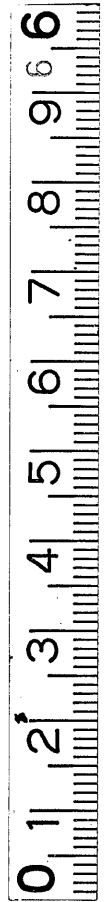


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AN  
ABSTRACT  
OF AN  
ESSAY  
ON THE  
Improvement of *Husbandry* and  
*Working of Mines, &c.*

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OF AN  
ESSAY

ON THE  
Improvement of *Husbandry* and  
*Working of Mines.*

IN A  
LETTER to the Right Honourable Sir  
*ROBERT WALPOLE.*

To which is added,

*A New Method* of measuring Lands, Hills,  
Houses, Towns, Rivers, Standing-Waters  
and Sea-Coasts :

With a CUTT of the Instrument.

By Sir ALEXANDER MURRAY of *Stanhope,*  
Bart.

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L O N D O N :

Printed for J. ROBERTS at the *Oxford-Arms* in  
*Warwick-lane.* (Price One Shilling.)

## EPISTLE DEDICATORY

To the Right Honourable

*Sir Robert Walpole, &c.*

S I R,

**T**H<sup>O</sup>' the following Method of Husbandry and Mining, with the Instruments here presented, are (as far as I know) new Inventions, and, with what I propose in the following Papers, will I hope be acknowledged to be universally useful and profitable to Mankind, but more especially to the Dominions of *Great Britain* and *Ireland*: Yet I do not therefore propose or desire *any Monopoly*, nor indeed do I expect or would I accept of any Reward in the least inconsistent

D E D I C A T I O N .

consistent with the Interest of the Publick. And for this Reason it is, that tho' I might have expected a considerable Reward from several private Persons as well as Companies, and even foreign States, had I offered to teach them this Method of discovering their Mines and Strata, &c. and at the same time of considerably increasing the Rent-Roll of all hilly and rising Grounds, at so easy a rate as 100*l.* per square Mile: and tho' I am sensible that the Value of my own Estate, as well as of all others who have Mines already discovered in them, must be lowered for some time by the universal Improvement, which will be one way or other immediately undertaken, and by the  
the

D E D I C A T I O N .

the vast Demand for Money and Hands, and the raising the Prices and Wages of Miners and Labourers, which will naturally ensue; yet since it is the Duty of every Man to communicate to his Country whatever he thinks may conduce to make it flourish, and not to doubt of being sufficiently protected and rewarded in all honestly meant and public spirited Attempts and Labours; and as I'm convinced that this new Method of Husbandry will soon become a very considerable and universal growing Benefit to the King and the whole Nation, I do therefore entirely commit my self and private Interest to their Wisdom, Justice and Generosity.

As

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DEDICATION.

As my Gratitude and Duty to the King and Country oblige me thus to offer my Thoughts for their Good, so I should fall short of that Measure of Duty and Regard I owe both to them and you as their first Minister, if I should dedicate them to any other Subject.

I am with a great deal of Esteem,

S I R,

*Your most humble and  
most obedient Servant,*

Alex. Murray.

( I )

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A

LETTER

TO

The Right Honourable

*Sir Robert Walpole.*

S I R,

THE Papers and Descriptions of the Instrument, herewith laid before you, have taken much more Labour and Time than I at first imagined. But I choose rather to appear slow, than lame and faulty in what I advance, especially to a Person of your Distinction, and in Matters that I esteem of so great Consequence. I hope you will likewise be so

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good

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good as to make some Allowance for my first Attempt, and my want of the *English* Language which is a vast loss to us *North-Britons*.

BUT besides, tho' the Subjects may appear very plain and easy, and tho' I am to advance nothing but what I know to be true from my own Experience, yet as all first Attempts of conveying one's Thoughts upon new Subjects are difficult, so more especially is the making an Abstract of them, of the Nature of the present one; in which out of regard for you, I was obliged in some respects to be as short as possible: Yet (as it is the universal Good of the Nation that I propose) I therefore thought I was obliged to accommodate my self, as much as possible, to the various Humours and Capacities of every common Reader.

THIS has obliged me to divide it into several Parts, and to be more particular in several Things, than otherwise would have been necessary to a Person of your superior Genius and quick Apprehension.

FURTHER,

( 3 )

FURTHER, since my Scheme is built upon some Principles and Observations which at first View must appear odd and opposite to the common received Opinions and Practices of Mankind: For Example, since I first undertake to prove that our barrenest high Grounds and Mountains are pregnant with the greatest Riches and Strength of the Nation, especially on their South and South-west Sides; I am obliged to be the more particular on this Head, and must be yet more so, thereby (if possible) to prevent the malicious part of Mankind from crying out against me, *Parturiunt montes, nascetur ridiculus mus*; knowing that often the very best Things, and which are most for the general Good, may be smothered in Embrio, by idle or malicious *Ridicule*; witness not only *Columbus's* Offers of discovering the new World rejected, slighted and laugh'd at by several of the wisest Nations, &c. But it consists with my own certain Knowledge that there are other Things lately discovered (which I know to be certainly true,

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and

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and may be made more useful to our Country than even *Columbus's* Discovery, tho' it were all in our Possession) and yet disbelieved, only because they seem improbable, and contrary to the present received Notions of Mankind.

