

BGS MEMOIR: GEOLOGY OF CAITHNESS.

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CHAPTER XV Pages 165 – 169; ECONOMIC GEOLOGY: CAITHNESS FLAGSTONES.

This early description of the Caithness Flags concentrates on the flagstones which were exported to developing cities. Locally, however, the stone was also an important source of roofing and still is today.

The regular free jointing, the finely laminated bedding, and the durable nature of the flagstones have for many centuries proved of great service to the inhabitants of Caithness. The pre-historic folk made free use of loose slabs in building, and probably to some extent quarried the stone, since they used comparatively large squared flags with which they sometimes ingeniously constructed doors to move on pivots of round stones on the cup and ball principle.

Since the advent of civilisation, scattered houses, many villages, and two large towns have been built entirely with rocks of local origin. In the towns and throughout the county the houses have been built, the roofs slated, the roads paved, the fields fenced, and the drains lined with Caithness flags, so varied are the uses to which the rocks are adapted.

The quarrying and shaping of flagstones for export has long been one of the chief Caithness industries, and pavement made of this durable stone may be seen in many of our cities, and flagstones have been exported from Caithness to distant countries.

The first quarry for exporting pavement was opened by a Mr. Scott in the neighbourhood of Murkle. The Castlehill quarry was opened by Mr. Traill of Rattar in 1824, and the first ship-ment of flagstones occurred in 1825. The industry steadily increased until shortly after the end of last century, but of late years has considerably diminished, as may be seen from the official statistics tabulated below. In the old Statistical Account of Scotland, published in 1845, it is stated that flags were being exported to London, Newcastle, Glasgow, and other towns. Two hundred and fifty men were employed in Thurso parish, and 100 labourers at Castlehill, where machinery was established for sawing and polishing the flags. Between 3000 and 4000 tons of flagstones were being exported from Castlehill alone at that time.

Year	Tons	Value £	Persons employed
1856	7,000		
1858	16,600		
1895	15,545	18,206	
1896	24,258	31,906	
1897	21,633	28,131	403
1898	17,818	22,484	404
1899	23,029	21,934	478
1900	18,794	17,378	454
1901	20,951	20,241	500
1902	34,804	23,239	414
1903	15,907	20,252	301
1904	18,187	20,404	402
1905	17,528	12,998	324
1906	15,534	10,109	205
1907	15,306	5,770	142
1908	9,880	6,409	191
1909	9,914	7,936	201
1910	7,400	5,605	154
1911	6,036	4,153	145

The decline in the industry during the last few years is probably connected with the extent to which concrete pavement has come to be used. Grades of Stone Quarried. The rocks may be classified according to their uses as follows

1. Rough flags or second quality flagstones.
2. First quality flagstones.
3. Stone slates.

1. ROUGH FLAGS.

These are obtainable in any part of the county where the Flagstone Series is at the surface. Small quarries have been opened in all the inhabited districts to obtain stones for various purposes. A second quality of flagstones from the quarries for first-class pavement flags is largely used for making fences.

2. FIRST QUALITY FLAGSTONES

These appear to have been quarried from two main horizons in the Thurso Flagstone Group. The higher horizon extends from near Castle-town in a westerly direction to Weydale and Whitemoss and again from the quarries at Holborn Head through Hill of Forss and Janetstown.

The lower horizon is quarried at Spital and Achscrabster, and is considered on the whole the more durable rock.

Owing to the rapid repetition of bands of rock which to the eye are exactly like those quarried, it is, however, impossible to say if actually the same band has been quarried at each of these horizons or several bands lying within a few hundred feet of one another. The latter is the more probable. The rocks of Thurso Flagstone Group, explained in another chapter (p.95), show rapid changes in character with constant repetitions of series of bands of rather different characters. The first quality flagstones usually form the most calcareous and least arenaceous layer in each sequence, and it would depend on the thickness of this layer and its composition whether it be workable to advantage or not. These layers may vary from a few inches to several feet in thickness. Their fitness for pavement depends on their perfectly smooth bedding planes and the facility with which the rock splits to the thickness required. Such a rock usually has widely spaced joints allowing large sizes of flags to be obtained of a regular shape. The durability of the flagstone probably depends on its fine-grained character and cement-like properties and on the nature of its constituent minerals. The chief flagstone quarries are as follows –

Castlehill Quarries, near Castletown; Birklehill Quarry and Stone-gun Quarry - in Olig Parish; Weydale Quarries, Whitemoss Quarry, Janetstown Quarries, Holborn Head Quarry, and Hill of Forss Quarries - in Thurso Parish. Achscrabster Quarries in Halkirk Parish, Spital Quarries in the parishes of Halkirk and Watten.

