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JUBILEE EXHIBITION
OF EARLY MINING LITERATURE

May 1st to September 29th, 1928.

ANNOTATED CATALOGUE
compiled and arranged with an introduction by
ARTHUR J. HAWKES, F.S.A.,
Borough Librarian.

FOREWORD

by

THE EARL OF CRAWFORD AND BALCARRES, K.T.,
Chairman of the Wigan Public Libraries Committee.



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PRINTED FOR THE LIBRARIES COMMITTEE.
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The Wigan Libraries Committee cordially thank the under-mentioned owners for the loan of valuable manuscripts or rare printed books:—

The Cardiff Public Libraries Committee:

Three deeds, seven printed books, and broadside.

The Department of Mines: Printed book.

The Earl of Crawford and Balcarres, K.T.: Manuscript.

The Mining Institute of Scotland: Three printed books.

Messrs. J. H. Naylor, Ltd., Wigan:

Original early miner's lamps.

The Newcastle-upon-Tyne Public Libraries Committee:

Three printed books.

Messrs. Peace and Ellis, Wigan: Manuscript.

The Society of Antiquaries of Newcastle-upon-Tyne:

Two manuscripts.

Canon C. C. Thicknesse, M.A., Rector of Wigan: Manuscript.

FOREWORD

By THE EARL OF CRAWFORD AND BALCARRES, K.T.

WE are celebrating the Jubilee of the Wigan Public Library by an exhibition of books about Mining and its ancillary practises—a subject of the greatest interest to our district, which is one of the oldest coal-fields in the country. Alas! our trade is no longer as thriving as in bygone times, but my colleagues and I feel that we cannot do greater honour to our Library than by organizing a special display—particularly as the subject is one to which constant attention has always been paid by our predecessors in office. In fact it may be claimed that the section of our Library devoted to Mining ranks among the really complete and efficient collections on the subject.

But while we have wisely specialized about an industry which concerns us so intimately (for the prosperity of our neighbourhood is bound up with this enterprise)—we have tried to make the Wigan Library catholic in its outlook, by providing sources of study and research in many branches of learning. We have been fortunate in enlisting the help of public-spirited townsmen who have laboured generously towards the attainment of this ideal. Our building and a large section of our books are owing to private gifts; moreover we have profited from the technical skill of our professional staff, whose advice on the choice of acquisitions whether by purchase or gift, has been

invaluable. The result is that we possess a far larger variety than is usual in Municipal Libraries. We have nearly a hundred incunabula, a hundred selected book-bindings—a dozen early manuscripts, together with many examples of calligraphy, apart from our collection of local manuscripts and charters. Our Voyages printed by De Bry run to fifty volumes, and I imagine there are few libraries in Great Britain which can rival our long series of the Royal Society publications beginning in the year 1665.

Our visitors must therefore forgive a pardonable pride in a library which has been constructed by incessant efforts during half a century; and I fancy that an acknowledgement of the success achieved by our relatively small Borough is perhaps reflected in the goodwill shewn us by other Municipal Authorities who have been so ready to contribute to our Loan Exhibitions; I think I am correct in saying that no less than fourteen Public Libraries have lent us valuable volumes from their shelves, in order to allow us to perfect the special exhibitions we hold from time to time.

We are most grateful to them—likewise to private persons who have helped us—and I may add a word of praise for the Staff to whose good offices, here and elsewhere, the members of Public Library Committees are so largely indebted.

C. & B.

WIGAN,
26/3/28.

INTRODUCTION

WIGAN is the centre of a coal area which forms an important part of the South Lancashire Coal Field. The coal seams crop out on the surface all over the neighbourhood, and coal getting from these out-crops began at least with the Roman occupation. The demands of the population of Wigan seem to have been adequately supplied from this source down to the end of the 16th century, and it is not till this period that we hear of any pits either in Wigan or in the immediate neighbourhood. Yet that the search for coal in the Wigan district was systematic as early as the first half of the 14th century is shown by the reservation of coal rights by Robert Standish in a deed dated 5th Dec., 1350. This charter records an exchange of lands in Shevington, near Wigan, between Robert Standish and Margaret Shuttlesworth. Robert granted "all his lands . . . betweene 'le Culone' neare Quitebroke and 'le Quitehull' . . . excepting to the said Robert and his heirs Fryston [fire-stone] and Secole [sea-coal] if it be possible to find them within the aforesaid lands . . ." (exhibit No. 8).

It is notable, too, that the earliest printed account of Wigan connects it with coal. Writing about 1540 John Leland says (after describing Wigan) "Mr. Bradshaw hath a place Caullid Hawe a myle from Wigan. He hath found moche canal like se coole in his grounde, very profitable to him." It was called cannel or candle-coal because it burnt freely and gave a good light. It is very hard, shiny, and dustless. An anonymous eighteenth century writer referring to Wigan records: "Besides the clear flame it yields in burning, it is also curiously polished into the appearance of black marble, and formed into busts of great men, urns, vases, candlesticks, sugar basins, snuff boxes, inkstands, etc., which are sold and presented as curiosities, and meet with good acceptance, both at home and abroad." Two centuries ago the Queen of Prussia had a set of dressing-boxes made of Wigan cannel; and Baines records (1825) that "at Haigh Hall a summer house is made of it, which ladies with their delicate draperies visit with impunity," and that it had been there "a hundred years without deterioration."

In this connection it may be remarked that the largest block of coal ever mined was a "giant cob of cannel" cut under the supervision of Mr. William Waring at the Wigan Junction Collieries and sent for exhibition to the Chicago World's Fair in 1893. It weighed nearly twelve tons, took nine months to hew, and is said to have cost £1,000. A photograph of the great block may be seen in the Exhibition.

In the early 17th century we find the cannel collieries at Haigh in a highly developed condition as is shown by the manuscript (No. 1) lent by the Earl of Crawford. From this manuscript we see the "pillar and stall" system in operation, the method of mining which continued almost exclusively to be used in this district down to the sixties of the last century. On the other side of Wigan, at Worsley Mesnes, Pemberton, a pit was sunk in the year 1600. Detailed accounts dealing with this operation and the first coal-getting are preserved in a manuscript which in 1883 was in the possession of the late Mr. John E. Bailey, the Manchester antiquary. In that year he published the accounts in the *Wigan Examiner*. They mostly record the wages for "wyndinge stone" and "wyndinge water." John Naylor was engaged on the latter job for a week at 7/-. The same man received eighteenpence "for wyndinge coale and stone both night and daye Mondaye." Towards the end of the accounts the sales of coal are recorded—at prices which seem almost meaningless to-day: "Soulde fyftie loades of coales gotten by Roundall Burchall for fyfteene shillings tenepence." At this time it might be remarked Newcastle coals were being sold on the London market at 7/- and 9/- a chaldron, or about one-and-a-half tons. In the third week of the Worsley Mesnes venture fifty-two loads of coal were obtained. In "the fourthe weecke six score and three loades; the fyfte weecke xii. score and two loades." £6 was paid to "Robt. Birchall for synkinge of coale pitt in his croft next lane and other charges." The exact locality of this pit cannot now be determined. It is, perhaps, worthy of notice that the Birchalls seem to have specialized in coalmining; two of the name are mentioned in this document and another occurs in the Haigh accounts a little later.

In Wigan itself the first pit was dug, so far as is known, on land near Millgate in 1619 by Peter Plat. This pit is referred to several times in Bishop Bridgeman's Wigan Ledger, exhibit No. 2. Considerable trouble with water occurred, and in 1621 it was abandoned,

gas in the cupboard." Dr. Winnard was absent, but Dr. Hutchinson, his assistant, attended, though somewhat incredulous of the report. 'A woman burnt by an explosion of gas from a cupboard,' he could not believe it! However, he proceeded to the house, where he found Mrs. Crook in great suffering, having been severely scorched about the face and neck. It was stated that she was going to the cupboard, with a lighted candle in her hand, when the terrific explosion of firedamp took place. Mr. Hutchinson, it would appear, was still hard of belief, and Crook, the husband of the woman who was injured, asked him if he would wish to see a repetition of the explosion, stating that it would be attended with no evil consequences. Mr. Hutchinson assented, and we may be sure that he exercised no small degree of caution when the cupboard was opened and the light applied. Crook, however, was unfortunately less apprehensive, and a tremendous explosion taking place, he received a serious burn on that very sensitive organ of the human physiognomy—the nose. The people in the house screamed, and the greatest consternation prevailed. It is stated that the body of flame ran along the ceiling and escaped out at the door, but Mr. Hutchinson says that he did not observe this phenomenon . . ."

The Dr. Winnard mentioned in the foregoing was the founder of the Wigan Public Library, having bequeathed £12,000 for the purchase of books. He died in 1875 and the Library was established three years later.

No trade has occasioned so much national concern and so much Government action as the coal trade, due no doubt to the three great facts: the high economic importance of coal, the domestic necessity of coal-fuel in a treacherous climate, and the dangers attending coalmining. From the earliest times the trade has been the subject of public complaint, especially in regard to advancing prices, and spread over the long period of four or five centuries, the increase seems to have been steady and continuous. In 1536 coal was sold in Newcastle at 2/6 a chaldron, a Newcastle chaldron being equal to 53 hundredweights. In London the chaldron was only 27 hundredweights so that the charge in London in 1536 for Newcastle coals of 4/- per chaldron was for only half the quantity. The 2/6 in Newcastle therefore is to be compared with 8/- in London. By 1590 the price in London had gone up to 9/- per chaldron, equal, presumably to 18/- a Newcastle chaldron. The Lord Mayor com-

plained to the Lord Treasurer Burleigh that a small group had secured a monopoly of the output, and asked that the price might be fixed at 7/-. Whether he did so is not clear; probably not, since Queen Elizabeth was really responsible for the monopoly, having secured a lease of the Manors of Gateshead and Whickham which she assigned to the Earl of Leicester.

In Wigan in 1600 pit-coal was sold for 4d. and 2d. a load, but whether a barrow-load or cart-load is not stated, probably the former, since there is a charge in the accounts for "one wheele barrowe VIId." Which is to be considered the cheaper, the barrow at sixpence or the coals at twopence, I leave my readers to judge!

In 1633 the price of coals in Newcastle was 9/- per chaldron; in 1635 10/-. In 1638 Charles I. incorporated a company of monopolizers, empowering them to buy all the coals produced in their district. They were to pay the King 1/- per chaldron and sell the coals in London at not more than 17/- in summer and 19/- in winter. From this time onward price controversies were periodic and Acts of Parliament for preventing abuses frequent. Some of the pamphlets included in the Exhibition dealing with this subject are highly amusing.

Owing to the ease with which the duty could be collected coal has been a favourite instrument for raising public revenue, the first recorded tax being sixpence per ton every quarter of a year levied in 1379 on all ships bringing Newcastle coals to London. Coal thus brought to London was called sea-coal to distinguish it from charcoal. The name is recorded as early as 1236, showing the early importance of this export trade from the north-east coast; yet the "Croydon colliers" with their charcoal industry survived till after the Commonwealth.

Whenever funds were required for some special national purpose coal seems to have been the first thought of the statesman. The earliest Act (1651) in the Exhibition is for laying an impost on coals towards the building of war-ships. After the Great Fire a charge was levied on coal to finance the rebuilding of London. New churches are required: coal dues are increased; war funds are needed: coal dues go up again; and so it went on till in 1793 it is stated that "the duty on coals at London is upwards of one-hundred per cent. of the prime cost."

It is curious the sidelights business documents often throw upon general affairs, and it is perhaps natural that records of the coal trade should reflect the general state of the weather. Yet one hardly expected to find an account of such an unusual event as the freezing of the Thames in a stray collection of price reports limited to four years. The collection of documents forwarded from London to Elswick, 1760-1764 (kindly lent by the Society of Antiquaries of Newcastle-upon-Tyne—see No. 3), are distinctly interesting in this respect. The covering notes to the price-lists are very brief yet many interesting items of information are to be noted. Quick changes in the weather at least are not limited to our own day. In their report dated December 26th, 1762, the Factors state that the weather has been very mild, but in their letter the following week (Jan. 4th, 1763) we learn that the Thames is so completely frozen that "no craft can move upon the river." On January 18th the ships are delivering coal across the ice, but it may be noted "the centre of the river is still open." According to Andrews's *Famous Frosts* this frost lasted ninety-four days, setting in on December 25th, 1762. Nothing, however, is said about the freezing of the river, though "a most intense frost with easterly wind" continued without intermission till the end of January.