I FLATTER myself therefore, Sir, that you and other Persons of Judgment and Generosity will only consider the Thing itself, and not disesteem it, because of any Improperities in the Language, or Mistakes in my Calculations, or perhaps in some of my Reasonings on the Subject; since I only pretend to appear as an experienced Husbandman and Miner, and a zealous Lover of the Prosperity, Liberty, Peace, and Trade of *Great Britain* our *Communis Patria*.

BUT in all Events it gives me infinite Pleasure to think, that I shall have the Honour and Happiness by this Scheme, not only to be instrumental in greatly advancing the real Strength and Happiness of *Great Britain*, but that I am able to make it appear that all the Fatigues, I have undergone,

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dergone, the Expences I have been at, and Measures I have taken these last ten Years, have been directed towards this End; and that I have so linked my private Interest, with that of the Publick, that they will be found to be inseparable.

SOME may be apt to say, that this new Method of Husbandry and Mining may be practised by most other Nations, as well as by us; that their Grounds are more fertile, their Territories larger, and consequently that they may probably discover richer Mines than any we have, &c. All this I grant is rational and probable; but then they must become as free Nations as we are, for no Freeman in his Wits will work them under absolute Governments: and tho' their Subjects or Slaves should be forced to work them, yet every Body of Spirit will either rebel, or fly, or lodge their Effects and secure their Property either here or in *Holland*: But as *Holland* hath no Mines in *Europe*, and are only afraid of our rivalling them in their Fishing; therefore whilst we remain together

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ther in Amity, and the two Countries of the greatest Liberty, all foreign Mines will rather increase our Riches and Numbers of useful and rich Subjects than diminish them: But if we ever by our Rashness or Want of Spirit, lose our Liberties, we deserve that our Country should become a Desert, and it will naturally become so, and poor and contemptible indeed.

It is therefore, not only our Duty, but our Interest to support all the absolute neighbouring Powers, and no ways to provoke them to disturb our Liberty, or to encourage any Attempts of their Subjects towards their obtaining theirs. By this means only shall we be able to rival the vastly more numerous and finer Countries of *France, Italy, Spain* and *Germany*, not only in Trade by Sea, but in the only Points in which at present we fall short of them, *viz.* want of Numbers of People, Largeness of Territory in *Europe*, and cheap living: and I'm sorry I am obliged in Duty to say, that unless something of this kind now proposed

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proposed be speedily fallen upon, we run an evident Hazard of being not only rival'd in our Mines and Woolen Manufactures, but of losing many of our most useful and valuable Settlements and Branches of Trade in our Plantations.

FOR just by that Proportion that *France, Spain*, and other foreign Countries, are more numerous and can live cheaper than we at home, will they be able soon to over-plant, and undersell us out of them.

WHEREAS if we, like the undebauched *Roman* Commonwealth, encourage our Colonies, and do not suffer them to be squeez'd and oppress'd by needy, or avaricious and rapacious Governors; and if we give a suitable Measure of the *Jura Civitatis Britannicæ* to them, to the *Indians*, and all Foreigners; and if we increase our Grass Grounds, Provisions and Necessaries, and Mines at home by the Method now proposed, and to be more particularly explained in the following Papers, we shall drain our neighbouring States daily of their Subjects and

Riches,



( 8 )

Riches, both at Home and in the Plantations; for it is our Liberty only we have to depend upon, and which alone gives us the Advantage over them. And as the Children of Refugees will become natural free-born *British* Subjects, and consequently Lovers of the Liberty of their Country; so neither can their Fathers be suspected of hurting the Peace and Liberty of that Country to which they fly for Refuge, on account of the Slavery and Tyranny of their Kings and Countries, by whom they can only expect to be despis'd, and used as Renegadoes.

I COULD offer some other Thoughts concerning our Plantations, which I think of Consequence, but that I'm afraid to encroach too much upon your time; and for this Reason I shall but touch some of our present Difficulties and Dangers of the Decay of our Trade and Manufactures on the one hand, and the Increase of our Expence from Luxury on the other; occasioned chiefly by the Increase of Numbers of idle Servants and Equipages,  
Gaming,

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Gaming, Stock-jobbing, Horse-matching, &c. which last (tho' originally well intended to encourage People to raise a large and serviceable Breed) is now quite inverted.

THE expensive Living of all Ranks of People, but above all the rest our principal Nobility and Gentry; their living so much at *London*, and employing their Money and Time upon ignoble Luxury or in mad Profusion, which our Forefathers bestowed wisely and generously upon improving their Lands and Estates, and in supporting Numbers of poor and industrious Tenants, Workmen and Manufacturers in the Country. But on the contrary it's too evident that there are now great Numbers of miserable destitute People, who for want of Employ are supported either at the publick Expence or by unlawful Practices, that might be made happy and useful Subjects; and it were to be wished that some Remedy could be found, whereby the great Numbers of unhappy Debtors under Confinement might be made useful

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to the Publick, themselves and Creditors.

