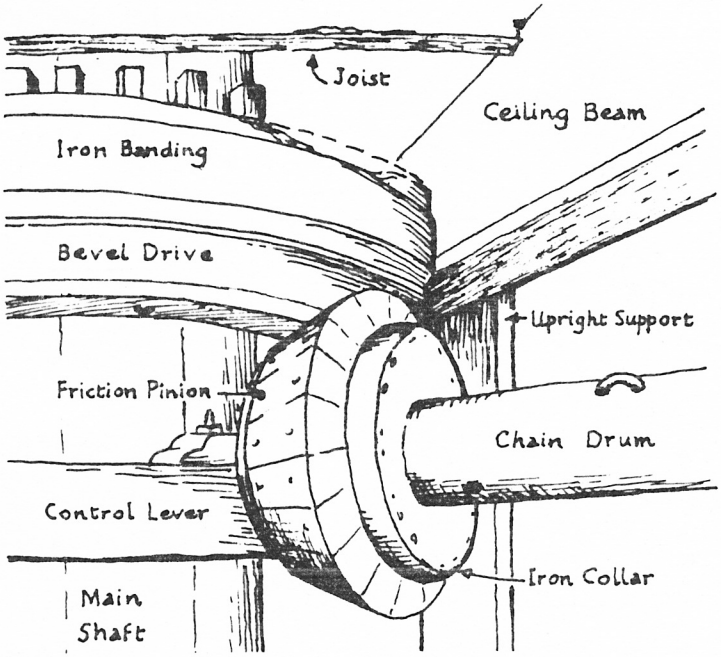
The following were the principal dimensions recorded on 17/18 September 1977:

Rowington Tower Mill	ft.	in.	metres
Vertical height of mill, including cap:	39	4	(11.99)
Vertical height to top of brickwork:	28	4	(8.74)
Height of Cap and Dust floor:	12	4	(3.76)
Height of Bin floor:	7	8	(2.34)
Height of Stone floor:	8	0	(2.44)
Height of Meal or Ground floor:	11	4	(3.45)
Interior diam. of curb (set back 6 inches):	15	2	(4.62)
Diam. at top of brickwork (outside):	17	8	(5.38)
Diam. at top of brickwork (inside):	14	2	(4.32)
Diam. of Bin floor:	16	8	(5.08)
Diam. of Stone floor:	18	6	(5.64)
Diam. of Meal or Ground floor:	20	10	(6.36)
Exterior diam. at ground level:	24	4	(7.42)

The depth of the brick footings below ground level was not determined but when the ground floor boarding had been removed it was noted that the four brick walls running E-W across the interior and supporting the floor joists went down at least three feet (0.91m.) so the tower brickwork is likely to be much deeper.

The machinery remaining in the mill is mostly seen in the elevation shown partly in the round and partly in section. Cap details are given in the Appendix by John Bedington who carried out measurement and made the drawings. Here is given

