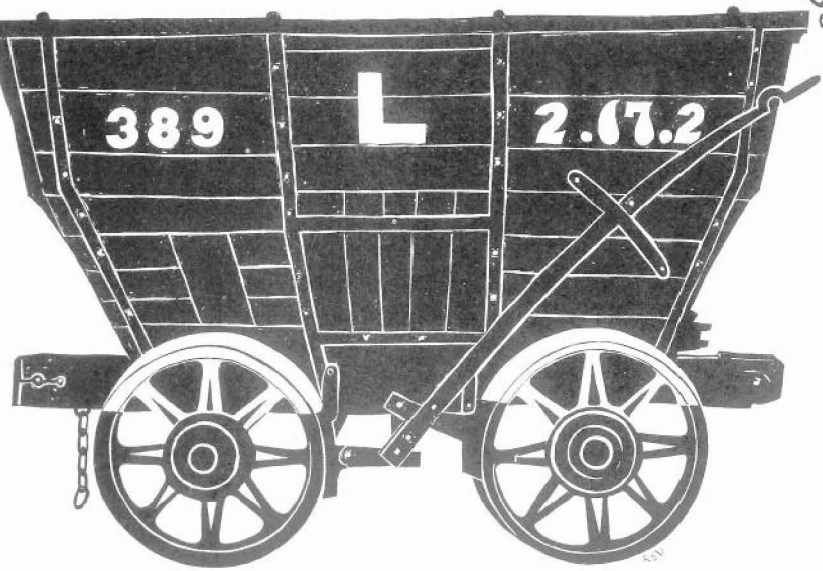
The North East Industrial Archaeology Society



August 1971

BULLETIN 14

The North East Industrial Archaeology Society

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Editor's notes

Our main contribution in this issue stems from visits carried out some years ago to collieries by members of an Engineering History Society now defunct, but some of the contributors are still active in our Society.

I consider that this article is very useful as a guide for our members who may be visiting industrial sites at the present time. Usually cameras are the main utensil on these excursions, but a lot of other information available is often disregarded with the result that no records are kept after the visit.

Another of our contributions concerns the Belmont Junction Water Tower, which unfortunately was news last month due to its partial demolition. Here I think the lesson to be learnt is that whether an object is to be preserved or not, it is always wise to have it surveyed and recorded!

As Industrial Archaeology is becoming increasingly publicised, requests come at this time of year from people interested but living in other parts of the country. Usually they ask for details of industrial sites in the North East area to visit, but some are also keen to see local Group's activities if possible, whilst in our area. There may also be members who wish to see what the Groups are doing, so here is a brief list for those interested:-

Sunderland Group

Ryhope Water Pumping Station (Map Ref: 78/NZ404525) - now in process of preservation. Complete beam pumping engines in situ.

Scotts Pottery site, Southwick, Sunderland - excavation of 19th century works site to be continued, for one week only, 8th August to 15th August inclusive. Further details from Mr. Stuart Smith at Sunderland Museum, (tele. Sunderland 70417).

Teesside Group

Boulby Alum. Works (Map Ref: 86/NZ752197) - on Sundays only, up to November. Fourth season's excavation taking place on site of 18/19th century Alum. Works in large quarry on Boulby cliff. Visitors can park cars at Boulby Corner (Ref: 86/NZ762188) then walk northwards about half a mile along footpath near cliff edge to site at above reference. Alternatively contact Keith Chapman (address as below).

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Belmont Junction Water Tower

W. Fawcett

Anyone travelling out of Durham along the Sunderland road is likely to have noticed, just before passing under the railway bridge beyond Belmont, a group of buildings associated with a prominent stone chimney. The railway was the route of the main line of the Newcastle and Darlington Junction Company, and the chimney is that of the water tower at Belmont Junction, from which ran the City of Durham branch on an alignment now largely obliterated by the new road cutting into Gilesgate.

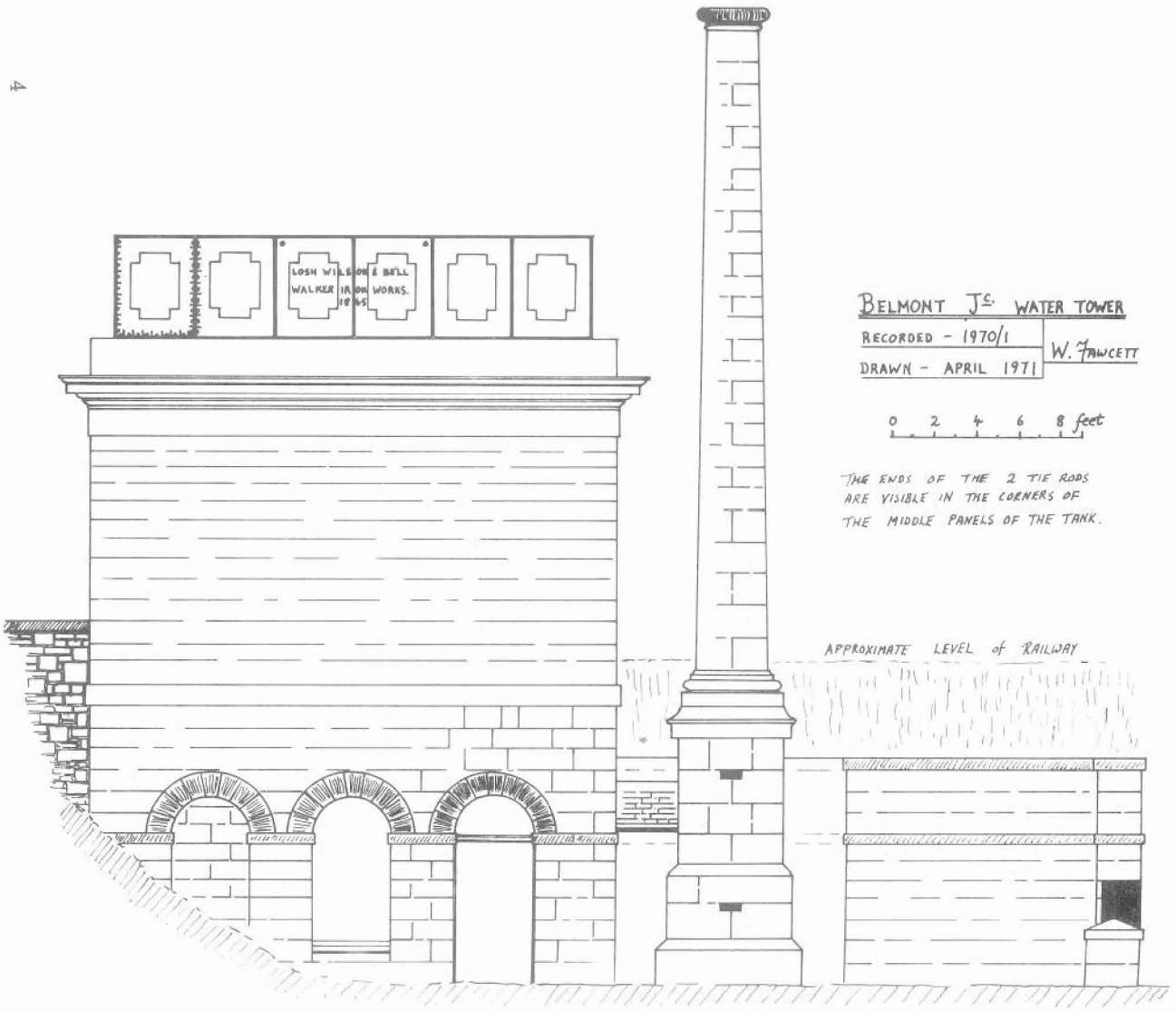
This company was one of several controlled by the "Railway King", George Hudson, and his friend the York architect George Townsend Andrews was commissioned to design the stations including the terminals at Gateshead Greenesfield (the train shed of which was demolished only three years ago) and Durham Gilesgate, which though somewhat isolated by the new road is very well maintained by its present owners.

To judge by the detailing of this water tower I feel certain that it too was designed by Andrews, though to date no direct references have appeared in the records.

The building abutting onto the railway embankment, is basically a two feet thick stone shell carrying an upper floor (at the level of the main string course) of two inch thick stone flags supported by three brick vaults which form the ceiling of the room below. These vaults, similar to those sometimes employed in girder bridges, are carried by five iron girders, only the exposed bottom edges of which are visible. At the top of the building, five "I" section beams bedded into the masonry of the parapet support the tank along the lines of junction between panels.

The tank itself proudly bears its origins in the inscription:-

LOSH, WILSON & BELL
WALKER IRON WORKS
1845



BELMONT Jc. WATER TOWER

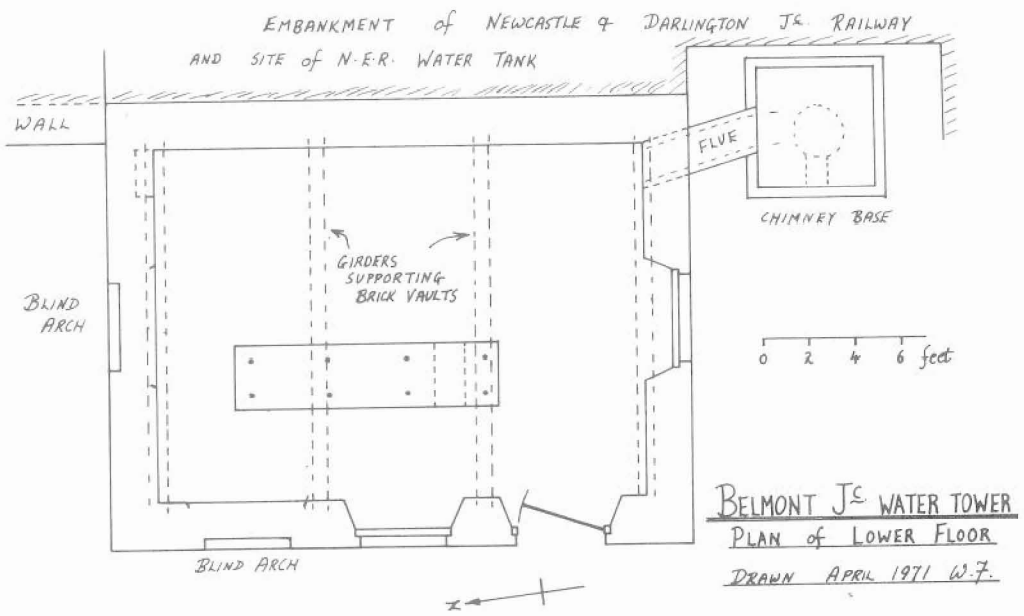
RECORDED - 1970/1

DRAWN - APRIL 1971

W. FAWCETT

0 2 4 6 8 feet

THE ENDS OF THE 2 TIE RODS ARE VISIBLE IN THE CORNERS OF THE MIDDLE PANELS OF THE TANK.



