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LUMPSEY IRONSTONE MINE
Map reference NZ 686187

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SYNOPSIS
Lumpsey Mine, throughout its life was very much a show pit with the latest technology applied. It was locally the only mine to use hydraulic drills. Opened in 1880 by Bell Brothers, the Teesside ironmasters, the operation was designed to produce 11,000-12,000 tons of ironstone per week but output was often below this target. Bell Brothers worked the mine until 1923 when they amalgamated with Messrs. Dorman Long and Co. who operated most of the mines in the area at this time. They closed the Lumpsey working in 1954. A very detailed description of equipment and techniques is given in this paper. The site is now cleared and little remains.

Introduction
The extension of the Middlesborough and Guisborough Railway into East Cleveland in 1865, paved the way for the opening of more ironstone mines in the area. Several of these mines were owned by Messrs. Bell Brothers, the Teesside ironmasters, and on 26th April 1880, they began sinking two shafts at a farmstead called Lumpsey, situated due south of the village of Brotton, and lying in the fork where the above railway joined the branch line from Saltburn.

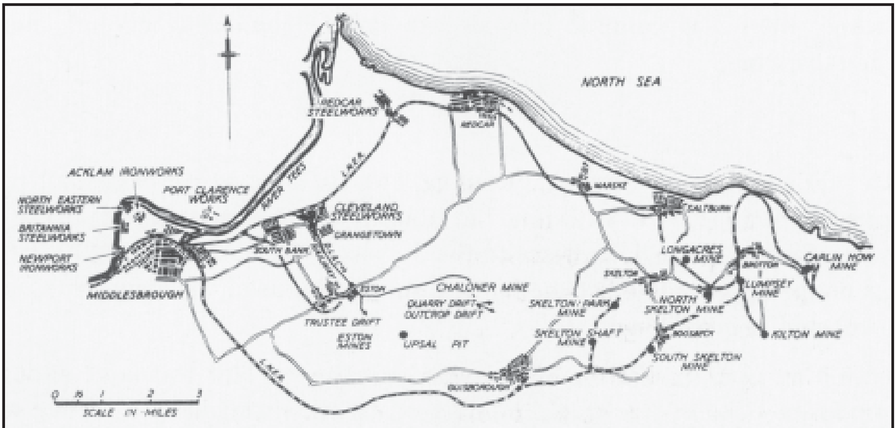
Geology
The Cleveland ironstone occurs in large beds in the Middle Lias formation. The beds cover a total area of about 350 square miles but cannot be worked profitably for much more than one fifth of that area. The Main Seam of ironstone is thickest and best along the escarpment of the Eston Hills where it is 20 feet thick dipping at about 1 in 15 towards the South East. It gradually thins to around 9 feet 6 inches thick at the Lumpsey Mine. Here it contains about 29% iron in the raw state and 37% when calcined. As the main seam extends towards the South East, a shale band appears with iron pyrites in it. The Kilton and Lingdale mines south of Lumpsey found it necessary to erect extensive picking belts to clean the ironstone and the heaps of waste rock have been quite a landmark in the area. Further South East the seam becomes two bands of about 2 feet thick with a shale parting of about 4 feet and is no longer workable.

The ore is an impure clay ironstone, consisting of carbonate of iron with clay and calcium and magnesium carbonates, also containing about 1.5% to 1.7% of phosphoric anhydride or 0.65% to 0.74% of phosphorus. Because of the amount of phosphorus in the ironstone it was not until the Gilchrist-Thomas process was developed in 1879-80 that it could be converted into steel.

Sinking Operations
The shafts were fifteen feet in diameter and sunk to a depth of 94 fathoms (564 feet) to reach the main seam of ironstone which here is about 8 feet 6 inches

thick. This was completed by 3rd November 1881. During this time several feeders of water, amounting to about 1,700 gallons per minute, were passed through and nearly 60 fathoms of tubbing were put in. Below this came the Alum Shale or Upper Lias and the Jet Rock, which being of a soft impervious nature contained no water, but much inflammable gas.

The cribbing is shown in detail in Fig.1. The ring crib, Fig.1(1) is about 4' 7½" across the inner arc and has a ring or gutter (a) to collect any water that may run down the walls of the shaft. It is 1½" thick all over. Fig.1(2) shows a segment of one of the three single cribs. Below is a section through on line A-B. A section through one of the three bottom double cribs is shown in Fig.1(3), the top one being 22" wide and the bottom one 20"; the plan being the same for all as shown in Fig.1(2). Both the double and single cribs have escape valves (e), to release the air as it escapes from the back of the tubbing. Where the double cribbing is used the top crib has simply a hole cast in it to allow the projecting part of the bottom to pass through it. The tubbing is shown in Fig.1(4). The tubbing of the first 20 fathoms is ¾" thick; the second 20 is 7/8" thick; and the last 20 1" thick. Every segment of tubbing has a hole (x) in its centre, fitted with a wooden plug which can be bored out when it is desired to tap the tubbing.



-Plan showing Positions of Ironstone Mines and Steelworks of Dorman, Long & Company, Limited.

[5]

When a suitable place was found to lay the various cribs the diameter of the shaft was widened out and the bed carefully levelled all round. The segments were then placed in position on the stone, between each segment a piece of ½" deal sheeting was placed and behind pieces of deal were carefully packed. As soon as the whole was laid it was wedged tight by driving in wooden wedges both behind and in the joint. The tubbing was wedged in a similar manner. Fig.2(1) shows how the tubbing was finished off at the bottom where it rested upon the last double crib. The last row (b) had both top and bottom flanges as wide as the bottom flange of (a). The last row but one of tubbing (a) was widened out at its bottom flanges. (b) also had pockets cast in it to support the ends of the wrought girders (e), which supported the cistern and the whole weight of the pumps which were placed within them. This row of tubbing again rested on the double cribs (c.d.). One or two of the cribs failed to hold the water. This was not so much from the character of the stone as from the shaft being sunk on a fault.

Fig. 2(2), shows the methods of hanging the sets by means of ground blocks and tackle (ab) and shows the method in which the pumps and cisterns were supported by the tubbing.

Fig. 3 shows the general arrangement of the sinking machinery at the surface, (a) is the main jack engine house used for raising the men, stone, rubbish, etc., (b) is the pumping engine house. The engine had two cylinders 24" diameter x 4’0" stroke; it was geared 3 to 1, and was worked with steam at 45 lbs. pressure. (c) is the crab engine house; this engine had two 14" cylinders with 2’0" stroke and they worked the crab by means of a screw and worm wheel.

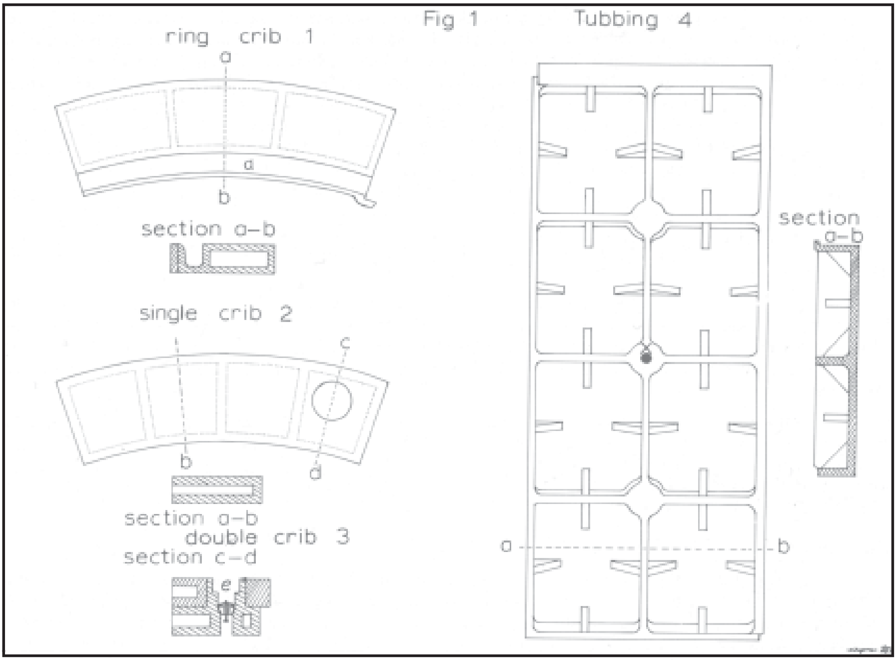
Dynamite, on account of its efficiency under water, was almost entirely used, 2,029 shots being fired during the sinking of the upcast shaft. Spoil was removed by a kibble, a large iron bucket which was hand filled. Water collecting in the very bottom of the shaft during a short interval, e.g. overnight, was removed by a “water barrel”, which was made of iron. The barrel was open-topped and with a trap door in the bottom which automatically opened when the barrel was lowered onto a hard surface.

Downcast Shaft

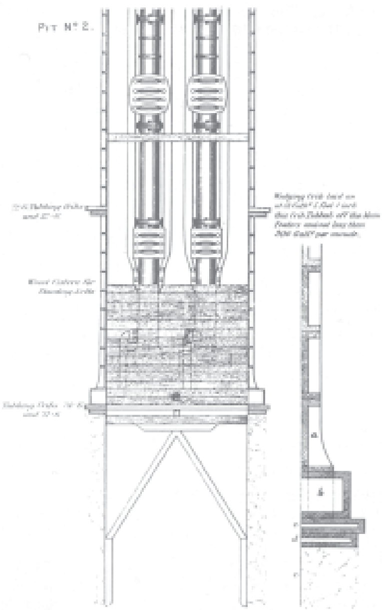
This shaft was 564 feet deep. It was worked by two single decked cages which carried two tubs each or eighteen men. The two cages ran in guides set in the shaft. These were long square lengths of wood placed end to end and running the full depth of the shaft; they were called “skeets” and were fixed to crossbars set in the shaft called “buntings”. When the steam winding engine was replaced by an electric winder in 1922, it was found that it was not so powerful as the former. It was discovered that the different weights of the cages (one being loaded with two empty tubs in the heapstead and the other being loaded with two full tubs at the shaft bottom) caused the motor to stall. This then had to be repaired, which meant that time was wasted and production lost. To combat this it was decided to attach an old winding rope from the bottom of one cage to the bottom of the other and so help to counterbalance the cages by its weight. The old winding rope used came from Lingdale Mine. The ends were attached to the cages by a swivel socket so that as the cages went up and down, the rope would freely turn and so not twist itself.

The main shaft was deepened by about 60 feet for this rope to hang in. This was sunk between 1922/24 through solid rock without interrupting the flow of production. It was achieved by drilling several vertical holes in stages, then charging and firing them. These were fired electrically, and at each firing the cages were stopped at the landings. This extension of the shaft was later brick lined.