"The Miner's Guide" by William Hardy, 1748 (see No. 122), is one of the earliest practical books on mining. The author appears to be unknown to mining history; he is not mentioned by Mr. R. L. Galloway or Robert Hunt. The copy exhibited is itself interesting on account of the heavy use it has received and the inscriptions of the earliest owners. Conrad Bulcel [? Busell] in 1753 noted down his purchase of two mines and two engines. Without punctuation the note reads: "May y^e 16: 1753. Bought a mine of arnime worthy on y^e Colehils; like wise a mine on y^e mill [?] feild and to pay for one half of the said mine; [also] tow gines to Be paid at tow payments, one gine in a month time and the other gine the first masar at ethar mine." The "gines" or gins were winding engines. Mr. C. T. Onions suggests the last phrase to mean "the first measure at either mine," *i.e.*, the first measure of coal or ore to be raised. Another owner, Samuel Butler, in 1749 was evidently greatly impressed with the merits of the book and wrote his appreciation of it in verse.

The attempts to use "sea-coal" in place of charcoal for the "running of iron" appear to have been made by a number of people

thank Mr. Harry Farr, the City Librarian of Cardiff; Mr. Basil Anderton, B.A., the Borough Librarian of Newcastle-upon-Tyne; and Mr. C. H. Hunter Blair, M.A., F.S.A., Secretary of the Society of Antiquaries of Newcastle-upon-Tyne; for their courtesy and co-operation. The printed books, however, are almost entirely drawn from the Library's own stock, and do not by any means exhaust its collection of early books and pamphlets. The arrangement in the sections is chronological to show the development of mining literature. Reasonably full titles have been given, together with a brief collation and places of publication; where the last has been omitted London is always to be understood.

A.J.H.

Exhibition of Early Mining Literature



PART I.

MANUSCRIPTS AND EARLY FOREIGN BOOKS.

I.—MANUSCRIPTS.

- I. MANUSCRIPT. [Records of Mining Transactions, grants, etc., of the Bradshaighs of Haigh, near Wigan, 1635-1698. Also] Orders for the Oditors [*sic*], Hewers, Drawers, Winders, Treaders, Takers of Cannell at the pit Eye, and all other officers & worke folks belonging to the pit & pits, myne & mynes, of Cannell or Coale belonging to Roger Bradshaghe of Haighe, Esqr., his heirs, etc. . . . Set downe & agreed upon By the afforesaid Roger Bradshaghe & the Aditors, Hewers, etc. . . . to be performed . . . by the afforesaid officers & worke men . . . according to such penulties and forfeitures as hereafter is expressed. 1664.

Two MSS. on paper, sm. 4to. of 18 and 10 leaves respectively, bound together in old vellum separated with 45 blank leaves.

Lent by The Earl of Crawford and Balcarres, K.T.

This interesting document reveals the care with which the mining operations at Haigh were conducted in the middle of the 17th century. The fines for disobedience are usually one penny, but are occasionally higher, rising to sixpence and once to tenpence (article 7, relating to improper selling and measuring). Article 4, for Hewers, will serve as an illustration of the clauses relating to working: ". . . no hewer or getter of Cannell or any other p[er]son or p[er]sons shall make or shape anye pillar or pillars under a yard and sixteene inches on the syde Nor under a yard and a half & sixteene inches on the ends. But if hee soe doe . . . hee shall forfeyte . . . for every pillar soe wrought 6d." Under the date of 1645 in the first MS. there is a list of "Forfitures of the Workemen in the Lathom pite" beginning "Will. Birchall for workinge 5 yards to[o] widd and one pillar to[o] little," but no monies are indicated. There is an interesting account, dated June 24, 1636, of "Money paid to the Hewers . . . over and above their wages" of 4/., which appears to be an annual bonus. There were seven hewers in two pits in 1636. The workers were allowed free coal, which privilege it seems was somewhat

abused and in 1687 Peter Shakerley (who was Mayor of Wigan in 1694), as guardian to Sir Roger Bradshaigh, made new orders: "Whereas great damage occurs to the Estate . . . by the allowance of extravagant great basketts of Cannell to the Hewers, Drawers, and Winders" only "common-scale basketts" are to be allowed, two each day, the hewers being expected to get and send up 30 baskets on ordinary days and 20 on Saturdays—which seems to indicate that the Saturday half-holiday is a very ancient institution in the Wigan district.

2. MANUSCRIPT. Bishop Bridgeman's Wigan Ledger, 1615-1642. Thick folio.

Lent by the Rector of Wigan (Canon C. C. Thicknesse).

The Ledger in which Bishop John Bridgeman, rector of Wigan 1615-1643, as lord of the Manor of Wigan, entered all his transactions with his tenants. There are many references to coal getting, but the most interesting is the permission granted to Peter Plat in 1619 to gutter a ditch "on the lord's wastes, which is the street of Millgate," to conduct water from a coal-pit he had digged in his own ground near Millgate which was so full of water that he could not work it. Though there had been a great deal of out-crop mining much earlier this is the earliest record of a *pit* within the town of Wigan, and by a curious coincidence is the site of the present Mining College. The old shaft was discovered when the foundations were being excavated in 1901.

3. MANUSCRIPT. Coal factor's (Messrs. Tatton & Harrison & others) Weekly Report to Mrs. Ann Hodgson at Elswick, Nr. Newcastle-upon-Tyne, of the prices of coal on the London markets, 1760-1764. Folio.

Lent by the Society of Antiquaries of Newcastle-upon-Tyne.

The first report is dated London, 8th March, 1760, and the front form reads: "The undermentioned coals have been sold since our last report." Twenty-eight sorts of coal are listed (all Newcastle seams) and prices are given for each day of the week whenever sold. The average price in March, 1760, is about 31/- per chaldron, which by July had gone down to between 26/- and 29/- per chaldron; by December the rate had advanced to the price of 35/- and 37/-. The average price in July, 1761, was 30/-, and the December price in the same year had advanced to as high as 39/-. In July, 1762, the average price was 32/6, but in the following winter did not exceed 37/- (January and March, 1763), and on the average was about 33/-. By the end of April the price had fallen in some cases to as low as 26/-. In December, 1763, the price remained low, varying from 32/- to 34/-. and on January 9th, 1764, the Factors report that "little business has been done . . . the demand is small and the weather very mild." This is in striking contrast to the previous January (1763) when the Thames appears to have been frozen: ". . . few coals remain unsold, but many ships are sold & at work, tho' 'twill be impossible to deliver them till a thaw happen,

as no craft can move upon the river . . ." This continued for some time and on January 18th the Report states: ". . . The weather is very severe and many ships are delivering coals upon the ice . . ." The thaw came on February 1st but the ships could not get to the Pool until a day or two later.

The last report is dated September, 1764; the earlier are addressed to Mrs. Ann Hodgson, the later reports to John Hodgson, Esq.

4. MANUSCRIPT. Brief for the coal-owners, Feb., 1738-39, against the petition of the Glassmakers, Brewers and others, Traders and inhabitants of London, who are great consumers of coals imported from Newcastle and the Northern parts of England, in to the Port of London. (Folio, MS. on paper, 12 leaves.)

Bound with An enquiry into the reasons of the advance of the price of coals . . . (See No. 134.) 1739.

Lent by the Society of Antiquaries of Newcastle-upon-Tyne.

Needless to say the Glassmakers, Brewers, etc., have been complaining about high prices and laying charges of profiteering and worse. Things were so bad that in 1738 Parliament passed an Act empowering the Corporation of London to fix the price of coals. The answer of the coal-owners as contained in the present "Brief" is equally consistent with expectation. We are informed that "considering the decrease of the value of money, the increase of the price of labour, the great and uncertain expense there is in mining and working of collieries, the extending [of] their waggon-ways . . ." etc., etc., that the increase in price is not unreasonable. It sounds very familiar!

5. MANUSCRIPT. HILTON (Joshua). [Report on the Alston moor lead mines, Cumberland, detailing and evaluating every vein separately, 1778; with the opinions of Messrs. John & Thomas Dickinson, 1821.] Copy in clerk's handwriting. 4to., pp. 444.
6. MANUSCRIPT. MULCASTER (James). An Account of the method of smelting etc. lead ore as it is practised in the Northern part of England, containing an explanation of the several processes the ore undergoes, from the time of its being brought to the mill, to that of its being finally manufactured into saleable lead and bullion there; together with some account of the mode of washing lead ore so as to make it fit for smelting, and a description of those substances mineral and fossil with which the lead ore in Alston Moor is

EXHIBITION OF EARLY MINING BOOKS

generally accompanied, and the effects they have upon it in smelting. (With a description of the Works at Langley Mill.) (4to., pp. 332.) *Langley Mill, Northumberland, 1806.*

7. MANUSCRIPT. Memoranda on the Sunderland Coal Trade, 1635-1842. (8vo., pp. 182.)

The purpose of these somewhat random notes is not clear; they have the appearance of being notes for evidence before some Committee.

8. STANDISH DEED No. 63, in the Wigan Public Library. CHARTER indented witnesseth that Margaret daughter of Adam de Shutlisworth has granted to Robert Son of Adam de Standisch all her lands and tenements *etc.* . . . between Quitebroke and the water of Doggles [Douglas] as they lie within the bounds of the village of Shevynton . . . For this grant . . . the aforesaid Robert has given . . . to the aforesaid Margaret . . . all his lands . . . betweene "le Outlone" neare Quitebroke and "le Quitehull" . . . Excepting to the said Robert and his heirs Fyrston [fire-stone] and Secole [sea-coal] if it be possible to find them within the aforesaid lands and tenements . . . *Witnesses* John de Standish, William de Andirton, Henry de Chernok, and others. Dated at Shevynton the Sunday next after the feast of St. Andrew Apostle [Dec. 5]. 24 Ed. III. [1350]

This is the earliest documentary reference to coal in the Wigan district. "Fire-stone" is probably the early local name for cannel. The deed is printed in full by J. P. Earwaker in his *Charters and Deeds of the Standish Family*, 4to., [1879], pp. 17-19; and in his *Local Gleanings*, vol. 2 (re-printed, 4to.). The Rev. T. C. Porteus identifies Quitebroke with Calico Brooke and Quitehull with White Hall. "Le Outlone" is the out-lane.

9. COAL MINING CHARTER. Derby, 1368-9 [March 5]. Monday after the feast of St. Cedde [St. Chad] the bishop. Indenture being a lease for 40 years from John, the prior, and the convent of Gressel, Eymer Taverner of Stretton, John son of Richard, of the same, John de Melton of the same, Roger Taylour of Appulby, William Wysser of the same, Radulph the clerk, of Meysham, Richard Wyldy of Childecote, William de Sheyle of the same, John Savage of the same, and Alice, relict of Thomas de Kynston, of the same, to John Pymme of Hathcote of the mine of sea coal in their lands in the fee of Okthorp. Yearly rent per week

or for two or more days in a week when they dig coal, 8d. for each "pyke," always counting two men working underground as one "pyke," and three men working underground as two "pykes," and four men working above ground as two "pykes." The prior bound himself and his successors to pay the said John Pymme 20 marks on the feast of the annunciation then next ensuing, and the other lessors bound themselves in 20 marks at the same time. [The Feast of St. Chad was on 2 March.]

Lent by Cardiff Public Libraries Committee.

10. COAL MINING GRANT. Pembroke. 1486, Sept. 20. Grant from Jasper, brother and maternal uncle of kings, duke of Bedford and earl of Pembroke, to his servant Thomas Morice of the town of Tenby, for his good service, of all mines of coal under the Road Woods in co. Pembroke, with power to work the same and to use the trees thereon for pit-wood. Yearly rent 40s., payable by equal portions on the feast of St. Philip and St. James, and on the feast of St. Michael, the Archangel, as was customary in times past.

Witness: The seal of the Chancellor of Pembroke [which is now missing]. Latin.

Lent by Cardiff Public Libraries Committee.

11. COAL MINING LEASE. Flint. 1722, Oct. 1. Indenture being the counterpart of a lease for 31 years from Letitia Lloyd of Leadbrook, co. Flint, widow, to Edward Butler of the town and county of Flint, gent, of the seams of coal and coal mines under a close of land called *Lime kiln field*, in Coleshill, co. Flint. Yearly rent, one-sixth share of the coal, etc., raised.

