

A FAMILIAR DESCRIPTION
OF THE
OLD DELABOLE SLATE QUARRIES.

BY
JOHN T. F. TURNER.

I HAVE frequently thought, that a familiar description of a Cornish Slate Quarry would prove interesting to many who, not having the opportunity of seeing one, are yet daily availing themselves of the protective shelter of its well known produce. So often has this idea impressed itself on my mind, that I have determined to attempt to give a plain and easy description of the largest of these quarries.

It would require no effort on the part of the least observant of the many tourists who pay their summer visits to Cornwall, to notice, that from Newquay to above Boscastle the rocks within three or four miles of the coast line are of a *slaty* nature. A quarryman, or geologist, would further perceive that the quality of this slate varied considerably in different parts. Here and there, in the beds of streams and rivers, in excavations, or in the sea cliffs, he would find the rock to present a firmer, more compact, and metallic appearance than ordinary. Here would he pause and examine if the stone would readily and evenly split in thin sheets. If so, he would know he had discovered what *might*, perhaps, prove to be a valuable vein of slate.

Relying on such favourable appearances, capitalists have opened quarries with more or less success, many of which are still at work; while of others, the results having come far short of the expectations, the works have been discontinued. Specimens of the latter class may be seen at Mawgan, near St. Colomb; at Portquin, near Wadebridge; and in the neighbourhood of Camelford; while one of the former, employing about 100 men, is on the river Camel, by Wadebridge, contiguous to the abandoned openings. Two or three are inland, in Tintagel parish; several are on the cliffs above and below Boscastle; and lastly, *the* quarries called the Old Delabole Slate Quarries, employing at the present time, December, 1864, 450 men and 130 boys; of this I purpose giving a more particular description.

First, a word of advice to intending visitors. The works are far from the railway; the nearest station is at Bodmin-road, 27 miles from Plymouth. Thence to the quarries is 16 miles. An omnibus will take you to Bodmin, 3¼ miles, from which a mail coach leaves for Camelford at 10· 30 a.m. Then you are still 2½ miles from Delabole.

The most convenient mode is to send to the Camelford Hotel, ordering a trap to meet you at the station. This will not cost much more, and will save time. As a Delabole

Railway Bill is now before Parliament, we may anticipate an improved mode of transit. If the route recommended above be taken, while on the old Bodmin racecourse, and yet twelve miles from Delabole, the traveller will most probably enquire the name of that immense mass of rocks in the distance, whose sides rise precipitously from among woods and cultivated fields, and will feel surprised on being told, "It's only the rubble heaps of the *Dennybole Quarries*." Neither will his wonder be diminished when he reaches the works, and finds himself in an amphitheatre, surrounded by these hills of rubble, which are in some places 200 feet high, and of such a length, that were they extended in one straight line they would reach 2700 yards.

A stranger's first impulse, after wondering at the immense labour expended in raising so vast a quantity of *waste* matter, is to look into the pit itself, For this purpose he goes towards the "papet heads,"¹ which are strong wooden stages, projecting 14 feet over the cliff, to which the slate is hoisted. He feels at first confused at the sight beneath him, and cannot for some time discern anything but a mixed mass of rubbish, with some apparently diminutive men moving about amongst it. This passes away, and he clearly distinguishes the slate rock, which the men are excavating, from, the refuse thrown into old and finished workings.

The pit itself is of an oblong, or rather an elliptical shape, and measures 450 by 200 yards. Its average depth, where still worked, is 250 feet; its greatest, 300 feet. The whole of this area is not quarried at one time, for this includes past and present workings. Four spots are at present operated on, having each an average area of from half to three-quarters of an acre.

The Delabole vein of slate runs north and south, while in Wales and Devon there exists the "edge cleavage;" here the beds, and, consequently, the cleavage, are nearer the horizontal, dipping from east to west, about three inches in the foot, with a slight fall from north to south. This occasions a different mode of procedure to that of Wales: there, they work in galleries; here, in pits.

