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Lime Quarries of Horton

Helwith Bridge Granite + Road Stone
Quarry

The LIME QUARRIES of HORTON.

The Limestone Industry has grown out of an ancient craft and mechanisation has been called upon to meet the needs of today.

The Past. Limestone would be burnt by chance as soon as fire was used in the limestone country.

Early quarrying. In this district there are many old "holes" where limestone was dug. Old kilns in the fields show that many farmers roasted limestone with wood or even coal (the coal being obtained from surface mines on Penyghent, the cart road being still visible; Fountains Fell has old coal shafts).

Industrial Revolution 1750 - 1850, the industry escaped the changes & development that went on in England in that period in textiles, coal & iron. The reason was that we are remote - quarry men are slow to accept new ideas - in the rural area there was enough labour (cheap), so mechanisation was not wanted.

(From a 6" Ordnance Survey Map drawn a map of Herton, showing particularly the quarry - Little & Co. (Central line))

- Two Important Discoveries
1. Cushion. 1858 - An American patent. This brought to an end the job of the stone-breaker.
 2. Blasting gelatine. 1875 - Swedish chemist - Bernard Nobel. He was ~~not~~ so worried by the possible use of his discovery in war that he created the Nobel Prize scheme. The Nobel Prize had been used but was "unsafe".
- Kilne production has not improved & developed as some industries have done - Most quarries are over 30 years old. New plant is very expensive & the selling price of the product is low. Recent improvements are noticeable in Station. The fuel shortage & increased cost has meant that fuel for kilns had to be used ~~to be used~~ to better purpose. Robson changes have meant that such firms as Settle Kilns have had to turn their attention to new designs

1. The quarry face. Over a quarter of a mile in length - height varies between 80' and 150'. Stone is in horizontal strata - cream coloured - contains 99% pure lime or calcium carbonate. It is hard - needs a pressure of 22,000 lbs. to the square inch to crush & has to be blasted out of the hillside.
 2. Blasting. Vertical holes 18' from edge, 16' apart, dug enough to take a 25-lb. cartridge are drilled from top to floor level. Each blast is mainly confined to six or seven holes, giving about 30 to 25,000 tons of ~~rock~~ stone. Face to be blasted is carefully measured & Volume
- Herton Lime Works of the Settle Kilns Ltd. Founded many years ago by John Selary - gave employment to local inhabitants & "foreigners" from the Derbyshire quarries. Within the past 10 years great extensions have been made, & the quarry is an efficient & modern one and in the country, U.S.A. or Germany. It is on the Eastern slope of Moughlan, facing Dewyghent
- Process in Herton Quarry

calculated, so the amount of explosive needed can be worked out.

Holes are stemmed with lime dust after charging. The row is fired from a shot-firing battery which can only be fired by electricity.

3. Moving stone to crusher.

Until ^{lately} this was manual labour - stone broken by men with hammers & loaded into bogies. Now the whole output is handled by an excavator. This can load 800 to 1000 tons per day. It is on a caterpillar track & worked by a 100 H.P. electric motor. The shovel can pick up $1\frac{1}{2}$ cu. yds. & shoot this into a dumper.

* Here attempt to draw an excavator. You may have seen it. Photograph 3. In the Yorkshire Dalesman will help.

The dumppers deliver the stone from the face to the receiving hopper of the crusher which is constructed of re-inforced concrete.

A pen and ink sketch of a dumper here.

4. Crushing and screening.

Large tonnage per hour dealt with. Much of the stone is in large pieces some weighing as much as $2\frac{1}{2}$ tons. Thus the machinery is very heavy - when working it seems to shake the ground round about, & the stone passing along the feeding hopper makes a big noise. This crusher does in fact weigh 61 tons & has a mouth 55" by 36". It could crush 250 tons of stone per hour though it is not usually worked at this rate. The motor which works it is an electric one of 150 H.P.

(Draw it.)

Screening All the stone that leaves the crusher is less than 10" any way, but it needs to be separated into sizes. This is done on a vibrating & a rotary screen. In the building where this is done it is impossible to hear the human voice as there is so much noise. The different sizes of stone are put into separate chutes or hoppers. From here it goes into bogies. These each carry about 2 tons. They are weighed & then attached to a rope haulage, which trams the bogie either to the kilns or the railway or road wagon loading points.

Kilns. All the stone which is not sold raw is calcined in vertical kilns to produce lime. There are seven kilns. They are large-diameter cylindrical steel casings with fire-brick linings. Stone is charged into the kiln top & the fuel is charged by hand half-way down. Lime is drawn from the bottom of the kiln. The work of the lime-drawer here is definitely skilled, as well as hard and sometimes dangerous work. Lime kilns need understanding - experience, conscientiousness, interest are needed.

