

FROM
FLOOR TO FLOOR

“O Lawr I Lawr”

GOING DOWN
IN THE
OAKELEY AND VOTTY QUARRIES

From
“CABAN”
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From Floor To Floor – Going Down In The Oakeley And Votty Quarries

The following account of the Oakeley and Votty Quarries in the 1950's is taken from "Caban" the quarry magazine. The tense of the original has been retained as far as possible, although references to photographs have been edited out, as it is not possible to reproduce them here at the moment! (Many were used as illustrations in "Slate From Blaenau Ffestiniog") Despite this, it is hoped that the flavour and scope of the original article remains. It is certainly the most complete "tour" of the workings in print. Much of what was described was still true ten years later, although by then Floor R had been given up for slate production and the problems with falls and water ingress had become a millstone around the quarry's neck.

Graham Isherwood, Telford, January 2006

FROM FLOOR TO FLOOR

A Tour Begins.	(Caban April 1953)	P.3
Underground at Oakeley and Votty.	(Caban August 1953)	P.5
The Middle Distances	(Caban, January 1954)	P.8
The Lower Levels.	(Caban, May 1954)	P.11
Nearing the Bottom.	(Caban November 1954)	P.14
From P to Q. Caban.	(Caban, May 1955)	P.16
Floor to Floor Concluded.	(Caban, October 1955)	P.20

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

A Tour Begins. (Caban April 1953)

Although it is customary to see Oakeley referred to as "the largest slate mine in the world," or to read that at Oakeley we are winning slate along a descending staircase of fifteen levels, following the veins of slate to a depth of nearly 1,000 feet into the mountain, it should also be noted that for many years before and after we began delving below ground for our world-renowned product, we had been engaged in considerable operations on floors, or galleries, located on the open mountainside. Therefore in introducing this series of articles which aims to take the reader on a tour of inspection from floor to floor, embracing the scores of miles of workings at the Oakeley and Votty mines, attention must first be given to the way into the workings before embarking on the way down.

Earliest Endeavours.

Showing a great arc cut into the snow-capped mountain with shelf-like tiers dropping symmetrically 200 feet or more to "DE" level, the floor of the vast quarry affords a fair impression of some of the earliest endeavours. From upper galleries, long since deserted, was won much of the fine quality slate which, generations ago, was exported in quantity by sea from nearby Portmadoc to roof the cities of Northern Europe.

The Top Floors.

From "Lefel Galed" the cluster of quarry buildings near the centre of the floor, it is still a fair walk - perhaps half a mile - and stiff climb to the snow-tipped scene above. Broken ground, debris from a fall many years ago, obscures much of the actual scene of the early operations. The galleries were worked out, but the winning of prime quality Old Vein continues, though largely as a measure of reclamation. The impressive physical features of the old workings, their forbidding ruggedness is emphasised by two pillars of slate and rock jutting skywards 200 feet from the broken terrain of floor "DE", on which stands the rockman's power-driven crane.

Twin "Pillars".

The pillars have particular point in the story of our journey down below. Frequently, in previous articles on aspects of work in the slate mine, there have been references to the strategic importance of the walls of slate, 40 to 45 feet thick, which are left untouched flanking the working chambers. The walls, or pillars, are the supports to the roofs of floors, levels and chambers within the mine. The pillars are, in fact, the legs and shoulders on which the whole of our undertaking underground is supported. The breadth and great strength of such supports was brought into high relief and took us into an open working place, styled DE.9 where Rockman David Charles Davies was found on the base of the open section "stamping" a shot preparatory to loosening another selected block of slate. Close by was his helper, William John Morris. The exposed, protruding portion of the pillar was now part of the upper landscape. Having outlived its original usefulness it was ripe for reclamation. There was work here for some time, productive work, before the exposed section went the way of all good slate.

Reclamation.

The DE floor has several such enterprises. At the other extremity of the sweeping curve of cliff and excavation Old Vein slate is being reclaimed in three other open places. The plan of campaign here is to work through and round the pillars. A mechanical grab, resembling a toy against the background of walls leaning into the mountainside, is a full-size "navvy" used to remove unwanted loose material and to facilitate the rockmen's work.

Leaving Daylight.

The hive of activity hidden and covered by the great mountain massif, and which is our objective in this series, was suggested by a dark opening under the jagged edge of the cliff wall. The Oakeley Mine lies inside and below, though this corner of DE floor is by no means the only way down to our main workings. To be faithful to our course and objective the departure from daylight operations to slate winning in the dark has to be made at this point, for by venturing along the tramlines which were seen to disappear into the mountain, work on the DE floor is found to be carried on also underground. The tramline emerged from its tunnel in the uppermost section of the mine - the worked-out chamber DE.B11. The great vault-like cavity was once filled solidly with Old Vein.

Roofing.

The first of these is notable for the stream of sunlight pouring through an aperture near the roof. Proximity to the "outside" is thus made very evident. The ventilation hole marked the end of the "roofing" tunnel, a technical feature of our craft which, as readers of Caban will have noted, is the first operation to be carried out by slate miners when opening a chamber for rockmen. The line of sunlight penetrating the inner gloom not only approximated to the downward slope of the vein, but also defined the route of the narrow "roofing" cut made by the miners to give ventilation to the chamber and elbow room to the rockmen when their turn came to assault the vein of slate.

The Walls go down.

The wall of rock to the right of the emptied chamber is the supporting pillar, the topmost part of which emerges to the daylight. Flanking the left hand side of DE.B11 is the complementary wall, in this case still an integral part of the mountain and rising upwards another 200 feet or more. Here in this typical hollowed-out underground chamber, emerging from the tunnel cleft in the wall, were Hugh Jones and David Griffith, specialists in Old Vein, manoeuvring newly-won blocks of slate from the associated chamber DE.B10.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

Out and Under.

DE.B10 has a dual personality. It is both underground and open to daylight and is located behind the dark opening under the cliff, to which attention has been drawn. The situation was suggested by the Old Vein specialists at work in the sunlight filling their cave-like chamber. The scene inside the chamber DE.B10 was of another place in the important work of reclamation. In this instance rockmen have been engaged working from the inside round the disused side of the pillar, or wall, and had, in fact, pierced to the outside. Considerable caution has to be exercised in situations of this kind. As we have previously emphasised, nothing is left to chance.

A conference found in DE.B10 was in reality an urgent consultation between Undermanager Alfred Humphreys and the rockmen on the most economical method of winning a large and promising piece of roof which has developed a threatening crack.

Tell-tale taps.

The Undermanager traced the extent of the "overhang" with a walking stick. We left him listening to the tell-tale taps from the Undermanagers stick to return through DE.B11 to the innermost chamber on this floor, DE.B12. Here we found Harry Roberts and millman J.D. Williams, his helper for the day (William Roberts being absent) at work reclaiming on one side of the chamber. A typical product of the trimming operation was the block of Old Vein loaded on a trolley ready to be hauled out to the open via the worked-out number 11 chamber. At this point underground (though on the same floor as that which extends far outside) we pause in our excursion to prepare for the actual descent into the Oakeley and Votty mines.

Slate winning at our Votty and Bowydd subsidiary is entirely underground.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries
Underground at Oakeley and Votty. (Caban August 1953)

Moving down via a series of stout staircases which link the various levels at approximately the angle of the slate vein, the actual descent into out Oakeley and Votty mines might be made on foot.

In our last issue the introduction to the journey from floor to floor concluded at the points of entry to the underground workings. At Votty, where there are no outside workings, this is at the entrance to the "C" floor main level.

The 7.30 scene was typical of the start of the working day - a steady stream of rockmen, miners, their labourers, the hauliers of traffic, haulage engineers, and pumpsmen, following a well-defined route, first along a level underground, thence down to their working places.

Following in the wake of the quarrymen, the phase of the journey now to be described embraces floors "I" and "K" at Oakeley and "C" at Votty. In one respect the "K" and "C" floors at our respective mines are key points in the operation of slate winning, for it is at these levels that most of the traffic at both mines is marshalled - the blocks of slate from the chambers for despatch outside to the mills; the slate waste for disposal to the tips and the trains of empties to be lowered on inclines to the landings at various levels for dispersal as needed along the floors.

Traffic Centres.

The scope and character of the underground traffic centres could be appreciated from the despatch junction at Votty, where a diesel trainload of blocks, in charge of John Ivor Thomas and David Evans, was on the point of moving out to the mills through the "C" floor main exit.

This every-day scene on the "production-line" at Votty could also be viewed from the mouth of a continuing level on "C" floor where one or two chambers located virtually at the top of the mine are still being worked. Tram lines running off to the left disappear under an archway concealing the foot of the Tuxford incline up which all slate waste from the Votty has to go for tipping. The camera was incapable of reproducing the whole scene of activity on the traffic floor, but added realism to the measure of this activity was conveyed by looking past a line of empties to the shed housing the winding gear perched above the brink of the incline serving the various floors of the mine. The men handling the newly arrived blocks from below were Howell Daniel and Evan Hughes.

Oakeley Haulage Floor.

