A

GENERAL VIEW

OF THE

COAL TRADE OF SCOTLAND,

&c. &c. &c.

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OF THE

COAL TRADE OF SCOTLAND,

CHIEFLY THAT OF THE

RIVER FORTH AND MID-LOTHIAN.

TO WHICH IS ADDED,

AN INQUIRY

INTO THE CONDITION OF THE WOMEN WHO CARRY COALS UNDER GROUND IN SCOTLAND, KNOWN BY THE NAME OF

BEARERS.

WITH AN APPENDIX,

IN WHICH A REVIEW OF THE TRADE IS TAKEN TO THE PRESENT PERIOD, SINCE THE TREATISE WAS FIRST PUBLISHED IN 1808; AND A STATEMENT GIVEN OF THE STEPS LATELY TAKEN BY GOVERNMENT, WITH THE VIEW OF PLACING THE COAL TRADE UNDER AN EXCISE: THE EFFECTS OF WHICH ARE FULLY CONSIDERED.

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1812.

TO

JOHN FRANCIS ERSKINE OF MAR,
ESQUIRE,

PROPRIETOR OF THE ALLOA COLLIERIES,

THE FOLLOWING TREATISE,

RELATIVE TO THE COAL-TRADE OF SCOTLAND,

IS INSCRIBED,

WITH SENTIMENTS OF THE HIGHEST RESPECT,

BY

HIS MOST OBEDIENT SERVANT,

Alloa, August 24. 1808.

ROB^{T}. BALD.

PREFACE.

THE following short Treatise relative to the COAL-TRADE of SCOTLAND, is with much diffidence presented to the Public.

I am sensible, that the style in which it is written, is far from that kind of composition which is expected from those whose writings are to meet the public eye: but the avocations of a laborious life will, it is hoped, be admitted at least as some extenuation, if not an excuse.

I trust, however, that the statements which are adduced will be found correct, at least sufficiently so for a general view of the subject, without entering into very minute calculations.

Having been engaged from an early period of life in the operations of collieries, many of the statements are made from personal knowledge of the subject.

The authorities which I have consulted upon the occasion are,

1. Records of the Family of Mar, in particular a collection of papers connected with the Coal-Trade, left by John Earl of Mar, now in the possession of John Francis Erskine of Mar, Esq;

2. Brand's History of Newcastle.

3. Encyclopædia Britannica.

4. Sta-

4. Statistical Account of Scotland, by Sir John Sinclair.

After the Work was sent to the Press, I was favoured with the perusal of a Tract, published by Lord DUNDONALD in the year 1793, (which is not now to be found in the booksellers' shops), in which I was much gratified to find, that his Lordship had discussed several of the points I have treated of; in particular, the bad system pursued in the Forth Collieries, of separating the coals into Great-coal, Chews, Lime-coal, and Panwood,—the alteration of which system is one of the principal improvements suggested in the following Treatise, and to which I beg leave to solicit particular attention. His Lordship also takes notice of the slavery endured by the women who carry coals under ground.

I shall be happy, if what I have stated in the following sheets shall meet the public approbation, and shall tend to produce any improvements in the Scottish Coal-Trade, for the interest of all concerned.

R. B.

CON-

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A

GENERAL VIEW

OF THE

COAL TRADE OF SCOTLAND.

CHAP. I.

Preliminary Observations.—Price of Coals in Edinburgh and Glasgow.—State in which Collieries were a Century ago.

IN the list of articles of household expenditure in Scotland, that of Fuel bears a considerable proportion in the monthly expences of a family; and in our cold, damp, and variable climate, during winter, the comfort of a good cheerful fire is indispensably requisite to our health, independently of its use in culinary purposes, and those trades, upon a small scale, where a certain degree of heat is so very necessary.

The using of Peat as fuel is daily decreasing, as the spirit of agriculture spreads; the husbandman, now finding by experience, that it is more for his interest to buy Coals at a very high price, than waste his time and labour in digging peat, as that time and labour come to much better account, when expended in improving his farm.

Pit-coal is therefore every day coming more and more into use; and its intrinsic value to Britain, in a civil and political point of view, is so obvious, as almost to preclude the bringing forward any illustrations upon these heads.

Observations have been made by able and well informed men upon this subject; but as the writer has now, for a number of years, been closely engaged in the operations of collieries in Scotland, he begs leave to contribute his share of information upon so important a matter.

The occasion of the following remarks upon the Coal Trade, arose from the great advance which has taken place in the price of coals

coals in Edinburgh within these few years; an advance of at least *cent. per cent.*,—which bears hard on the middling classes of society, but more severely upon mechanics, labourers, and the lower orders of the community.

That the price of coals is advanced, is what might have been naturally expected from the great increase of the price of labour, and of all materials used at collieries; while, at the same time, it is certain, that the coalmasters have by no means reaped that advantage, which is generally believed they have done, from these advances.

One circumstance respecting the price of coals in Edinburgh, is very remarkable; and it is surprising that no person, fully acquainted with all the facts connected with it, has made a thorough investigation of the matter; and it is this,—that the inhabitants of Glasgow have coals delivered at their houses at about one-half of the price paid by the inhabitants of Edinburgh; that is, they are in Glasgow 7 d., in Edinburgh they are 1 s. *per cwt.*, and the Glasgow coals are allowed to be

fully equal in quality, if not superior, to those in the vicinity of Edinburgh.

Before inquiring into the cause of this great difference in price, we shall take a review of the Coal Trade in Scotland, particularly from the beginning of last century, from which some very curious facts will appear, respecting the price of coals in the river Forth, as connected with the supplying of fuel to the capital, and North of Scotland.

The first authentic accounts we have of coal being wrought in Scotland, was in the lands belonging to the Abbey of Dunfermline, in the year 1291,—a period not very remote.

The collieries then opened were drained of their water by mines or levels brought up from low ground, until they intersected the bed of coal.

The coal fields thus drained, adjoining the river Forth, being very limited, recourse was had to water machinery, and the first account we have of these machines, is in the year 1600, when a patent was granted for twenty-one

twenty-one years, to a predecessor of the Balcarras family, for his invention of a machine for drawing water from collieries.

A short time after this, the collieries at Culross in Perthshire appear to have been the most extensive then in Scotland, as an act was passed in the year 1663, 1st Charles II., chap. 17., constituting the Culross chalder of coals the standard for Scotland. From the profits of these collieries the Abbey of Culross is said to have been built.

We find, that in the year 1690, water-wheels were commonly employed, having a large axle across the pit mouth, over which was an endless chain of two or three tires reaching to the coal; to these were attached a number of oblong wooden buckets or troughs, in an horizontal direction, which were continually filling at the bottom and discharging at the top, as they turned over the great axle-tree. When there was abundance of water for the wheel, the full complement of buckets was placed upon the chains, but as the water decreased, a proportional number of buckets

was taken off, which was the only plan for regulating this rude machine.

Although each bucket was full of water as it was lifted from the pit-bottom, none of them were more than half full at the discharging point near the axletree, owing to the leakage of the joints, and vibrations of the chains, so that the water was constantly pouring down the pit like a deluge.

The keeping of this machine in repair was very expensive. The chains for a pit of eighty yards deep cost then L. 160; and, when a bolt gave way, the whole set of chains and buckets fell to the bottom with the most tremendous crash, and every bucket was splintered to a thousand pieces.

It was for these machines that many of the large artificial collections of water we now have in coal districts were formed, and that at a very great expence.

When water could not be procured, the same kind of machinery was used upon a small scale, moved with horses, which was comparatively very expensive, and could only draw water

water from a small depth; of course, all those fine fields of coal, where neither a day level nor water machinery could be employed, had to remain useless to their owner and the public, and that to all appearance for ever, as there was no other device for getting clear of the water.

In the year 1708, when a plan was projected in Scotland, for drawing water from coal mines, by means of wind-mills and pumps, it appears that there was no person in Scotland capable of giving advice upon the matter, or of executing the work, except the mill-wright of Montrose*, who had been sent at the expence of that town to Holland, in order to inspect the machinery of that country. Of this circumstance, the town of Montrose has reason to be proud. And it was suggested, that if this mill-wright could not be procured, application should be made to the *Mechanical Priest in Lancashire* †, for his advice.

Wind-mills were accordingly erected upon several collieries, but although they were

* John Young.

† Records of the Family of Mar.

powerful machines, they were very irregular, so that in a long tract of calm weather, the mines were drowned, and all the workmen thrown idle. From this cause, the contingent expences of these machines were very great; besides, they were only applicable in open and elevated situations.

In the year 1709, John Earl of Mar, who not only paid the most minute attention to the improvements of his collieries in Clackmananshire, but also studied the general improvement of Scotland on a great and extensive scale, with the most liberal views, sent the manager of his works to Newcastle, to inspect the machinery of that district, and learn the mode of conducting colliery-operations in every department.

From his report, it appears, that the machines then in use were water-wheels, and horse-engines, with chain-pumps; the common depth of the pits was from twenty to thirty fathoms, and a few from fifty to sixty fathoms: the expence for sinking one of these was about L. 55,

and

and the machine for drawing the coals cost only L. 28.

It appears, that when it was requisite to draw water from the depth of thirty fathoms, two pits were sunk at a little distance from each other; one pit was made thirty fathoms deep, the other only half that depth. One machine drew the water half way up the deep pit, when it was poured into a mine which communicated with the bottom of the other pit; from this the water was raised to the surface by another machine. In deeper mines, a third pit with a third machine was resorted to.

In Scotland, however at that time, the machinery was more powerful, as water was raised at once from the depth of forty fathoms by the chain and bucket, as before described.

Barlow's machine is also taken notice of, as being in use at Newcastle; but the steam-engine is not even hinted at.

The colliery which was then upon the greatest scale at Newcastle, put out annually 25,000 chalders of coals, and made of clear

profit

profit L. 5000 *per annum*, a great amount, when compared with the present value of money. The collieries then going were few in number: at present, no less than sixty-six names of great collieries stand upon the lists at the Coal Exchange, London.

At that time, waggon-ways were in use at Newcastle; but they were not introduced into Scotland till a considerable time afterwards.

The Earl of Mar having procured drawings of the Newcastle machinery, wished to introduce such parts of it as he conceived might be useful in his works; for this purpose, he, in the year following, viz. in 1710, engaged an engineer * from Derby, in the county of Derby, to visit and inspect his collieries in Clackmananshire, and to give plans for improving the machinery, particularly for drawing water, which was the great object in view with all coalmasters. The specified sum which the engineer was to have for his trouble was L.50 Sterling money; and he accordingly came to Alloa, where he remained for some days,

* George Sorocould.

days, and left a report, and his opinion of what he conceived best to be done. Among other things, he advised the substituting of pumps in place of chains and buckets. But when he went away, still there could be found no person in Scotland to put his plans in execution. The chain and bucket engine was, however, superseded by the water-wheel with cranks and beams working with pumps. This machine is the most simple of all the hydraulic engines, and from the simplicity of construction, it remains in common use to the present day. It is so easily kept in repair, that any colliery which is drained by it, is nearly upon a footing with a level free colliery.

Attempts have been made to improve this machine, but the results have not been very favourable.

The sinking of pits in Scotland at this period, was the most tedious and severe work that can be imagined; the sinking of an engine-pit requiring several years for its accomplishment, as the beds of strong hard sandstone are much thicker and more abundant than

than in the English coal field. Gunpowder was not then used in sinking; for although it seems to have been applied to this purpose in England, about the year 1680, it was not in common use for many years afterwards; and it is indeed astonishing to think how it was contrived to sink pits through strata, upon which we find, that the best tempered steel pick can make no impression. The mode then practised in sinking through hard strata, was by a set of tools termed *stook and coil*, or *stook and feathers*. The manner of application was as follows:

In the first place, a bore-hole of from two to three inches diameter, was put down several feet, by means of a steel auger; two long slips of iron named the *feathers*, were placed down each side of the hole, and betwixt these a long tapering wedge, termed the *stook*, was inserted; this wedge was driven down with ponderous hammers, till the rock was wrenched asunder. This was a powerful instrument, but its operation was very slow and expensive. We have had no opportunity of seeing this mode

mode in practice. The above account is taken from the tradition of old colliers and sinkers, who report, that the progress made in sinking through hard stone was so very slow, that the coalmaster frequently inquired if the sinkers were *lything* the water, that is, making it of a thick and muddy colour by their operations.

This difficulty of sinking pits was the occasion of the coal being wrought far under the dip of the engine-pits, which was effected by either *damming* and *laving*, or by *sloping pumps*. From this mode of working, many disasters occur to the present collieries, by coming upon old wastes full of water, where it was conceived no wastes could be, thus endangering the mens' lives, and drowning the colliery.

These facts are stated to shew, that collieries, both in England and Scotland, were only in their infancy exactly one hundred years ago, which is an important point to be kept in view.

The

The colliery operations upon the crop or verge of the coal, were uniformly continued until there was no cover of rock above the coal, and the consequence was, that the earth sunk down along the whole stretch of the workings, and admitted vast quantities of water to the mines every rainy season, over and above the common and natural growth of the strata, and which to this day remain an almost overpowering load upon many of the best coal-fields, where the most powerful machinery is at present employed to keep the mines dry, and this water will continue to occasion an excessive expence on such works while they exist; for instance, there is one very valuable colliery, where the growth of water arising from the above cause, requires a machine capable of bringing from the depth of 270 feet, no less than one million of gallons every twenty-four hours.

From the causes above stated, the collieries then at work were few in number, and a strong demand for coals in England; and it is certain, that much more money was then made

made in Scotland by working coal, than has been made these last thirty years, even with all our additional knowledge and experience in coal-mining, aided with highly-improved and powerful machinery.

CHAP.

CHAP. II.

Price of Coals, and the amount of Colliers' and Labourers' Wages, a Century ago.—Invention of the Steam Engine,—and its Effects.—Great Rise in the Price of Coals since the year 1785.—*Remarks upon the Value of Coal Fields, and upon the Capitals employed in Collieries.*

WITH respect to the price of coal a century ago, we find, that about that period, particularly in the year 1715, great coal was put free on board in the river Forth, at 4 s. 8 d. *per* ton, when the labourer's wages were at 6 d. *per* day, and all materials used at collieries cheap in proportion; the wages of a miner or sinker were 10 d. *per* day; and as colliers' wages are generally rather more than double that of a common labourer, we may estimate their winnings at 14 d. *per* day. It is therefore conceived, that the price of labour

bour is a fair criterion by which we may estimate the comparative price of coals.

In this way collieries were carried on, and confined in a very few hands, until the happy invention of the Steam-Engine,—an invention of the highest utility to Britain, and without which we would have been very far behind in our most important mining and commercial concerns.

It appears, that the steam-engine was first applied to collieries upon Newcomen's principle, upon which principle it still continues in general use, on account of its simplicity. The great improvements by subsequent engineers, and particularly by the ingenious and celebrated Mr Watt, has rendered this machine the most complete and powerful of any that philosophy and the genius of man have presented to the world.

Newcomen obtained his patent in the year 1705, and the engine was brought forward for collieries in the year 1712. Between this time and the year 1720, they began to be commonly used at Newcastle.

But in what place the first of these engines was erected in Scotland, we have not been able to learn with precision, even after making every inquiry upon the subject; and it is rather surprising to think, that the first erection of a machine of such consequence is not a matter of notoriety.

In consulting the Statistical Accounts of Scotland, we find, that the steam-engine erected at Elphingstone, in the county of Stirling, and parish of Airth, is stated to be the second of the kind put up in Scotland.

Understanding that a steam-engine had been erected at an early period at Edmonstone Colliery, in the county of Mid-Lothian, an application was made by a gentleman to the present proprietor, John Wauchope, Esq; inquiring if he could throw any light on this subject.

Mr Wauchope instantly attended to the application, and, in a very polite manner, sent from the family records those papers which still remained relative to the erecting of the steam-engine at Edmonstone Colliery. They are authentic documents, and I therefore feel much

much indebted to that gentleman for his liberal communications, and still more so for his granting me permission to take what notice of these papers I thought proper.

The first of these papers is dated May 1725. It is "A *license* granted by the *Committee* in "London, appointed and authorised by the "*Proprietors* of the *Invention* for raising *Water* "by *Fire*, to ANDREW WAUCHOPE of *Edmon-* "*stone*, Esquire."

This license states, that as the colliery at Edmonstone could not be wrought by *reason of water*, liberty is granted to erect *one* engine, with a steam cylinder nine feet long, and twenty-eight inches diameter, according to the method and manner now used at the coalwork of *Elphingstone* in Scotland; for which license a royalty of L. 80 *per annum* was to be paid for eight years.

As this deed contains a great many clauses, conditions and reservations, a copy of it is annexed in the Appendix, No. 1. and also a copy of the discharge for the royalty at the expiry of the term of years.

The second of these papers contains an account of the expence of the materials of this machine, exclusive of the engine-house, the amount of which is L. 1007 : 11 : 4. This account contains every minute article furnished; it is a curious and valuable paper, dated 1727. It is likewise inserted in the Appendix, No. 2. and is deserving of particular notice.

From the reference made in the license, we are inclined to suppose, that the *Elphingstone steam-engine*, in the county of Stirling, was the *first* of that kind erected in Scotland. This must have taken place about the year 1720, which is corroborated by the traditions of the old colliers.

It is evident from these papers, that the erecting of a steam-engine was a most arduous and expensive undertaking, and all those men employed in the execution of the work were sent from England.

The steam-cylinder, some of the working barrels, and all the buckets and clacks, were made of brass, somewhere beyond London. The common pumps for the pit were of elm, of a bore nine inches diameter, and made out of

of the solid tree, hooped with iron, and brought from London. The boiler top was made of lead; it is presumed that this was used on account of the supposition, that plates of iron, rivetted together, could not be made sufficiently tight to contain steam.

