

LIME-KILNS IN NORTH- WEST GLOUCESTERSHIRE

by
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It may be said that whenever limestone occurs, lime-burning has been practised at one time or another. Lime-burning is an ancient art, and in the eighteenth and nineteenth centuries great quantities were consumed for agricultural improvement, also for building purposes. Kilns in Gloucestershire were numbered in their hundreds, most of which have vanished into oblivion.

The purpose of this paper is to record kilns surviving in various stages of decay, and also their sites where nothing else remains. Three sites are investigated - Corse Wood Hill with Ashleworth, Gorsley and May Hill, and will be described under these headings. The first worked impure bedded limestones of the Lower Lias, the others being associated with outcrops of Silurian limestone. The variety of design is surprising and at variance with one industrial archaeologist's contention that "all limekilns are the same".

Kilns may be divided into two types: flare kilns and continuous or perpetual kilns. The former were generally smaller and used only occasionally as demand arose, being fired once and then emptied. Documentary evidence so far discovered relating to the kilns described is sparse, and this account is based mainly on two geological publications of the mid-nineteenth century, and Tithe, Enclosure and Ordnance maps, in addition to fieldwork.

CORSE WOOD HILL & ASHLEWORTH Fig 1.

Delightful and unspoilt upland country lies between Tirley and Hartpury, where Liassic rocks with their beds of impure limestones were quarried extensively for building and lime-burning. The boundaries of quarries still manifest themselves as cliff-like edges to fields on the summit of Corse Wood hill. Little now stands of the kilns located, which were no doubt abandoned over a century ago.

1 The Ledge SO 813287

The site is reached by a lane from the Gloucester - Upton-on-Severn road. The only visible structural remains are the crown of a brick arch, this being the tunnel of a chamber accommodating the kiln 'eye', at the end of which is a masonry wall. A similar chamber stood a little to the north, the kiln design probably resembling that of Hay Farm (see No. 9)

Nearby is a large grass-grown dump of spoil or waste stone. According to local information, there was once a dwelling called Lime-kiln Cottage on the hill behind.

2, 3 Stait's Barn SO 817285, 818286.

Tirley Inclosure map (1) of 1795 marks these two kilns, the former being on the Tirley-Staunton parish boundary. Neither is shown on the 1921 6" Ordnance map, and nothing

is to be seen now.

4 Wickeridge Street. SO 808273

To the south of Corse Wood hill, this kiln is close to the road on the south side and probably still exists entire beneath much rubbish and undergrowth. It has not worked within living memory.

5 Ashleworth SO 806253

I remember this kiln 30 or 40 years ago standing beside the road on the south side; it has long been demolished. Mr A Compton of Corse (aged 86) informs me that as a young man he went there for lime. The stone was wheeled up a ramp in barrows and came, as he put it, "from all over the fields". A Scottish family named Cockburn of Ashleworth worked it. Both this and the previous example are marked "old limekiln" on the 1921 6" map.

6, 7 Hartpury SO 800247, 802252

Very recently a map of Hartpury dated 1809 came to light in the Gloucestershire Records Office - D199/4, showing kilns as follows: the first was on the south side of Danford's Lane, which was later converted into the turnpike road to Gloucester. The second lay a few yards north of the Ashleworth road, stone quarries being marked in the vicinity. There are no present remains, and neither is shown on the 1st edition of the 6" map. Further sites may be revealed on Tithe and other maps of this district: there has not yet been an opportunity to study them all.

GORSLEY DISTRICT Fig 2.

8 Linton Wood SO 672266

This kiln is only a few yards from the M50 Motorway, in a large and much overgrown quarry. The site is marked as "kiln" and "quarry" on the 1889 6" Ordnance map, so perhaps both were active then. The design resembles the Hay Farm kiln (see No 11). However, it appears that the front wall did not extend to the full height of the kiln, the mouth of which is marked by a hollow depression among trees.

9 Green's Quarry SO 677259 Fig 3.

In 1839 Murchison recorded (2) "On Gorstley Common are very extensive quarries including 15 or 20 ft of beds sufficiently calcareous to have been formerly burnt for lime". These quarries are now situated in the village of Gorsley which has largely grown up in the meanwhile. Green's Quarry was the largest, but for some reason was abandoned much earlier than the others. It is of interest in being associated with four kilns, of at least three different designs and sizes, and no doubt of different periods. From Murchison's remarks it appears that all had been abandoned before 1839, and the extensive growth of trees, including mature yews, on the site confirms this. The area is marked as "Lime-kilns" on Bryant's 1¼ in. map of 1835.