The scenes on the main haulage floor at Oakeley are equally indicative of the bustling activity which marks the daily round on "K" floor. But to reach "K" in the wake of the quarrymen the route has first dropped down a pathway through a roof tunnel which lies above "K". Running east and west underground, "I" floor was driven many years ago, but it has by no means outlived its usefulness. The winning of good slate goes on in several chambers. At I.B12 rockmen Alfred Hughes and J. Lloyd Hughes, engaged reclaiming in a working place which ranges upwards through two floors, might have been said to have a stint which would keep them fully occupied for a long time. The rockmen, against the background of the great wall of the chamber, were standing on a ledge high up, probing a crack which, later, would be made to yield a sizable block of slate. To do this successfully they had to fully exploit certain characteristics in the slate, notably cracks and overhanging weight. One of the rockmen, secured by a safety chain, was in the act of assessing the possibilities while the other probed and levered cautiously. The safety chain is an essential piece of equipment in the chambers. Rockmen use the chain as a hand and leg-hold while shinning up the slope of the vein, or as an anchorage while working above the ground level of the chamber. The chain is itself anchored to a steel peg driven into the live rock. The strength and reliability of the simple and effective device is not taken for granted. All chains, and the pegs from which they are suspended, are subject to examination.

"Pin Points".

The visit to I.B12 coincided with such an inspection, and the results were satisfactory. James Parry's work as a securer, repairing unstable roofs by the process of pinning with steel bolts or pegs, has been described in Caban. The exceptional strength and reliability of the pin and its wedge were stressed at one and the same time. I.B12 furnished the most graphic proof of these exceptional qualities in the form of a pinned anchorage, set high in the chamber roof, for a heavy duty, power driven block and tackle serving the rockmen, first as a drag-line with which to haul out blocks of slate, and as a simple weight lifter for raising the block onto a trolley. Usually the tackle is suspended from a wooden tripod.

In this case the double purpose of dragging and lifting was felt to be better served by attaching the line to a single pin let in and wedged in the roof. The view strikingly conveyed the feat of strength with a block of slate weighing three tons suspended comfortably on a steel wire running through a block attached to the roof by a 12-inch peg with a diameter of 1.5 inches. The secret of the strength and security of the double-purpose bolt lay in the angle at which the bolt was inserted, the care taken in matching the length of the hole in the roof with that of the steel pin, and the all-important wedge which "married" the pin to the rock.

A careful and correctly installed bolt will "hold its ground" indefinitely. When occasion required the removal of a pin it has been found that the surest method is literally to quarry it out with the rock attached!

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

Following the sharp angle of the vein, the way down to "K" involves negotiating another footpath, this one an elaborate staircase which descends through a former chamber, filled with slate waste. The "K" footpath emerges in an opening in the foot of the walled up mouth of the chamber. On "K" level we saw the massiveness and solidity of the "dam" against which the rubbish had been tipped and, incidentally, afforded an impression of the characteristic quality of the slate-mason's art.

The "K" floor, like the corresponding "C" floor at Votty, embraces both working chambers and the "nerve-centre" which controls and handles traffic to and from all floors in the mine. Daylight is also reached from "K" floor via the main "Balance" outlet and its big haulage lift operated from the "DE" floor. Located a couple of hundred yards inside "K" is the principal haulage incline known as the "New Incline" (new is a relative term only) which, seemingly, fell from the edge of the "K" floor down into the darkness to serve with its triple ropes the descending scale of floors to "P" level. A separate short incline serves "R". This main artery carries the great bulk and burden of the work. A subsidiary haulage, referred to by the quarrymen as the "Old Incline", parallels the main haulage over the shorter distance down to the "L" and "O" floors, and to the east of "K", there is a third incline capable of serving as required the floors from "K" up to "DE".

Workaday Scene.

An impression of the mixed nature of the traffic and its volume is gained in the workaday scene in the sidings near the top of the "K" Balance on "DE" floor. The long train load of blocks and the trucks stacked with waste brought up via "K" two wagons at a time, was seen awaiting haulage to the quarry top, where the blocks were dispersed to the mills and waste hauled up to an even higher level for tipping. The haulage gear in both our mines is electrically driven. While the unhookers and hitchers on "DE" are marshalling their charges for the final despatch to the top, their opposite numbers underground on "K" sustain the rhythm of the traffic movement, receiving laden trolleys and trucks on the twin inclines, unhitching the haulage ropes, propelling the wagons to a point where gravity, and a gradient can take charge, and where others in the haulage team take over to see the traffic through to the foot of the "K" balance lift. The phases in this operation could be seen: A large block from "Q.10", one of the lower and distant chambers, was seen "tight on the rope" coming up the main haulage incline to "K" and passing the entrance to "L" floor. Richard Jones and his colleague, William Chart, who work as unhookers and hitchers on the brink of the incline, were seen in action at the "landing," swinging round the block speeding its momentum to the point where gravity took charge. At a novel angle, another large block from "P.1" appeared virtually to fill the traffic level. This block was being "shepherded" on the brake down to the waiting "K" balance lift. The stout wooden three-barred platform trolleys for carrying blocks, and the steel sided trams reserved for waste are hauled up the gravity slope to the "K" incline by means of a ropeway operated by Gwilym Roberts. The arrival of one such train of empties at the underground traffic junction on "K" was also seen. At this point the empties are propelled inside via a tunnelled roadway to the right. Outgoing traffic is marshalled in a corresponding level.

Re-opening "K.13".

Headquarters of the staff and the volunteer ambulance teams are located near the "New Incline". Beyond the "Old Incline," and deeper into the workings, slate winning goes on in earnest. In this, the older section of the mine, is an interesting example of the re-opening of an old chamber which has been more or less blocked at one time by heavy falls of rock. The approach to this potentially valuable site was made from "K.12". Having driven through the dividing wall, rockmen Robert Jones and Harry Hughes had gained entrance to "K.13" at the very foot of the tumbled accumulation of slate blocks and rubbish which had brought about the earlier closing of the chamber. For the present the rewards for their endeavours are qualified by the large amount of waste material which also has to be cleared. The rockmen were seen dwarfed by a block of slate rock, one of many awaiting removal - work requiring skill and caution.

Deep In the New Vein.

Robert Jones is confident that the chamber would be made to give up the whole of its hitherto hidden hoard of blocks. To this end there are preparations in the neighbouring "K.12" where the Oakeley platelayers, Robert H. Roberts and Thomas H. Williams, were found busily relaying and squaring up the tram track in readiness for the removal of weighty pieces from "K.13". Deep in the New Vein was "K.B1" where rockmen Daniel Jones and Orthin Roberts are engaged in tackling the rock in a different fashion. In contrast with the operation in "K.13" and again in "I.B12", on the floor above, the job in hand in "K.B1" has been to work through the floor of the well worked chamber with a view to winning slate from an excessively wide footing or base. Excavating perhaps twenty feet into the waste on the floor of the chamber, the rockmen have uncovered their objective and begun work in the excavation, winning fine blocks of New Vein in the process. The rockmen were standing on the slope of the exposed portion, looped by their safety chains. Orthin Roberts, former English League and Welsh League goalkeeper, said that progress was now steady and straightforward with a promise of "a supply of good stuff for many months to come."

Development - A Continuing Process.

Development - the driving, opening and widening of new chambers giving fresh sources of supply - is a continuous process at both our mines. At this point in our journey underground perhaps the "I" floor at Votty affords the most convenient examples of the successive stages of development. Miners are still at work on the floor, pushing forward through the New Vein, opening out a range of new chambers all numbered in the "thirties." In a previous visit we have seen surveyors checking bearings before handing over the newly-opened chamber "I.32" to the rockmen. The fine, clean thickness of slate stands invitingly while miners push forward and higher through the "roofing" tunnel. That was the scene in the chamber late last year.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

Second Phase Development.

The scene this summer: The first phase of production is almost over. The "virgin" bed of New Vein at the floor of the chamber has been won and the product despatched for roofing. Miners are again in charge, this time for the purpose of extending the "roofing" prior to starting widening operations to give rockmen greater access to the vein. Seen at work was William R. Jones, one of the miners. I.30, also a recently developed chamber, showed how the rock face was uncovered and rendered progressively more accessible by the process of development. I.30 was in full production and will remain so for a long time, furnishing a steady flow of blocks on to the trolley, with others awaiting removal to the mills.

Continuity.

The continuity of development was further emphasised by a glimpse across the chamber I.32 to the opening in the wall marking the entrance of a level which, having passed through the chamber wall, served the newer chamber I.33 and continued beyond to a point where another chamber - I.34 - will eventually be opened up. In the foreground waste was being loaded into a truck. And so the development goes on, an unending process in which the way ahead, it was said, caters for the years ahead.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

The Middle Distances (Caban, January 1954)

Our story of the journey into the Oakeley and Votty mines now takes us into the "middle distances" where the surge of work increases in importance and momentum. In the last issue we surveyed the main haulage levels. At Oakeley this took the reader one stage underground. At Votty we had reached the brink of the main incline serving the network of floors below. The electric haulage at Votty lowered us quickly to the level of "K" floor where an electric loco serves the full length of chambers in the New Vein. The loco is capable of drawing loads of 20 tons and is powered by motor, driven by batteries which are re-charged nightly at a power point conveniently located on the floor. A much smaller load was going in on "K" where Driver Edward Thomas was seen taking out a block and other material from chamber 26, quite half a mile inside the workings. Elsewhere, another sturdy and reliable loco, a Ruston & Hornsby diesel which, catering for "I" floor, one step above "K" was seen with Robert I. Jones at the controls and Storeman J. Evan Roberts standing by, as a trainload of empty trucks negotiated a bend in the New Vein development area.