Witnesses: George Warrington; John Johnson.

Lent by the Cardiff Public Libraries Committee.

14. MANUSCRIPT. Minute Book of the Manchester Association of Proprietors and Lessors of Collieries, 1843-1855. (MS. on paper, sm. folio, 126 leaves, with two printed documents inserted.)

Lent by Messrs. Peace and Ellis, Wigan.

This is the first minute book of the Association which eventually became the present Mining Association of Great Britain.

PART I. 2.—PRINTED BOOKS BEFORE 1700.

(EXCEPT ENGLISH.)

15. ROEMISCHER. Römischer auch zu Hungern und Bohem u. Ku. Mai Zinberghwercks Ordnung auff die Bergkwerck . . . (Sm. folio, 23 leaves ; wood-cut frontispiece.) *Zurickaw*, 1548.

A very early German work on Tin-Mining in Hungary, Bohemia, Croatia, etc., and one of the earliest and rarest books on mining. An excellent and well preserved copy with splendid impression of the frontispiece depicting the operations of ore getting and washing.

16. AGRICOLA (GEORGIUS) [*i.e.*, George Bauer]. *De Re Metallica Libri XII.*, quibus Officia, Instrumenta, Machinæ, ac omnia denique ad Metallicam spectantia, non modò luculentissimè describuntur, sed et per effigies, suis locis insertas, adjunctis Latinis, Germanicisque Appellationibus, ita ob oculos ponuntur, ut clarius tradi non possint ; ejusdem de Animantibus Subterraneis Liber, ab Autore recognitus, cum Indicibus diuersis quicquid in Opere tractatum est, pulchrè demonstrantibus . . . [Editio Secunda]. (Thick folio, numerous wood-cuts.) [col.] Basileæ, . . . per Hieron. Frobenium et Nic. Episcopium. 1561.

This work, first published in 1556, is of great importance as the first comprehensive book on mining and metallurgy, while the numerous excellent wood-cuts give the first exhaustive pictorial account of the machinery and processes then in vogue. Agricola was the first to give a full account of the chemistry of metals. He also discovered bismuth, and in mineralogy distinguished between simple and compound minerals, the first of which he divided into earths, concretions, stones, and metals. In "De Re Metallica" he states that mineral substances may be recognised by the colouring of a flame on burning them—the first suggestion of blowpipe analysis. It remained for a long time the most important text-book on mineralogy. During 180 years it was not superseded as a text-book and guide for miners and metallurgists, and until Schluter's great work (see No. 31) appeared in 1738 it had no equal.

17. AGRICOLA (GEORGIUS) [*i.e.*, Georg Bauer]. *De Re Metallica*, translated from the first Latin Edition of 1556, with biographical introduction, Annotations, and Appendixes on the Development of Mining Methods, Metallurgical Processes, Geology, Mineralogy, and Mining Law from the earliest times

to the XVI. Century, by Herbert Clark and Lou Henry Hoover. (*With fac. title, and reproductions of all the original woodcuts.* Thick folio.) *For the Translators, 1912.*

A most excellent translation of Agricola's famous work by the present United States Secretary of Commerce and his wife. It contains a biographical sketch, most valuable historical survey and notes, bibliography of the book, and a full index.

Second copy lent by the Department of Mines.

18. ALBERTUS, *Magnus, Bishop of Ratisbon.* De Mineralibus et rebus metallicis libre quinque. (12mo., pp. 404.) *Cologne, 1569.*

Originally written about 1250 A.D., the author being one of the most learned men of his day. It is based on the writings of Aristotle.

19. MATTHESIUS (JOHANN), *German pastor at Joachimsthal (1504-1568).* Bergpostilla oder Sarepta, darinn von allerley Bergwerck und Metallen . . . Mit trostlicher und lehrhaffter erklerung aller sprück, so in heiliger Schrift von Metall reden, und wie der helig Geist in Metallen und Begarbeit die Artickel unsers Christlicken glaubens furgebildet . . . Sampt der Jochimstalischen kurtzen Chroniken lisz auff das 1578. Jar. . . (Folio, pp. xxiv., 238, lviii.) *Nurnberg, 1578.*

A translation of the title of this remarkable book will no doubt interest many: "Sermons on the Mount, or Serepta, in which there is given a good account of every variety of mine, mining and metals, their quality and nature, and for what they can be utilized. With pious explanations of such passages in the Holy Scriptures which refer to metals, and how the Holy Ghost has formed the articles of our Christian faith in metals and mining . . . With this is given a chronicle of the Vale of Joachim [a famous mine] up to the year 1578."

20. CESI (BERNARDO, S.J.). *Mineralogia, sive Naturalis Philosophiæ Thesauri, in quibus Metallicæ Concretionis Medicorumque fossilium miracula, terrarum, pretium, colorum, et pigmentorum, apparatus, concretorum succorum virtus, lapidum atque gemmarum dignitas continentur.* (Thick folio, pp. [viii.], 626 [lxi].) *Lugduni, 1636.*

This work is chiefly valuable as a storehouse of all that was known on the subject to Della Porta, including copious reference to the ancient writers and the church fathers. It contains also much of chemical interest. Pp. 1-137 treat of Mineralogy proper, pp. 187-283 of colours and pigments, and pp. 541-608 of Gems. Of special interest is a chapter on the Magnet (pp. 532-9), which shows that the author did not know of the researches of Dr. William Gilbert, published 36 years before the

above work. Another chapter treats of the philosopher's stone. The work is rare. *Sothoran's Catalogue*, 806. Contains on back of the title page armorial book-plate of Sir Humphrey Mackworth (1657-1727), exploiter of the Cardiganshire mines (see Nos. 85, etc.).

21. BERTEREAU (MARTINE DE), *Baroness of Beau-Soleil*. *La Restitution de Pluton, a Monsieur L'Eminentissime cardinal. Duc De Richelieu. Des mines et minières de France, cachées au ventre de la terre . . . La raison purquoy les dites mines ont esté presque inutiles, etc.* (Sm. 8vo., pp. 184.) *Paris*, 1640.

Madame Bertereau was a celebrated woman mineralogist. She married in 1601 the Baron Beausoleil, an inspector of mines of the German Empire, and together they journeyed over Germany, Hungary, and France. In 1626 he secured an authorization to survey the whole of French territory for the discovery of mines and minerals. His wife accompanied him and wrote an account of their work. She published two works in 1632 describing "the riches and inestimable treasures" they had discovered. On the second, the "Veritable Declaration de la decouverte des mines et minieres de France" she styles herself the "illustre Dame Martine de Bertereau."

22. BARBA (ALVARO ALONSO). *The Art of Metals, in which is declared the Manner of their Generation, and the Concomitants of them, written in Spanish by Alvaro Alonso Barba, Master of Art, Curate of St. Barnard's Parish in the Imperial City of Potosi, in the Kingdom of Peru in the West-Indies, in the year 1640. (also, The SECOND BOOK, wherein is taught the Common Way of Refining Silver by Quicksilver, with some New Rules added for the better Performance of the same.)* Translated in the year 1669 by Edward [Montagu, 1st] Earl of Sandwich. (2 vols. in 1. Sm. 8vo., pp. iv., 156 + 92.) *S. Mearne, 1674.*

The translator was Samuel Pepys's friend and patron. For note, see No. 120.

23. FRATA & MONTALBANO (MARCO ANTONIO DELLA) *Marchese*. *Practica minerale trattato del March. M. A. della F. et M. [also] Catascopia minerale overo exploratione o'modo di far saggio d'ogni miniera metalica.* (4to., pp. x., 184 + ii., 40; *with engraved title-page and 24 fine plates.*) *Bologna: Manolessi, 1678.*

This rare work is especially interesting for its illustrations of mining and metallurgical operations. Deals mainly with gold, silver, and quicksilver.

24. BECHER (JOHANN JOACHIM). *Actorum laboratorii chymici Monacensis, seu, Physicæ Subteraneæ libri duo . . .* (12mo., pp. xxiv., 820; *with mystic frontis.*) *Frankfort, 1681.*
25. MELTZER VON WOLCKENSTEIN (CHRISTIAN). *Glück Auff! De Hermundurorum metallurgia argentaria. Von Eitzgebürgischen Silber-Bergkwerk in Meissen, diatriba Academica, etc. Praes. A. Rechenburg.* (Sm. 4to., pp. 69). *Leipsig, 1690.*

Dr. John Percy's copy.

PART I. 3.—FOREIGN WRITERS, XVIIITH CENTURY.

28. WEIGEL (CHRISTOPH). *Abbildung und Beschreibung derer samtlichen Berg-Wercks und Schmeltz-Hutten Beamten und Bedienten nach ihren gewöhnlichen Rang und ordnung im behorigen Berg-und-Hutten-Habit.* (Two engraved titles and 48 plates by Christoph Weigel, with descriptions in German. 2 vols. in 1, sm. 4to., ff. 74.) *Nurnberg, 1721.*

A collection of 38 illustrations of German mining costume, with descriptive text. The preface, in a somewhat humorous vein, praises the merits of the mining people. Plate 13 represents "the coal master who examines the fitness of the coal . . ."; pl. 14 "the coal measurer"; pl. 23 "the coal porter" who carries the coal to the furnace. In vol. 2, pl. 17 represents a "mining singer" with zithern, guitar, and triangle; pl. 18 is the "ore diviner"; pl. 14 is "the overlooker," who with a very jaunty air, is seen going on his patrol with lamp and stick.

29. BRUECKMANN (FRANZ ERNST). *Magnalia Dei in locis subterraneis; oder unterirdische Schatz-Cammer aller Konigreiche und Lander, in Ausfuehrlicher Beschreibung aller, mehr als m dc. Bergwercke durch alle vier Welt-Theile, etc.* (Folio, pp. viii., 368, xvi.; with frontispiece portrait and 13 fine folding plates.) *Braunschweig, 1727.*

Includes accounts of the mines in Mexico, Chile, Paraguay, Florida, Canada, Peru, Brazil, and Guiana. One plate shows the American natives searching for gold in the river beds.

30. SWEDENBORG (ÉMANUEL). *E. Swedenborgii, etc., Regnum subterraneum sive minerale de cupro et orichalco. De que modis liquationum cupri per Europam passim in usum receptis: de secretione ejus ab argento: de conversione in*

orichalcum, etc. (Thick Folio, pp. xiv. x 536; *with large map and many folding plates.*) *Dresden, 1734.*

On pages 136-9, the author mentions that in some parts of England attempts were being made to substitute coal for charcoal in iron smelting (see Nos. 57, 60, and 69).

31. SCHLUETER (CHRISTOPH ANDREAS). Gründlicher Unterricht von Hütte-Werken, worin gezeigt wird, wie man Hütten-Werke auch alle dazu gehörige Gebäude und Oefen aus dem Fundament recht anlegen solle, auch wie sie am Hartz und andern Orten angeleget sind. Und wie darauf die Arbeit bey Gold-Silber-Kupfer-und Bley-Ertzen, auch Schwefel-Vitriol-und Aschen-Werken gefuhret werden müsse. Nebst einem vollstandigem Probier-Buch, darin enthalten wie allerley Ertze auf alle Metalle zu probieren, die Silber auf unterschiedene Art fein zu brennen, Gold und Silber mit Vortheil zu scheiden und alles, so dazu gehöret, zu verrichten. (Thick folio, pp. [xx.], 612, [xxxiv.], 198, [xxvi.]; *with fine frontispiece by Arenhold, vignette on copper, and 58 folding plates.*) *Braunschweig, 1738.*

This great work on metallurgy was the first to challenge the supremacy of Agricola's *De Re Metallica* as the miners' and metallurgists' text-book (see No. 16).