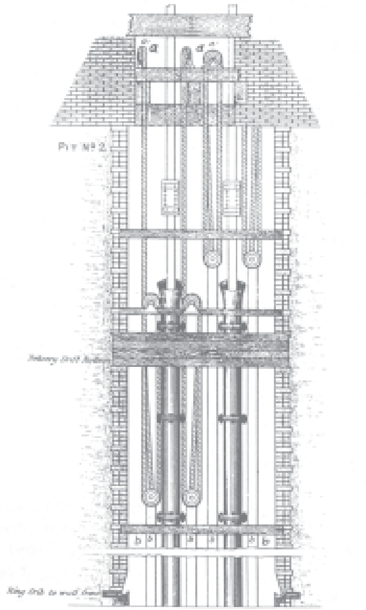
LUMPSEY IRONSTONE MINE



Upcast Shaft Fig 2 (1)



Upcast Shaft Fig 2 (2)



Every day the shaft was examined by the Shaftsman, who also inspected the pump room. He sat on top of the cage to which he was securely held by a harness. The cage was slowly lowered to the bottom, then raised for him to look over the shaft lining and timber work. At the same time the foreman blacksmith stood at the shaft top and inspected the winding ropes. These had to be kept well greased to keep them supple and rust proof. They were 1.3/8" diameter and changed about once every eighteen months.

About 70 feet down the shaft was a small pump house with a reservoir. The shaft above this house was waterproofed by a layer of tubbing behind the brickwork. This made the water from the layer of rock known as the “Freestone” collect in the reservoir, and from there it was pumped to the surface by a small electric pump controlled from the surface. This freestone water was pumped into storage tanks behind the winding house and used for washing horses, cleaning stables and drinking.

Upcast Shaft

The No. 2 Shaft was used for ventilation, pumping, and for evacuation in case of emergency. At the top of the shaft an enclosed passage connected it with the fan house. Air was sucked out of the mine via this shaft from around the workings and so caused fresh air to descend the downcast shaft. This necessitated an air lock at the surface so that entry to the shaft could be gained whilst the fan was running, thus no air could enter at this point thereby short circuiting the flow of air through the workings.

For shaft inspection an open bucket or kibble was kept there. This was large enough to carry two men at a time. They sat astride opposite sides of the kibble holding on by the lifting handle. There was no guide, so each man used a leg to push against the shaft wall if the kibble swung about in the shaft. If repair work had to be done in the shaft, to the lining or pump spears, a special platform was used for the men to stand on. It consisted of a large rectangular frame fixed to a rope by four chains and a metal ring and from this was suspended a timber platform of similar size held by a chain at each corner. The men working on this each wore a strong leather harness attached to the platform by means of a chain, as a safety precaution. This platform was raised by a horse gin, which was dismantled in 1925.

The timber headgear over this shaft was about 73 feet high. This was because the pump spears in the shaft were in long sections and if one broke it had to be hauled up into the headgear to be replaced.

For this purpose a small crab engine was used (steam driven) and this was situated alongside the pumping engine on the surface. The rope from this engine went around a pulley at the base of the headgear, up and over another one at the top, then down the shaft. This crab engine was removed in 1925 when the surface pumping engine was demolished.

In 1937 the headgear was re-built in steel and a small cage running in wire guides was installed to replace the kibble. About this time the massive timber doors directly over the top of the shaft were replaced by steel doors. In a small brick lean-to against the pump house were kept the shaftsman's tools and a spare kibble was also stored near this shaft top.

To the north of the downcast shaft stood the haulage engine house which contained the steam driven machinery working an endless rope system which went down the shaft into the mine. This provided power for the main endless rope haulage system which stretched south easterly from the shaft bottom for at least a mile. This rope system down the shaft was also carried through the workings to work several small pumping engines.

About 1900, electric driven haulage was provided underground and the surface haulage system was dismantled.

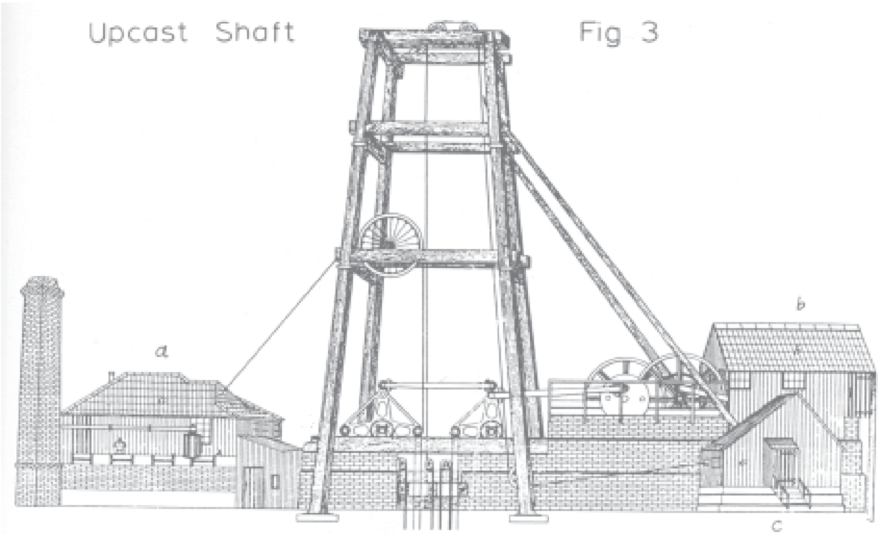
The pumping arrangements were that small pumps in the working pumped water along pipes and channels to the up cast shaft bottom where the surface pumps brought it up to the surface. The plant consisted of a horizontal steam engine working a long rod to and fro, which through two cast iron quadrants, worked two sets of vertical rods or "spears" stretching the full depth of the shaft. These were used to operate pumps at the shaft bottom which forced the water into a rising main which brought it to the surface. As these spears were located in the up cast shaft they were surrounded by much timberwork to keep the shaft airtight.

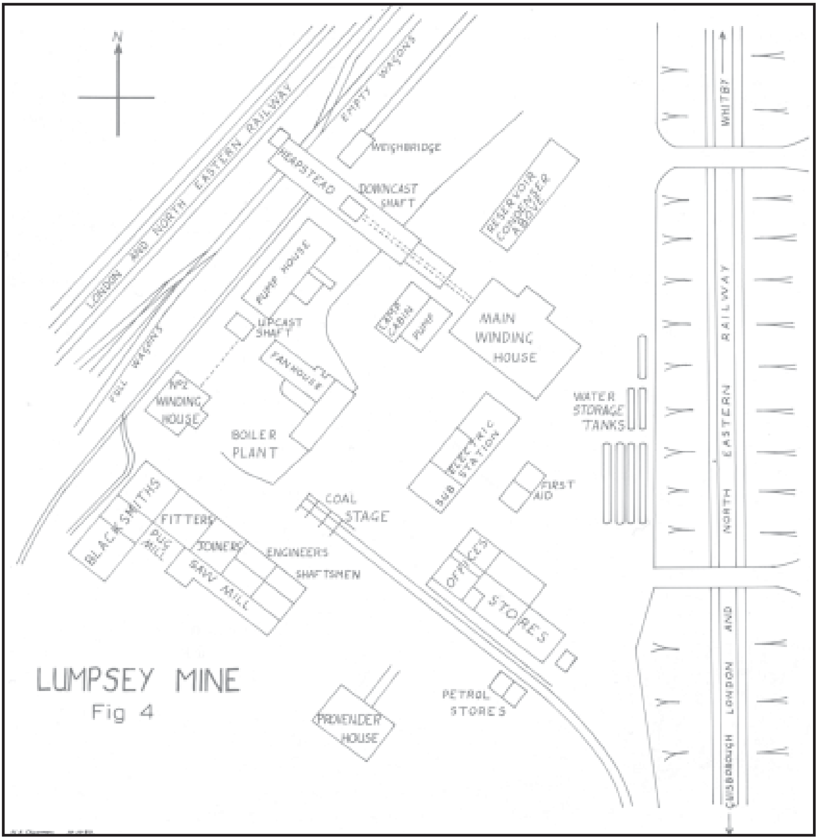
This pumping system was used from the opening of the mine and was increased in size in 1908, by equipping it with a Davey Differential Compound Engine, which worked until pumping was moved entirely underground in 1925. At this date electric turbine pumps were installed. These pumps pushed the water from the workings to the shaft bottom. The water was then pumped up the shaft to some underground storage tanks before going down to the local beck. About 4,000 gallons of water per minute were pumped to the surface by this method.

SURFACE INSTALLATIONS (Fig. 4)

Headgear and Heapstead

The original headgear was of wood and had two large pulley wheels on the top of it. From the top of it ran a wooden walkway to the front of the winding house. This headgear was changed between 1916-18. On 20th March 1918, the new headgear of steel joist and channel construction was almost complete, then on Friday the mine was closed and during Saturday and Sunday the wheels and ropes were fitted into the new steel headgear and the wheels removed from the old one. The new headgear was ready for use on the Monday morning. During the erection, rivets, nuts and bolts were prepared on the site. All materials were hauled up the headgear by a small steam winch. The new headgear was 100' 3" high.


Upcast Shaft
Fig 3
a
b
c


N
LONDON AND NORTH EASTERN RAILWAY
EMPTY WAGONS
FULL WAGONS
WEIGHBRIDGE
HEAPSTEAD
DOWNCAST SHAFT
RESERVOIR CONDENSER ABOVE
PUMP HOUSE
UPCAST SHAFT
CAGE CABIN
PUMP
MAIN WINDING HOUSE
FAN HOUSE
No2 WINDING HOUSE
BOILER PLANT
ELECTRIC STATION
SUB
FIRST AID
WATER STORAGE TANKS
COAL STAGE
BLACKSMITHS
FITTERS
PUG MILL
JOINERS
ENGINEERS
SHAFTSMEN
SAW MILL
OFFICES
STORES
PETROL STORES
PROVENDER HOUSE
WHITBY
NORTH EASTERN RAILWAY
LONDON AND
GUISBOROUGH LONDON AND
LUMPSEY MINE
Fig 4

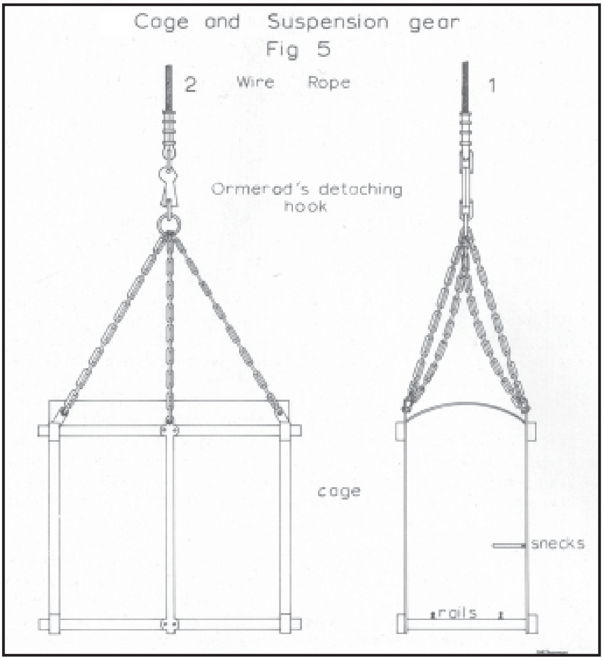
On the front of the winding house was a wooden frame that held the end of the walkway from the winding house to the headgear. When the walkway was demolished the frame was left in position and this remained there until the site was cleared in 1967.