Father and Son partnership.

Work on "K" has continued many years with the result that the number of chambers at this level has reached double figures. In one of the higher numbers - "K.27" - on our route to "L" floor, we found rockmen R.F. Daniels and his son Kenneth at work - the only father and son partnership in the mine. The adjoining chamber "K.26" is in an advanced state of development. Work has progressed to the point where the "bon," or face of the chamber above is visible. The immediate objective of the rockmen, Evan Ellis Roberts and Thomas Ellis Jones is to push forward at the angle of the vein and ultimately into the solid slate floor of the chamber above and beyond them. While older chambers on the higher floors continue to give useful service, yielding their quota of high quality slate, it is in the part of the mine below and rather ahead of the zone of the "K.20's" - the area of the Old Vein ranging in the "thirties" on "L" floor - that the visitor would receive his best impression of slate in situ and in bulk.

Starting a Chamber.

The way down to "L" Floor via an inclined and tunnelled staircase is readily accessible. Chambers 34 and 35 are already in full working order. The method of starting a chamber was well represented in "L.36", where Meirion Wyn Morris and Cyril Lewis - products of our apprenticeship scheme - had newly followed the miners into the chamber to begin work on the virgin vein. The clean cut slice, or widening, left for them by the miners, and the inviting vast top layer of slate lying at its angle in the strata from the top to the bottom of the section opened for work, made an impressive picture. The rockmen, one leaning against the angle, the other holding the dust extractor were drilling along the cleavage for the purpose of disengaging or splitting a carefully calculated top layer, or slice, from the bed of the giant slab. Having accomplished this, the rockmen later will drive a complementary pillaring hole through from the surface at right angles to the cleft and thus induce a vertical split, which would enable them to win from the solid mass a block of the dimensions and volume desired. The winning of Old and New Vein continues apace at Votty. Miners are at work opening two further chambers in the line. Indeed, it is thought likely that the level will go through into the "forties."

Production Potential.

While the sight of so much embedded slate, bared before the rockman's drill, was certainly impressive when seen for the first time, the real picture of the potential of production contained in a newly-opened place - the fully worked capacity of a typical underground chamber - has to be viewed from the other extreme. For this it was necessary to jump the ten, fifteen, or maybe twenty years which elapse before a chamber such as "L.36" is deemed to be approaching the stage of having been fully worked through, with the thick vein of slate, lying between the high supporting walls or pillars, prised out and carried away throughout its whole length, breadth and depth. To see this at a glance one has to go back on the years and into the older group of chambers on "L" floor.

A Glance Backwards.

The chosen chamber, viewed from the traffic level at the wide entrance to the great open vault, looked down a distance of 52 yards, all of it worked cleanly from a solid mass of slate, such as that on which the young ex-apprentice, Cyril Lewis, was starting his career as a rockman. Beyond the tripod in the background was seen what remained of this section of the vein sloping sharply upwards into the gloom where the rockmen, David Anwyl Williams and Roderick Roberts, had already worked to the floor of the chamber above. Another aspect of the fulfilment of the "potential" in a given chamber was demonstrated in the inside of a fully developed Old Vein chamber, in this instance where we saw the diminutive figures of the rockmen, E.R.Jones and R.W.Jones, literally on top of their work. The tiny figures of men, when measured in the mind's eye against the loftiness, length and breadth of the echoing, empty chamber, conveyed graphically a fair estimate of the stint which confronted the rockmen who, many years ago, first embarked on the opening of this particular chamber. The small distance between this, the concluding stage of development, and that we saw started at "L.36" is difficult to calculate, but as one old hand said, it must measure several miles of slated roofs! Serving the three floors "K" to "M" is an independent incline cut parallel with the main haulage incline, and to which it is linked by a loco operated traffic route. In charge of "L" floor loco - converted to a battery locomotive by the Votty engineers - was William Llewelyn Davies.

"Enbyd!"

Crossing a high level bridge at Oakeley, where, sixty feet below the parapet, pin points of light marked the presence of rockmen at work in "N.B6", the drawn-out sing-song cry of "Enbyd!" ("Danger!") repeated thrice with sustained urgency was carried up on the cool draught of the ventilation. Blasting was about to begin on the floor below. The time honoured warning shout,

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

always cried in the Welsh Language, was followed in due time by the explosion of a gunpowder charge and the rumble of falling rock. All in the vicinity had to heed the warning and take suitable precautions against the danger of flying rock fragments. The banshee cries of "Enbyd!" and the bump of the explosions followed us underfoot along the level of the floor. The firing of controlled charges was within the competence of all experienced rockmen. Normally the rock so dislodged would have followed the pattern prescribed by the rockman. He would have gauged the length, breadth and thickness of the slab to be dislodged or brought down by the charge. When the dust and smoke of the explosion had settled, the rockmen returned to work, crowbars in hand, knowing what to expect. An unusual or abnormal result of a particular charge producing a situation carrying with it the threat of danger, also fell within the compass of the rockmen's "intuition," or as they would have said, their "intelligent anticipation." Occasionally, to gain an objective, snags in the rock have to be eliminated. Such situations, if they reveal a latent danger, are resolved in consultation with the under-managers and if necessary, are tackled with the co-operation of security specialists. In the average course of events, however, the rockmen themselves are capable of detecting, avoiding and eliminating snags.

De-watering at Oakeley.

The way down from "K" to "L" is along a well defined staircase route, zigzagging through a filled up chamber. A block from the nether regions passing under the bridge at the "L" floor junction typifies the scene at the respective landings at all the floors on the main route down to "P". A further auxiliary short haul links the bottom floor at "R" level with the main incline on "P." On "L" floor Old Vein slate is still being worked and won. On this old-established floor, too, are located the major intermediate pumping stages for de-watering the mine. Situated as we are in a mountainous district, where the annual rainfall averaged upwards of 100 inches, it is to be expected that rather more than a modest volume of water will find its way into the mine workings at Oakeley, either by seepage or via more direct routes.

Watch and Ward.

The Oakeley quarryman see little of this water in the mine. A network of leats and looms, strategically deployed, contrives successfully to trap and divert the unwanted element into out-of-the-way places where the water is pumped out for discharge to the surface. The rhythmic thud of the powerful pumps are a reminder of the need for constant watch and ward. The new Oakeley under-manager, William Owen Williams, was found inspecting one leat constructed across the top level of a disused chamber situated just off the line of traffic on "L" floor, and offered a fair impression of the quite substantial and permanent provision made for de-watering. The flow of water continued through a tunnel in the 12 yards thick chamber wall, and was low in the channel, denoting a comparatively dry spell. A rise of one foot in the leats is commonplace following heavy rains. A dark pool was on the other side of the chamber wall with a foaming outlet from the "L" floor leat spilling into it.

Tackling the Job.

We have touched on the nicety with which large blocks of slate of prescribed sizes are dislodged from the face of the vein by the rockmen. In "L.6" we saw the initial operation, John Roberts and Maldwyn Davies having taken their foothold on the wall of the chamber preparatory to boring a pillaring hole behind the great inverted wedge-shaped mass of slate which they have decided to take out and win. Theirs will be a long job. In due course they will have extracted the rear section - a block no bigger, no smaller, than that required to simplify the major task of winning the inviting mass of prime Old Vein rock. In chamber "L.B8" one could see at close range the effect of such skilled and calculated work. There David Lloyd Jones and John Williams had brought down from near the top of the chamber a block exceeding ten tons in weight.

Dexterity.

The subsequent operations, on the floor of the chamber, call for finer demonstration of their skill - the splitting of the mass into manageable proportions. After the splitting, at least two tons had been sliced from the top surface. The rockman was to be seen, first, driving home his chisel a moment or two before the tell-tale crack appeared and shot through the length and thickness of the bulk. Immediately after the split, the two rockmen levered the two blocks apart, thus completing the cleavage. Further splitting might be decided upon before despatching the raw material to slate makers in the mills above ground. Dexterity rather than main force is the quality which succeeds in the manhandling of blocks of such proportions. The dead weight is taken care of by power winches.

"M" Floor, Oakeley.