BELMONT Jc. WATER TOWER

PLAN of LOWER FLOOR

DRAWN APRIL 1971 W.F.

and, in the conventional fashion, is built up of cast iron panels - six along one side and four the other with two rods tying together each pair of opposite sides.

The lower room presumably contained the pumping engine, together with a boiler to feed it, and one can still see a massive stone bedplate constructed, like the rest of the building, of ashlar blocks and carrying the stubs of eight fixing bolts. Running out to the chimney was a flue constructed of firebrick on a two feet wide, two inch stone slab supported on two iron beams. The base of the distinctively elegant chimney stands partly in a recess in the abutment wall containing the railway embankment.

The upper room now contains nothing except for the six inch diameter pipe which I believe carried the upward flow of water, and scanty fragments which show that the windows were once glazed, with iron frames. In plan this room was once identical with the room below except that none of the windows were blind and the side containing the door faces the railway.

Later the North Eastern Railway (successors to the earlier companies from 1854) built a larger tank, bearing the date 1861, against this wall. As part of this the two windows on that side, together with the tympanum of the door, were blocked up. A drawing still in existence at York Railway Offices, and dated 1910, confirms that the new tank used the pump already in the older building, and also informs us that the room beneath this tank was partitioned to form a bedroom and kitchen, perhaps for the North Eastern's roving platelayers? The upper room in the 1845 building was used as a store at this time.

What kind of engine was eventually used I do not know, but as an example I can cite the very fine and even earlier water tower at Haydon Bridge on the Newcastle and Carlisle Railway which was finally equipped with a Crossley single cylinder paraffin engine.

Footnote - Although the Belmont Water Tower was scheduled for eventual removal to the Beamish Museum, on the 24th June, 1971, it was partly demolished by a railway demolition crew! Only the chimney and stone base of the building is left standing, but it is still hoped to preserve this remnant.

Coal from Croxdale Pit

Philip Grant

This study has its origins in an article entitled 'Coal from Croxdale Pit - A Preliminary Report' which appeared in "Industrial Heritage", the magazine of the Durham University Industrial Archaeology Group in October, 1970. This in turn was the result of field work and a little documentary research initiated when a fellow member of the University Group, John Ratsey, pointed out to me that a footpath we both knew and used on the south side of Durham City ran for part of its way along embankments and through cuttings of an old railway. Study of the Ordnance Survey 6" map published in 1860 showed an 'Old Wagonway' leading south-west from Houghall, where there was also a colliery, to Croxdale Pit (disused) near Low Burnhall Farm. This was the start of research which has grown so much that I am now involved in a full study of the coal mines of the Durham City area. The information contained in this particular study has been collected from a number of sources, including the Durham County Record Office, the Mining Record Office (Team Valley), Durham University and County Libraries and the Dean and Chapter of Durham's archives at Prior's Kitchen. The picture it provides is not a complete one, but there is sufficient information on which to base a definite outline of the life of the pit and its wagonway/railway connections.

Neither Croxdale Pit nor its wagonway appear on the 1838 Tithe Map, although the land on which they later appeared is shown as belonging to William Thomas Salvin of Burn Hall. By the time that the first Ordnance Survey of the area took place in 1858 the pit and its wagonway appear to be disused. A brick and tile works is marked on the map, adjacent to the site of the pit. Letters and leases of the Salvin Family of Croxdale (deposited with the Durham County Record Office) suggest an active life for the pit, or at least a pit in the Croxdale area leased and managed by the same company that was working Whitwell Colliery, of 1838 to 1847. I believe that the pit referred to is Croxdale Pit. The Victoria County History (1) records that borings from the surface were taking place at Farewell Hall, near Croxdale, and at Burn Hall in 1837, which would help to substantiate this.

At about the same time the Durham and Sunderland Railway was pushing its way towards the area, aiming to tap the coal market of the Brandon district. Rent assessments for some Dean and Chapter tenants in the Shincliffe

Township mention lands handed over to the railway company in 1838/1839, and W. W. Tomlinson (2) records that a one and a quarter mile section of the railway was opened between Sherburn House and Shincliffe on 28th June, 1839. By February, 1842, the line was in operation to the Elvet Coal Company's new colliery at Houghall. A further short section of the railway was opened as far as Blaid's Wood in May 1845 (3), but there is no mention of the railway going further. In fact it did go further. Although it never reached Brandon it was continued as far as Croxdale Pit. The Victoria County History (4) records that the first coals were obtained from Croxdale Colliery in 1845, and it is likely that the railway/wagonway had reached the pit by this time. The slow progress of the railway on the two miles west from Shincliffe can be explained by the financial troubles in which the railway company found itself by 1841. Wayleaves on the line had to be reduced and dues increased to keep the railway running (5).

Nor were things rosy at Croxdale Pit when the railway eventually reached it. By 1847 there was a dispute between Salvin and the lessee of the pit over the surrender of the lease. The terms allowed the lessee to terminate the lease before it expired if notice of one year was given. The lessee did this, and intended to cease all activity at the pit during the year. Salvin disputed the action, as to leave the pit for a year without the pumps working would lead to a flooded mine, which he would have little chance of re-letting. The outcome of the quarrel is not evident from the Salvin Papers. Whether or not 1847 saw the end of mining at Croxdale Pit is uncertain. By the time of the 1851 Census the only industrial worker living near the colliery site was a labourer in the tile sheds, and by 1853 when T. Y. Hall published his "Treatise on Mines" (6), it is probable that mining at this pit had ceased. Croxdale is listed amongst collieries in the Household District, but does not appear in Hall's list of working pits and their owners.

All this suggests a very short life for Croxdale Pit, possibly only two or three years. The area actually mined from the pit in the Hutton Seam, however, would indicate a longer life. The mine abandonment plan for Croxdale (Farewell Hall) Pit, now deposited with the Mining Records Office, is unfortunately not dated. The abandonment plan for Houghall Pit shows the same area of the Hutton Seam incorporated in the workings of that colliery, but the Croxdale plan probably shows the area which was mined exclusively from Croxdale Pit. The same workings were also later linked with those of Littleburn Colliery near Meadowfield, and when the River Browney broke into the Littleburn workings about twenty years ago some of the water was forced up the old shaft of Croxdale Pit, causing some damage at Low Burnhall Farm. After this the shaft was finally filled in.

Although the exact working life of Croxdale Pit is uncertain it was short, which poses the question: why? Trial borings down to the Hutton Seam must have been promising for the heavy capital investment of sinking a pit to have been undertaken. The answer probably lies in the geology. T. Y. Hall states that the Hutton Seam from Whitwell to Croxdale, Burn Hall and Langley is inferior (7), the reason being the Ludworth Whin Dyke, an intrusion which runs east to west passing very close to the site of Croxdale Pit. This has had the effect of reducing the percentage of volatile matter in the coal for up to three-quarters of a mile on either side of it (8). This would probably mean that the coal won from the pit would fetch a lower price than that from other, better placed pits, and suggests that the pit was closed after only a short life as being uneconomic.

Houghall Colliery on the other hand, was just far enough north of the dyke to be mining good coal. It worked the Hutton Seam from 1842 until about 1885. In 1883/1884 it had an annual production of 84,000 tons of coal and employed 281 men, 219 of them as underground workers (9). The coal from Houghall, and from Croxdale was carried away along the branch railway to Sherburn-house Station, thence to the coast for export either coastwise to London and other southern ports, or abroad.

This branch line itself is of interest, as this is the main feature of the Croxdale and Houghall coal mining era, which still remains on the ground. Why was the section west from Houghall referred to as an 'Old Wagonway' by the Ordnance Survey, when it was probably no different in construction to the line east from Houghall, which was marked as a railway? The reason for this may be that the whole branch was originally operated by rope and standing engine, not by locomotives. K. A. Hoole records that an accident report of 1858, showed that the western end of the branch line was still being worked by rope, but that the change to steam locomotives took place soon afterwards (10). The change would have taken place at about the same time as the information for the first Ordnance Survey map of the area was being collected, leaving the by then disused line to Croxdale Pit as what could be described as a wagonway, whilst the line from Houghall to Sherburnhouse was being worked as a normal steam railway.

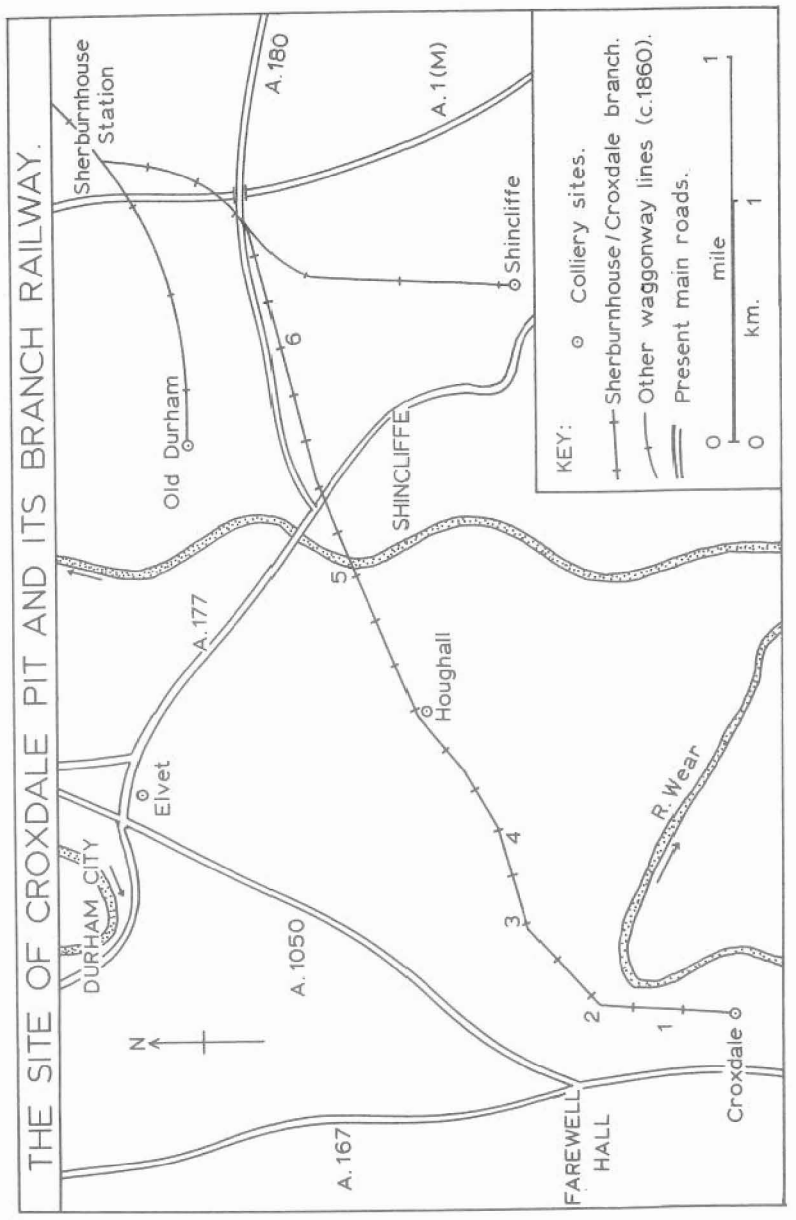
The evidence on the ground which can still be seen is as follows: A small area of waste ground (NZ267393) with remnants of metal and brick beside the track leading from the A167 (old A.1 road) to Low Burnhall Farm marks the site of Croxdale Pit, and its associated brick and tile works. The foot-path leading north from here follows the line of an incline (1 on map) which took the railway up the steep side of the Wear Valley. The remains of the engine house (2 on map) for the stationary engine which hauled the wagons

up the bank are still visible as a few blocks of stone in a field at the top (NZ268397). From here all definite trace of the line disappears for several hundred yards, but a slight depression running across two ploughed fields probably marks the course of the line north-eastwards.

