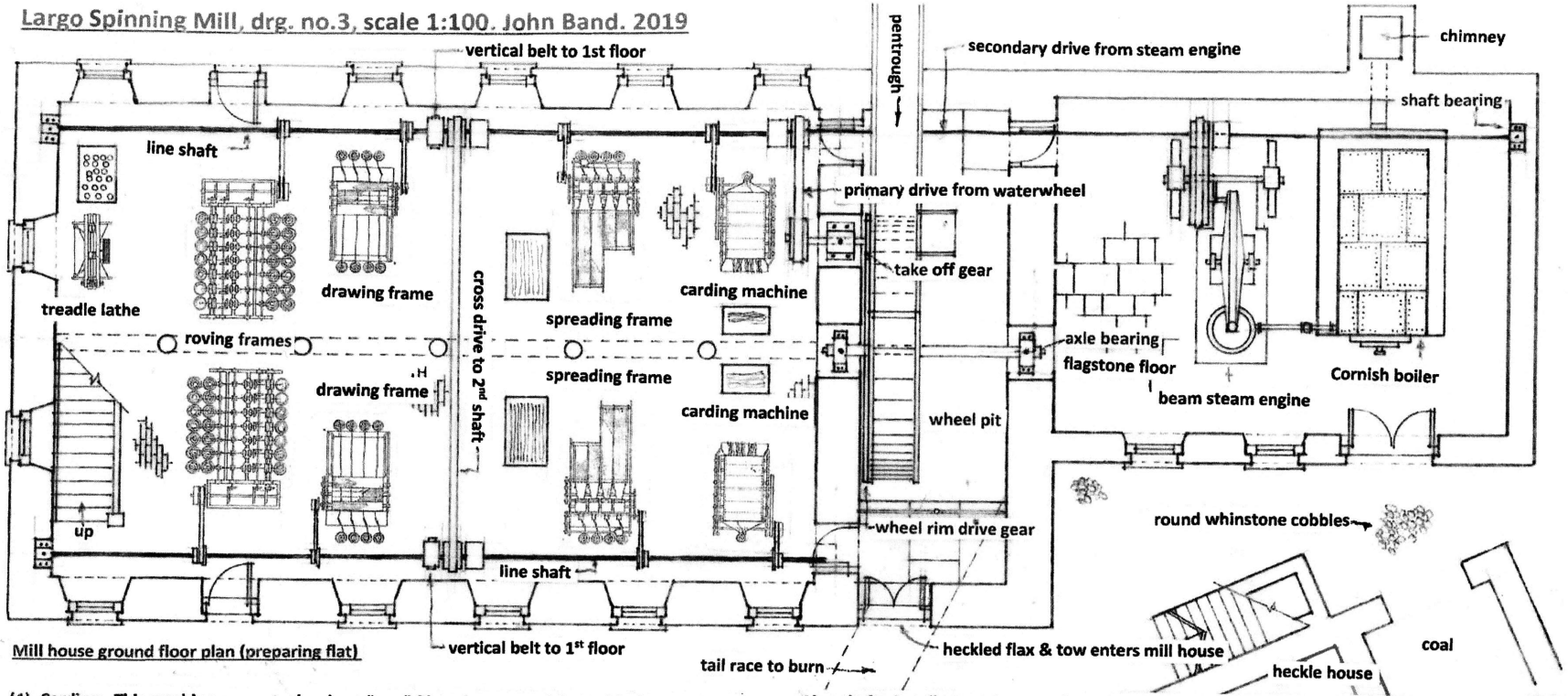
Largo Spinning Mill, drg. no.3, scale 1:100. John Band. 2019



Mill house ground floor plan (preparing flat)

(4). Carding;- This machine converts the short "tow" fibres into material suitable for spinning. The machine disentangles, cleans & intermixes the fibres to produce a continuous "web" or "sliver" by passing the fibres between differentially moving surfaces covered with card clothing. It breaks up unorganised clumps of fibres and aligns the individual fibres to be parallel with each other. The machine is in the form of a large diameter roller with several smaller rollers around its outer circumference in the form of an arch.