Knowing the run of the slate, and the character of former openings, the quality and quantity of the produce of any proposed pit is to a great extent determined. I say, to a great extent; for, as in mining, the mineral may be destroyed by the presence of some adventitious body, *e. g.*, granite, which in slate spoils the cleavage, or, as the men say, "*takes away its nature*," and renders it extremely hard, and useless for roofing purposes.

Having selected an area for opening, on the borders of the old pit, men, with shovels, picks, and barrows, remove the top soil and rock, which they throw over into the last quarry. Meanwhile an engine is being fixed, and the carpenters are at work erecting "papet heads." It is not necessary to remove the engine every time a new pit is opened, as it is placed so as to command the probable site for two or more pits. Having reached a sufficient depth, four chains (sometimes six) are wound around "cages" near the engine, thence along supports over the "papet heads" into the pits. These are drawing-chains. Passing over these same supports, and securely moored at the surface and in the pits, are four other thicker chains, up and down which, by means of a wheel, the drawing-chains pass. They serve as moveable inclines, and, as they guide the course of the loads, are termed guide-chains. The total length of the guide and drawing-chains is 4½ miles. Wagons, made of sheet-iron, 5ft. square by 15in. deep, are hooked to the drawing-chains, and are filled by a party of men, generally two to a wagon, called "fillers," while a similar number of "landers" and "emptiers," at the surface, receive and dispose of their freight.

One of the latter signalizes to the engine driver when to hoist by giving three strokes on a bell: two signify lower, and one stop. If the stone to be raised be large, a chain with hooks is sent down in lieu of the wagon, and the stone is named a "steamer."² As the loads reach the top, a platform, or table, is advanced under each, by means of a windlass. These support wooden carriages, on which the wagons, or "steamers," are lowered. They are then drawn back, and the loads are pushed a short distance along a tramroad, by men, to the foot of an incline, about 35 yards long, leading to the summit of the rubble, up which they are drawn by chains connected with the engine, thence by a horse to their destination. When the distance is great, by an admirable system of "running roads," which fall one foot per 100 feet, the wagons are impelled by their own weight; and, being emptied, return by another similar road to the "papat heads."

To ensure diligence, this work, and indeed all, as far as is practicable, is done by contract, thus constituting Self-interest foreman.

Each pit is divided into about eight portions, called *quarries*, distinguished from each other by numbers. Notice is given, by placards, at the end of each month, that such and such quarries are to be let, and that tenders will be received at the counting-house. The men form themselves into "pairs," *i. e.*, parties of two or more, who work together, and share alike. These examine the quarries, and determine the lowest price per dozen for which they can work. They are guided in this by many considerations, among which may be mentioned, the appearance of the rock visible, its quality and cleavage, its position, the results of any previous opening of the same bed of slate, by the presence or absence of "*spar*", (*i. e.*, granite)—that bugbear—and by the space between the "sparry heads." These heads are like perpendicular rents, filled up by a granite or calcareous formation, extremely fine, and running in all directions. The value of one whole pit here is considerably lessened by the prevalence of these; for they prevent the making of large size slate and flooring stones, and with the size the price rapidly increases.

Having weighed these considerations, and agreed among themselves, one of the "pair" privately gives to the clerk their tender, which varies from 1¾ d. to 4¾ d. per dozen for medium size slates (20 in. x 10 in.), the other sizes and flooring being at a previously fixed proportionate rate, which is invariable.

If the rock be destitute of slate, it is worked at so much per fathom, say 3s. Frequently fathom and dozen work are combined. Two men will rip 50 or 60 fathoms per month. These contracts are taken for periods of one, two, or three months.

The filling and landing are separate contracts, entered into annually, at per 100 loads—generally 1s. per man, when the depth is considerable. These men work from light till dark all the year round: true, they are not *actively* employed all these hours, for, when they are chaining steamers, they can work two or three minutes, and rest ten minutes. Though only labourers, during summer they frequently earn 20s. per week—a sum which all must confess is dearly earned by their long hours. To ensure the *filling up* of the wagons, for every light load they are mulcted 6d.