The line can be rejoined from the footpath through Blaid's Wood, on the south side of the cemetery, where the path climbs onto what was a battery (embankment) across a small valley (NZ272401). Several culverts carry streams under the battery, the two on the north side are relatively easy to inspect, their stone and brickwork is still in good condition (3 on map). The path then follows the line eastwards through a small cut (cutting), then climbs some steps as the line goes into a deeper cut which led to a tunnel under Hollingside Lane (4 on map) (NZ275402), but all trace of the tunnel has now disappeared. The corresponding cut emerges into the wood on the east side of the lane and the footpath rejoins the line of the railway along a now wooded battery to Houghall farm hamlet (NZ278405).

For the next six hundred yards the line of the railway was very close to that of the present road. The old workings and pit heaps of Houghall Colliery (NZ282406) have been planted over with trees, but east of the colliery the line can be seen as a low battery running beside the road. The railway crossed the River Wear on a wooden bridge (5 on map) (NZ285407). On the west side of the river a little of the abutment remains as a wall, old sleepers forming a boundary between the battery and the field to its north. The remnants of two wooden pillars can be seen in the river if the water is low. The other bridge abutment stands up boldly at the end of a battery on the east bank.

The high, wooded battery on the east side of the river runs directly to the northern end of Shincliffe Village (NZ289408). Here a bridge used to carry the line across the road between the Railway Tavern and Shincliffe Station, which has now been converted to a Rural District Council Depot. Much of the stone-work of the bridge abutments and the station is retained in the present walls. A further battery continued across the line of the A.177 road before the railway entered Sandy Cut (NZ292410). This cutting (6 on map) was the major earthwork on the branch line with a length of about 600 yards and an average depth of 40 feet. This is not officially a footpath, but it is still possible to walk through the cut. At its eastern end the line was joined by a wagonway which came down from Shincliffe Colliery (NZ298401). A new housing estate has been built on the site of the pit, but the line of the wagonway down the bank survives as a footpath. From this junction (NZ301413) the line has been obliterated by earthworks associated with the Durham Motorway, but from old maps the line can be seen to have curved northwards to Sherburnhouse Station (NZ304417) where it joined the main system of what was by 1860 the



North Eastern Railway.

It is interesting that many stretches of old railway and wagonway remain as public footpaths. Perhaps some were established as rights of way because of miners walking to work alongside the railway, particularly at pits such as Croxdale and Houghall where few workers lived adjacent to the colliery site. Whatever the reason, it was this phenomenon which began my research, a part of which is presented here.

National Grid References given are all in the "NZ" 100 kilometre square, and may be followed on O. S. 1" Sheet 85, Durham.

The author is grateful to Captain G. M. Salvin and to the National Coal Board for permission to publish material from the Salvin Papers and National Coal Board Records deposited at Durham County Record Office.

References:

(1) The Victoria County History of Durham, vol. II (1928) p. 334.
(2) W. W. Tomlinson, 'The North Eastern Railway - Its Rise and Development' (1915), p. 328 (Reprint 1969).
(3) Tomlinson, Ibid, p. 470.
(4) Victoria County History, Ibid, p. 338
(5) Tomlinson, Ibid. p. 470.
(6) T. Y. Hall, 'The Northern Coalfield' in Trans. North of England Inst. of Mining Engineers, No. 2 (1853-4), pp. 267 and 284-7. Also published as 'A Treatise on Mines'.
(7) Hall, Ibid. p. 181.
(8) G. A. L. Johnson, 'Geology' in J. C. Dewdney (ed.) 'Durham County and City with Teesside'. (1970), p. 22.
(9) Annual Returns of the North of England Coal Owners' Mutual Protection Association. (1883-4).
(10) K. A. Hoole, 'Regional History of the Railways of Great Britain, vol. 4 The North East' (1965).

A Gin wheel in S.E. Northumberland

H. Beavis, J. Day and S.M. Linsley

The separation of grain from straw has always been an essential feature of agricultural practise and yet it was not until about 1786, that a method to satisfactorily supersede the flail was established. Then it was that Andrew Meikle, a civil engineer of Houston Mill near Haddington, invented his Threshing Machine (1), which was eventually modified so that it could efficiently carry out the processes of threshing and winnowing. Power for such a device could be obtained from wind, water, muscle or steam.

By far the most popular method in the Northern Counties was the Horse Wheel. This device constrained up to six horses to walk in a circle, the constraints imposing a rotary motion in a vertical shaft which by bevel gear and pinioned lying shaft, (see drawing and key for details), on intersecting axes, drove a threshing machine. In early forms the gear wheel, its supports and the horse beams, were overhead with respect to the horses and generally a crude, single storied building was provided to house them, being located adjacent to a standard threshing barn. The wheel houses were round, square, oblong or polygonal and form an easily identifiable farm building.

In spite of numerous Gin House locations in the Northern Counties, surprisingly little has been written about them. Wheelhouses in North Yorkshire have been the subject of a recent paper (2) and a general survey on various applications of horse wheels appeared in 1960, (3). Other than these pioneering papers, the prime sources of information are the contemporary texts on farming (4), (5) and (6).

A recent investigation into the distribution and diffusion of Wheel Houses in Northumberland (7) has shown that 562 possible sites can be identified from Ordnance Survey Sheets. At least 264 of these were extant in 1970, but clearly both of these figures could be underestimates of the Gin House population. However, in none of the 264 Gin Houses inspected was there anything even approaching a complete horsewheel. Nevertheless, there was one such virtually complete system, located in South East Northumberland, which because of its dangerous condition had to be dismantled before

it collapsed from old age. Dismantling was carried out by the 'Friends of the North of England Open Air Museum' and the Gin House and Wheel is now in storage.

The Gin House in question was located at Berwick Hill Low House, Northumberland. The land which it served is reputed to have been in the continuous possession of one family from the Norman Conquest until 1950 (8). At the time of the Conquest it came into the hands of the de Mitfords, passing by marriage, through a female line to the Stapeltons and finally being acquired by the Ridley family of Blagdon in 1950. A tablet set into the wall of Low House bears the initials "M. S." and the date 1723, although it is evident that some of the other farm buildings predate this. Judging by the number of neighbouring farms bearing a similar tablet, 1723 was a year of considerable re-building by the Stapeltons. Similar re-building and/or extensions in 1956 are indicated by tablets of the same design, but with the initials "M. W. R." (Matthew White Ridley), although this does not appear to have been the case at Low House.

A Tithe Map dated 1841 (9) shows the Gin House and states that the farm was owned by Thomas Stapelton and tenanted by John Nicholson. It is probable therefore, that the Gin House was in operation before 1840. It was still in use in 1879 when Matthew Hall moved from Short Flatt, Bolam, to take over the tenancy. He used the wheel and thresher until he changed the system of husbandry from tillage to grass land in about 1900. Subsequently the gaps between the Gin House pillars were boarded up, the building being put to a variety of uses, but finally serving as a poultry house; remarkably the wheel survived.

Matthew Hall's great nephew, Mr. L. R. Carmichael, who spent much of his life at Low House and took over the tenancy in 1948 argued that since it existed before him, it had every right to continue after him. (Industrial Archaeology is always indebted to these rare gestures of sympathy). It was not until 1960 that accessible ironwork was removed (e. g. gear wheels) but nevertheless, a virtually intact horsewheel was left.

In essence the Gin House was of the polygonal type, the facetted red pan-tiled roof being supported by stone pillars and timber roof supports. Ridge stones and a hemispherical apex stone completed the main roof, but a short pantiled tie ridge integrated this with the adjacent threshing barn. From the nature of the abutment of the minor pillars to the barn wall, the latter must have pre-dated the wheel house and was possibly a standard threshing floor.

The wheel itself was a four-horse, overhead gear-turning type with shoulder starts and equalising-pulley trace chains (see accompanying drawing). All of the main structural components of the wheel were of timber, the basic horse beam superstructure being wedged to the central vertical axle. The latter was cut from a single solid baulk of timber as were the massive Collar Beam and lying shaft.

Very little was left of the threshing machine and a partially conjectured sketch is shown in the drawing. It appeared to be of the Scottish (Scotch) type and the operation would be as follows - corn from the stack was spread out onto a wooden feeder platform with heads towards the thresher drum. The heads were fed into the fluted feeder rolls, which whilst revolving slowly, presented them to the faster rotating thresher drum whose function was to beat the grain out of the heads. Straw, grain and chaff were carried over the top of the thresher drum and on to the pegged raker drum which in turn drew the broken down corn over the slotted concave. This allowed grain and chaff to fall into a hopper whilst the straw progressed out of the thresher whence it fell into the straw barn. Winnowing may have been carried out in a separate and possibly hand powered machine, or a winnowing machine may have been situated beneath the slotted concave being driven indirectly from the thresher gearing. (In Northumberland such machines were known as "Dighters").

The horses were hitched to the starts by equalising chains, which ensured that the load was shared equally on each shoulder. In addition a separate chain from one of the horizontal wheel braces to the near side of the horse's bridle, constrained the horse to walk in a circular direction. Although four horses were needed at any given time, the work was arduous and four hour shifts were an efficiency maximum. A horseman would usually be a necessity to keep the horses moving or stationary as the case might be. He could do this from a stationary position or walking in the opposite direction to the horses.