I CAN't but observe also with Concern the present Embarrassment which most of the publick Companies are involved in, from their unsuccessful Attempts or Mismanagements in Trade; whereby Multitudes are reduced to great Difficulties either seeking Redress, or where securely to deposite their Money, or employ it to Advantage; when our woolen and mineral Manufactures (which are our ALL) are in danger of being daily rival'd by our neighbouring Nations, who are making frequent and formidable Attempts that way, and have already drawn several of our Miners and Manufacturers from us.

I AM sensible that every Man of Thought and Honour who really loves his Country will be as tender of exposing its Weaknesses as he would be of exposing his own: Yet as when his private Affairs seem in danger, or desperate, he is forced to beg the Assistance of his Friends; just so are we in the Affairs of our Country obliged to apply to those, who like you are at the Helm. And  
I humbly

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I humbly submit how easy and how vastly advantageous it would be for his Majesty and the Government by all means to discourage Luxury and Idleness, and to create and stir up a Spirit of Industry and Frugality; and what immortal Honour it would bring upon you and all such who should be at the Head of so great and good a Work.

SIR *William Temple* very ingeniously observed that it is very easy to bring back a River into its natural Banks: And *Xenophon* in his incomparable Treatise of the *Athenian Mines*, says, and all great Men very justly agree with him, and advance as a Maxim, That all States owe their Prosperity or Declension to the Virtues or Vices, the Abilities or Weaknesses and Examples of their Rulers. How easy and glorious a Thing would it then be for the present King and Ministry to raise an Emulation thro' all Ranks and Degrees of Persons to follow *Mining* and *Husbandry*, Industry and Frugality, which are the natural Channels of the *British* Genius, as well as

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the natural Sources from whence all our Strength and Riches flow? This would not only very soon vastly increase the Revenues, Strength and Riches of King and People, but would effectually put an end to all dangerous foreign and domestick Factions and Designs, so that even Envy will be able only to gnash her Teeth.

As the advancing the publick Good is my principal View, so it carries me above all private Resentments: Therefore was it, that in the Conversation I had the honour to have with you, I only complained in general, but avoided all particular Grievances; and now I shall but hint at some of them, with the View of having them redress'd, in a private and amicable way, by your Address and Genius.

For altho' I can make it appear that I have been these many Years, and am still, oppress'd, and that my Character and Money - Credit have been vastly wronged by vexatious Law-Suits and unprecedented Claims and Calumnies; and since in a

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more particular manner, I can prove that within these last ten Years I have been constantly flaving in the Service of my Country in general, but more particularly of those parts of *Argylshire*, where my Estate lies, where I was the first Person that introduced any kind of Trade: and at the Time I was giving Bread, and contriving Employment for many hundreds of poor and idle Persons, who wanted both; and have been making my Tenants and all the Neighbourhood rich, by bringing in vast Sums of Money among them, and doubling the Value of several Branches of their Product, and giving them considerable Encouragement and Advantages: Notwithstanding, I say, these my Endeavours, I have been not only falsely, enviously and maliciously informed of, as if I had provided and lodged Quantities of Arms and Gunpowder in my House with a treasonable Design, and to make a villainous Use of them against the Government; for which there was not the least Shadow of Truth. My Cattle have been ham-

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ham-stringed in my Parks, and the Houses of my Tenants wilfully set on Fire in the Night; Multitudes of my Cattle stole for Years together; Flocks of them purposefully and maliciously gathered together in the Night, and forced over Precipices, so as twenty of them have been destroyed at one time: all this I cannot only prove, but can make it appear, that there has been frequently Plots and Designs formed, and Calumnies invented purposefully to stir up the Populace to *murder* me; and thereby to frighten and force me, my Friends and Servants out of my Freeholds and Leaseholds in that Country.

I HAVE besides been put to vast Charge and Expences on these Accounts; and among other hellish and unmanly Designs, they have within these two Years invented, and do continue to spread the following Report in those parts of *Argylshire* where my Estate lies, *viz.* That I contrived the Scheme of the Mines in *North-Britain*, especially in the Highlands, with some of the Court of *England*, purposefully

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to enslave *Scotland*, especially the Highlanders; that in a particular manner I have been these ten Years employed as a Spy upon them, and that I had wrote up a Letter to the King, acquainting his Majesty that all the highland Hills were full of rich Mines of Gold and Silver; but that the Highlanders were so barbarous and so great Enemies to his Majesty that they could neither be safely trusted in that strong Country, nor be brought to work themselves, or yet to allow Strangers to live peaceably amongst them; that for these Reasons I had proposed to the King to transport all the Highlanders into the *West-Indies*, to strengthen our Colonies, and to people the Highlands with industrious and laborious Subjects from the Southern Parts of the Island.