To return to the other contractors,—they have to blast and rip the rock, prepare it for the fillers, and split it into slates. They have, therefore, always a part of the pair "at grass" called "cleavers."

In first dividing a pit into quarries, a narrow gutter or trench is cut out in front of it at right angles to the cleavage, so as to afford a free opening for the men to begin to rip, and likewise to form a "line of least resistance" for blasting. One or more pair will here begin

to remove the rock to a depth of three or four feet to what is termed a "floor." Floors run through the whole body of slate at about this distance apart—some greater, some less. The intervening mass is a "bed:" floors are therefore the upper surfaces of beds; they run, as a rule, *about* parallel with the cleavage. As soon as the first parties have removed a few feet from the gutter, others replace them, and as *they* progress, are in like manner succeeded by others, so that the whole will be worked in terraces. The first lot, having reached the back of the pit, will recommence at the gutter, which is continually deepened. This is the best method of working, but, from local causes, cannot always be carried out. Occasionally a gutter is run through the middle of the pit, quarries being formed on each side. More frequently still, joints or "free-heads" are available in lieu of gutters, and on the plea of economy are preferable.

Powder is extensively employed by the pitmen. Holes are bored in the rock by an iron bar, tipped with a steel bit, called a jumper. When the hole is deep enough, *i.e.*, generally speaking, to the next floor, it is wiped out dry by means of a swab, which is sedge wrapped around the head of a wooden rod. If water penetrates, the sides are covered with a thin coating of clay; a handful of powder is then thrown in, in which the end of a piece of safety-fuze is inserted, more powder is then poured in until the hole is about half full; then some slate, broken up very small, is thrown in, and tightly pressed and rammed down on the powder, filling up the hole. This operation is called "tamping." As a precaution, blasting is forbidden, except at the hours; and as the clocks strike, bells are rung at each papet-head, giving warning. Then the safety is cut, leaving a sufficient length to burn, to enable the fireman to effect his escape. "Fire hole," shouts the man. He ignites the safety, and all take shelter, generally to a rough kind of house "built of loose stones, and covered with strong beams, supporting coarse slate slabs. Scores of holes are fired daily, and yet scarcely ever an accident occurs from this cause.

I know but of two serious ones during a residence here of two years: and for these the sufferers themselves were highly blameable. In each case the holes had missed fire, and, contrary to orders, in trying to save the charge by jumping out the tamping, a spark was struck which ignited the powder. In one case the powder providentially found vent through the hole, without rending the rock, sending the jumper away like a ram-rod from a gun, and only scorching the hands, arms, and face of the workman, who, feeling nervous, had kept his head leaning back, to which the preservation of his sight was due. In the other instance, the stone was partially broken, and the youngster, a lad of 18, lost his hand, one eye, and for months the sight of the other. I have known a large stone to narrowly miss striking the head of a man; and there is a story told by the foreman, of a man ascending a high ladder, reaching from the pit to the surface, and when within a few staves of the top, a large piece of stone was projected upwards, striking the astonished climber on that part of his person where the poet tells us John Gilpin was galled, and, its force being well nigh spent, seating him unhurt "at grass."

The greatest danger to which the pitmen are exposed is from falling stones; either from pieces breaking off the steamers as they ascend, or from the latter striking against and removing portions of the cliff. Sometimes during damp or frosty weather, although great pains are taken in leaving a firm "back," stones will become loose and fall.

On the 8th of June last, one fell on the head of a man,³ killing him instantly. Again, the drawing-chains will sometimes break, and the load and, more dangerous still, the broken chain will strike the rocks with great violence. The first time I went over the pits,

I saw a chain thus snap, and the loaded wagon, with a fearful noise, ran swiftly down the guide-chain. The men ran to the right and left, and one took shelter under a ledge on which the chain swung, deeply imbedding itself in the stone. More disastrous was a similar occurrence on the 1st of October last, when the wagon struck the leg of a poor man, and smashed it. He lingered a couple of weeks, had the leg amputated, but died from mortification.