In the grounds of Linton Hall the kilns are in a long row extending over some 80 yds., and seem to have increased in number piecemeal to meet rising demand. It seems probable that they date from the 1790s, in association with the Newent coalpits which were then being developed by Perkins, Moggridge & Co. The structures are so ruinous, decayed and overgrown, that to make a proper survey is practically impossible. (3)

The oldest kiln is almost certainly at the west end. All have single chambers, and at least two have two eyes facing the front. Between kilns 1 and 2 are two horizontal masonry tunnels or vaults 4 or 5 ft. wide and high. The first, blocked by a fall, may have served an eye, though it is rather far from the kiln. The second is on a higher level (see Fig. 3), blind and apparently without purpose. Since the site was first explored several years ago, some of the masonry of the front of kiln 3 has fallen, leaving a very dangerous structure on the point of further collapse and virtually blocking the entrance altogether. This kiln together with No. 4 are heavily battered to resist soil pressure.

Kiln 4 is much the largest of any described in this article (see Table) and of particular interest is a flue or conduit at the top, shown in Fig. 3. Its purpose was perhaps a means of employing the waste heat to some use or for increasing the draught, albeit in a very asymmetrical fashion. Such application would have needed a lid or capping to divert the hot gases into the flue, and nothing like it has been encountered elsewhere. Another unusual feature is the very long (24 ft.) chamber or vault leading to the eyes, and from examination it appears this may be an addition to the original structure, being built of brick rather than masonry. Kiln 3 was also extended to a lesser degree in a similar fashion.

Collectively these four kilns were capable of high output, and in so rural an area the kind of market to justify construction is difficult to envisage. The variance with each other and with other designs described here is also hard to explain.

MAY HILL DISTRICT (4)

According to the "Memoirs of the Geological Survey" (5), the Wenlock Limestone "is the grand source of lime in the May Hill district and is extensively quarried in long continuous channels along the crests of woody hills, especially on the western side of May Hill. The solid masses of limestone are locally termed 'woolpacks', they yield the finest and most abundant lime-flour and seem to prevail along the high and prominent crests of the hills" ...

10 Aston Ingham SO 684236

This kiln was close to the road west of the school, a twin-chamber construction as at Hay Farm. It last worked about 1920 and according to local reports was filled in and buried in the 1950s. A tramway brought stone from the hill behind, but little trace of the quarry now remains. Various other quarries were also worked for lime between here and Clifford's Mesne.

11 Hay Farm SO 698226 Fig. 4

This site makes a rewarding study. Also certainly the kiln was never used or even fully completed; there is only partial infill between the front wall and the kiln shaft. The former is leaning dangerously and must be on the point of collapse.

The kiln was partially choked with rubbish when first examined, but by permission of the owner was cleared out to permit an inspection of its form. The inverted bottle-shape will be noted from the figure.

The mouth of the kiln is 6 ft 9 in. across. At 5 ft down the diameter increases to 7 ft 2 in., then declines linearly to 5 ft at 10 ft depth. Below this point for the remaining 5 ft (15 ft overall) the sides taper in order to produce a truncated oval form at the bottom, this being 1 ft 10 in. x 3 ft 9 in. along the major axis. The form of the Hay Farm kiln seems to be the nearest there is to a standard north-west Gloucestershire type. The shaft agrees with that described in Rees' "Universal Dictionary", (6) the design apparently superseding the earlier conical shape about the end of the eighteenth century. Since the right-hand eye is larger and lower than the left, it was probably intended for drawing the lime. The structure is entirely masonry, of May Hill sandstone, well mortared and jointed. It is marked as "Limekiln" on the 1887 6" Ordnance map.

