



Clackmannanshire
Field Studies Society

Linn Mill

Excavation and Survey Report, 1974

Second Edition, 1979

REFERENCES –

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O.S. map - 25" sheet CXL 2 (1863).

Mr Oscar Goodall.

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O.S. Name Book - Linn Mill.

O.S. Name Book – Linn Mill (Addition).

CLACKMANNANSHIRE FIELD STUDIES SOCIETY

LINN MILL

EXCAVATION AND SURVEY REPORT

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Preface to the Linn Mill Excavation Report

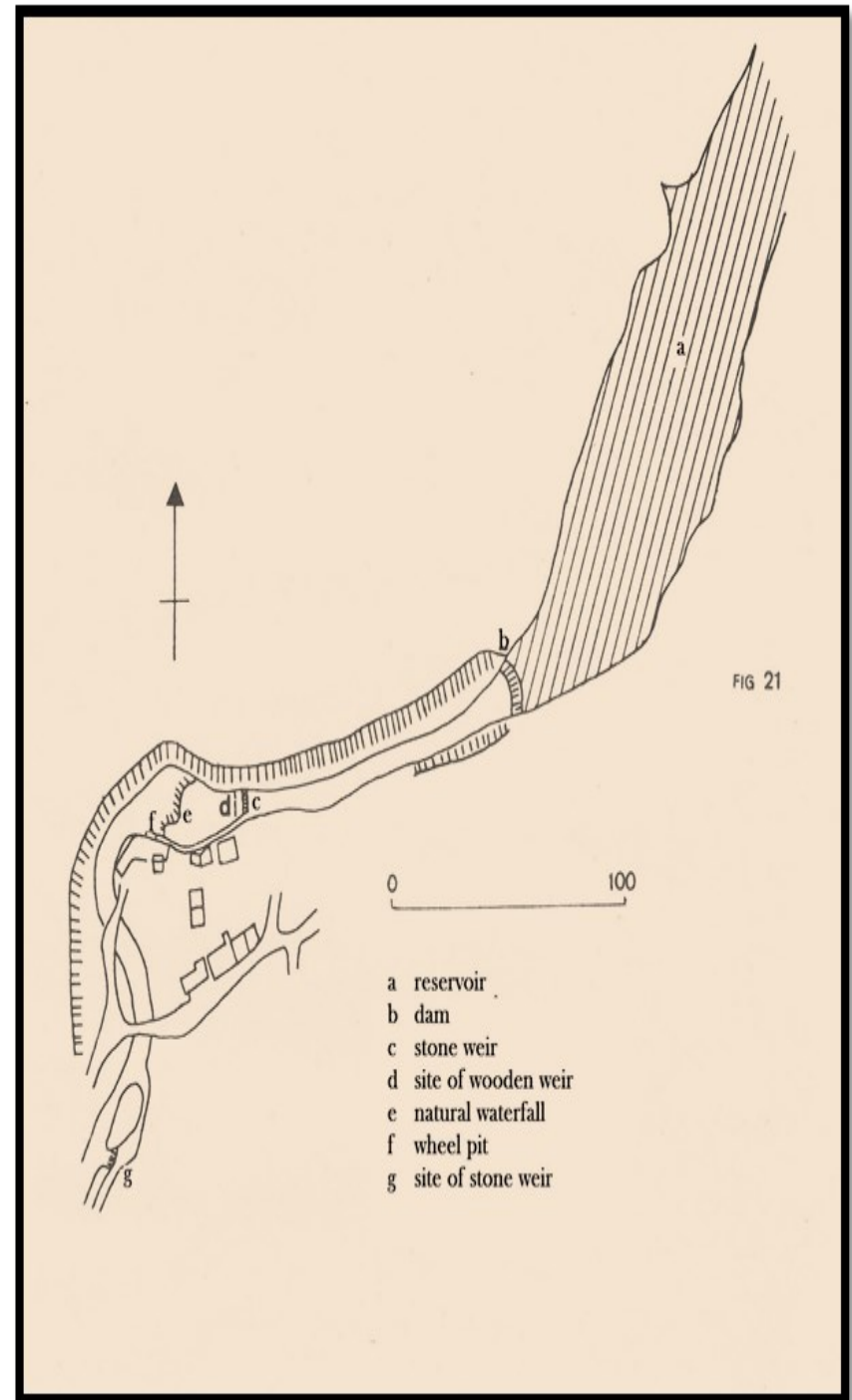
This is the first of the occasional papers which are intended to be important element of the Society's publications, intimating the results of research projects by individuals or groups with the Society. The Linn Mill projects was the common factor in the Society's early existence but did not meet with the material success intended for two reasons – lack of general support and the intervention of nature. The first factor became more significant as it was realised that there was more work than was originally estimated and appeals for help on Sunday afternoons and Thursday evenings came to little result. Nevertheless excavation was carried out to the extent of uncovering the evidence for an extremely complex water mill site history as described in the paper. The rock fall which covered part of the site and blocked the river on 13th March was the death blow to renovation plans including an operative wheel. When the river was finally diverted through the site in August it was fortunate that the work had been done for so much washed away.