When a load is hoisted, a pitman signalises to the landers its destination thus: a movement of the hands, imitating the use of a mallet and chisel, means it is to be taken to the cleavers; a movement backwards and forwards of the hands, signifies that it is to be sawn for flooring; while a motion from right to left shows it to be thrown away as waste. Great care is taken to separate the rock into blocks of about a ton weight, which are hoisted entire, at less damage than when in small pieces in the wagons. As before stated, these blocks are termed steamers; but if of indifferent quality, and to be thrown away, the name "scollucks" is applied to them instead.

Let us follow the slate, rise with it, and mark the processes through which it passes, ere it is ready for the merchant or builder.

The cleavers, or hillmen, build rough walls as a partial protection from the inclemency of the weather; for being on the rubble at an elevation of 900 feet above the sea, they are necessarily much exposed. These are by the side of the tramroads, over which the product of the pits passes. By means of a beetle and flat chisel, the pieces of slate are quickly split into thin laminae, about one-fifth inch in thickness. To cleave a large block, heavy beetles and iron wedges are used. Frequently the block is too large to work advantageously, and is then split *across* the cleavage. This peculiar operation is called "flerrying," and is thus performed: The stone is laid on its flat, and by means of a chisel a small groove is chipped vertically out of one side. The chisel is then placed in the centre of the groove, across the cleavage, and is struck several times with an iron hammer. The effect of these blows is seen in a very fine crack, extending itself in a slightly curved direction across the slate, dividing it in two parts. The better the quality of the slate, the easier will it flerry, and also cleave. Should this method fail, then the "feathers and tearer" are resorted to. A hole is jumped in the block, near the edge; in this, two slightly curved pieces of iron are placed (the "feathers"), having the concave surfaces toward each other, between them is inserted an iron punch; this is forcibly hammered in, and breaks the stone asunder.

These sheets of slate are then passed to the "dressers," or cutters, who, seated on a wooden "horse," and armed with a blunt steel knife, 18 inches long, and a measuring stick, trim them to their proper dimensions. The "horse" is a low wooden stool, on one end of which the cutter sits astride, and on the other, in front of him, is fixed edgewise a flat piece of iron, three feet long, on which the slate is rested when the knife strikes it. There are two measures; one, for the large sizes, being marked at every alternate inch, from 18' to 30', for the length, and at half those distances for the breadth; the smaller stick being notched from 12' to 16' for the length, and half of these for the breadth. Each has a nail at the end, with which the largest size a slate will make is scratched off: to this it is cut. Near one-third of the material is thus cut off. At many quarries a saving is effected by occasionally cutting slates an inch or two wider than half their length. While this economises material, it increases the strength of the slates. An experienced cutter will tell immediately on inspection the size the material in his hand will make: the measuring,

consequently, is effected so rapidly as to perfectly astonish a spectator. A dexterous hand will trim 100 dozen of a medium size in an ordinary day of 10 hours, *i. e.*, at the rate of two per minute. They are well protected from rain and wind by a small wooden house, consisting of two sides, fixed together at an acute angle, and a roof. This is made on the works, and costs them fourteen shillings.

The slates now receive peculiar names, according to size; thus—

Queens, are 36, 34, and 32, by 18, 17, and 16 inches.
 Princesses 30, 28, and 26, „, 15, 14, and 13 „,
 Duchesses 24 by 12.
 Marchionesses . . . 22 „, 11.
 Countesses 20 „, 10.
 Viscountesses . . . 18 „, 9.
 Ladies 16 „, 8.
 Small Ladies 14 „, 7.
 Doubles 12 „, 6.

There are, in addition to these "size slate," a large, rough kind, of varying dimensions, having one side, uncut. These are termed "rags" from their ragged appearance when piled in the yard. Also, a small, irregular sort, called "scantle," made of pieces too small to make "size slate." This last kind is in great request in west Cornwall, and forms a very strong roof.