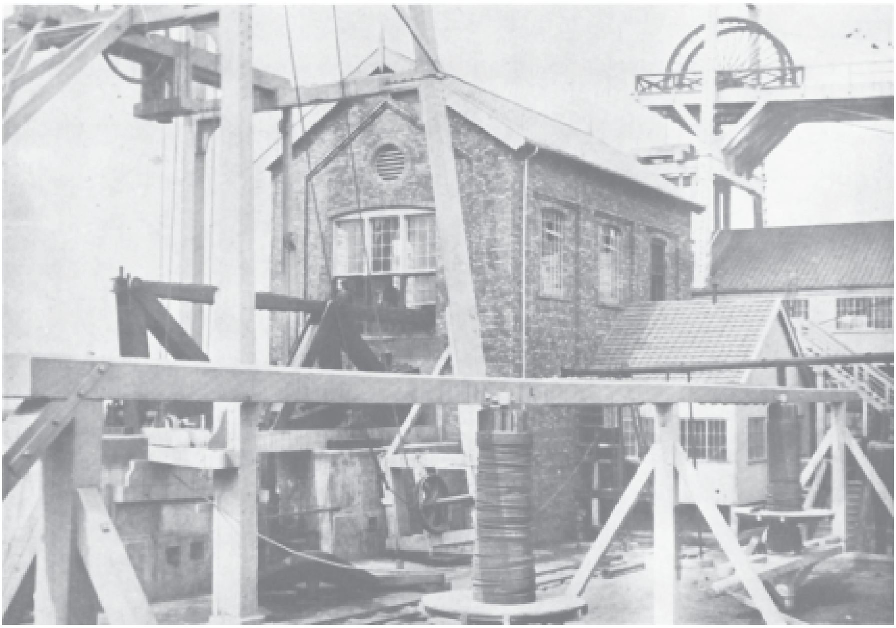
The heapstead was a wooden building built around the shaft top and raised above ground level. This was the main level at the surface and was known as “bank”. The actual ground surface level was known as the “horse-hole”. When the cage came up to the heapstead level it went a few feet above the bank where two levers or “keps” were moved out under the cage from the landing at each side, and the cage was then lowered to rest on them. In order to descend, the keps were retracted and then the cage was lowered. The keps were operated at bank level by the Banksman who looked after the changing of the tubs and men in and out of the cages. The Onsetter did the same at the [8] bottom of the shaft. The men were searched for cigarettes, matches, etc., at bank, but this only came permanently into being when the mines were declared “Safety Lamps” Mines about 1953.

The tubs came out of the cage and were pushed into the “tippler”. As the tubs went into the tippler they pushed the previous tub out. This one passed over semi-circular pieces in the track, and in so doing operated the tippler emptying the second tub. There was a small foot control by the tippler so that it could be stopped at any stage of the revolution. The now empty tub was pushed out of the tippler, and round to the base of a short up-gradient. There was a continuously moving belt between the rails up the gradient. Fixed to the outside of the belt were a number of hooks which caught under the axles of the tubs and pulled them up the incline. This was known as a “creeper chain”. The tub came off the creeper automatically at the incline top and rolled down by gravity and was reversed by a short incline over the points and thence rolled back to the shaft. There was also a small tippler for handling shale.

The horse-hole level was used for loading timber, equipment and horses into the cages. Much of the timber was too big for the cage and had to be slung beneath it. In the very early stages it was also the standard procedure to do the same with the horses, but later they were carried in the cage.

The cage used in the downcast shaft had an iron floor laid with rails and connected to the roof by six iron bars, three on each side. From the top of these, chain was fastened to the rope; the two central chains were longer than the other four and hung loose so that if the four corner chains broke the two loose ones were strong enough to hold the cage to the ring. The sides of the cage were enclosed. On the top of the cage was a safety device to stop the cage in the event of the rope snapping. This was connected to the rope so that if it snapped the strain set off the gear and operated metal claws which dug into the skeets on both sides of the cage. These were strong enough to hold the cage in the shaft. This device was generally fitted to the cages used in all Messrs. Bell Brothers mines in the early years. It was removed when regulations came into force which ensured that winding ropes were not allowed to become liable to break. The type of cage used





View of pumping engine house and quadrants on top of upcast shaft. Note two capstans in foreground for lifting equipment in shaft. About 1908-1918.

in the shaft is shown in Fig.5. Fig.5(1) shows the end view and the snecks can be seen. One of these was fitted at each end of the cage and when in the down position (as shown), they prevented the tubs from falling out of the cage. Fig.5(2) is a side view showing the six chains. The four corner chains carry the weight of the cage, the centre two are for emergencies.

On the headgear was a device for disconnecting the rope from the cage in the event of an overwind. The device used at Lumpsey was called Ormerod's Hook, having been invented by Mr. Edward Ormerod of Manchester. The rope to each cage passed through pulleys in a rectangular board that was suspended below the pulleys. In the wooden board were placed two funnels. The winding ropes passed through one each of these funnels and down to the device shown at Fig.5 (2). From this device six chains held the cage. When the rope overwound the device was forced into its funnel; in doing this a lever was forced upwards and the rope shackle was released. This safety device prevented the cage from being dragged into the pulleys which would have broken the ropes and sent the cage crashing own the shaft. The ring to which the six chains were attached was itself fixed to the Ormerod Hook described.

The Main Winding House

A large brick building with timber roof completed in 1881, as shown on the date stone placed above the main doorway. Due to its height and also its position on high ground at the north east corner of the site, it dominated all other buildings.

The original winding engine was steam driven and built by Messrs. John Fowler & Co. of Leeds. It consisted of a pair of 42" cylinders with 6' 0" stroke. The winding drum was a spiro-cylindrical type increasing from 17' to 21'. It was capable of winding 240 tons per hour and had a gross load of 8 tons 12 cwts. Time in drawing was 30 secs. and it could change in 25 secs.

With a view to reducing the coal bill, it was decided to renew the plant and modify the winding engine. During 1903 one of the original cylinders was replaced by a 24" Corliss valved cylinder to provide a high pressure side of this engine capable of using the 150 lbs. per sq. in. The steam then passed to the remaining original cylinder of 42" diameter to convert this engine to a Cross Compound winder. The whole of the exhaust steam from these engines was condensed in a jet condenser having steam-driven air and Circulating pumps. This condenser was erected in the space between the Winding Engine House and the Electric Sub Station.

The steam winder was replaced in March 1922 by an electric winder. Over 360 tons of concrete were used to form foundations for the new drum and 100 tons for those beneath the driving motor. To accommodate this motor an extra section was added to the north wall of the building.

The new winding gear was built by The Metropolitan-Vickers Electrical Co. Ltd., and had a spyro-cylindrical drum 14 feet diameter at the ends and 17’6" in the centre. It was about 10 feet wide. It was geared 6 to 1, and driven by a 710 h.p. slip ring motor running off 3,000 volts and having a Weir type liquid controller. To make the rope climb from the smaller diameter to the larger, grooves were cut in the drum to form a spiral. The theory behind it was that the added diameter of the centre and the extra weight so placed enabled the motor to start easily and at the end of the wind to assist in braking it.

To the winding drum were attached two ropes. These were fitted in such a way that as one rope coiled onto the drum, the other uncoiled. At the other end each rope was connected to one of the two cages in the shaft. One cage would be at the surface and the other at the bottom. As the drum rotated the cage at the shaft bottom was wound up whilst the other cage was lowered.

A full load of stone was four tons in two tubs and this could be raised in 26 seconds. With this winding gear 2,000 tons could be raised in eight hours. The brakes, made by Messrs. Whitmore, were operated by compressed air, the compressor being placed in the undercroft of the building.

To the left of the drum was the indicator board. On it were marked representations of the shaft and cages. As the winding gear operated, so the cages moved from the top to the bottom of the scale giving a visual indication of the running of the cages to the winding engineman. The communication with the shaft was by mechanical means. Two visual indicators were set up on the wall in front of the engineman, one had wires running down to the onsetter at the shaft bottom, the other went to the banksman. On the indicators were figures and written instructions which were a standard code. These were:- (1) Stop/raise; (2) Lower; (3) Men; (4) Raise steadily; (5) Lower Steadily. When the cage at the shaft bottom was loaded the onsetter pulled his lever once which moved a pointer on one indicator in the winding house. The banksman, when his cage was loaded rang twice which was recorded on the other indicator. The engineman set off his engine which automatically cancelled these indications. Towards the end of a wind the engineman knew when he had reached the final drum revolution from his indicator board and from paint tracks on the side of the drum which indicated the precise place in which to stop the drum. A bell rang when the cage reached the landings. There was also a speedometer showing the speeds of the cages. This was important when man-riding; the maximum speed being five feet per second; when winding stone it would be twenty feet per second, and the winding time an average of 26 seconds.

To the left of the winding drum was a small drum driven by a clockwork motor. Every two days a spherical roll of paper was put on this drum and a pen fixed to write on it. This roll of paper was connected to the winding gear which caused a line to be drawn continuously on the paper with a blimp every time a cage made a journey. At the end of the day the roll showed the number of runs and approximately the time of each.

This winding gear was fitted with a “Kings” slow banker which governed the speed of the gear when arriving at the landings. Governors were also used to control the speed of the gear during winding, and to stop the gear automatically in the event of an overwind.

Once every three months the whole winding gear was put through a rigorous inspection to check that all the safety devices worked correctly.

The winding engineman was on a platform set about six feet above the floor and to the left and behind the drum. The engineman sat on a chair with the forward/ reverse control lever on his left hand side, this lever controlled the speed of the drum. On his right was a handbrake. In front was an inverted “U” shaped metal tube which was the emergency cut-off. If the power did not cut off when required the engineman brought his foot smartly up and through this “U” shape, knocking the top off. This driving platform was surrounded by large glass windows and was roofed and was entered from the rear.

On the roof of the winding house was the mine buzzer. It was sounded at the start and end of shifts and also at twelve midnight on New Year’s Eve to bring in the New Year.

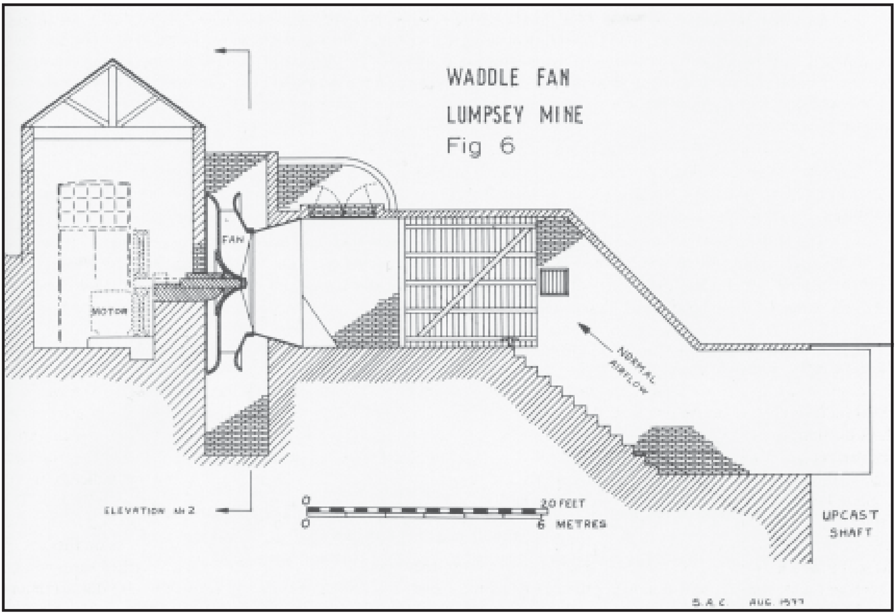
Secondary Winder and Fan House

This was a small building to the south of No.2 shaft. Before 1922 this had a steam driven engine, but at that date the electric winder was installed. The winding gear was of a simple type consisting of a drum driven by a 60 h.p. Metro-Vickers engine through gearing. Before 1925 this building was also the engine house for the steam driven Guibal Fan with a large chimney up which the air was expelled. From the side of the fan house ran an enclosed passage down below ground level to the shaft. This fan house was demolished in 1925 when a new fan house was built, see Fig.6 and 7.