Altho', I say, by the above Methods my Relations, Servants and my self, have been threatened and forced out of *Argylshire*; and that I have had repeated Informations of present Designs against my own and Brothers lives: tho' by these

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Things and the barefaced Injustices myself and several Freeholders met with in the late Election for the Shire of *Peebles*, I have been put to vast Charges in Attendance here, and in being kept from duly overseeing the numerous Works, I have contracted for in *North-Britain*, whereof I have laid a List before you : Though my Creditors have been also artfully alarm'd against me on the one hand, and the *York-buildings* Company and their Agents have been encouraged on the other not only to delay Payment of upwards of 4000 *l.* which they owe since their Entry to my Mines ; but to enter into unjustifiable Schemes purposely formed against my Estate, and that Justice which they owe my Partners and myself : Yet such is really my desire to be at Peace with all the World, and not to obstruct or disturb the publick Good by private Complaints, that I have hitherto been silent, and am still not only willing, but desirous to bury all these things in Oblivion, provided I can get rational Security and Protection for the  
Time

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Time to come, and that I may not by a longer Silence, not only further encourage the Malice of my causeless Enemies, and endanger my own and my Friends Lives and Properties, but even the publick Rights and Interests of the King and Nation : for if such Villanies and villainous Reports (for I can justly give them no softer Name) be not discouraged, my Silence may not only be attributed to Guilt or Want of Spirit, but even render all future Attempts of Mining and Husbandry in the Highlands suspected as so many Designs formed by the Publick against what artful and designing People endeavour to make the Populace believe is their Interest and Liberty.

UPON the whole, as I hope the Necessity of my Case will excuse this Detail of some of my Grievances, so I flatter myself that you will not only have some regard to what I have said on this Head ; but also to what I shall hereafter propose. In which tho' I have but hinted at the Fund without particularising several of the great and good  
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uses which may be made of so extensive and solid a Subject, towards paying our Debts, and easing our Poor of their present Burdens, and from the Duties upon our own Product and Manufactures, &c. Yet I forbore this, and the making of several Computations, only because all such Things must occur readily and more justly to a Person of your superior Knowledge.

Besides, I shall have occasion to treat the Subject more particularly in another Place, where I undertake to shew, how this Scheme can be easily, certainly and safely conducted and executed in all its Parts, *viz.*

*1<sup>st</sup>*, How long Leases of Grounds and Mines (sufficient for employing more than all our idle and poor People) may be easily obtained on Conditions equitable and advantageous to the Proprietors and Lessees, as well as to the King and the whole Body of the People.

*2<sup>dly</sup>*, How a Capital sufficient for executing this Project in its largest Extent may be easily raised.

*3<sup>dly</sup>*, How

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*3<sup>dly</sup>*, How the said Capital may be managed, so as each Stockholder may be secure from all Mismanagements and Corruptions, and sure of reaping a certain and considerable Profit. And this, by forming a private Company, to be afterwards erected into a publick one, having his Majesty Governor, &c. which royal Company may be so established, and with such new Laws, Rules, Regulations, Articles and Checks to be incorporated and engross'd in their Charter to be confirmed by Parliament, as will answer the above Ends, and produce a certain and considerable Profit to every Stockholder: Insomuch that all the present publick Companies, as well as private Persons, will be fond of being Adventurers: which Company will nevertheless at the same time considerably advance the Interest of all Proprietors of Grounds and Mines; will considerably encourage and better the Condition of all our Labourers and Manufacturers; will considerably encrease the Revenues of King and People; will

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raise an universal Spirit of Industry, and will profitably employ the Money and Labour, not only of our own rich and poor Subjects, but the Money and Labour also of many rich and poor Foreigners, who will be desirous of settling themselves in these Islands of Liberty and Property, and of flying all Slavery and Oppression.

By which means and by encouraging and employing the Army in the said Works in the manner to be proposed, the whole Body of our own natural born Subjects may be soon made like the ancient *Romans*, able and well disciplined Husbandmen, Miners, Seamen, Fishermen and Soldiers: whereby we like them may become able vastly to extend the *British* Name and Fame by peopling and improving our extensive foreign Plantations from our own Nurseries, with happy and sure Subjects; whereby in time, or in case of Necessity, we may take the sole Possession of our Herring, Fishing, &c. and become the common Asylum and City of Refuge, Freedom, Liberty and Property,

as

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as well as the common Emporium of all the World.

*A particular List of several Mines in North-Britain mostly discovered and carried on by my means.*

I HAVE not only been at vast Fatigues and Charges myself, these many Years in travelling thro' most of the hilly Grounds in *Scotland* and *England*, and in making myself knowing in mineral Affairs, but I have been at other very considerable Expences on this Account.