The finished slates are then taken by the "pitchers," and carried on their backs, in a small wooden **V**-shaped receptacle to the show-yard. There they count and pitch them, the largest size, on their ends, in five dozens; and the small sizes, in 100 dozens, on their sides. Five per cent. over tale are allowed for breakage. Having marked on them the quarry whence they came, a foreman rapidly counts them by the five or 100 dozen, and enters the number to the credit of their respective quarries. These are added up monthly, given to the clerk, and the wages computed according to the terms of contract, deducting cost of powder, and purchase and repairing of tools.

There are many boys,⁴ and a few men, who work over the scollucks and refuse slate of the cleavers. They may constantly be seen climbing up and down the heaps, picking up likely pieces, and trying them; now reaping a rich harvest, and again spending much time and trouble in splitting a large stone only to find it useless. On the whole, they fare pretty well, and between them can earn £200 per month. This, independent of the direct pecuniary advantage to the Company, greatly benefits them indirectly, by training up a skilled band of youthful cleavers, who, when become men, are more likely to remain than new hands. Cleaving is an art in which none can excel but those who practise it early. All scantle is trimmed by boys, who thus become habituated to the use of the cutter's knife. As vacancies occur, the most proficient are selected to cut the size slate.

Here let us leave the roofing slate, and turn our attention to the flooring department.

Stones sufficiently large (or too coarse for thin cleaving) are split in thicknesses varying from one to four inches, and used as covering for floors. The quarrymen then measure the largest rectangle they can on its surface for the number of feet; on which they are paid according to quality, thickness, and terms of contract. The sawyers next take it in hand, and operate on it either by manual labour or by steam power. In the first

place a saw, consisting of a smooth, thin sheet of iron, fixed in the bottom of a frame, the sides of which are round wood uprights, connected at the top by a thin iron rod, is worked by a man, who, sitting on a stool, takes one of the uprights in his hands, and draws and pushes the saw forwards and backwards across the slab, on which, from a "dripping-board," a continuous dropping of water washes particles of flint sand beneath the saw-plate, which particles, by friction, wear away the stone.

Saws, acting on the same principle as these, are connected with the machine-engine; but eight pair, of 12 feet long, are worked at once, and set at a guage, varying from 2ft. to 3ft. 9 in. The flooring once fixed, the work of sixteen hand-saws is effected in three-quarters of an hour. Where rapidity of execution is required, they are of great utility; but are open to the objection, that the stone must be brought to them. Eight men tend these, and can make five cuts per day. Three circular saws, impelled by steam, cut through the slabs at one foot per 75 seconds. This kind is well known in carpenters' shops, and need no description here; and I will only add, they are employed on slate of good quality only; for, unable to cut through "burrs" (called also "curleys") and other hard places, they jag the edges to the right and left.

Adjacent are the planes, on the iron beds of which the sawn slabs are placed and moved backwards and forwards under a steel bit. A man with a rasp removes all roughnesses from the edges, then gauges the flooring, returning to the sawyers all that is "out of square." Then the foreman measures, and enters in his book the sizes, in order to calculate the wages due to the sawyers, planers, and rasps. The best of these manufactured slabs, containing no cracks or flaws, are selected for making water-cisterns, corn-chests, and troughs, for which there exists a great demand, as they combine durability with lightness, and occupy but little room. They are made so as to contain from 10 to 2,000 gallons. Head and tomb stones are made in great numbers, and as they do not admit of vegetation, like granite, will retain an inscription for any length of time. I have seen some 240 years old. That our ancestors were aware of this quality is seen from the fact that occasionally monumental inscriptions are found on a piece of *slate* let in a granite tomb. A slate-tomb has a good appearance, and a very handsome one may be had for £10; plainer ones for £4 or £5.

For such, and similar purposes, the stones are sanded, *i.e.*, polished, by the following simple and economical process. A stout rectangular framework of wood, ten feet by six feet, is moved over a flat half as long again, by means of a crank. The bed first, and then the frame are filled with slabs, closely wedged together. Sand, on which several small streams of water fall, is put over all, and soon insinuates itself between the slabs, and in about 50 minutes polishes their faces. A still finer polishing is effected by briskly rubbing soft sand, with a cloth, by hand. Some of the small slabs are not sawn, but have their edges broken off by hammers, and finished with rasps.