Dismantling of the Gin House and Wheel presented certain problems. The roof structure was weak, the main pillars leaned considerably and the whole building held itself together by will power. All the components had to be loaded onto a tipping wagon using only muscle power and ingenuity. Basically the wheel superstructure was wedged to the vertical axle so that when the wedges were removed the whole thing virtually fell apart like an outsize wooden puzzle. This, together with the fact that all of the major components carried indented location marks (in Roman numerals) for ease of erection, indicated that the wheel had been pre-fabricated elsewhere,

possibly by Rastrick of Morpeth. Carved into one of the sheer beams was a query inscription which may denote an assembly date of 1814. This is certainly the right sort of period for work of this kind.

There are many basic questions concerning wheel houses, their distribution, design, variation and other features which are yet unanswered. Why are there so many locations in the Northern Counties and so few in say East Anglia? Did the introduction of Horse Wheels coincide with a movement of labour away from the land and into the industrial areas, and if so which was cause and which effect?

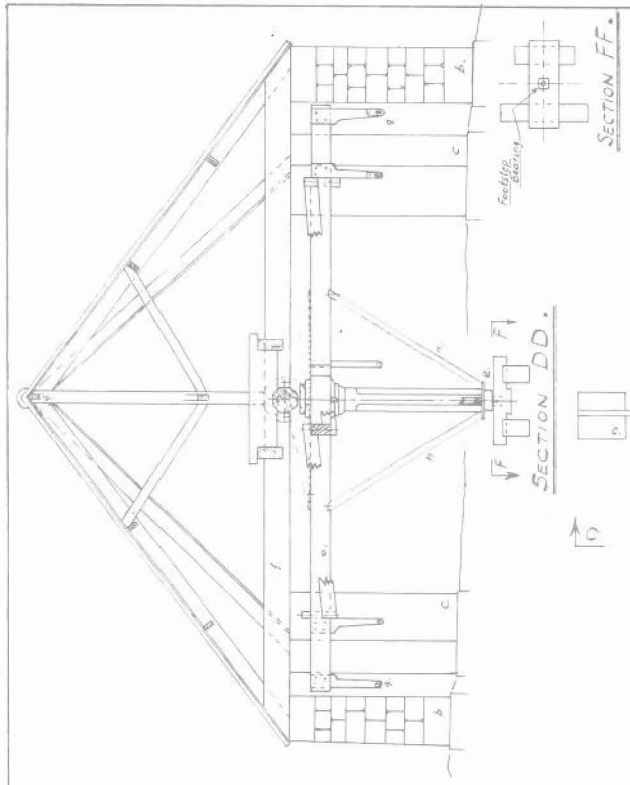
Did stationary steam engines supplant Gin Houses on farms or do the former merely indicate a delayed change to improved threshing techniques being constructed at farms which did not formerly have Gin Houses? This latter point is being investigated and will form part of a future article on the subject. The present article does not begin to answer any of these questions, but offers just one more small piece of information of the subject.

References:

(1) Wilson, J. M. "The Farmer's Dictionary", Edinburgh.
(2) Harrison, A. & Harrison, J. K., "The Horse Wheel in North Yorkshire", The Cleveland and Teesside Local History Society, Bulletin 8, 1970.
(3) Atkinson, F. "The Horse as a Source of Rotary Power", Trans., Newcomen Society, Vol. 33, 1960.
(4) Low, D. "Elements of Practical Agriculture", London, 1843.
(5) Bailey, J. and Culley, G., "General View of the Agriculture of Northumberland", Board of Agriculture, 1797.
(6) Stephens, H., "The Book of the Farm", Edinburgh, 1855.
(7) Hellen, J. A., "Some Provisional Notes on Wheelhouses and their Distribution in Northumberland", Journal of Geog. Society, University of Newcastle, 1970.
(8) Carmichael, L. R. Personal communication, 1971.
(9) Tithe Map. Northumberland Record Office.

Key to Drawing

a	Thresher house wall	2' 0" thick
b	Main Pillars	2' 2" x 4' 6" approx.
c	Minor Pillars	2' 1" sq. approx.
d	Horse-walk or floor	22ft. approx. mean dia.
e	Footstep of Horse Wheel	
f	Collar-beam	$8\frac{1}{2}$" wide x 1' 2" deep.
g	Sheer-beams	6" " x 1' 1" "
h	Eaves ties.	3" " x 4" "
k and l	Flanges on Central Shaft	
m	Horizontal spokes, not fitted	
n	Diagonal bracing (all missing)	3" wide x 4" deep
o	Horse-beams	5" " x 10" "
p	Horizontal braces (3 only)	3" " x 7" "
q	Yoke-bars	3" " x 7" "
r	Bevel Wheel (missing)	
s	Bevel Pinion (Missing)	
t	Lying Shaft octagonal	5" face
u	Spur Wheel (thresher, missing)	
v	Trace Chains (with equalising pulleys)	



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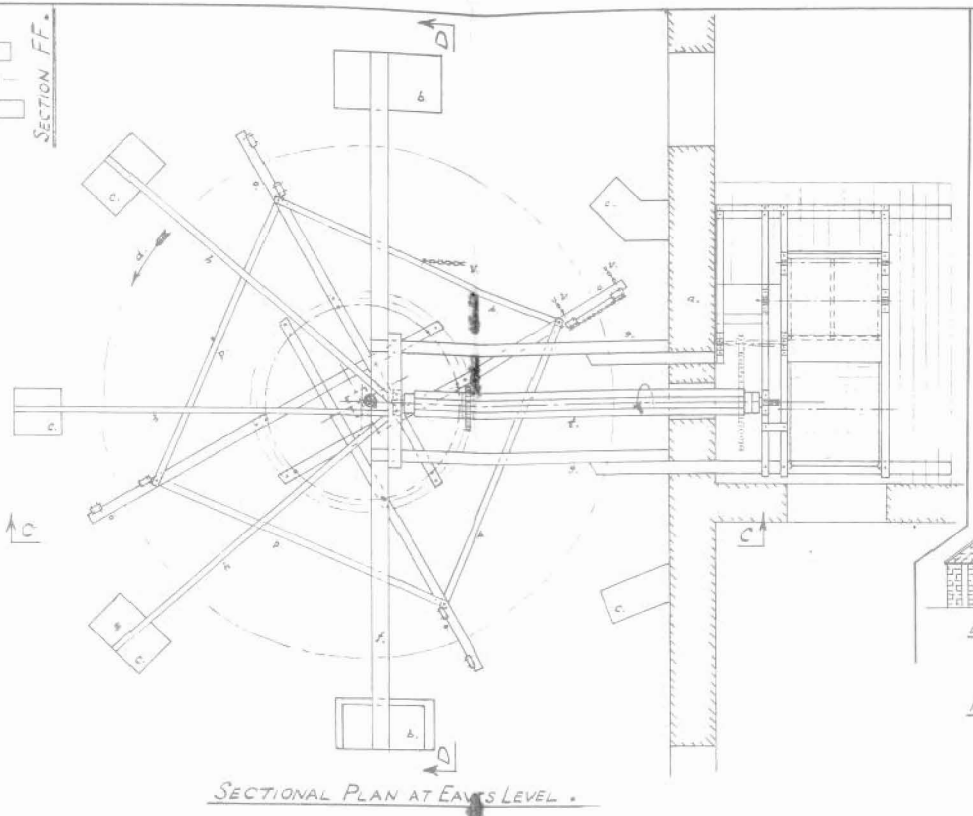
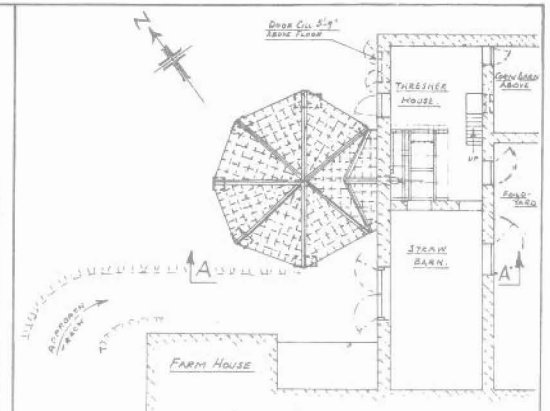


SECTIONAL PLAN AT EAVES LEVEL.

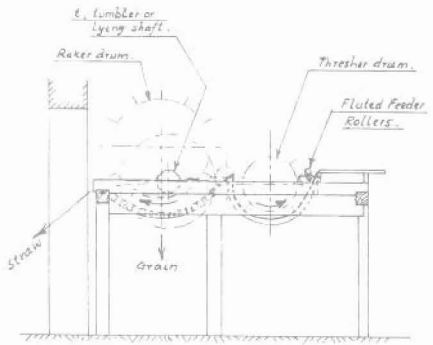


LAYOUT PLAN.
SCALE :- 1/16" = 1 FOOT.

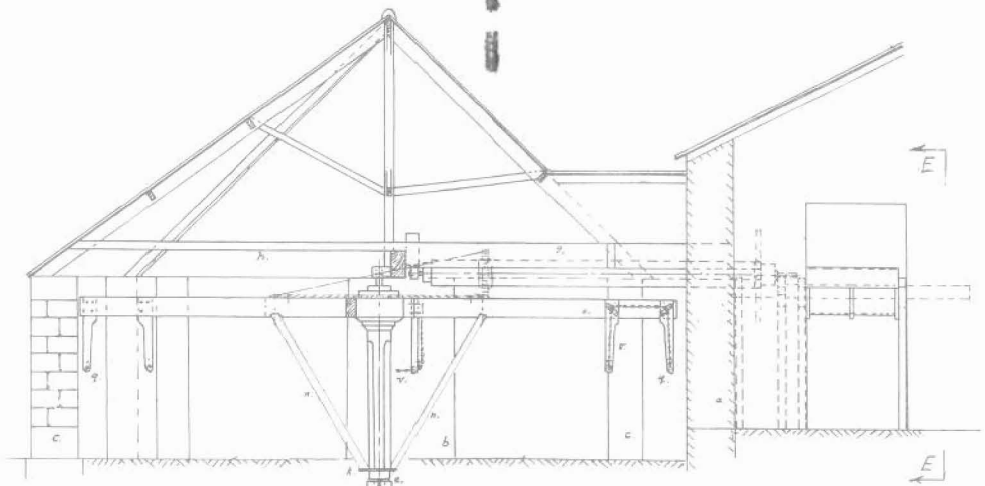
ELEVATION BB.

ELEVATION AA.

NOTES — GIN-HOUSE, MASONRY PILLARS.
ROOF, PAN TILES & RIDGING.
TIMBER-WORK GENERALLY WORM-PITTED & IN VERY POOR CONDITION. FOR REMOVAL, EXTREME CARE WILL BE NEEDED TO PREVENT TOTAL COLLAPSE.
WHOLE STRUCTURE IS LEANING TOWARDS THE NORTH.
TIMBER BRACES, ETC. WHICH ARE MISSING, SHOWN
BEVEL GEARING MISSING, DIMENSIONS ESTIMATED.