The new fan house contained an electrically driven Waddle Fan. This fan was a single inlet 144" fan driven through a Hendry laminated belt by a 70/9 b.h.p., two-speed squirrel cage pole-changing motor with auto transformer starting. This fan could deliver 90,000 cubic feet of air per minute. This was a special fan house in that the fan could be changed to blow air into the mine instead of drawing it out. To do this a large wooden door was drawn across the face of the fan, and another one in the roof was opened. When the fan was re-started air was drawn in through the hole in the roof and sent through the side passage, by-passing the door and so down the shaft. This method was to be used only in an emergency.

Boilers

The boiler plant formerly stood to the north of the downcast shaft and the original 6 egg ended boilers worked at 40 lbs. per sq.in. About 1906 a new boiler plant was constructed near the No.2 shaft, the older boilers being dismantled and the chimney felled in 1907. These new boilers of the Lancashire type, worked at 150


WADDLE FAN
LUMPSEY MINE
Fig 6
FAN
MOTOR
NORMAL AIRFLOW
ELEVATION No 2
0
20 FEET
0
6 METRES
UPCAST SHAFT
S.A.C. AUG 1977

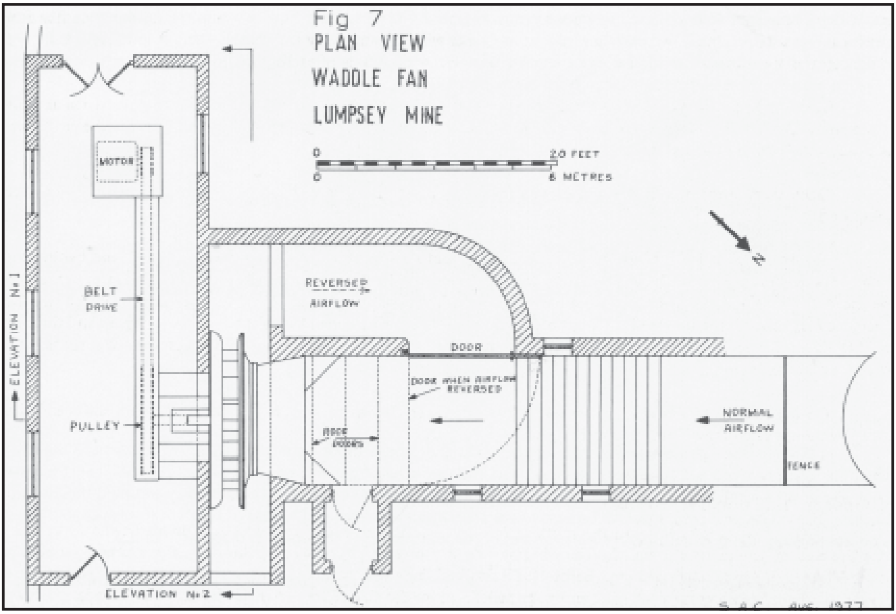


Fig 7
PLAN VIEW
WADDLE FAN
LUMPSEY MINE
0
20 FEET
0
6 METRES
N
MOTOR
BELT DRIVE
PULLEY
REVERSED AIRFLOW
DOOR
DOOR WHEN AIRFLOW REVERSED
NORMAL AIRFLOW
FENCE
ELEVATION No 1
ELEVATION No 2
S.A.C. AUG 1977

lbs. per sq.in. The new range of three boilers had a diameter of 8' 6" and were 30' 0" long. A new wrought iron stack was built to a height of 130 ft. for the new range. These boilers provided power for a steam driven sub-station, fan house, main winder, secondary winder and underground haulage. Boiler feed pumps for this plant were provided by Messrs. John Cameron & Co., of Manchester.

Boiler Plant
For the boilers a coal depot was built near the sub-station or electric house. Coal wagons were pushed along a railway line from the Brotton/Boosbeck line. This track ran between the storehouse and the stables. The coal was unloaded from doors in the bottom of the wagons and piled beneath the staging. It was also used for the fires in the workshops, offices, etc. This boiler plant was dismantled in 1925, the chimney being felled in 1936.

Sub-station
This was constructed in 1904, and designed to provide power for electrical drilling machines and lighting. The machinery comprised four vertical compound steam engines by Messrs. John Fowler & Co., of Leeds, geared to four electrical generators made by Messrs. Andersons, Engineers, Newcastle upon Tyne. About 1922 this mine was connected to the National Grid and these engines were removed, three being shipped to Russia. Transformers were installed in their places and current taken from the National Grid.

Condenser
By the main winding house stood a cooler, about 70 feet high and made of wood. The operating principle was that the exhaust steam was fed through a condenser after treatment to remove oil. The condensed water was then fed back to the boilers. The cooling agent in the condenser was a separate system of water which was pumped from the reservoir at the base of the cooling tower to the condenser. Here it became hot as it condensed the exhaust steam, was passed to the top of the cooling tower and caused to break up into thousands of droplets as it fell through a network of wooden ledges inside the tower. The cold water was then collected in the reservoir at the base. The cooler was dismantled in 1922.

Offices
Opposite the sub-station were the offices. On the ground floor were the general offices where the mine accounts were recorded and brought up to date, and the pay office. Before each shift the miners called at this office and were given a small wooden board with their own number on it. At the end of the shift they returned these boards to the office. This enabled a check to be kept of who was inside the mine and in case of accident it was possible to tell who was missing. On the first floor were the offices of the mine manager and under manager.

The long room behind the pay office housed the horse drawn ambulance. Before this a two wheeled handcart was used to transport dead or injured men to the Cleveland Cottage Hospital in Brotton. This Hospital was built in 1874 by Messrs. Bell Brothers for their miners. The miners paid two pence per man per week, for a doctor and the upkeep of the Hospital. In 1930 a small two roomed first aid post was built opposite the sub-station.

[14]

Storehouses

Behind the mine offices stood the stores. Here equipment and spares for the general running of the mine were kept. There were also two stores for lamp oil and in later days diesel oil for the locomotives.

Across the railway sidings from the storehouses were the surface stables with provender house above. The stables had stalls for six horses and a room for their gear. Two loose boxes were provided for sick or injured horses. The horses were used on general haulage about the surface. On the west side of the buildings was a wooden roof with open sides, this being the cart shed. The upper storey, connected to the ground by an inclined wooden gangway on the north side of the building, was used to store feed.

The horse feed was prepared at Messrs. Bell Brothers "Chop House" at Skelton Park Mine and despatched to their various mines.

Workshops

These were all in one block together. The blacksmith's was the largest of the three. It was divided into three rooms, the northern room adjoining the joiners being the blacksmith's proper. It had about four fires in it, and about the same number of anvils. Joined to its southern end was the stemming house, where clay was made into rolls for use by the miners. Earlier the stemming house was in the old farmhouse that used to stand at Lumpsey. Around the inside of the walls of this room ran a pipe with large metal plates on top of it. Smoke and fumes from two fires were led through the pipe: later steam was used. The rolls of clay were put on these metal plates to dry. The men were paid 2/3d per day for rolling clay. About 1920 the third room was added to the south of the stemming house. This room contained three fires and anvils. The first room had a power-driven grindstone in it. Clay was still rolled in one corner of the southern room and dried in metal cupboards behind the fires. These fires were of brick with metal hoods, one fire having a metal chimney. In a small brick lean-to against the east wall of the blacksmith's was an electrically driven pump which forced air through pipes to the fires in order to create a draught and make them burn hotter. In the blacksmith's, tools were made and sharpened. Many of the drills used in the mine were made there, and at one time, when Messrs. Bell Brothers still owned the mine, all tools were marked with "B.B.". The regular work was drill sharpening and machinery repair. Some equipment for the horses was made and repaired there, but it was mainly for the few surface horses. There were two blacksmith's shops underground for the others.

The fitters and carpenters shops were where the carpentry for the mine was carried out. Tub bases were made and assembled whilst wooden baulks and planks for use both above and below ground were shaped. Almost all repair work and tools for the mine were made in the workshops described. The joiners also undertook repair work to the houses owned by the Company in Brotton and Carlin How.

The next two main buildings were the engineers and shaftsman's offices. Behind them was a small room with railway tracks laid in the floor. This was used latterly as a diesel locomotive repair shop.

Under a wooden lean-to shed against the workshops was a saw-mill. In here tree trunks of larch and Norway spruce were sawn into props sixteen feet long or shorter as required. Baulks of timber of square section and planks were also shaped. In the space between the saw-mill and the blacksmith's was a pug mill. Shale, clay and water was mixed to make the clay used to make the stemmings in the stemming room.

The area immediately south and west of the blacksmith's was the pit yard. Here the timber for use in the mine was stacked on arrival and tubs for repair were parked here. Here also was a large wooden platform painted with the correct gauge of track for use underground. New sets of points and track were placed on this platform to check if they were made correctly. In front of the main winding house were two small buildings. The one nearest to it was a small pump house used to pump water to the storage tanks. These tanks stood opposite the winder house and the substation.

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The other building was the lamp cabin. It had racks in it on which the cap lamps were re-charged. The safety lamps were re-fitted and kept here. At the start of a shift a miner went to the pay office to collect his token, then to the lamp cabin for his lamp. The steps into the heapstead were nearby so he climbed them and waited for his cage.

The stone used to be taken away in standard gauge wagons from ten to twenty tons capacity, but later larger steel wagons were used. The empty wagons were stored in sidings to the north of the heapstead and were gravitated down through the loading bay to the full sidings to the south of the heapstead. To the north of the heap stead was the weighbridge for weighing the railway trucks. All the stone was taken to the works of Messrs. Bell Brothers at Port Clarence.

There were two powder magazines. One was in a field south of the mine tip and the other was used for larger amounts of explosive and built into the mine tip. Powder came in 15 lb. wooden boxes known by the miners as “jumbo” boxes. The miners called at the smaller magazine for their powder and took this into the mine in 5 lb. zinc or copper tins.

General
The usual shift was from 6 a.m. to 2 p.m. (front shift). During the second World War shifts of 2 p.m. to 10 p.m. (back shift) and 10 p.m. to 6 a.m. (night shift) were started. The mine formerly worked six days a week but about 1920, a five day week became the rule.

During 1921 short time working of two or three days a week operated for some time, then in 1923 Messrs. Dorman, Long & Co., took over Lumpsey Mine and apart from a closure period of one year (1932-3), worked it until the 29th November 1954. Most of the miners were transferred to Lingdale, Kilton and North Skelton Mines afterwards. The fan, secondary winder and pumps were kept going for North Skelton Mine. This was because North Skelton was still using part of the underground workings of Lumpsey. North Skelton’s usage of the workings ceased when the mine closed on the 17th January 1964, this being the last ironstone mine in Cleveland.