Both the impetus behind the project and the writing up were the sterling efforts of Murray Dickie. About 12 other members took part in the digging and researching and, despite the drawbacks, many valuable lessons were learned. Thus this paper indeed marks a significant achievement for the Society.

W.G.U.

We are extremely grateful to Mr Grindlay, owner of Grassmainston Farm upon whose land the mill stands, for his permission to carry out work on the site and to the Clackmannan Society for their assistance with this work

I wish to thank the "hard-core" members of the work group - Mrs T Dickie, Miss Dimmer, Miss Johnstone, Mrs E Kennedy, Miss J Sneddon, Mr M Oakden, Dr J Robson and Mr A Roy for the tremendous amount of time and effort which they have put into the project. I would like to thank Mr A Stoyel



STAGE V - The outline of building 1 / 1V was re-roofed with corrugated iron at some date after 1890. The floor level has been filled in with broken pan tiles and a drain has been constructed at the NE corner of the paved area. The building was in use for the storage of farm implements until 1967.

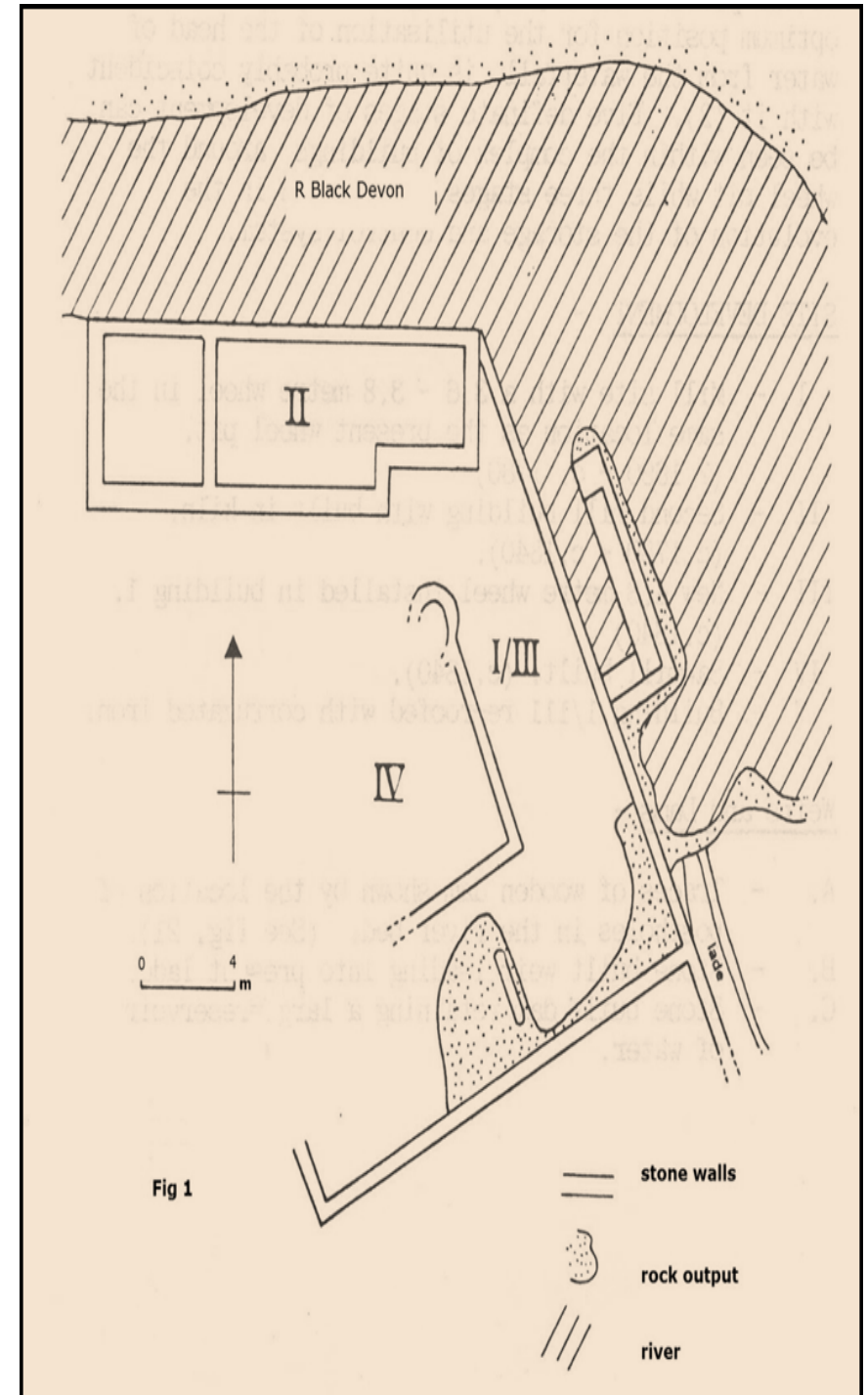
STAGE VI - The complex has now been more or less completely destroyed following a massive rock fall from the opposite cliff and the consequent flooding due to the river being dammed. (March 1971).

WATER SUPPLY -

The potential of the site for water power lies in the existence of a large waterfall (point e) which provides a natural head of water approximately four and one half metres in height. By constructing the mill (point f) below the waterfall a more than adequate head of water can be obtained by the use of a very low weir.