The cost of this engine was very great; for, if compared with the present value of money, it may be stated at L. 4000. This great expence evidently arose from the quantity of brass employed. The substituting of cast-metal, and the great improvements which have been made in the foundry department, have comparatively reduced the cost of these machines very much; so much so, that the materials for an engine upon Newcomen's principles, and of the size of the Edmonstone engine, with a complete pile of cast-iron pumps, can at present be furnished for a sum not much exceeding the half of the sum paid for the Edmonstone machine. This is one of the many advantages we have gained by industry and a close application to the improvement of our machinery.

From the discharge granted for the royalty, it appears, that the sum of L. 240 was paid in full of all demands, whereas the sum specified in the license was L. 640.

But, as it is natural to suppose, that the machine would at first be very imperfect, and frequently going wrong, an abatement of the royalty might be made on that account, according to an express stipulation in the license. At the same time, it must be remarked, that however imperfect and awkward we may suppose this machine to have been, it was the foundation of the greatest improvements in machinery which have appeared in the kingdom.

That these engines were very little understood, and very difficult to be kept in order, appears from an agreement entered into betwixt the tacksman of one of Mr Wauchope's collieries, and the engineers who erected the steam-engine. It is there stipulated, that the engineers were to have no less a sum than L. 200 a-year to keep the engine going, and were, besides, to have the half of the clear profits

profits of the colliery, after paying all expences.

It was also stipulated, that if the engineers could not make the engine draw water, so as to place the colliery in working order, they were to have liberty of taking away all the materials furnished by them, and to be paid a reasonable allowance for their pains and charges.

This shews, that there was but little confidence as to the result, after expending great labour and expences in erecting steam-engines at that period.

A copy of this contract is given in the Appendix, No. 3. and it is hoped that the copy of these documents will be acceptable to those who are interested in the coal fields of Scotland.

Although at this instant, the Glasgow Collieries are very numerous and extensive, yet it appears, that the steam-engine was not introduced there until the year 1763, which is another strong proof of the rapid progress which collieries

collieries have made since that date, in every department of the business.

The steam-engine produced a new æra in the mining and commercial interests of Britain, and as it were in an instant put every coal field, which was considered as lost, within the grasp of its owner. Collieries were opened in every district, and such has been the astonishing effect produced by this machine, that great coal was shipping free on board, in the river Forth, in the year 1785, at 4 s. 10 d. *per* ton, that is, after a period of seventy years, coals had only advanced 2 d. *per* ton, while the price of labour, and all materials, was doubled. This is so striking, that it seems scarce credible, had not the statement been taken from most authentic documents.

It is to the steam-engine alone we owe this very great advantage, and surely those men deserve well of their country, who have, by their genius and industry, contributed so much to its most essential interests.

The great competition in the coal-trade, which has continued since the above period, has

has evidently enabled Britain to bring her manufactures to market, and undersell all other competitors, even in those countries where the price of labour was not one-third of what was paid at home.

With respect to the profits of the coalmasters, they are said to have been very great about a century ago; but it is certain, that since the introduction of the steam-engine, few or no fortunes have been made in this line in Scotland; indeed, it is commonly asserted, that upon the whole, there has been more loss than gain. We have not access to know what the profits precisely have been of late, but there is every reason to conclude, that very little has been cleared *per* ton upon the annual sales, and that it is so near the losing point, as scarcely to be an object worthy of pursuit. Still, however, the general idea is, that the profits yielded by Scotch collieries are great. In England, however, there are strong examples to the contrary, and princely fortunes have been acquired. No doubt, there are collieries in Scotland that make

make handsome returns, but they are but few in number.

The short period of the last twenty-two years has produced a great advance upon the price of coals shipped on the river Forth; for, from the year 1785 to the year 1800, they rose from 4 s. 10 d. to 7 s. *per* ton. At this instant they are from 9 s. to 11 s. *per* ton, (great coal always being understood); but during this latter period, the price of labour has again been doubled, and the price of wood, iron and ropes, much advanced.

As the price of labour appears to be a proper scale to compare the price of coals by, let us consider what ought to have been the cost of a ton of coals at present, compared with the price of last century. Labourers' wages were then 6 d.; colliers' 1 s. 2 d.; four times the colliers' wages was the price of the ton, viz. 4 s. 8 d. The present rate of labourers' wages may be rated at 2 s. *per* day; that of a collier at 4 s. 6 d. Four times this sum is 18 s., and this appears to be the sum *per* ton for which coals ought to have been sold at present, in order to have produced a return to the coal-

master,

master, equal to the returns made from coal a century ago; and the price would have been even higher, had not the steam-engine been applied to drain the water from collieries.

There is one view of a colliery which has seldom been taken into account and considered, which is this: In any estate, the number of acres of coal is limited; each year a certain proportion of the whole is wrought and sold, and, as to the owner, completely alienated. In other commercial concerns, the same ground can be gone over again and again, and by one generation after another; but a coal-field once wrought out, ceases for ever. If, therefore, the coalmaster cannot bring his acres of coal to good account, it would be better that they never had been brought to light, at least in so far as regards him.

But the bold and public spirit of adventure is such, and the enterprising mind of man so active, that the hope of better years keeps always plenty of coal in the market; a circumstance most fortunate and well ordered for the community. And indeed those concerned in collieries

collieries would require to receive something like an adequate return in the adventure; for, excepting war, and the sea, we know of no other business attended with such excessive labour and anxiety in every department, or where men are so frequently brought to their wits end, and called upon to run every risk of life, limb, and fortune.

With respect to the capitals employed in collieries, they are great, for which 5 *per cent.* is no equivalent; and if we suppose, for example, that L. 20,000 is laid out upon a colliery, this stock would not bring L. 4000, if the colliery was given up. This is one of the strong inducements which makes coalmasters carry on collieries, even under the most unfavourable circumstances; for, while a colliery is at work, all the estimated stock is really and absolutely of the full value as it stands; but the instant the concern stops, the stock suffers the full diminution above stated.

CHAP.

CHAP. III.

Inquiry into the Causes which occasion the great difference in the price of Coals in Edinburgh and Glasgow.—Detail of the Modes of Working Coal at Glasgow, and in the River Forth District.—Present average prices of Coals.

LET us now inquire into the causes of the vast disproportion between the prices of coals at Edinburgh and Glasgow.

The collieries which chiefly supply Edinburgh with coals by land-carriage, are situated, at an average, about five and a half miles distant; the distance to the nearest being about four miles, to the farthest about seven miles. No city in the kingdom is more fortunately situated, not only in respect of distance, but also in respect of the extent of coal-field, the thickness and number of seams.

Those which supply Glasgow, are situated about four miles distant; the nearest being about

considering how short a distance there is between them?

One cause of the great difference of the carter's hire, arises from the superior mode in which the coal sales are conducted at Glasgow. There each colliery has an agent in the city, who receives orders for coals; these orders are sent out each day to the respective collieries, by which means, the manager appoints each carter his day's work before he leaves the colliery in the morning. By this plan, the delivery of the coals is quite regular; no time is lost; all imposition is avoided, as the carter has nothing to do with the money for the coals, but is answerable for the weight delivered. This last is of much importance; for, without this, it is hard to say what the price of the coals is. The city of Edinburgh has had much to do attempting to correct the great abuses in this alone; and this point has not yet been effectually adjusted.

The system pursued by the Edinburgh carters is very different indeed, which not only operates

operates against the inhabitants, but against themselves.

When the coals are in great request, and no stock of them upon the hills, they go in crowds to the different collieries, and wait very long ere they are served; frequently lose a whole day; each cart of coals is weighed by 4 cwt. at a time upon a common beam; this is the practice of the best collieries, by which much time is lost: the introduction of weighing-machines, as practised at Glasgow, would be a great improvement. When the demand becomes less, the coals are procured sooner at the hills; but as they frequently have no orders for coals in the city, it is no uncommon thing for them to lose a day standing in the streets before they get a merchant; and from this view of the matter, it is wonderful how they contrive to keep themselves and horses alive, even with all their industry and skill.

The common work of a Glasgow coal carter each day, is to go twelve miles with his cart loaded with 24 cwt. of coals, and return the same distance with it

empty. The average distance from the city to the collieries is about four miles, as before stated, so that he loads and empties his cart three times; and for carrying the above weight four miles, he gains 3 s. 6 d. The result is, that a ton is carried one mile for 8¼ d.

The common average work of an Edinburgh coal-carter each day, is to go either four or seven miles, according to the distance of the respective collieries, loaded with 12 cwt. of coals, and return the same distance empty. The average distance from the city to the collieries is about five and a half miles, so that he loads and empties his cart once; and for carrying the above weight, he gains about 4 s. 9 d. The result is, that a ton is carried one mile for 1 s. 5 d., being a difference in his favour, compared with the Glasgow carter, of no less than 9 d. *per* ton, or nearly *cent. per cent.* Even at this very great advance of price, he is not near so well off as the Glasgow carter, and the citizens of Edinburgh pay high for this bad system.

From

From the great irregularity of this mode of conducting the work, it is not easy to give such accurate statements as could be wished; but the following tables will shew more precisely the great superiority of the Glasgow system over that of Edinburgh.

TABLE relative to the GLASGOW COAL-TRADE.

Distance of the Collieries from the City.	Price of the Coals at the Collieries *per* ton.			Number of Journies performed by a Carter each Day.	Number of Miles travelled when loaded with 24 cwt.	Carter's Hire ach Journey when employed by the Collieries.			Amount earned *per* Day when hired.			Average of the Amount earned when the Carter is upon his own account.		
MILES.	L.	S.	D.			L.	S.	D.	L.	S.	D.	L.	S.	D.
2	0	10	0	6	12	0	1	7	0	9	6	0	0	0
3	0	9	2	4	12	0	2	6	0	10	0	0	0	0
4	0	8	4	3	12	0	3	0	0	9	0	0	12	6
5	0	7	6	$2\frac{1}{2}$	$12\frac{1}{2}$	0	4	6	0	11	3	0	0	0

The greatest quantity of coals is brought from the collieries at four miles distance.

TABLE relative to the EDINBURGH COAL-TRADE.

Distance of the Collieries from the City.	Price of Great Coal at the Collieries *per* ton.	Price of Chew Coal at the Collieries *per* ton.	Number of Journies performed by a Carter each Day, loaded with 12 cwt.	Amount earned each Day.	Amount which could be earned at these rates according to the Glasgow plan.
MILES.	L. S. D.	L. S. D.			L. S. D.
4	0 11 8	0 5 3	1, and at times 2 or 3.	4s. 9d. to 14s. 3d.	1 8 6
7	0 11 8	0 5 3	1.	4s. 9d.	0 15 0
The greatest quantity of coals is brought from the collieries, at about four miles miles distance.			Upon an average in summer and winter only one journey can be reckoned, owing to the unavoidable delays which occur at the collieries and in the city.		

From the Table of the Glasgow coal-trade, it appears, that the prices of coals are at the collieries in proportion to their distance from the market,—a natural consequence in almost every branch of trade; and the work performed is also in the same proportion, only the amount of a day's work as to length of journey is the same, and the earnings are high.

Whereas from the Table of the Edinburgh coal-trade, it appears, that the prices of coals are the same at all the collieries, whatever be the disproportion in point of distance; and this most evidently arises from the very bad and ruinous system pursued; in short, the errors here are so very glaring and obvious, that it is not necessary to make further comments upon a subject where a reformation is so much wanted. The coals at the Edinburgh collieries are not dearer than at the Glasgow collieries, when we consider that the latter are mixed coals. The extra expence arises from the system upon which the collieries are wrought, the carting, and bad mode of conducting the sales. Even high as the cartage

is,

is, the carters are not so well off by one-half as their neighbours at Glagow.

As the chews at the Edinburgh hills are no less than 50 *per cent.* cheaper than the great coal, it is certain, that if the Glasgow system were wholly adopted, the Edinburgh coalmasters could afford to sell their coals as cheap as the coalmasters at Glasgow, and with greater profit than by the present plan pursued.

The supply of coal which Edinburgh receives by sea is chiefly from the collieries of Halbeath, St David's, and Wemyss, upon the opposite coast, or from those up the river, the farthest of which is Alloa, distant about twenty-four miles. These collieries ship their great coal on board, after a carriage of from one to five miles, at the rate of ten or eleven shillings *per* ton. The freight to Leith, and carriage from thence to Edinburgh, fluctuate according to the demand; but the average freight in summer and winter may be stated at four shillings *per* ton for great coal: the freights of chews are always lower, on ac-

count of a cargo of them being got sooner at the coal port than great coal.

Within these few years, the plan of the coal-trade carried on by sea to Leith and the North of Scotland has changed considerably.

Formerly the shipmaster was the merchant, and he waited at the port where he was selling his coals, frequently for many weeks, when sales were dull, at times disposing of only a ton or two each day. This plan was attended with not only great loss of time, but also with very great expence.

The trade is now very much into the hands of merchants, who live at the port or coal market, and pay a certain freight *per* ton to the shipmaster. By this means there is no detention at the market, so that the shipmaster instantly returns to the collieries for another cargo. In this way he gains less money each voyage; but, on the other hand, he can make more voyages in a given time.

Upon the whole, one would think, that this mode of conducting the trade is in favour of the community at large, provided it continues a free and open trade to every one who may choose

choose to try it. These coals can be afforded at the prices current in Edinburgh, even with all this additional expence.

Besides this supply from the collieries on the river Forth, a very great quantity of English coal is daily brought to market, of which last there are different qualities and prices at Newcastle and Sunderland; and it is evident, that if this extra supply of Scotch and English coals had not come to market, the price of coals in Edinburgh, and in the North of Scotland, must have far exceeded the present prices, high as they are thought to be.

In the buying and selling of coals, as in other merchandise, there is a diversity of weight and measures, which gives rise to the greatest abuses.

At the country collieries, coals are sold by the *load*, the *mett*, the *cart*, by a certain number of *stones Dutch*, or by the *bundred weight*; the consequence is, that excepting a person buys by the latter, he cannot know what he is about.

At market, they are sold by the *waggon*, *ton*, *cart*, *bundred weight*, *dale*, *boll*, *creel*, *stone* and *chalder*; and when we speak of a chalder,

der, it is as difficult to find out what the quantity is as any of the rest; because

The London chalder is -	27 cwt.
The river Forth chalder,	30 do.
The Newcastle chalder, about	52 do.
The Perth chalder, nearly	5 tons.

and every other district of country has its own peculiar weights and measures.

This kingdom has long complained of these grievances, which are much felt, but without redress, and we are told, that the great nicety of adjusting a physical standard is the cause of the delay. France has shewed us a good example in this particular. If the principles there assumed are correct, might they not be adopted? One universal weight and measure would correct many errors, and give a greater facility to mercantile transactions.

We now come to state another most evident cause, which enhances the price of coal to the inhabitants of Edinburgh, above those of Glasgow. This arises from a strong and deep-rooted prejudice, and although the remedy is clear as noon-day, it will in all probability be neglected

neglected, until higher prices urge the necessity of attending to it.

What is here alluded to is this,—an idea is formed by the inhabitants of Edinburgh, that the coal which is in large masses is of a quality far superior to that which is of a small size, commonly termed *chews*, (dross or culm being out of the question, as it will not easily burn in a common fire-place.) This prejudice is not peculiar to Edinburgh, it is equally prevalent in Dundee, Perth, Dunbar, and all those towns which are supplied with coals from the river Forth.

With respect to the quality of great coal and chews, it is the same; for, in general, a bed or seam of coal, as it lies under the various strata, is of pretty uniform hardness, excepting those bands of splint coal, which occur less or more in almost every seam. And the art of the collier is to hew down immense blocks of coal, in size from one to four cubic yards at a time. In this operation, a quantity of dross or culm is produced in every colliery. The next step, is to divide this block into

pieces,

pieces, in order that they may be transported to the hill. This operation, and the subsequent handling of them, uniformly produces chews and culm. Coals that are termed Chews, are in size from a cubic inch, to that of five inches on the side. From this is it not evident, that chows are of the identical quality of great coal, being only great coal broken down?

Chews are at present shipped in the river Forth, at from 7 s. to 8 s. *per* ton, and are chiefly used in glass-works, foundries, breweries, air-furnaces, and lime-works; and when free of culm, they produce a heat much more intense than if large masses of coal were used, on account of their presenting a much larger burning surface to the air, and producing a reciprocal action of heat among the different pieces.

The term Great Coal, being unknown in the Glasgow and Ayrshire collieries, we must now state the labour and difficulties which the prejudice before mentioned produces in the coal-trade, and shew how the inhabitants of Edinburgh,

Edinburgh, and the North of Scotland suffer by it.

In the Glasgow collieries, when the collier has brought down from the wall a mass of coal, he, with a sharp pick, divides it into pieces, the largest of which a man can easily lift;—a quantity of chews and culm is produced, as before mentioned. The chews and culm are first thrown into the basket which carries the coal to the hill, and the round coals are built firmly above them. In this manner they are drawn to the pit-bottom by horses or men, and from thence sent up to the hill, for sale, where only two kinds of coal are known, viz. Coals and Dross.

When, therefore, a cart is to be filled with these coals, the round coals are laid aside, and a labourer, with a riddle of an inch mesh, separates the dross from the small cubic pieces of coal. Those coals which keep above the riddle, are thrown into the cart, and the quantity of this kind is regulated by the general quantity of small coal which the seam yields in working, which in practice is easily ascertained.

tained. The round coals are put on next, and built in a very firm manner above the mouth of the cart, a mode in which the Glasgow carters are very dexterous. The weight of the cart having been previously ascertained, the weight of the coals are adjusted on a steel-yard, by the hill-grieve, and thus delivered to the consumer.

This is the whole process of the Glasgow system. The dross which is separated, is sold for the use of steam-engines, so universally used for driving machinery; it suits the purpose very well, and is afforded at 20 d. *per* ton on the hill.

