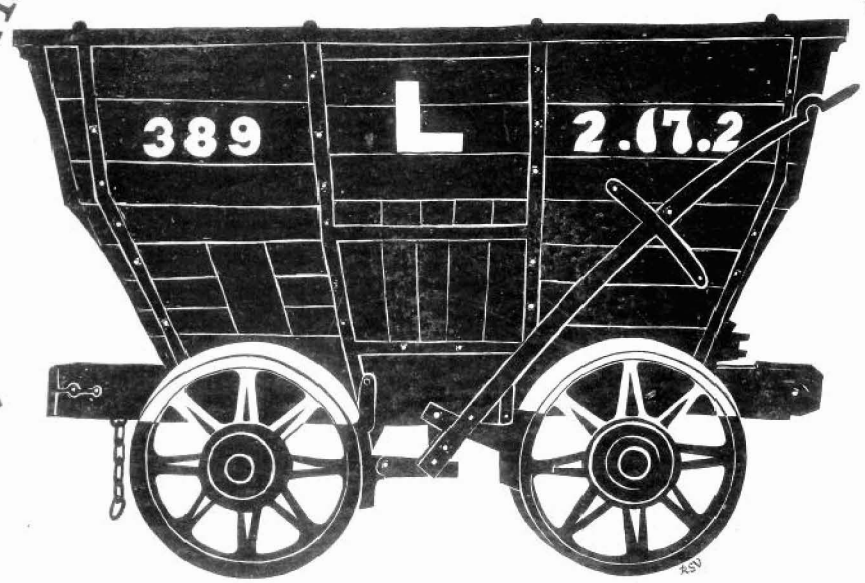
July 1968

The Industrial Archaeology Society For The North East



BULLETIN 6

The Industrial Archaeology Society for the North East

Bulletin 6 July 1968

EDITORIAL PLEAS

Whether by accident or design an index was included with the last Bulletin, so perhaps now is the appropriate time for a new Editor to be appointed. As I am also fortunate enough to possess a copy of each of the first five Bulletins, no doubt these will be very useful as a basis from which to work.

I must emphasise straight away that the Bulletin is designed primarily to cover a large area of the North of England, and to include all aspects of Industrial Archaeology existing in this area. To enable me to do this I appeal to anyone who has any information or photographs, no matter how small the subject, and is interested in publicising this to the other members of the society, to get in touch with me.

With regard to local groups, I must ask for the assistance of Group Secretaries, not only to keep me in touch with current activities, but also to keep me informed of future projects, especially lectures etc., in case members from other parts of the North East are able to participate.

Whilst on this subject of seeking information, the following will no doubt be of interest to some of our members. Mr. F. Atkinson has received a letter from The County Planning Officer for the North Riding of Yorkshire who is preparing a list of County Treasures in the North Riding. He wishes to include in this list details of industrial sites of historical interest, worthy of preservation and protection. As the assistance needed is obviously of the type in which our members can help, Mr. Atkinson or myself will be very pleased to receive any details of sites which should be included. I should add, however, that the sites should at the present time be in a reasonable state of preservation and suitable for protection, as unfortunately by now far too many of these places are often past either of the above stages.

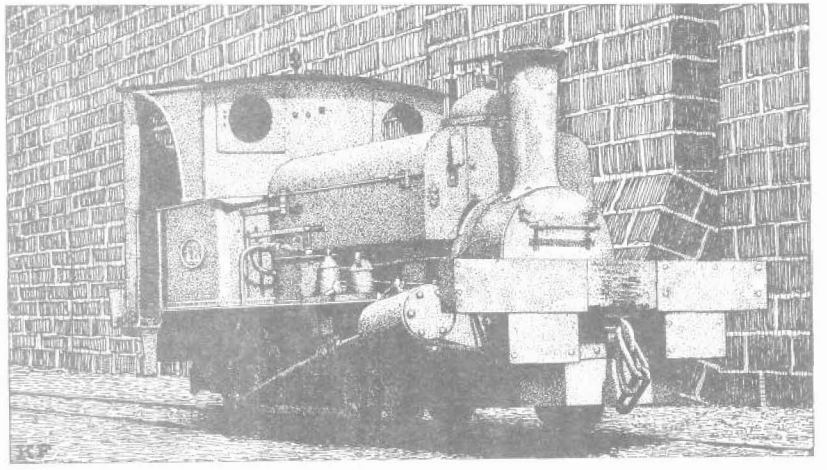
In this edition our main article is on the "Killhope Lead-Crushing Mill in Weardale by Mr. H. L. Beadle. As the site will be known to quite a number of our members, we believe this will be not only interesting, but may stimulate further research in this part of County Durham.

Mr. F. Atkinson has written us an informative article about the chainmaking industry at Winlaton, and in connection with this I have received some interesting

newspaper cuttings from Mr. Stafford M. Linsley, who was involved in the removal of parts of Messrs. Bagnall's Chain Shop at Winlaton. These included stone window lintels and sills, wooden shutters of a most unusual design, steel guards, stone cooling troughs, ridge stonework and a quantity of handmade bricks. I am hoping that in the future we may be able to give more details of this remarkable industry, with the assistance of our friends there.