SECTION EE.
Thresher details conjectured.



SECTION CC.

FOUR HORSE-DRIVEN THRESHING PLANT AT BERWICK HILL, LOW HOUSE FARM, SOUTH NORTHUMBERLAND.

NAT. GRID REF. 7B NZ 170 769.

SITE PARTICULARS TAKEN 4TH SEPT. 1970. BY S.M.L., J.L.D. & H.B.

FOR LEADING SCANTLINGS & ITEMS a, b, c, ETC. SEE SCHEDULE.

0 2 4 6 8 10 12 14 FEET

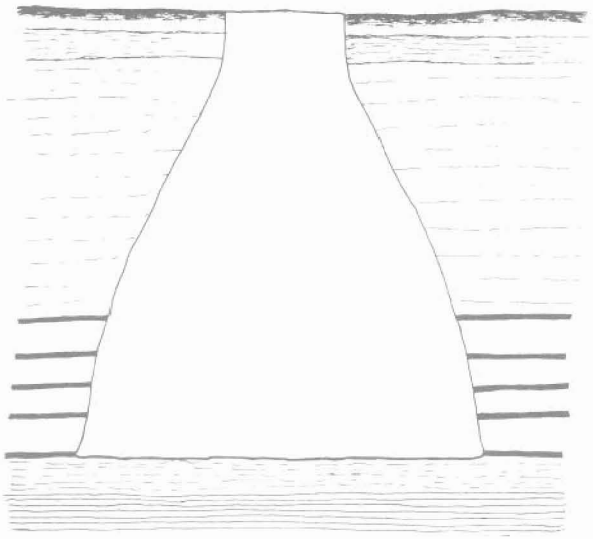
THRESHER ADDED. 17TH SEPT. 1970. H. BEANEY.
10TH OCT. 1970.

Bell Pits at Whittonstall

North East Industrial Archaeology Society Field Survey of 16/1/71.

Pits spaced fairly close together at about 10m. centres. Mostly of the same form, but dimensions varied. Pits taken down to the lowest band of ironstone nodules and belled out just sufficiently to prevent the shale collapsing from above. No attempt to extract the coal from the lower seam. Diameter at the base varied between 3 and 4m.; depth to base between 4 and 4.5m. Diameter of entrance about 1.2m. Pits appeared to have been back-filled with shale, presumably from the excavations of new pits. Outline of pits can be discerned at the surface after the topsoil is stripped off. Sides of the pits were clean and have stood up very well to the course of time. Pits have been provisionally dated to c.1370.

R. M. Higgins.



S.A.C.

Typical section

Visits to some old Colliery Engines

R.M. Higgins

Introduction - One of the forerunners of the present Industrial Archaeology Societies in the North East was the North Eastern Historical Engineering and Industrial Locomotion Society. It was formed in 1946 by Coulson Cairns and other members of the Stephenson Locomotive Society and included Capt. Gibson, Messrs. Harry Beavis, John Fleming, L. G. Charlton, G. W. Trestrail, H. W. Evans, T. J. Burkett and G. H. Anderson. The object of the Society was to visit and record the disappearing engineering and railway relics.

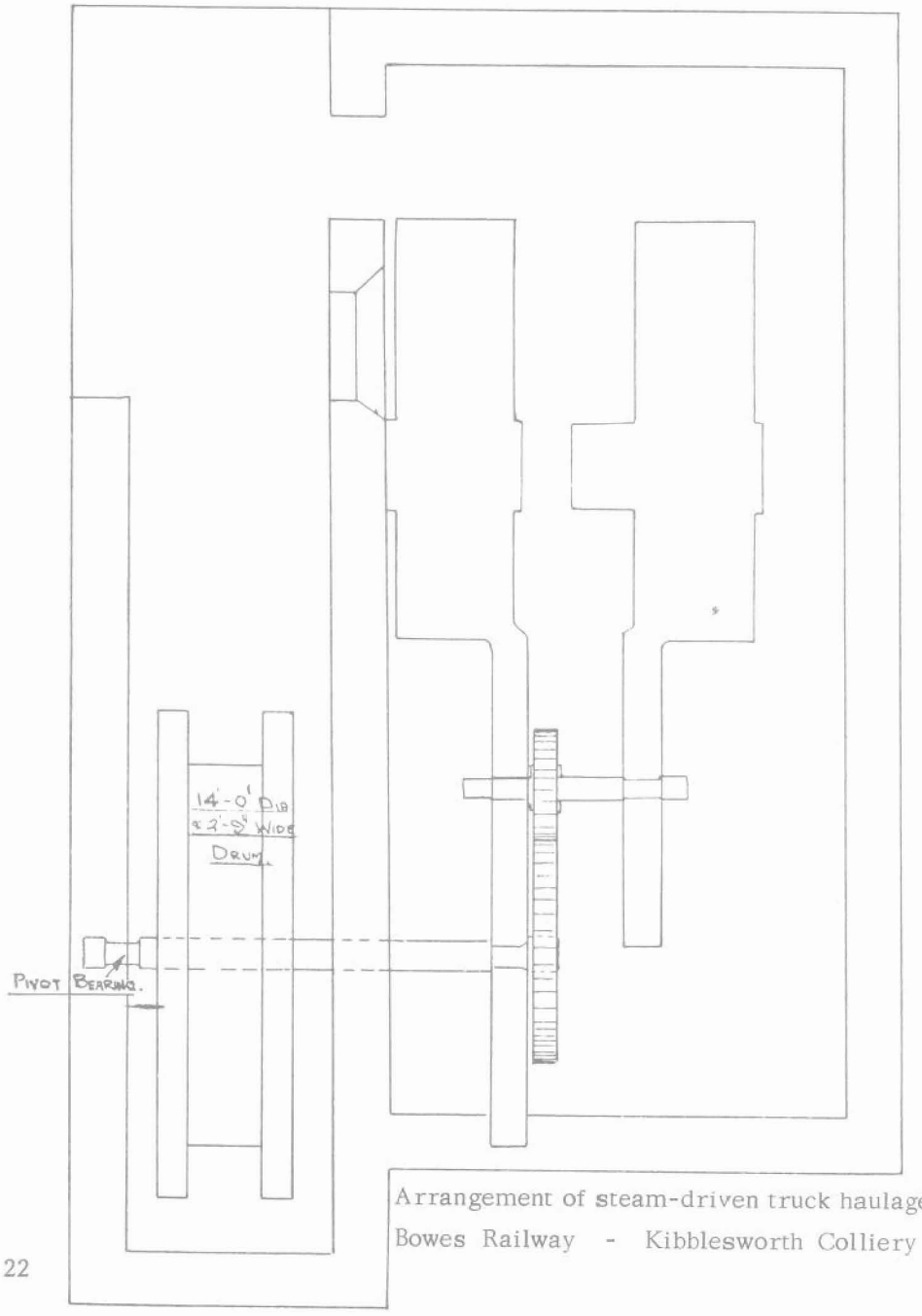
One of the first projects tackled was the preservation of a locomotive built by Messrs. Black, Hawthorn and Company of Gateshead in 1874. This had spent its life at Hebburn having been purchased by Messrs. Charles Tennent and Company for their chemical works. It passed into the hands of the International Aluminium Company when they took over the works and was acquired by Messrs. George Cohen, Sons and Company when the works closed. An approach was made to Cohens who kindly donated the engine to the Society.

Through the kindness of the National Coal Board the locomotive was stored in the shed at Killingworth where members devoted considerable time to cleaning and renovation. In 1953 it was transferred to the Science Museum, South Kensington, where it is now on display.

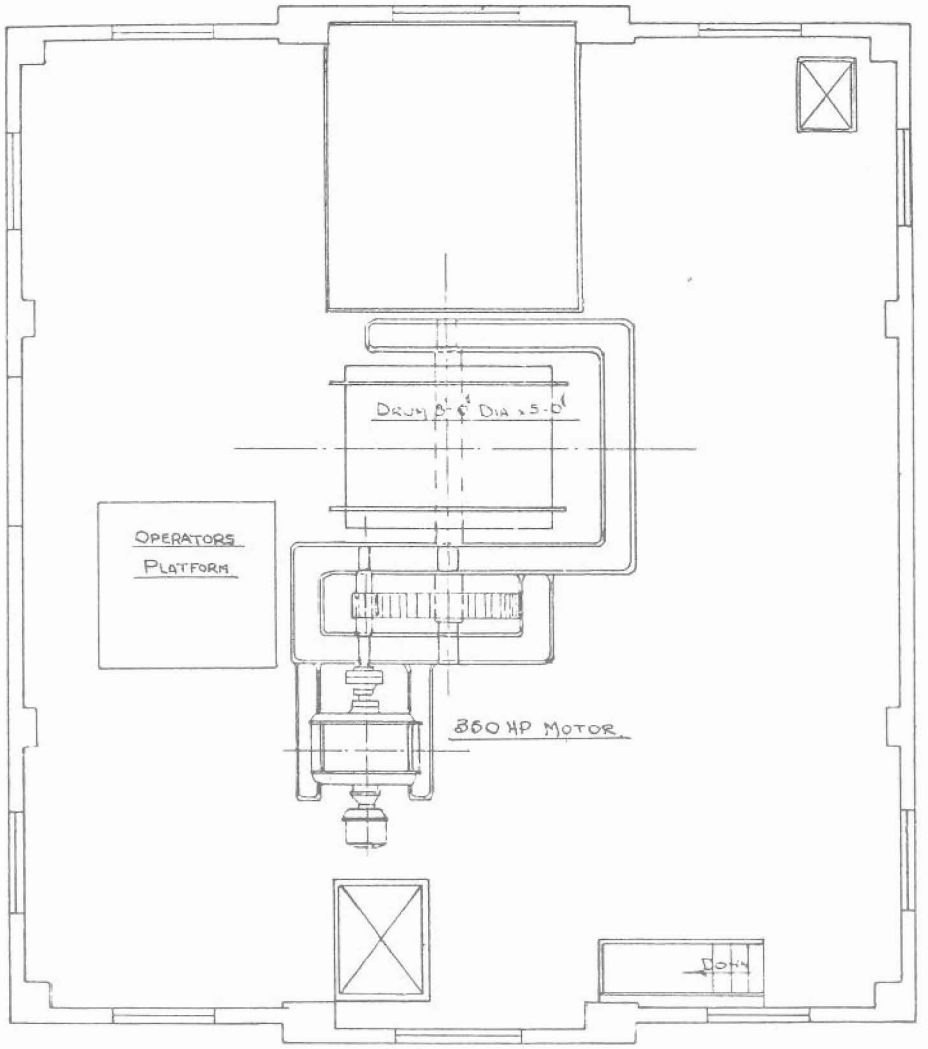
Visits were made to various sites, some of which were reported on. Members and guest speakers gave talks on a variety of topics relative to the interest of the members who took it in turn to act as hosts to the Society in their homes.