In this way the coalmaster brings all his coal to market, excepting what must be left in pillars to support the superincumbent strata. To the collier all is reckoned productive labour, excepting the dross, and the consumer has the coals of such a size as best suits him, and upon moderate terms, so that all the parties are satisfied.

The mixed coal is not only used in Glasgow, but also in Paisley, Port-Glasgow, Greenock, and

and all the towns upon the west coast without exception. And the Ayrshire coals, which chiefly go to the Dublin market, are precisely of the same kind, and are of course put on board of ship with great facility, in comparison of the labour requisite in shipping great coal, which, with the filling of the waggon, costs not less than 7 d. *per* ton on the river Forth.

In East Lothian, the coals are wrought also upon the Glasgow plan.

The plan pursued in working coals upon the river Forth, is very different.

When the collier has got the mass of coal brought down from the wall, he with the greatest possible care separates it into pieces, which are as heavy as one or two men can with difficulty lift, and it is his object to have them as near this standard as possible. If the coal be free and soft, he is as careful of breaking it into small coal or chews as if he were handling plates of glass. There is, however, a quantity of small coal and chews produced, beside what arose from the first operation. The great coal is laid up on one side of the mine, the chews

on

on the other, and the lime coal and panwood are most commonly thrown aside into the waste, and lost for ever; and what is more surprising, about twenty years ago many thousand tons of chows were also every year thrown aside, because no person would buy them, on account of the imagined inferiority; and it required all the attention and perseverance of the most skilful coalmasters, to introduce them into our manufactures, where they are now preferred, and solely used.

When the coal is ready to be sent to the pit bottom, if women are employed as bearers, immense loads are put upon their backs, and these oppressed females, groaning under heavy burdens, travel to the pit, where they lay down the coals, and build them up in the place appointed for each collier, until their respective turn arrives for sending their coals to the hill. When a collier's turn arrives, he leaves his work at the wall-face, and rolls the pieces of coal to the volume of the pit, where, with great care and difficulty, they are put into the basket. Upon their arriving at the hill, they are laid down

down at the side of the bin, where they are again, piece by piece, built up like a wall; and in this operation chews and small coal are again produced and separated. The next step is to transport them to sea, when each piece of coal is carefully taken down from the bin, and built in the waggon in a horizontal position, to prevent breakage: here chews and small coal are again produced and separated. Upon the waggon arriving at the shipping place, the coals are either carried on hand-barrows, or slid down a plank to the hatch of the vessel, where each piece of coal is built up in the hold, exactly in the same manner as bricks are placed, to prevent breakage. In this operation alone, seven men are required for each vessel which is loading. The chews and culm produced here are shipped along with the great coal.

Upon the ship arriving at the port or market, the coals are handed out, piece by piece, and put on the carts; an additional quantity of chews and small coal is again produced, and that in proportion to the softness of the

coal. These small coals sell at a price far below the great coals, and occasion a dead loss to the shipmaster. The great coals are at last laid into the cellar, and the consumer estimates their quality exactly in proportion to their size; and well they may be valued, considering the great toil, trouble, and extra expence which is incurred for this great object! Let us now see the result of the whole business.

To burn such masses of coal as are in the cellars, is quite impossible, as they would not kindle by any ordinary means. If, therefore, in a winter morning, attention is paid to what is going on in the coal-cellar of each family, where a number of fires are to be put on, nothing is to be heard but hard blows; and upon entering, what must be the astonishment of those who have attended to the whole detail of keeping the coal in large masses, to see them at last violently attacked with every kind of destructive implement, such as heavy cannon-balls, double and single headed shot, hammers of all descriptions, axes, crows, pokers, picks,

picks, and pieces of whinstone, or by one piece of coal dashed with violence against the other; all with a view to reduce part of them to chews, which was previously so much avoided, and which could be bought 30 *per cent.* cheaper than the great coal. Of the above implements actually used for breaking coal, not one is adapted for the purpose except the pick: all the rest not only break the coal into chews, but absolutely bruise much of it into a powder of no use; and therefore, while the predilection for great coal continues, no family ought to allow their coals to be broken by any other implement than a light sharp pick.

It is probable, that some persons who may read the above statement, will ask in amazement, Is this really the case? It is a fact; and it may be seen in practice every day in Edinburgh, Leith, Dundee, Perth, and in all those towns which are supplied with coals from the river Forth, and no where else. Our west country friends are better economists in the coal-trade, from the wall face to the room grate.

From this demand for Great Coal in the market, no fewer than four kinds of coal are produced in every colliery, viz. Great Coal, Chews, Lime-coal, and Panwood or Dross, all of them from the same mass; so that even the dross contains, in a given weight, nearly as much of the true principles of coal as any of the other kinds.

The following statement shews precisely the result of the two modes of working the coal-field,

GLASGOW SYSTEM.

Left in pillars,	$\frac{1}{3}$	$\frac{2}{3}$,
Coal wrought,	$\frac{2}{3}$	

The wrought coal is thus divided:

Large coals diminishing to the size of three-fourths of an inch,	$\frac{12}{15}$	$\frac{15}{15}$.
Dross or culm, used for engines, &c.	$\frac{3}{15}$	

RIVER

RIVER FORTH SYSTEM.

Left in pillars, - -	$\frac{1}{3}$	$\frac{2}{3}$.
Coal wrought, - -	$\frac{2}{3}$	

The wrought coal is thus divided:

Great coal, - -	$\frac{8}{15}$	$\frac{15}{15}$.
Chows, having lost in value 30 *per cent.* -	$\frac{4}{15}$	
Lime coal, and dross or culm, thrown aside and lost for ever, - -	$\frac{3}{15}$	

From all that is above stated, is it not plain and evident, that the price of great coal is greatly enhanced from the extra labour attending it from the wall face, to its being put on the fire? The facility of the west country mode, and its superiority in every point of view, is obvious at a glance. The collier's work is comparatively easier; he can work the ton at a much less price, and in short the whole detail is simple, economical and business like; whereas the Forth system is intri-

cate, laborious, expensive, lavish as to the coal-field, and carries folly in its face. But such are the strong implanted prejudices, that it is probable the system will for a long time be persisted in, until the coals rise to such an extravagant price, that strong necessity alone will bring about a change.

Great coal is rapidly advancing in price, and must continue to do so; for even at this instant, the Glasgow coalmasters have as good prices for their mixed coal, as the Forth coalmasters have for their great coal.

The present prices of coals upon the coal-hills in Scotland, are from 4 s. 2 d. to 11 s. 8 d. *per* ton. The prices paid the collier is from 1 s. 6 d. to 5 s. *per* ton. These prices shew the great difficulties which one colliery may labour under, when compared with another.

The average prices of coal at present put on board of ship, may be estimated as follows:

Great

Great coal,	L. 0	10	0
Chews,	0	7	0
Lime coal,	0	4	4
Panwood or dross,	0	3	0

The collier is paid for his work somewhat in proportion to the above, excepting for the dross, for which he receives nothing.

CHAP. IV.

Of the using of Coals in Private Houses and Public Works. The adopting of the Glasgow mode of Working and of Selling Coals recommended.

WE now come to take a view of the using of coal, as connected with household economy and public works.

The price of coals on the river Forth was formerly stated, and we may, for precise calculation, state the great coal at 10 s., the chews at 7 s. *per* ton, being a difference of no less than 30 *per cent.* This shews in a strong light, how much the great coal must be loaded with an extra expence; for every time they are turned over, as before described, a portion of chews is produced; and each piece of great coal thus broke down loses exactly 30 *per cent.* of its value, independently

pendently of the dross, which will scarcely bring any money. This loss must, therefore, be added to the price of the great coal.

It will naturally be asked, Would not families find their account in burning chews in place of great coal, seeing they are so much cheaper? To which it must be observed, that the quantity of chews produced in any colliery, bears a certain limited proportion to the great coal, depending upon the quality of the seam; that is, a Splint-coal will produce a less proportion of chews than a soft cubical coal, and therefore there could not be a sufficient supply of chews for the market; besides, being in small pieces not exceeding five pounds in weight, they blaze so rapidly away, that the extra quantity consumed, would be nearly equal to the extra expence of the great coal: for kitchen-fires, however, no kind of coal can be better adapted.

With respect to room-fires, the best economy is, to make a fire of chews in the morning to warm the house, and as it will be in full heat after breakfast, a large piece of coal should

should be placed on the centre of the fire, having the reed or fracture in an horizontal direction, with small coal packed around it. This fire will last a day, and keep the room at a proper degree of comfortable temperature; therefore, in an economical point of view, pieces of great coal are absolutely necessary.

From what has now been stated, is it not evident, that mixed coal, as used in Glasgow, is exactly what a family must have, and which the inhabitants of Edinburgh and the North of Scotland have the trouble of making from great coal, at a very high premium? If the inhabitants of Glasgow were to demand great coal from the collieries, no money would induce the coalmasters to introduce such an expensive and useless plan; because, in all operations, the great point in view is to render them as simple as possible, and this is attained most completely by the west country system.

Further, to shew that the predilection for great coal arises from habit and prejudice, there are many families living in Edinburgh

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at present, who formerly lived in Glasgow: they will all acknowledge, that the mixed coals they used in Glasgow, made as good fires as the great coal they at present use in Edinburgh, and in general very superior. Besides, there is a great supply of coals brought to Glasgow from the neighbourhood of Airdrie, by the Monkland Canal: these coals find a ready market in the city, and they undergo the same fatigue and breakage as mixed coals would do, if sent from any of the collieries upon the river Forth, and landed at Leith, or the North of Scotland. Can any arguments be more in point?

With respect to the dross or culm which is always produced, it ought to be used a little wet, and put round the great coal; but it ought never to be put on any fire, excepting when the fuel is in full heat, otherwise it stifles the burning, and renders it the most uncomfortable fire that can be imagined, as the dross of Scotch coal, (with a few exceptions), will not cake in an ordinary fire like the rich English coals; and in families, the dross

dross ought to be separated by a wire-riddle, of a quarter of an inch mesh. All the coal which keeps above, will, when thrown on a fire, produce a most excellent glow; so that there need be no loss of any part of the coals.

Another demand for large blocks of coals, is, for the servants to make what is termed *gathering-coals* in the kitchen; the largest pieces are carefully preserved for this purpose; so that upon looking into a kitchen about three o'clock in the morning, a strong fire will frequently be found, fit for roasting an ox.

This great fire is knocked to pieces in the morning, and simply serves the purpose of carrying fire to the other rooms of the house. This is not only an expensive mode, but highly dangerous, and very much destroys the furniture, by the flakes of soot which arise from the fires carrying through the house, over and above the burning of carpets.

In London, and in towns where the economy of fuel is particularly attended to, the kitchen fire is put out every night; and each family

family considers a quantity of fire-wood to be as necessary in a house as coal. The first work of a servant in the morning is to strike a light, and with the help of wood, a fire in the kitchen is instantly made; the room fires are put on with wood and coals, so that a red-hot poker from the kitchen very soon kindles the whole.

This is a good and economical plan, and is at present practised by a few families in Scotland.

The next point in question is, if mixed coals were used, would they be cheaper? Certainly they would, as will evidently appear from the following statement.

It has been found by experience, that, in general, the chews produced in a colliery, bear the proportion of about one-third to the great coal. Therefore, at the present prices, and under the present system, if they were mixed together, the price *per* ton of mixed coal would be as follows:

Two

Two tons great coal, at 10 s.	L. 1	0	0
One ton chews, at 7 s.	0	7	0
	L. 1	7	0

Which, divided by three, leaves 9 s. *per* ton for the mixed coal, or it is 10 *per cent.* cheaper.

As to the coal consumed in manufactories, chews are generally used at glasshouses, foundries, breweries, soapworks, and in all such furnaces; but as the quantity of this kind of coal is limited, great coal is frequently resorted to; and therefore, upon the whole, their expence would be very little increased, by burning mixed coal, as is practised in the manufactories in the west country. In distilleries supplied with coals from the river Forth, a strong prejudice has been formed against chew coal, and therefore great coal is uniformly used; so that a person upon entering a still-house, is surprised to see the large blocks of coal, shivered to a thousand pieces with a large hammer, and reduced precisely to chews before they be thrown into the furnace. And

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the reason is obvious; because this size of coal produces the most violent and rapid combustion.

The great objection to the use of chews, is, that there is in them a great mixture of culm, which, when put into the furnace, choaks the fire, by preventing the admission of air to every side of the burning fuel.

That the chews shipped on the river Forth are greatly mixed with culm, is a just and universal complaint of the buyers, and therefore it ought to be taken out by a riddle before they be used; and if chews were so cleaned, they are as fit for rapid distillation as any other coals whatever.

In the mixed coal system, all the culm is separated before the coals are sent to market, by which means there is very little culm produced, even after delivering the coals from the ship; as not a single particle enters into the cart or waggon on the hill.

Therefore, from all that has been stated, it must, it is presumed, appear to every impartial mind, that the introduction of the west country

try system of mixed coal, would be for the benefit of every individual concerned in the coal-trade, from the coalmaster to the consumer, independently of the advantages attending the plan in a national point of view. All the coalmasters with whom we have conversed upon this subject, confess the injury sustained by the Forth system; but they all consider, that the prejudice is unconquerable, arising more from the habits of the servants than from those who pay for the coals.

But such is the effect of long habit and deep-rooted prejudice, that, in all probability, the predilection for great coal will continue, in spite of evidence and conviction, till firm measures are taken to bring about a reform.

The strength of prejudice cannot be better illustrated, than by an anecdote told by a late eminent and worthy Professor of the Edinburgh University.

He was connected with a colliery, where there was a water-wheel for draining the mines. It revolved with amazing rapidity; and upon this velocity, the mill-wright who took

took charge of the machine, rested his skill as a mechanic. The Professor, who viewed this velocity with a different eye, ordered pumps of larger dimensions to be attached, which very much reduced the velocity of the wheel, but in a given time, more water was brought up than before. Of this the mill-wright was half convinced. The Professor, still seeing that larger pumps, and a slower motion, would be an improvement, ordered a second alteration. The mill-wright was no longer an obedient servant; he said that he could not think of doing this; for it vexed his heart to see his wheel moving so very slow already, in comparison of its former speed!

Servants who have been accustomed to exert their strength every morning in breaking great coal to pieces, may be told, and half convinced of the superiority of the mixed coal; but the idea they have formed of the superiority of great coal, will, in their minds, (like the quick-running wheel, in the mind of the mill-wright,) always have the preference.

CHAP. V.

The importance of the Coal Mines to Great Britain, considered in a National and Political point of View.

THE coal mines of Great Britain, considered in a national and political point of view, are of the first-rate importance; they are indeed one of the vital principles of the State, and every patriotic statesman, and lover of his country, will regard them in this light, whether they be considered as the means of giving bread, and the comforts of life to thousands and ten thousands of inhabitants, or of training a numerous race of the most hardy and intrepid sailors to guard our shores, and protect our liberties and dearest rights.

Valuable as are our mines of iron, copper, tin, and lead, they shrink in comparison with those of coal; for without coal, few of the others could be worked to any advantage, and all

all our manufactories depend almost immediately on this very useful article. The fostering care of Government ought therefore to be directed to so important a concern, and every privilege allowed, which would tend in any manner to keep the price of coals at a fair and equal rate with other articles.

The iron trade of Britain, which has within these few years attained an astonishing height, depends entirely on coal; and the quality of our iron has been improved so much of late, that there is now no doubt, but that in a few years, we shall not be under the necessity of depending upon a foreign power for a single ton of this most precious and useful metal, and at this critical moment, we feel, as a nation, the high advantage by the progress we have already made in this manufacture. Lately, British iron was only used for the coarsest work; it is now in general use, in demand for our Navy, and its quality is improving every day.

Without coal, the steam-engine, that indefatigable servant, would have been an useless

invention to Britain, and without the steam-engine, in what state would our mines and manufactories have been? In short, it is by our coal-mines and steam-engines, that our manufactories have made such rapid progress, and at this moment stand unrivalled, even although the price of labour has been doubled within these twelve years, as before taken notice of.

The great scarcity of wood in Britain prevents its being used as fuel. We therefore depend entirely on coal; and as it has now become a very expensive article in the North of Scotland, Ireland, and in many parts of England, every uncommon advance upon the price, must not only be considered as operating against individuals, but against the body politic. Therefore, every plan which can in any degree tend to increase the annual output of the collieries, ought to be most carefully attended to.

From what has been stated with regard to the two modes of working at Glasgow, and on the river Forth, it is evident, that the Glas-

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gow coalmasters work their coal in the way which is most beneficial for themselves, the colliers, the consumer, and the State; because all the coal is brought to use, and that with the fewest workmen, and therefore the Glasgow system ought to be followed as the best, by every coalmaster. By the awkward plan pursued on the river Forth, the case is most completely reversed in all points. The loss occasioned to the coalmaster, collier and consumer, has already been stated: the loss to the State is this; a greater number of men is required to produce the same quantity of coals; this augments the price, and from the predilection for great coal, immense quantities of lime-coal and culm are left behind in the workings or waste of the pits, and lost to all generations. In many collieries, the quantity of this kind of coal is so great, that a set of workmen are kept below ground for the sole purpose of clearing it out of the colliers' way, where it appears to occupy half of the excavation made by the working of the great coal.