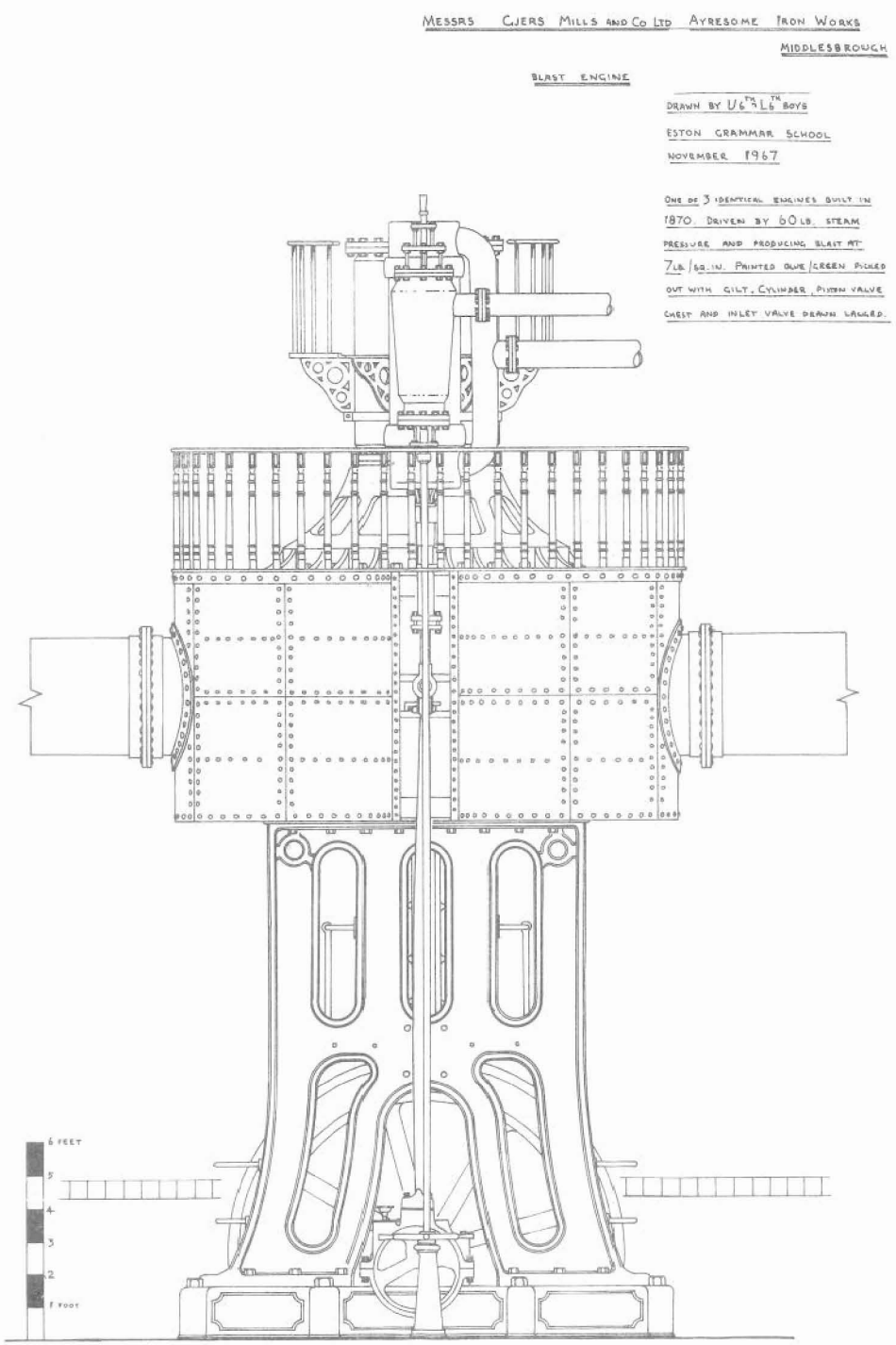
I believe that other activities in the Tyne area include the industries of the Ouseburn, Seaton Sluice, Settlingstones Mine and also the North Walbottle project, of which some details were published in the last edition. I am looking forward to receiving details regarding these activities from the Tyneside Group in the near future.

Finally may I remind members that their support is needed in creating the Regional Open Air Museum at Beamish Hall near Stanley in County Durham. The "Friends of the Northern Regional Open Air Museum" held their first annual meeting in April, 1968, and their two chief aims are, (a) to encourage the formation of the Museum, and (b) to assist in the preservation of appropriate material, and I may add that the rescue operation at Winlaton was one of their projects. Would anyone interested please get in touch with the Hon. Secretary, Mr. Eric P. Griffith of 'Whitethorn', East Oakwood, Hexham, Northumberland.



Seaham No.18

Built by Stephen Lewin of Poole in 1863 and still working at Seaham Harbour (Drawing by Ken Fleming, reproduced by permission of Industrial Railway Record)



Blowing engines

at Ayresome Ironworks, Middlesbrough

John K. Harrison

For many years in the late nineteenth century the Cleveland/Teesside area led the ironmaking world in the matter of increased size in blast furnaces. From the height of 42 feet adopted in the three furnaces built by Messrs. Bolckow and Vaughan in Middlesbrough in 1851 the standard height by the late 1860's was roughly 70 feet (some slightly lower, some considerably higher). The object of increasing the height was to reduce the fuel consumption per ton of pig produced. Waste gases escaped from the top of a high furnace at a lower temperature than from a low furnace, and this resulted in economy of heating. Advantage was taken of the fact that Durham coke had a comparatively high load bearing property. It was customary to charge Cleveland ore in larger pieces than the ore of other areas so that the air could percolate through the charge more easily, but, in spite of this, it was necessary to pay careful attention to the blowing equipment so that it would be powerful enough to force air through the high column of materials.