A row of postholes cut into the bedrock just below the stone-built weir. The stone built weir (point c) offers no greater head of water. Rather it represents a move towards a greater degree of permanence in the structure. The reservoir (point a) held behind the stone built dam (point b) is of unknown date. It most probably indicates the problem of a low level of water during the summer months. A problem which must have been intensified by the considerable quantities of water being removed by the lade at Forestmill to supply the Gartmorn complex.

It is interesting to note that another lade complex; the feeder system for the water powered colliery pumping engine at the Craigrie Pit, started from this site (point g).



STAGE 1

Examination of the area around the existing wheel pit revealed the following evidence to suggest that there had been an earlier wheel of smaller size:

a. **Wheel pit I** a portion of the N. wall of building 1 within the present wheel pit shows clearly traces of an earlier keyed-in wall at right angles to the main building and about 0.6m closer to the shaft than the rear wall of the existing wheel pit.

(See fig. 2)11 The rear wall of the existing wheel pit is not keyed- in to the mill wall or to the outer wheel pit wall.

(" " ") 111 The existing outer wall of the wheel pit is in two distinct parts : a lower part and a more recent looking (i.e. less eroded blocks of stone) upper part.

b. Bearer

(See fig. 4) There is a cut stone bearer in the inner wall of the pit & 5a)wheel pit. The basal surface of the old main bearing lay 0.6m below that of the new. This coincides with the centre level of the lower shaft hole. This stone bearer is underlain by cut blocks and overlain with rubble fill.

c. **Shaft hole** There are two shaft holes in the wall of the mill. **See (fig. 5b)** The centre of the lower shaft is 0.6m below that of the upper. The lower hole is partially blocked with stones and bricks. The two shaft holes are of identical size.