To shew the great proportion which this small coal and the pillars actually bear to the coal brought to the market in the Forth trade, it may be stated, that in a coal-field, the solid pillars of coal which must of necessity be for ever left behind for the support of the roof and safety of the colliers, amount to a third of the whole field; and in general, the small coal thrown aside, is in the proportion of a fifth or a fourth of the coal brought to market, as before stated; that is, the pillars and coal left behind constitute about seven-fifteenths of the whole coal-field. And, as this small coal is fit for the burning of lime, making of salt, or for fire-engines, the leaving of it behind must be looked upon as a loss to the nation. And, without entering into a minute investigation of the matter, it is estimated, that at least sixty thousand tons of this coal are lost annually in the collieries on and adjoining the river Forth, which is equal to the annual output of any one of the largest collieries in Scotland. The adopting of the Glasgow system, formerly mentioned, would rectify

rectify this great abuse, and at once bring to market every bit of coal above the size of an inch, for our houses and manufactories, while the smaller coal and dross would serve the purposes before stated. This alone would greatly increase the annual quantity of coal raised at every colliery; and, as the annual quantity increases, the prices must keep in some proportion to it, and afford a more ready supply to those districts of our country where the scarcity of fuel, and the exorbitant prices, are most serious evils, and a complete bar to any great improvement, either in agriculture or in manufactures.

CHAP. VI.

Limited number of Colliers in Scotland considered.—Their numbers cannot be increased, as in other Trades.—Investigation of the Cause.—Loss sustained by the State, when Colliers become Soldiers or common Labourers.—Value of a Collier's Work in an agricultural point of view.

ANOTHER cause, which tends to advance the price of coals in Scotland, is, that the number of colliers is very limited. This class of men, from their peculiar habits, form a distinct society, living in houses together at a distance from towns, intermingling very little with the other classes of the community, and generally marrying among themselves, particularly where women are employed to carry coals, as none but a collier's daughter would choose to be a collier's wife in such a case.

All

All the colliers in Scotland were under a most severe servitude prior to the year 1775. They were accounted *ascripti glebæ*; that is, they belonged to the estate or colliery where they were born and continued to work, and from it neither they nor their children could remove; so much so, that when an estate with a colliery came to be sold, the colliers and their families formed part of the inventory or live stock, and were valued as such; in short, they were bought and sold as slaves. This system secured, indeed, a race of colliers, but it was disgraceful to a free Government, and therefore every man must rejoice at their emancipation.

Before their freedom was granted, it was generally conceived that it was this slavery which prevented common labourers becoming colliers, and it was expected, that, upon removing this obstacle, great numbers of workmen would go to the coal-wall, as the wages were double of what they usually earned above ground. The result has been far otherwise; for, even the allurement of double wages has induced

induced few, very few indeed, to forego the busy haunts of men, and cheerful light of the sun, for the damp, gloomy and dangerous region of a coal-pit. Besides, it appears that in working the Scotch coal, which is very strong in the wall, it requires such constant exertion and twisting of the body, that, unless a person have been habituated to it from his earliest years, he cannot submit to the operation. For instance, it is a common practice for a collier, when making a horizontal cut in that part of the coal which is upon a level with his feet, to sit down and place his right shoulder upon the inside of his right knee; in this posture he will work long, and with good effect. At other times, he works sitting with his body half inclined to the one side, or stretched out at his whole length, in seams of coal not thirty inches thick.

It is therefore certain, that the number of colliers cannot be increased at pleasure, as can be done with mechanics and labourers; the latter can begin any time, when young, and from any class of society; but he who is to

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be a Scotch collier, must begin his labour as soon as he is able to creep to the coal-pit.

Many of the colliers have of late, particularly within these eight years past, betaken themselves to the work of common labourers, at half their original wages. Many of them have enlisted with the army, and not a few have been drawn as militiamen. A collier, therefore, from what has been stated, may be looked upon in one view as a very bad soldier, and most assuredly so, as concerning the policy of the State; for his part, he fights a much better battle for his country when driving vigorously at the coal-wall, than when charging the enemy sword in hand; that is, by his increasing the annual quantity of coal, the price of it is kept moderate, or it only increases in a fair ratio with other articles,—thus extending our manufactures, and spreading the advantages of improved agriculture. But if, by enlistments, and ballots for the militia, one man in thirty be taken, then most certainly the annual output of coal must in

proportion

proportion be diminished, and hence a national loss be sustained.

To shew the value of a single collier's work, in an agricultural point of view, his annual produce may be estimated at 400 tons.

This quantity of coal would burn of limestone - - 2400 tons.

This quantity of limestone would produce of shells - - 7200 bolls.

This quantity of shells would produce of slaked lime at least 14,400 bolls.

If 100 bolls of lime be allowed for a Scotch acre, the above quantity would serve as a manure for - - - 144 acres.

If lime be applied once in seven years, as is the common practice, the quantity of land which could be properly kept in an improved cultivation by one collier, amounts to - 1008 acres.

As at the collieries of Whitehaven and Newcastle, a collier will put

put out 1200 tons of coals *per annum*, the number of acres he could keep in cultivation with lime amounts to no less than 3000 acres.

Hence most evidently appears the loss which the State sustains by each collier who leaves his occupation, and becomes either a soldier or common labourer.

From what has been stated, would it not be sound policy to exempt all those who are effective colliers from the militia? Let them be ballotted to prevent subterfuge; but if it can be certified, that they have worked as colliers for five or six years previous to the ballot, let them be exempted from serving, under this certification, however, that upon their leaving the coal-wall, the privilege shall instantly cease. This boon would be in favour of the State, as it would be a strong inducement to the collier to remain at the coal-wall, and thereby prevent many from becoming common labourers.

No doubt the argument which will arise against this will be:—Let the coalmasters protect their men, and secure their services. This protection has been offered to many of them, and they have refused it, because one of their well-known inherent propensities is love of change. Some have accepted of their master's offer, and considerable sums have been paid on this account to provide substitutes, which expence must, if possible, be laid upon the price of coals.

Viewing this matter impartially, there is no doubt but that this privilege would have a very strong effect, provided the principles were most faithfully and honourably acted upon: and the privilege ought to extend to all colliers in the kingdom.

It is a singular fact, that though, as above stated, a very few solitary instances occur of labourers or mechanics becoming colliers, we find great numbers of them employed at all the other works about a colliery, such as making roads below ground, filling coals at the pit bottom, driving mines in the rock, working

ing ironstone, and sinking pits; the last of which is one of the most laborious, wet, and dangerous employments that can be imagined, particularly the sinking of engine-pits, where the smoke of the gun-powder prevents the rays of light from penetrating; so that the workmen are enveloped in the most terrible darkness, where the glimmering light of a candle only extends a few inches, and just serves to shew how impenetrable the darkness is. While employed at this work, there is nothing to be heard but the clanking and rebounding of machinery, the impetuous rushing of water, and the re-echoing sound of the ponderous hammer, while every other hour they have to lay a train to gun-powder; and quickly springing to the basket, are drawn up the pit by the aid of machinery, with great velocity to escape being blown to pieces; and, it frequently happens, that the train takes fire ere they have ascended a few fathoms; so that the splinters of stones fly around them in all directions; and the sound of the explosion is so overpowering, as to make the ears tingle, and

suspend

suspend the sense of hearing for some minutes; yet in the midst of these hairbreadth escapes, they go on with their work in the most persevering style. We have seen manufacturers and tradesmen betake themselves to this rough employment, and turn out very excellent, bold and intrepid workmen. But if a proposal were made to these men to change this very dangerous employment for that of a collier, they would spurn the idea even with double wages, and be not a little astonished how such a proposal could be made to them. Can the necessity of early habit, in training a collier, be placed in a stronger point of view, and is it not an argument for the measure proposed, to secure their services?

In many of the collieries in England, the case is very different. In that part of the kingdom, there are grown up men who turn colliers, particularly the Irish who come to the works on the west coast. In these collieries, and at Newcastle, a good collier will put out three or four times more coal than is done by a collier in Scotland; not that they are physically stronger than the Scots, or labour

bour harder, but the coal-wall is much easier to work; and it is from this cause that the English coal, which is of so excellent a quality, sells so much cheaper than our great coal at the shipping-places; added to which, every particle of coal turns out productive labour to the collier, and sells at one price, for the benefit of the coalmaster. It is this which enables the English to adventure such immense capitals in the trade,—capitals which would bear down the best colliery in Scotland.

It may then be asked, How does it happen that English colliers do not come to Scotland, when there is a demand for their services; or what prevents the Scotch colliers emigrating to England for better work? To this it is answered, that long habit, and our native place, attach us to home, besides the difference of manners, and mode of living in the two countries. The experiment has been made at a great expence, and numbers of English colliers have been brought here; but from the hardness of the coal, and other causes, they soon took an opportunity of deserting, so that in a

short time a straggler or two only remained behind. On the other hand, the great depth of the English pits, and dread of the inflammable air, are strong preventives against the emigration of Scotch colliers to England.

CHAP.

CHAP. VII.

Inquiry into the expediency of Exporting Coals to the Continent.—Rapid progress of the Coal-Trade in the Eighteenth Century.—The prominent Improvements.—Sketch of the Boundaries of the Main Coal-Field of Scotland.—The Improvement of our Country depends upon the Collieries.—Ideas of Philosophers respecting the renovation of the Coal-Fields.

WITH respect to the exportation of coal, the propriety or policy of our doing it, has long been a question, and therefore demands a particular investigation. Williams, the mineralogist, has given this an able discussion in his treatise entitled *The Mineral Kingdom.* But if any additional light can be thrown upon this subject, it may be of service.

At one period, the quantity of coals sent to the Continent was very considerable; but it

has greatly decreased since the French Revolution, and the long continuance of the war has comparatively annihilated the trade; so that at present the coalmasters place little or no dependance upon it.

Formerly the demand in Holland was great. There the fine splint coals of the river Forth commanded a decided preference, as the Dutch split them into pieces like slates, sweeped them clean, and laid them up ready for the fire. This arose from their uncommon attention to cleanliness in their houses, for which they are so very remarkable. This trade from the river Forth was extensive about a century ago, and also the exportation of salt along with the coals. There were a great number of salt-pans upon both sides of the river Forth, even as far up as Alloa. These pans consumed all the small coal, and most probably were the cause of the beginning of the very bad system of separating the coals, which we still labour under. Most of these salt-works are now in ruins, and their places only known by the retaining of the name. In the town of Culross alone, there were above fifty salt-pans constantly

stantly at work, which shews on how great a scale this trade was carried on.

If a general peace were to take place, and complete confidence once more to be established among the nations of Europe, it is certain that the demand for coal abroad would be very great, which demand would tend very much to enhance its price at home. It may be urged in favour of exportation, that as Providence has blessed us with such immense stores of this very useful article, the refusal of a portion of it to our neighbours on the Continent, would be acting upon a narow and illiberal principle, quite unworthy of Britons.

But let us consider the subject with a little minuteness. It was formerly mentioned, that the working of coal in Britain took place in the thirteenth century, a period not much exceeding five hundred years ago. No doubt coal was known and used before that period, but the quantity was so small, that it does not merit any attention in the view we are now taking. During the above century, the coal-trade must have made very little progress, and

it is natural to suppose, that the workings would only be carried on in those coals which appeared in the face of rising grounds, or in glens, where the strata were laid bare by torrents of water. The progressive boldness of the collier may from thence be easily conceived.

In the year 1306, a violent prejudice was entertained, that the smoke of coal was extremely hurtful to the lives and health of the citizens of London; so much so, that an act was passed, in all due form, strictly prohibiting the use of sea-coal within the city, under severe penalties; and if any person was found transgressing, authority was granted to proper officers, to pull down and destroy the fire-places used for such fuel; so that the using of coal in London at that time must have been entirely suspended.

In the year 1325, the exportation of coal was scarcely known, as it is mentioned as a singular circumstance, that a vessel traded between Newcastle and Normandy, bringing corn and returning with coals.

In

In the year 1563, the price of coal, and great scarcity of it, was such in Scotland, that an act was passed prohibiting any more exportation. And we find, that it was only in the beginning of the eighteenth century, that pits of eighty yards deep were to be found in Scotland, and they were not much deeper at this time in England, on account of the machinery then in use.

The rapid progress that was made in every department of the coal-business during the eighteenth century is quite astonishing, and the plan of operations has been reduced to a regular system. Bold and enterprising schemes have been put in execution; and we now find in Scotland pits of 140 yards, and in England no less than 300 yards deep.

The great and prominent improvements are,

1*st*, The introduction of the steam-engine for drawing water, the improvements of which are such, that it is capable of doing work to any extent, and is applicable in all situations.

2d, The introduction of the rotary steam-engine, for drawing coals up the pit, invented about the year 1782. For this application of this most useful machine, we are said to be indebted to the engineers of Coalbrookdale. The saving of expence which has been produced by its means is very great; for, without it, the expence of drawing coals with horses from the depth of 300 yards, would have tended very much to raise the price of coals.

The execution of work performed by this machine far outstrips all former ideas we had of drawing coals quickly, as it is no uncommon thing now to see a basket of coals weighing 7 cwt. drawn 200 yards up a pit in the space of fifty seconds, which is at the rate of 12 feet *per* second. Without this machine, it would have required many regiments of horses to draw up the coals at Newcastle alone. But this machine is still very little used in the Mid-Lothian collieries, the cause of which is not easily to be conceived.

In Scotland, particularly at the Alloa colliery, a machine was introduced about the year

year 1740, for drawing coals, upon a simple and very ingenious construction. It consisted of a water-wheel of about 18 feet diameter, and three feet broad, divided vertically, so as to have two sets of buckets; the one set placed reverse to the other, so that when water was let upon one side of the wheel it turned forwards; when the water was stopped upon this side, a valve allowed the water to flow upon the other division of the wheel, which made the wheel move backwards; this produced an alternate motion of the ropes in the pit; and with a strong lever the machine was quite under command. This is still the cheapest and best machine for coal-drawing, where a plentiful supply of water can be got. A plan of this machine was carried to Newcastle; and, although water could not be procured in a fall for it, a steam-engine was applied to pump water up to the top of the wheel. This was a very circuitous plan, but it was the intermediate step to the rotary engine. Many of these machines are still to be seen in use upon the Sunderland collieries, drawing coals with great velocity,

velocity, but it is presumed no more will be erected, excepting in situations where there is a good natural fall of water, as the whole plan looks so very preposterous when compared with the rotary steam-engine. Besides these different engines, a machine was introduced for drawing coals, by making a bucket of water descend upon the opposite side of the rope barrel, to which the rope with the basket of coals was attached; but this machine could only be applied where there was plenty of water above ground, and very little below ground, from which cause its use is very much circumscribed.

4th, The introduction of waggon-ways for transporting of coal from the pit mouth to the shipping-place, particularly the recently improved cast-iron rail-way: formerly it was the work of a horse to bring down 6 cwt. at a time; one horse will now bring down from twenty to thirty times that weight.

5th, The last and greatest improvement in point of humanity, is the substituting horses, in place of women, for transporting the coals below ground; and there is ample room for

great

great exertions in this department, both on the river Forth, and in Mid-Lothian, particularly in the latter district, where very few horses have been introduced.

It will naturally occur to those who consider this latter subject, that there must be some very strong inducement for the continuance of so slavish a plan as this, and therefore we shall endeavour to investigate the cause.

Let us suppose, that there is a colliery which puts out 30,000 tons of coals each year with bearers, upon which a profit is made; if this colliery were to change the mode, introduce horses, and still put out the same quantity of coals, it is certain these profits would be very much diminished. This, therefore, at first sight, must operate against any change; and the reason is, that when colliers have horses given them in place of bearers, they give very little abatement from their prices, perhaps only about one-fifth, because the work was performed by their own family, and therefore coals are transported by bearers much cheaper than by horses; because, in the first place, a considerable

considerable capital must be laid out in buying horses and upholding them; each horse must have a boy to drive him; besides which, there is a train of incidental expences, such as grooms, road-keepers, horse-shoers, and saddlery accounts; added to which, the expence of keeping is as great when the colliers are idle as when they are working; and when oats and hay are very high-priced, the expences are doubled, and the whole plan requires much more attention and management; whereas, in the bearing system, all these expences are avoided, and the rise of markets makes no difference.

On the other hand, a train of expences is incurred by the employing of bearers, which, although not so obvious, is nevertheless true.

In the *first* place, Let a collier be ever so expert at his occupation, if his wife or daughters be indisposed, all his exertion goes for nothing, and it is certain much work is lost annually by this cause alone: and the difficulty of procuring a collier with a family of bearers is now so great, that it is no easy task

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to extend, or even keep up the numbers in those collieries where bearers alone are employed. In the *second* place, This system requires that the pits be very near each other; this involves a very great and constant expence, as there is not only a continual sinking of pits, but a constant making of roads and removing of machinery: each pit must have a complete establishment of grieves, labourers and pit-bottom men, and the surface of arable ground occupied by these operations, and rendered for a long time useless, amounts to a great value. This is strongly exemplified in the Mid-Lothian collieries.

Whereas, by the introduction of horses, these expences are avoided. The saving in this point, and particularly by the production of a much greater annual output of coals, overcomes the extra expences attending the horses; for it is certain, that colliers with horses can put out a greater quantity of coals than by bearers; and this must be the case, otherwise they could not afford to give any abatement of their prices; over and above which, all the small

small coal can be sent to market, which was no object formerly. Besides, colliers without families will never seek employment at works where bearers are employed, and this prevents these works being extended according to the wishes of the coalmaster.

With these great improvements in the collieries, our manufactures have kept pace, and have flourished in a high degree, to the great advancement of our best interests as a nation.

During the last fifty years, the extent of coal-field which has been exhausted, is great, and it is not easy to give a precise statement of it; but this we know, that there are many collieries completely exhausted and silent, which may be seen in every distrrict. But suppose we assume any given number of tons of coal wrought in that period, we must, for the next fifty years, take a quick increasing series, that is, the quantity consumed will be as 3 or 4 to 1, provided Britain continues to make the same rapid progress in her agriculture, her manufactures, and her commerce, which

which every good subject of Britain ardently hopes and trusts will be the case.