The drawings show the engines designed by John Gjers and built by Messrs. Cochrane, Grove and Co. of Middlesbrough for Ayresome Ironworks between 1870 and 1872. John Gjers was already well known in Middlesbrough iron-making circles, having been closely associated with the Ormesby Ironworks, the Teesside Ironworks and the Linthorpe Ironworks. His experience led him to select (from the variety of horizontal, vertical and beam engines in use for blowing furnaces on Teesside) the direct acting vertical engine with steam cylinder above the air cylinder. In a contemporary description Gjers supplied some details of the engines. They had 96" blowing cylinders, 40" steam cylinders, 4 foot stroke, worked at 50 lbs / square inch steam, and compressed air to $4\frac{1}{4}$ lbs at 30/32 strokes per minute. The steam valves were piston valves and the air valves the leather flap type. Each engine could be worked independently and two were sufficient to drive the four 70' furnaces. The engines were in service from 1871/72 to 1966 and were still in fine condition. The blue/green paintwork, picked out with gilt lining, was kept in a highly polished state until continuous work finally ceased, and rust began to take over.

The engines were originally driven by a set of 10 cylindrical, egg ended boilers 60' long and 4'6" diameter. Heating was by blast furnace gas. These

were later pulled out and a range of Babcock and Wilcox tube boilers substituted.

When the first visit was made by the group of Sixth Form boys from Eston Grammar School which did this survey, conditions were most unfavourable. The problems of measuring upt the 34' high monsters, in the dark of November evenings, did not deter us from completing a preliminary survey, since we fully expected that the engines would disappear very quickly. In fact, they were still standing nearly a year later, and the drawings were revised under slightly more favourable conditions (one wall of the engine house having by this time disappeared). The engines were dismantled shortly afterwards. The engine house is drawn as originally built without its later accretion of pipes and valves, and without the later extension built to house a fourth engine, built by Messrs. Yates and Thom of Blackburn. It came as a surprise to us to find that the house was built in white firebrick. In latter days it was, of course, coal black.

****

REVIEW

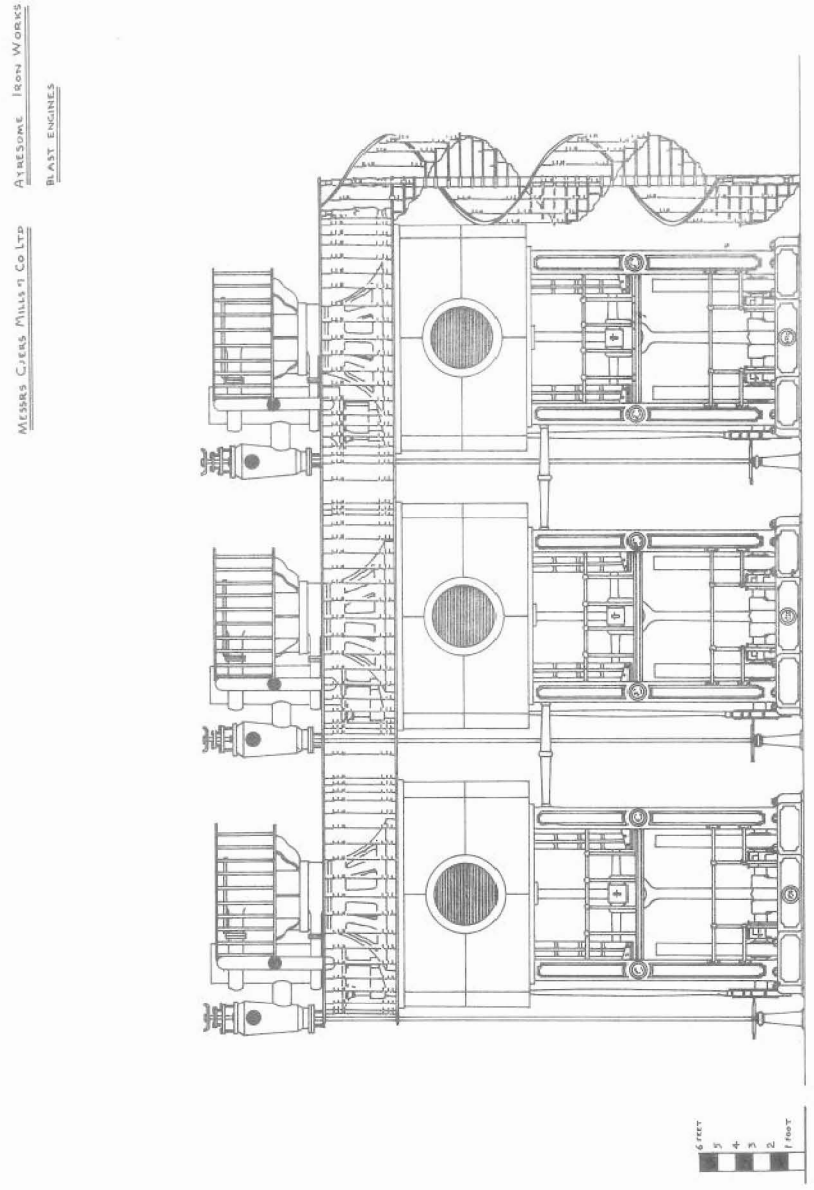
Eyewitness : The North East in the Early 19th Century
compiled by Edwin Miller. Pub. : Harold Hill, Newcastle, 1968, 6/-.