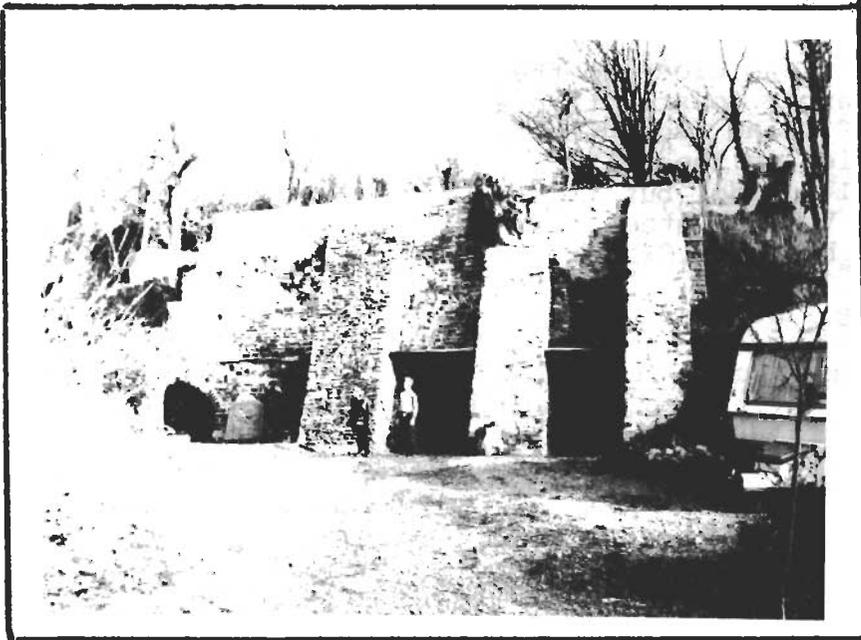
12 Old Farm SO 686207

The vestigial remains of a kiln can be made out in a line of small quarries in a strip of woodland on the outcrop of the Wenlock Limestone. There is much evidence of ancient crop-working here, and it is surprising that a more accessible spot to the west for the kiln was not chosen.

The same bed of limestone outcrops southwards across the A 40 Gloucester-Ross road all the way to the Huntley-Longhope road, a distance of 1½ miles. It has been very extensively worked, and there were formerly large quarries at The Rock, which fed a pair of kilns nearby at Rocklands.

13 Rocklands SO 688202 Fig. 5

Situated behind a house some 50 yards from the A40, these kilns are in good condition having been restored by the owner.



Rockland Kilns Recently restored and now used as garages. Corrugated iron over the entrances to two of the chambers obscures the view of the arches.
(Photo - D. Bick)

They conform to the general arrangement of the Hay Farm pattern but the front wall is battered up to the springing of the arches. It is also reinforced by three massive buttresses, apparently added as a precaution. At the left-hand end is a peculiar igloo or bee-hive masonry structure which shrouds or protects the adjacent chamber; its purpose is obscure.

No eye is apparent at X (see Fig. 5) but on close inspection it appears that the arch forming the aperture was removed and the hole filled up, perhaps to convert the kiln to 'single eye' operation. The mouth of the left-hand kiln is grassed over, but that of the other kiln can just be made out although filled to the top.

Much land hereabouts belonged in the eighteenth century to the Foley family and Benjamin Hyett. A kiln is marked at this spot on the Longhope Tithe map of 1841, landowner Rev. John Probyn, Dean of Llandaff, aged 80; occupier William Jones. By 1884 the 6" Ordnance map marks the site as "old limekilns".

South of Dursley Cross a prehistoric road leads to Longhope and passes over the Wenlock Limestone. In this area are the deepest and most impressive examples of limestone quarrying in north-west Gloucestershire, being even today for long distances 60 ft deep and more resembling open workings on a mineral lode than quarries. Northwards from the old road a footpath (7) leads about 200 yds alongside these excavations to the site of a kiln, No.14.

14 Kiln Wood SO 694197

This is marked as "limekiln" on an estate plan of 1780 (8), and on the 1841 Tithe map is marked "Lime Quarry and Kiln", landowner Thomas Drew the younger. According to the Ordnance survey it was disused by 1884. Only a few feet of masonry remain in view, in the bottom of the quarry.

15 Hobbs Quarry SO 695194

Immediately south of the aforementioned ancient road, the limestone workings extended without interruption to the Huntley-Longhope road and a public path follows the course. The first 50 yds or so has been infilled and thus it appears sealed the fate of "old kiln" marked on the 1903 25 in. Ordnance map. The quarry beyond has been recently cleared out and restored as an area of Special Scientific Interest, and gives a splendid exposure of the Wenlock Limestone, of a delicate pale blue-grey colour. Further south, the quarries are much overgrown but still very impressive in their extent and magnitude.