Conclusion
Practically all the buildings remained after the final closure in 1964. The machinery was removed, except for the 12 feet diameter waddle fan, which was bricked up in the fan house. Unfortunately no alternative use for the site was found and it rapidly deteriorated subsequently under the ravages of weather and vandalism. In 1967 the owners of the site decided to level it, damage having extended to the point where several buildings stood roofless and not a single pane of glass remained intact.

As a result of this, the Teesside Industrial Archaeology Group decided to survey the site and drawings were made of all the buildings, photographs taken and a site plan prepared.

Behind the storehouses was found the iron water barrel used during the sinking for removing water. It was half-buried in the ground. With the aid of R.E.M.E., members of the Territorial Army and a three ton lorry, we managed to dig out this kibble and despatch it for preservation in the Dorman Museum.

The site was entirely demolished shortly afterwards, only the fan remaining intact in the remains of the building. Even this has suffered severely through vandalism since. The two shafts remain, bricked around the top, but the workings are flooded.

[16]

Fig.8 - The Lumpsey royalty originally covered 985 acres and was mainly underlying arable land although it included the hamlet of Kiltonthorpe and part of the village of Carlin How. In fact at the opening of Lumpsey around 1880 the mine at Carlin How had been working for eight years in this same royalty; of course it was owned by Bell Bros. It would appear that the royalty was planned to be worked by the two mines and was laid out in the manner whereby the advantages of this system were used to the fullest extent. Fig.9

The method of extracting ironstone widely used in Cleveland was the Bord and Pillar system. The success of this and any other method of extraction in mining depends on good initial planning. At Lumpsey the two shafts were sunk so that a line running through them is N.E. to S.W. which is in alignment with the strata which is dipping gradually to the S.W. Then from the bottom of each shaft a heading was driven at right angles to this, Le. in a south-easterly direction. These two parallel headings were eventually completed to a total length of about 1¼ miles and were practically level. At the same time similar headings were driven off from the shaft bottoms in the opposite direction right to the royalty boundary.

During any work underground it is of prime importance to maintain good ventilation. As soon as the two shafts were sunk and the ironstone seam had been proved to be worth working, they were joined by a drift cut in the ironstone seam. Then a permanent ventilating fan was constructed on the surface over one shaft, which became the Upcast as the air was drawn up this shaft by the fan. The fresh air was drawn down the other shaft which became known as the Downcast and was used as the main production shaft of the mine. As the headings proceeded the ventilation system had to be carried with it. At a certain distance a roadway or bord was driven at right angles to connect the two parallel headings. This caused the air flow coming down the working shaft to travel up the heading through the bord, then to return to the upcast shaft via the other heading. When the headings had been driven a further fixed distance a new bord was cut and the old one was stopped up or reduced in size to make the air go through this new bord. This system was repeated throughout the entire length of the headings at regular intervals, which away from the vicinity of the shafts, were 22 yards (one chain). The northern heading of the two was driven directly from the downcast shaft and so was developed into the main haulage road. The heading was wider at the shaft bottom to provide space for sidings and a large brick arch was built to take the weight of the strata above. The other heading became the main air return route to the up cast shaft and the fan.

Equally spaced along the main headings three pairs of secondary headings were driven at right angles up the rise of the seam in a north eastern direction. Other pairs of headings were driven on the dipside of the main headings. These secondary headings were all designed as haulage roads and were driven to the boundaries of the royalty in various directions to provide transport facilities for the most remote areas of the mine. Also, a system of parallel headings was driven to develop a ventilating system to permit work to be done in any part of the mine. By these methods the framework of the Lumpsey ironstone mine was being created.

At about the same time a similar main haulage road was being extended in a southerly direction from Carlin How mine which joined up with the Lumpsey main haulage road by 1904. Atter this date the output of the Carlin How mine was sent by this haulage road to be wound at the Lumpsey mine shafts. While the Lumpsey haulage plane was almost level, the Carlin How plane was quite steep as it rose up to the Carlin How shafts. So the tubs of ironstone were lowered down the Carlin How plane then transferred to the Lumpsey plane for the journey to the shafts.

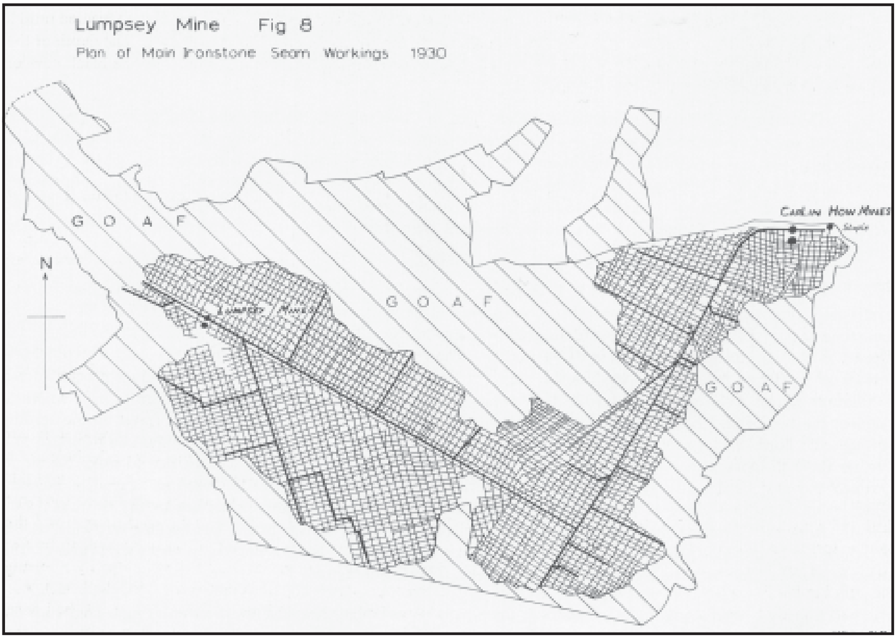
About this period the mine was at its most productive with headings and bords being cut between haulage ways breaking up the areas of stone into the Bord and Pillar pattern until the workings filled the entire royalty. This was known as working the ‘whole mine’. In the early 1920s additional royalties were leased on the northern edge of the existing working areas and these were soon filled with the headings and bords of the mine. Once all the workings had been created, it was the usual practice in Cleveland then to commence the removal of the Pillars of ironstone so created. The removal of pillars was started on the boundaries of the royalty and worked back towards the haulage roads and over the years gradually back towards the mine shafts. Removing the pillars was known by the miners as ‘Working the brokens’. By 1944 the Carlin How mine area had been worked out and was abandoned. Lumpsey Mine closed in November 1954 after a haulage road had been constructed to the nearby North Skelton mine. The remaining stone in the Lumpsey royalty was removed by this route until the closure of North Skelton in January 1964.

Drilling

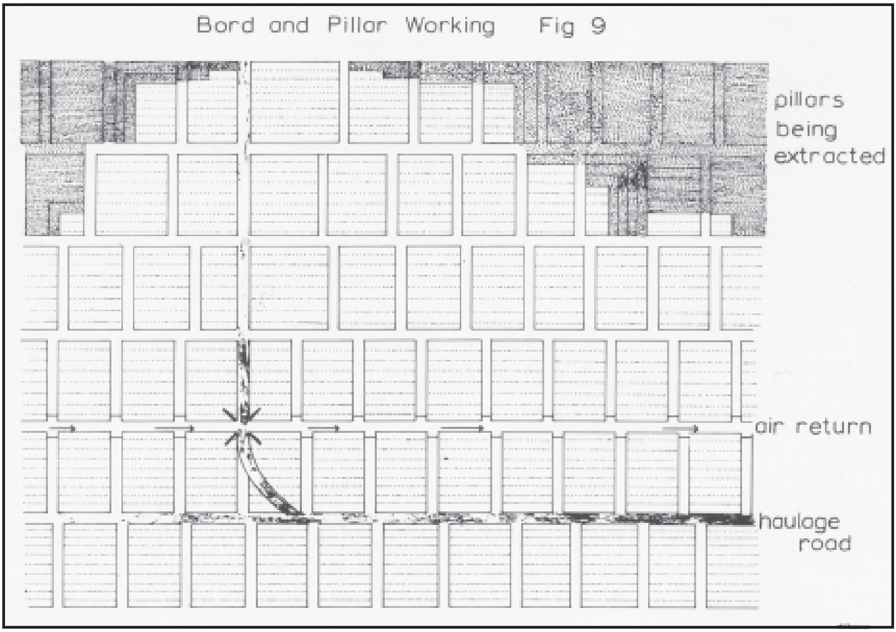
The method of actually mining the ironstone always followed the principle of drilling one or several holes into the working face, then charging these holes and blasting the stone down. This principle remained the same although drilling machines, blasting powder and methods of shot firing changed.

Hand Drills

The earliest drill used was the hand-drill or ‘Jumper’ drill. This was in the form of a crowbar, about 6 feet long when new, but wore down to much less; 9 inches of one end was thickened and heavy, the other end was [17] flattened and shaped into a chisel point. To drill a hole with this implement, a small hole was chipped in to the face with a pick, then the chisel point of the drill was rammed into the hole and twisted. This action was repeated until a hole of the required depth was drilled. 3 to



Lumpsey Mine Fig 8
Plan of Main Ironstone Seam Workings 1930



Bord and Pillar Working Fig 9

4 feet could be drilled by this method in 20 minutes. The depth of the hole depended on the 'backs' or natural cleavages in the stone. The resulting hole was triangular, and the Black powder was often made in triangular cartridges to match.

Hand Drilling

There were several variations of hand-drill, the most popular being that made by B1ackett, Hutton & Co., at the Cleveland Steel Foundry, Guisborough. Fig.10.

The method of operation was as follows. The stand for the drill was first set up and this was of two types; the cup set or the back set, used depending on the position and direction of the hole.

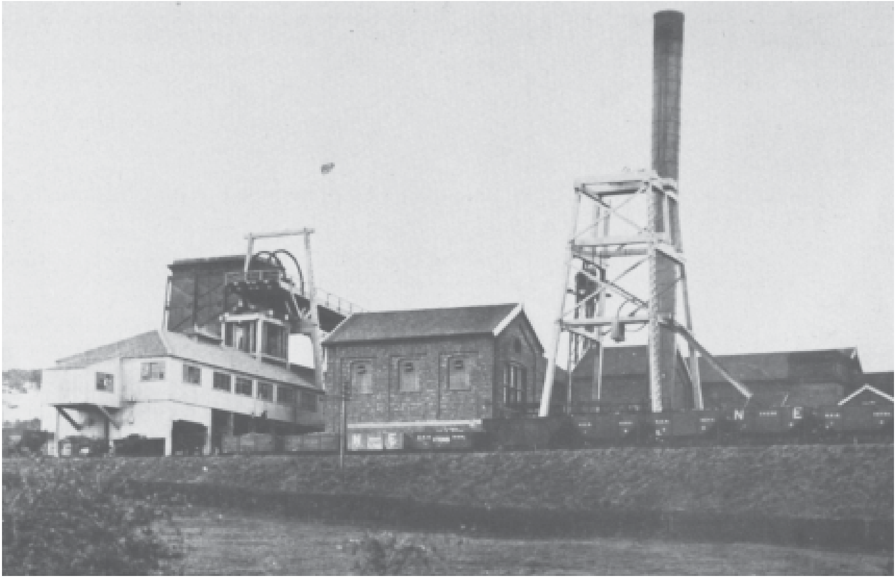
The cup set consisted of a cup shaped piece sliding on a bar. The bar was hammered into the face a few inches below the intended hole and when solid the drill was set up on it, a projection on the drill fitting into the cup on the cup set. The first twist drill of 18 inches long, was placed into the cup on the front of the drill and placed against the ironstone in the position of the intended hole.