The evident increased consumption of coal in Scotland may be attributed to the following prominent causes:

1*st*, The style of living is altered in a great degree, compared with what it was fifty years ago, so that a person of the same class of society keeps at least double, if not treble, the number of fires in his house, and this alteration is very conspicuous in our cities.

2*d*, The extension of the iron-trade,—the rapid distillation of spirits,—the manufacture of glass,—the numerous steam-engines employed in all kinds of work, besides a very great number of manufactories on a less scale, such as potteries, tile-works, breweries, soap-works, &c.

3*d*, The burning of lime, particularly for the purposes of agriculture.

This last trade may be said to be only in its infancy. The consumption of coal for this purpose within these last fifteen years, is truly surprising. This arises from that strong spirit for

for improvement in agriculture, which is so evident in every district in Scotland; and it is evident, that each acre of ground brought into cultivation, adds to the physical support and strength of the State.

The following annual estimate is made from practical data, of the consumption of coal in some of the above manufactories in Scotland.

	Tons.
1. In iron-works, exclusive of foundries, - -	160,000
2. In glasshouses, - -	25,000
3. In distilleries, at eight months *per annum*, - -	53,000

The consumption of these works will give a general idea of the waste of coal-fields; and it is to be considered, that the quantity consumed in the iron-works, No. 1., as above stated, is equal to the annual output of the three most extensive collieries on the river Forth. That the coal-pits are getting deeper, is, above all, the surest evidence of the vast excavations made every year below ground.

But

But in order to give a more minute view of the matter, let us suppose, that there are 1000 good effective pickmen or colliers employed in the collieries adjoining the river Forth, these will in one year put out 400,000 tons of coal, exclusive of culm; and if the seam of coal be three feet thick, they will exhaust about 100 acres, allowing about one-third to be left for pillars. This estimate is rather low. If, therefore, 1000 men create such a waste in one year, how great must be the excavations made in Scotland, England, and Wales! for, in two counties of the latter district alone, there are twice as many iron-furnaces as in the whole of Scotland. It would require considerable labour and investigation to procure an accurate account of the total number of tons of coal annually wrought in the empire, but it is an investigation well worthy of the attention of the State.

Vast and extensive as our coal-fields are, the great consumption of them is evident from what is above stated. We very naturally say, that our coal-mines are inexhaustible; but

this is not the case. Even if the Grampian mountains were composed of coal, we would ultimately bring down their proud and cloud-capped summits, and make them level with the vales.

The coal-field of Scotland is confined to a certain district of country. It crosses the island in a diagonal line from west to east. Beyond this belt, either to the north or south, little or no coal is to be found; and the inhabitants who are removed at any distance from the coal-field, feel the greatest hardships by the high price and scarcity of fuel.

The north boundary of the coal-field extends from the banks of the river Eden, near St Andrew's, to the south parts of Kinross-shire, from whence it sweeps towards the Ochil mountains at Dollar, and keeps close upon their base westward till it arrive at Craigleith, one of the hills of that beautiful range, when it suddenly turns southward, and crosses the river Forth below Stirling; from thence it is traced by Kilsyth, Campsie, Witch-hill and Kilpatrick,

trick, till it fall into the river Clyde above Dunbarton.

The south boundary commences near Haddington, and stretches by Linton, Douglas Mill, Glenbuck, Muirkirk, New Cumnock, and from thence down the water of Girvan till it join the ocean.

These boundaries are not minutely correct, but they certainly contain the whole of the MAIN COAL-FIELD of Scotland which is of any importance. Detached insulated fields are no doubt to be found beyond these lines, as at Brora in Sutherlandshire, and at Sanquhar in Dumfriesshire, but they are not of great extent. Coal-strata are also to be found lying underneath the precipices of greenstone rock at Abbey Craig, Stirling Castle, and Craigforth, in Stirlingshire; but these are beyond the line of the main field, and only very thin seams of coal destitute of bitumen, termed Blind-coal, have been found there.

Even within these boundaries, are tracts of country without coal, owing to the intervention of hills, and the convulsion of the strata by

whinstone, and those *troubles* and *dikes* so common in coal-fields.

When this coal-field is traced upon the map, it shews distinctly the great extent of our country which is destitute of good fuel, and that all easy access is cut off to the north, where the climate is most rigorous in winter, by high and steep mountains; and we must allow, that the inhabitants of these districts have a strong claim upon us, that we give all due attention to the economy of our coal-fields; nor ought Ireland to be forgot, which depends upon us so much for fuel.

This coal-field contains four different kinds of coal, termed by practical men,

1. Splint-coal.
2. Open burning cubical coal.
3. Smithy or caking coal.
4. Blind-coal *.

The most extensive and valuable part of the field is composed only of the two first kinds.

The

* There is another kind, known by the name of Parrot or Cannel Coal, but it has not been found in any great quantity.

The other part of the field contains all the four kinds.

The prevailing strata which accompany the first-mentioned field, are sandstone of various shades, and blue argillaceous schistus. In the second field, besides these, there are in particular whinstone (by which is generally meant greenstone), and limestone; it abounds also with aluminous and bituminous schistus, and also with bands and balls of pyrites *. These seem to be the characteristic strata of the two fields.

As to the natural cause which produced the striking difference in the qualities of the coal, it has been endeavoured to be demonstrated by two parties of philosophers, the one named Plutonists, Vulcanists, or Huttonians; the other Neptunists or Wernerians. The first of these ascribe the formation, or at least consolidation, of minerals to the agency of *fire;* the latter, to that of *water*. But for particulars,

* These are used for the manufacture of sulphate of iron, or copperas.

we must refer the reader to their publications *.

Surely our primary attention ought to be paid to supply the wants of our own empire. Let us in the first instance survey the North of Scotland beyond the river Forth. Do we not find, that coals are in general very high-priced, and frequently not to be had for money? In many districts, the lower orders of society are unable to purchase even the smallest quantity for culinary purposes. Hence the idea of lime-burning, and the introduction of manufactories, is out of the question. It will be enough, in point of argument upon this topic, for any man to read a few of the Statistical Accounts of the parishes of the North of Scotland, published by Sir John Sinclair. The distress of the inhabitants for want of fuel is the general complaint, and this want is looked upon, very justly, to be the principal cause of

* *Vide* Professor PLAYFAIR's Illustrations of the Huttonian Theory, and Mr MURRAY's Comparative View of the Huttonian and Neptunian Theories.

of the poor and uncultivated state of the country. For, although peat can be procured, its price even far exceeds that of coal, on account of the great degree of labour and waste of time employed by the very persons who are to consume it. This great expence is not very obvious to themselves at first, but it is most certainly true.

It must be here remarked, that however high the prices of coal now are in the North of Scotland, they would have been much higher, had not Lord Melville, in the year 1793, procured an act, 33d George III. chap. 69., by which the duty imposed upon all coals carried beyond the mouth of the Forth was abolished. Before this period, all coals carried coastwise from Stirling bridge to Dunbar upon one side, and to the Redhead on the other side of the Forth, were free of duty; but the inhabitants north of these limits had a duty to pay of no less than 3 s. 8 d. *per* ton,—a sum nearly equal to the prime cost, over and above the freight, and the risk of a sea voyage. A more impolitic, partial and oppressive duty was perhaps never imposed, and therefore the

inhabitants of Scotland are most highly indebted to his Lordship for procuring a repeal of this duty, the repealing of which has contributed essentially to the best interests of their country. The benefits resulting from it are evident at a glance. Look to the towns north of the Forth; they have made, and are making rapid advances every day in population and manufactures, and these advances have been greatly aided by having a regular supply of coals from the river Forth, and from England, since this act was passed; and so great is the demand now to the northward, that the Forth coalmasters are able to send very few coals north of the Tay, as the supply there is chiefly from England. Even at Perth and Dundee, the demand for Scotch coal is much limited by the introduction of English coal. Hence is evident the great extra demand for coals, as all the Forth collieries have felt no diminution of sales from this cause.

It is worthy of particular remark, that although the exportation of coals has declined very much, and is even at this moment altogether

together suspended by the war, the continual increase of our own consumpt has been such, as to be more than an equivalent for this diminution; so much so, that the price of coals upon the river Forth, is at present higher at the ports where they are shipped, than in any former period.

There is a singular circumstance regarding the coal-trade, which has frequently excited surprise. It is this: a kind of periodical stagnation takes place, so that the price of coals is reduced, and vast quantities accumulate upon the hills at the different collieries. This it is rather difficult to account for, especially when we consider that the consumpt must be pretty uniform. It is presumed, however, that it may in part be attributed to the following cause.

Suppose that there is a brisk demand for coal; in this case, a great number of ships enter into the trade at once; this tends to make the demand apparently much greater than it actually is, and the coalmasters are induced to make every possible exertion to put out an extra

extra quantity of coals; every collier who can be got from the inland works is sought after, and every labourer at the collieries, who had been formerly a collier, is brought to the wall-face. By these means, an extra quantity is raised and sent to market, until it is overstocked, and a stagnation takes place of course. This gradually produces a relaxation of effort at the different collieries as to output of coal, until it fall below the demand, which again produces a brisk demand, and a kind of vibration in the trade. The general output of coal, however, increases progressively.

Such being the case with respect to the coal-field in Scotland, it remains for the enlightened politician to judge of the propriety of exporting to the Continent coals, an article which may be termed one of the vital principles of the State, as before mentioned, both in a political and commercial point of view. Are there not extensive districts in the North of Scotland remaining uncultivated, but which are capable of high improvement, the cultivation of which would give employment to thousands

sands of inhabitants, and prevent emigration to America, which operates most powerfully against us? Even the thousands of acres which are cultivated, could be rendered more than doubly productive, if lime could be procured on moderate terms. As to limestone, there is most abundant store in the North; but the distant carriage and high price of coal prevent this important and national improvement. If we turn our eyes to England, we find a great display of industry and perseverance, and with bold and enterprising adventure. Where there are rivers, every attention has been paid to make them navigable, almost to their sources, for small vessels. Where there are no rivers, canals are resorted to, and they are found to intersect the country in every direction, so that there is no town of any importance beyond the reach of water-carriage; and such is the spirit by which these works are carried on, that no obstacle, however great, is thought insurmountable; if a deep valley intervene, the lofty and airy aqueduct connects the mountains, or if a mountain obstruct

struct the course, the canal soon penetrates the solid rock. Lastly, Where canals cannot be formed, cast-iron rail-ways are made. By these means, agriculture and commerce are advanced in the highest degree.

Little has yet been done in this way through the North of Scotland, and there is therefore ample room for improvement. Let canals be formed through the districts capable of cultivation; from these, branches and rail-ways can go off to the smaller valleys. This will at once give a facility of carriage for coal and lime, in the first instance for agricultural improvement, which is the great object in view: manufactures and commerce will follow of course.

This would so much increase the demand for coal, as to be fully equal to the most vigorous exertions and output of the collieries, and add real and permanent strength to the pillars of the State; for, as before stated, the number of colliers in Scotland is completely limited, and they cannot, like other classes of workmen, be increased at pleasure: hence any very

very extraordinary exportation to the Continent, would raise the price very much at home.

If, however, any collieries depend much upon an export trade, it would be ruinous to stop exportation on a sudden. A period of years ought to be fixed, so as to give time to turn their sales into other channels; and in case of dull sales at home, a price ought to be fixed when coals might be exported, to secure the prosperity of the collieries.

But if canals be constructed in the North of Scotland, an improvement to which the gentlemen of that district are most zealously turning their attention, the reciprocal interests of all concerned will be highly advanced. Those districts, which at present are nothing but barren wilds, will be turned into fruitful fields, and filled with populous villages.

If we turn to our sister island, Ireland, we find there also a great want of fuel. Her coal-field, so far as explored, is very limited, and the quality of a peculiar kind, termed Blind-Coal, as before described, and only suitable for

proportion scarcely visible to the microscopic eye upon this magnificent scale.

All this theory may be perfectly true; for no human powers of argument can prove it to be false: but the converse is equally applicable to it; no human powers of argument can prove it to be true.

Let us grant that it is true, What is to become of mankind between the conclusion of our present coal-fields and that grand and important period, when the ocean, unable to ingulph any longer such masses of flinty rock, shall heave from its capacious bed another fabric of nature, replenished with a new kingdom of minerals for the use of man? No doubt, in the other two kingdoms of nature, we see a constant decay and renovation going forward; but in the mineral kingdom, any analogy as to renovation is very partial and limited indeed.

This theory is indeed beautiful, and displays not only an immense depth of genius and philosophy, but also a towering, sublime and aërial fancy. At the same time, it is to be feared, that it is a legacy for which those who are

to

to succeed us in these kingdoms, will give us no great praise, if we waste the coal-fields in a lavish manner. To all human appearance, the period of the next five hundred years will make a mighty difference in our collieries, when reasoning upon fair, evident and practical principles. Before the lapse of another century, all the fittings of collieries presently working will be finished, and the increased depth of pits which must of course follow, with an increase of water in the mines, will tend to increase the price of coal in no common degree.

From this view of the subject, is it not prudent and politic to be good husbands of that which so very materially concerns those who are to succeed us?

CHAP. VIII.

Hints to Philosophers and Men of Science for aiding the Labours of the Practical Mineralogist.—A standard Nomenclature much wanted.—Plan humbly proposed for correcting this great impediment to the Science of Mineralogy.

BEFORE taking leave of the subject treated of in the preceding pages, where the practical parts of colliery operations were attended to, we beg leave to throw together a few hints to philosophers and men of science, to shew where their labours and researches would be of the greatest benefit to those who are engaged in the laborious occupation of managing collieries, or in exploring districts of the kingdom for coal and minerals.

The public is much indebted to Mr KIRWAN, and to Professor JAMESON, for the great attention they have paid to Mineralogy: the latter gentleman has, in the third volume of his System of Mineralogy, given a view of the succession

succession of the strata, from the granite mountains to the alluvial rocks, which he has not only exemplified by the appearances in a district of country, but also by those which are observed in the stratification of the distant regions of the earth; thus elucidating a beautiful order and arrangement in Nature, very different from what a person would conceive who should only take a superficial view of rocks and mountains. It is the study of this arrangement that will lead to important discoveries.

Formerly, when collieries were of small extent, each manager considered the seams of coal which he wrought, as peculiar to that field, and as having no connection or analogy with any other seams of coal whatever.

These limited views are now, in a great degree, given up, and the coalmaster traces by analogy particular seams of coal, extending for many miles over a great district of country; so that upon seeing the stratification of a distant colliery, he immediately compares

it with those stratifications he is best acquainted with; and if the leading characteristics of any of the coals can be traced, he conceives, with propriety, that the upper and lower seams of coal will also be found, although they may be altered in quality and thickness. For example, it is conceived, by this train of analogy, that the seams of coal in Clackmananshire, correspond with the coals and stratification at Glasgow, though at the distance of thirty miles, and divided by many great slips and dikes in the strata.

This is advancing so far in systematic arrangement; but the great deficiency is, that we are in want of a correct mineralogical vocabulary. It must be granted, there are many of these; but which is the one to be assumed by practical miners, as the standard to which they may all refer, so that in the course of their operations they may be able to write in an intelligible language concerning the various strata they have either sunk or bored through? Nomenclatures may be formed every day, and with much ingenuity; but

but still this is doing little to the general advancement of science; it is labour in vain, if one nomenclature be not universally adopted.

At present, when a coalmaster visits collieries situated in different counties, or even in different parishes of the same county, when he inquires what are the strata in the coalfield, he hears minerals named so variously, that it is only by experience and long residence in a particular district of country that he can understand what is meant. If a mineralogist, who has studied any of the recent mineral names were to go to a colliery, and be told, that, in sinking for coal, the following strata were met with, viz.

Clunch,
Bakerie,
Till,
Blaes,
Blue metal,
Plies,
Faikes,
Girdles,
Shivers,

Grey bands,
Dogger bands,
White metal,
Red metal,
Grey metal,
Black metal,
Whin metal,
Post-stone,
Spar-stone,
Hard hard stone,
Scours of coal,
Cashy metal,

and many other strange provincial names; he would gain no more knowledge of the subject than he had before. These terms vary at every colliery, not only in Scotland, but also in England and Wales.

The degrees of hardness of the strata are equally ill defined, and more ludicrous. It is no uncommon thing to hear a miner say, that such a stone is hard; very hard; hard hard; desperately hard; hard as an *ape's head;* as hard as the *devil*, or as a *smith's study**. These

* Anvil.

These degrees of hardness may be very well understood among miners, but the ideas which a philosopher would form of the hardness, is not easy to be conceived.

Even the coal itself has many different names applied to it, such as

A Bed,
A Seam,
A Vein,
A Stratum,
A Band,
A Delft.

While any system is involved in such a chaos of obscurity and provincial terms, How can it be extended with any general utility, improvement, or satisfaction?

It appears, that while any individual, even with a becoming ardour and zeal, attempts to correct these errors, he will fail in the undertaking; because every man versed in the

science of mineralogy thinks for himself, and conceives in his mind a language more simple and correct. Even separate societies of philosophers, who attempt this reform, will be in the same situation as an individual.

In London and Edinburgh, there are societies now formed, for the purpose of producing a new and universal language for the mineralogist; but it is feared they stand independent of each other; and in this view, no good, it is feared, will be done, and no general standard will be agreed to.

With all due respect and deference to those learned bodies of men, who do most zealously and earnestly endeavour to promote science, the following plan for a general arrangement is suggested:

1st, That members of the different societies should, by meeting and correspondence, form a general mineralogical society.

2d, That a correspondence should be opened by this society, with those gentlemen who

are

are interested in the different mining districts of the kingdom, or who manage those operations, in order to procure from them correct sections of the strata they perforate, with specimens of those strata accurately marked with the corresponding provincial names.

3*d*, These being acquired, let the society fix upon such names to the strata as shall be judged best, arising, if possible, from the prevailing component parts of the mineral. The language should, if possible, be plain, of easy articulation, and involving in it no theory whatever; for the least tincture of this will to a certainty overthrow every plan of arrangement.