16 South Hobbs SO 696188

"Old Limekiln" is shown here on the 1884 6" Ordnance map, and no doubt stood in the quarry itself. Unfortunately, the last $\frac{1}{4}$ mile of outcrop working has been completely levelled and grassed over, and we may suspect the kiln was buried in the process. In 1841 the landowner was John Coleman, and the kiln "In Hand".

Assuming the workings from Kiln Wood to South Hobbs averaged 50 ft deep and 60 ft wide, the total volume of stone removed may be computed at 12,000,000 cu. ft, or about 700,000 tons.

KILN CAPACITIES

Accurately to compute the internal volume of a kiln is clearly impossible without access for measurement. Therefore to give some idea of relative capacities a simple approximate formula has been devised.

$$\text{Volume } V = 0.75 \pi \frac{d^2 h}{4}$$

d = diameter of mouth of the kiln
h = overall height of kiln (the actual height of the kiln shaft would be somewhat less)

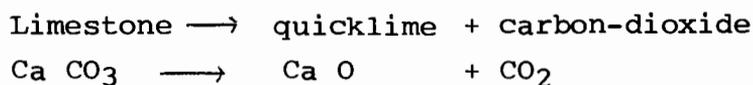
(Calculation appear on the following page).

Table

Kiln			d ft		
Linton Wood			?	21	?
Green's Quarry	1		?	23	?
"	"	2	11	23	1,600
"	"	3	11	27	1,900
"	"	4	17	27	4,600
Hay Farm			6.75	16	240
Rocklands	1		7.5	19	630
"	2		7.5	19	630

THE CHEMISTRY & PRACTICE OF LIMEBURNING

The process of converting limestone to lime consists of heating the stone to a temperature of 900° C - 1000° C, sufficient to expel carbon-dioxide. The equation is as follows:



Carbon-dioxide, being heavier than air and in effect poisonous, caused many casualties, especially to tramps and vagrants spending the night in the warmth of a kiln.

Quicklime is a very active substance and combines with water, producing great heat, to form slaked-lime or calcium hydroxide



Limeburning was more an art than a science; the draught and temperature were much at the mercy of wind strength and direction, and of the varieties of stone and coal supplied. Burning consumed a great deal of air, at least 15,000 cubic feet per ton of lime. This was needed for combustion of the fuel and to remove the carbon-dioxide released, for since the reaction is reversible, the gas could otherwise re-combine with the calcium oxide.

To obtain even burning throughout the charge, good air-distribution was assisted by the use of multiple eyes. Many kilns however, managed with one, and it is possible that certain limestones were more tolerant than others in this respect.

Overburning was as detrimental as underburning, and argillaceous limestones (limestones with a clay content) could vitrify and become useless. When withdrawn, the lime was not in powder form, but in just the same shape as the stone fed in from the quarry; it was of course lighter by the weight of carbon-dioxide expelled.

CONCLUDING REMARKS

It is hoped this account will encourage further studies of kilns in general, and Gloucestershire examples in particular.(9) Investigations are already in hand or completed by I.A. societies in the south-west, and an illustrated booklet on kilns of the area has recently been published by the Department of Economic History, the University of Exeter.

I should like to thank Drs. Stafford Linsley and Marilyn Palmer for useful comments; grateful thanks are also due to owners of the sites for access, and to the staff of Gloucester Records Office for assistance with documentary research.

D. Bick 1984

REFERENCES

- 1 Gloucester Records Office.
- 2 R I Murchison, "The Silurian System" (1839) 442.
- 3 D Bick, "The Hereford & Gloucester Canal", (Newent 1979) 10, 16. See also "Records of the Newent Coalfield" GSIA Journal 1979.
- 4 For the geology of the May Hill area, see J D Lawson, QJGS Vol CXI Part 1, 85-109.
- 5 J Phillips, "Memoirs of the Geological Survey", (1848) Vol 1, Part 2, 185.
- 6 Rees, "Universal Dictionary", (1812) Vol 20, Part 39.
- 7 According to Ordnance maps, this path is a public right of way, irrespective of signs to the contrary.
- 8 GRO Hyett Estate, D6. E4.
- 9 See also David Bick, "Limekilns of the Gloucestershire-Herefordshire Border", "Industrial Archaeology Review", Autumn 1984, Vol vii, No. 1.