FOR besides Rewards for Intelligence and Instructions in these Matters, I have employed several skilful trusty Persons these last ten Years, in viewing the whole west Coast of *Scotland*, from the *Orkney* Islands to the Borders of *England*, as also in viewing most of all the midland hilly Countries of *Scotland*: I employed likewise one skilful in Iron-works to whom I gave 50 *l. per annum* salary besides his travelling Charges, only for his Intelligence

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gence and Information in this Branch of Trade: by whose means among other things I was one of the first who discovered the Impracticableness of Mr. *Wood's* Method of melting any considerable Quantities of Iron Ore with Pit Coal to any Advantage.

I HAVE been also at considerable Charges in causing make new Maps of several Parts of *North-Britain*, which were either altogether omitted or very imperfectly marked in our Maps hitherto. And upon the whole my Time and Thoughts have been constantly employ'd in attempting to raise a Spirit of Husbandry, Planting and Mining, which will be allowed to be the Sources of all our Trade, as well as of our most valuable Manufactures.

THE West Coast of *Scotland* from the North Point of *Schetland* to the *Mule* of *Galloway* (exclusive of the Sea) is about five hundred Miles in length in a streight Line, besides the considerable Windings of that unequal Coast, and the considerable

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derable and numerous Islands thereto belonging.

THIS whole Coast and its Islands, together with the South Coast and Island of *Man*, from the said *Mule* of *Galloway* to the Mouth of the River *Nyth*, are every where cut with bold and strong Veins of Copper and Lead, besides Coal and Iron Ores to be found in Quantities in many Places.

I SHALL not in this List trouble you with a particular Account of each good and promising Vein, which I have seen or whereof I have had certain Intelligence, but shall only name such of them in which I have either been the first Undertaker or have been instrumental in their being undertaken by others.

1<sup>st</sup>, IN the *Orkney-Islands* I have above twenty Parcels of Lead taken from different promising Veins in that Country.

2<sup>dly</sup>, IN *Argyleshire*, I shall afterwards mention my own Estate and Mines in the Barony of *Ardnamurchan*; and shall only here add that I myself discovered

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ed above ten promising Veins in that Country all bearing Lead at Day\*; besides the Appearances of Copper and other Veins discovered by the Workmen, all which would be esteemed very valuable Appearances in *England*: but the *York-buildings* Company have neither shewn sufficient Ability or Management to work them right.

3dly, THE Countries of *Morvern* and *Kingarloch* which are fully larger and just as full of promising Veins of Lead and Copper as my own Estate is.

4thly, THE Island of *Mule* is 24 Miles square, hath likewise several promising Veins of Lead, besides Coal in several Places.

5thly, THE Parish of *Muckairn* which is near six Miles square has likewise several promising Veins of Lead and Copper.

6thly, JUST so hath the Island of *Jura* which is 24 Miles long and six broad, where there is likewise great Quantities of Iron Ore, which with the *Lancashire* Ore

\* Near the Surface.

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*Daniel Campbell* of *Shawfield* and Company do mix at an Iron Furnace which I first persuaded an *Irish* Gentleman to erect.

7thly, THE Island of *Ila* which is 24 Miles long and 18 broad is well known to be full of excellent Mines of fine Lead and Copper, as also Quicksilver has been found there, and Iron Ore in great Abundance, whereof the said *Shawfield* has likewise used at the above named Furnace.

8thly, BESIDES those above Mines in *Argylshire*, (of all which, except *Ila*, I have been the first Discoverer and Undertaker) I have been likewise very instrumental in discovering, searching after and working the following Mines in that Shire, viz. several very promising Veins of both Lead and Copper within the Countries of *Ardgour*, *Moydart*, *Appin*, *Lismore*, and within the Earl of *Broadalbaine* and Sir *James Campbell* of *Auchinbreck's* Countries: So that it appears that the Shire of *Argyle*, which from *Glenelg* to the *Mule* of *Kyntire* is above one hundred

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hundred and twenty Miles in Length, exclusive of all its Islands, is cut every where with promising Veins.

AND as I have either my self set, or been the Occasion of setting many hundreds of poor People, who wanted Bread, to work within that Shire; so I can make it evidently appear that by this Time I could have set ten times as many profitably to work upon these Subjects, if I had not met with great and unexpected Discouragements.

BUT besides the above Works in *Argylshire* I have been concerned in a vast many other Trials in different Parts of *Scotland*; and have still Contracts subsisting with the Earl of *Galloway*, and above a dozen other Gentlemen in the southern and midland Countries of *Scotland*, where there are excellent Appearances of Mines in all which I am the first Undertaker. Nor indeed is there any one Ridge of high Mountains in *Scotland*, but especially upon the Western Coast, which is not cut with Veins of some one or other useful Metal or Mineral.

UPON

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UPON the whole, as no Man of Honour and Experience can dispute the above Facts, so the Consequences and Uses to be made of them are thus humbly submitted by,

S I R,

*Your most obedient**humble Servant,*

Alex. Murray.



E 2

A B S T R A C T  
O F A N  
E S S A Y  
F O R T H E

*Improvement of the Lands and Discovery of  
the Mines and Minerals of Great Britain  
and Ireland.*

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PART FIRST.