Membership was never very large, at the most about twenty, some of whom took no active part as in all such societies. Unfortunately, for various reasons interest flagged and the society was finally wound up in the early 1960's. During the seven active years of their existence they visited a number of colliery engines. The original reports of their visits, some still in manuscript form, came into my hands in 1970.

The following is an edited version of their reports printed with the kind permission of the original authors and with additional material supplied by the late Mr. T. J. Burkett and Mr. G. H. Anderson. Mr. G. H. Anderson had



Arrangement of steam-driven truck haulage
Bowes Railway - Kibblesworth Colliery



Arrangement of new 350 hp truck haulage
Bowes Railway - Kibblesworth Colliery

spent a life-time working on the Bowes Railways and knew in detail the operation of the haulage ways, ropeways and the inclines.

The Kibblesworth Colliery Engine - Map Ref: O. S. 244564

The Kibblesworth Colliery railway was opened officially on 30th May, 1842, being an extension of the Springwell Railway. The original owners were Messrs. J. Southern and Partners, but in 1852 the colliery was sold to Messrs. John Bowes and Partners and the railway became part of the Pontop and Jarrow Railway, which came into existence at the same time. The engine was situated on the hillside overlooking Team Valley. Prior to 1840 when the present pit was sunk a horse operated waggonway existed at Kibblesworth. It operated from a shaft to the west of the present site and ultimately joined the Brandling Junction Railway, later the Tanfield Railway at the Teams. An engine of sorts drew the 'corfes' from the shaft or pulled wagons, it is not certain which, but from an uncollated account it was weird, wonderful and crude to the extreme. It was locally built and for some reason, long forgotten, known as 'The Hen'.

The society visited the 'new' engine on 27th October, 1946. The engine, a two cylinder horizontal type, was used for hauling wagons up the incline from the bottom of the Team Valley. The present R. Hawthorn Engine was originally worked either as a single or a double cylinder by two independent throttle valves, one over each cylinder. These cylinders had a 0. 585m. (23in.) bore and a 1. 200m. (4ft.) stroke and worked at a pressure of 0. 25 N/mm^2 (35lb/in.^{2}). Later the throttle valves were left open and a large single throttle inserted in the main steam pipe which had a lever about 2. 000m. (7ft.) long and was 90 x 20mm. ($3\frac{1}{2}$in. x $\frac{3}{4}$in.) in section. The last throttle or regulator was put in about 1918 and had eccentric motion above the spindle. The pillar supporting the handle was the brake pillar from locomotive No. 11, a Messrs. Robert Stephenson and Company locomotive 1313 of 1860. The original cylinders were replaced in 1928, the new cylinders being 0. 45m. (18in.) bore, 1. 200m. (4ft.) stroke and the steam pressure was raised to 0. 7 N/mm^2. (100lb/in.^{2}.). This conversion was carried out by Messrs. Ayers, successors to the Joicey Company, locomotive builders, under the direction of Mr. T. Pringle of Messrs. John Bowes and Partners.

The valve chests were placed on top of the cylinders. The valves plain 'D' slides, were driven through rocking shafts by a single eccentric gab motion. Connecting rods with 3. 050m. (10ft.) centres ran on crank pins which were cottered into the crank webs; a most unusual arrangement according to modern ideas. The crossheads, running in double guide bars were bolted to brackets cast on the bedplate.

A single eccentric was used for each cylinder. These were 3. 050m. (10ft.) long and fish bellied in outline with a 'T' section to stiffen up the main beam of the rod. The 'T' section was only added on the eccentrics in 1928. It was Yoke ended at the sheave end and the opposite end had a gab and bearing plate to engage with the valve rocking levers and reversing gear.

The gab motion was of the two lever type. One lever lifted the eccentrics clear of the valve driving pins, whilst the valves were operated by the hand levers to reverse the engine. The engine drove the single drum through a spur gear giving a two to one reduction, the drum being 4. 250m. (14ft.) diameter and 840mm. (2ft. 9in.) between the cheeks. The engine was disconnected from the drum by sliding one end of the drum shaft until the spur wheels were out of mesh, the outside end of the drum shaft being mounted on a pivot bearing for this purpose. The braking consisted of a full band brake on one side of the drum rim and a half strap on the other, both controlled by a screw down hand wheel in the drum house.

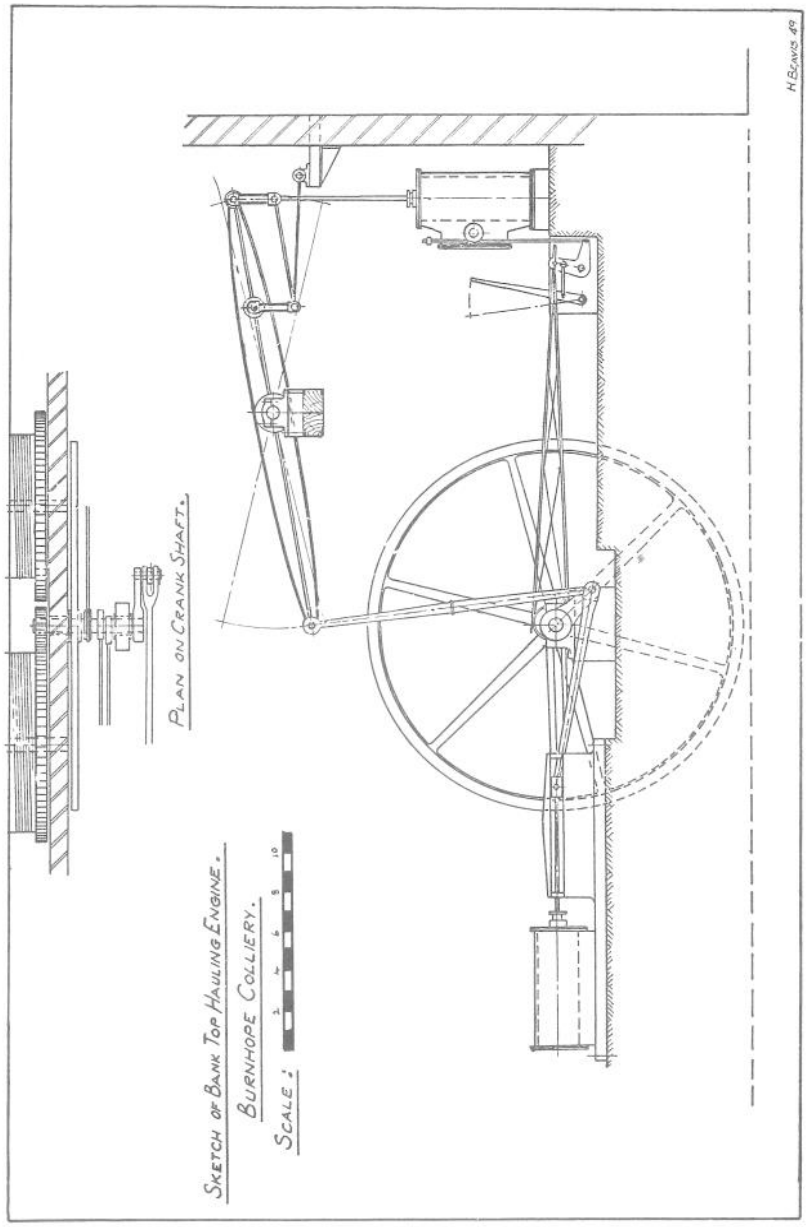
The spur wheels, made in two pieces were bolted on a square section of the crank and drum shafts. A modern feature was the mechanical lubricator driven off the tail rod of the right hand cylinder.

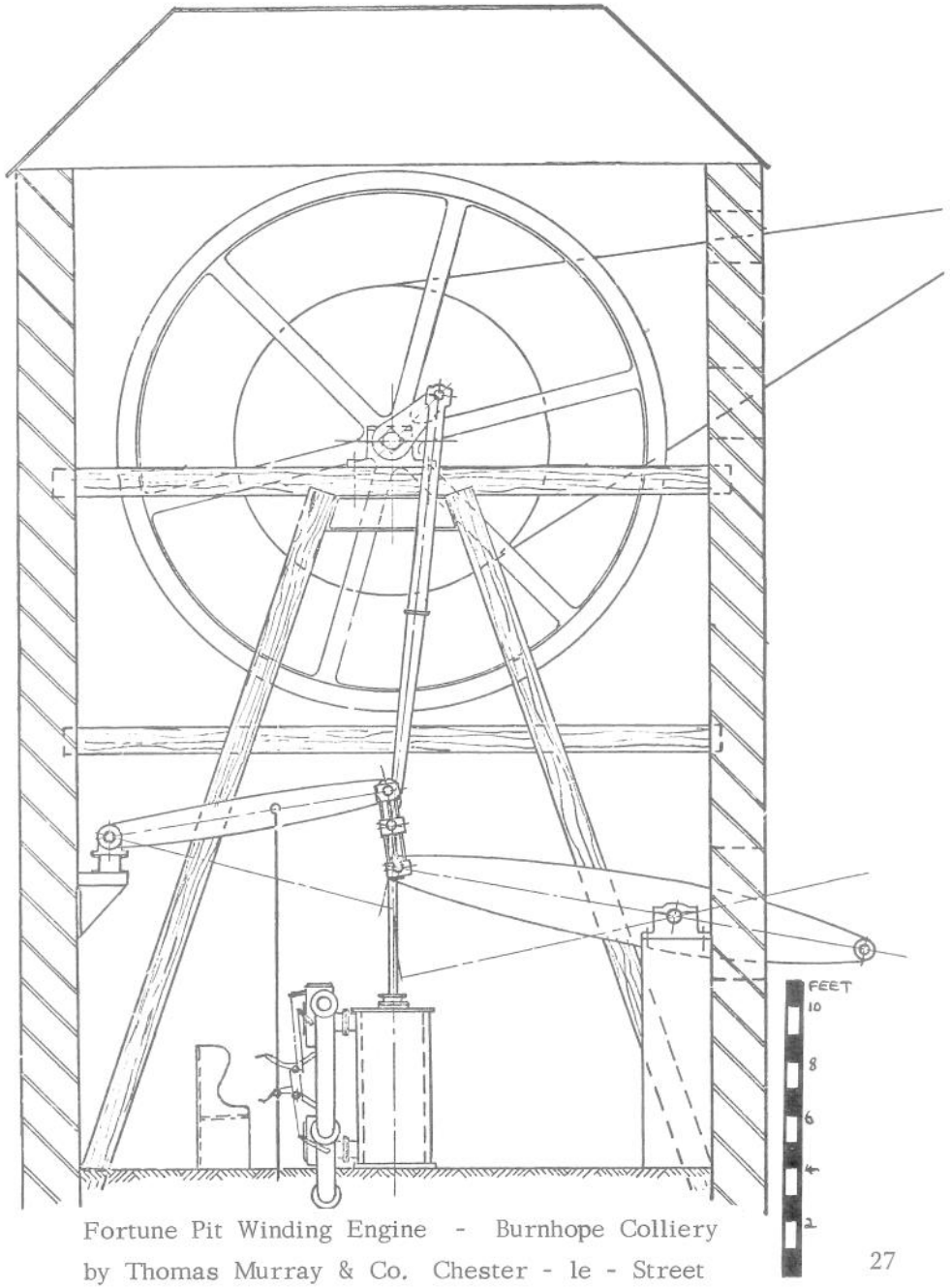
At the time of the visit the engine was working but was disconnected from the drum. It was known locally as 'Ralphy's Engine', a reference to the father of the engine man, who drove it for many years. This veteran was shortly afterwards replaced by an electric hauling engine. Originally the engine was fed by independent old cylinder type boilers, but later used one of the seven Lancashire boilers with reducing valve from the colliery Boiler House. Three of these were left, one of which was partly dismantled, whilst the other two were in steam alternately. The engine finally ceased work in July, 1947, after 105 years service. The two drawings were supplied by the Engineer of Messrs. Bowes and Partners.