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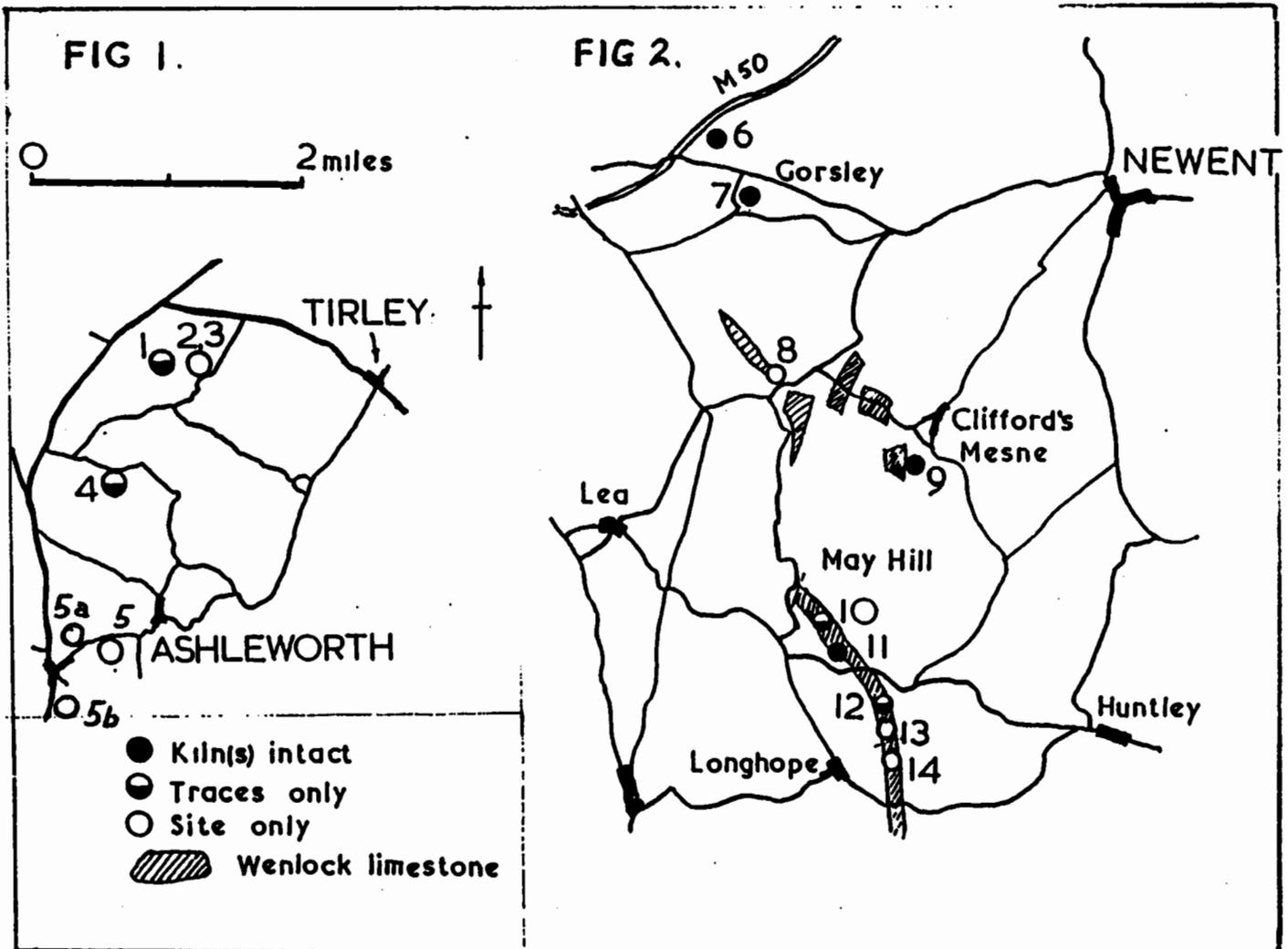
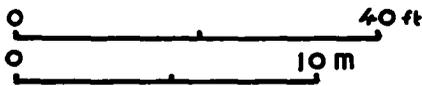
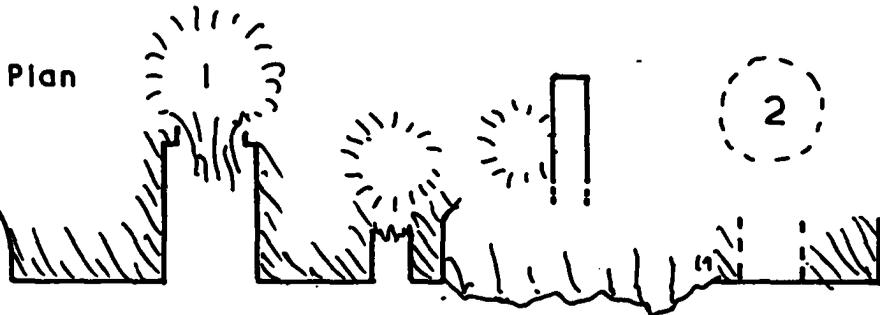
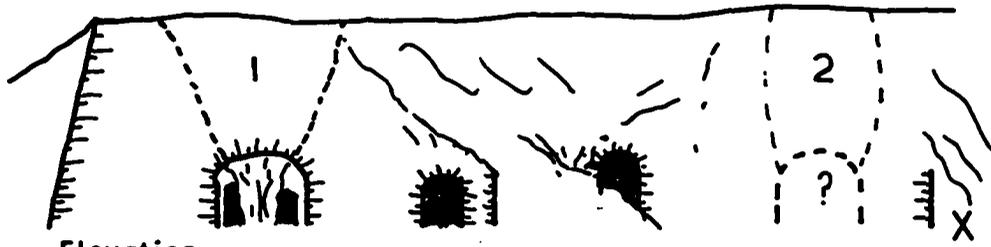
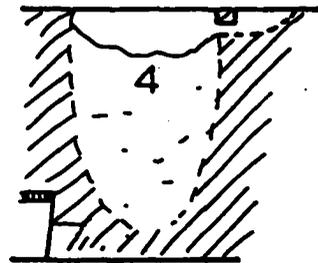
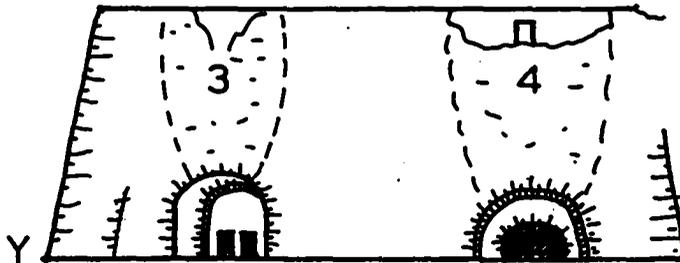