32. BEYER (AUGUST). Grundlicher Unterricht von Berg-Bau, nach Anleitung der Marck-scheider-Kunst, worinnen gewiesen wird, wie die Geburge und darinnen streichende Gange, Kluffte und Floze zu untersuchen und zu beurtheilen, und wie Schachte und Gruben-Gebaude mit Nutzen anzustellen und richtig abzumessen, etc. (Folio, pp. [xii.], 258; *with 14 folding plates neatly coloured.*) *Schneeberg, 1749.*
33. SCHLUETER (CHRISTOPH ANDREAS). De la Fonte des Mines, des Fonderies, etc. Traduit de l'Allemand . . . Le tout augmenté de plusieurs Procédés & Observations; & publié par M. [Jean] Hellot. (2 vols., 4to.; *with frontispiece and 58 folding plates.*) *Paris, 1764*-1753.*

*Volume 1 would appear to be of the second edition, it having originally appeared in 1750. Hellot almost wholly rewrote Schlueter's work (see No. 31); and added numerous valuable notes, in one of which he gives two definitions for *cement*; "it contains in fact a great deal of original matter; many processes not noticed by Schlueter are given, and many essential articles are introduced, which had been totally omitted in the original work."—*Thompson.*

34. HENCKEL (JOHANN FRIEDRICH), *Director of Mines, Freiberg*. Pyritologia; or, a History of the Pyrites, the principal Body in the Mineral Kingdom . . . with . . . an Account of the Advantages arising from Mine-works in general, and [in] particular from those of Saxony. Translated from the German of J.F.H. (8vo., pp. xviii., 376, [vi.]). *A. Miller, 1757.*
Frontispiece missing.
35. TILLY (de), *Writer on Coal*. Mémoire sur l'utilité, la nature, et l'exploitation du charbon minéral. (8vo., pp. vi., 134; *two folding plates.*) *Paris, 1758.*
This seems to be the first French book on coal-mining, but very little appears to be known of the author. The illustration of winding by horse winch is particularly interesting.
36. LEHMANN (JOHANN GOTTLÖB). *Traité de Physique, d'Histoire Naturelle, de Minéralogie et Métallurgie.* (3 vols., 12mo.; *with copper plates.*) *Paris, 1759.*
Vol. 1: L'Art des Mines, ou Introduction aux Connoissances nécessaires pour l'Exploitation des Mines Métalliques. Vol. 2: Traité de la Formation des Métaux, et de leurs Matrices ou Minières. Vol. 3: Essai d'une Histoire Naturelle des Couches de la Terre. Gives many remarkable observations touching mineralogy and geology. The author was accidentally poisoned in 1787 when making some chemical experiments.
37. CRAMER (JOHANN ANDREAS). *Elements of the Art of Assaying Metals . . . ; deduced from the true Properties and Nature of Fossils; confirmed by the most accurate and unquestionable Experiments, etc.* [Transl.] with notes and observations not in the Original . . . [by Cromwell Mortimer, M.D.] . . . *with A List of the chief English authors who have written upon Minerals and Metals. Second edition.* (8vo., pp. xxiv., 472, *and six folding plates.*)
L. Davies and C. Reymers, 1764.
This is a work of the first importance; the second edition being the more valuable.
38. SPERGES (JOSEPH MARIA ANTON VON), *Baron*. Tyrolische Bergwerksgeschichte, mit alten Hrkunden, und einem Anhang worinn das Bergwerk zu Schwatz beschrieben wird. (8vo., pp. 370, *port. and vign.*) *Wein, 1765.*
39. BERICHT. Bericht vom Bergbau. (4to., pp. xvi., 312; *with 18 folding plates.*) *Freyberg, 1769.*

40. MORAND (JEAN-FRANÇOIS-CLEMENT). *Memoires sur la nature, les effets, propriétés, et avantages du feu de charbon de terre apprêté, pour être employé commodément, économiquement, et sans inconvénient, au chauffage, et à tous les usages domestiques.* (la. 12mo., pp. 232; *with 4 plates of fireplaces.*) Paris, 1770.
Bound with Raulin's Observations, and Le Brun's Instruction.
 (See Nos. 45 & 50.)

According to Morand's preface, the use of coal for domestic purposes seems to have been unknown in France in 1770, and one-fourth of the whole population of Paris is stated to be unable to have fires in the winter owing to the scarcity of wood; a statement which is confirmed by the efforts of the Government of Languedoc five years later (1775) to popularize coal for this purpose. See note to No. 44.

41. DELIUS (CHRISTOPH TRAUGOTT). *Anleitung zu der bergbaukunst nach ihrer theorie und ausubung, nebst einer abhandlung von den grundsätzen der berg-kammeralwissenschaft für die K. K. Schemnitzer Bergakademie.* (4to., pp. xviii., 520, 46; *with 24 folding plates.*) Vienna, 1773.

A greatly esteemed work on the theory and practice of mining. A French translation appeared in 1778 (see No. 51).

42. MONNET (ANTOINE-GRIMOALD). *Traité de L'Exploitation des Mines, ou l'on décrit les Situations des Mines; l'Art d'entailler la roche et la substance des filons, de former les puits et les galeries, de procurer de l'Air aux Sousterrains, d'en vuider les eaux, d'élever les roches et les mines au jour, et de percer la Terre. Avec un Traité particulier sur la Préparation et le Lavage des Mines. Le tout traduit de l'Allemand.* (4to., pp. xx., 348; *with 24 folding copperplates.*) Paris, 1773.

43. JARS (GABRIEL). *Voyages Métallurgiques, ou Reserches et Observations sur les mines and forges de fer, la fabrication de l'acier, celle du fer-blanc, & plusieurs mines de charbon de terre, faites depuis l'année 1757 jusques & compris 1769, en Allemagne, Suède, Norwege, Angleterre & Ecosse.* (4to., pp. xxxii., 416; *with 10 folding plates.*) Lyons, 1774.

A complete treatise on the theory and practice of mining, greatly esteemed in its day. Pages 174-282 describe the working of the coal-mines of Lancashire, Yorkshire, Newcastle, and Scotland.

44. VENEL (FRANÇOIS-GABRIEL). Instructions sur l'usage de la Houille. Plus connue sous le nom impropre de charbon de terre, pour faire du feu ; sur la manière de l'adapter à toute sorte de feux ; et sur les avantages, tant publics que privés, qui résulteront de cet usage. (8vo., pp. xxiv., 546 ; with 9 plates of fireplaces.) Avignon, 1775.

This book was written at the request of the Government of Languedoc as the following translation from Barbon's *L'Exploitation de Bassin Houiller* (1898) makes clear. On page 79 we read : "For some time the State had been occupied in trying to persuade the public to use mineral coal instead of charcoal ; to this end they charged M. Venel, professor of Medicine at Montpellier and an able chemist, to make experiments to find the simplest and surest methods of utilizing pit-coal and to prove that mineral coal was not injurious to health. The State also proposed to accustom the public to make use of coal for domestic purposes, and with this in view commissioned M. de Genssance, an able mineralogist, to tour the province and examine the quality of the mines . . ." It is noteworthy that five years earlier J. F. C. Morand recorded that coal as a domestic fuel was practically unknown in France (see No. 40).

45. RAULIN (JOSEPH). Examen de la houille, considérée comme engrais des terres. (8vo., pp. iv., 70.) Paris, 1775.

"These researches consider the effects which are produced [by coal and coal-ash] on vegetable earth, upon the vegetation which it maintains, and upon the animals which it nourishes."—Transl. of Preface. It called forth a reply printed in Amsterdam in 1777 (see No. 50).

Two copies ; one bound with Venel's *Instructions*, the other bound with Morand's *Memoires*.

46. FERBER (JOHANN JACOB). Travels through Italy in the years 1771 and 1772, described in a series of letters to Baron Born, on the natural history . . . of that country. Transl. from the German . . . by R. E. Raspe. (8vo., pp. xxxiv., 378.) L. Davis, 1776.

Deals mainly with mineralogy and mentions the coal-beds. See also Nos. 49 and 48.

47. GELLERT (CHRISTLIEB EHREGOTT). Metallurgic Chymistry : a System of Mineralogy in general, and of all the arts arising from this science, theoretical and practical, transl. by J[ohn] S[eiferth]. (8vo., pp. xvi., 416 ; with four folding copperplates and folding table.) T. Becket, 1776.

Gellert first introduced the art of extracting the precious metals from their impurities by the mercury amalgamation method. The table of solutions, in which the metals, etc., are identified by their symbols, is of very curious interest.

48. RASPE (RUDOLF ERIC), *author of the original "Baron Munchausen,"* 1737-1794. An account of some German volcanoes, and their productions . . . being an essay of physical geography for philosophers and miners . . . (8vo., pp. xx., 140; *with two folding plates.*) L. Davis, 1776.
49. BORN (IGNAZ EDLER VON), *baron.* Travels through the Bannat of Temeswar, Transylvania, and Hungary, in the year 1770; . . . a series of letters . . . on the mines and mountains . . . to which is added J. J. Ferber's Mineralogical History of Bohemia. Transl. from the German by R. E. Raspe. (8vo., pp. iii., 320, [xxii.]; *with two maps.*) G. Kearsley, 1777.
- There are several interesting references to coal-beds intermingled with volcanic strata. On page 192 the author relates that at Chemnitz "I saw here on the *Seven Women* vein . . . several old blasting holes, one marked with the year 1637. Rossler relates, that in 1627 the blasting of mines was brought from Hungary and introduced into German mines. But Beyer says that in 1613 it was invented by Martin Freygold at Frieberg." According to Oscar Guttman in his *Blasting* (1906) this latter date cannot be maintained—1627 appears to be correct.
50. [LE BRUN (L.S.D.)]. Observations critiques sur un ouvrage intitulé; Examen de la houille, considérée comme engrais des terres, par M. Raulin . . . Instruction sur l'usage des houilles d'engrais, & de leurs condres . . . Par L.S.D.L.B. (8vo., pp. 154.) Amsterdam, 1777.
- See No. 45. Two copies; one bound with Venel's *Instructions*, and the other bound with Morand's *Memoires*.
51. DELIUS (CHRISTOPH TRAUGOTT). Traité sur la science de l'exploitation des mines, par Théorie et pratique, avec discours sur les principes des finances . . . Traduit par M. Schreiber. (2 vols., 4to., pp. xxiv., 520 vi., 456; *with 25 folding copper-plates.*) Paris, 1778.
- A French translation of No. 41.
52. BORCH (MICHEL, JEAN DE), *Count.* Minéralogie Sicilienne docimastique et metallurgique, ou connaissance de tous les minéraux que produit l'île de Sicile, avec les détails des mines et des carrières, et l'histoire des travaux anciens et actuels de ce pays. (8vo., pp. lxxx., 264.) Turin, 1780.

53. CHASSOT DE FLORENCOURT (CARL). *Über die Bergwerke der Alten.* (12mo., pp. 72; *with three folding copperplates.*)
Gottingen, 1785.

An historical study on mining in Greek and Roman times, based on the writings of Diodorus Siculus, Dioscorides, Pliny, Strabo, and others. It was awarded a prize by the Royal Society of Gottingen.

PART II.

ENGLISH BOOKS.

I.—BOOKS BEFORE 1700.

56. BAILEY (JOHN E.). *Accounts for working a Wigan Colliery (Worsley Mesnes, Pemberton) in A.D. 1600-1601.* Extracted from a MS. and published in *The Wigan Examiner*, 1883.
57. STURTEVANT (SIMON). *Metallica; or, The Treatise of Metallica. Briefly comprehending the doctrine of diverse new Metallic Inventions, but especially how to neale, melt, and worke all kinde of mettle oares, Irons, and Steeles with Sea-coale, Pitt-coale, Earth-coale and Brush Fewell . . .* (8vo., pp. 120.) *Imprinted at London by George Eld, 1612.*
- Lent by the Cardiff Public Libraries Committee.**
58. *The Same.* [Facsimile reprint (ed. by John N. Bagnall), printed by T. Simpson, Wolverhampton, 1855.]
59. *The Same.* [Reprinted by the Commissioners of Patents of Inventions, 1858.]

Sturtevant was the first to invent a process for extracting iron from its ores by using mineral coal instead of the more expensive charcoal. He obtained a patent from James I.; but it appears that at the time he "stood outlawed" and "his patent was seized, apprizd, and delivered up to be cancelled"; a similar patent being immediately bestowed upon John Rovenzon (see No. 60).

60. ROVENZON (JOHN). *A Treatise of Metallica, but not that which was published by Mr. Simon Sturtevant upon his patent, which is now by order cancelled and made voyd, by reason of his standing outlawed at the time of the grant, and so still continuing . . . for the making of iron and other materials with sea-cole, pit-cole, etc., for one and thirty yeares, according to which patent, and direction within this treatise, composed*

by the same John Rovinson, is published in print before the end of Easter tearme, viz., the 15th of May, 1613 . . . Printed for Thomas Thorp, 1613. (8vo., pp. 30.) [Facsimile reprint (ed. by J. N. Bagnall) printed by T. Simpson, Wolverhampton, 1855.]