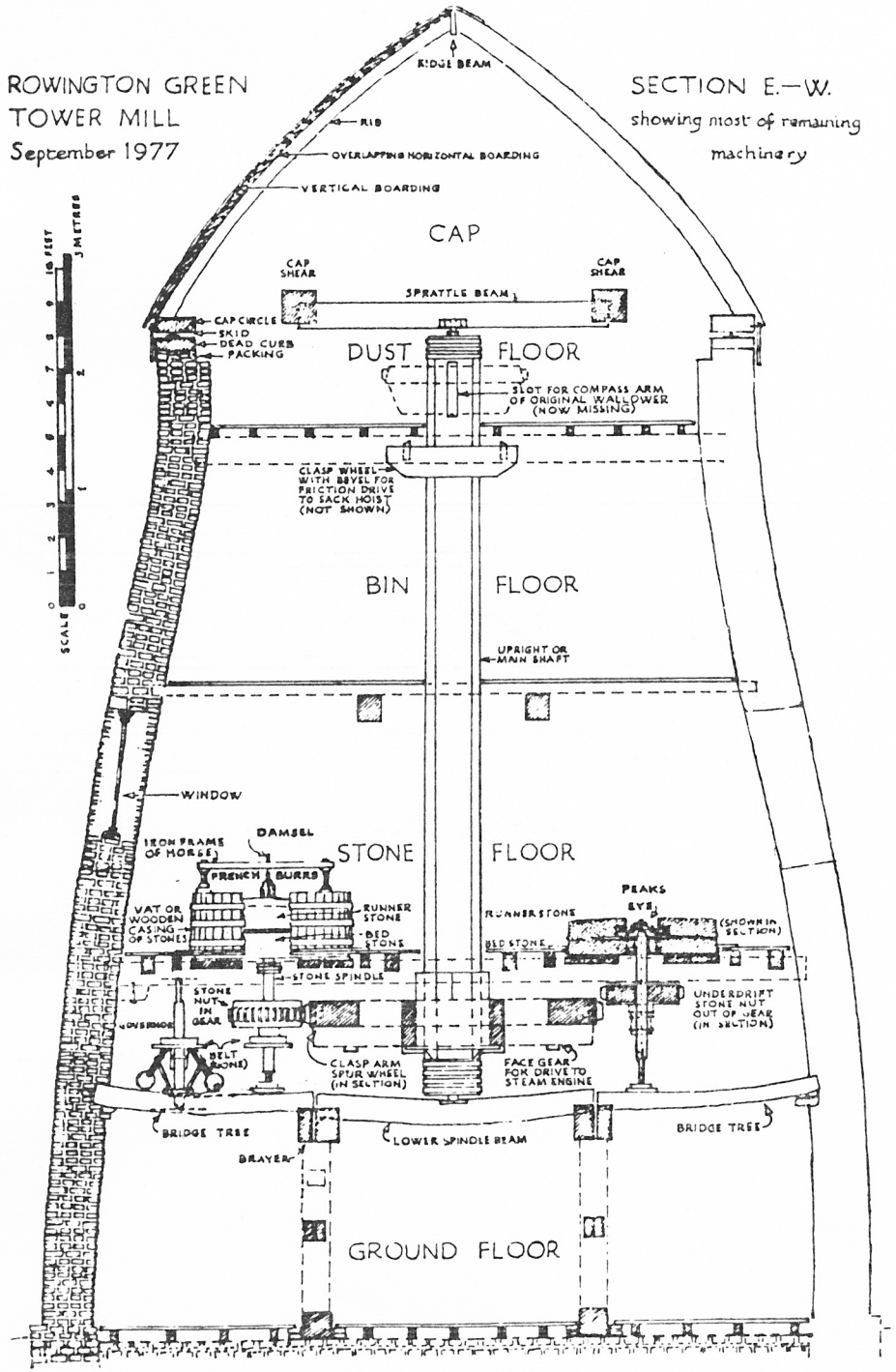
such basic information on the rest of the building as it was possible to gather in the time at our disposal. The main shaft, held in position by bearings on the sprattle beam and on the lower spindle beam, was 22ft. 9in. (6.93m.) in length, octagonal in section, having a width of 18in. (0.45m.) at the top and 21in. (0.53m.) at the base. Below the three iron bands holding the head were cross slots 22in. (0.56m.) deep to take the arms of the missing compass type wallower. Immediately beneath the Dust floor and close to the ceiling of the Bin floor was a sectioned wooden clasp wheel ('plank circle' as given by Summers) set on the main shaft, having a diameter of 3ft. 9in. (1.14m.), with (originally) 32 teeth above and a bevel below. It had a wide iron banding around the girth.