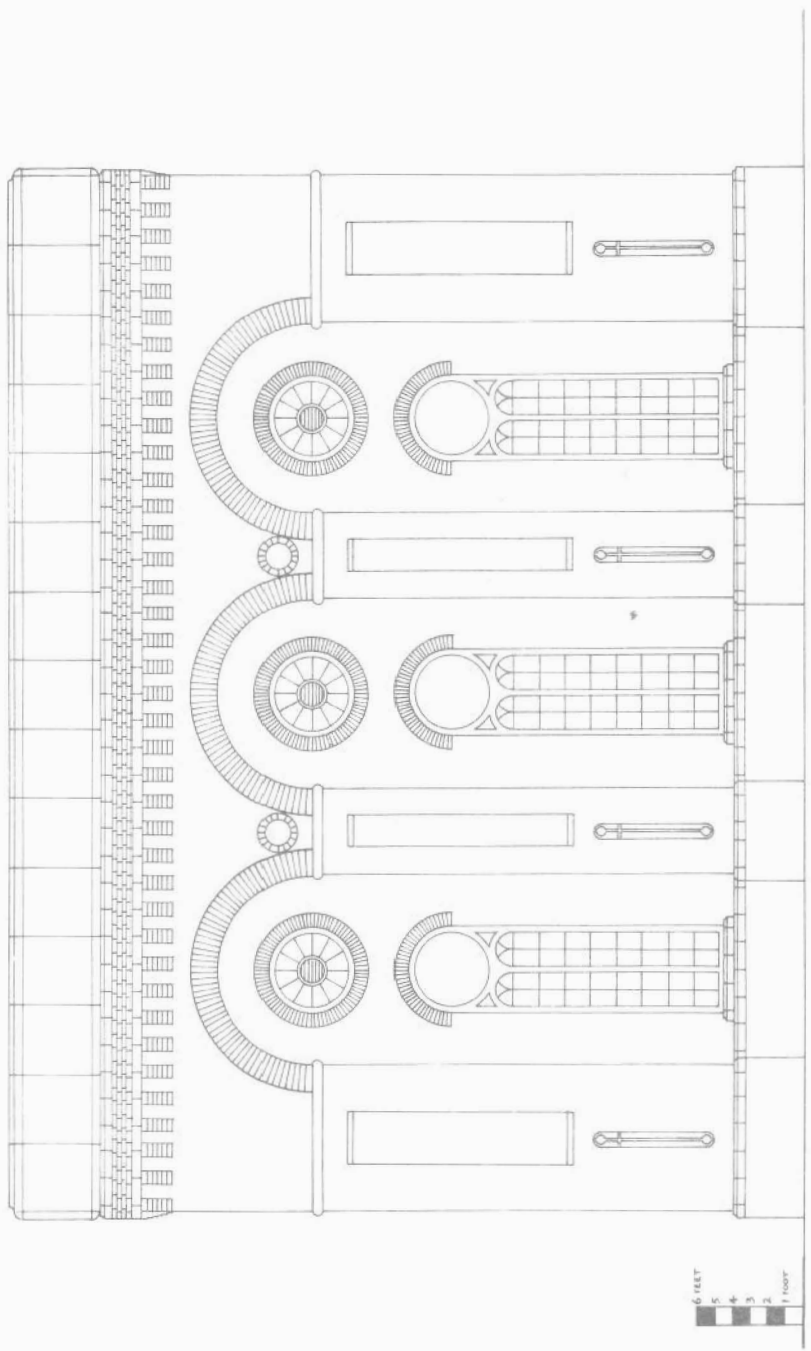
This little booklet might almost be titled 'Nose-witness', so full is it of miasmas, obnoxious effluvia and noxious exhalations! Anyone who talks of the 'Good Old Days' should be made to read this : they will soon be grateful for the twentieth century.

Mr. Miller has assembled a remarkable cross-section of contemporary description and comments relating to the everyday life of last century and has achieved a nice balance between the working classes and the gentry. His main topics range widely from town conditions and public health, through Chartism and trade unions, to anti-slavery and the penny post. It will be invaluable for teachers, being based not only on contemporary but on local material, and it should startle anyone who thinks that today's horrors are unique. (Not that this excuses either!).

There may be some industrial archaeologists who concern themselves strictly with the machinery of last century and ignore the people who made or operated it: If so, they will not find this booklet of help or interest. They will be the poorer for such a narrow view. For everyone else 'Eye Witness' will be an eye opener.

Frank Atkinson





Killhope lead crushing mill,

Weardale

H L Beadle

What has become known in recent years as Killhope Mine, and has attracted so much attention because of its large water wheel, is known in mining circles as "Old Killhope Mines". The millwas the centre, or collecting point, for ore obtained from a number of veins covering a fairly large area.