**I**N this first Part I make Improvements in Husbandry (especially in Grass Grounds) the certain Fund, whereby mineral Discoveries may be made and safely conducted: Proposing with the same Expence and by the same Methods, by which Improvements on the Surface are made, that the different Strata, Mines, Minerals, Marles, Clays, &c. shall be laid open and discovered; and that the certain Advantages arising from Husbandry and Iron-works may render all the other parts of Mine-adventuring safe and easy.

THIS Scheme is founded upon the following Propositions, *viz.*

I. THAT

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I. THAT Husbandry and Mining are the only Parents and Sources from whence all our present Riches and Grandeur flow.

II. THAT Numbers of well employed People, are the Strength and Security of a Nation.

III. THAT the Success of all our Manufactures and Trade depends upon the Plenty of Materials (especially of our own Product) and on our Manufacturers and Labourers being supplied with the Conveniences of Life cheaper or as cheap as in our neighbouring Nations.

IV. THAT unless such Provisions be made there is no Possibility of preventing the Success of the present formidable Attempts of our neighbouring Nations towards establishing the woollen and mineral Manufactures, and their drawing away great Numbers of our Seamen, Miners, Manufacturers and other our most useful Subjects.

V. THAT our coarse woollen Goods, for which there has been the greatest foreign Demands, and which do employ by far the

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the greatest Numbers of our People, are in the greatest Danger of being rival'd.

VI. THAT the only probable Remedy for preventing the Decay of our said Manufactures, and Loss of useful Subjects, is by extending the Improvements of Husbandry and Mining in the cheap and uncultivated Parts of these Islands.

VII. THAT *Great Britain* by her natural Advantages and most excellent Constitution hath the Preference at present of any other Nation, for extending such Improvements.

VIII. THAT the present most barren and highest Hills and Countries in *Britain* and *Ireland* (especially on the western Ocean) and other mountainous Grounds in the midland Parts of these Islands, which are at present esteemed of the least Worth from either being over wet or over dry, rocky, &c. are nevertheless by Nature the most valuable, and to be made at the least Expence to produce the greatest Riches by Husbandry and Mining, especially on their south and south-west Sides.

IX. THAT

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IX. THAT the Territories of *North Britain* and *Ireland* are by Nature as rich, if not more so, than *South Britain* in proportion to their Extent of Ground.

I WILL venture to assert that all these Observations, however uncommon some of them may appear at first View, are true, as several others are, which I have made, and which are even of much greater use than what I am now going to propose; but I shall forbear to mention them at present, till I see how acceptable they may probably be by the Reception of this first Part, which I now come to explain, *viz.*

I LAY down this general Assertion, that a due Mixture of Earth and Water is the chief Cause of Fertility and *e contra.* I don't say it is the only Cause, but it is certain, that all other natural and artificial Causes are ineffectual without this due Disposition of the Soil.

It will be allowed that by far the greatest part of these Islands are composed of Hills and Mountains, and that the Rains do quickly descend from their steep parts, leaving

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ing them too *dry*, and stagnate in the flatter and lower Parts, making them too *wet.* Hence it follows that the greatest part of the numerous Rules of Husbandry necessary for such Lands may be reduced to these two, *viz. Water Lands that are too dry: And drain Lands that are too wet.*

It will also upon Reflection be allowed that all the numerous Rules for discovering Mines hitherto in use or openly practised, may be reduced to this one, *viz.* To lay open the Seams and Strata of the different Earths and Rocks. Now by observing the two above Rules of Husbandry in the Method to be described hereafter, not only the due Mixture of Earth and Water will be preserved, but it will also follow that a stiff Soil will be loosened and a loose Soil fasten'd; the dry barren Soil will be enriched, and refreshed; the marshy chilly Ground will be warm'd and cherish'd; and all sorts of Mines and Strata will be discovered with more Certainty and for less Expence

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than by any other Method hitherto practised. Had this Method been known and followed the vast and numerous Wastes, Mosses, Mountains and Bogs, which are now of very small Value, had been rendered beautiful and profitable; and the greatest part of the Mines, Strata, &c. which now lie hid, had long since been discovered.

It is very observable that in all Improvements of Grounds ancient and modern that we know of, the constant Method was and is, to begin with the lower Grounds, and to carry the Improvements up Hill: now the Improvement of the lower Grounds could be of no Advantage to the higher; whereas had they begun with the Improvement of the highest Grounds, and made the proper Use of the Springs, Rain and Snow on the Summits of the Hills, for which God and Nature seem to have intended them; and had they ditch'd, hedged, planted and flooded the Sides and Summits of the Hills in the manner to be proposed, it would have been easy to carry on the Improvement  
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of the lower Grounds both in Husbandry and Mining with much more Success and Profit. Besides the Planting of the higher Grounds becomes a natural Fence and Skreen to the lower, and is a great Improvement in itself, by furnishing Wood for Iron-works and other Uses; and the Seeds of these Trees will naturally spread and be carried by the Winds into the lower Grounds.