The alternative mounting, the back set, was a broad metal bar pointed at one end with several slots cut through it along the length of the bar. This was hammered into the side wall at 90 degrees to the axis of the hole and a couple of feet from the face of the ironstone. A fin at the rear end of the drill was fitted into one of the slots and this drill was also set up with an 18 inch long twist drill. The handle was then rapidly rotated which slowly turned the twist drill and forced it into the ironstone face. When fully drilled into the face, the catch was taken out of gear and the handle turned in the opposite direction to take the pressure off the twist drill and permit the hand drill to be dismantled. The threaded shaft with the cup and twist drill at its end could be wound back into the machine by reversing the rotating handle as well as by disengaging the catch from the spur wheels and pushing the threaded shaft back into the metal tube of the drill. A 3 feet long twist drill was substituted and the drill reassembled. When this had been drilled into the hole in the face, a further twist drill of 4 feet 6 inches was fitted into the machine and drilled into the face. After this the drill was finally dismantled. This entire process took about 30 minutes and resulted in a hole of about 4 feet 6 inches deep and just over an inch in diameter being produced.

Hydraulic Drilling Machine

At 50 fathoms down the Upcast shaft a range of 6 inch diameter pipes were connected with the tubbing and carried to the bottom of the shaft then along to the districts. Branches off the main pipe were only 3 inches in diameter and went to convenient points where a strong flexible hose could be connected from the hydraulic drilling machines. The water pressure at the shaft bottom was 250 1bs. per sq. inch and actuated the drill by a turbine supplied by Messrs. Gilkes and Co., of Kendal.

The first drill commenced on 9th October 1884 and during the first quarter year averaged 55.4 holes per 8 hour shift, producing 125.3 tons of stone, i.e. 2.26 tons per hole. The cost for powder was 2.66d per ton of stone as against 1.83d



View from the North-West. Features are downcast shaft on left with cooling tower behind; Upcast shaft on right and between these the engine house which probably contained a Davey Differential compound engine. About 1908-1918.

per ton by hand. During the quarter ending 9th October 1886 production had increased to an average of 152 tons per shift.

By 1894 the hydraulic drills were limited in their use as they could only be operated economically on the rise of the seam where the exhaust water could be run back to the pumps at the shaft bottom. By then the stone was being worked mainly on the dip side and it was into this area that Mr. A.L. Stevenson introduced petrol engined drills built by Messrs. Priestman Bros. Ltd.

Petrol Drilling Machines

These large horizontal heavy oil engines were mounted on a four wheeled trolley projecting forwards, from which was a long arm carrying the drill. The engines rotated a pulley, working a belt which ran round a pulley powering the drill. The drilling machines were otherwise similar to the electric drill as shown. Fig.11 They were very satisfactory machines, drilling 80 to 85 holes per shift of about 7 hours. Being large machines they were difficult to move about the mine. Naturally they needed plenty of ventilation and careful maintenance, otherwise they gave off thick fumes. No doubt they were also tremendously noisy.

Electric Drills. Early Type. Fig. 11

Electric drills became popular in the late 19th century with the first in the Cleveland area being developed and used in the Carlin How Mines.

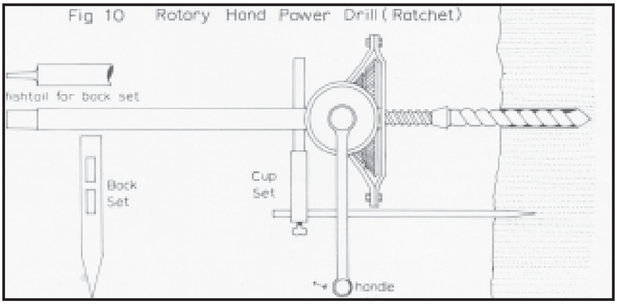


Fig 10 Rotary Hand Power Drill (Ratchet)

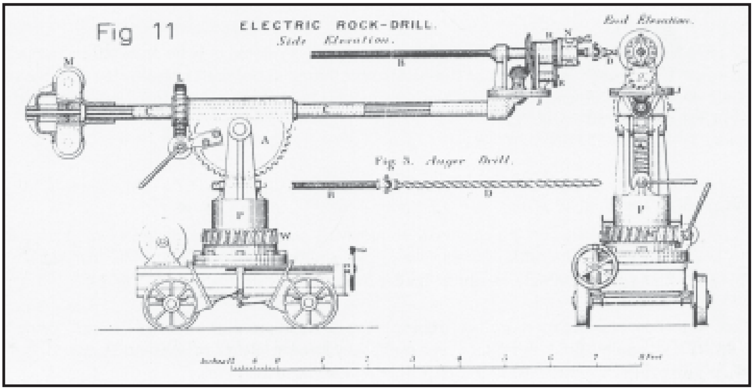


Fig 11

Steam driven generating plants were installed on the surface at Lumpsey and Carlin How mines but increasing use of electric power resulted in the transfer of all the generating plant to Lumpsey in 1903 and the demolition of the plant at Carlin How.

In the early 1890s Mr. Bigge of Messrs. Selby, Bigge & Co. electrical engineers of Newcastle·upon-Tyne, spent much time with Messrs. Steavenson and Clough designing and planning the details of the first attempt at electric drilling in the Cleveland Ironstone Mines. This took place in the Carlin How mines. They designed a machine mounted on a trolley which supported a long horizontal arm. At one end was the drill and at the other the motor which could run on a current of 300 volts at 20 amps. Each machine was fitted with a mains supply, piped to the working areas from the surface, each machine being fitted with a reel of cable to permit movement about the workings of the mine.

During one week two of these machines produced 1,577 tons with 790 holes drilled. Each hole was about 4 feet 6 inches deep enabling the miners operating them to earn 72.7d per shift each.

On average a hole could be drilled in 80 seconds and 60 to 66 were drilled in a shift. The problem with these machines was that they were rather large and difficult to move about the workings. In 1893 10 of these machines were at work alongside

100 hand drill miners. Each machine required one skilled operator to decide the order and position of the holes and an assistant to control the drill. It also needed a shot-firer to charge and fire the holes after the machine had moved on to the next job, plus several labourers to load the tubs with the fallen stone. By 1920 these machines were unable to be operated economically in the Broken workings because they required a large amount of space and were difficult to move about. So they were gradually removed leaving the hand ratchets as the only drills until the introduction of the hand held power drills in the 1940s.

Individual shotfiring

With hand and ratchet drills, one hole at a time was drilled, charged and blown. The hole was first cleaned by a long thin rod with a small metal plate set at right angles at the end, called a scraper. The hole was charged with black powder in the form of 2 oz. pellets. Pellets for hand drilled holes were triangular shaped to match the holes, the rest were cylindrical.

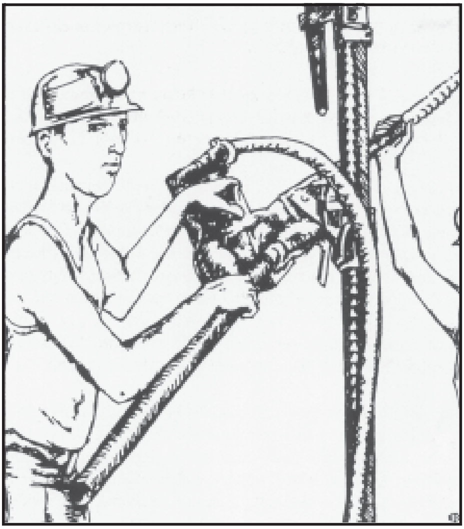
The pellets were pushed in with a wooden stick or stemmer, 4 or 5 pellets, depending on the position, depth and size of the hole and also the amount of stone required.

Next the pricker, a copper rod over 3 feet long, about ¼” thick, with a handle formed at one end and the other end slowly tapering to a sharp point, was put into the hole to break open the last pellet. A brass stemmer was then used to push clay pellets or stone drillings into the hole. The stemmer was enlarged at each end and had a groove along it on the underside. The groove fitted over the pricker which guided the stemmer and which was rammed in hard to form a solid seal between the powder and the atmosphere. The pricker was slowly withdrawn leaving a small hole running all the way through the powder. A habit adopted by some men was to rub the point of the pricker on their shirt sleeve to see if it had made the necessary contact with the powder. The powder was exploded with a sulphur squib – a small amount of blackpowder wrapped in paper soaked in liquid sulphur. It was about 6" long, extremely thin and coloured yellow. One end was painted red and this was bitten off to expose the powder inside. The squib was placed in the hole, powder end uppermost. Checks for gas were made and if satisfactory the end of the squib was lit and the men took cover some distance away.

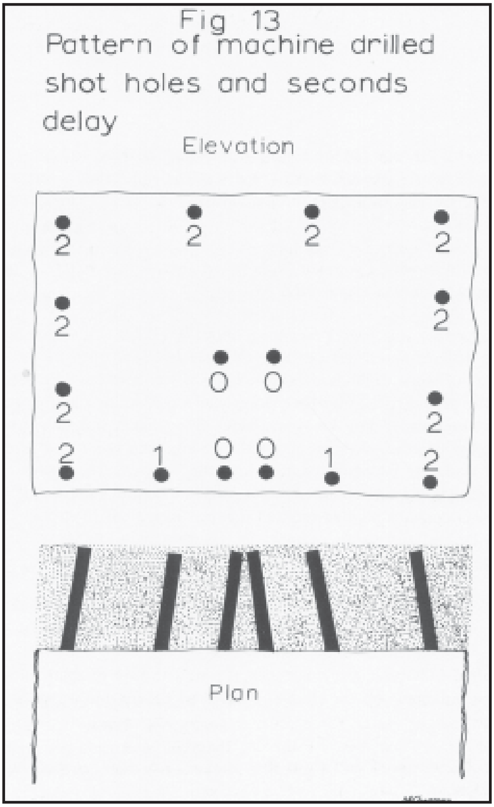
The miners made a habit of placing an empty tub in front of the face to lessen the amount of stone flying about but this was disapproved of by the management as it caused much damage to tubs.

When the squib ignited fully after a few minutes, it sent a shower of sparks down the hole which ignited the charge and so blew down the ironstone. If the charge failed to go off no one was allowed to enter the working place until an hour had elapsed.

The stone that had been blasted down was then loaded into a tub. Larger lumps of stone were broken up with sledge hammers and wedges.



Post Drill Fig. 12



Blackpowder came to the magazine as 2 oz. pellets packed in wooden boxes ('Jumbo' boxes) which held about 561bs. It was also carried in copper and zinc boxes. These boxes were either square or rectangular shaped and could be attached to the belt or slung over the shoulder.

Blackpowder also came in granule form, each granule being pea-sized. They were carried loose in a wooden box and measured out into a bottle. One bottleful was a 'tot' and the number of 'tots' charged into the hole depended on the nature of the stone etc. The amount of powder used worked out at approximately 6 oz. per ton of stone.