The following is a contemporary account of the opening of the Kibblesworth Railway.

"Opening of Kibblesworth Railway, 30th May, 1842 - The morning being favourable an immense concourse of people assembled to witness the event which was enlivened by Messrs. R. Hawthorn's amateur band attending and playing appropriate tunes.

The train for the procession, consisting of trucks fitted up with seats for owners and friends, accompanied by the band, preceded by wagons filled with coals, many pieces weighing about a quarter of a ton each. It moved off from





Fortune Pit Winding Engine - Burnhope Colliery
by Thomas Murray & Co. Chester - le - Street

the colliery about 11. 30 a. m. , and descended the inclined plane in beautiful style to the Team River, where it was attached to a rope 2, 200 yards in length, worked by a stationary engine of 80 H. P. , erected at Black Fell. (N. B. This engine was a single vertical beam engine by Murray of Chester-le-Street).

The signal having been given that all was ready, the train was again put in motion and ascended the inclined plane to Black Fell (Mount Moor, T. B.), passing under the new carriage road at Longacres (to Ravensworth Castle T. B.), also underneath the Durham old (Long Bank, Wrekenton, T. B.) and new (Low Fell, Birtley, T. B.) turnpike roads. Crowds of people had collected at each bridge to witness the passing of the train.

At Black Fell the railway is connected with that of Springwell Colliery (opened 1826, T. B.) down which the coals were sent for shipment to Jarrow. The coal which is known in the market as 'West Ayton Moor' is of superior quality for household purposes and an invaluable gas and coking coal. (N. B. The large block of coal on view at N. E. Coast Exhibition and now in King's College was mined from Kibblesworth, T. B.)

The gentlemen afterwards returned to Kibblesworth Hall where a handsome entertainment was prepared by the owners. Refreshments were also provided for the workmen, and their wives and daughters were invited to tea at the Hall, terminating the day by dancing. "

Burnhope Colliery, Co. Durham - Map Ref: O. S. 191482

Steam Plant - This pit was sunk in 1845 and production ceased in July, 1949. When it was visited by members of the society on Sunday, 20th November, 1949, the work of dismantling was in progress underground.

The central boiler house and the winding engines of the Fortune and Annie Pits and the Bank Top Hauling Engine were visited.

As far as could be learned at the time, the whole of the plant at the colliery was steam driven. It is interesting to note that there was an installation of two Lancashire Boilers 2. 000m. (6ft. 6in. dia.) x 6. 0m. (20ft.) long, working underground near the shaft bottom. These boilers supplied steam for driving the underground haulage engines. The exhaust from the boilers was led by a furnace drift to the upcast shaft. This was the means of ventilating the workings, and was understood to be the only ventilating system of this kind still at work in the country at that time. It was noted that the action of the

fumes in the shaft caused much difficulty in maintaining the ropes and other equipment in the shaft, in good order.

A minor point of interest noted on the heapstead, was that the tub creeper connecting the shaft house to tippler house made use of both strands of the chain, one taking full tubs, the other returning the empty ones.

Several steam driven haulage engines on the surface worked drifts from various directions and there was an aerial-ropeway some 7km. ($4\frac{1}{2}$ miles) long, which delivered coals to coke ovens at Langley Park.

Fortune Pit Winding Engine - This engine was a single cylinder, vertical engine with open type gab gear. It was built by Thomas Murray of Chester-le-Street in 1845. The engine was supported in a stone-built house with a built-in pitch pine timber frame.

Leading dimensions:

Cylinder 0. 680m. (27in.) diameter x 1. 500m. (5ft.) stroke.
0. 28 N/mm^2. (40 lb/in^2.) working pressure.
Drum was 3. 500m. (11ft. 6in.) diameter x 1. 300m. (4ft. 4in.) wide.
Pithead Pulleys 2. 500m. (8ft.) diameter.
Ropes 70mm. ($2\frac{3}{4}$in.) circumference x 194m. (106 fathoms).

It was noted that the workmanship of the engine was of a high order. The enginewright pointed out with pride, the fact that the steam chest with its steam and exhaust branches and the chests for the valves, were cast in one piece. This must have entailed some good pattern-making and foundry work. The steam and exhaust valve were of the small 'D' type, being operated through internal racks and pinion from the levers of the gab gear. The levers were actuated from stops on the plug rod suspended from the small beam of the parallel motion. (Sketch supplied by Mr. H. Beavis).

Bank Top Hauling Engine - Map Ref: O. S. 193495 - The engine was originally a vertical single cylinder beam engine by Murray of Chester-le-Street. When chaldron wagons were superseded by railway wagons, a single horizontal cylinder was added, driving on to the same crankpin.

Leading Dimensions:

Vertical cylinder 0. 680m. (27in.) diameter x 1. 500m. (5ft.) stroke
Horizontal cylinders 0. 600m. (24in.) dia. x 1. 500m. (5ft.) stroke.

Drums-Burnhope Side - 2.100m. (7ft.) dia. x 0.880m. (2ft. $10\frac{3}{4}$in.) wide.
Drums-Craghead Side - 2.750m. (9ft.) dia. x 0.880m. (2ft. $10\frac{3}{4}$in.) wide.
Ropes-Burnhope Side - 1.400m. (1500yds.) x 90mm. ($3\frac{1}{2}$in.) circumference.
Ropes-Craghead Side - 2.750m. (3000yds.) x 80mm. ($3\ 1/8$in.) circumference.

A new vertical cylinder and beam were fitted in 1940. It was noticed with interest that the vertical engine had a single slip eccentric with latticed type rod driving through rocker shafts a 'D' type slide valve. The horizontal cylinder had Stephenson link motion. The engine man controlled the combined engine from the vertical cylinder end, there being no inter-coupling of the reversing gears. The engine was started by lifting the eccentric rod from its rocker pin by a foot pedal, thus releasing the valve gear, the valve being operated by hand until the engine was put in motion. If the direction of rotation had to be reversed it was necessary first to reverse the Stephenson Gear of the horizontal engine, and then attend to the gab gear of the vertical cylinder. Either drum was engaged by a level gear which slid the drums bodily until the spurwheel desired to be driven, geared with the pinion on the crankshaft. (Sketch by Mr. H. Beavis).

Annie Pit Winding Engine - This was a single cylinder horizontal engine. It was built and installed by Messrs. J. & G. Joicey of Newcastle in 1868.

Leading Dimensions:

Cylinder 0.900m. (36in.) dia. x 1.600m. (5ft. 3in.) stroke.
0.35 N/mm^2 (50lb/in.^{2}) working pressure.
The Drum was 3.650m. (12ft.) dia. x 2.250m. (7ft. 5in.) wide.
Ropes 100mm. (4in.) circumference x 300m. (161 fathoms).
Pithead Pulleys 3.650m. (12ft.) diameter.

The valve gear was of Stephenson link motion actuating drop valves. It was noticed that the eccentrics were mounted not on the main crankshaft, but instead on a smaller shaft in line with it, driven by a return crank from the main crank pin. The overwinder was by Messrs. Robey and Company. This engine was still being used in the dismantling underground.

Fell Pit Winding Engine - A twin horizontal engine by Messrs. Martin Brothers of Airdrie.

Leading Dimensions:

Diameter of cylinders 400mm. (16in.)
Stroke 900mm. (36in.)

Steam pressure 0.57 N/mm^2 (80lb/in^2.)
Drum diameter 2.450m. (8ft.)
Drum width 2.0m. (6ft. 6in.)
Rope Pulley diameter 2.75m. (9ft.)
Rope circumference 75mm. (3in.)
Rope length 230m. (127 fathoms).

Hutton Seam Hauling Engine - Manufactured by Messrs. R. & J. Stringer of Ashton-under-Lyme.

Leading Dimensions:

Diameter of cylinder 400mm. (16in.)
Cylinder stroke 710mm. (28in.)
Diameter of drums 1.2m. (4ft.)
Width of drums 0.7m. (2ft. 3in.)

Warren Hauling Engine - This was a second-hand engine installed in 1921 and made by the Hansfield Engineering Company.

Leading Dimensions:

Diameter of cylinders 400mm. (16in.)
Cylinder stroke 900mm. (36in.)
Diameter of drums 1.5m. (5ft.)
Width of drums 840mm. (2ft. 9in.)

The Tanfield Moor Colliery - Map Ref: 172544

This was visited by the society members on 2nd November, 1947. The Tanfield Moor Colliery was situated near Tantobie, County Durham, at an elevation of 823ft., above sea level, a fact that was amply demonstrated on the occasion of the visit.

Tanfield Moor is a district honeycombed with mines and it is difficult to determine the actual age of the 'Willy Pit', Charles Lee in "The World's Oldest Railway" states that an early waggonway was laid on Tanfield Moor by Sir John Clavering and Thomas Brumell from the Lintz and Bucks Nook Pits. Two years later in 1714, Mr. George Pitt of Strathfieldsaye used this line when he opened out the Tanfield coalfields.