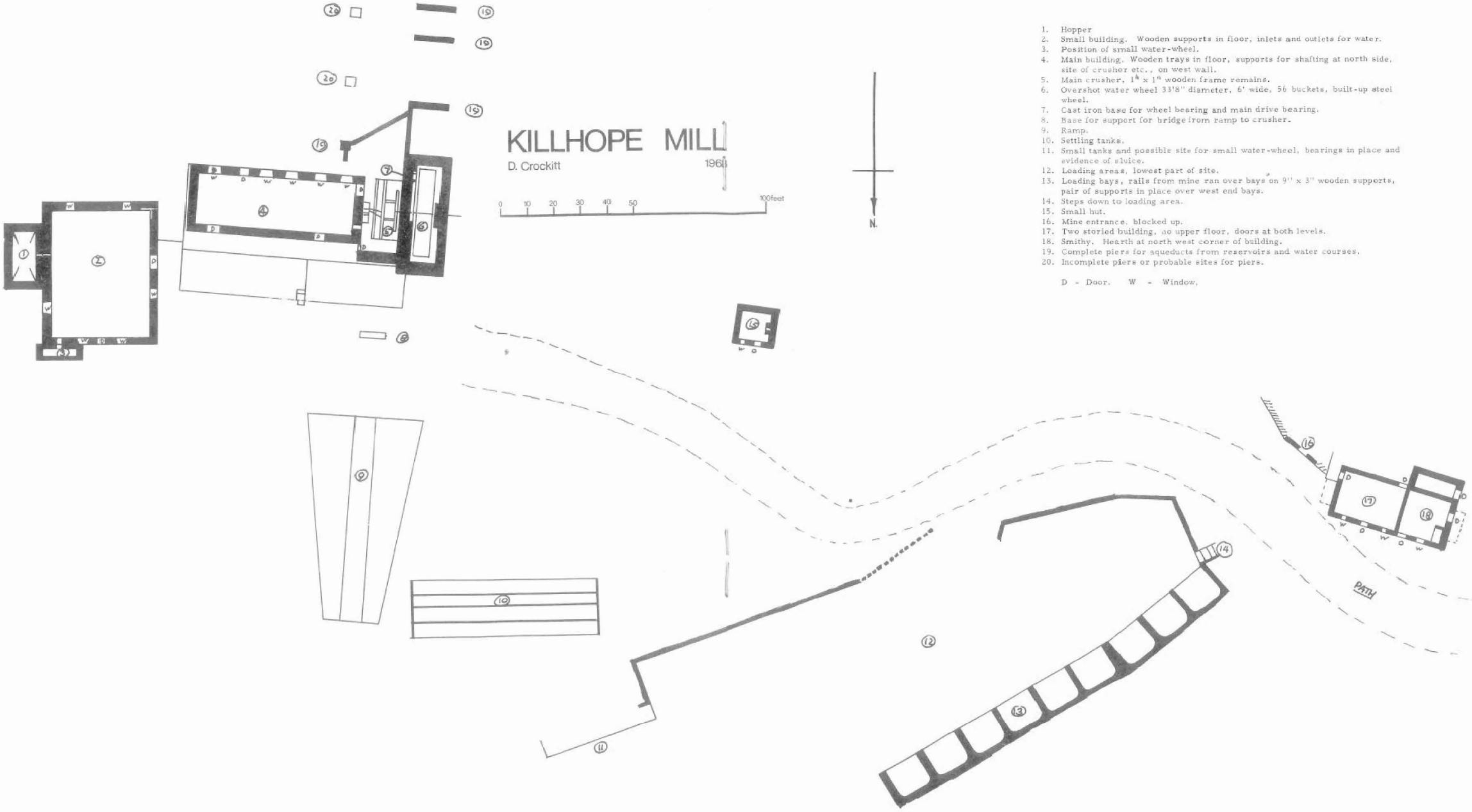
The name of the mine where the remains of the mill now stand was originally "Park Head Mine" and the arched mouth of "Park Level" from which the great bulk of the ore was brought, can easily be seen, although it has been walled up to stop access. These names were attached to the mine early last century and appear on the Geological Ordnance Survey of 1858. The last manager of the mine was Mr. Stephen Watson, Wearhead, and by the time it finally closed in 1916, the level had been extended in length to about 450 fathoms with many branches, shafts and rises to work about a dozen veins running in different directions.

Mining is known to have been active since the seventeenth century, but records seem to be scarce until the beginning of the nineteenth. Westgarth Forster records in his "Treatise" of 1821, that Killhope Mine was producing both lead and blende. (The production of some "blende" from the mines is understandable because the veins are on the edge of a blende bearing area.)

In mediaeval times a large part of upper Weardale was a Hunting Forest, or Park, enjoyed by the Bishops of Durham, and some of the old mining maps show the area as "The Bishop of Durham's Liberty". Whether or not Park Head was one of the north western boundaries, or the head of one of the deer parks in the forest, may be confirmed by someone informed on such matters.

Because of this right and liberty the mineral royalties eventually passed into the hands of the Ecclesiastical Commissioners and a large part was let to the Blackett-Beaumont family from 1696 to 1882, after which the Weardale Lead Co. succeeded to the rights.

The ore: bouse as it was called by the miners, was trammed from the level and tipped into the teams which are ten in number, where washing and separation commenced. Water was run on to the ore to wash away the dirt to make it possible to distinguish the quality and separate by hand as far as possible. It was turned over in the water by men with shovels, and when clean enough was shovelled on to a bunning where boys picked out the pieces of lead which were



1. Hopper
2. Small building. Wooden supports in floor, inlets and outlets for water.
3. Position of small water-wheel.
4. Main building. Wooden trays in floor, supports for shafting at north side, site of crusher etc., on west wall.
5. Main crusher, 1" x 1" wooden frame remains.
6. Overshot water wheel 33'8" diameter, 6' wide, 56 buckets, built-up steel wheel.
7. Cast iron base for wheel bearing and main drive bearing.
8. Base for support for bridge from ramp to crusher.
9. Ramp.
10. Settling tanks.
11. Small tanks and possible site for small water-wheel, bearings in place and evidence of sluice.
12. Loading areas, lowest part of site.
13. Loading bays, rails from mine ran over bays on 9" x 3" wooden supports, pair of supports in place over west end bays.
14. Steps down to loading area.
15. Small hut.
16. Mine entrance, blocked up.
17. Two storied building, no upper floor, doors at both levels.
18. Smithy. Hearth at north west corner of building.
19. Complete piers for aqueducts from reservoirs and water courses.
20. Incomplete piers or probable sites for piers.