The ports of shipment are Thurso, Scrabster, and formerly Castletown. The flags are shipped to many British and foreign ports.

Methods of Working Flagstones. - The flagstones quarries are driven as open workings from the outcrop. In certain cases, as at the Holborn Head Quarries (Plate VII, 1), where the dip is very gentle and the slope of the ground in the same direction, the working faces can be driven against the dip, and the floor of the quarry is kept dry by natural drainage. In other cases pumping has to be resorted to, but quarries in the Caithness flagstones are more troubled by surface than ground waters owing to the impervious nature of the rocks and the close and generally sealed nature of the joints.

The quarries are driven as far as the expense of removal of the "tiring" (the rock overlying the band specially suitable for pavement) will allow. No mining is resorted to, nor is blasting employed. The "tiring" is taken up layer by layer, by means of levers, until a sufficiently large surface of the flagstone pavement is exposed. The main joints in this layer are then opened by wedges and the pavement flags are lifted in layers of definite thickness by levers in the hands of experienced workmen. Each flag, as it is loosened from its bed, is taken away from the scene of operations by means of a crane and subjected to a preliminary squaring. As the working face advances in the large quarries that have been working for long periods, a perfectly smooth surface which formed the bed of the pavement layer is left as a floor to the quarry, and where the "tiring" is easily disposed of, as at Holborn Head, this floor in its unencumbered condition may be very extensive and forms a striking demonstration of the characteristic evenness of the bedding of the Caithness Flagstones.

The further shaping and finishing of the flagstones is sometimes done by hand, but cutting and polishing machinery has long been employed in Caithness. The chief flagstone works at present are situated at Thurso Harbour. There are also machines at the Spital Quarries, and formerly Castletown was the chief centre of these operations.

At the Thurso Flagstone Works (Plate VII, 2) the engine and main driving shaft, with gear and belting, are covered by a long central shed having on either side an open yard in which the cutting machines are arranged at regular intervals.

The flags are placed on long tables which can be wheeled beneath the cutting machines. In each yard six connecting rods from the machinery move backwards and forwards, for a distance of about a foot, six heavy horizontal beams of the same length as the tables. Each beam carries two knives with plane edges, and is swung on large frame supports by two iron rods attached to chains, which work over pulleys with adjust-able weights. The knives lie parallel on either side of the beam along its whole length, and, travelling with it, come in contact with the flags, one knife operating each table. Two pairs of tables on wheels are supplied for each pair of knives, and, by means of cross-rails, each pair can alternately be brought beneath the knives, or drawn away, in order to have the flags that are cut removed and replaced by others. Thus the flag-cutting on one pair of tables, and on the other the removal of finished flags and adjust-ment of fresh flags, can be carried on at the same time. A long sand trough with water pipes, attached to the supports on either side of the beam, continually feeds the knives with sand and water.

A row of flags to be cut is adjusted to position on each table by means of short wooden levers with projecting iron points, and fixed by wooden blocks and wedges, and the tables when wheeled under the knives are steadied by wooden props.

The cut is not carried completely through the flags, but after about one-half to three-quarters of an hour's cutting, according to the thickness of the stone, the machine is stopped and the tables drawn aside and replaced by others.

The flags are then trimmed by knocking off the edge of stone beyond the saw cut with a hammer from below. Sometimes the surface of the flags is polished. This is done under cover of a shed. The polishing tables move on wheels like those used for cutting, but are broader in proportion to their length, and have splashboards. The polish is obtained by means of flat concentric iron rings, slightly spaced in a horizontal plane, and given an eccentric rotation by a vertical shaft. The polished flags are used for special inside work only, such as flooring of lobbies and granaries, hearthstones, table tops, and mantelpieces. The usual stock sizes of the shaped flags are from 2 to 6 ft. in length, and 1 to 4 ft. in breadth, but much larger sizes can be supplied. Good examples of large flags may be seen at Scrabster where each of the four walls of the office of the Holborn Head Flagstone Quarries consists of a single large flag. Flags of unusual length are sometimes obtained and are used for gateposts and even for posts for drying-greens.

The thicker flags are chiefly used for paving, the thinner for damp-courses in building.

3. STONE SLATES

True slates are not found in Caithness, but formerly certain qualities of thin flags were universally used as roofing material. A very hard, thin, dark, micaceous flag was specially quarried at Achanarras and elsewhere for the purpose. Unlike true slates Caithness "stone slates" will not bear "holing," and are therefore difficult to replace, and the working of this class of "slate" has been abandoned. A special type of pale green thin flag or "slate" has, however, been much in demand lately for artistic work on churches and public buildings, and is exported to England from Thurso. These thin flags are obtained at Whitemoss near the surface. A spade is used in levering up the "slates," and they are trimmed into shape by hand with the hammer against a straight edge.