61. *The Same.* [Reprinted by the Commissioners of Patents of Inventions, 1858.]

See Nos. 57, 58, and 69. Both Rovenson's and Sturtevant's inventions were failures, but their books inspired Dud Dudley who successfully operated the method.

62. PLATTES (GABRIEL). A Discovery of Subterraneall Treasure, viz., Of all manner of Mines and Mineralls from the Gold to the Coale; with plaine Directions and Rules for the finding of them in all Kingdomes and Countries. And also of the Art of Melting, Refining, and Assaying of them is plainly declared, so that every ordinary man, that is indifferently capacious, may with small charge presently try the value of such Oares as shall be found either by rule or by accident. Whereunto is added a reall Experiment whereby every ignorant man may presently try whether any peece of Gold that shal come to his hands be true or counterfeit, without defacing or altering the forme thereof, and more certainly than any Goldsmith or Refiner could formerly discern, *etc.*, *etc.* (Sm. 4to., pp. [x.], 60.) *J. Okes for Jasper Emery, 1639.*

The first edition of the FIRST ENGLISH BOOK ON MINING AND METALLURGY; an exceptionally rare book. It is the first English book to describe the process of separating gold by nitric acid. Chapter II. sheweth "the waies to find out Pit-coales; also the naturall cause of the generation of them, by "plaine demonstration." The author, Gabriel Plattes, though he influenced many later writers, was much neglected during his lifetime, and is said to have been found dead in the London streets during the Commonwealth in a state of extreme destitution. Second and third editions appeared in 1653 and 1684, and reprints in 1738 and 1740 (see Nos. 119 and 120). The first English book on coal-mining did not appear until 1708 (see No. 115).

63. DECLARATIONS & ORDNANCES OF PARLIAMENT. A Declaration of the Lords and Commons assembled in Parliament: concerning coales and salt. Wherein is ample satisfaction given to all murmurers and malignants, why the honourable City of London hath not a supply as formerly;

also two ordinances of great importance . . . (Sm. 4to., pp. 6.)
Printed for T.S., Jan. 13, 1642.

Declares that no vessel of any sort "shall make voyage to Newcastle for the fetching of Coales . . . until that Towne shall be reduced into such hands as shall declare themselves for King and Parliament." (*Two copies.*)

64. [*Another Edition.*] A Declaration . . . That no Ships, Barques, or other vessels shal from henceforward make any Voyage to Newcastle, for the fetching of Coales . . . (Sm. 4to., pp. 8.)
Printed for John Wright, Jan. 16, 1642.

65. DECLARATIONS & ORDINANCES OF PARLIAMENT.
 An Ordinance of the Lords and Commons assembled in Parliament, that no Wharfinger, Woodmonger, or other seller of Newcastle coales, within the Cities of London and Westminster . . . shall after the making hereof sell any Newcastle coales, above the rate of 23/- the chaldron, and after the first of April next, above 2cs. at the most . . . (Sm. 4to., pp. 8.)
John Wright, Feb. 23rd, 1642.

The ordinance of January (see Nos. 63 and 64) prohibiting the bringing of coals from Newcastle, etc., made the fuel so scarce in London that prices reached £4 per chaldron, hence this ordinance fixing the price. This is probably the earliest example of the statutory regulation of coal prices, though in 1590 the Lord Mayor of London made apparently a vain request to Lord Treasurer Burleigh to fix the price at 7/- per chaldron, the current price being 9/- (see No. 134, etc.).

66. SEA-COALE. Sea-coale, char-coale, and small-coale; or, A Discourse betweene a Newcastle collier, a small-coale man, and a collier of Croydon: concerning the prohibition of trade with Newcastle. And the fearfull complaint of the poore of the Citie of London, for the inhancing the price of sea-coales. Printed for Hugh Adamson, Jan. 27, 1643. (8vo., pp. vi., 16.)
 Reprinted by M. A. Richardson. *Newcastle, 1846.*

Second copy lent by the Newcastle Public Libraries Committee.

Beautifully printed on Mr. Richardson's private press, and included in the "Miscellaneous" volume of his "Reprints of Rare Tracts . . ." It is mainly a humorous comment on London's complaint concerning the high price of coal consequent upon the prohibition of the traffic with Newcastle (see Nos. 63, 64, and 65) and the consequent revival of the charcoal industry of Croydon.

67. GARDINER (RALPH), of *Chirton, Northumberland*. England's grievance discovered, in relation to the Coal Trade; with the map of the River Tyne, and situation of the town and corporation of Newcastle; the tyrannical oppression of those magistrates, their charters and grants, etc. . . . London: (originally) printed for R. Ibbitson, 1655. (8vo., pp. viii., 216; with illus., ports., and map.)

Newcastle: Reprinted by D. Akenhead, 1796.

This is a history of the coal trade in Newcastle from the time of King John, preceded by the town charters, and is mainly an attack upon the administration of justice in so far as it affects the people's liberties, and the coal trade in particular. There are a number of royal portraits and several curious illustrations. Plate II., fig. 1, depicts a magistrate's court showing "the master swearing" (? bribing a witness) and "a master cutting a purse"; fig. 2 depicts Isabel Orde and John Williamson being "robbed in the open market" by Newcastle merchants on the order of the magistrates.

68. BUSHELL (THOMAS). An Extract by Mr. Bushell of his late Abridgment of the Lord Chancellor Bacon's philosophical theory in mineral prosecutions . . . (Sm. 4to., pp. 56.)

Thomas Leach, 1660.

One of the earliest English books on the art of mining. Thomas Bushell (1594-1674) became a page to Bacon at the age of 15 and became his seal-bearer and life-long friend. Bacon, observing the natural bent of his young servant's mind, imparted to him "many secrets in discovering and extracting metals" and Bushell always gratefully acknowledged Bacon's instructions declaring that his own mining processes and inventions were the outcome of that instruction. The title of his book pays similar homage. The "Abridgment" itself was published in 1650. Bushell secured from the King the patent to work the royal mines in Cardiganshire, which he pursued with much success.

69. DUDLEY (DUD). *Mettallum Martis; or, iron made with pit-coale, sea-coale, etc.* And with the same fuell to melt and fine imperfect mettals, and refine perfect mettals. London. Printed by T.M. for the author, 1665. (8vo., pp. xviii., 42.)

[Facsimile reprint by T. Simpson, Wolverhampton, 1855.]

70. *The Same*. [Reprinted by the Commissioners of Patents of Inventions, 1858.]

This reprint (first produced in 1851) is edited by John N. Bagnall, who contributes a biographical note. Dud Dudley (1599-1684), a Worcestershire iron-master, was the first *successfully* to use coal for extracting iron from its ores. His patents were dated 1619 and 1639 though his

inventions were undoubtedly inspired by Simon Sturtevant and John Rovenzon, whose books on the same subject appeared in 1612 and 1613 respectively (see Nos. 57 and 60). Their inventions, however, were failures.

- 70a SHIRLEY (THOMAS). *M.D., of Wigan.* The Description of a Well, and Earth in Lancashire, taking Fire by a Candle approached to it. In *Philosophical Transactions*, vol. I, pp. 482-484. 1667.

This detailed description of the Wigan Burning Well was contributed to the Royal Society "by that Ingenious and Worthy Gentleman, Thomas Shirley, Esq., an Eye-witness of the thing." Shirley, the author of several medical treatises, was a Wigan doctor, and observed the phenomena described whilst "returning from a Journey to my house in Wigan."

71. PETTUS (*Sir JOHN*). *Fodinæ Regales; or, The History, Laws, and Places of the Chief Mines and Mineral Works in England, Wales, and the English Pale in Ireland; as also of the Mint and Mony; with a Clavis explaining some difficult Words relating to Mines, etc.* (Sm. folio, pp. [xiv.], 108, [viii.]; *with port. and two engravings of mines.*) *T. Basset*, 1670.

This rare work is very valuable for giving an account of the state of mining in England during the XVIIth Century. It was undertaken at the request of Prince Rupert and Lord Shaftesbury. Large extracts from it are given in Hunt's "British Mining."

- 71a. SINCLAIR (GEORGE), *Professor of Mathematics at Glasgow.* The Hydrostaticks; or, The Weight, Force, and Pressure of Fluid Bodies, made evident by Physical, and Sensible Experiments. Together with some Miscellany Observations, the last whereof is a short History of Coal, and of all the common and proper accidents thereof; a subject never treated of before. By G. S. [i.e., Geo. Sinclair]. (Sm. 4to., pp. [xx.], 320; *with seven fldg. plates.*)

Edinburgh: Pr. by George Levinstoun 1672.

Second copy lent by the Mining Institute of Scotland.

The earliest treatise on the natural history of coal. Miscellany Observation No. I. (pp. 197-200) details an experiment with firedamp; Mis. Obs. No. XXIV. (pp. 258-302) is a thorough-going investigation of the nature of coal and coal-seams, with observations on firedamp and "wild-fire" explosions.

72. LONDON: COMMON COUNCIL. [A Collection of Acts of the Common Council, including a Report of the Committee set

up to inquire into several complaints "of the late raising of prizes, and abuses used in the measure and weight of coals" (1664) and transactions (1664-74) with the King and Parliament for the passing of a Bill to put down abuses; together with the Orders, Rules, etc., etc., made for the government of carts and carters within the City of London (1668).] *Begins*: Laurence Mayor, Com. Council, tent xxvii. die Januarii, Anno Dom. 1664. (*No t.p.*, sm. 4to., pp. 44.) [*Printed 1675?*]

Although it does not appear from the document here printed that any Act was passed before 1674, it is quite clear from items Nos. 94 and 95 that an emergency Act to deal with the Abuses was actually passed immediately following the Report of the Committee in January, 1664, above, being the first general Act of the kind dealing with the coal trade.

73. BROWN[E] (EDWARD). *M.D., F.R.S., eldest son of the author of "Religio Medici."* Brief account of travels in Hungaria, Servia, Bulgaria, Macedonia, Thessaly, Austria, Styria, Carinthia, Carniola, and Friuli; with some Observations on the Gold, Silver, Copper, and Quicksilver Mines, Baths, and Mineral Waters in those parts. (Sm. 4to., pp. [x.], 144; *with copperplates, mostly folding.* *Benj. Tooke, 1673.*

First edition of a work reprinted in 1685 as "Travels in divers Parts of Europe." It contains interesting descriptions of Hungarian and Austrian mines, as well as much other curious information.

74. ————. An Account of Several Travels through a great part of Germany: in four journeys. I. From Norwich to Colen. II. From Colen to Vienna . . . III. From Vienna to Hamburg. IV. From Colen to London. Wherein the mines, Baths, and other Curiosities of those parts are treated of. (Sm. 4to., pp. [iv.], 179; *with several folding plates.*) *Bound with the foregoing.* *Benj. Tooke, 1677.*

75. HOUGHTON (THOMAS). *Rara Avis in Terris; or, The Compleat Miner . . . containing The Liberties, Laws, and Customs of the Lead Mines . . . in Derbyshire . . . [and] The Art of Dialling and Levelling Grooves; a thing greatly desired by all Miners; being a subject never written on before by any . . .* (1680). Reprinted in Barba's "Collection," 1737 and 1740 (see Nos. 119 and 120.)

76. CLAYTON (JOHN). *D.D., 1657-1725.* An Experiment concerning the Spirit of Coals, being part of a Letter to the Hon.

Rob. Boyle, Esq., from the late Rev. John Clayton, D.D. . . .
[circa 1685.] In Philosophical Transactions, Vol. XLI.,
pp. 59-61. 1739.

Dr. Clayton, a native of Crook, resided in Wigan before securing the rectory of Wakefield in 1687. During his residence his attention was drawn to a "ditch within 2 miles of Wigan wherein the water would seemingly burn like brandy." He investigated the phenomenon and rightly determined that the gas came from the underlying coal beds. This led him to experiment by distilling the gas from the coal which he stored in bladders. "When I had a mind to divert strangers or friends I have frequently taken one of these bladders, and pricking a hole therein with a pin, and compressing gently . . . near the flame of a candle till it took fire." This is the first discovery of the illuminating value of coal gas.