(Sketch 9.)

Disposal of the Products.

The lime is graded - picked over by lime-pickers. These are usually quarry-workers who have had long service with the company, who are unfit for hard physical work, but who can soon recognise a bullhead (a core of unburnt stone) from a cob of lime. Much lime is sold without further processing.

The rest is hydrated. A white powder, is produced - free from impurity - all particles are smaller than a 200 mesh (a 200 mesh is a square hole whose side measures $\frac{3}{1000}$ of an inch). This is packed in paper-bags by blowing it from a spout on the machine through a valve in the corner of the bag.

Some lump lime is ground for agricultural uses.

Settle Limes have two works-locomotives with which they shunt wagons into the main line sidings. This industry ^{means} that the L.M.S. Station at Horton-in-Ribblesdale does more business ~~that~~ than any station between Shipley and Carlisle.

Uses of lime. It is one of the oldest manufactured chemicals. The stone is used in blast furnaces - as a road metal - in filter beds - for agriculture - for many chemical processes and as a building material.

It is the basis of the alkali industry - used in the manufacture of soap, steel & many heavy chemicals - water-softening & purification - sewage treatment - paper & leather preparation, bleaching; dyeing & scouring, gas & coke works, feeding stuffs & fertilisers - as a filler in many commodities, as widely different as paint & chocolate.

Include also sketches from any sources
Information gathered from workers.
Consider a possible visit.

Give an idea of the special jobs done by various workmen.

What work is done by German prisoners now?

Stick any pictures bearing on quarrying.
Mention can be made of the Granite quarry.
Housing provided.

Influx of workers from other parts of the country.

Additional information gained in a visit to Horton Quarry on 2/11/48.

Quarry-face - Before mechanisation, 31 men could produce 400 tons per week.

Now 21 men produce an average of 800 tons per week (record 947 tons).

Over 475 tons there is a pay bonus for the workers.

Firing shots. High explosive method previously mentioned.

Use of black powder (gunpowder) - is a cheaper & often used method.

"Chirping" or springing is done first (after the drilling of a 7" hole with the percussion drill) - i.e. first a charge of 1 cwt is fired - then $\frac{1}{2}$ cwt, then 2 cwt. -

$2\frac{1}{2}$ cwt - & 3 cwt. - This produces a chamber for the big charge & makes a crack so that the portion has to be just blown over.

Into this chamber about 2 tons of black powder are put. It is fired by a firing battery. The bottom part is blown out & the upper part topples down. 30,000 - 40,000 tons ~~was~~ were estimated in the shot I saw fired.

The Electric Sub-station which supplies the power for the Crusher & the Screening plant, the rope-haulage & the Compressor for the compressed air for drills etc., receives current at 11,000[±] volts — steps down to 400 v.

KILNS - 7. - 2 patent - 36 tons a day drawn
2 men.

2 small kilns - 18 tons a day - 1 drawer
(H. Simms)

3 large " 42 " - 3 drawers.

For proper calcination stone must be kept at 950° - 1150°C for at least 14 hrs.

4 cwt. of coal use to every 1 ton of stone.

36 cwt. of lime-stone produce 20 cwt. of finished products.

Kilns may go continuously for about 2½ yrs, then replacement of fire-brick lining is needed.

Workers about 90 employees

7 D.P.'s. have replaced German prisoners

Tradesmen Joiners shop. -

Loco-shop - Locomotives reconditioned

Electric welding
Lathe works. (fitters)

HELWITH BRIDGE. Granite & Road-stone Coy.
Quarry is not mechanised.

Blasting is done with about 3 cwt. black powder charges.

There are 12 men "breaking & filling."

1 filler can get 3 tons of stone an hour.

Pay 11.^d an hour to 11 tons.

Over 11 tons 1/3.^d an hour.

War bonus of 9.^d an hour.

In bad weather - 1/1.^d per hour for staying in
12 P.O.W. worked well.

Crusher Boulders are hauled by a petrol loco. to the Crusher.

Crusher - 30" x 18" - installed 1929
weighs 30 tons.

Driven by 160 H.P. Crude oil engine.

Screening plant sorts out 2¼", 2", 1½" - delivered through

Delivery - mainly by road - 9 lorries

(This firm also has a quarry at Ingleton - the stone there is better, & that quarry may be mechanised).

The stone is probably Conistone flag.
(Silurian) - blue flag.