The Delabole flooring is of a light blue colour; weighs about one ton to one hundred feet of one and a half inch thickness, and when struck has a peculiar metallic sound, proving its compact nature, and consequent degree of impermeability to moisture. Near the surface it is softer, looser, and of a red tinge, from the presence of ferruginous matter; but deeper the "nature" improves, and small thin flakes of mundic replace the iron.

The various "runs" have each their characteristics, and an observant quarrier will tell immediately whence a given slate came; naming the run as the *grass*, the *glassy*, the *hollow*, the *licée*, (a favourite stone, bearing dark lines running coincident with its grain,)

or the *great* run. The Delabole flooring is in great demand, and at present is not produced fast enough to supply it.

For the ridges of roofs, a roll and crease are manufactured, which, with equal, if not greater utility, are more ornamental than brick tiles. But to name all the purposes to which this useful mineral is devoted, would be to weary my readers, even if that consummation be not already effected.

To trace the gradual development of this quarry, would prove interesting; but, unfortunately, I have but scant data with which to proceed. As to its antiquity, we may quote Richard Carew, who, in 1602, in his "Survey of Cornwall," describes the blue as "in substance thinne, in colour fair, waight light, in lasting strong, and generally carrieth so good regard, as (besides the supply for home provision) great store is yearly conveyed by shipping, both to other parts of the realme, and also beyond the seas, into Brittannie and Nether-land."

A century and a half later, Dr. Borlase affirms,⁵ "that the grey-blue slate of Delabole, in Cornwall, weighs only 2,512 ozs. to the 100 ft., which is greatly less than the lightest Westmoreland slate that I have met with. This Cornish slate, from its lightness and endurance of weather, although I have no reason to think that in the least particular it excels the Westmoreland slate, is generally preferred to any in Great Britain, and is, perhaps, the finest in the world." Sir Henry De La Beche writing at the same time, says, in his official report on Cornwall, that "the Delabole Quarries have been long celebrated for producing a beautiful and durable material, combining considerable lightness with strength. The flag-stones, or thick slates from these quarries, are highly esteemed; they are exceedingly durable, not only when exposed to atmospheric influence, with inscriptions (such as those on tomb stones) upon them, but for pavements, in passages, court-yards," &c.

On first thought, one feels surprised, that a quarry which has been worked so many years does not extend over a greater area; especially when, at the present rate of working, upwards of 1200 tons of slate and rubbish are raised daily. But the "old ancient men," as they are locally designated, worked in small companies, and without machinery. Five or six working adventurers would take a set for a short term, at a low annual rent; open a pit, say 10 feet square, removing the top burden by wheel-barrows, until too deep, then carry all out on their backs, which were protected by leathern aprons, up a rough incline path formed out of the rubbish. Flooring slabs were raised to grass on the shoulders of four or five. From practice, they were able to carry very heavy weights thus. There is an old man still living here, who says, he often used to bear a stone 1½ in. thick, containing 20 superficial feet. This is confirmed by others. These adventurers would not usually carry their pits to a great depth, for on coming to "hardah" they would stop.⁶ Many such openings as these were made, and have since been re-worked by the present Company, and its immediate predecessors. Recently, the bottom of one of these, about 16 feet square, has been reached. It is said of this, that it took seven years to reach a good bunch of slate; one year's produce of which paid all expenses, though from the loose nature of the top-ground, the sides were frequently falling in. Wesley, in his Journal, narrates an incident connected with one of these falls. He says, Feb. 16th, 1755, "Having heard a confused account from a place near Camelford, I wrote to a friend near it, and received the following answer," * * * "On Monday, December 2nd, William Lane, John Lane, William Kellow, and five more of their partners, met in the morning, and sent one of their