77. PETTUS (*Sir JOHN*). *Fleta Minor*; or, The Laws of Art and Nature, in Knowing, Judging, Assaying, Fining, Refining, and Inlarging the Bodies of confin'd Metals, in Two Parts. I. Assays of Lazarus Erckern [*sic*] in V. Books: originally written by him in the Teutonick Language, and now translated into English. II. Essays on Metallick Words, as a Dictionary to many pleasing Discourses. [Second and last edition, unchanged.] (Folio, pp. [xlii.], 346, 134; with 43 engr.)
Stephen Bateman, 1686.

First published in 1683. The first part contains the only English translation ever published of Ercker's classic work. The dictionary of mining terms is the first published in English. The title page to Part II. has the imprint: London, Printed for the Author . . . 1683.

78. HOUGHTON (*THOMAS*), *writer upon mines, fl. 1680-95*. *Royal Institutions*: being proposals for articles to establish and confirm laws, liberties, & customs, of Silver & Gold mines to all the King's subjects, in such parts of Africa or America which are now (or shall be) annexed to, and depending on the Crown of England. With rules, laws and methods of Mining, and getting of Precious Stones. (12mo., pp. [vi.], 126.)
Daniel Poplar, 1694.

79. [*Second Edition.*] *The Golden Treasury*; or, The Compleat Minor. Being Royal Institutions or Proposals, etc. (12mo., pp. vi., 126.)
Printed for the Author . . . 1699.

An extremely rare book, in which Houghton proposed mining laws for the new lands approximating to the customary laws of Derbyshire.

The second edition is an exact reprint of the first except for the title-page. Houghton's book on the Derbyshire mining laws, published in 1680, is also very rare; it is included in Barba's collection of reprints, 1738 and 1740 (see Nos. 119 and 120).

80. LONDON COAL-METERS. The Case of the fifteen sea coal-meters of the City of London, in relation to their deputies. (8vo., pp. 16.) *N.D. Circa 1700.*

The Coal-meters were officers of the City Corporation, their duty being to measure all coal sold in London markets for which they received a penny per chaldron. These fees were farmed out to deputies who at this time refused to conform to the orders of the true holders of the office. [P. 6.]

PART II.

ENGLISH BOOKS.

2.—COMPANY OF MINE-ADVENTURERS, 1698-1720.

83. WALLER (WILLIAM), *Steward*. Essay on the Value of the Mines late of Sir Carbery Price. Writ for the private Satisfaction of all the Partners; *with two folding plates*. (12mo., pp. [xxiv.], 56.) 1698.

This book is dedicated to Sir Humphrey Mackworth, chairman in succession to the late Sir Carbery Price, of the company which was engaged in exploiting the silver, lead, and copper mines in Cardiganshire. Mr. Waller expresses himself as "much concerned to see so great a Treasure lye dead" for want of capital and owing to the Partners being "unhappily engaged in Differences and Law-suits amongst themselves." He recognizes however, that Sir Humphrey is the "one person" possessing all the necessary qualifications to set things right; but afterwards, when dismissed from his employment, he turned on his employer and gave information which caused Mackworth's impeachment before the Commons.

84. [SHIERS (WILLIAM).] A Familiar discourse or dialogue concerning the Mine-Adventure. (12mo., pp. 72.) 1700.

Second copy lent by the Cardiff Public Libraries Committee.

A propaganda pamphlet to induce the public to invest in the Company. Savery's fire-engine (see No. 113) is referred to on page 50 as a very ingenious invention.

85. MACKWORTH (*Sir HUMPHREY*). The Case of Sir Humphrey Mackworth, and the Mine-Adventurers, with respect to the extraordinary proceedings of the agents, servants, and

dependents, of the Rt. Hon. Sir Thomas Mansell, Bar. (8vo., pp. 12.) *Printed in London, 1707.*

This is rather a defence of Sir Humphrey, who was afterwards (1710) impeached before the House of Commons and found guilty of peculation. The pamphlet reproduces a letter from William Phillips challenging Mackworth to a duel.

See No. 114. HETON (THOS.). *Some Account of Mines . . . with an appendix relating to the Mine-Adventure in Wales . . . 1707.*

86. MACKWORTH (*Sir HUMPHREY*). *A Short State of the case and proceedings of the Company of Mine-Adventurers . . . London, 1710.*

Lent by the Cardiff Public Libraries Committee.

87. MACKWORTH (*Sir HUMPHREY*). *The Book of Vouchers to prove the case and defence of the Deputy Governour and Directors of the Company of Mine-Adventurers. Part I. London, 1710.*

Lent by the Cardiff Public Libraries Committee.

88. PARLIAMENT. *The Report of the Committee of the House of Commons, to whom it was referred to consider the Humble Petition of several creditors and Proprietors of Principal Mony, Annuities and Shares in the Mine-Adventure of England; with the Resolutions of the House of Commons thereupon. Jacob Tonson, 1710.*

Lent by the Cardiff Public Libraries Committee.

See also No. 99. *An Act for the Relief of the Creditors . . . of the Company of Mine-Adventurers (1710).*

89. MACKENZIE (*RODERICK*). *A Familiar Letter to a Gentleman at Bath; containing an account of the Proceedings of the Governor and Company of the Mine-Adventurers of England . . . 1720. London, 1720.*

Lent by the Cardiff Public Libraries Committee.

90. REPRESENTATION. *A Representation containing a vindication of Sir Humphrey Mackworth . . . London: T. Wood, 1720.*

Lent by the Cardiff Public Libraries Committee.

PART II.

ENGLISH BOOKS.

3.—EARLY ACTS OF PARLIAMENT.

93. AN ACT for laying an imposition upon Coals, towards the Building and Maintaining Ships for Guarding the Seas. Die Veneris, 28 Martii, 1651. (Sm. folio, pp. 8.) *John Field*, 1651.
 Fine copy of a rare publication. The Act was occasioned as a result of "The Parliament of England taking into their serious consideration the manifold Losses and great Prejudice sustained by the Merchants and other Good People of this Commonwealth, by reason of the many Pyrats and Sea-Rovers that infest the Coast of this Commonwealth." The Act was to continue in force "until the One and thirtieth day of March, which shall be in the year . . . 1653, and no longer," *i.e.*, two years.
94. A PROCLAMATION for the speedy getting into execution the late Act of Parliament for regulating the measures and prices of coals. London: Printed by John Bitt and Christopher Barker . . . 1664-5.
 Lent by the Cardiff Public Libraries Committee.
95. AN ACT for reviving a former Act [1665] for regulating the Building and Maintaining Ships for Guarding the Seas. Die Veneris, 28 Martie, 1651. (Sm. folio, pp. 8.) *John Field*, 1651.
96. AN ACT for continuing several impositions, additional impositions, and duties . . . and for taking off the oversea duty on coals exported in British bottoms . . . [Nov. 15, 1709.] (Sm. folio, pp. 24.) Pr. 1710.
97. AN ACT for reviving, continuing, and appropriating certain duties upon several commodities to be exported; and certain duties upon coals to be water-born and carried coastwise . . . [Nov. 25, 1710.] (Sm. folio, pp. 40.) Pr. 1710.
98. AN ACT for continuing part of the duties upon coals, culm, and cynders, and granting new duties upon houses, having twenty windows or more . . . [Nov. 15, 1709.] (Sm. folio, pp. 26.) Pr. 1711.
99. AN ACT for relief of the creditors and proprietors of the Company of Mine-Adventurers, by establishing a method for

settling the differences between the Company and their creditors, and for uniting them, in order to an effectual working of the mines of the said company. [Nov. 25, 1710.] (Sm. folio, *pp.* 18.) Pr. 1711.

This Act follows the impeachment of Sir Humphrey Mackworth before the House of Commons in 1710, when he was found guilty of peculation. (See preceding section.)

100. AN ACT to dissolve the present and prevent the future combination of coal-owners, lightermen, masters of ships, and others, to advance the price of coals in prejudice of the navigation, trade, and manufactures of this kingdom, and for the further encouragement of the coal-trade. [Nov. 25, 1710.] (Sm. folio, *pp.* 8.) Pr. 1711.

102. AN ACT for continuing certain duties upon coals and culm . . . to raise money, as well as to proceed in the building of [fifty] new churches [1711] . . . [Nov. 11, 1718.] (Sm. folio, *pp.* 36.) Pr. 1719.

These duties were placed upon coals for the purpose of rebuilding the churches destroyed in the Great Fire of London. The Act of Queen Anne (1711) which this Act continues amended the coal dues clause in the original re-building Act of 1667. In that Act a shilling duty was put on every chaldron of coal imported into London and was the only financial provision made for the rebuilding, and proved wholly inadequate.

103. AN ACT for granting to His Majesty the sum of three hundred and seventy thousand pounds, to be raised by loans or exchequer bills, to be charged on the surplus monies of the duties on coals and culm . . . [Jan. 17, 1726.] (Sm. folio, *pp.* 16.) Pr. 1727.

104. AN ACT for the better regulation of the coal trade. [Jan. 13, 1729.] (Sm. folio, *pp.* 14.) Pr. 1730.

Deals mainly with abuses connected with the shipping, measuring, and substitution of coals and coal contracts. A fine of £100 is imposed on persons receiving gratuities. Two copies.

105. AN ACT for rendering more effectual an Act made in the third year of His Majesty's reign, intituled, An Act for the better regulation of the coal trade, so far as the same relates to the preventing the inhancing the price of coals in the River Thames by the keeping of Turn in delivering of coals there. [Jan. 21, 1730.] (Sm. folio, *pp.* 14.) Pr. 1730.

106. AN ACT for continuing an Act for the more effectual punishing wicked and evil disposed persons, going armed in disguise . . . and of persons maliciously setting on fire any mine, pit, or delph of coal, or cannell coal . . . [Feb. 1, 1736.] (Sm. folio, pp. 10.) Pr. 1737.
107. AN ACT to empower the Court of Lord Mayor and Aldermen of the City of London to set the price upon all coals, commonly called sea-coals, imported into the Port of London from Newcastle and the parts adjacent thereunto . . . [Jan. 24, 1737.] (Sm. folio, pp. 8.) Pr. 1738.
108. AN ACT for further and more effectually preventing the wilful and malicious destruction of collieries and coal works. [Nov. 15, 1739.] (Sm. folio, pp. 4.) Pr. 1740.
109. AN ACT to explain, amend, and enlarge an Act made [1665] . . . intituled, An Act for regulating the measures and prices of coals. [Dec. 1, 1743.] (Sm. folio, pp. 6.) Pr. 1744.
Two copies.
110. AN ACT for declaring valid such acts as have been done by Thomas Paulin, as one of the principal land coal-meters of the City and liberty of Westminster, between the twenty-ninth day of September last and the eighth day of November following. [Nov. 18, 1746.] (Sm. folio, pp. 6.) Pr. 1747.
111. AN ACT for the better securing His Majesty's duties upon coal, culm, and cinders, exported beyond sea. [Nov. 29, 1748.] (Sm. folio, pp. 6.) Pr. 1749.
112. AN ACT for allowing under certain restrictions until the first day of August, 1806, the bringing a limited quantity of coals, culm, or cinders, to London and Westminster by inland navigation. [July 12, 1805.] (Sm. folio, pp. 6.) Pr. 1805.

The object of the Act is to give the Commissioners of Customs power "to erect and maintain . . . a stone or post on or near to the Towing path of the Grand Junction Canal, at or near the North East Point of Grove Park . . . And be it further enacted, that no greater quantity of any such coal, culm, and cinders than fifty thousand tons in the whole shall be brought by means of the said canals nearer to London than the said stone or post . . ."

PART II.

ENGLISH BOOKS.

4.—GENERAL WORKS, XVIIITH CENTURY.

113. SAVERY (THOMAS). The Miners' Friend; or, An Engine to raise water by fire, described, and of the manner of fixing it in the mines . . . London: Printed for S. Crouch . . . 1702. (8vo., pp. [16], *folding plate*.) Reprinted [for the Commissioners of Patents of Inventions] by Eyre & Spottiswoode, 1858.
114. HETON (THOMAS). Some account of mines, and the advantages of them to this Kingdom. With an appendix relating to the Mine-Adventure in Wales . . . (Sm. 8vo., pp. xxiv., 178.)
John Wyatt, 1707.