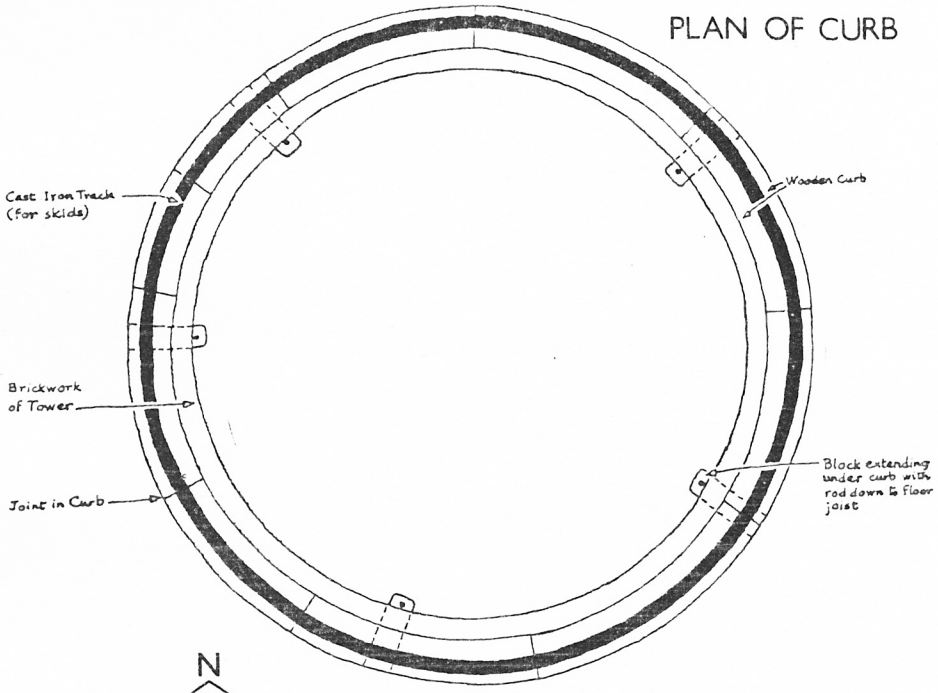
This was the friction drive for the sack hoist which was still in position and was undoubtedly the one constructed by Summers, the millwrights. The overall length, including the spindles was 5ft. 10in. (1.78m.), the windlass or chain drum itself being 4ft. 6in. (1.37m.) with a diameter of 6in. (0.15m.). The bevelled head or pulley, made up of some 20 bolted wooden blocks and held in position on the drum with iron-banded collars on either side had a diameter of 19in. (0.49m.) tapering to 15in. (0.38m.). The hoist had its bearings on cross timbers, the inner one being the control lever, themselves held in slotted supports morticed or otherwise fixed to the two ceiling beams. The friction drive was brought into play by a cord, attached to a perforation at the distal end of the pivoted control lever, and carried over a shear block in the ceiling down through holes in the floors to the miller with sacks of grain at ground level. The control cord and sack chain had both gone, as indeed had most of the woodwork of the grain bins. Low arched windows faced N. and S. at this level.

ROWINGTON GREEN
TOWER MILL
September 1977

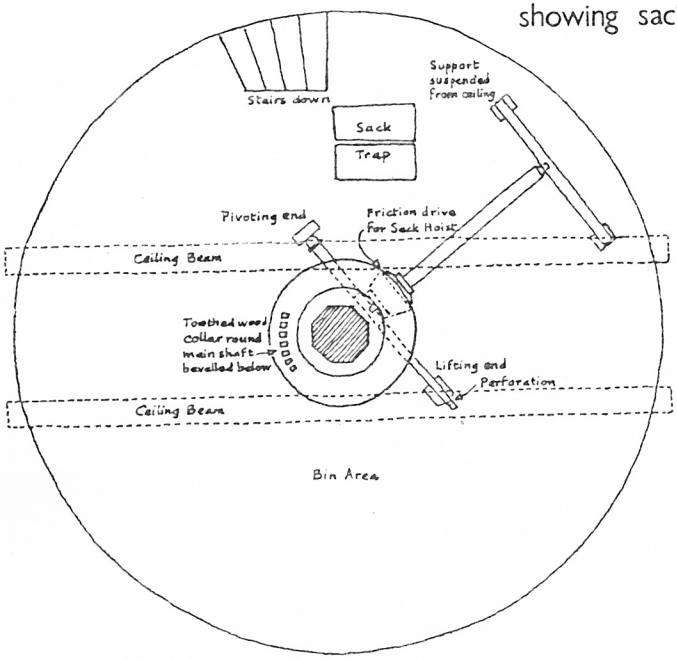
SECTION E.—W.
showing most of remaining machinery



PLAN OF CURB



PLAN OF BIN FLOOR
showing sack hoist



In the Stone floor parts of the grain chutes remained but the hoppers and shoes etc. were absent, and only one horse, of cast iron, made by R.G. Handley, Moor Street, Birmingham, was extant. This, carrying through a perforation in its central bar the spindle of the four-barred damsel, was still in its original position, set on the internal rim or flange of the vat surrounding the French burrs, which were positioned on the east side of the room. The height of the vat from the floor was 1ft. 9in. (0.53m.) and the wooden staves were held in place with the usual three iron bands; its diameter at the outer rim was 4ft. 6in. (1.37m.). The stones had a diameter of 4ft. (1.22m.) and, with their plaster covering, rose to a height of 1ft. 3½in. (0.39m.) above floor level; the eye of the runner stone being 10in. (0.27m.).

There was no vat, horse or damsel existing with the pair of peak stones. The bed stone was seen to have been well set into the floor with a brick curb surrounding it, and the two stones, sitting one on the other, only rose to a height of 1ft. 0¼in. (0.31m.) above floor level. The diameter of the peaks was 4ft. 4in. (1.32m.) and the eye again 10in. (0.27m.). Similar low arched windows, originally having two horizontal iron bars across the wooden frames, faced E. and W. on this floor.