The New Vein is being worked on in the northern section of the "M" floor. "M.B10" was awaiting the arrival of the rockmen. At the inspection, William Owen Williams pointed to the route onwards - a dark opening under the north wall of the chamber through which miners will drive a level before opening a companion chamber. The rough hewn surface of the slate was as the miners had left it after widening a working foothold for the rockmen. The first task of the rockmen in such a situation is to skim the surface, taking off what was known as "Y Tew cyntaf," or the first thickness. Across the approach level miners Lewis Griffiths and Joseph Freeman were engaged in similar work widening the chamber "M.B11." Joe Freeman, who hails from Hull, is one of a growing group of newcomers from outside the traditional centre of slate mining and working at Oakeley. He joined us after a long spell of service in the R.A.F.. His duties brought him in 1946 to this neighbourhood where he married. The lofty bridge, where had echoed the warning cries of "Enbyd!" spanned "N.B6" a chamber worked by Richard Stoddart and John Edwin Hughes and devoted primarily to the production of raw material for the manufactures of the slab mill. In the slab mill the blocks are machined, cut and planed to serve a variety of purposes, from headstones to kerbs, shelves and pastry boards. Our viewpoint of the activity in "N.B6" was from the "M" floor bridge just half way up the 120 feet high walls of the

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

chamber. Down below the rockmen were working on a large "square" of slate from which they would split to order slabs of the dimensions and quality required by the machinists. The slabs are of New Vein, eminently suitable for the job. Later as the rockmen work through, normal methods of slate-making will be resumed.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

The Lower Levels. (Caban, May 1954)

In our industry the way down is also the way ahead, though we must hasten to point out that in the literal interpretation the way down is not necessarily along the route, nor by the means described below. That we found Tom Roberts, a securer at Oakeley, confidently descending a wire rope ladder from N to O floor, nevertheless has a bearing, as will be seen, on the all important factor which governs events in our slate mines, which is, that we never rest in our pursuit of new fields of endeavour. Tom Roberts, in fact, was using a temporary means of approach to and from a development zone to carry out routine inspection of installations essential to production and the safety of the mine. The normal way down was seen where a giant staircase, zigzagging down to the floor of a worked out chamber, gives easy and comfortable access to the working places. The staircase route continues out of sight down to O floor and reaches upwards to the main entrance level on K floor.

Delving deeper.

Delving deeper into the middle distances in our review of the floors as they descend, the pattern of new development becomes clearer with the certainty that slate winning at Oakeley remains, truly, a cumulating long-term operation with a future potential none the less productive than has been the results of the immediate past.

The emphasis on new development can not be avoided. the Undermanagers, whose job is to bolster as well as sustain the regular flow of good blocks to the mills, live and move in the labyrinth underground in a kind of private world which, though physically shut in by massive surroundings, has its horizon so distant that it has to be measured in years.

Being the men deputed to carry out the design of things they see not only that which is there, but all that which experience and special knowledge assures them is to come. Attention has constantly to be projected well ahead and in most cases for years ahead, seeing through the blank bulk of a chamber wall to events and operations which will fructify when present day 'prentice hands will be fully experienced partners in the ancient craft of slate winning.

Planned Progress.

Long term planning is an essential and complementary element in the surge of activity underground - a rhythmic process of ordered exploration, skilled preparation, actual development and, finally, rewarding production lasting for years. This sequence of events yields nothing more rewarding than the sight, first thing in the morning, of a typical run of traffic newly out of O floor where development is in full swing. The train of blocks, with the inevitable waste, was seen marshalled and awaiting transfer to the surface via the main haulage system.

In our last issue we paused at the point where miners Lewis Griffiths and Joseph Freeman were reported widening the new chamber M.B11, while rockmen were about to enter M.B10 to take out the first thickness of slate. The way down to N floor, as we indicated, is via a staircase solidly built up from many tons of waste sawn ends of slate. The men on the staircase were engaged on N floor. It was a long walk down through the years of earlier development, passing a number of chambers in advancing or advanced stages of production, before, at N.B9, we encountered the sound and shape of things to come in the newest New Vein development zone. At work in N.B9 is another of our father and son partnerships - rockmen David Morris Jones and his son, Hugh Morris Jones. The tradition of family craftsmanship remains strong at Oakeley; we like it that way. The rockmen were in the act of boring a pillaring hole in a large block levered down almost to the floor of the chamber preparatory to splitting it into more manageable proportions for despatch to the other half of the partnership, the slatemakers at work in the mills on the surface.

Father and Son.

The power and precision of both the men and their machine were graphically conveyed in the attitude of father and son. The air-driven boring tool was firmly held and directed by David Morris Jones, a most experienced rockman. His son, meanwhile, operated the regulation dust extractor which drew away and held every particle of dust raised by the revolving drill, at the same time facilitating visual control of the pillaring operation.

The sturdy bulk of the rockman on the ladder is derived, as David Morris Jones said, as much from his zest for hill-walking as his agility as a rockman, clambering up and down the slope of the vein. David Morris Jones springs from farming stock, but his preference for the slate industry has not diminished his interest and association with the countryside. His chief pastime is to walk the surrounding hills and country roads observing the seasons come and go, noting the bird and animal life, and calling on farmer friends. "I am a rockman by trade, but I am a countryman, too," he insisted.

Steel on Rock.

Mingling with the distinctive note of the pillaring drill biting easily into the slate was the harsher sound of hardened steel driving into solid rock coming from beyond the wall of the chamber. Here, taking place, is the inevitable development. N.B9 was open and producing, N.B10 could not be far behind. But development is not always so in time or in step with the desired rhythm of our progress. It was so here, where miners were at work driving out in a northerly direction almost at right angles to the run of the floor, seeking the "chert," the hard layer of rock above the vein of slate, before striking out to extend the group of chambers.

Joseph Freeman, whom we saw assisting in corresponding development work on the floor above, was here with his veteran

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

partner, David Douglas Evans. The miners explained that sometimes the strata played tricks with their calculations and that it was necessary carefully to read the signs lest a lot of well meant effort came to naught. One simple and effective aid to reading the signs are the surveyors direction lines suspended like plumb lines from the roof of the miner's level.

"Exploration."

A glance from behind, keeping both tell-tales in line, showed the direction which must be followed and which is known as the pillaring line. The device also revealed an unwanted deviation. This form of "exploration" by the miners is, of course, carefully controlled and calculated, and has to conform to a master plan of development which, as in the New Vein districts, eventually becomes common to a group of succeeding floors. The miner's ultimate objective is the opening of N.B10 and to make a way to N.B11, but this is not the only consideration in the task. It is also necessary to prepare a roofing or tunnel following the slope of the bed from the floor below. This provides for an extension and improvement of the ventilation to the twin areas of development above and below the floor.

Roofing may also be a starting point from which to widen a chamber below. The way ahead thus builds up into an interrelated, purposeful engineering project designed as much to improve conditions for the present as to cater for the future. A further example of the link-up in the general scheme of development occurs at N.B7.

Traffic Speed-Up.

To speed up the movement of traffic expected from the new development a level was being cut through a corner of the great wall separating N.B7 from its neighbouring chamber, N.B6, on the south side. The tunnel would by-pass traffic across the chamber floor on to the traffic level serving N.B6, thence, via a more convenient approach, to the main incline midway along the floor. This diversion will serve not only to improve traffic facilities, but in the long term approach create a certain freedom of movement, enabling the scope of projected development on the floor below to be very much widened. Working on the current stage in this progress were rockman Richard Stoddart and William Hughes Evans who emerged, with a ladder, from the unfinished tunnel in the wall. William Hughes Evans, who started with us as a slatemaker, came back to Oakeley following service in Korea, where he had operated with a raiding and demolition squad. He was present in Korea during the first retreat in 1951, serving with the brigade of infantry which fought its way back to the relief of beleaguered American forces. Thereafter he was engaged in a number of exploits, none of which he was willing to discuss. He admitted, however, that his work was always calculated to achieve the maximum nuisance value for the common enemy. His "demolitions" are now strictly controlled operations.

The "Nether Regions"

The "O" floor, approximately 800 feet below the site of the Quarry Office, might be designated as definitely in the nether regions. We reached it via a further easy descent along the main staircase. Our objective here is a new development in the New Vein at the eastern and western ends of the floor. Development might reveal itself in unexpected places. Just as the quiet of an unlighted length of level started to encourage a belief that all must be achieved in that particular zone a glow of reflected light suddenly emerging from what appeared to be a hole in the floor of a worked out chamber relieved the darkness ahead to confuse the uninitiated and to alert the questioning mind. It was so at O.B1 on the journey down. To all intents a deserted chamber, we were pulled up short by the rattle of chain in the darkness, then the glow through the floor, followed by a lighted helmet emerging literally through the floor. Under the light was the quizzical face of Robert Williams, showing mutual surprise. He had hauled himself up through the roofing tunnel from the floor below on a tour of inspection.

Hole in the floor.

The hole in the floor, located a few yards from the level and against the wall inside the mouth of the chamber was, as he explained, the first stage in another practical form of development which, in due course, would enable the rockman and his partner to work upwards and under the Bon carrying the level and converting it into a natural bridge or rock and thence onwards, at the angle of the vein to win the huge weight and thickness of slate forming the floor of O.B1. The crater-like lip of the hole, was the top of the roofing shaft driven up from P.B1. Rockman Robert Williams was on the chain examining the top and sides. Below, at the base of the roofing, the operation known as widening was taking place.