D - Door. W - Window.

taken to the bing-stead, and the pieces of stone which were taken to the dead heap. The larger pieces of mixed ore (stone and lead) were broken with a bucker and separated as far as possible. All the small and other mixed ore which could not be separated by hand was filled into a wagon and hauled up the incline to be separated by mechanical means. The fine mineral washed from the teams was collected in large settling troughs and treated in trunks and buddles described later. The dirty water and very light fines escaped down the burn.

THE MILL

The precise date of erection remains unsolved. Miss Susan Edge (Assistant Archivist, Durham County Records Office) in her search of the Blackett-Beaumont records in Newcastle University Library discovered interesting information about a small mill which was completed at Killhope in 1828 The report says "It will be a great inducement to the miners to work out old places so that production will be kept up". Other interesting information is given about the water wheel, rollers and costs of erection. This appears to refer to a mill which stood at Burn Bottom. John Harvey Walton in his "Times Past in Upper Weardale" says, "A crushing and ore separation mill was erected at Burn Bottom and about 1860 this was re-modelled after being removed to Park Pasture". The Burn Bottom Mill stood on the same bank of the burn as Park Head mill a quarter of a mile further north west. The Geological Survey of 1858 shows a mine-shop at Park level mouth but no mill buildings, so 1860 may be a near date for the erection of the present mill.

The Burn Bottom mill buildings became a house, but with the depression in lead mining at the turn of the century became unoccupied, and was later cleared away. Crushing rollers were used in both mills and it is said that these were only introduced into the north of England about 1820.

The mill was standing complete in 1919 when an inventory of all the company's properties was made, but it was robbed soon after this to replace worn out machinery at some of the other mines which were still producing. The jigs were taken to Boltsburn mine, then at a later date the remains were disposed of as scrap.

The arrangement of the mill as it stood in 1919 is a little difficult to re-construct in view of the fact that almost everything, except the large wheel, has been removed, and the area in front of the buildings where the sludge and slimes were treated has been levelled over, destroying the lay-out of these works. There were also variations and modifications from time to time dictated by the nature of the product. It appears from the lay-out of the whole of the works that an extraordinary amount of fines had to be dealt with. This points to one of two things; either the ore was of a soft nature, or there was much poor grade ore which had to be crushed down fine to make extraction of the lead possible. The latter is more likely.

From the evidence which is available it appears that after the ore arrived at the top of the incline it was tipped into a hopper which fed into fluted rollers from which it ran down a chute to an elevator foot to be elevated to the first trommel which would screen out all the material below $\frac{3}{4}$". This would immediately pass into a set of trommels which screened it to 5/8", $\frac{1}{2}$", 3/8", $\frac{1}{4}$", 1/8" and 1/16", each size being channelled to a jigger with the exception of the two smaller sizes which were diverted to the buddle house. The rejects from the first trommel were chuted to a further set, or possibly two sets of smooth rollers, and after passing through these was taken back to the trommels by a second elevator. The evidence seems to suggest two sets, and assuming this to be the case the rejects would be shared between the rollers by a shedder.

The foundation timbers for the rollers, the chute and the elevator boot can be seen between the wheel and the building, although some of the roller foundation timbers are missing. The inclined spars on which the trommels were mounted are still in position and the boot of the second elevator is still in situ. The whole of this building was occupied by the reject rollers, elevator, trommels, jiggers and their associated driving gear, pipe work, boxes, hoppers and flow channels.

It appears that four jigging machines were employed to separate the lead from the stone; an operation which resulted in the heavy lead finding its way to the bottom and the lighter materials to the top, with a middle layer of mixed ore called chats or middlings. The lead was diverted to the bing-stead, the light material and stone to the dead heap and the chats to a further crushing process, which was very often a stamp mill although there is no evidence of one being employed. Possibly a further set of smooth rollers was used.

The lower building was the buddle house with its large stone settling tank standing outside. Zenner buddles were used, and the revolving parts were driven by a small water wheel which stood outside at the east corner of the building. Here the finer material was separated on the circular buddle floors which were inclined from the centre; the mixed water and fines was delivered on to a suitably shaped boss or cone which distributed the mixture evenly on the floor. The buddle was controlled by an operator who stopped it at the proper time and removed the separated lead to one place, mixed to another, and the waste to the dead heap. The middles or middlings were treated again and the final result was that very little lead escaped.

All the fines and sludge which had flowed from any of the previous processes had meantime been collected in large settling tanks or pits from which it could be recovered and treated in trunks or dolly tubs which were the appliances normally used for the treatment of this material. The tanks were oblong, varying in size, but from what can be seen of the remains the size was 22 yards long and four feet six inches wide. These were in all probability the largest employed, but there would be others between the buildings and the burn which have been lost for the reasons already stated. The fines and sludge, mixed with water, flowed in at

one end and by the time the flow had reached the other end most of the solids had fallen to the bottom and the water was discharged through an opening. This opening was sometimes progressively built up with small pieces of wood. When the tank was full the supply was directed to the next one. A certain amount of separation was possible in these tanks due to the heavy material (lead) dropping to the bottom immediately it entered, whilst the lighter material flowed a little further before it dropped or finally adhered to the bottom. Therefore, when the tank was emptied care was used to keep the good and poor separate.

Brunton cloth buddles were also used at the mill. This buddle was invented at Allenheads about the middle of the nineteenth century by a man called Brunton. It was a simple arrangement consisting of a broad cloth belt crossed by wood laths, which ran around two rollers. Sludge and water was fed on to the belt in suitable quantities; the belt then ran through a trough of water where the lead was washed off and recovered. When they were introduced at the mine is unknown, but they replaced the function of the dolly tubs and represented a great saving in labour costs.