Has the book-plate of John Towneley (1697-1782), the translator of *Hudibras* into French, and a note inserted "Mr. Banks presents his compliments to Mr. Towneley and returns his book upon the Cardigan-shire mines with many thanks for the loan of it. He believes it to be very scarce as he never saw a copy of it before. Soho Square, Dec. 20, 1775."

115. C (J.). The Compleat Collier; or, The Whole Art of Sinking, Getting, and Working Coal-Mines, etc. As is now used in the Northern parts, especially about Sunderland and Newcastle, by J.C. Printed for G. Conyers, 1708. (8vo., pp. vi., 50.) [Reprinted by M. A. Richardson.] *Newcastle, 1846.*

Second copy lent by the Newcastle Public Libraries Committee.

This reprint is beautifully produced on Mr. Richardson's private press and is included in the "Miscellaneous" volume of his "Reprints of Rare Tracts . . . chiefly illustrative . . . of the Northern Counties." The original is excessively scarce and is the first printed work on the art of coal-mining. It is in the form of a dialogue and sheds "considerable light upon almost every branch of mining, as carried on in the north at this early period," says Mr. R. L. Galloway.

116. [STRINGER (MOSES)], *M.D.* Opera mineralia explicata; or, The Mineral Kingdom within the dominions of Great Britain display'd. Being a compleat history of the Ancient Corporation of the City of London, of and for the mines, the mineral and the battery works. With all the original grants, leases, instruments, writs of privilege and protection, by sea

and land, from arrest (except in the mineral courts); . . .
(8vo., pp. xii., 308.) *Jonas Brown* [1713].

The author in his introduction is at pains to distinguish this City of London Mining Corporation from the Company of Mine-Adventurers founded by Sir Humphrey Mackworth whose misfeasance created such a stir in 1710 (see Nos. 83-90). This city corporation was founded by royal charter in 1574, which was renewed by James in 1609. Here are presented all the rights and privileges as well as the history of the Society of which the author is a leading shareholder. He describes himself as "Her Majesty's Chymist and Mineral Master-General." In 1699 he published a 4to. volume, "English and Welsh Mines and Minerals."

117. MURRAY (*Sir ALEXANDER*). An Abstract of an essay on the improvement of husbandry and working of mines, in a letter to the Rt. Hon. Sir Robert Walpole . . . (8vo., pp. vi., 80; *two folding plates*.) *J. Roberts*, [1733].

118. STEER (*GEORGE*). The Compleat Mineral Laws of Derbyshire, taken from the Originals . . . and all their Bills of Plaintiff, Customs, Cross-Bills, Arrests, Plaintiff's Case or Brief, *etc., etc.* (12mo., pp. viii., 172.) *Henry Woodfall*, 1734.

The editor states in his preface that the liberties, laws, and customs of mines are "very hard to come at from the Originals, and the rest lie dispers'd in written Copies, and those, when found, very uncertain, scarce, and contradictory, and of little or no Advantage, because most of them are wrote in Hands you cannot read."

119. BARBA (*ALVARO ALFONSO*). Collection of Rare and Valuable Treatises, on Metals, Mines, and Minerals. Parts I. and II. containing the Art of Metals, written originally in Spanish by Alvaro Alonso Barba, translated by the Earl of Sandwich, in 1669. Part III. containing that Invaluable Piece of G. Plattes, *viz.*, a Discovery of all sorts of Mines from Gold to Coal. Part IV. Houghton's Compleat Miner. (12mo., pp. xii., 216, iv., 68.) *C. Jephson*, 1738.

120. *Second Edition*. (12mo., pp. xviii., 320.) *J. Hodges*, 1740.

Barba's work (see No. 22) is valuable for containing a full account of the ancient Peruvian method of amalgamating ores rich in native silver. It also includes (according to John Percy) an excellent account of the Kongsberg silver-smelting process, founded on the author's observations in Bolivia, and of the Cazo or Caldron process. The work is fully discussed in Hoefler's *Histoire de la Chimie*, vol. II. (1809), pp. 305-11. Gabriel Plattes' book is the first English book on general mining, and a first edition with the title "A Discovery of Subterranean Treasure" is included in the exhibition (see No. 62).

121. HOOSON (WILLIAM), *a Derbyshire Miner*. The Miners Dictionary. Explaining not only the Terms used by Miners, but also containing the Theory and Practice of that most useful Art of Mineing, more especially of Lead-Mines. (8vo., pp. 230, *unpaged*.) *Wrexham: Printed for the author, 1747.*

This work was attacked in D. W. Linden's *Three Letters* (see No. 123). Contains a list of 48 subscribers including Mr. John Halliwell of Wigan.

122. HARDY (WILLIAM), *Writer on Mining*. The Miner's Guide; or, Compleat Miner. Containing: 1. A succinct Account of a Vein in the Earth. 2. The Customs, Laws, and Articles of the High and Low Peak . . . 3. An Account of the Load-Stone, with the first invention of the Compass; to which is joint Houghton's Dialling and Levelling, illustrated with a variety of additional Examples. 4. Several curious and useful Tables, in most Branches in Mining, by Inspection; useful to both Masters, Overseers, and others concerned in the Mineral Way. 5. A brief Account of the Assaying of the two Metals, Lead and Copper . . . (8vo., pp. viii., 236; *with ten diagrams and an extra one on the blank fly-leaf*.) *Sheffield: Pr. by Francis Lister, 1748.*

This interesting work is unexpectedly rare, the reason being, no doubt, that most copies were worn out in use by practical miners. The copy exhibited has obviously done good service and bears several early signatures. The earliest, which is in rhyme, is worth quoting: "In 1749 Samuell Butler, this Book was mine, and I can Look on this when I Goe or Ride, for this I call yt miner gide, and in my mind it is named Right for it is plane to all mans sight; the woork man needs not posle his Brane, nor the Mastr that mentane. Look on this Book and it will deRect if you Be not a mear subject. Samuell Butler." "Conr. Bulcel" in 1753 records his purchase of two mines and "tow gines" (i.e., engines) which he is to pay for in two instalments, one gine in a month's time "and the other gine the first masar at ethar mine" (? the first measure at either mine). Pages 110-118 are occupied by a poem by Edward Manlove, steward of the Wirksworth wapontake, on "The Liberties and Customs of the Lead-Mines within the Wapontake of Wirksworth . . . Derby." Though worn the copy is perfect except for a mutilation of the last leaf. New editions were published in 1762 and 1810.

123. LINDEN (DIEDERICK WESSEL), *M.D.* Three Letters on Mining and Smelting; in which a method is laid down, whereby these useful Sciences may be generally improved; with a fourth Letter setting forth a Discovery of an easy

method to secure Ships' Bottoms from Worms. (8vo., pp. 96.) *Geo. Keith, 1750.*

TWO COPIES. According to a note in John Weale's copy the author "was a German who had settled at Holywell in Flintshire, and pretended to a great skill in the use of the mining rod . . ." (Sotheran's Catalogue, 1927, No. 806.) The first Letter deals with "the present state of Mining in North Wales."

124. HALES (STEPHEN), *Physiologist and Inventor, 1677-1751*. A Treatise on Ventilators. In two parts. (8vo., pp. v., 350, plates.) *R. Manby, 1758.*

Includes a section on "the happy effects" of ventilators "in refreshing the noxious air of ships, hospitals, and mines." The author "a poor, good primitive creature" according to his neighbour Horace Walpole, was one of the foremost scientists of his time, a zealous parish priest, and a most versatile man.

125. HORNE (HENRY). Essays concerning Iron and Steel: the First containing Observations on American Sand-Iron; the Second, Observations founded on Experiments on Common Iron-Ore, with the methods of reducing it . . . and an Appendix, discovering a more perfect method of Charring Pit-Coal, so as to render it a proper Succedaneum for charred Wood-Coal. (Sm. 8vo., pp. iv., 224.) *T. Cadell, 1773.*

126. BARRAS (EDWARD). Description of boring with a brake for coal-mines or minerals, etc. With plate. *Extract from "The London Magazine,"* March, 1778. [P. xi.]

127. PRYCE (WILLIAM), *M.D., of Redruth*. Mineralogia Cornubiensis: a Treatise on Minerals, Mines, and Mining, containing the Theory and Natural History of Strata, Fissures, and Lodes, with the methods of Discovering and Working of Tin, Copper, and Lead Mines, and of Cleansing and Metalizing their Products . . . ; with An Explanation of the Terms and Idioms of Miners. (Folio, pp. [xxxiv.], xvi., 322; with portrait by Basire, seven folding plates, and two folding tables.)

For the Author, 1778.

Copy contains the book-plate and signature (in pencil) of Sir Edward Smirke, the mining historian, and vice-Warden of the Stannaries of Cornwall and Devon, 1843-1870.

128. [BRITISH TAR COMPANY, 1782.] Account of the qualities and uses of coal-tar and coal varnish, with certificates from shipmasters and others. (8vo., pp. 44.)
T. and G. Wilkie, 1785.

The first exploitation of the Earl of Dundonald's process for extracting tar from coal, discovered 1780.

129. GEISSAU (A. F. v.). Essay on the Construction and Use of a Mine-Auger. To which are added, the description of an Earth-Borer, for Country Gentlemen and Farmers, and an improvement of the Well-Borer of Mersennus. Transl. by W. J. McNeven, M.D. (8vo., pp. xi., 44.; with three plates [two folding]).
W. Richardson, 1788.

The translator is the well-known United Irishman.

130. WATSON (RICHARD), *Bishop of Llandaff*. Of pit coal, being Essay VIII. of Watson's Chemical Essays, 1793, pp. 317-368.

One of the most notable researches of this distinguished chemist, first published in 1781. It was not only the first comparative analysis of different sorts of coal but suggested the condensing of the volatile products from coke-ovens, which nearly a century later was to become of great industrial importance.

131. CURR (JOHN), *of Sheffield*. The Coal Viewer and Engine Builder's Practical Companion. (4to., pp. 96; with five folding plates.)
Sheffield: Printed for the Author, 1797.

Second copy lent by the Newcastle Libraries Committee.

This interesting work gives the first printed account of an iron railway, pp. 23-9, treating of "Cast Iron Rail Roads," while one plate illustrates the iron plates, sleepers, and points, and another the carriage used on them, with details of construction. "The making and use of rail-roads and curves were the first of my inventions, and were introduced at the Sheffield Colliery about 21 years ago; they are doubtless a great acquisition in rendering the article of conveyance much easier and less expensive, and it is not the least convincing proof of their being so, that they have been generally imitated and made use of in most collieries for the last three years, especially in the southern parts of the kingdom."—*Preface*. Benjamin Outram is generally credited as having first introduced iron railways at the Butterley Ironworks in 1793, or 17 years after the invention alleged to have been made by John Curr; but this and other notable achievements in mining receive full acknowledgement in Mr. R. L. Galloway's *Annals of Coal-Mining*. John Curr is another notable mining engineer who receives no mention in the *Dict. of Nat. Biog.*

PART II.

ENGLISH BOOKS.

5.—COAL PRICES AND TAXATION.

134. ENQUIRY. An Enquiry into the reasons of the advance of the price of coals, within seven years past. In which are shewn, The great impositions laid on the several consumers by a monopoly of that commodity . . . (8vo., pp. 38 ; [P. 6].)
E. Comyns, 1739.
135. [CAULIN ()].] The frauds and abuses of the coal-dealers detected and exposed: in a letter to an Alderman of London. (8vo., pp. 26.)
M. Cooper, 1743-4.
136. *Also, The Third Edition.* (8vo., pp. 34.) *M. Cooper, 1747.*
The third edition contains some interesting autograph comments dated 1763, and in the same hand is the note: "Supposed to be wrote by Mr. Caulin who kept a Gown Ware-house in Tavistock Street, Covent Garden, & to support his place of Coal-Meeter." The persons who bought the whole ship-load of coal were called "crimps" and several Acts dealing with "abuses" single them out as particularly guilty of wrong dealing, so that the term became a by-word for chicanery. "Dec. 6, 1763. Mr. Randel Lighterman told me that in the coal trade at present there were but seven crimps" says the annotator of this book. The book itself deals with "all manner of villainies" and makes diverting reading. Half-a-century earlier, of course, "this business was carried on in a very different manner"! "The Dealers . . . had not then lost their ancient name of Wood-mongers . . . the pompous Title of Coal-Merchant had not been thought of."
137. STEVENSON (JOHN), *of Gravel Lane.* Observations on the Coal-Trade in the port of Newcastle-upon-Tyne, with a comparative view of the two bills brought into the House of Commons last Session . . . (8vo., pp. iv., 80 [P. 6].)
For the Author, 1789.
In 1778 Stevenson published "Four letters concerning the slavery of the colliers, coal-bearers, and salters in Scotland."
138. FROST (JOHN), *citizen of London.* Cheap coals; or, A Countermine to the minister and his three city members. (8vo., pp. 74.)
T. Parsons, 1792.
An attack on Pitt's continuance of the duty on coal. [P. XI.]