The original roofing from P.B1 is discernible on the wall of the level in the background. The gain anticipated by the second roofing shaft in the foreground is represented in part by the distance between the two apertures. Actually the whole floor of the chamber comes within the compass of this development.

Following through.

This form of development adds considerably to the life of the lower chamber, enabling it to yield its maximum possible production and to take a considerable "premium" in the form of blocks from the unused floor of a complementary chamber above in which usual methods of production have ceased. In O.B2 the next phase in the "follow through" movement is well advanced. Standing on the Bon, or natural bridge, left by the rockmen working under and through from P.B2 some 60 feet below, and looking ahead into the recesses of the worked out chamber was under-manager Morris Jones. Rockman David Roberts was seen balanced on a chain at the extreme end of a widening which had started, as in O.B1, with an exploratory roofing shaft emerging as a hole in the floor. In this case the roofing shaft had completely lost its identity. Working laterally from the bottom of the roofing and across the face of the vein, P.B2 rockmen had widened and won their way upwards until

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

they emerged under the Bon or traffic level projecting the face of the rock forward and upward actually into the floor of the disused O.B2. The top of their chamber then became the lip of the floor above, and what remained to be gained was the mass stretching beyond into the darkness and into the hidden depth below.

Natural Bridge.

The provision of a natural bridge for the traffic level over a joint undertaking in this category is not always practicable. In some cases the Bon has also to be taken out and in its place has to be constructed the more orthodox type of bridge with steel girders, wooden floor and steel stays. An example of the sturdy bridging called for in our industry is provided on "O" floor where a new construction supported by 40 feet steel girders spanned the gap left by the removal of a natural bridge over P.2. The new bridge, seen in its unfinished state and before the installation of stays to be pinned to the roof, was erected by Oakeley engineers. It is a heavy duty traffic viaduct built to carry the new traffic from the O.B district down to the incline on "O" floor.

Tom Roberts, the securer, was met again here, inserting the stanchion, he had made his way to the scene via the temporary ladder from "N" floor, a route which the new bridge was designed to supercede.

New Vein Development.

Out in the western district on "O" floor development follows the more straightforward course with new chambers being mined, prepared and added to the group producing New Vein. The subject of our study is O.17, one of the new chambers in the new district. O.17 is typical of both the momentum and rhythm of productive development. The tell-tale ribbing of the channelling machine shows where a free side had been cut at the foot of the rock to facilitate and speed up the rockman's task. The rockman, Robert D. Edwards, was up on the chiselled face of the vein drilling a hole capable of blasting down a forty-ton block. Hugh Martin, his partner, stood by with the dust extractor. A labourer was filling waste into a wagon, and a block awaited despatch to the incline. This was the workaday scene, relieved on the right by a glow of light made by miners at work driving a level through the wall of the chamber, driving ahead to new chambers and new vistas of industry and production. We leave the story of the venture from floor to floor at this stage watching the miner, William John Jones and his apprentice, George Radcliffe, a newcomer from Liverpool, forging ahead literally at the end of the traffic line, and levelling up the bottom and side of the tunnel which would soon give access to O.18 and other chambers yet to come.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

Nearing the Bottom. (Caban November 1954)

In keeping with the theme of our journey from floor to floor we resume the descent to the lower levels of Oakeley on the note of development. In our last issue was featured a sturdy new bridge on O floor spanning a forty-foot gap over chamber P2 below - a heavy duty viaduct built to cater for new traffic from new development in the O.B district of the mine. The completed construction is now in use, and one of the first of a succession of large blocks of slate was being rolled across the bridge. Resting on forty-foot steel girders, the foundations for which were seated in live rock rising at either end out of the dark chasm which was P2, the bridge is flanked by guard rails and footwalks. The structure is further supported by steel-rod tension stays secured by bolts or pins wedged and anchored in the ingenious and positive manner characteristic of slate mining and devised here some eighty or more years ago. Rolling the wagon with its two ton load were rockmen Hugh Martin Hughes and R.D. Edwards assisted by labourers Eddie Crilly and Arthur Johnson. The bridge was erected by our own engineers.

On P Floor.

Down in P floor one stage, or sixty feet below, the new bridge was seen in full perspective. This plainly shows the point and purpose of the new structure. The view forward to what remained of the rock face in the chamber and upwards where the bon, or natural shoulder of rock which normally marked the upper boundary of development in a particular chamber, has been worked through and away, thus giving access to the corresponding chamber, located, it might appear, one step upwards and further forward, as though on a giant staircase. The new bridge, its four steel girders visible underneath, spanned the space left by the rockmen after the removal of the bon. A new potential of production is thus created and made accessible, enabling further development to proceed directly from the floor of P2 forward into the thickness of the floor of the chamber above.

Hidden Factors.

Looked at in its rough hewn condition, and dwarfed between the towering walls of the empty chamber, the potential of new slate is, indeed, a hidden factor. But in the neighbouring P1 chamber, where development of this kind is well advanced, the picture becomes clear. There, rockmen William Parry and Bleddyn Owen were seen actually at work on the bon. The channelling machinists, clearly, have been there before, cutting an artificial foot joint to facilitate the onward and upward thrust through the smooth face of rock. In the foreground was a typical block of fine New Vein slate, one edge deeply scored by the channelling machine and already brought down, trucked and awaiting removal via the long haul to the mills 800 feet above the chamber. The clean cut from the channelling machine was traceable along the foot of the rock face. The equally clean and neatly sliced edge of the thickness of slate, which the rockmen were contemplating, was characteristic of the skill and care taken in this specialised method of slate winning. The principle of "follow-through" development as a standard and means of prolonging life and inducing greater productive yield of chambers lying "in-step" and which otherwise might be deemed to have neared the end of their productive careers, was touched on in our last issue. The preparations notably the preliminary upward thrust from the lower chamber - otherwise the roofing tunnel driven at the angle of the vein through the barrier of the bon - was described at the same time.

Follow-through - The start.

Close up to the bon in the lower chamber the scene is set at the beginning of follow-through development. On the right, against the massive chamber wall, the inclined roofing tunnel marks the line of approach to the upper floor. Standing at the open base of the tunnel was rockman Robert Williams, who, with his partner, will proceed in due time with the progressive widening of the tunnelled foothold, moving to the left across the thickness of rock, drilling, blasting and levering out raw material sufficient for many months of slate making by their partners in the mills. In this way, and by the skilful application of the steeped up widening operation hundreds of tons of good slate, forming the solid slate floor of the O.B1 will be won and brought down to the floor of P.B1. The floor will thus advance in depth and in step with the steady progress of the rockmen. The channeller and his multi-drill boring machine was readily recognisable. Serrations across the base of the rock, and again at intervals higher up, showed that some channelling cuts had been completed. Owen H. Jones, the channeller, stood on the staging, while fitters Leslie Jones and Ellis Edwards made adjustments to the mechanical aid. The way ahead here is literally cut and dried. Rockmen will take out slate from the line of channelling at a prescribed thickness, proceeding, where the roofing penetrates the bon, to widen and work under the top layer of the bon, leaving the undeveloped shoulder of rock linking the two walls of the chamber to serve as a natural bridge support for the traffic level on the floor above.

Advanced working.

The full effect of the "follow-through" movement was to be seen in P.B2 and the widening through to the floor of O.B2. With under-manager Morris Jones, was rockman David Roberts, balanced on a chain at the extreme end of the widening from the roofing tunnel into the floor of O.B2. His chain reached down under the bon, along the slope of the vein, and on to the floor of P.B2. Below the floor, were Richard Williams on the chain, and in company with rockman Robert Hughes consulting on the next phase of their work. The channellers had gone from P.B2 leaving their tell-tale imprint on the rock; the roofing shaft was no more. The narrow, upward exploratory thrust through the bon had been widened out of recognition, leaving only the sharply angled and clean cut edge of its earliest extremity. Development was seen in full action. Blocks had been taken from the channelled cuts and more would readily follow. P.B2 and O.B2 were fast becoming one unit. And so it will go on, widening and winning, until both chambers in time merged as one vast emptied cavern echoing no more to the rockman's drill.

"Plyg Mawr"

While there is nothing haphazard either in the preparation or execution of the work involved in this phase of development -

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

decisions are based on experience of the "ground," backed by a host of careful calculations - the rockman's task is sometimes eased or supplemented by what he regards as an element of luck. Natural rifts in the rock tend to help and guide him. Frequently geological eccentricities enable the rockman to size up and safely bring down outsize blocks of slate, some of them of quite exceptional dimensions, as in P.B8. Rockman Robert Jones, crowbar in hand, stood at one end of the "plyg mawr" which he and his partner David John Thomas had safely landed on the chamber floor. David John Thomas, who was a former R.A.F. welterweight boxer, described this one as "light heavyweight." Before Caban came along, he said the "plyg mawr" had already yielded up four blocks for the mills. He estimated that a further twelve "good blocks" remained to be taken. The approximate weight of the "plyg" was forty tons. The block was brought down from a lofty corner of the chamber. Another of similar dimensions was there for the taking. Robert Jones and his partner were confident that, given the required element of "luck" plus a little deft persuasion by blasting, the second "plyg mawr" would soon be theirs.