WATER SUPPLY

Due to the mill being situated at 1,530 feet O.D. the provision of sufficient water for washing, dressing and power presented a problem, especially in times of hard frost or drought. It was necessary therefore, to undertake important and extensive works to provide adequate water supplies to make regular working possible.

Apart from water to drive the water wheels, every operation, from washing in the teams, through the mill to the slime pits needed a supply of water. Any of the machines, boxes, pipes or channels would become clogged without its proper amount.

Four main water races and four dams served the mill and dressing floors. One race started from Killhope Burn at Cobblers Level and flowed directly the large water wheel. Another started at Cowhorse Hush and could be used to supply the Buddle Shed and the lower dressing floors. Whether or not this race was fed from Collier Hill dam is unascertained, but it is a possibility.

The dams represented the reserve supply and were built one after the other along the fell side at suitable places, (i.e. where there was a substantial deposit of peat and boulder clay) commencing with Kidd's Dam (NY 817431). No. 2 was built south east of Middle Grove Hush and the remaining two a short distance above the mine. The water flowed from one to the other in that order. Kidd's Dam was fed by a race which started by collecting the waters of North Cleugh and The Rake (NY 807433) and flowed under the road about 60 yards above Killhopehead Bridge, running into the dam at its west end.

But the race which brought the major supply of water, and indeed must have been the mainstay of the mill in dry weather, could bring water from the head of

Stonygill Silke on Ireshope Moor (NY 825 367). Taking all its windings and connections into consideration the distance involved is about 11 miles. About 500 feet in height is lost between the start and the point where it joins the connecting race between Kidd's and No. 2 Dam. This appears to be due to many old water courses being harnessed on the west side of Wellhope Burn, and particularly on the west side of Burnhope. These latter are at a higher level, having been constructed at a much earlier date to feed the dams made for the ancient hushes, and later to serve the old mines of Langtae, Lodgegill and Scraithead.

The usual run (loss in height), given to a race to maintain a reasonable rate of flow, was two inches to the chain and it is possible that the race proper began at Small Meres in Wellhope Burn (NY 806409). But it was possible to take water from Stonygill Sike to the mill if necessary, and there is sufficient evidence on the various maps to establish this, apart from the evidence of those who can recall the actual operation.

DESPATCH OF LEAD CONCENTRATES.

The despatch of the dressed product to the smelting mill was from the bing-stead. In the early days this was taken to Allenheads mill by jaggers each carrying two to three hundredweights in two panniers. (This was before the days of either the Burn Bottom or Park mills), the route taken being by "Carriers Way". Starting from Burn Bottom the way lay up Carriers Hill, taking an almost straight line over the moor to the mill, a distance of about three miles. For a large part of the distance, after crossing the boundary between Durham and Northumberland, the way and the smelt mill flue are side by side.

In the more recent years of the mine's activity the product would presumably go to Rookhope Mill which was erected to smelt the ores from the Weardale mines. The road out from the Bingstead is obvious, although unfortunately the bridge has disappeared long ago.

CONCLUSION

This article is not written with the idea of establishing anything final, but rather to stimulate interest and help to form a basis for the development of further research and investigation.

It is written after an "On the Spot" investigation and enquiry, a search of maps and ordnance surveys, from local knowledge and experience, and from other sources already indicated. Whoever it was who said, "Boots, not Books are one of the most valuable acquisitions in search of such information", most certainly made a useful recommendation to anyone engaging in such work.

Much further useful work can be done to establish the main features of the mill. A set of rollers may not be too difficult to find, jiggers are still quite common,

a Zenner buddle could be constructed, a dolly tub was a simple appliance and someone may undertake to construct a Brunton buddle.

The water race and its connections from Stonygill Sike to Kidd's Dam is in itself a major subject for research and would take weeks of patient study and investigation to establish its vast and complex ramifications, because it was in use early in the nineteenth century and without any doubt very much earlier.

In the effort to give some idea of the working of the mill from the evidence available, no attempt has been made to describe the method employed to recover the zinc blende from the ore, because no evidence is available. But it is possible that this product of the mine was recovered in the following way : first by selection in the mine where possible, then by picking on the washing floors; then possibly from the middles, seeing that the specific gravity of lead is 7.5 and zinc about 4.0. It is probable that the large stone settling tank outside the buddle house was used for the zincfines recovered from the Zenner buddles, but this cannot be taken as conclusive.

****

Waterworks beam-engine

Notes on a visit to Darlington Corporation Waterworks, Coniscliffe Road, 20th June, 1968.

According to the inscription in the main building, this dates from 1849 and originally held two other engines. There was also another beam engine in the separate gas engine house.
The engine in use was erected in 1904 by T. & C. Hawksley, Civil Engineers, Westminster and built by Teasdale Brothers, Engineers and Boiler Makers, Darlington. It is powered by two Lancashire boilers built in 1902. This engine house was built in 1903.
The beam engine is of two cylinder components, (cylinder diam. 18" and 29" with 7ft. stroke) giving an output of 180 h.p. at 100lbs. per sq. in. and 16 revolutions per minute. There are two pumps coupled to the beam and fly wheel, pumping 1800 galls. per minute. One is a lifting pump from the river and the other a ram pump to the reservoir.
The engine went out of normal use approx. 40 years ago when electric pumps were installed and is now used for about one week per year. The building contains ornate metalwork and the original paintwork has been lined out carefully with ornamental flourishes.
Gas engine house : contains two gas engines built by R. Hornsby & Sons running on producer gas. These have been out of use for several years.