number for Theophilus Kellow, to come to work. He came, but was so uneasy, he could not stay, but quickly returned home. William Kellow was sent for in haste, and went to look after his mare, which had cast her foal. The other seven continued labouring till twelve. All the workmen usually dine together, but these wrought on while the rest withdrew; till in a moment, they were covered with rocks of all sizes, falling about ten yards, some of which were thought to be three tons weight. William. Lane had some years since known the love of God; he was sitting cleaving stones, when the rock calved in upon him in a concave surface, which just made room for his body: only one edge of it light upon him, and broke one of his thigh bones. When they dug away the stones, he was earnestly praying to God, and confessing his unfaithfulness. As soon as he looked up, he began exhorting all around instantly to make their peace with God. His bone being set, he soon recovered both his bodily strength and the peace and love which he had lost. Another, who sat close by his side, was covered over and killed at once. Close to him John Lane (son of William) was standing; he was thrown upon his face, he knew not how, and a sharp-edged stone pitched between his thighs, on which a huge rock fell, and was suspended by it, so as to shadow him all over. The other five were entirely dashed in pieces."

There is likewise a tradition among the men, that on one time a raven flew down, and was in the act of appropriating a pasty belonging to one of the quarriers, when the owner gave chase, and thus escaped injury from a fall which occurred during his absence.

This quarry was worked by a one-horse whim; and here we may note the dawn of mechanical appliances.

Some openings were worked by capitalists who employed 40 or 50 men.

Situated on both sides of a small boundary stream, this slate-vein was in four different estates, belonging to Squire Trevanion, Messrs. Bakes, Smith, and Hocking. Forty years ago, Mr. Bakes employed about 40 men in working a quarry on his estate, using a whim and windlass to hoist wooden boxes, called "kibbles," filled with slate. Slabs were always small, and raised in a more open kind of wagon, called "ragmoles," or "hutches." No size slate was cut.

The rags, scantle, and flooring, which were not sold to country customers, were sent, when convenient, to Port Isaac, six miles off, in wagons drawn by four oxen, led by one horse. Mr Bakes kept two such teams. When sufficient had accumulated at the port, it was shipped, frequently for France. This quarry was leased, and afterwards purchased, by T. E. Avery, Esq., of Boscastle, who in his turn leased it to Messrs. Grainger and Trickett, of Plymouth, who put up the first steam-engine. Finding their capital too small to work advantageously, and being continually harassed by their litigious landlord, they transferred their lease to the present Company. Finding his new tenants too powerful for him, Mr. Avery sold the land to them, while he continued to work an adjoining pit called Landwork, the property of the Hockings. In 1844 they rented, and subsequently purchased, the Trevanion estate. On Landwork lease expiring, they took it for fourteen years; this year, 1864, they have purchased it, and are now sole proprietors of the whole of the Delabole quarries, which at present consist of:—

Landwork pit, on the Hocking's estate
Leasework ,, ,, Bakes' ,,

Grove „ „ „ „
Ash Tree „ „ Trevanion „

The latter is called also "Clarke's Hole," because Adam Clarke once preached there.

Each of these has a steam-engine of about 35 horse-power. There is also the machinery engine, the boiler of which feeds a smaller one, which works the smiths' blast and the fitters' lathes, &c.

An incline 750 feet, with a fall of 5' in 12', reaching from summit of rubble to bottom of pits, is now in course of erection. It will be worked by another engine, and will be employed in raising slate.

The pits are unwatered by one engine pump, and a pair of pumps worked, when water is plentiful, by a water-wheel; at other times by a turbine.

As it is determined to work Ash tree, already 300 feet deep, to a much greater depth, if the present very favourable appearances of a trench recently sunk prove to be a true index of the quality of the lower beds, a new set of 11-inch pumps are now being fixed, to be connected with the drawing engine.

There is no reason for supposing that the bottom of the vein has been yet reached: pits have been abandoned, because of having come to a run of hardah—elvan (or slate whose cleavage was destroyed by internal heat) of unknown thickness; and it has been considered less expensive to take off "new heads," than to risk working through this. The indications of slate in Ash Tree, already alluded to, are at a greater depth than any previous workings, and consequently beneath this run of elvan.