4*th*, Although, by these means, men of science would perfectly understand each other, when treating of minerals, it is of the highest importance that not only those who conduct the mining operations, but even that the miners themselves should use the new terms. For this purpose, if a table were made out of the synonymous provincial names, with the new scientific

scientific names opposite, and copies of these sent to all the different collieries and mines, the managers of the works could, by a little perseverance and attention, soon correct the common language. Hence a standard nomenclature would be established, which would greatly advance the science of mineralogy, and simplify very much the labours of the mineral surveyor.

A few years ago, a gentleman of the Royal Society of Edinburgh*, who has paid great attention to the study of this science, found it so perplexed and obscured by the various names given to the same kind of mineral by different authors, that he, in order to render the study more simple, selected the mineralogical synonymes from the recent British, French and German authors who had written upon the subject, and arranged the whole in alphabetical order, with numbers and references; which arrangement must have cost him

* THOMAS ALLAN, Esq.

him considerable labour. This shews how very intricate and involved this department of science is at present, and is an argument for some plan being adopted to correct these difficulties.

The importance of this reform to Great Britain, is so obvious as to require no comment whatever.

INQUIRY

INQUIRY

INTO THE

Condition of those Women who carry Coals under Ground in Scotland, known by the name of

BEARERS.

The first, most approved of, and most liberal plan, is to draw the basket of coals from the wall-face to the pit bottom, by means of horses, from whence it is drawn to the hill by machinery. This is practicable in all seams of coal high enough to admit horses, or where height can easily be gained by cutting up part of the pavement, or taking down the roof.

The next method resorted to, when sufficient height cannot be obtained at an easy rate, is to draw the coals in small wheel-carriages, by men, women or boys hired for the purpose, or by the collier himself, as practised in the west country.

In the third mode, the coals are carried by women, known by the name of Bearers, who transport them from the wall-face to the pit-bottom, from whence they are drawn by machinery to the hill.

The fourth and last mode is the most severe and slavish; for the women are not only employed to carry the coals from the wall-face to the pit bottom, but also to ascend with them

them to the hill; no doubt this was the practice in the very early periods of collieries; and it is only wonderful, that such a custom should remain to the present day, in the midst of all our refinements.

This latter mode is unknown in England, and is abolished in the neighbourhood of Glasgow. Seams of coal are there wrought of every thickness; so that no argument can be brought in support of it as a system which is indispensably requisite, in any circumstances.

It is, however, a certain fact, that severe and laborious as this employment is, still there are young women to be found, who, from early habits, have no particular aversion to the work, and who are as cheerful and light in heart as the gayest of the fair sex; and as they have it in their power to betake themselves to other work if they choose, the carrying of coals is a matter of free choice; and therefore, no blame can be particularly attached to the coalmaster. Yet, still it must, even in the most favourable point of view, be looked upon as a very bad, old and disgraceful custom.

But, as married women are also as much engaged in this servitude as the young, it is in this instance that the practice is absolutely injurious and bad, even although they submit to it without repining.

With respect to the labour attending all colliery operations, it is in vain to speak of Utopian schemes of ease and refinement; it is a labour which requires severe bodily exertion, and the sweat of the brow, more than almost any other operation. While this falls to the lot of the men, there is nothing wrong, as it is not particularly prejudicial to their health; but the case is far different with the women.

Let us now take a view of this system, the severity of the labour, and the consequences.

In those collieries where this mode is in practice, the collier leaves his house for the pit about eleven o'clock at night, (attended by his sons, if he has any sufficiently old), when the rest of mankind are retiring to rest. Their first work is to prepare coals, by hewing them down from the wall. In about three hours

hours after, his wife, (attended by her daughters, if she has any sufficiently grown,) sets out for the pit, having previously wrapped her infant child in a blanket, and left it to the care of an old woman, who, for a small gratuity, keeps three or four children at a time, and who, in their mothers' absence, feeds them with ale or whisky mixed with water. The children who are a little more advanced, are left to the care of a neighbour; and under such treatment, it is surprising that they ever grow up or thrive.

The mother having thus disposed of her younger children, descends the pit with her older daughters, when each, having a basket of a suitable form, lays it down, and into it the large coals are rolled; and such is the weight carried, that it frequently takes two men to lift the burden upon their backs: the girls are loaded according to their strength. The mother sets out first, carrying a lighted candle in her teeth; the girls follow, and in this manner they proceed to the pit bottom, and with weary steps and slow, ascend the

stairs, halting occasionally to draw breath, till they arrive at the hill or pit top, where the coals are laid down for sale; and in this manner they go for eight or ten hours almost without resting. It is no uncommon thing to see them, when ascending the pit, weeping most bitterly, from the excessive severity of the labour; but the instant they have laid down their burden on the hill, they resume their cheerfulness, and return down the pit singing.

The execution of work performed by a stout woman in this way is beyond conception. For instance, we have seen a woman, during the space of time above mentioned, take on a load of at least 170 lbs. avoirdupois, travel with this 150 yards up the slope of the coal below ground, ascend a pit by stairs 117 feet, and travel upon the hill 20 yards more to where the coals are laid down. All this she will perform no less than twenty-four times as a day's work.

The amount of work performed is as follows:

Travelling

Travelling up the slope of the coal loaded, - - 150 yards.
Returning with the empty basket, 150
Ascending the pit loaded, - - 39
Descending with the empty basket, - - 39
Travelling on the hill loaded, 20
Returning with the empty basket, 20

These distances, multiplied by the number of times the journey is performed, give the following result:

Travelled in a horizontal direction above and below ground loaded, - 4080 yards.
Travelled with the empty basket, 4080
Ascent of the stair loaded, 936
Descent with the empty basket, 936

10032

Of which the loaded distance is, 5016
And the unloaded, - - 5016

Those who are versed in the effective strength of men, will be able to calculate how many yards of horizontal distance are equal to the perpendicular ascent. It is presumed the

proportion would be comparatively great, when we consider that the weight of the body must be added to the weight carried.

The weight of coals thus brought to the pit top by a woman in a day, amounts to 4080 pounds, or above thirty-six hundred-weight English, and there have been frequent instances of two tons being carried.

The wages paid them for this work, are eightpence *per* day!—a circumstance as surprising almost as the work performed.

To many who may read this account of work, the amount of it will not be very obvious, because the depth of the pit and slope of the coal, compared with the same horizontal distance above ground, appear no very great matter.

But, in order to bring the amount of this work to a standard or scale by which it may be compared, we shall take for example, a well known and familiar object, the steeple of St Giles's, Edinburgh, the height of which is 161 feet from the street to the weathercock.

The

The depth of the pit is, as stated,	117 feet.
Perpendicular rise of the slope of the coal,	36
	153

Now, let us suppose, that a scale-stair were carried up from the base of the steeple to this height, which is within eight feet of the weathercock, and a platform made there, and that thirty-six hundred-weight of coals were laid down at the distance of 150 yards from the base,—a coal-bearer would make twenty-four journies to this great height, and lay down upon the platform the whole quantity of coals, or even two tons, upon an extra exertion.

This she would perform, not as the mere effort of a day, after long training, like our celebrated pedestrians, but she would perform the same work, five days each week, and that not for a week, a month or an year, but for years together.

Astonishing as the feats are which have been performed by pedestrians for high betts,

the palm must be yielded to the coal-bearer; for it is certain, if one of them had the prospect of gaining five guineas, by making a great exertion for one day, the work she would perform would far exceed all that is stated.

There have been instances of their carrying three hundred-weight at once, and of ascending the slope of a coal and pit, equal to 222 feet, which is sixty-one feet higher than St Giles's steeple; but the particular instance before stated, fell under the observation of the writer.

In short, the height ascended by them, when loaded, is equal to more than four times that of Arthur's Seat above the level of the sea, or to the height of Benlawers in Perthshire, above the level of Loch Tay, the total ascent being 3672 feet.

In those pits which are so deep as to prevent the women from carrying the coals to the hill, the distance from which they bring the coals to the pit bottom may be stated at 280 yards.

This

This journey they will perform thirty times with the weight above mentioned, in the space of ten hours; so that the journey performed each day, is as follows:

Journey when loaded, -	8400 yards.
Ditto, with the empty basket,	8400
	16,800
Perpendicular ascent of the slope of the coal, - - - -	700

From this view of the work performed by bearers in Scotland, some faint idea may be formed of the slavery and severity of the toil, particularly when it is considered that they are entered to this work when seven years of age, and frequently continue till they are upwards of fifty, or even sixty years old.

The total quantity of coals thus carried by women in one year must be very great, as the quantity in one small county alone, amounted, a few years ago, to no less than 100,000 tons.

The collier, with his wife and children, having performed their daily task, return home, where

where no comfort awaits them; their clothes are frequently soaked with water, and covered with mud; their shoes so very bad as scarcely to deserve the name. In this situation they are exposed to all the rigours of winter, the cold frequently freezing their clothes.

On getting home, all is cheerless and devoid of comfort; the fire is generally out, the culinary utensils dirty and unprepared, and the mother naturally first seeks after her infant child, which she nurses even before her pit clothes are thrown off.

From this incessant labour of the wife, the children are sadly neglected, and all those domestic concerns disregarded, which contribute to render the life of the labourer comfortable and happy. It is presumed, that it is from this habit of life that infectious diseases make in general greater havock among the children of colliers than among those of any other class of labourers, so much so, that we have seen the number of deaths in one year exceed the number of births. Enter their houses; these

these will afford ample demonstration of all that is adduced.

This habit of life is also the cause of the money which they earn being spent, without economy; hence they are always in want. No doubt, there are many exceptions to the contrary; but the case now brought forward is too frequently to be found.

How different is the state of matters, where horses are substituted for women, and when the wife of the collier remains at home.

The husband, when he returns from his hard labour with his sons, finds a comfortable house, a blazing fire, and his breakfast ready in an instant, which cheer his heart, and make him forget all the severities of toil; while his wife, by her industry, enables him to procure good clothes and furniture, which constitute the chief riches of this class of the community. A chest of mahogany drawers, and an eight-day clock, with a mahogany case, are the great objects of their ambition; and when the latter is brought home, all their relations and neighbours are invited upon the occasion,

occasion, when a feast is given, and the whole night spent in jovial mirth.

The sentiment of the Poet most aptly applies here, and with peculiar force :—

> Let not ambition mock their *useful toil*,
> Their *homely joys* nor *destiny obscure*,
> Nor grandeur hear, with a disdainful smile,
> The short and simple annals of the poor.

The desire they have of procuring such articles as above stated, is a great mean of preventing their money being spent in ale-houses, and therefore deserves every praise and encouragement.

It frequently happens, that the mother of a family continues to bear coals even to within two days or twelve hours of her inlying. The mere mentioning of this circumstance is quite enough to any person of the least knowledge or reflection, without particularizing any of the consequences.

Besides the wives and daughters of the colliers, there is another class of women attached to some collieries, termed Framed Bearers,

ers, or, more properly, Fremit Bearers, that is, women who are nowise related to those who employ them. These are at the disposal of the oversman below ground, and he appoints them to carry coals for any person he thinks proper, so that they sometimes have a new master every day: this is slavery complete; and when an unrelenting collier takes an ill-natured fit, he oppresses the bearer with such heavy loads of coal, as are enough to break, not only the spirit, but the back of any human being.

That the women are fully sensible, and feel the severity of their labour, is but too evident, especially to all those who have been accustomed to travel below ground. One case, for example, we shall mention, which occurred.

In surveying the workings of an extensive colliery below ground, a married woman came forward, groaning under an excessive weight of coals, trembling in every nerve, and almost unable to keep her knees from sinking under her. On coming up, she said in a most plaintive and melancholy voice: "O SIR, THIS IS

"SORE,

"SORE, SORE WORK. I WISH TO GOD THAT "THE FIRST WOMAN WHO TRIED TO BEAR "COALS HAD BROKE HER BACK, AND NONE "WOULD HAVE TRIED IT AGAIN."

Under such circumstances, who would not feel for their misfortunes, and make every exertion for their relief, in that circle where their influence extends, however limited that circle may be? The mentioning of a few of the circumstances attending this system to the proprietor of an extensive colliery, was the instant means of relieving a number of those women from this terrible slavery,—from this worse than Egyptian bondage.

It is to be hoped, that in a few years the bearing of coals in Scotland will cease to be known. To change the whole system of a colliery at once, would be almost impossible, and highly detrimental to all concerned.

Common prudence suggests, that the change be gradually made, and more particularly as a work which is fitted or established for bearers, requires a new arrangement to fit it for horses. But it is needless to state all the particulars

ticulars here, excepting that a horse cannot pull up the rise of a coal to a pit bottom, on account of the great acclivity, being about one yard in five; whereas a cart-road, which has a rise of one yard in twenty, is reckoned steep. A bearer, when loaded, chooses rather to go up the acclivity than go down.

We are apt to declaim against the conduct of the colliers, which is no doubt frequently very cross and troublesome; but what can we expect from men whose wives are kept in such a degraded state? Would mankind in general be any better under similar circumstances? We must not look for miracles. The woman who bears the coals has right to say as much about the price of labour as the husband. Is it any wonder, then, that the combinations they sometimes form are strong? Do we not all acknowledge the very high and extensive influence of women in society? Do we not pay them a ready tribute? Let the condition of this class of women be bettered, and most undoubtedly the best consequences will follow.

There

There are particular situations and circumstances, where bearers may for a few years still be necessary, that is, there may be collieries, where, if the system were at once abandoned, the colliery would cease to be wrought, or at least would be wrought to great disadvantage; as, for instance, in the edge-seams near Edinburgh, where it will require both genius, and a strong and persevering exertion to alter the system; but there is no doubt as to its practicability. The metallic veins are nearly perpendicular; but we have never seen any bearers employed in them. If the present plans were instantly changed, a loss would ensue, not only to the individual, but to the public. In such cases, young women are to be found, who, from early habit, will cheerfully submit to the drudgery; but the married women ought, for a thousand reasons, to be relieved from the bondage. The strongest arguments could be brought forward on this point, but we deem it unnecessary.

Having thus endeavoured to bring into view the state and condition of a class of women in

in society, whose peculiar situation is but little known to the world, or even to those in whose service they are, it must be remarked that the picture is not placed in too strong a light, considering the darkness of the shades by which it has been obscured. To enter into a more minute detail of the sufferings they undergo, would be a very unpleasant task.

But, to sum up all, the system is severe, slavish, and oppressive in the highest degree, and renders their life the most weary of all the pilgrimages of mankind through this journey of life.

If what has been stated shall tend in the least degree to meliorate their condition, it will be a pleasant reflection to think that some little service has been done to society. And I trust, that the day is not very distant, when the system of bearing coals will be only talked of as a very bad old custom, and when we will blush to hear that such slavery existed in Scotland in the nineteenth century!

APPENDIX.

county of Mid-Lothian, which cannot be wrought by REASON OF WATER, hath therefore applied to the Committee for the liberty and license of setting up and using on the said coal-work, one engine of the said invention, for draining thereof: Now WITNESS these presents, That the said John Meres and Committee aforesaid, for and in consideration of rent and other conditions, to be paid and performed on the part of the said Andrew Wauchope, have GIVEN and GRANTED, and by these presents GIVE and GRANT to the said Andrew Wauchope, his heirs, executors or assignees, full and free power, license and authority, at his and their own charges, to erect, set up, and exercise in and upon the said work, called the Colliery of Edmonston, Caldcoat, Newton and Shaffair, one engine of the said invention, and no more; the stem, barrel or cylinder of which engine shall not exceed nine feet in length, and twenty-eight inches diameter, according to the method and manner now used at the coal-work of Elphinston in Scotland, to hold, use and exerce the samen engine,

engine, so to be erected, from and after the 24th day of June next ensuing the date hereof, for and during, and until the full end and period of the said John Meres and proprietors aforesaid, their grant and license for the sole use of said engine, being eight years complete next following and ensuing. IN CONSIDERATION of which liberty and license, and other conditions to be performed as aforesaid, by the said John Meres and Comittee above mentioned, the said Andrew Wauchope, by these presents, binds and obliges him, and his foresaids, well and truly to pay, or cause to be paid, at or in the dwelling-house of the said John Meres, situate in the Apothecary's Hall, Blackfriars, London, as to the said John Meres and Comittee aforesaid, their heirs, excutors and administrators, or assigneys, the yearly rent and sum of Eighty pounds lawfull Brittish money, for the use of the said engine, enduring the foresaid whole time and period of eight years, by quarterly payments of Twenty pounds on the four most usuall terms in the year, viz. The Feast of St Michael

the Archangell; the birth of our Lord; the annunciation of the blessed Virgin Mary; and the nativity of St John the Baptist; under the penalty of Four pounds for each of the said terms failzies, without any deduction or abatement thereout, for or in respect of any taxes, assessments, royall aids, or other impositions, matters, cause or thing whatsomever; the first quarter payment of Twenty pounds to begin and be made on such of the said feast days as shall next happen after any coalls shall be raised out of the said coal-eary or coal-work, for sale, by use of the said engine: And in case the said yearly rent of Eighty pounds, or any part thereof, shall happen to remain unpayed by the space of fourty days over and after the foresaid feasts and days of payment above condescended upon, whether the same be demanded or not demanded, it shall and may be lawful to and for the said John Meres, and Comittee aforesaid, by their servants, horses, carts and carriages, to enter into and upon the said engine, and the house, ground or place where the same