The slate miners.

The roofing tunnel has figured often in this description of the working scene underground. The men who carry out the all-important excavations are the slate miners, a skilled group, specialists in their field, and distinct from the rockmen. The miners have been found at work driving new floors, opening new chambers and pushing through traffic diversions. They also construct the wide steep shafts in which are installed wooden staircases to working places on the lower floors. Built to withstand the wear and tear of the steel-spiked boots of the men who daily clamber about the rock face, the staircases are known simply as "paths." A new path leading up through the solid rock from Q to P, where Undermanagers Morris Jones was found on his rounds, ascending, is a typical example of the solidity of the structure and the skill of the Oakeley miner.

Course of Duty.

It has been mentioned that snags and difficulties encountered by the rockmen are dealt with in the course of duty. There are exceptions, notably when faults are revealed in the formation of the rock necessitating reconsideration and adjustment of the planned progress. Usually a slight diversion from the surveyed route is all that is necessary to overcome the snag. Occasionally the snag may prove stubborn, requiring some exploratory probing, possibly in several directions, before what is sought is finally found and continuity of development re-established.

"Testing the ground."

The operation is known as "testing the ground" and miners are called in to do it. Also, on occasion, if the rock is "difficult" the operation may be protracted, even lasting several months before the safest and surest route to the new slate beyond is agreed. In the far easterly district of P floor we found miners J.R. Edwards and Richard Edwards actually engaged in a long stint of exploration. They were found working under a patch of marble-like spar nearing the New Vein. Masked, and with the dust extractor held at the business end of their machine, the miners were using a mechanical drill known in the mine as a "pusher." The legs of the tripod house a hydraulic device which has the effect of taking the whole strain and weight of the drill off the arms and shoulders of the man guiding it. The power driven "pusher" is capable of use in any given direction and with equal facility, an advantage which is found particularly acceptable when, as in this instance, the work of excavation might be protracted and the rock diamond hard.

Marshalling traffic.

P floor is one of the major producing units in the mine. The traffic levels and junctions are correspondingly imposing. All traffic from Q and R floors below - laden and empty - is raised on a separate incline to the P floor for marshalling and disposal via the main haulage system. Quadrupled lines of traffic converge near the exit from P floor. On the right are two traffic levels serving P floor proper. An empty wagon was being pushed into one level, a load of waste from P was halted in another. From the traffic landing behind the pillar on the left was seen a block of slate newly arrived from the bottom floors. Also on the left, empty wagons for the rockmen on Q and R were being manoeuvred onto the traffic landing.

Behind the pillar.

The scene behind the pillar was continued on the traffic landing from Q and R floors, the busy bottom levels of the Oakeley mine. The unhooker waiting to take charge of the block about to be landed was Robert Davies. The electric haulage gear was housed in a structure on the right where, at the controls, was Aneurin Hughes, the engine driver, whose duties also included charge and operation of the compressor which furnished compressed air power to the rockmen and others on Q and R floors. The final point of our visit to P floor was the "business end" - the foot of the main traffic incline serving all three of the lower floors. Unhooker John Williams was found here marshalling a typical train of traffic in readiness for haulage to the surface of the Oakeley mine.

Safety Precautions.

In this survey of the everyday scene at our mines the emphasis on security has been constantly stressed. The provision of expert exponents of first aid is one of the many safety precautions. On P floor Thomas J. Young (in his first aid clinic) combines his job as haulier with that of ambulance man. Thomas Young has twenty-three years experience with the local St. John's Ambulance Brigade as well as a wealth of war-time experience as an R.A.M.C. Staff Sergeant. He joined the R.A.M.C. as a military hospital reservist and served throughout the duration of the war at several military hospitals in this country. His field of activity as Ambulance man covers P, Q and R floors.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

From P to Q. Caban, May 1955

From P floor to Q floor, the route to be followed in this instalment of the journey from floor to floor at Oakeley, literally is a matter of steps - the brand new steps which we have already mentioned. Mined and hewn from the solid rock the new staircase reaches up through the darkness from the level at Q floor to P floor eighty or ninety feet higher up. Undermanager Morris Jones, who might be regarded as a little above average height, and who was to be found comfortably making the descent, afforded a fair impression of the width, headroom, and solidity of this new footpath giving access to the bottom floors. Often there is speculation as to ways and means of utilising the waste material which, inevitably, accompany the process of slate winning. The staircase from P floor may be instanced as one of the practical methods of using slate waste.

No trowel, no mortar.

The staircase is constructed of selected or shaped slabs of waste slate - a veritable jig-saw of bits and pieces, skilfully sorted, laid, fitted and levelled to form both the foundation and the steps - all of it without the aid of trowel or mortar! Oakeley slate masons, experts also in the old art of "dry-walling" are the builders. A hammer and chisel, and an unerring eye for the right sized piece in the right place are their only equipment in this and similar constructional work. The steps are laid on the angle of the vein and the rest on the live rock. Examples of the mason's work abound in the quarry. Much of it is to be found on the surface, where the retaining walls supporting roadways and haulage inclines and certain outbuildings constructed of slate waste erected "dry" are never-ending objects of interest and puzzlement to lay visitors accustomed to the more orthodox methods of building with bricks and mortar. Town-dwelling holiday makers in the area, who find our industry a fascinating subject for investigation, never fail to be surprised by the quality of the workmanship, the fine finish achieved, and its effectiveness.

Old Stairway.

The new stairway supercedes an older and much less elaborate footway: The obsolete staircase runs to one side of a supplementary haulage incline which serves the Q and R floors, and connects with the main haulage marshalling junction on the P floor level above. Dewi Lewis, hitcher on Q floor, was to be found standing on the footpath alongside of which ran the main incline down to R floor and the switch line turning off into Q floor. Our survey ended in the last issue with a reference to the busy traffic marshalling point on P. In charge of the haulage motor at the head of the incline was Aneurin Hughes, whose other duties include the driving and maintenance of air compressor plant which serves a multitude of power operated aids in use by rockmen and others on P floor and the two bottom floors.

Power units.

The compressor, with its engineer at the controls, occupies a space carved from the solid. Motive power for the compressor is electrical - steam has long gone out of fashion. Its function is to supplement, or boost, the head of compressed air which, at different levels, is introduced and piped into the mine workings. Although specifically included as a source of power for the three lowest floors, the P compressor does not necessarily supply all the power demanded at this depth. But because of its strategic position at the end of a compressed air line which starts high up on the quarry top, fully 1,000 feet above P floor, it is, nevertheless, a key unit in the network of ancillary operations which contribute to the smooth running of the many tasks involved in slate production.

Channelling.

One of these is the channelling machine, a device erected against the face of the vein in the rock chambers themselves for the mechanical cutting of slate on a big scale. It is a big user of compressed air power and has been much in evidence on Q floor where widening and development is in full swing. Simply stated, the duty of rockmen is to prise out, or quarry, blocks of slate from the section of the sloping vein of slate lying between the wide pillars of the chambers. In a newly opened chamber the vein of slate first appears as a wall of rock - perhaps thirty six or forty feet wide, and extending forward from the chamber entrance to a depth at the base of possibly 150 feet, and again upwards at the angle of the vein, to a height of about sixty feet. The quite impressive cubic content of such a mass of slate is a measure of the stint to be undertaken by the two rockmen partners appointed to the chamber. In point of time, and given fair average conditions of working, the removal of the mass and its reduction into blocks and, finally marketable slates, may occupy a matter of fifteen years before the working place actually assumes the vault like appearance which gave rise to the description of "chambers."

Rock conditions.

In the rockman's own estimation, the description "fair and average conditions" means that he and his partner are enabled first to find and then take advantage of the natural geological configurations in the slate that the rockman termed "joints," from which to work below and behind a selected solid mass of rock due to be won and tumbled down on to the chamber floor. At the lower depths in the mine, such as on Q floor, compression and the great weight of the slate vein, assumes greater significance than that found at higher levels. The rock, they say, "feels tougher." Natural aids to probing and prising are fewer and in such cases rockmen have to resort to artificial or mechanical aids. The channelling machine is the chief mechanical aid. Slate has the facility of splitting along two planes - one horizontal or parallel with the face of the vein; the other vertically, or from top to bottom. It was essential, therefore, when preparing for a first "bite" out of the rock to seek out a natural fissure as a point of "purchase" from which to begin the attack on the main bulk, or failing that, to create one artificially. Usually nature herself provides the answer in the form of what is known as a "foot joint." If, however, a joint is not present, and the mass of rock is indeed a solid wall, a foot joint, or its equivalent, has to be induced by the "channellers."

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

The channelling machine.

The channelling machine, with its multiple bank of projecting spearheads - diamond hard drills six feet in length - and driven by compressed air, has proved an ideal mechanical aid for this work. The machine chisels a six feet deep cut across the base of the rock at right angles to the face of the vein, and, if necessary, along the whole width of the chamber from the free side at one extremity to the edge of the great supporting wall opposite.