(5). Spreading, drawing & roving;- The object of spreading is to produce a "sliver" both "tow" & "line" flax of uniform thickness. The attendant knows from experience the quantity of flax or "stricks" to spread in rows across continually moving bands of cloth on the feed beds (small conveyor belts). The ends of each strick are lapped to reach the middle of the previous in order to produce a continuous finished sliver in the form of a flat "ribbon". The rows of flax are drawn through a series of rollers fixed in pairs (each pair revolving faster than the previous), these produce a continuous drawn out sliver of fibre. The machine finally combs, separates and straightens the slivers which falls into a "cans". The drawing frame which is similar to the spreading frame is then used to further increase the fineness & uniformity of the sliver. This frame consists of two sets of fallers & rollers, and the place of the feeding (conveyor) table & guides is supplied by a plate of polished sheet iron, the width of the machine, over which the sliver glides in passing from the cans to the detaining rollers. These rollers are set in a triangular form, the sliver being made to pass under the first, over the second & under the third. The drawn slivers are finally made into "roving", this is the conversion of the slivers of flax fibre from a flat "ribbon" to a soft, small cylindrical cord which is ready for spinning. The finished roving can be of either line flax or tow.

Columns/beams;- In order to break the span of the first & attic floor joists, steel columns were required with a "head tree" on top of each supporting sections of timber beams.

Line shafts & pulleys or drums;- These were the link between the steam engine or waterwheel and the machinery in the mill. The shafts were made up of lengths of round steel bolted together at their end flanges and suspended on iron brackets from the floor joists above, each bracket being complete with a bearing requiring regular lubrication. Adjacent to each piece of the machinery a pulley or drum was fixed to the shaft with another unsecured (idler) directly adjacent to it to allow the drive belt to be slipped across in order to disengage the piece of machinery from being driven. The ability to disengage all or individual machines was important for two reasons;- It allowed for maintenance of machines without shutting down all machines and at the end of each shift when the mill bell was rung all machinery was disengaged from the power pulleys, this allowed the steam engine to be started the following morning without the need for it to overcome the friction of driving all the vertical & line shafting along with all the individual machines at the same time, ie once the shafting was at full speed the machine drive belts would be individually engaged by slipping their belts from the idler pulleys to their adjacent drive pulleys. The pulleys or drums had a slightly convex top surface which kept the belt in place during operation, a flat surface would allow the belt to drift from side to side, potentially slipping off completely.

Belts;- These were traditionally made of Oak tanned leather with the hairy side down ie onto the pulley or drum, this provided better adhesion than the smooth shiny side. To assist with the adhesion the leather was impregnated with a mix of hot boiled tallow (animal fat) & bees wax. With the limited size of a cow hide many lengths had to be joined by lacing with wire or leather, lapping & glue or using types of patented metal clips. Later woven fabric belts were adopted with only one joint.

Access doors;- The doors to both the front & rear elevation of the mill house were of timber lining framed and braced, each with an 8 paned fanlight above. The door to the waterwheel house was a pair of doors as above with each door containing small glazed openings at the top.

Sash windows;- Timber sliding sashes with 8 panes per sash.

Waterwheel;- The advert for Largo Mill in 1801 mentions the waterwheel as of the "overshot" type, 18ft. (5.48m) dia. x 3 ½ ft. (1.067m) wide. It drove the machinery via a large rim gear on the circumference of the wheel. The wheel pit when excavated in 1983 revealed a projecting ring on the dressed ashlar face of the pit below the mill house gable. This ring was approx. 200mm wide projecting from the wall face approx. 50mm. From extensive research on pit construction this detail appears to date to be unique to Largo Mill. I can only assume it was for running some form of guide rollers fixed to the side of the wheel in order to maintain full "meshing" of the rim & drive shaft gears. The waterwheel is recorded as generating 14 horse power & was 65% efficient.

Steam engine;- The steam engine and its house was added at some point between an advert in 1814 (no mention) & an advert in 1828 (first mention). The engine was possibly manufactured & installed by Messrs J & C Carmichael, Ward Foundry, Dundee who commenced business in 1810 manufacturing all types of mill engines and flax spinning machinery. An old style "beam" engine & Cornish boiler is recorded at Largo Mill in 1860. In 1835 the engine is recorded as 6 H.P., by 1838 it had been up graded to 14 H.P. The engine was introduced due to a problem with a constant supply of water to power the mill, particularly in times of drought. The 1828 advert to let the mill emphasises this problem "It is driven by water, assisted by steam in the dry season". The use of "assisted" tells us that the primary power was water, this was a free source of power & obviously the preferred option, coal had to be bought. The wheel & engine could be independently connected/disconnected from the line shafting by slipping their drive belts on/off the drive pulley or drum on the line shaft to/from the adjacent idler pulley or drum alongside.