shall be situated and erected, and to take up, distrinzie and away take the said engine, and the barrells, boylers, pypes, materialls, and other things thereto belonging, and the samen to sell and dispose of, for the best price that can be gotten, and out of the money arising from the sale of the said engine and others, to retain and keep all the arrears of the said rent then due, and the coasts and charges of such distress and sale, and return the overplus, if any be, to the said Andrew Wauchop and his foresaids: PROVIDED allways, and by these presents it is hereby provided and agreed, that if, at any time during the continuance of this grant and license, the coals within the said colliery and coal-work shall be wrought out, or the working thereof stopt, so as the said engine shall be laid in or cease working by the space of three months at any one time, that during any such time as the said coal shall not be wrought, or the said engine cease to draw water, above the said space of three months, not only by reason of any accident of not working the coall, or any

stop

in the engine itself, but also upon any accident whatever, that the said engine is not made use of, then there shall be a proportional abatement of the foresaid rent thereof allowed and given down to the said Andrew Wauchop, corresponding to the time that the said engine does not go, and is not made use of by him, any thing herein to the contrary notwithstanding: PROVIDED always, that the said Andrew Wauchop, or his foresaids, do timeously notify to the said comittee, at the aforesaid Apothecary's Hall, the said accedent and stop of working, or not using the said engine, by a missive letter subscrybed by him: AND FURDER, the said Andrew Wauchop and his foresaids, by these presents, doeth covenant and agree to, and with the said John Meres and Comittee aforesaid, that he and his foresaids shall erect, use and exerce the said engine only and allenarly, in and upon the coall of Edmonston, Caldcoats, Newtoun, Shaffair, and that he shall not work, get coal, drive drifts or ways under ground, by means and help of the aforesaid engine, whereby the water

ter of any adjacent colliery or coaliarys, vein or veins of coall, belonging to any other person, shall or may be drained or eased, or be accessory or assistant to the same any manner of way, directly or indirectly: And for the better discovery and preventing thereof, it shall and may be lawfull for any servant or servants of the said John Meres, or Comittee aforesaid, their heirs, executors and administrators, partners or assigneys, being thereto duly authorised, at all seasonable times, and by usual ways, to go down into the pitts belonging to the said Andrew Wauchop, there to new search and ride the same, and afterwards to ascend and come up from the said pitts by the like ways, without any denyall, disturbance or interruption whatsomever; As also, that he or his foresaids shall not erect or use more than the aforesaid one engine, hereby licensed: It is also hereby mutually covenanted and agreed by the parties above named, that in case the said Andrew Wauchop, or his foresaids, do not, on or before the twenty-fifth day of December next ensuing, erect the

the aforesaid engine in manner above mentioned, then and from thenceforth the present grant and license shall cease, determine, and be utterly void, any thing in the premises to the contrary notwithstanding: PROVIDED, that the said John Meres, and Comittee foresaid, shall in due time provide and furnish the said Andrew Wauchop with a cylinder, iron barrels, regulator and other brass-work, within the limits and space condescended on, upon the proper charges of the said Andrew Wauchop: AND both parties consent to the registration hereof, in the books of Council and Session, or any other judge's books competent, to have the strength of a decreet, that letters of horning and all other execution necessary pass hereon, in form as effeirs, and thereto constitute

their procurators. IN WITNESS whereof, both parties have subscribed these presents, consisting of this and the three preceding pages, written on stamped paper, by Patrick Spark, servitor to Gabriel Napier, writer in

in Edinburgh, ATT Edinburgh and London, the twenty-seventh day of April, and twenty-sixth day of May One thousand seven hundred and twenty-five years, before these witnesses *respectivè*, viz. To the subscription of the said Andrew Wauchop, at Edinburgh, the said twenty-seventh day of Aprile, Mr James Don, advocate, Mr William Lumsdain, writer to the Signet, and the said Gabriel Napier; and to the subscription of the said John Meres, and Comittee foresaid, at London, the said twenty-sixth day of May, and year foresaid, before these witnesses, Cornelius Dutch *jun.* of Apothecary's Hall, Blackfriars, London, and the said Gabriel Napier, filler up of the last date, and witnesses names and designations, and marginal note, to which he and Cornelius Dutch are also witnesses.

A. WAUCHOPE.
JOHN MERES.
THOS. BEAKE.
EDW. WALLIN.

James Don, *witness.*
Will. Lumsden, *witness.*
Gabriel Napier, *witness.*
Corn. Dutch, *witness.*

WE

We the before-mentioned Henry Robinson and William Perkins, and we Cornelius Dutch and Foot Gregg, executors of, or otherwise deriving right from the before-mentioned John Meres, and we Gregory Beake and William Sharp, executors of, or otherwise deriving right from the before-mentioned Thomas Beake, and Benjamin Wallin, executor of, or otherwise deriving right from the before-mentioned Edward Wallin, Do hereby declare, we have received of and from James Wauchope of Edmonstone, Esquire, the legal representative of the before-mentioned Andrew Wauchop, the sum of Two hundred and forty pounds, which we accept in full and compleat satisfaction of the whole obligements contained in the foregoing articles and annuity thereby covenanted to be paid; and therefore, the said James Wauchop, his heirs and executors, and all others whom it may concern, are hereby discharged of the same for ever. In witness whereof, written by Ezekiel Trengrove, of Apothecary's Hall, London, Gentleman, we have subscribed these presents, at London, the

the 10th day of December One thousand seven hundred and thirty-five years, before these witnesses, Edward Ray, of Apothecary's Hall, London, Gentleman, and the said Ezekiel Trengrove.

WM. PERKINS.
J. ROBINSON.
CORN. DUTCH.
FOOT GREGG.
BENJ. WALLIN.
GREG. BEAKE.
W. SHARP.

Edwd. Ray, *witness.*
Ezek. Trengrove, *witness.*

No. II.

No. II.

ACCOUNT of the Expences of Edmonstone Fire-Engine, to Mr Potter, discharged 1st July 1727.

AN Account of Money paid for a Fier-Engin belonging to the Honourable the Laird of Edminston, by John Potter, Enginer.

Imprimis,—To a cilinder 29 inches diameter, with workmanship, carried to London, and all other charges and expences,	L. 250	0	0
To a pestion, - -	9	10	0
To a brass barrel, 7 foot long,	17	10	0
To one brass bucket, and one clack,	0	13	0
To charges of unloading the cillinder at London, and getting it on shipboard, - -	2	10	0
To carriage of the pestion and			
Carried forward,	L. 280	3	0

Brought forward,	L. 280	3	0
brass barrel to London, by land,			
and to Newcastle by sea, -	1	15	6
To charges getting them from Shields,	0	5	6
Paid for elm pumps at London,	53	4	6
To one one hand screw, -	1	17	0
To charges putting on ship-board,	2	3	6
To cariage to Shields, -	3	15	6
To bringing from Shields, -	2	5	6
To one joynter, - -	1	15	0
To a jack-role, with iron-work to it,	1	0	0
To two cast-mettle barrels, 9 foot long, and 9 inches diameter, and with expences after them,	41	16	6
To putting them on ship-board,	0	6	0
To cariage of them to Newcastle,	1	11	6
To two brass buckets, and two clacks; 9 inches diameter; a brass regulator and injection-cock, and other cocks; sinking-			
L Carried forward,	L. 391	19	0

Brought forward,	L. 391	1	9
vouls, injection-caps, snifting-vouls, and feeding-vouls,	35	5	0
To one jeck for the wy,	0	12	0
To charges of bringing the pit barrels from Shields,	0	10	0
To two bags of nails, and three ladles,	4	4	0
To the plumber's bill for lead, and a lead top for the boyler, with sheet-lead, and lead-pipes,	78	10	6
To cariag from Durham to Newcastle,	2	10	0
To the timber bought in Yorkshire, for the engine, with carriage by land and water, and freight to Newcastle,	82	16	0
Paid at Newcastle for dues to the town,	1	5	0
To charge more at Newcastle for loading timber pumps, boyler, and the rest of the matterials,	3	5	0
Carried forward,	L. 600	16	6

Brought forward,	L. 600	16	6
Paid for the clearance of the boat,	0	4	6
To 44 cwt. 1 qr. 14 lb. of chains, screw-work, and all other iron-work about the engin, except the hoops of the pumps, at 5 d. *per* pound,	103	10	10
To plates and revet-iron for making the boyler,	75	10	0
Paid for coals 16 s.; to a smith's shop 10 s.	1	6	0
Paid for cariage of iron-work to Newcastle,	2	5	0
To cast-mettle bars for the furnice,	16	14	0
To soder,	15	10	0
To seven bends and one hide of leather,	8	15	0
To two brass codds for the regulator beam,	5	14	0
Paid for ropes,	19	16	0
Carried forward,	L. 850	1	10

descharge the said Andrew Wauchope, his heirs, and all others whom it concerns theare of, and of all that I can ask or claim of him upon any account or acation preceeding the date hearof: In wittese weereof I have writting of and subscreed those presenes at Edmonston the first day of July One thousand seven hundred and twenty-seven years, before these witneses Joseph Holden, tacksman of the said Andrew Wauchope salt-panes near Muslebrugh, and Abraham Potter, my brother-german.

JOHN POTTER,

Joseph Holden, witness.
Abraham Potter, witness.

No. III.

No. III.

ARTICLES of AGREEMENT betwixt Mr James Smith *of Whitehill, Proprietor of the Fire-Engine and Coal-work of Whitehill, and* Jno. *and* Abr. Potters, *Engineers in Bishoprick of Durham.*

1. THE said engine is to be made a sufficient well going engine, by the said Jno. and Abr. Potters; all the expences of the said Mr Ja. Smith but the first advance, to be made by the said John and Abr. Potters.

2. That whatever sume or sumes of money the said John and Ab. Potters shall advance or give their credit for, in purchasing new materials for the use of the said engine, the said Mr James Smith shall give his bond to repay such sume or sumes, with a premio of 10 *per cent.*, to be paid out of the first and

readiest of the price and profits of the coal that shall be wrought and sold out of the said coal-work; and in case, by any unforeseen accident, it shall happen, that the said engine shall not be able to draw the water, and make it a going work, then it shall be in the power of the said Jno. and Abr. Potters, to take away all such materialls as shall be furnished by them, and the said Mr Jas. Smith shall only be lyable to pay them a reasonable allowance for their pains and charges in repairing the said engine, as it shall be determined by two persons to be named by them, with power to them to choose an impire for determining the difference, if any happen.

3. That the said Mr Smith is to give to the said Jno. and Abr. Potters, the full right and disposal of the brass cylinder, presently standing on the said engine, to be sold to the best advantage, and the price thereof to be accounted for by them, or applied by the said Jno. and Abr. Potters in purchasing new materialls, or imploying workmen at the said work.

4. That

4. That after the said engine, &c. is fully repaired and made a sufficient and well going engine, actually drawing water, by pumps of seven and nine inch bores, the said Mr Jas. Smith is to pay to the said Abr. the sum of Two hundred pounds Sterling, as his yearly sallary and reward for his pains and other charges he may be at in keeping servants to attend the said engine, and which sum must be paid and allowed to the said Abr. weekly and monthly, as his work requires, and for tear and wear in repairing the said engine yearly; and which said sum is also hereby declared to be in satisfaction of tear, wear, and attendance, &c.: The said Mr James Smith always furnishing a sufficient quantity of coals to be laid down at the engine-house for supplying the said engine, and allowing a competent time to the said Abraham for repairing the said engine, if at any time the same may happen to go wrong. DECLARING, nevertheless, that if any accident then shall happen to the cylinder, boyler, or engine-shaft by fire, shall not be understood to fall

fall under tear and wear, but is to be repaired out of the free profits of the said coal-work.

5. That the said Mr James Smith shall, and does hereby appoint the said Abr. Potter steward and factor of the said coal-work, for the whole years to run of the tack sett by the Lord Edmonstown to the said Mr Smith, with power to them to sett down pitts when needfull, or drive drifts, and to hire what number of coaliers and other servants they think fitt to employ at the said work; and what charges they shall lay out in making pitts or drifts, in hireing or imploying such coaliers and servants, shall be allowed as uncoast out of the profite of said work. The said Jno. and Abr. Potters being always accountable to the said Mr James Smith for the remainder proffites of the said coal, and paying of costs and charges in the first place, and reimbursing of all expences to be laid out by the said Jno. and Abr. Potters in the second place, and other expences the said Mr Jas. Smith has laid out already in setting up the said engine, which he computes to be Twelve hundred pounds Sterling, is to be

be payed off, in the next place; and thereafter the free profits of said coal-work is to be divided thus, viz. The one-half to the said Mr James Smith, and the other half to the said Jno. and Abr. Potters equally, after allowing the Two hundred pounds mentioned in the fourth article as uncoast; as also allowing the coals furnished by the said Mr Smith for the use of the engine, as an article to be charged in the accompt of uncoast.

6. It is also agreed, that the said engine, and the whole materials thereto belonging, pumps and barrells, and other materialls, whether in the shaft or engine-house, shall, at the expiry of the said tack sett by the Lord Edminston to the said Mr Smith, pertain and belong to the said Mr Smith in property, providing that such sums shall be advanced by the said Jno. and Abr. Potters be first satisfied and payd.

7. That the said Mr James Smith shall, for the said Jno. and Abr. Potters, their security of what advances they may make in terms of their articles, assign, as by thir presents, the hereby

hereby assigns them the said Jno. and Abr. Potters, in and to as much of the first and readiest of the proffits of the said coal-work, as will repay such sum or sumes as they shall happen to advance or give their credit for, in terms of the said articles: And both parties bind and oblidge them, their heirs, exrs. or administrators to the performance of the said whole articles *binc inde* to others, under the penalty of over and above performance: And for the more security, both the said parties consent that thir presents be insert and registrate in the books of Council and Session, or any other Judges books competent, that letters of horning on six days charge, and all other execution necessar may pass thereon, in form as affeirs, and thereto constitute their prors., &c. In witness whereof, both parties have subscribed these presents, consistg. of this and the two preceeding pages, written on stamped paper by Jno. Irwine, writer in Edinbo., att Edinbo. the same place, the sixteenth day of February, and twenty-eight

eight day o ye said month Javij and twenty-seven years, before these witnesses, viz. to the subscription of the said Mr James Smith and Jno. Potter, att Edinbo. the said sixteenth day of February; Mr Alexander M'Gill, architect in Edinbo.; Gabriel Napier, writer there, and Patrick Spark, his servant, filler up of the first place, date, and witnesses, and to the subscription of the said Abr. Potter at Edinbo. the said twenty-eight day of February and year foresaid, the said Mr Alexander M'Gill, Gabriel Napier and Patrick Spark, who is also inserter of the last place, date, and witnesses.

Alex. M'Gill, witness. JA. SMITH.
Gabriel Napier, witness. JNO. POTTER.
Pat. Spark, witness. ABR. POTTER.

No. IV.

REVIEW of the Coal Trade, since the Year 1808.

SINCE publishing the preceding Treatise relative to the Coal Trade of Scotland in 1808, the chief improvement therein pointed out, has been tried, viz. the introduction of the Glasgow system of Household Coals; a point of the greatest consequence in the general Trade and economy of the Scotch Collieries. We have, therefore, thought proper to take a review of the foregoing Treatise, and state what has occurred in the Trade, since it was published.

For these three years past, the Coal Trade of Scotland has been generally at a low ebb, and fluctuating. At times, the stocks of coals were very great upon the hills, and the prices reduced at least 20 per cent. The most

most obvious causes of which were, the checks received by the manufacturing interests of the country, and the overpowering flood of English Coals that are daily poured into the Scotch market, which threaten to overthrow the whole of the River Forth and Lothian Collieries. English Coals began to be much used in Scotland, after the passing of the Act 33d Geo. III. chap. 69. brought forward by Lord Melville, as taken notice of in the preceding Treatise, chap. VII. At first, their sale was confined to the districts of Aberdeen, and the ports to the northward, gradually supplanting the Scotch coal; so that, comparatively, there are few of the latter now used there. The Scotch Coal-Master has not only seen his market cut off in that quarter entirely, but also much circumscribed at all the ports southward, viz. at Montrose, Arbroath, Dundee, Perth, Dunbar, Leith, and Edinburgh, as may be distinctly seen from the Customhouse returns. By the Lothian Coal-Masters, it must be felt particularly severe, as English coals are now

used in Edinburgh, thus competing with the Scotch coals, which are wrought within five miles of the city. Besides which, many gentlemen on the coast of Fife are now importing English coal, although abundance of coal is to be found in almost every quarter of that rich and flourishing county. Stronger proofs of the balance of trade in favour of the English coals certainly cannot be adduced, particularly when the long voyage, freight, and sea risk, attending them, are taken into account.

We may consider the collieries of Scotland divided into four districts, where coal is wrought upon a great scale, viz.

1. The River Forth district.
2. The Lothian district.
3. The Glasgow district.
4. The Ayrshire district.

The Coal Trade of the River Forth consists chiefly in the coasting trade, which is the greatest vend, and the supplying of manufactories,

nufactories, in particular, iron-works, distilleries, glass-works, and lime-works.

The Coal Trade of the Lothians is chiefly confined to the supplying of Edinburgh, the numerous towns in its vicinity, distilleries, salt-works, potteries, and lime-works, there being little or no coasting trade.

The Coal Trade of Glasgow consists in supplying the city of Glasgow, with its numberless manufactories, iron-works, and populous villages in the interior of the district, and all the towns down the Firth of Clyde, besides, in having a great export trade to Ireland, the West Indies, and America.

The Ayrshire district has its chief trade to the coast of Ireland, where the consumpt is very great. There are comparatively few manufactories in this district, except the salt-works, but there is a good inland sale.

The two first districts, viz. the River Forth and Lothian, have only been hurt by the English coals, since the passing of the before-mentioned Act. And these have been affected in a very severe degree; so much

so, that many collieries are laid in, others are reduced to a very small scale, while others have carried forward under such unfavourable circumstances, that the capitals expended are more than a Scotch colliery is able to struggle with; these go on, however, in the hope of more favourable circumstances occurring, because to cease working would at once lose the whole capital, and do an irretrievable injury to the prosperity of the district in which they are situated.