ARMS - Eight arms of hardwood measuring 10cms. X 4cms. X 64cms.

SHAFT - Octagonal hardwood three metres long 17.5 cm .across.

BEARINGS - Cast iron cross pieces onto square centre with cylindrical end. The cross pieces slotted into grooves cut in the shaft. Any slack which resulted from wear was taken up by inserting wooden wedges between the slot sides and the cross pieces.

RINGS - Wrought iron locking rings were hammered onto the end of the shaft to fix the bearings firmly in place.

BOX - The bearings sat on bronze journals enclosed in cast iron boxes. These boxes were then set into wooden bearers. (See fig. 2 on page 4).

NAVE - The iron nave bolted together to fit over the octagonal shaft (See figs.18, 19, 20.).The ends of the arm fitted into slots, were covered by fitted wrought iron plates and bolted in place. The two halves of the nave were bolted together by means of wrought iron straps. (FIG. 19 shows the inner surface of one half of the nave).

BUCKETS - Wooden planks 1.06 metres long and 2.5 cms. thick were fitted into the slots in the shroud. From fragments found In the wheel pit they would appear to have been made of softwood.

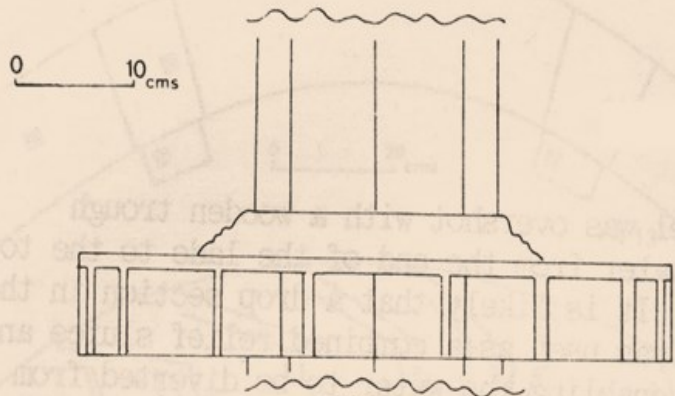


Fig 18

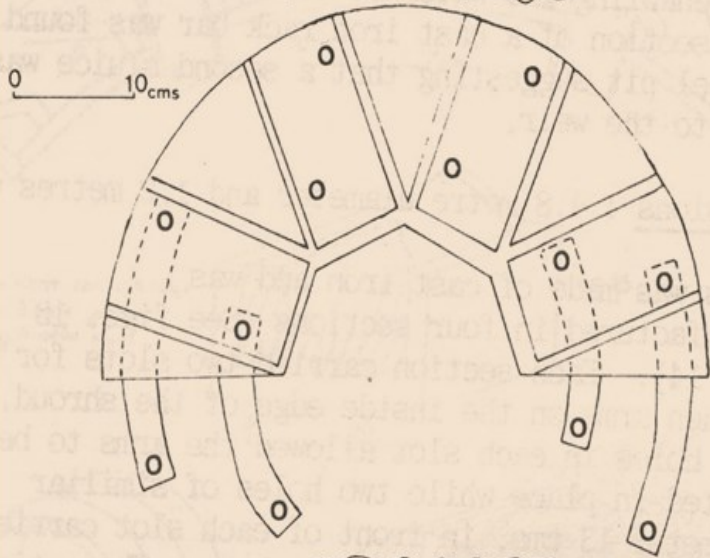


Fig 19

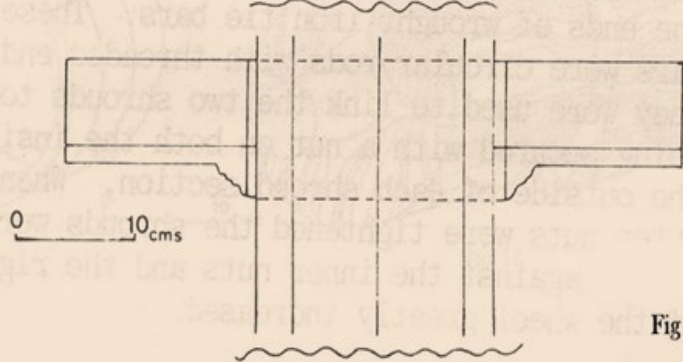


Fig 20

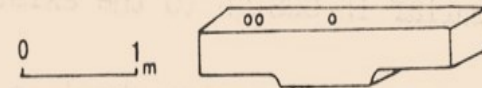


FIG 3

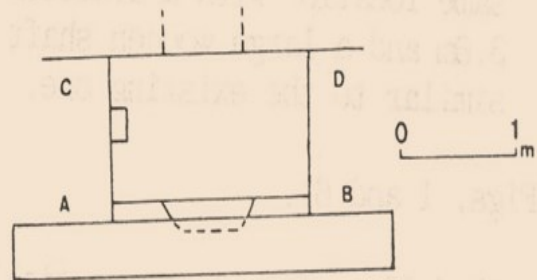


FIG 4

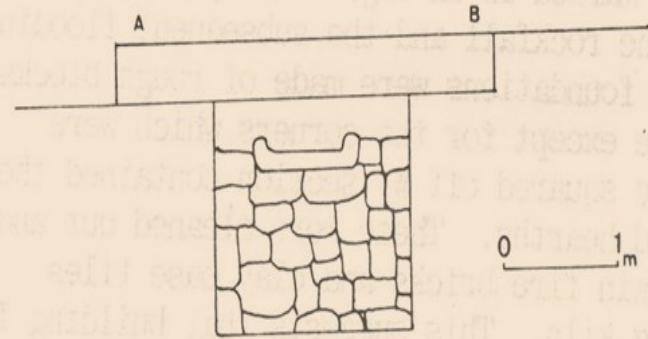


FIG 5a

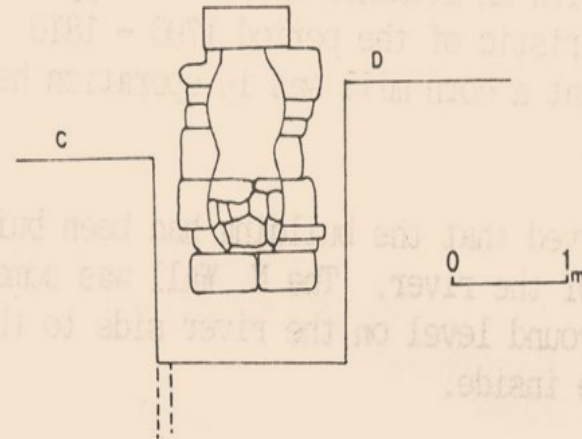


FIG 5b

(This suggests that the earlier shaft was a large wooden beam similar in design to the existing one)

CONCLUSION - There was an earlier wheel in the same location with a diameter of about 3.6m and a large wooden shaft similar to the existing one.