FIG 3

GREEN'S QUARRY



note XY=77ft



Elevation

B

Section BB

Plan

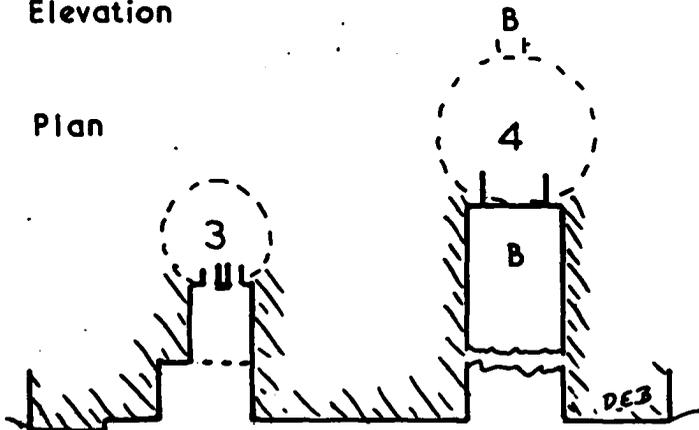
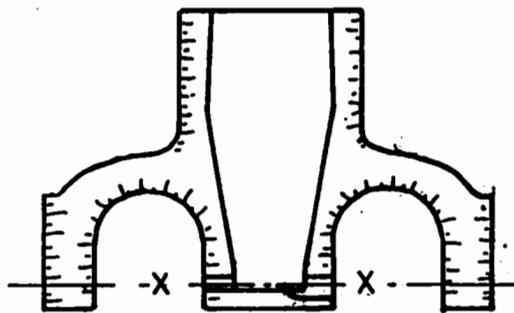
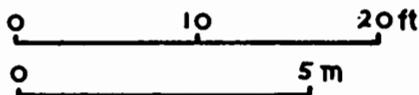
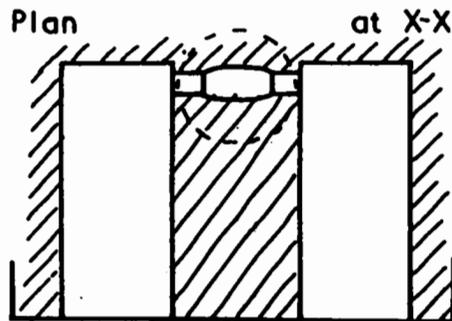