Very much more remained, and still mostly exists, in the Meal floor of this underdrift mill, now the kitchen/breakfast room of the house. The wooden spur wheel is of clasp-arm construction and has a diameter of 8ft. 6in. (2.59m.), excluding the 96 projecting morticed teeth. To the underside of this wheel is bolted a cast iron circular face gear having 144 teeth which, as mentioned above, was driven through lay shaft and pinion from an auxiliary engine housed outside the mill.

The stone nuts, also wooden, with reinforcement iron rings, have diameters of 2ft. (0.61m.), excluding the 24 morticed teeth. The spindles are square-sectioned where they pass through the nuts, being held in or out of gear with wedges. The lower spindle beam taking the weight of the main shaft and spur wheel, as well as the two bridge trees, taking the lower bearings of the nuts, are considerably bowed downwards; and there is packing beneath the ends of these trees where they enter squared cavities in the tower wall. There are also massive cross timber braces in the body of the ground floor to take the other ends of the bridge trees and the spindle beam.

A centifugal governor, set on its own timber support with the upper spindle in a blister bolted to one of the main ceiling beams, once controlled the speed of the nut operating the French burrs. This tentering gear included steel yard, fulcrum, tentering screw and brayer, so that even today only the belt between the drives on the two spindles is missing.

Other features on this floor originally included doorways N. and S., each 3ft. 3in. (0.99m.) wide and 7ft. 6in. (2.28m.) high, having double wooden doors. The top of each opening was a low arch and the surrounds were carried out in rounded-off brickwork. It was not possible to retain either of these openings as doorways in the present house plan; the one to the south has been mostly bricked up and that to the north has been half closed leaving the upper part to form a kitchen window. New doorways have been cut through, that to the east leading to the central hall of the house and the west one as a back door to the garden. Windows, one 2ft. 10½in. (0.88m.) high by 2ft. 6in. (0.76m.) wide, set at 4ft. 4½in. (1.33m.) above floor level, were placed just E. of the N. door and just W. of the S. door, but both had been bricked up earlier this century, probably to prevent vandalism. The north one has now been re-opened. Internally just beyond the windows were two fireplaces with chimneys running up through the wall. One of these, having a charming crested frontal to the grating, has been preserved and inserted in a similar position using the same chimney, on the first floor sitting room of the house.

The main timbers and cross braces supporting the machinery have been strengthened and retained. The woodwork was all sand-blasted and immediately thereafter the ironwork red-leaded to prevent further rusting. In the upper floors some of the main oak floor beams were also preserved; when the decayed ends had been cut away they were re-inserted in the new ceilings. The original wall stairways between

floors having average 8in. (0.20m.) treads, as well as joists and (many missing) floor boards were taken into account during the survey, but all were removed owing to their worm-eaten or otherwise rotten condition.

It only remains to thank those who have helped in carrying out this survey. On the historical side, Lt. Col. E.C. Wilson, members of the staff at the County Record Office, Mrs. Joy Woodall, who is writing up the history of Rowington, and Mrs. Eileen Measy, Keeper of Folk collections at St. John's House, Warwick, have together kindly supplied much data. On the technical side my thanks go to my Midland Mills Group colleagues: Mr. Tim Booth (as set out above); also Mr. Barry Job, Mr. Cyril Johnson and Mr. John Bedington, all of whom risked life and limb to photograph and measure details of the mill. Very sincere thanks also go to Mr. and Mrs. John Jennings for willing co-operation and much practical help.

REFERENCES AND NOTES

1. V.C.H. (1945), p.154
2. Warwick County Records VI (1941), p.28
3. W.A.Seaby, Warwickshire Windmills (Warwickshire Museum Abstract No. 1, 1979) p.25
4. J.Woodall, From Hroca to Anne (1974), pp.11-13
5. Preliminary O.S. map, c.1814; Warwickshire Advertiser (7 June 1823); Greenwood's map, 1822; O.S. map 1831; Tithe map, 1847-9; Midland Counties Herald (2 Nov. 1848)
6. Warwickshire Advertiser (28 Oct. 1815 and 11 Nov. 1815); recorded in Rowington Rate Book for 1834; Tithe map, 1847-9. Not shown on Yates, Greenwood or O.S. maps.
7. Yate's map, 1793; Sherriff's map, 1796; Preliminary O.S. map, c.1814; Greenwood's map, 1822; O.S. map, 1831; Tithe map, 1847-9; O.S. 6", 1886 and 1905; V.C.H. III (1945) p.147
8. The millwrighting business had largely been taken over by Robert's son, Alfred Henry Summers, in the late 1880's; the vast collection of notes on wind and watermills, collected by the late Herbert Simmons of Shoreham-by-Sea is now housed in the Science Museum, S.Kensington, but these need to be used with much caution.
9. This photograph, as indeed several others in the collection, has been printed from the wrong side of the negative, showing the tower the opposite way round.
10. Mr. Jennings informs me this hut or shed still exists in the grounds of Shakespeare Hall.