FROM these and several other Considerations I can make it appear that the Methods hitherto generally practised, in Husbandry, especially in *Britain* and *Ireland*, have been wrong and preposterous: Whereas, by this Method, I now propose at one and the same time, and by the same means, to drain all wet, and flood all dry Grounds, to raise Planting proper for each Soil, to discover all sorts of Soils, Manure, Mines, Minerals, Strata, &c. to make ways for useful and necessary Land and Water-Carriages along the most mountainous Countries, to divide the Grounds conveniently, usefully and beautifully;  
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tifully ; and at the same time to fence them and cause a perpetual Manure to come upon any part of the enclos'd Grounds which may require it ; as also to hush \* regularly, and make the Water serve for Fish-ponds, Miln-Damms, &c. by which means Husbandry and Mining will be carried on hand in hand with one and the same Expence ; and the certain Advantage arising from the Husbandry and Iron-works will render all the other Parts of Mine-adventuring safe, certain, and vastly cheaper than at present.

FOR want of this necessary Piece of Knowledge and the right use of fit Instruments for levelling, not only large Tracts of Ground lye uncultivated and great Riches under ground undiscovered, but immense Sums of Money have been, and may yet be thrown away unprofitably ; besides losing Ground which a Water-level might have reached, or by endeavouring to carry it higher than it would go, or by bringing the Canals thro' expensive Rocks or sinking Sands, which might have

\* A Term used in Mining to signify Flooding.

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been avoided : I don't build merely on Theory, but it is what I have found true and practicable by Experience.

NEAR my House in the County of *Peebles*, which is one of the most remote from the Sea, and most mountainous Countries in *Scotland*, upon one of the highest and coldest Spots of Ground in the Neighbourhood, being altogether dry and barren, I ordered a Trench to be drawn along the Side of the Hill, upon an exact Levell, which intercepting the Rains and Rills of Water formed a Canal ; and being carried on thro' the said Ground, sufficiently watered it, so that in the Space of two Years, such an Improvement was made, that instead of what it was formerly, a *barren Heath*, it was covered in many parts with fine Grass ; and from being not worth two Shillings *per Acre*, is now worth fifteen Shillings ; being as good in Quality as what pays so much in *England* ; besides there are several hundred thousand Trees which I planted and are thriving very well upon it. This Canal is  
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about three Miles long, and much deeper than necessary, being my first Effay, and yet did not cost me one hundred Pound.

My next Effay was draining excessive wet Ground and deep Peet-Mosses, near my House in *Argylshire* on the West Coast, which I ordered to be trenched in several Divisions, whereby a Tract of Ground, which never had payed ten Pounds *per Annum*, was compleatly drained in one Year; and in the Year following one fourth part of the said drained Ground yielded as much Hay as was sold for one hundred and fifty Pound, at four Pence *per Stone*: there is in the said Tract of Ground besides Mosses, not yet improv'd, a great deal of Ground, which produces fine Rape-feed, and Wheat which yielded ten Fold, both which grew on Peet-Mosses, that were eighteen Foot deep in some Places. The only further Improvement I made upon these Mosses was laying on Sea-Shells, which the Heat of the Sun calcines as the Fire does Lyme-Stone.

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I HAVE been the more particular concerning the said excessive wet and mossy Grounds, because there are vast Tracts of them thro' *Britain* and *Ireland*, and because they are of all others at present the most barren, so as to be commonly esteemed wholly unprofitable, except for firing. Just so all excessive dry Hill-Sides, of which there are likewise vast Tracts, are commonly esteemed of very little Value; whereas indeed the direct contrary holds good in both Cases: for all Mosses have been once the best Spots in the Countries where they lye, and may easily be made so again: and since all excessive wet or excessive dry Grounds are to be bought or farmed exceeding cheap; since generally all the uninclosed, hilly Grounds within *Britain* and *Ireland* are either over wet or over dry, and since there are vast Quantities of them, and Water and Level enough to be had for watering or draining them; considering also that even upon the Tops of our wildest Mountains, and upon the most rocky,



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rocky, stony and marshy Parts of our Grounds, several sorts of Trees may be planted, and will grow to the greatest Perfection, and become of general and certain use for Iron-works as well as for shelter, &c. therefore I conclude,

1<sup>st</sup>. THAT the said Grounds must appear of all others the most profitable and improvable in point of Husbandry, as well as most promising and productive of different sorts of useful Mines, Minerals, Strata, &c. and of different useful Trees, Grains, Roots and Grasses, as shall, if necessary, be more fully shewn.