Stage 11 – (See figs. 1 and 6).

The building marked 11 on fig. 1 was partially excavated before the rock fall and the subsequent flooding destroyed it. The foundations were made of rough blocks of yellow sandstone except for the corners which were ashlar blocks. The squared off W. section contained the bases of two ruined hearths. These were cleaned out and were found to contain fire bricks and clay base tiles from a grain drying kiln. This suggests that building 11 was a grain mill with an attached kiln. The type of tiles are characteristic of the period 1790 – 1810 (3) and it is known that a corn mill was in operation here at that date (4)

It was observed that the building had been built out into the bed of the river. The N. Wall was some two metres from ground level on the river side to the floor level on the inside.

The bank on which the S. side of the building stands is composed of the remains of a much earlier cliff fall with large jumbled boulders of yellow sandstone cemented together with clay and stones.

In dating this building as the second phase of development the nature of the junction of the N. walls of the building 1 and 11 was taken into consideration. The new wall which was constructed at the time of the installation of the larger wheel butts into the wall of building 11. This requires that building 11

NEW WHEEL-

The wheel was overshot with a wooden trough caring the water from the end of the lade to the top of the wheel. It is likely that a drop section in the wooden trough was used as a combined relief sluice and safety device enabling the water to be diverted from the wheel. A section of a cast iron rack bar was found in the pit wheel pit suggesting that a second sluice was in use closer to the weir.