ROWINGTON TOWER MILL: THE CAP
by JOHN BEDINGTON

The cap was of the design, common in Warwickshire, known as 'boat-shaped'. It was approximately 18ft. wide at the widest point of its base and, as seen in 1977 was 18ft. long, though it is conceivable it may have been slightly truncated, since as mentioned below, the back of the cap was modified in later years. It measured approximately 9ft. 6in. from the cap circle to the roof ridge at the highest point of the ridge.

As can be seen from the drawing, a basic wooden cap circle was extended outwards at the front and back to give a boat shaped base and from this base rose 12 ribs (ie. rafters) on each side of the cap terminating at a bow shaped ridge beam and carrying horizontal overlapping wooden boarding overlaid (presumably at a later date) by vertical wooden boarding. The roof ridge was capped with galvanized iron and the cap had a 'petticoat' of tongue and groove boarding some 1ft. 6in. deep.

The cap turned on 10 iron skids running on an iron track: the skids are closer together at the front where the weight of the windshaft and sails had to be borne. It was evidently centred by 6 wheels running against the inside of the curb in the usual way but only the mortices for the blocks which held these wheels remain.

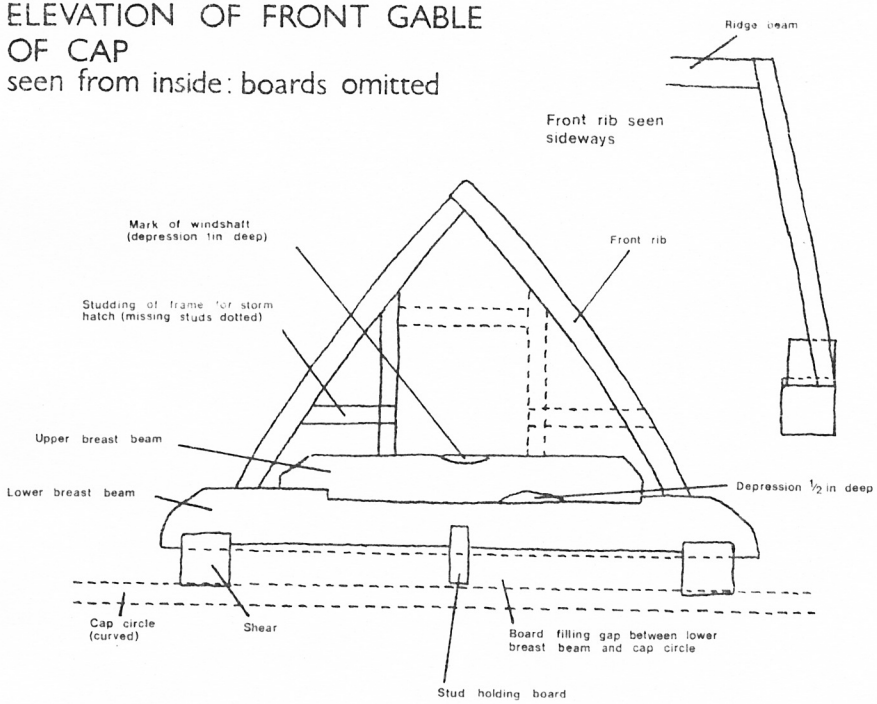
The neck bearing of the windshaft was carried on a breast beam supported by a 'lower breast beam' which straddled the shears at the front; the upper breast beam itself seems (from a depression cut in the lower side) to have originally been used the other way up.

The back 4 feet or so of the shears (with the back beam that they carry) have been sliced on at some stage (apparently after the mill stopped working by wind). This is a shame as it would have been nice to know how the tailpole was fixed. The complete absence of any toothed rack (or pegs for an internal winch) seems to prove that tailpole winding must have been used to the end of this windmill's working days.