The rockman's initial working place is virtually in the space provided by the "roofing." The tunnel, constructed by the miners, is the first excavation, running upwards, through the slate, alongside the rock of the right hand supporting pillar, leaving first a working space at the bottom and thence along the whole length forwards and upwards to the ultimate roof of the chamber. The "roofing" aperture finally emerges in the traffic level of the floor above and thus ensures a free flow of ventilation to the chamber.

The working space at the foot of the rock is sufficient for the start of operations by the two rockmen, who begin by cutting a "free side" on the right hand side of the chamber and then across, progressively taking out the first thickness of slate.

In Q4 chamber, in which the width and slope of the slate vein was clearly to be appreciated we found channellers David Emlyn Lewis and Thomas Davies in the act of dismantling a machine after completing their task. Most of the bulky equipment was on the chamber floor. The machine incorporated water-cooling dust reduction units. David Emlyn Lewis was standing on staging from which a top cut had been channelled, and was handing down one of the six foot rock drills. When in operation the drills were mounted on a horizontal bar, which was seen behind the channeller. The "drifter" as the rock drills were termed, bored a line of holes 2.25" or 2.375" in diameter to the full depth of six feet.

A precision tool.

The channelling machine is a precision tool, the drilled holes are left exactly parallel and in line. The holes are divided only by the merest film of rock. A broaching tool breaks and removes the thin dividing layers between the holes, leaving as the finished job a clean deep cut twelve yards or more across the face of the vein. Q.4, at this stage is in fact ready and primed for a resumption of full scale working. Thomas Davies, on the floor of the chamber, had been operating power driven cutting machines on veins of both slate and coal. His experience of coal mines, however, was not of his own volition, and was as a prisoner of war. He was out with a field reconnaissance unit in North Africa probing enemy movements on the outskirts of Tunis when his squadron was captured. Until 1944 Thomas Davies languished in prison camp near Naples, but with the approach of the Allied invaders of Italy, he was transferred to Germany.

"As soon as the 'Jerries' discovered I was a Welshman, automatically and without further inquiry I was drafted to the coal mines of Silesia to join other Welshmen," he said.

"It was the German's belief that every Welshman must be a miner, and so I became a miner, - that was until the Russians, coming in from the East, threatened to overrun us. It was then that we had to run for it - or rather march. We were force marched 1,500 miles in all. They took us down into Czechoslovakia, then out again into Bavaria - this way and that, until suddenly it was all over and we were alone. The 'Geordies' came up and released us officially."

"Hobbies?" we asked.

"Certainly not walking" was the channellers reply.

Mark of the machine.

The precision work of the channellers and the clean cut effect produced in subsequent operations by skilled rockmen were strikingly revealed in Q.3. The serried line of holes cut by the machine as a top cut were clearly seen in section. A foot joint has been cut along the base. The rockmen, as was seen, had succeeded in displacing and lowering two heavy blocks from the upper channelled cut. Richard Williams, a rockman with ten years service, and Gilmour Wyn Hughes, 19 years, were tackling the next phase in the process of winning the big blocks. Their job is to slice off the top of the block, breaking down the fine even proportions into smaller editions of the original and in more manageable proportions.

The appearance of fine precision attained by channellers and rockmen in the production of this big block is not always guaranteed or expected. Slate, like most rock, is affected by temperament - or, as the rockmen say - "snags" - thus any exactitude which may be achieved is not necessarily scientific. Gilmour Hughes, who was at the base with crow bar in hand, is a product of our school for apprentices. He completed a three years course as slate-maker before becoming an apprentice rockman.

The Practical process.

In the practical process of handling and fashioning slates from the solid he learned in the mills all the characteristics of the commodity produced. There, also, he gained the all important facility of correct appraisal of the raw material before cutting or sawing and splitting, thus ensuring the maximum yield of best quality slates from a given block. The expert slate-maker has to develop an unerring eye for these things, and by deft touch, set out to prove the accuracy of his estimate in his output of slates. Experience in the mills, handling a wide variety of blocks, inevitably develops an intimate knowledge of types and quality of material calculated to give the best results with the minimum of waste.

Time served apprentices have this important advantage when the occasion comes, - as it had to Gilmour Hughes - to try

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

conclusions at close quarters with the slate in situ. The principles they found were unchanged. Another product of the apprenticeship scheme was rockman John Edwin Hughes, in Q.6. He partnered his father, R.D. Hughes.

Father and son partnership.

The father and son combination have been prospering for eight years. In the chamber, the partners were squatting under the cleared free side of a channelled cut preparing a cleavage hole in the side of the rock. A water-pump - another of the many pieces of equipment which drew power from the ubiquitous compressed air line - was at work in a pool which had collected over a foot joint. Seepage from heavy rainfalls continues long after the depression has passed over the Snowdonian hills, and one of the effects is a temporary inconvenience, quickly to be dispersed by pump and gravitation to big sumps and dams strategically placed in the mine. At intervals, or, as necessary the stored water is pumped through easy stages to the surface, and so into the streams which carry all our surplus water to Cardigan Bay. While the pump was at work the senior rockman prepared a cleavage hole to receive a controlled charge of gunpowder with which he proposed to crack the block along the horizontal plane. The top layer, up to the limit of the channelled section, has already been won.

In Q.9.

The workaday scene in Q.9 is typical of chambers in advanced stages of production. Channellers were at work there long ago. The widening is proceeding and some of the orderly shapeliness of the less developed chambers is absent. But blocks of slate of suitable dimensions appeared to be jostling for position on the floor of the chamber. One block, tilted on top of a bigger "conquest," was being swung round by the air motor of the crane. Behind, and above this block, were to be seen at least six others, all cleanly cleft from the widened section of rock, and which, in turn, would be levered and "craned" down for despatch to the counter parts in the production team - the rockmen's slatemaker partners in the mills. In this chamber developments have reached a stage where it might be deemed necessary later to move forward and beyond the technical boundary, and under the floor of the chamber above, thus to continue and extend the field of slate winning. This operation, involving the provision of a natural bridge or bon at the far extremity of the chamber roof on which to carry the traffic level serving the floor above, has been fully described in previous articles in this survey. The channellers may be required yet again to assist and facilitate he further advance on the site.

Natural aids.

Even at this great depth which is common to the Q floor, natural aids to slate winning are often available. Q.11, which we viewed over the shoulder of an on-looker at the mouth of the chamber is an example of development carried out by rockmen without the aid of channelling machines. The view was interesting, too, for the fact that it showed the nature and purpose of the free side running up between the slate and the wall into the dark recess at the top of the chamber. Working in the "roofing" was rockman Morris Hughes, who was cutting into the cleft to extend the scope of his operations up to the big unexploited slab of slate on the higher side of the chamber. The section in the foreground, immediately behind Ronnie Roberts, who was loading waste into a truck, would be won too, in due course. The development here is clear cut and orderly, and, as will be appreciated, presages a further long period of steady production. The rockmen's work is periodical, involving considerable and progressive periods of preparation. There is no haphazard hacking and hewing. The rock has to be nursed, even cajoled, into giving way before the laws of gravity.

Full Scale Production.

The rockmen's function is in the nature of a surgical operation, parting chosen sections of heavy material from the mother vein at an acute and difficult angle, using safe efficient and proven methods of extraction, then to induce the final slide which brings down the block without damage to the floor of his chamber. How effective this can be was shown to full advantage in Q.8. Here, without the aid of channelling machines and in the strict tradition of manual slate winning was a fine block newly parted from the solid high up on the smooth face of the vein, and brought down by gravity along the angle of 40 degrees. The big block had to be halved, perhaps quartered, by the rockmen to the length and thickness of the smooth faced blocks which awaited despatch on the trolleys. The massive girth of the vein of slate filling one end of the chamber and the different working thicknesses adopted by the rockmen, Griffith Jones and Caradog Owen, were other features of the scene in Q.8

Seventeen years of production.

The chamber wall, which extends upwards right through all the floors of the mine, is bared for twenty five or thirty feet of its length - it extends even further and out to the traffic level - and shows some part of the original thickness of the vein. The cleared space in the foreground was the floor of the chamber - cleared by dint of the work of two men, relentlessly and painstakingly repeating the process of cleavage and pillaring to take out the huge cubic content of slate which was represented by the space. In Q.8 the rockmen are about half-way through the task. Before them stood the formidable mass, as tough, as thick, as plentiful, seemingly, as it must have appeared when rockmen first entered the chamber seventeen years ago.

Rockman and sculptor.

We have touched on the art and artifice in the rockman's craft. It was not necessary to be an artist to become a successful rockman, though in Griffith Jones we have a rockman who is an artist in slate, and a prize winning artist too. He is a self-taught sculptor, working exclusively in roofing slate. His hand-carved plaques have won favour at Welsh eisteddfodau and at art exhibitions. Alas! for the eisteddfod and the skilled amateur sculptors there does not appear to be much scope nowadays for the fine work with chisel and mallet on the native slate of the Welsh highlands. Even the National Eisteddfod, said Griffith Jones,

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

appeared content to neglect the ancient skill. Our rockman-artist had not abandoned his hobby. While awaiting inspiration for his masterpiece, he continued to exercise deftness with the chisel by fashioning paper-thin miniature fans from slivers of Old Vein slate. There are examples of these novelties as far away as the United States.