Michael Wheeler

GLOSSARY

Teams	The place where the ore from the mine was tipped and where washing and dressing commenced.
Bing-stead	The place where the dressed product was weighed and stored ready for despatch. 1 Bing = 8 cwts; $2\frac{1}{2}$ Bing = 1 ton.
Bucker	A square piece of flat iron with a loop on the top to take a round shaft. The size was usually about 4" x 4" x $\frac{1}{2}$" thick or slightly larger, and was used to break down large pieces of mixed ore.
Trunks	Long rectangular shallow troughs in which fines and sludge were separated.
Buddles	There was great variation in buddle construction which were designed to separate the finer material below 1/8" in size.
Jiggers	An appliance used for the separation of the rougher grades, the ore being activated by water motion produced by a flat plunger operated by an eccentric shaft and connecting rods.
Trommels	Cylindrical screens or sieves for the separation of crushed ore into different sizes.
Stamp Mill	Stamps which were operated by cams and automatically did the work of a bucker on the smaller ore, i.e. chats from the jiggers, as they flowed underneath.
Fluted Rollers	Rollers with channels or grooves running around which were used for the first crushing operation.
Blende	Known by a variety of names. The proper name is Sphalerite, but is was often called "Black Jack" by the miners, and is the ore from which zinc is obtained.
Dolly Tub	Barrel shaped container with stirring blade or blades called a dolly. Used for the separation of slimes.
Shedder	"V" shaped plate which shared the supply between two sets of rollers.
Jaggers	Hardy small ponies, sometimes called Jagger Galloways, which were extensively used as carriers before the road system was adequate for wheeled vehicles.
Bunning	A raised platform made of wood slabs.

Killhope lead crushing mill photo : Frank Atkinson

A group of Winlaton chainsmiths, c.1900

The last chainsmith, 1966

Winlaton

Frank Atkinson

Chainmaking came to Winlaton (County Durham) probably more than two and a half centuries ago. Certainly an iron-working factory was set up there by Ambrose Crowley in 1691, primarily for the manufacture of nails and later his enormous works at Swalwell nearby had a reputation for its manufacture of anchor chains and anchors. When Gabriel Jars visited the Swalwell forge in 1765 he observed chains being made from links up to three feet in diameter and weighing 250 lbs. each.

Meanwhile the Winlaton factory had become a centre, by 1700, for nail-making and a wide range of 'oddware' - patten-rings (worn on the soles of shoes for extra protection), light chains, fire-hearths and bill-hooks.

The manufacturing organisation of the Crowley family was prodigious and their famous Law Book which is preserved in the British Museum details every administrative matter. Much of the Law Book was concerned with creating a permanent, flexible machinery for the efficient handling of the flow of materials, since stocks of the right kinds of iron had to be held at each stage of manufacture, yet for financial reasons the stocks had to be kept as low as was practicable.

Throughout the 18th century the firm prospered but the Peace of 1815 was the occasion of the first serious reduction in the scale of the firm's activities. The Admiralty contracts for anchors chains, nails and small ironware were seriously cut and as a result the Winlaton factory was abandoned.

One may easily imagine the social upheaval which this must have caused, for we are living through similar industrial upheavals today, this time with a Welfare State to cushion the blow. Skilled workmen were reputed to have migrated to Sheffield and Rotherham, where it was later claimed that "many of the most distinguished iron works in these towns owe their rise in no small measure to the superior ingenuity and information imparted by emigrants from Crowley and Company's workshops".

Meanwhile some of those left behind in Winlaton contrived to maintain a livelihood as independent domestic craftsmen and, with ever-diminishing numbers, this state of affairs continued into the middle of the twentieth century.

We may therefore trace the chainmaking skills of the present century to

the 1690's when the first iron-working skills were brought to Winlaton. Mr. Jack Hunter was the last chainsmith to work in Winlaton. For the last few years he had mostly spent his time checking and repairing rather than producing chains, but just before his retirement in December 1966 he hammered-out his last piece of chain whilst a cine-record was made (16mm. Ektachrome at 24 fps.) by Julian Utley and the author. The owners of the shop, Messrs. Wilson Bros. then generously presented the entire contents for the use of the Regional Open Air Museum: anvils, tools, testing-machine etc. and all this is now stored at Brancepeth.

The workshop so used by Mr. Hunter, although containing this interesting old equipment, had been structurally altered some years ago but very fortunately a workshop survived in the village which had gone out of use in the 20's : Bagnall's workshop, near 'The Turf Inn'. Here the layout could be accurately recorded and the important features such as hearths, cooling troughs and window shutters still removed. For more than two years Blaydon Council generously allowed this derelict workshop to remain standing, but eventually local pressure for its destruction grew, as residents feared that children would be harmed. Accordingly in May this year several volunteers from the 'Friends of the Northern Regional Open Air Museum' were able, helped by Stafford Linsley and John Dodds, to take down the building, and the essential parts have now been removed to the Brancepeth store.

Acknowledgments

In addition to the various individuals mentioned above, I am indebted to Sid Chaplin who first introduced me to the Winlaton chain-works; to the County Architect for permission to reproduce from a survey of Bagnall's workshop and to Mr. E. Cain who carried out the survey.

For further reading one can recommend Men of Iron by M. W. Flinn (Edinburgh University Press, 1962) and the more specialised Law Book of the Crowley Ironworks (Edited by M. W. Flinn : Surtees Society, Vol. 167, 1952).

Published by the Industrial Archaeology Society for the North East
c/o The Bowes Museum, Barnard Castle, Co. Durham.

Editor:
S. K. Chapman, Esq., 26 Springfield Avenue, Brotton, Saltburn-by-Sea, Yorks.