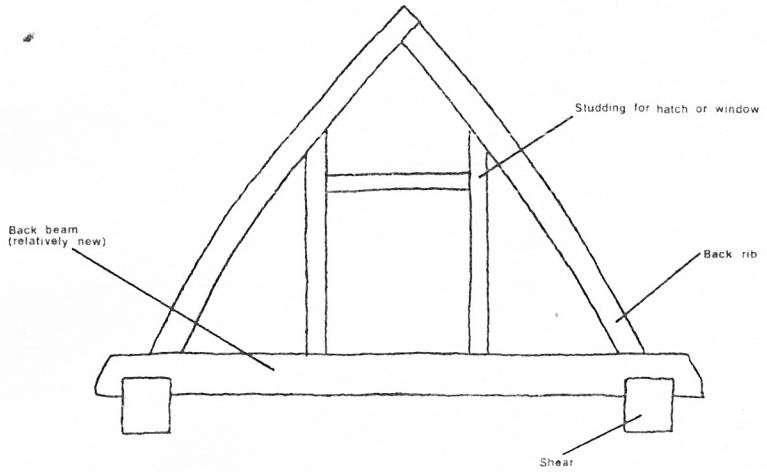
Although the windshaft, brake, brake wheel and wallower had gone at the time our drawings were made in 1977, the position of notches in the shears for the brake, and of mortices in the shears for the beam that had supported the tail bearing of the windshaft allowed us (as can be seen from the drawings) to calculate the position, and certain other details, of the windshaft, brake wheel and wallower within a matter of inches:- the length of the windshaft from tail bearing to neck bearing inclusive was approximately 14ft., the overall diameter of the brake wheel 8ft. and the overall diameter of the wallower (which at least at one stage was compass arm) 4ft.

ELEVATION OF FRONT GABLE OF CAP

seen from inside: boards omitted



ELEVATION OF BACK GABLE OF CAP



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ELEVATION OF TOP OF UPRIGHT SHAFT AND SHEAR BEHIND IT

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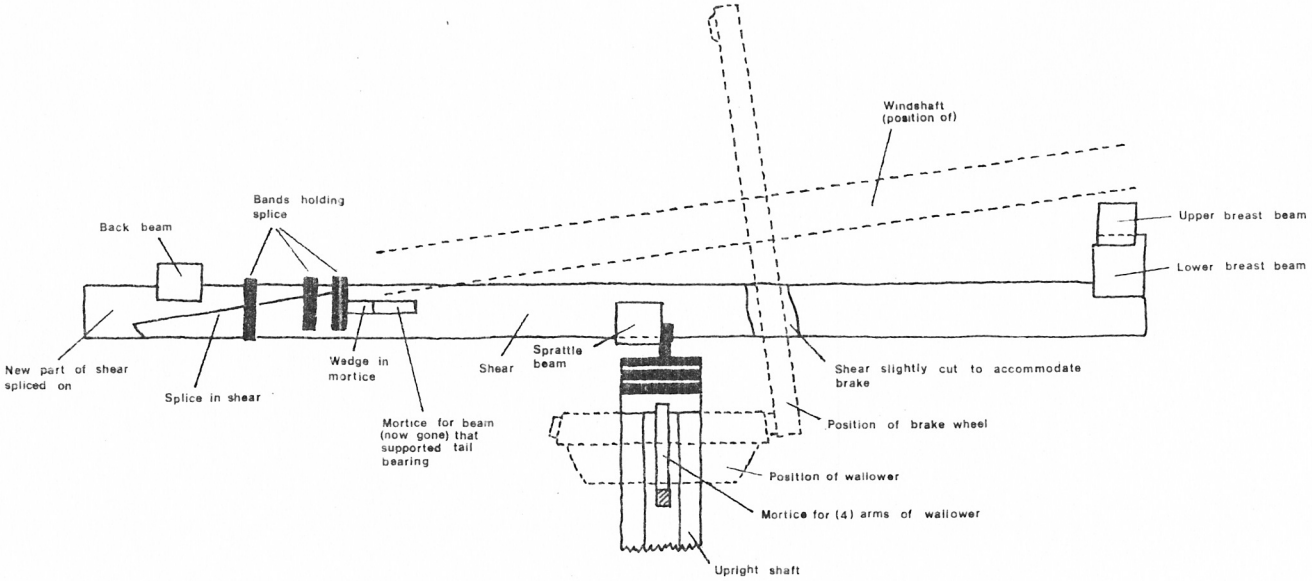

PLAN VIEW OF CAP FRAMING

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