139. HARDIE (DAVID). Taxation of coals, considered in an address to the inhabitants of the cities of London and Westminster, and all places supplied with coals from the port of London. (8vo., pp. 42.) *London, 1793.*
 "The Duty on Coals at London is upwards of one hundred per cent. of the prime cost." [P. 6.]
140. EDINGTON (ROBERT). An Essay on the Coal Trade, with strictures upon the various abuses now existing; . . . the impositions to which the Dealers and Consumers are subject; with hints and suggestions for the amelioration . . . and the remedies for the various abuses . . . (8vo., pp. 102 [P. 6].) *Lewis & Co., 1803.*
141. *Second Edition.* A Treatise on the Abuses in the Coal Trade . . . (8vo., pp. xii., 132.) *W. Smith, 1817.*
 A full analysis of coal trade (especially the carrying trade) economics. The second edition was published by subscription, no less than 200 names being listed.
142. HILLS (ROBERT), *Coal-Merchant, of London.* The Causes of the present high prices of coals, in the Port of London, explained; in a letter to the editor of *The Times*. (8vo., pp. 34.) *Printed for the Author, 1814.*
143. OBSERVATIONS. Observations on the Duty on sea-boure coal and the peculiar duties and charges on caal, in the Port of London. (8vo., pp. 24.) *Longman, 1830.*
N.B.—Items relating to coal prices are scattered in other Sections, reference should be made to the Sections of Manuscripts and Acts of Parliament particularly. Complaints about rising prices seem to have begun as early as 1590, recurring during Commonwealth and again during the Restoration; they seem to have gone on increasing in vehemence ever since.

PART II.

ENGLISH BOOKS.

6.—SAFETY MOVEMENT, EARLY XIXTH CENTURY.

145. TROTTER (THOMAS), *M.D.* A Proposal for destroying the fire and choak-damps of coal-mines: and their production explained on the principles of modern chemistry; addressed

to the owners and agents of coal-works, etc. (8vo. pp. 48.)
Newcastle, 1805.

On retiring from Naval service Dr. Trotter settled down in Newcastle, and owing to the prevalence of mining accidents was induced to make a chemical study of fire-damp. He followed up his first essay with another in the following year (1806): "A Second Address to the Owners and Agents of Coal Mines on destroying the Fire and Choak Damp." [P. 17.]

146. BUDDLE (JOHN). The First Report of a Society for Preventing Accidents in Coal Mines, comprising a letter to Sir Ralph Milbanke, Bart., on the various modes employed in the ventilation of collieries, illus. by plans and sections. (8vo., pp. 28; with 12 plans.) Newcastle, 1814.

John Buddle (1773-1843), a notable mining engineer, succeeded his father as manager of Wallsend Colliery in 1806. He made many efforts to reduce mining accidents and following a disastrous explosion at Felling Colliery in 1813 helped to found the Society above given. He drew up the First Report, which describes a method of ventilation adopted by him, and discusses the problem of lighting. The indirect result of this Report was the evolution of the safety lamp through more or less cumbrous forms until it reached the comparative perfection of the lamps designed by Clanny, Stephenson, and Davy. See Nos. 150, 151, 152.

147. RYAN (JAMES). A Letter from Mr. James Ryan, director of coal mines . . . on his method of ventilating coal mines, for which he received the gold medal and 100 guineas from the Society for the Encouragement of Arts, Manufactures, and Commerce, Adelphi. (8vo., pp. 32; four folding plates.) Printed for the Society, by R. Wilks, 1816.

Two Copies. James Ryan, a celebrated Irish mining engineer, who is one of the remarkable omissions from the *Dict. of Nat. Biog.*, joined John Buddle (see No. 146) in founding the Society for Preventing Accidents in Coal Mines. His system of ventilation was first propounded in 1806, but though he gave a series of lectures at Newcastle he failed to induce any owner to adopt it. In 1816, however, his efforts were rewarded by the Society of Arts, as above indicated.

148. PARIS (JOHN AYRTON). On the accidents which occur in the Mines of Cornwall in consequence of the premature explosion of gunpowder in blasting rocks . . . the methods . . . for preventing it . . . To which is appended a schedule of the names, circumstances, and injuries of a large proportion of those Miners who . . . are in consequence, blind or totally disabled. (8vo., pp. 30, 14, frontis. [P. 4].) Penzance, [1817.]

149. C. (W.). The Condition and treatment of the children employed in the mines and collieries of the United Kingdom . . . compiled from the Appendix of the First Report of the Commissioners appointed to inquire into this subject . . . (8vo., pp. 94; *with illustrations.*) *Wm. Strange, 1842.*

Perhaps the most remarkable illustration is on page seven, depicting a woman winding up two children sitting interlegged facing one another on the bar or "clatch-iron" from which the corf is suspended. The winch is an ordinary well-winch and the children are at the mercy of the winder in addition to the precariousness of their perch. [P. 6.]

PART II.

ENGLISH BOOKS.

7.—THE SAFETY LAMP.

150. CLANNY (WILLIAM REID). On the means of procuring a steady Light in Coal Mines without danger of Explosion. *In Philosophical Transactions, 1813, pp. 200-205. 1813.*

Dr. Clanny completed the construction of his first safety lamp in 1812 and fully described it in a paper read before the Royal Society in 1813. This is the first published account. A more general account was published by Dr. Clanny in a letter to the *Polytechnic Review* in 1844 and reprinted as a pamphlet in 1845. A copy of this pamphlet is also exhibited.

151. DAVY (*Sir HUMPHREY*), *F.R.S.* Practical hints on the application of wire-gauze to lamps, for preventing explosions in coal mines. (Sm. 8vo., pp. 12; *illustrations.*) *W. Bulmer, 1817.*

The first popular description and scientific explanation of the wire-gauze safety-lamp (see No. 152.)

152. DAVY (*Sir HUMPHREY*), *F.R.S.* On the Safety Lamp for Coal Miners; with some researches on Flame. *First edition.* (8vo., pp. viii., 148.) *R. Hunter, 1818.*

The first full account of the wire-gauze safety lamp invented by Sir Humphrey Davy, and including a summary of all the researches made by him on the subject of explosions leading up to the invention, with a folding copperplate of the lamp and its details. W. R. Clanny invented a safety lamp in 1813, but its clumsiness and intricacy made it impracticable. George Stephenson anticipated Davy's invention of a wire-gauze protected lamp by a few months, but Davy's invention was the outcome of a brilliant series of researches on the nature of flame. He was the first to demonstrate and state the reason *why* a cylinder of wire-gauze surrounding the flame afforded protection from explosion.

153. UPTON & ROBERTS. Important information addressed to coal mine proprietors, ship owners, gas companies, distillers, and the public in general. The insecurity of Sir H. Davy's lamp demonstrated by a series of chemical experiments, and the perfect security of Upton & Robert's new safety lamp, proved by the same chemical tests. (8vo., pp. 24, [P.6].)
G. Allen, 1833.
154. HALL (THOMAS YOUNG). Safety lamps. A paper read at the monthly meeting of the Northern Institute of Mining Engineers, held on Friday, the 5th August, 1853, in the lecture room of the Literary and Philosophical Society, Newcastle. (8vo., pp. 16; illus.) Newcastle, 1853.
155. A series of five original Miner's Lamps, by Clanny, Stephenson, Davy, and Upton & Roberts.

Lent by Messrs. J. H. Naylor, Ltd., Wigan.

PART II.

ENGLISH BOOKS.

8.—EARLY SELECT COMMITTEES OF INQUIRY.

157. REPORT from the Committee appointed to consider the state of the Coal Trade of this Kingdom. (Folio, pp. 206, 42.)
23rd June, 1800.
158. REPORT from the Select Committee of the House of Lords appointed to take into consideration the state of the coal trade in the United Kingdom, with the minutes of evidence before the Committee . . . (Folio, pp. iv., 384, *folding plates* [1 coloured], map.)
15th June, 1829.
159. SYKES (JOHN), of Newcastle. The Evidence taken before the Select Committee of the House of Lords, appointed to take into consideration the state of the Coal Trade in the United Kingdom, together with the duties of all descriptions, and charges affecting the same, as well in the Port of London as in the several other ports of the United Kingdom; to which is now first added, a list of explosions and inunda-

tions which have occurred in the coal mines of Northumberland and Durham; with notes and remarks. (8vo., pp. 100, *plates and map.*)
Newcastle, 1829.

A full report of the evidence reprinted from a Newcastle newspaper with the additions indicated.

160. REPORT from the Select Committee of the House of Lords appointed to take into consideration the state of the coal trade in the United Kingdom; with the minutes of evidence. (Folio, pp. 288, 6 plates [2 folding].) 2nd February, 1830.
161. REPORT of the Select Committee [of the House of Commons] on the state of the coal trade. (Folio, pp. 398, 3 *plates* [2 *folding*].) 13th July, 1830.
162. REPORT from the Select Committee on accidents in mines; together with the minutes of evidence . . . (Folio, pp. xii., 362, 15 *plates*, 11 *folding*.) 4th September, 1835.
163. REPORT from the Select Committee on the state of the coal trade; together with the minutes of evidence . . . (Folio, pp. xliv., 286.) 2nd August, 1836.
164. REPORT from the Select Committee on the Coal Trade (Port of London) Bill; with the minutes of evidence, Appendix, and Index. (Folio, pp. x., 268.) 13th June, 1838.

These are the earliest Parliamentary enquiries into the conditions of the coal trade and are now scarce and valuable.

PART III.

MISCELLANEOUS BOOKS.

166. EVRARD (ALFRED). *Traité pratique de l'exploitation des mines* [with atlas of sections, plant, tools, etc.] (*Texte* 8vo., pp. viii., 376; *Plates Atlas* folio, 2 vols., 69 folding plates.)
Mons, 1879.
167. FENWICK (THOMAS). *A Theoretical and practical treatise on subterraneous surveying and the magnetic variation of the Needle. First edition.* (8vo., pp. [xvi.], 208; *with 7 folding plates.*)
Newcastle, 1804.

Second copy lent by the Newcastle Libraries Committee.

168. HAWKINS (*Sir CHRISTOPHER*). Observations on the tin trade of the ancients in Cornwall, and on the "Ictis" of Diodorus Siculus. (Roy. 8vo., p.p. 80, illus.)
J. J. Stockdale, 1811.
169. HERON DE VILLEFOSSE (A. M.). De la Richesse Minérale. (*Text*, 3 vols. 4to. ; *Atlas* : 1a. folio, 63 plates.) Paris, 1810-1819.
170. HUTCHINGS & ROSENFELD. The Miners' Own Book, containing correct illustrations and descriptions of the various modes of California mining including all the improvements introduced from the earliest day to the present time. (8vo., pp. 32 ; with many illustrations.) [P. 17.]
San Francisco : Hutchings and Rosenfeld, 1858.
171. KIRSOPP (JOHN), *the younger, F.G.S.* Northumberland and Durham coalfield : map and plotted vertical sections of strata ; selected, drawn, and arranged by J. K. (Large folio, 19 sheets, 1 map.)
Newcastle, 1907.
172. ——— Supplement to plotted vertical sections . . . comprising full details of past and present ownership of the mineral royalties, nature and characters of the Coals . . . etc. (Fcp. folio, pp. 72, map.)
Newcastle : Published for the Author, 1908.
173. PONSON (A. T.). *Traité de l'exploitation de mines de houille, ou Exposition comparative des methodes employées en Belgique en France, en Allemagne, et en Angleterre . . .* (*Text*, 6 vols., 8vo. ; *plates* 2 vols., folio pl. 68 and 78.)
Liege and Paris, 1867-71.

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