FIG 4 HAY FARM



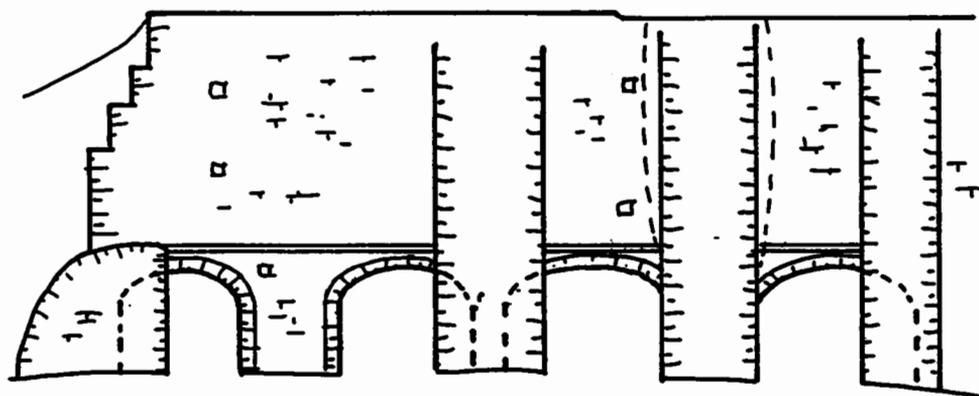
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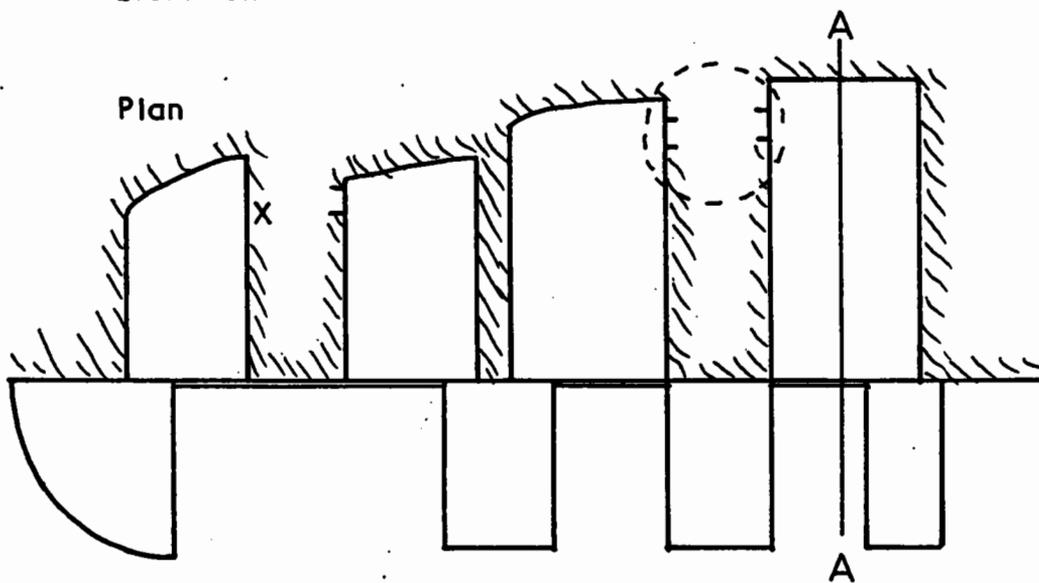
Cover Drawing. Another attractive sketch by Pat lane. This is of a charcoal plant, another view of which appeared on the cover of the 1971 Journal. It can no longer be seen, as it was demolished by the Forestry Commission to make way for an Exhibition building (which, I am told, has not yet been built.). The plant stood near a cross-roads between Cinderford and Coleford and though closed before World War II was re-opened during that war, and worked for some time since. At least this drawing is a record of what was there before.

FIG 5

ROCKLANDS



Elevation



Plan