From the gradual, but steady progress of English coal into all the ports supplied from the River Forth, the vend from thence is more and more circumscribed; and the Coal-Masters of this district have, more from necessity than choice, been forced to make establishments in Leith for the sale of their coals, thus incroaching upon the natural sale of the Lothian Collieries; at the same time, selling their coals lower than they can afford to do. From these circumstances, the Forth and Lothian Coal-Masters are much hurt in their trade; they are brought into an injurious competition

competition with each other, and are sacrificing their capitals to the public,—a plan which, if long continued in, must be the ruin of many.

It has been proposed as a remedy, to apply to the Legislature to have the Scotch coal put on an equal footing with that of England, in regard to the coasting trade. At present, all coals sent coastways from Scotland to England, pay a duty equal to that on English coal; but the quantity of coals sent from Scotland to England is so very limited, as not worthy of being taken notice of as a trade. On the other hand, English coals, in immense quantity, are sent into Scotland duty free, a circumstance most directly against the River Forth and Lothian Coal-Masters. It must however be allowed, that, when the case is considered in a broad and liberal view, the evil complained of is partial, while the good is general: Because, while the whole inhabitants of England, who receive coals coastways, pay a high duty, the inhabitants of Scotland are supplied with

both Scotch and English coals, duty free. This has been an important boon, and has tended most effectually to forward the manufacturing and agricultural interests of Scotland in no common degree. But for this the Forth and Lothian Coal-Masters have suffered, and, we fear, must continue to suffer without redress, which is very severe.

Scotland, when compared with England, would require some favourable circumstances to bring her forward in the scale. England, as a country, is very populous, comparatively champaign and fertile; has a favourable climate, and great capitals employed in trade. On the other hand, Scotland is very thinly peopled; the greater part of the surface wild, rocky, barren, and mountainous, so that in one view it is only by the sides of her largest rivers, that high cultivation and towns are to be found. The climate is cold, damp, and variable, and much of the sub-soil very unfavourable for cropping; the capitals in trade comparatively

tively small. So that, if the two countries are dealt with upon the same terms, the difference must of necessity be much in favour of England, with its physical advantages. And we must confess, that however just and strong the claim of the River Forth and Lothian Coal-Masters is for a redress from Government, it is not easy to point out a remedy at once proper, effective, and popular. Various plans have been proposed, but all of them seem to fall short of the general object. This, therefore, remains a subject for the mature and deliberate consideration of those so deeply interested in it; and who feel a heavy loss every day, in the sacrifice of their fortunes.

The other two districts, viz. the Glasgow and Ayrshire, are free from the evil felt by the other two districts, viz. the introduction of English coals upon their market; but they are not exempted from their peculiar and local difficulties, as all colliers have their share of them, so that we need scarcely enter into particulars applicable in a general view.

view. Only we may mention, that the Glasgow district suffers much when the least stagnation takes place in the staple manufactures of that quarter, and the Ayrshire district suffers when the distilleries of Ireland are stopped, as the latter use Scotch Coal in preference to the Cumberland Coals, on account of their open burning quality.

As one of the chief views in writing the foregoing Treatise, was to introduce the Glasgow system of Household Coals into the market, in lieu of the awkward system of the River Forth; viz. the dividing the Coals into distinct parts, termed Great Coal, Chews, and Lime Coal,—the prejudices to combat were great, particularly as the consumers firmly believed, that the Chew Coal was of a quality very inferior to the Great Coal. We have now, however, the satisfaction to state, that the Glasgow system has been introduced in Leith and Edinburgh, and that with a success beyond what could have been expected in so short a period. The inhabitants are now fully convinced that

that there is not only a great saving in expence by using Household Coal, and more economy in point of waste; but that the small Cubical Coal is of the same good quality as the Great Coal; and so fully has this plan taken place, that Great Coal is but seldom asked for; indeed, many families now find it their interest to buy Chew Coal only.

The detail of the two modes of selling Coals, are fully and distinctly pointed out in Chap. III. and IV. of this Treatise. Upon a few of the Coal-hills, the Glasgow system has been also adopted with equal success, and there seems now to be no doubt whatever, that this superior system will become universal, for the benefit of the community, and of every one engaged in the Coal Trade. The system must however be gone into cautiously and by degrees; a sudden change of the whole plans of a Colliery, would be attended with bad consequences as to the economy of working. This system appears to be one great point necessary to be attended

tended to, as it enables the Coal-Master to keep the price of coals moderate; and therefore contributes, at least in some degree, to stem the influx of English Coals, which is so overwhelming to the Forth and Lothian Coal Trade.

The continuance of the war still keeps all ports shut against the exportation of Coal. As to the expediency of encouraging that branch of trade, this is fully discussed in Chap. VII. of this treatise; and though what I have stated there as my sentiments, has been severely censured, I do not yet see any good cause for altering my opinion. A great export trade would certainly commence upon peace being established,—and the Coal-Masters would reap a very high advantage, which in one view they certainly require after such a series of years of bad fortune. But it is certain the community would suffer by a sudden and great advance in the price of coals. Any thing which tends to raise the articles of fuel high in Britain, I still contend, is a national loss. I must confess

at

at the same time, that the arguments of the Coal Masters, in favour of exportation as formerly, are very forcible.

If the blessing of peace were once more restored to Europe, it is expected that the demand to the Continent will be great, in which event the imposing of a high duty upon coals exported, would certainly be a matter of sound policy.

No. V.

STATEMENT regarding an Investigation made lately by Government, in order to obtain a Minute Account of the Output and Sales of Coal in each Colliery, with the view of Imposing an Excise Duty on Coal.

SOME months ago, orders were sent down to Scotland by the Ministry, to collect every possible information regarding the output and sales of the Collieries. The name of the person or persons to whom this investigation was committed in the first instance, we do not know; but the next step taken was to commit the investigation to the Excise officers in the different Colliery districts. Each of these received a schedule, divided into distinct columns, into which were to be inserted

inserted the annual output of each Colliery; the kinds and quality of Coal raised; the chief sales, whether coastways or inland; and also what quantity was used in manufactories, and particularly for agricultural purposes.

Besides these points, there were a number of minor objects to be attended to.

In making these investigations, the Excise officers were charged in the schedule, to conduct them with the utmost secrecy, so as no person whatever might in the least suspect that these inquiries had any thing in view regarding a return being made to Government, as the idea of a tax would instantly be suspected.

The investigations have been gone into, and returns made; but we need not add, that the correctness of the returns is very dubious. How could it be correct from the sources of information resorted to! The Excise officers, from the strict injunction of secrecy, never could speak freely to any of the persons who were alone able to give them any thing like

like correct data; and when it chanced that Coal-Masters were spoken to by auxiliary Investigators not in the Excise, the course of their inquiries, in spite of all pretended causes of inquiry, shewed to at least a few of the best informed Coal-Masters, that there was evidently a deep plan in view. And it rather seems surprising, that in a matter which required such uncommon secrecy of investigation, the whole should have been committed to a numerous class of men, who, though fully qualified for the undertaking, are frequently sent from caprice to uncomfortable districts of the country, or who are suspended from their employment for causes indeed too often trivial. Could it be supposed that all of them would religiously keep a secret thus imposed upon them; or that none of them were warmly interested in the welfare of a single Scotch Coal-Master, independently of their feelings as members of the community? This was expecting too much; the whole project was known some time ago, and the Coal-Masters astonished

astonished at the mode used in general, with such apparent secrecy.

Such are the plans which have been followed by the ministry. If they are carried into effect, the consequences are palpable, and to a certainty ruinous.

Of the plan and evident effect, we will now enter upon the discussion.

In the early part of Mr Pitt's administration, he proposed a tax upon Coals at the pit-mouths; and with this view, he made every inquiry into the subject, and had all his calculations fully made, upon which he brought forward a motion for the tax. It need scarcely be stated, that it was most unpopular; and as such, met with a very steady and general opposition. Upon that occasion, Sir William Cunynghame, a Scotch member, stood forward in the opposition of the measure, with a patriotism and zeal which did him much honour; the consequence of which was, that this plan was completely lost by the minister; and we have no doubt but that firm and energetic

statesman did not take his ground upon that occasion, without weighing well the subject in all its bearings, nor without being master of every minute circumstance connected with the trade. The strong reasoning urged against the measure, will still be applicable, not only with all the force it then had, but certainly we may add, with redoubled force, from the great change which has taken place in the political situation of Britain with the continent of Europe.

The heavy duty upon all Coal carried coastways into England, is a severe tax in every sense of the word; the more so, as those lying at a great distance from the mines naturally must pay a great extra charge for carriage, independently of the tax, and the inhabitants of London, particularly the lower orders, pay a price so high, that it becomes a matter of astonishment how they can procure even the least quantity of fuel. Frequently the price has been as high as three shillings per cwt.; and it is even hard to say, what is the absolute price paid

paid by those who buy small quantities from the retail Coal Merchants. The duty upon Coal was at first but trifling, and it has from time to time increased to the present sum per ton, by which an immense revenue is derived;—if over and above which, the heavy items of River-charges, and dues payable at the Port of London, are added; the first cost of the coals at the shipping port sinks in the comparison.

We might here enter into a minute detail of the various duties, &c. imposed, but it is unnecessary for our present purpose.

Upon the supposition that a tax upon Coal is to follow the investigation, we shall take a view of the hurtful consequences, which must of necessity result and these we will consider under the following heads, viz.

1. As affecting the Collieries.
2. As affecting the people at large, and the

lower and labouring classes of society in particular.

3. As affecting the manufactories of our country.

4. As affecting our agriculture.

5. As affecting the Empire in a political point of view.

What we shall now state is particularly applicable to Scotland, but generally to the Nation at large, and I trust the application will appear evident.

1. As affecting the Collieries.

I have stated in Chap. I. and II. the state of the Collieries in Scotland a century ago, and that they were then as to extent in their infancy, and have given a comparative state of the price of Coals and labour then, with the prices in the year 1808. The invention of the steam engine, I have shewn, has been the means of the very rapid progress made in the improvemeut of Collieries, and mining concerns in general, and of bringing

bringing fields of Coal into the market, which otherwise must have remained useless.

The Coal Trade of Scotland since the above invention, has upon the whole been an unprofitable concern to those embarked in it; and we can safely say, that there is scarcely one solitary instance of a fortune, worthy of being called so, made from it. Not a few fortunes, we are sorry to say, have been lost. The stop put to exportation of Coals, and the influx of English Coals, as before stated, have rendered the Trade worse and worse from year to year, so that not a few Collieries totter on the brink of ruin. These are obdurate facts, and fully felt by the adventurers. If a tax be put on, either at the pit-mouth or upon the coasting trade, the ruin of many will be soon completed; for this cause, the English Coal, though loaded with an equal duty, will hold a decided superiority, and a severe economy, resorted to by every person in the article of fuel; hence the demand must be circum-

scribed, and the number of operative Colliers daily decrease; a loss, if once occasioned, almost irretrievable, at least for a long period of years.

2. As affecting the people at large, and the lower and labouring classes of society in particular.

Coals, in this our northern and damp climate, are an absolute necessary of life, we may say, next in order to the food we eat, and of course necessary for the existence of every individual. Any great advance of price is a calamity: if a tax be put upon it, the effect will not operate merely as the extent of that tax per ton, as is evidently the fact in all cases of taxation; for whatever tax is laid on, the advance in price may be stated double, if not treble; and if the consumpt is by this means circumscribed, the demand must decrease generally, and tend very soon to stop many Colliers, thus throwing the trade into fewer hands, in which case the community must suffer.

Those

Those who are rich, will not feel the tax in their private capacity, but the middling orders of society, who feel already the load of taxes very heavy, will find this tax a direct encroachment, both on their finances and comfort; and this is the more certain, as there is every probability of the prices of Coal rising gradually in the common scale of trade, from the advance of all materials used in Collieries, and the daily accumulating ordinary expences.

But in whatever degree this class of society may suffer from the tax, it is nothing in comparison of what the lower and labouring class of society will suffer. This laborious, hardy, and useful class of mankind, contrive, by a rigid economy, to rear their families upon very limited daily wages; economy in fuel is with them a primary object; no small proportion of them are exposed during the whole year to all the vicissitudes of weather; and in particular, to rain and severe cold. Their native hardihood bears up against this, and they suffer, without repin-

ing, these severities, happy in the thought of returning at the close of the day to their cottage, or humble dwelling, where, with their family, their labours are forgot over a warm, cheerful, blazing fire, and their clothes dried and made comfortable for the labours of the returning day; they use no candles, and the little time they can devote to reading is always by fire-light. To look at a cottage by night during the severity of winter, with the fire blazing through the window, conveys at once to the mind the ideas of life, comfort, and happiness.

If by any means they should be deprived of this great comfort of life, how much changed would be the scene, what a blank in their comforts! This tax will directly tend to deprive them of this blessing, which, like an icy spectre from the chilly regions of the north, will enter the cheerful cottage, and with a freezing hand damp the blazing fire to a few dying embers, and render the repast of their humble board sad and comfortless.

fortless. This picture cannot be painted in colours too vivid.

3. View of the tax, as affecting the manufactures of our country.

The effect here is so palpable, and obvious to every one, as scarcely to require any elucidation. The injury which would arise to almost every species of manufactory would be great indeed, but to none more than the Iron trade of Britain in all its stages, which we have taken notice of in Chap. V. of this Treatise; a small tax on the ton of Coal, would be a heavy tax on the ton of Iron.

The whole of our mining concerns depend as to their prosperity upon the abundance and cheapness of fuel, and if the price be increased by means of taxes, the utility of the steam engine will be greatly abridged. In short, this tax evidently will be a severe cut against root and branch of every manufactory, and all our valuable mining concerns. Pages might be written on this subject.

4. View

4. View of the tax as affecting our agriculture.

The importance of agriculture stands first in the class in the economy of States. In whatever manner the tax may operate indirectly against this colossal pillar, it will strike directly at its foundation. In the improved husbandry, by a course of systematic rotation, or in the cultivation of waste lands, lime is an indispensable requisite; and without Coal, to burn the raw lime-stone, it cannot, generally speaking, be applied to land. The value of a single collier's work, in this point of view, is stated in Chap. VI. Since the coasting duty was taken off, through the influence of Lord Melville, the burning of lime has increased in an astonishing ratio every year, and still continues to do so. For this purpose, coals are carried coastways to a great distance; and afterwards, many miles by land to the lime-quarries, at a great expence; which expence, nothing but the strong spirit for agricultural improvement could support. Lime-stone is to be found in

in great abundance in many districts of Scotland, which would highly improve the land if wrought; but the distance from Coals, and the expence in bringing them, renders these rich beds of lime-stone of no value whatever in the present state of matters.

The Government of our country have, with a wise and liberal policy, given great countenance and encouragement to this the first of arts, and it has highly prospered. Let this tax be imposed, and check the burning of lime; and as much real evil will be done by that one act, as will at once damp the spirit of enterprize, nourished with care for so many bypast years by our zealous agriculturists. Need we write more on this subject?

5. View of the tax, as affecting the Empire in a political point of view.

Whatever affects the four particular points now noticed, must consequently affect the state in the political scale of nations in a great degree; but there is one particular point

point of view, in which it will appear more obvious.

Great Britain certainly stands very high amongst the nations of the world, with a prosperity and state of improvement, no doubt resulting from greater causes than that of trade, and a manufacturing country. But it is as a manufacturing country to which we will confine ourselves at present. Perhaps we cannot place this in a stronger and more obvious light, than by stating the views taken of Britain by the French Political writers. When they took a review of Britain as a manufacturing country, on a great scale, it appeared very astonishing how she could dispose of her manufactures over the whole Continent at a profit, and undersell all others that tried to compete with her, even on their own ground, while the price of individual labour, or days wages, were four times higher in Britain than on the Continent, it appeared a paradox; but they add,—This she, however, accomplishes with ease, by the aid of her coal mines, which are so abundant, valuable,

luable, and extensive; these, with the Steam Engine, (brought to perfection by her men of genius), applied in so many various ways for the abridgement of labour, give her a physical superiority over every other nation that tries to rival her as a manufacturing country.—Can any language be more in point? it supersedes the writing of volumes on the subject; and we are informed, that the present Emperor of France is by no means blind to this cause of our superiority.

From what has been stated regarding the effects of this proposed tax, would it not be most injurious to the state in every department? it would unnerve the very sinews of our trade, and be a death-blow to our flourishing manufactories. Were our determined enemy set in council, to deliberate upon a plan to wound us in a vital part as a nation, the advising, the imposing of this tax, would be the most successful he could possibly suggest.

No doubt, supplies must be raised to pay the unavoidable expences incurred by this terrible

terrible war; but surely they may be obtained from sources less injurious to the general welfare. Perhaps the ministry may propose a tax very low indeed, and scarcely worth while contending against, in one view; but, if once a tax and an excise is established, the amount may be increased very easily from time to time afterwards, as in other cases, of which we have many precedents.

The tax upon Coals carried coastways to England, was but trifling at first; one duty was laid on for the State, another to raise an annuity, and one for the pious purpose of building churches in the reign of Queen Anne; but these duties, in place of being repealed, have been greatly increased. The smallest duty would be a serious evil, and therefore, the enlightened Statesman, who can discriminate all the shades of national policy, will certainly oppose this tax if brought forward, with the same determination and zeal, as their predecessors did under the administration of Mr Pitt.

It is to be wished that this subject had been

been treated by an abler pen, and by one whose sphere of action was more extended. What I have stated regarding the Coal Trade, arises from being immediately concerned in the management of Collieries, having however no personal interest in the adventure of any; so that what I have written may be received more readily, as free of any interested bias. To the dangers and difficulties connected with Collieries I have been no stranger, having been intimately acquainted with them for a long period of years.

FINIS.

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