Besides the "spar," which destroys all slate it touches, and being a fused mass subjected to great pressure so difficult to quarry, there are occasionally found, running east and west, walls of hardah, called "*ratchels*." These walls are generally triple, and are about 18 or 24 inches wide at the surface, but gradually taper until they vanish. They are dreaded, because they are generally accompanied by *slides*, which dip precipitously from east to west, and, when loosened at the bottom, will suddenly slip away, carrying all their over-burden into the pit. Two years since a slide gave way at Landwork, burying all the slate; providentially it took place one Sunday morning; had it occurred during work time, some 30 men might have been killed. So great was the fall, that for a considerable time the quarrying of that pit was stopped; and it was full twelve months before all the dé bris was removed.

"Shortahs" are masses of loose rubbish, which appear to have fallen in and filled up cracks and rents; near them the slate is generally of good quality: hence they are termed "good feeders of slate."

Reverting to the spar once more, I have often wondered how veins of granite, ejected in a melted state from a subjacent mass into overlying strata, should be found abundant in one bed, while the one immediately *under* it (through which one would expect it to have risen) contains, as is probably the case, no traces of it. My enquiries receiving no satisfactory reply, I have frequently thought over it, and at last fancy I have found the cause; but as my geological knowledge is very slight, I will state the reasoning by which, I have arrived at the following conclusion, so that, if incorrect, its fallacy may be easily seen.

Since "*cleavage is at right angles. or nearly so, to the bed of stratification,*" and clay slate being a sedimentary deposit, and consequently, horizontal, it follows that slate

cleavage should be vertical; but the planes of cleavage of the Delabole vein are nearer the horizontal; consequently, since their deposition, the strata have been tilted by a subterranean upheaving force into its present position.

This having been the case, we may well suppose that, *prior* to this, veins of igneous matter may have been forced through the stratum or strata immediately overhead, and, having cooled and solidified, retained their relative positions in the strata after these latter were tilted, thus causing beds (not of stratification) of slate at present underneath veins of granite to be free from any such veins.

The shipping is effected at Port Gavorne, six miles off, where the vessels are beached. About 16,000 tons are shipped annually. Wagons, in number about 45, owned by the neighbouring farmers, are employed in carting the slate to the port.

Ere concluding, I beg gratefully to acknowledge the readiness with which the foremen and others connected with the quarry have replied to my numerous queries concerning the works. To them I am indebted for much of the information contained in the above essay, which, I trust, will prove to my readers, what its title asserts it to be,— "A Familiar Description of the Old Delabole Slate Quarries."

1. An abbreviation of parapet (?).
2. The orthography of this and other technical terms is not presumed to be correct, but is intended to accord with local pronunciation.
3. The landers are encouraged to inspect the chains as they ascend, by receiving 4d. for every damaged link they discover. As soon as one is pointed out, a portable forge is brought to the spot, and the injured link replaced by a new one.
4. These are called "Cullers," or "Hullahbobbers;" and, among themselves, for brevity's sake, "Bobbers," and their work "Bobbing."
5. Bishop Watson's Chemical Essays, Vol. iv. p. 319.
6. Dr. Borlase describes the strata of the deepest of these pits, thus:—"Green sod, 1 ft. Yellow brown clay, 2 ft. Rock dipping to S.W. good for nothing, 10 or 12 fath. *Top-stone* of a brownish colour, 10 fath. Best stone at 24 fath., from grass. Then bottom-stone of a grey-blue colour, metallic sound; raised by iron wedges, and containing 5, 10, 12, or 14 ft., superf. Separate floors, 12, 20, or 40 fath., from top." He adds, the specific gravity of the slate is $2\frac{62}{121}$, and that it "is not subject to rot or decay, to imbibe water, or split with falling . . . but for its lightness and endurance of weather, is generally preferred to any slate in Great Britain."— *Vide* Rev. Richard Warner's "Tour through Cornwall."

A Familiar Description of the Old Delabole Slate Quarries, by John T. F. Turner, published by John Lewis, 85 Union Street, Stonehouse, 1865. Printed by W. Brendon, Plymouth.