With the early method of shot firing using squib and blackpowder, only one hole at a time was fired. An upper or “face” hole was drilled and fired, blowing out a section of stone. A lower or “clipper” hole was next drilled and a lower section of stone blown out. Finally two side holes were drilled and blown. In practise differences in the quality of the stone and the blackpowder meant that varying amounts of stone were brought down with each shot, resulting in a reduction or increase in the number of shots needed to work a given area. Deciding the angle, position and length of the holes was highly skilled and depended mainly on the shape of the face. Sometimes weak stone and serious faulting prevented any progress being made on a particular face, which was abandoned and eventually worked from a different direction. Such a face was known as being “shot-fast”.

Compressed air and electric drills Fig.12

Compressed air and electric drills were introduced about 1945. The compressed air drills were of two types. One was mounted on a bogie and moved from face to face. To be operated it needed a driller, a drill charger, two fillers and a shot-firer. The other type was a hand drill which only needed two men to hold it steady as it drilled. If the drill piece jammed, a valve operated to release the compressed air so the drill ceased to function. The electric hand drill had no such device so that if it became jammed it would jump and twist about until switched off. Drill pieces varied in length from 6' which was the favourite, but there were also 4' and 8' drills. These drills usually had a changeable bit made of tungsten carbide. There was an older twist drill but this was less popular.

Shot firing

With the introduction of electric and air drills a new explosive and manner of firing was adopted. Sabulite was the most common of these new explosives and needed a detonator to fire it. The detonators were about 3/8" in diameter, and an inch in length and were kept in a special pouch carried on the shot-firer's belt. The shot-firer also had a special pair of pliers and a small copper pricker. When the required number of pellets, less one, had been loaded into the hole, the remaining one had a small hole made in one end with the small pricker. The detonator was pushed into this hole. These detonators worked by electricity or safety fuse. Safety fuse was carried in a coil and the required length cut off with the pliers. One end was then pushed into the detonator, the end of the detonator being crimped round it by the pliers. The pellet was then pushed into the hole with the fuse left to trail out. The hole then only needed to be made airtight by ramming in 2 or 3 clay rolls. The end of the fuse was lit and the men took cover while the charge exploded.

When there was a danger of gas a “tin whistle” was used. This was a small cylinder about 1" long containing a glass phial which was put at the end of the safety fuse. A special pair of pliers was used to crush the “whistle” which ignited the fuse safe from gas.

Sabulite was useful for breaking up large lumps of stone. A small depression was made in the stone, a lump of sabulite stuck in, the fuse lit, and when it detonated, completely disintegrated the stone.

Sabulite could also be detonated by electricity by having a positive and negative lead trailing from the detonator.

Multiple Electrical Shotfiring Fig.13

In the 1940s with the modernisation programme, electrical multiple shotfiring was introduced when 16-18 holes would be drilled and fired at one time. The holes were arranged as shown in the diagram. The four centre holes forming the “sump” were charged with detonators termed “Naughts” and usually had an extra pellet of Sabulite to give greater power. The central hole was called the Buster. The next two holes outward at the bottom were detonated with “Ones” and the remaining holes “Twos”. The holes went into the stone at particular angles. Those in the middle [23] formed a sharp angle with the face as shown in the diagram. The next two outwards made a greater angle, the two outermost making almost a right angle. The holes were usually about 6 feet deep.

The charges were connected in series by attaching the positive lead from one hole to the negative lead of another. The circuit joining the holes in the face was extended by connecting a long length of cable to it leading to the firing position. It was the shot-firer’s job to charge the holes, then fire them with a shot exploder. The firing position was chosen several pillars away from the face to provide adequate cover. A small current was put through the circuit to test it using a galvanometer, then when all was ready and the area cleared, the cable was connected to the exploder. The shot-firer screwed in the handle, then wound it to make up the electric charge which turned on a light when ready. Then a button was pressed which completed the circuit and set off the charges.

The “Naughts” went off first, followed by the others, the whole taking only fractions of a second. The effect was for the sump to blowout first, broken apart by the “Buster”, followed by the “Easers” bringing down the remaining stone.

After removing the handle and disconnecting the cable, the shot-firer went forward to test for gas and examine the roof and side walls.

Before the introduction of Sabulite, the miners had blasted their own stone. Now an examination had to be passed to become a shot-firer and no-one else was allowed to fire shots. A shot-firer would travel from one place to another in a certain area firing the holes that the men had drilled.

The most recent system was part of a general organisation. A district now had several working places, each occupied by a pair of miners. They selected the placing of holes etc., which were actually drilled by a team of drillers using electric or compressed air machines. This team moved about the district. The holes were fired electrically by the shotfirer who also travelled around the district. The stone was filled by the miners, probably using an “Eimer” compressed air loader, who put up more steel roof supports when necessary.

The general modernisation programme was initially planned during the war but took some years to come into effect, mainly because much equipment was coming from America.

The first power drill to replace the hard rotary machines was a post mounted electric drill of which two or three were used. The drill fitted on to an adjustable post, set up in front of the face, and by screwing out the top and bottom it was held rigid between the roof and the floor.

Although capable machines they took a lot of time to set up and move about and so were discarded in favour of hand held compressed air or electric drills which required two men to operate.

Lighting
The most effective form of naked light employed, and the Simplest, was the candle. A miner was always well supplied with these and used 3 or 4 during the course of a shift. He also brought a lump of clay in which to press his candle which could then be stuck on the wall in any convenient position. He usually carried his supply of candles in a metal box to prevent them from being eaten by rats.

When travelling to and from his working place the candle was often stuck into a large treacle tin with parts removed and a handle fitted. This acted as a shield and reflector. A more popular system was to use a hard oil lamp for travelling.

Acetylene lamps were introduced about 1920 and eventually became very popular after initial unpopularity because they tended to dazzle, and had a strong smell. They were all supplied by the Premier Engineering Co. of Leeds. The miners type had a large hook on top to enable it to be hung on any jutting rock or even stuck into a prop. An official’s lamp was usually smaller with a proper handle and often a small reflector. Horse drivers and leaders were distinguished by their hand oil lamps.

Platelayers sometimes carried a torch which was a metal can, often an old coffee pot, fitted with a large spout and wick. These burned oil and were infamous for the amount of smoke they produced. A more common lamp for platelayers and always for deputies was a wooden midge. This was a tall box on legs with an open front and a handle on top. A candle was fixed inside. A belt was often fixed on the back for spare candles. These midges were quite large and used for more than just lighting, such as a small step ladder or a seat.

[24]

From the very beginning the Cleveland Mines were said to be gassey in the ‘brokens’ but alright in the whole workings. Naked lights were the rule but deputies regularly tested for gas with safety lamps. It is said that Davy Lamps were used at North Skelton Mine (opened 1871) and two early lamps, a Davy and a Clanny, used in Skinningrove Mines are still in existence.

A large stock of safety lamps was kept at Lumpsey for use by the men in a district affected by gas. They used the lamps purely for lighting and were not expected to make gas tests with them.

The principal safety lamp supplier was Patterson & Co. of Gateshead. The safety lamps they supplied varied quite considerably over the years, some of them incorporating shutters to control the air flow through them and some having flint and electrical relighting attachments. The Type HCP, of which two variants were made, was perhaps the most complicated. It had only a single gauze, whereas the usual lamp had two; it had peculiar shields around the gauze and was much larger with an increased area of glass around the flame. Internally it had a tall glass using wire gauze partitioning.

Horse Haulage

The basic method of haulage was the horse, which was used in all districts to move tubs between the working places and the “landings” or reception Sidings for the ropeways. They were also employed in moving general tools and equipment when necessary.

The highest number underground at any time was 72 and between 20 and 30 remained when the mine closed. All full grown stallions, they lived permanently underground, only being brought to the surface during times of strike, closure or sickness. Between shifts they were kept in a stable block equipped with its own farriers shop and facilities for washing and feeding the animals. They were looked after by one or two horsekeepers who also attended to cleaning out the stalls and replacing the bedding of straw and peat moss.

When the mine was working one shift a day all the horses were employed, but if two were worked then half worked each shift. A horse driver was paired with a particular horse and they worked together for most of their working life. He controlled the horse by walking alongside, holding two long reins attached to its head – riding was forbidden.

Each horse had a particular name which was chalked over the entrance of its stall and examples were "Acorn, Cadger, Canter, Orbit, Zogg, Custard and Dingley".

Two types of harness were used according to the nature of the job. On predominantly level going a tail chain was used. This consisted of a strap or length of chain running along each side of the horse, from the halter round its neck to a spacing bar trailing behind its rear legs. From each end of this bar a chain converged to a ring from which a short length of chain emerged ending with a hook.

On a gradient a limber was used which consisted of two wooden shafts between which the horse was placed. From a cross bar at the rear ran a short length of chain with a hook. The limber therefore prevented the following tubs running forward and injuring the horse when descending a gradient, but meant that the horse had to walk inside the rails. The tail chain enabled the horse to walk to one side and so caused much less wear and tear on the sleepers. A horse was allowed to haul four or five full tubs on the level and six to eight when going downhill.

MAIN HAULAGE

Endless Rope

The Lumpsey Bank had an endless rope haulage system, 2,450 yards long. As its name implies it was an endless rope, 2½" circumference; one end was tied to the other. The rope wound round a large horizontal pulley wheel at the south-eastern end of the engine plane and along it to another similar pulley near the shaft bottom. Near the shaft bottom was an extension of the rope from the engine plane, which went round a 6 feet diameter Fowler's clip wheel and was driven by a 100 HP English Electric Motor. The engine was situated in a small engine room and drove the rope continuously at 2-3 miles per hour.

Before about 1922 there had been a steam engine on the surface with the ropes going down the shaft and working underground.

The Lumpsey Bank had only a slight inclination downwards from the shaft bottom and the bank ended in the vicinity of Kilton Castle. From there a steep bank led up to Carlin How pit bottom. This was the Carlin How Bank. The tubs were clipped on to the moving rope and travelled to the bottom of the Lumpsey shafts. They were unclipped and placed in sidings to await their turn to be hoisted up the shaft to the surface and emptied; they were then stocked in sidings awaiting the cage and returned underground to be loaded again.

Carlin How Haulage

About 1910 the direct hauler for the Carlin How Main Bank was placed underground. The surface system had been steam driven, but the new one was a 230 HP electric motor by British Thomson Houston & Co., driving by gearing a single drum onto which a rope was coiled. This rope ran down the incline and was used to haul sets of about 10 tubs out of the districts of the mine either side of the bank. It hauled them out of the sidings onto the bank and lowered them down to the end of the Lumpsey bank. It then hauled empty tubs up to the districts which needed them. The tubs were chained together in the sets. The rope had a hook on the end which was fixed onto a hook on the first tub. The ropes ran over small pulley wheels laid in the middle of the railway track. After 1929 this system was replaced by an old electric hauling motor that had been standing unused for years on one of the Carlin How banks. It was installed at the base of this incline at the junction of the Carlin How and Lumpsey banks. The rope from it ran up the side of the bank to a large return pulley at the top of the bank. The rope went round this pulley and was connected to sets of tubs by a hook at the end. Sets of full tubs were hauled out of the side banks onto the main bank then lowered down towards the engine house. The set was disconnected and fed onto the endless rope system for transport to Lumpsey pit bottom. The Carlin How bank was 2,300 yards long and the rope used on it was 2.5/8 inches in circumference.