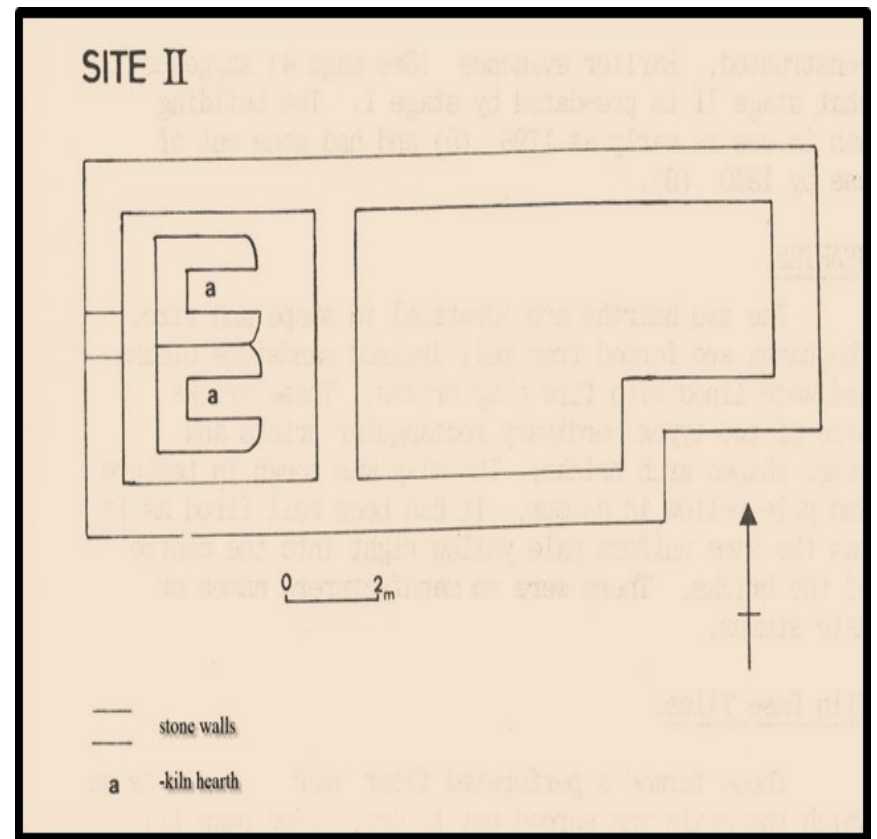
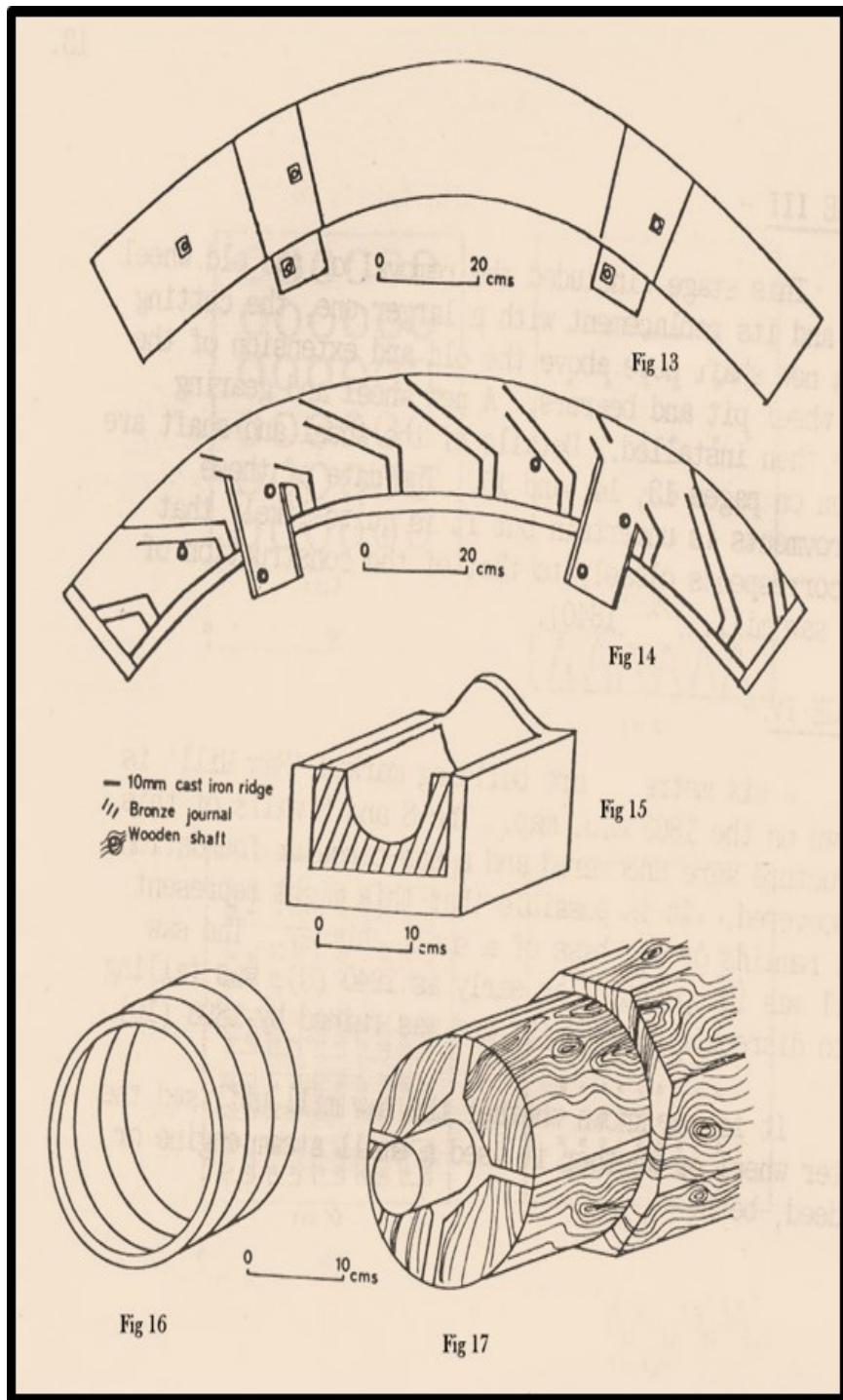
OVERALL DIMENSIONS:

4.8 metre diameter and 1.2 metre wide.

SHROUD –

This was made of cast iron and was manufactured in four sections (See Figs. 13 and 14. Each section carried two slots for wooden arms on the inside edge of the shroud. Two holes in each slot allowed the arms to be bolted in place while two holes of similar diameter 13cms. In front of each slot carried the ends of wrought iron tie bars. These tie bars were circular rods with threaded ends. They were used to link the two shrouds together being secured with a nut on both the inside and the outside of each shroud section. When the outer nuts were tightened the shrouds were locked against the inner nuts and the rigidity of the wheel greatly increased.

The inside edge of the shroud carried a series of cast iron ridges which held the wooden planks of the buckets in place. At the end of each shroud section drilled tie pieces allowed the section to be bolted on to its neighbour.



Earlier evidence (See page 4) suggests that stage 11 is predated by stage 1. The building was in use as early as 1796 (5) and had gone out of use by 1840 (6).

HEARTH.

The two hearths are identical in shape and size. The bases are formed from well dressed sandstone blocks and were lined with fire clay bricks. These bricks were of two types: ordinary rectangular bricks and wedge-shaped arch bricks. The clay was rough in texture and pale yellow in colour. It had been well fired as it was the same uniform pale yellow right into the centre of the bricks. There were no manufacturer's names or date stamps.

KILN BASE TILES.

These formed a perforated floor over the hearths on which the grain was spread out to dry. (See page 11)

Many fragments of kiln base tiles were recovered from building 11, especially from within the hearths. There were two types of tiles: one (type a) having thirty six cone shaped depressions terminating in thirty six manholes and the other (type b) having twenty five square depressions terminating in one hundred small holes.