Rockman-footballer.

Another personality on the Q floor was William Jones, who combines his work as rockman in Q.13 with professional football in the Welsh League on Saturdays. At 28 years he was right wing player with the Blaenau Ffestiniog Welsh League First Division team. His football career since the war has included first team appearances with Bangor City in the Lancashire Combination and the Cheshire League; Cambrian Coast Football with Harlech; Welsh League appearances with Pwllheli and the great Welsh International and ex-Everton centre-half Tommy Jones; a period with Portmadoc, and then, as he put it, "back to Blaenau." At one period in his career William Jones aimed to leave Welsh League Football for the greater prizes across the border and secured a trial with Grimsby Town, then in the hey-day of success as a First Division club.

In the current football season Oakeley Quarries has furnished three players in the town eleven, the others being slatemakers D. Thomas, centre-half, and G. Morgan left-half. William Jones said of D. Thomas; "I consider him to be a future centre-half for Wales. He plays a brilliant game." Gwyn Morgan, incidentally, was chosen first reserve for the Welsh amateurs who met Scotland on March 5th.

Miners follow rockmen.

Although in the normal course of events the miner's drill is heard first in a new chamber, there are occasions when the miner has to follow the rockman. It is when the slate winners had gone, their work, ostensibly, finished, and the chamber left high, wide, and empty. While on Q floor such a contingency is necessarily a long way ahead, it is to be found on K floor, one of the higher levels in the underground workings. There, in K.1, the oldest New Vein chamber on the floor, Caban was able to find miners John Reginald Edwards and Richard Edwards - the men who drove the tunnel for the new staircase from P floor - actually at work winning slate from a position far removed from the popular conception of mining. The miners were dwarfed against the high walls of the emptied chamber, standing on a staging thirty feet above the floor drilling behind a bulge in the wall - all of it good slate. They were boring along the horizontal plane at the angle of the vein. A gun-powder charge later would speed up the good work of development. A close inspection of the wall revealed a series of near-perpendicular serrations in the rock. Set equi-distant in layers, some of them almost in line to the chamber roof, they were the tell-tale marks of pillaring carried out by an earlier generation of rockmen, and probably with the aid of hand operated tools before the general introduction of the air driven pneumatic drill. Rockmen tended frequently to work round geological snags and similar obstacles, thus leaving bulges here and there similar to that which disturbed the symmetry of the K.1 wall. The big bulge in K.1 is expected to yield many tons of good roofing slates after the miners had finished.

Security.

All aspects of work in the mine are subject first to the rigid rules of conduct governing safety and security. Rockmen are encouraged and assisted in the observance of the rules by constant watch and ward of mine officials and other specialists in security. Temperamental inequalities in the rock formation are quickly detected, and it is then that securers James Parry and Tom Roberts take over in the chamber to check out suspicions and seek out and remove affected parts in the roof or walls. In P.11, the chamber in line and above Q.11, the securers had made a roof survey and were completing repairs by scaling off a suspect portion of roof, their platform a perch at the top of a 50 foot ladder. Jim Parry was aloft near the top of the 55 rungs, sounding and removing a faulty layer in the roof. Standing back in safety, under a natural bridge of rock giving on to the working part of the chamber, was Tom Roberts.

Pointing the ladder.

The ladder is noteworthy not only for its length but for the manner in which it is poised. It stands erect, almost perpendicularly, to reach a point just short of the chamber roof. The only visible means of support are in fact rope and chain anchorages. The ladder is tilted slightly forward of the securer to rest in mid-air against a skilful arrangement of ropes and tackles anchored firmly to the roof walls and floor. The ropes also hold the ladder firmly in the erect position, permitting of no movement sideways, though allowing for the slight movement backwards and forwards. The securer secures himself at the top, and is thus able to work freely with both hands. Skill and judgement enter exclusively into this work, the practical result of which was to be seen in the debris on the chamber floor - all of it directed to fall well forward and clear of the securer working with hammer and crow-bar.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

Floor to Floor Concluded. (Caban, October 1955)

To have reached the bottom of the Oakeley mine on floor "R" is by no means the end of matters in the production of slate. On the production chart the lowest point is, indeed, one of the highest factors. It is there, in conjunction with the earlier developed chambers on "Q" that the flow of blocks to the mills is greatest. Down on "R", about 1000 feet in vertical depth from the level of the Quarry Office, the working chambers are still an appreciable distance above actual sea level. The burrowed mine workings lie deep into the mountain base following the angle of the slate vein.

Elbow Room.

The vastness of these deep workings; the amount of "elbow room" available for the winning of slate at such depths is in sharp contrast to generally accepted impressions of underground working. A typical level on "R", hewn from the hard rock of the mountain interior, itself illustrates the scale of the engineering and mining which is preliminary to the opening of large scale development such as is the practice at Oakeley. R.7, in which the slate appeared to have cascaded at an angle of 30 degrees to the floor of the chamber, but which in actual fact had been skilfully "quarried" by the rockmen, Thomas Jones and John Morris Jones, served also and strikingly to illustrate the breadth and height at which it is customary to work in the practice of slate mining. There is nothing cramped in these conditions. The diminutive figures of rockmen high up on the slate showed this too. By reason of the "wide open spaces," which are the chambers, and the lofty tunnelled approaches linking and intersecting the development areas, natural ventilation flows fresh and untrammelled from floor to floor, unfailingly.

Air.

Air is also the chief source of power for the rockmen and their several aides in the traffic and labouring sections. This comes under high pressure boosted at different levels and is conveyed along a steel pipe-line of the type which was clearly seen running along the wall of the level on "R." Water, as well as air, percolates to the lowest level. Water, as previously described, presents a problem of drainage in our mines; one which has to be overcome by constant attention to pumping and disposal via a main water adit running out to daylight near the surface.

In R.7 the scene was set for the blasting of the big "plyg" or block of smooth surfaced slate on which one of the rockmen was standing. Thomas Jones, the senior partner, the nails of his right boot making a secure anchorage on the shining sloping surface of the rock, was poised over a powder hole awaiting the powder and tamping dust which John Morris was seen bringing along the chain which acted as "life-line."

Footwear.

Slate rockmen might not sport the heavily nailed boots of the week-end rock climbers who abound in the neighbouring Snowdonian hills, but their own footwear is by no means dainty. They favour strong, hardwearing boots with nails strategically placed to afford a purchase on the rock surface. Experience and intuition, plus the presence of regulation chain holds, and a light ladder where necessary, ensure security. Every step is measured. The workaday position of the two rockmen "on the job" in R.7 was typical of the respect for the rock which becomes second nature to the skilled slate quarryman. Thomas Jones has been working down from floor to floor at Oakeley and Votty for over 30 years. At the age of 44 he is already a grandfather. John Morris Jones is a member of a new generation of rockmen.

Faults and flaws.

The appearance of plenty and the impression of unrestricted development to be gained from the scene in R.7 do not deceive. At the same time, conditions in any one chamber can not be held to be typical. The struggle is always against the known and the unknown - the normal and the abnormal conditions. Faults and flaws in the strata which upset pre-calculations are prone to reveal themselves unexpectedly. They are regarded as temporary obstacles to be overcome in the forward and upward march through the section of the vein serving a particular series of chambers.

Conditions sometimes vary sharply in adjoining chambers. It is the case in R.6, a comparatively new chamber, where conditions do not compare with the relatively open development of R.7. In R.6 channeller Clifford Jones was at work boring a cut along the bottom thickness of the steeply sloping section of the vein. Above him the chert, the darker coloured hard rock, appeared to have overlaid the slate and thus temporarily limited the scope of development. In this case the task was to continue the roofing tunnel under the chert so that the unwanted rubbish would fall down behind, and at the same time widen to work the slate forward and under the overlying strata in the expectation that the wayward chert would resume its normal position in relation to the vein. The element of confidence in such operations is invariably justified by the collective wealth of knowledge of the rock which abounds in the undertaking.

The channellers tool is a pneumatically operated drill tipped with four-bladed bits of hardened steel capable of swift and accurate penetration along a precise line and in the toughest rock. The drills were biting into New Vein, which at R level is, in reality, the toughest slate in the mine.

Removing snags

The calls on the miners to assist in the removal or circumvention of snags are not infrequent. In our last issue they were perched on a platform high up under the roof of K.1 chamber starting work on a widening out to facilitate the winning of a large bulge which an earlier generation of rockmen had left as part of the wall of the old chamber.

From Floor To Floor – Going Down In The Oakeley And Votty Quarries

The effect of the operation was now clearly to be seen. An open-sided cut, or widening, had been mined along the angle of the slate, leaving a projecting triangular bulk of good slate ready and available for winning by the two rockmen, Gorwest Jones and Thomas Williams. The pursuit of good slate is unending. Where nature reluctantly releases her hold in one place she gives in abundance in another. In K.1 the bulky bonus block, although certainly not overlooked by the rockmen of the day, was ignored because of readier material, easier to win, and so it is that K.1 temporarily has a new lease of life.

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