Secondary Haulage. Self Acting Inclines.
Full tubs were delivered to the ropeways, which at Lumpsey consisted of self acting inclines and powered inclines delivering to a level endless rope system extending through the mine from the shaft bottom.

The smaller banks on the side of the mine to the west of the Lumpsey Bank were worked by direct haulage, this side being known as the ‘Lowside’. The side above Lumpsey Bank rose higher and was consequently known as the ‘Highside’. The banks on the Highside were worked by self-acting inclines, which operated on the principal of a heavier load outweighing a lighter load.

A roadway or bord was laid out with several sidings at both places, these being known as ‘Landings’ and were collection and distribution places for tubs travelling the inclines. At the bank-head landing, full tubs arrived from various working places hauled by horses, which also removed the empties. A ‘Dogwhipper’ then arranged the full tubs into sets of 10 or 11 which were fed by gravity into position on the incline. As the tubs had no brakes ‘Sprags’ or ‘Dregs’ made of steel were inserted through the wheel spokes instead. When the sprags were removed and the brake removed from the pulley the incline started to lower the full set and raise the empty; speed was controlled by the brake on the pulley. A wire rope wound round a large drum or pulley at the top of the incline. Originally it was a large drum fitted with a brake but this was gradually replaced by a large horizontal pulley because the drum was dangerous to horses. They were liable to get their legs stuck in the braking gear. The horizontal pulley was a clip wheel with 80 or 100 special metal clips fixed round the circumference. The wire was gripped by these clips and they regulated the speed.

The incline had a double railway down it. In another system the double tracks merged into one just below halfway down and the single stretch was used by both sets of tubs alternately. When a set of full tubs was at the top, a set of empty ones would be at the bottom. Small horizontal rollers in the tracks supported the rope.as it ran along the incline. The full set was released from the top and as it went down it hauled up the empty seat. When the full ones were at the bottom they were unhooked and pushed away to be connected to the endless rope. Empties disconnected from the endless rope, were formed into a set and hooked on in place of the full tubs. Meanwhile the empties, now at the top, were disconnected and replaced by more full tubs. The incline was again set in motion and the process repeated. Sets of tubs generally consisted of 7 to 10 tubs depending on the size and gradient of the incline. Empty and full sets consisted of the same number.

Signalling

The bankriders, men connecting and disconnecting the tubs at the top and bottom of the incline, worked in conjunction with each other. They communicated by means of a mechanical signalling apparatus. A wire ran from the bottom to the top of the incline. The top end of the wire was attached to the head of a large hammer, which pivoted on the other end of the shaft. The wire ran over pulleys arranged so that when the wire was pulled and released at the [26] top the hammer was raised, then dropped onto a large piece of metal, usually a wagon buffer-end, so making one bank or “rap”. The signalling system then was:- One rap: stop; two: set in motion. The signal system for the direct haulage system was one rap to stop, two to wind up and three to lower down. The endless rope had no signals. Later they were electrified and push type switches operated bells.

Some time between the two wars a telephone system was installed, not only along inclines and ropeways but all through the mine and up the shaft to the surface.

Diesel Haulage

The first diesel locomotive to be used underground in Cleveland was officially put into service in 1951 in Kilton Mine. The second, a sister engine was delivered to Lumpsey Mine on 14th October 1953, and was Ruston and Hornsby of Lincoln built, of their class LBU No.353484 becoming Dorman Long No.5. It was joined by LBU No.353494 on 9th March 1954. Both locomotives had 3 cylinder diesel engines, two gears in forward and reverse and a system fitted to the exhaust pipe to clean the exhaust gases.

They were intended to replace horses and therefore took over the work performed by them, but they came too late to have appreciable effect before the mine closed in November 1954. However the locomotives stayed underground because the workings were still worked from North Skelton Mine and haulage to the shafts there was only by locomotive. In fact rope haulage was dispensed with and the last horse (Taffy) was brought to the surface in 1958.

The Men

Until recent times the main branches of employment in East Cleveland were the mines, the nearby Iron and Steel Works or local farming.

In a mining family as soon as a youth officially became 14 years of age he went to work with his father and older brothers at the mine. Often their first job was to be a “trapee” lad, opening and closing trap doors to allow horses pulling tubs to travel between different sections of the mine without short circuiting the air current. They had with them their “bait”, water bottle and hand oil lamp, and this was how they worked from 6 a.m. - 2 p.m. for several weeks or months. An example of a “trapee’s” pay can be derived from Skinningrove Mine where working 12 days a fortnight about 1900 they received 5/10d.

Some lads started work as helpers in the fitting shop or blacksmiths, or went underground to work on the ropeways and inclines.

When a youth applied for an underground job he was initially taken on as a horse leader, i.e. leading horses about the mine to get to know the layout of the mine, then later helping to train new horses. After some months he became a horse driver and took charge of a horse pulling tubs between the working places and the rope haulage systems. For this job a lad at Longacres Mine in 1909 received 3/3d a day.

After a certain length of time a driver had the choice of continuing as a driver or becoming a miner, although some became platelayers, incline workers or blacksmiths. If he chose to become a miner he became filler or apprentice to an experienced miner. Miners, in the days of hand drills and ratchet machines always worked in pairs, one being the stone getter , the other the filler. The new lad became a filler and had first to learn the skill of filling a tub, then securely stacking stone on top to increase the capacity from 30 cwt. to something over 2 tons. He also learnt how to drill, charge and fire holes, and how to place the hole so as to take full advantage of the faults etc., in the stone. Wages varied considerably over the years.

After a minimum period of two years experience of stone getting a man could become a miner, allowed to carry his own powder, fire his own shots and work with a mate.

The standard shift underground started with the walk from the shaft bottom to the district. A miner usually carried with him his “bait” tin and water bottle, tin full of squibs, powder-box and his collection of tokens or tallies. He also had candles and a lump of clay or he may have had a proper oil handlamp, or a home made candle lamp or a safety lamp, or in later years an electric cap lamp.

At Lumpsey the earliest powder boxes were wooden, holding about 5 lbs. and Some were still in use at the closure, but copper and non-ferrous metal boxes were introduced, particularly when high explosives were used. Squibs were carried in small metal tubes holding about two dozen.

At a convenient place in each district was the deputies cabin, usually situated in the entrance to a blocked up bord. Here each man reported to a deputy who had done a pre-shift inspection, and received instructions about his working place. Assuming there were no problems he went on to his working place. When a district was declared unsafe because of gas everyone working within it had to carry a safety lamp and as they passed the cabin going to work, the lamp was checked by the deputy.

Tools and equipment were generally left in the working place, or somewhere safe but convenient. Each miner, or sometimes each pair of miners was given a number which was stamped on all their equipment and tokens. Tokens were strips of brass bearing the number, with a length of wire attached, which were hung onto the tubs filled so that when they were weighed on the surface the tonnage was rated to the correct man or team. If they ran out of tokens the number was chalked on the tub.

Generally a miner’s equipment consisted of the following: two or three sets of drills – a set consisting of:-

1. 3 or 4 drills 1' 6", 2', 3', and 4' 6" long (originally they were standard length but shortened through constant re-sharpening – each day at least one set was at the blacksmith’s being re-sharpened.

2. One hand machine drill (in earlier times perhaps one or two “Jumper” drills).

3. One cupset.

4. One backset.

5. One key (a tool to fit over the end of a drill jammed in the hole in order to loosen it.

6. One pricker.

7. One stemmer.

8. One scraper.

9. Two 7lb. hammers.

10. Two picks and

11. Several wedges.

The first rung in the promotion ladder was to become a deputy. There were one or two deputies to a district, depending on its size. Several districts came under an overman of which there were perhaps half-a-dozen. They in turn came below the under manager and the manager.

The set up of a district is illustrated in this example, given to us of a typical district in Liverton Mine. There were 8 working places, with 2 additional ones spare, 16 miners, 2 horse drivers, 1 platelayer, 2 labourers and a deputy and his mate, a total of 23 men.

Each district had its own number, e.g. 3 West, 50 East, 3rd Bank. At the start and end of each shift the men called in at the Deputies Cabin to be counted and given instructions.

The deputy had one of the most important jobs in a mine because he was directly responsible for safety in relation to ventilation and roof support. The normal single shift system started at 6 a.m. but the deputies started at 5 a.m., and he spent an hour examining all the working places etc., for gas and roof faults.

To become a deputy a man had to undergo an examination to make sure he was competent to do the job and he was provided with a certificate if he passed.

Timbering

The deputy's other main job was to organise the timbering and support of work places and roadways. He visited each working place once or twice a day to inspect the roof and walls and set timber where necessary. In particularly weak places he put up a horizontal baulk across the place, which was usually about 14 feet wide, supported at each end by a prop which would be about 8 or 9 feet high. With his axe-cum-hammer he would shape the bottom of the prop to a rough point to form a weakness. Then if weight came onto the timbering the bottom of the prop slowly "bushed" up and collapsed gradually. If there was no weak point the prop would bend or snap suddenly in the middle.

A very common system of support was to put in a baulk supported by the stone itself. A hole was chipped into the wall near the roof on one side. Then a shaft was cut into the opposite side. One end of a 16 ft. baulk was [28] placed into the hole and the other was fed onto the shelf. When in position chocks were wedged firmly between baulk and roof. The baulk was placed in the shelf on the same side as the face so that it was firmly held when blasting took place.

Engine planes and main roadways were always strongly supported with heavy timbering, steel arches and possibly even concrete supports.

In some spots a heavy roof fall left a large cavity in the roof and this had to be completely filled with timber supports right to the top.

Where roadways were driven through shale or areas previously worked, two or three layers of planks were used to form a solid wooden roof.

Norwegian pine was mainly used for props. During the war local timber was utilised but this was of much inferior quality.

The roof was of dogger, and very poor quality ironstone varying in thickness from 3 feet to 1 foot in thickness. This made a good roof so that really not much timbering was needed.

Gas

The Cleveland Ironstone Mines had a constant threat of inflammable gas hanging over them but were not declared Safety Lamp Mines until 1954.

Up until then naked lights had always been used and it was the deputy's duty to carry out tests for gas with his safety lamp. To make a test the flame of the lamp was turned down very low and the lamp held in several places close to the roof, methane being lighter than air. If gas was present, a bluish triangular cap appeared over the flame, varying in size according to the concentration. Steps were then taken to divert the ventilation flow to clear the gas away.

Another practice was to ignite the gas with a candle stuck on the end of a pricker or stemmer while the deputy performing the operation laid flat on the ground. Apparently this practice was safe with low percentages of gas in small pockets.

A common occurrence was to meet with a feeder of gas issuing from the walls or the roof. This was always lit and might bum for a few minutes or a few days. In some mines a feeder was piped off and used for lighting along main haulage roads which, running from the bottom of the downcast shaft were main air intakes and therefore permanently gas free.

If concentrations over about 2% were found the district was emptied until the gas cleared, but if it persisted the men were allowed to resume work using safety lamps. They could carry naked lights travelling to work but at the Cabin, at the entrance to the affected districts they changed to safety lamps previously supplied at the lamp cabin. At the Deputy's cabin these lamps were examined and the men searched for contraband in the form of cigarettes and matches. In serious cases of gas, and always in the latter years after 1954, the examinations and searches were carried out at the pit top by the banksmen.

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Many former Cleveland Miners who once "worked in the Stone" were willing to talk of their lives and work.

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