The clay from which the tiles were made is of the same colour and texture indicating that it came from the same or very similar localities and that it had been well fired. (7)

MANUFACTURING PROCESS.

Type A:

1. **The** clay had been well mixed and formed into rough slabs. There were very few inclusions of air in the clay but enough to show that it had been mixed and folded.
11. The rough slab was thrown into sanded mould of square outline with forty two small cones arranged on the basal surface of the tiles.
111. from the basal side. The mark of the pin which was used to punch these holes can often be seen on the walls of the cones.

STAGE 111 –

This stage included the removal off the old wheel pit and its replacement with a larger one, the cutting of a new shaft hole above the old and extension of the pit wheel pit and bearers. A new wheel and gearing were installed. Details of the wheel and shaft are given on pages 13, 14, and 15. The date of these improvements is uncertain but it is quite likely that it corresponds closely to that of the construction of the saw mill. (c. 1840).

Stage 1V -

A six metre square building marked “Saw Mill” is shown on the 1863 O.S. map. The S and E walls of this structure were uncovered and a sub-circular foundation discovered. It is possible that this might represent the remains of the base of a small chimney. The saw mill was in operation as early as 1840 (S), was falling into disrepair by 1863 (9) and was ruined by 1898 (10).

It is not known whether the saw mill utilised the water wheel or whether it used a small steam engine or, indeed, both.

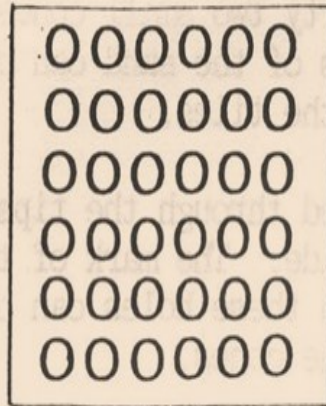


Fig 7

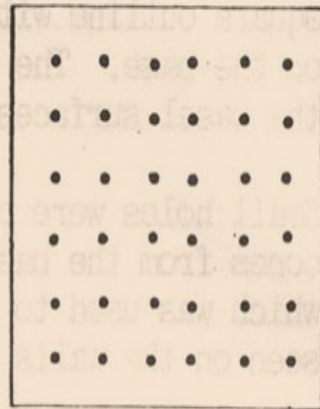


Fig 8

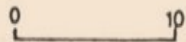


Fig 9

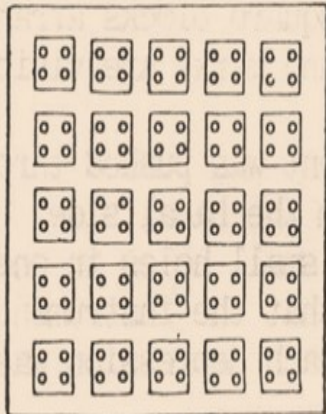


Fig 10

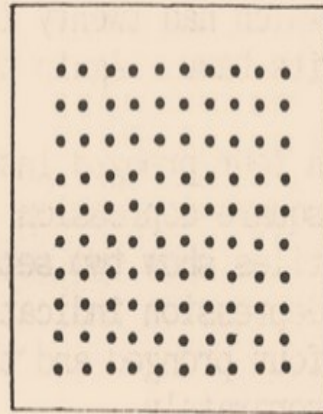


Fig 11

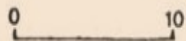


Fig 12

TYPE B:

1. The clay had been mixed but not as well as it had been in the manufacture of type A as there were numerous inclusions and folds visible.
11. The rough slab had been thrown into square mould which had twenty five square blocks arranged on its base. Again the sand marks are visible on the tiles.
111. A four pronged instrument was pushed through each square depression from the basal side, Some tiles show two sets of small holes in one depressing indicating that the instrument was four pronged and that each depression was cut separately.

The colour and grain of these tiles are identical to those of wares from Clackmannan Brick Works sited less than one mile away.

(See Tile pattern description on page 11.)