Mr. Jim Barrow, the colliery manager, gave the age as 240 years. Actually, mining operations were being carried out then on Tanfield Moor which may

have caused some confusion. Sykes in his Local Records states that under the date 14th June, 1768, "The coals from the newly won colliery at Tanfield Moor, belonging to the Earl of Kerry, were carried down to the staithes at Derwenthaugh." To accomplish this a branch joining the 'Main Way' must have been built in 1768, joining it at Bowes Bridge. Assuming all this from the position of the colliery, the actual age was more likely to be about 180 years at the time of the visit.

A branch of the Stanhope/Tyne Railway from Annfield Plain to Tanfield Moor was opened in 1885, using part of the track of the Harelaw waggonway, a branch of the former 'Main Way', and for nearly six years the Tanfield Moor coals were conveyed over the Stanhope and Tyne Railway to Shields. In 1840 the Brandling Junction Railway had reached Tanfield Lea, lower down in the valley over the old waggonway and contracted to construct an extension to join Tanfield Moor Colliery on condition that they got the carriage of all the coals mined. Due to this diversion of traffic the connection between Tanfield Moor and Harelaw fell into disuse after the opening of the new extension in November 1840. It is particularly important to note that the Brandling Junction Railway Extension followed the line of the old waggonway which Sykes states was opened in 1768. This tends to confirm the age of the pit as 180 years.

By 1947 the colliery surface workings were being closed down, the coal being drawn from a drift on the road side between Dipton and Pickering Nook and transported by road. The shaft 225m. (124 fathoms) deep, was 3.200m. (10ft. 6in.) diameter and was fitted with wooden girders for the two double deck cages. In addition it carried the ropes used by a surface engine for underground haulage.

The Winding Engine - The principal item of interest, the winding engine, was an inverted vertical non-condensing type with parallel motion and gab operated valve gear, working at about 0.63 N/mm^2 (90lb/in^2.) pressure. The engine had a stroke of 1.500m. (5ft.). The diameter of the cylinder bore could not be determined, but was in the region of 0.850m. (2ft. 9in.). Following the customary layout the valves were arranged so that the top horizontal shaft controlled the admission and the lower shaft the exhaust cycles. The valves were capable of being locked by sliding a wedge shaped key between cams mounted on the two horizontal shafts.

The beams of the parallel motion were of double construction 3.650m. (12ft) long and 360mm. (14in.) deep and placed 400mm. (16in.) apart. Provision was made for driving condensate and air pumps, but these auxiliaries were not fitted or had been removed, with the exception of a pump at the engine main side of the engine. The crank pin was secured with a hexagonal nut and

set bolt, the whole assembly being mounted on a shaft with a square section of 250mm. (10in.) face for the drum mounting.

The flywheel, of cast iron, was mounted between the crank and the drum and was 5.500m. (18ft.) in diameter. The rim was 215mm. (8½in.) deep with a 125mm. (5in.) face. It was mounted with oak strips curved from the flat to act as a brake drum. The spokes of the wheel were of 'T' section and still carried the marks of the joints of the moulding boxes. The drum was mounted on cast iron spiders and was 1.700m. (5ft. 6in.) in diameter and 2.450m. (8ft.) long. The two ropes were wound in reverse direction and instead of being wound between rims were coiled between metal horns. The engine was mounted on massive timber supports built into the engine house. It is doubtful as to who built the engine as no maker's plates were fitted. The design and general appearance were definitely those of Thomas Murray of Chester-le-Street.

The Hauling Engine - The surface hauling engine was used for underground haulage, the ropes descending the shaft. A normal load consisted of 30/8cwt. tubs. It was built by Messrs. J. & C. Joicey and Company, Newcastle upon Tyne, N63/1900. It was a two cylinder, horizontal type geared to the drum with a fly wheel mounted on the crank shaft. The only novel feature was that the eccentric rods were cranked to clear the drum shaft. Due to this the rods could not be raised or lowered to reverse the engine, hence the valve gear was modified in that the straight expansion link swung from a pivot at the lower end whilst the radius rod was raised or lowered.

An old engine house, previously containing the engine for operating the incline, stood back from the head of the bank and was then used as a dwelling house. The incline is now self acting and is the property of the London and North Eastern Railway. A runaway set demolished the old banksman's house which was later replaced by a small brick building. Two features to note were the plate marking 'Limit of the North East Railway Maintenance' and a throw over point lever marked 'N.E.R. N.D.'.

The visit concluded with a short tour of the remains of some of the waggonways in the district. The remains of an embankment between Dipton and Pickering Nook proved on the inspection of an old Ordnance Survey Map to have been a spur giving access to a pit near the junction of the wall ends opposite the Prince of Wales Public House (not visited!)

The most interesting item was the tunnel built of stone and with a brickwork roof lining, situated in the Lintz waggonway running under the main wall and

the Bowes Railway. An old shaft adjacent to the waggonway and north of the tunnel proved to have been sunk through stone and only partly built with brickwork.

The Wearmouth Colliery - Map Ref: O. S. 392583

The Winding Engine - The engine was built in 1848 by Thomas Murray of Chester-le-Street, and was an inverted vertical type with parallel motion in place of guide bars. The cylinder which replaced the original one 50 years before had a 1.550m. (61in.) bore, a 2.150m. (7ft.) stroke and was lagged with mahogany.

The gab motion operates a set of double beat drop valves controlling the admission and exhaust of steam. A condenser in the lower part of the building maintained a steady 650 to 700mm. (26-28in.) of vacuum, the air pump having a stroke of 1.150m. (45in.).

On the second floor of the building the crosshead and arms of the parallel motion with the necessary connections for operating the valve gear and pumps were located. The connecting rod of massive proportions was about 6 to 7m. (20-24ft.) long, but no actual measurements were taken. The crank was equally massive, the work of forging it certainly must have been a mighty effort, calling heavily on the resources of the Chester-le-Street brewery! The crank pin was secured with a key.

The main shaft was 400mm. (16in.) diameter squared to carry the drums, the journals being carried in bearings with two capping pieces. The drum was about 7.500m. (25ft.) in diameter and was located on the top floor of the engine house. It was of metal construction heavily shrouded with oak bearing pieces for the flat ropes 130 x 22mm. (5in. x $^{7}/_{8}$in.) which were wound between horns instead of being wound longitudinally along the barrel of the drum. On the outside end of the shaft was a second and smaller drum which carried the flat chain that ran down the counterbalance shaft to balance the weight of the cages and load.

Throckley "Isabella" Colliery

The Compound Vertical Pumping Engine - The engine was visited by members of the society on 27th July, 1947. It was maintained in working order as a stand-by for the modern electric pumping machinery. Up till the end of 1946 it was run for a few hours each month. It was finally dismantled and scrapped in 1948.

It was built by Messrs. James Simpson and Company of London and erected in 1885. There is an article about this engine with a sketch in "The Steam Engine" by Mr. D. K. Clark, from which some of the following notes were taken:

Leading dimensions:

H.P. Cylinder,	diameter	900mm. ($35\frac{3}{4}$in.)
	stroke	1.87m. (6ft. $1\frac{1}{2}$in.)
L.P. Cylinder,	diameter	1300mm. (51in.)
	stroke	2.75m. (9ft.)
Pump Piston,	diameter	610mm. (24in.)
	stroke	2.75m. (9ft.)
Pump Plunger,	diameter	430mm. (17in.)
	stroke	2.75m. (9ft.)
Weight of beam		24 tonnes
Weight of fly wheel		30 tonnes
Diameter of fly wheel		6.1m. (20ft.)
Total weight of pumpwork		110 tonnes
Steam working pressure		0.45 N/mm^2 (65lb/in^2.)
Vacuum		0.0075 N/mm^2. (30in.)
Normal Speed		14.25 r.p.m.
Pumping Capacity		6.7m.^{3}/sec. (2500 galls/min.)
From a depth of		110m. (360ft.)

The spear rod was made of wrought iron tubes in 4.3m. (14ft.) lengths outside diameter 200mm. (8in.) and 25mm. (1in.) thickness of wall.

The valve gear of the engine was driven by bevel gears from the crankshaft and the slide valves were operated by eccentrics on this horizontal shaft. Steam was admitted to the H.P. cylinder by slide valves with cut off plates. The steam after leaving the H.P. cylinder passed to the receiver. Slide valves with cut off valves admitted steam to the L.P. cylinder. The exhaust valves in this case were rotating cylindrical valves giving a large opening for exhaust. As this exhaust steam does not use the same passages as the incoming live steam, initial condensation is reduced.

On its trials the engine developed 259.4 effective H.P. in the pump. The coal consumed was at the rate of $2\frac{1}{2}$lbs. per H.P. per hour. The engine was regulated by governors mounted on the main steam pipe adjacent to the main stop valve, driven by belt from valve motion shaft.

The fly wheel was built in four sections. The rim had hollow sections to compensate for the weight of crank and connecting rod. The crankshaft was 390mm. ($15\frac{1}{2}$in.) diameter. A new crankpin had been fitted by local labour; it was shrunk into place.

The beam was composed of two outside members secured at the ends with balance weights. At the end of the beam nearest the cylinders the balance weight had been fitted between the two side pieces to balance part of the moving weights of the pump spears.

Beamish Colliery Second Pit - Map Ref: NZ.232531

A seam of first class coal 3.0m. (10ft.) thick at a depth of 27m. (90ft.) was discovered on the Shaftoe Estate by the Lambton, Hetton and Joicey Collieries and in 1931 a drift was opened to mine the coal in Beamish Park.

The coal was hauled from the drift across a river and private road in the Park on steel bridges 2.1m. (7ft.) wide and then through a second drift to the foot of the main shaft about one mile away near Chophill Colliery.

The members of the society visited the steam driven surface haulage engine at the top of this shaft. The engine originally operated the workings of the pit, but had been modified to haul a set of fifty 13cwt. tubs from the drift at a maximum speed of 10 mph and up the shaft. The haulage way was single track with a gradient against the load of 1 in 20 ($1\frac{1}{4}$in/yd.).

The haulage engine was installed about 1870, possibly by Joicey's and was a twin cylinder, horizontal engine with double drums. The method of clutching was unusual in that the engine crankshaft carried a spur pinion and a drum was placed at each end of the crankshaft. By means of a level system either of the drums, complete on its shaft and bearing, was made to slide bodily so that a spur wheel on the chosen drum shaft meshed with the crankshaft spur pinion. To ensure that only one drum was engaged at a time an interlocking gear was used.

The reports were originally written by the following:-

"Kibblesworth Colliery and Engine"	-	L. G. Charlton & T. J. Burkett
"Burnhope Colliery"	-	H. Beavis
"Tanfield Moor Colliery"	-	L. G. Charlton
"Wearmouth Colliery"	-	L. G. Charlton
"Throckley 'Isabella' Colliery"	-	H. Beavis
"Beamish Colliery"	-	H. Beavis

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