2<sup>dly</sup>, FROM what I have experienced in the two Counties abovementioned, which are generally esteemed among the barrenest in *Britain*, and from the Improvements made by his Grace the Duke of *Argyle* and Earl of *Islay* by Planting and Husbandry, on the wildest, barrenest, coldest and highest Grounds in these two Counties; and considering that the Marks of ancient Tillage appear on the Tops of the Hills in the said County of *Peebles*; that  
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fine Timber grows naturally on the Tops of the highest Hills in *Argylshire*; that the Families of *Perth*, *Tweeddale*, *Panmure*, *Southesque*, *Kinnoul* and *Aboyn*, have raised fine Plantations on the highest Grounds in the several midland Parts of the Country; and that Mr. *Heron* of *Bargaly* hath as fine Fruit Gardens, and hath raised as fine Plantations of all kinds of Timber in one of the wildest and most mountainous Parts of the County of *Galloway*, as in any Orchard or Plantation in *Britain*: Considering also how much higher Prices, readier Mercats, and how much more of the Sun, there is to be expected in the more Southern, and warmer Parts of *Britain* and *Ireland*, I may therefore justly conclude, that by laying out one hundred Pounds on each square Mile of over wet or over dry Grounds within *Britain* and *Ireland*, they may be made upon an Average in two or three Years, at least half a Crown *per Acre per Annum*, which is about 80 *l. per Square Mile*, better than  
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they are at present. See Fig. 3d. That by letting nineteen Years Leases of the said Grounds and obliging the Tenants to subdivide, and plant them into Enclosures of ten Acres each, according to what is described in Fig. 4th on the Picture, every Acre one with another at the End of the first nineteen Years will be ten Shillings *per Annum*, or 320 *l. per square Mile*, better than at present.

4thly, THAT by further subdividing and planting and quartering each said Enclosure of ten Acres, into Enclosures of two Acres and one half, which may be easily done by the Tenant at the End of thirty eight Years as appears Fig. 5th every Acre one with another will be at least worth twenty Shillings *per annum* more, that is, 640 *l. per square Mile*, than at present: and supposing that Sir *William Petty's* and other Computations be just, *Great Britain* and *Ireland* contain eighty Million of Acres; and that the one half is uninclosed, and over wet or over dry; and supposing only, that the said

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said uninclosed half may be made but near as good in Soil as those now enclosed in *Holland*, whereas indeed they are naturally better, and to be made fertile and kept so, at much less Expence; hence it will follow;

1<sup>st</sup>. THAT our Rent-roll may be raised in two or three Years time above five Millions.

2<sup>dly</sup>, ABOVE twenty Millions at the End of the first nineteen Years Lease.

3<sup>dly</sup>, AND above forty Millions more than they are at present at the End of thirty eight Years.

AND as it is computed that one Acre and an half in *Holland* maintains one Person; supposing then we allow two Acres to each Person in *Great Britain* and *Ireland*, hence it will follow, that *Great Britain* and *Ireland* will maintain forty Millions of People. All this vast Encrease of our capital Stock and Numbers of People is founded on the solid and certain Foundation of watering, draining and planting our grass Grounds, and en-

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creasing our Woods and Cattle thereby, without the Necessity of any further Tillage.

BUT how much more our capital Stock and Strength may be expected to be increased by the Multitude of Discoveries of useful Mines, &c. and by our being thereby enabled vastly to increase and profitably employ, not only our own poor Inhabitants, but to decrease the Number of Foreigners by drawing them from all Nations to be employed upon these, and all other Branches of Husbandry, Manufactures, Trade, Carriages, Fishing, &c. shall be more fully shewn in another Place, and will partly appear from what follows.

EVERY body knows that there are vast Tracts of mineral Countries, in *South-Britain*, in which there are many valuable Mines, already discovered; and I hope it will not be disputed, but that by the Method of Hushing proposed in the Description of the mechanical part, a vast many more Discoveries may be rationally expected. Just so I am not only able  
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to prove my eighth and ninth Propositions, concerning *North-Britain* and *Ireland* to be rational, however odd they may appear in some Particulars; but in as far as concerns the Minerals of *North-Britain*, they are confirmed by my own Observation and Experience: *viz.* I appeal to the great Number of Veins and Mines, which I my self have discovered or been the Occasion of discovering within these last ten Years, and to the great Numbers of People I have been the Occasion of setting to work upon Iron-works, Lead and Copper Mines in several parts of *North-Britain*, a List of which I have already given above. See Letter p. 21. & seq. I shall only now mention one Lead Vein among many other promising ones lying within my Estate of *Ardnamurchan*, which is certainly one of the most considerable Veins in *Britain*, being discovered and laid open above a Mile and a half in length and of vast breadth; whereby the *York-buildings* Company, who are the present Leases, might have cleared  
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eight thousand Pounds *per annum*, had they wrought it in mineral Order and with Judgment and Economy ; which was observed by Mr. *Francis Place* their former Manager.

BESIDES this Estate which is twenty four Miles long, and four Miles broad, having several square Miles covered with fine Wood, and all of it within three Miles of navigable Water, is full of other promising Veins and Mines, which might be wrought to Advantage ; and all of it to the Tops of the highest Mountains is capable of the above Improvements, by Iron-works and Husbandry. And indeed all the other Estates along the Coast of *Argylshire* have the same advantageous Prospects of great Improvements by *Husbandry, Planting, Iron-works, Mining, and Fishing.*

AND as I can make it appear that *Argylshire* may be easily made equally fertile and populous with any western County in *Britain* ; so that County together with all the other midland and western Counties

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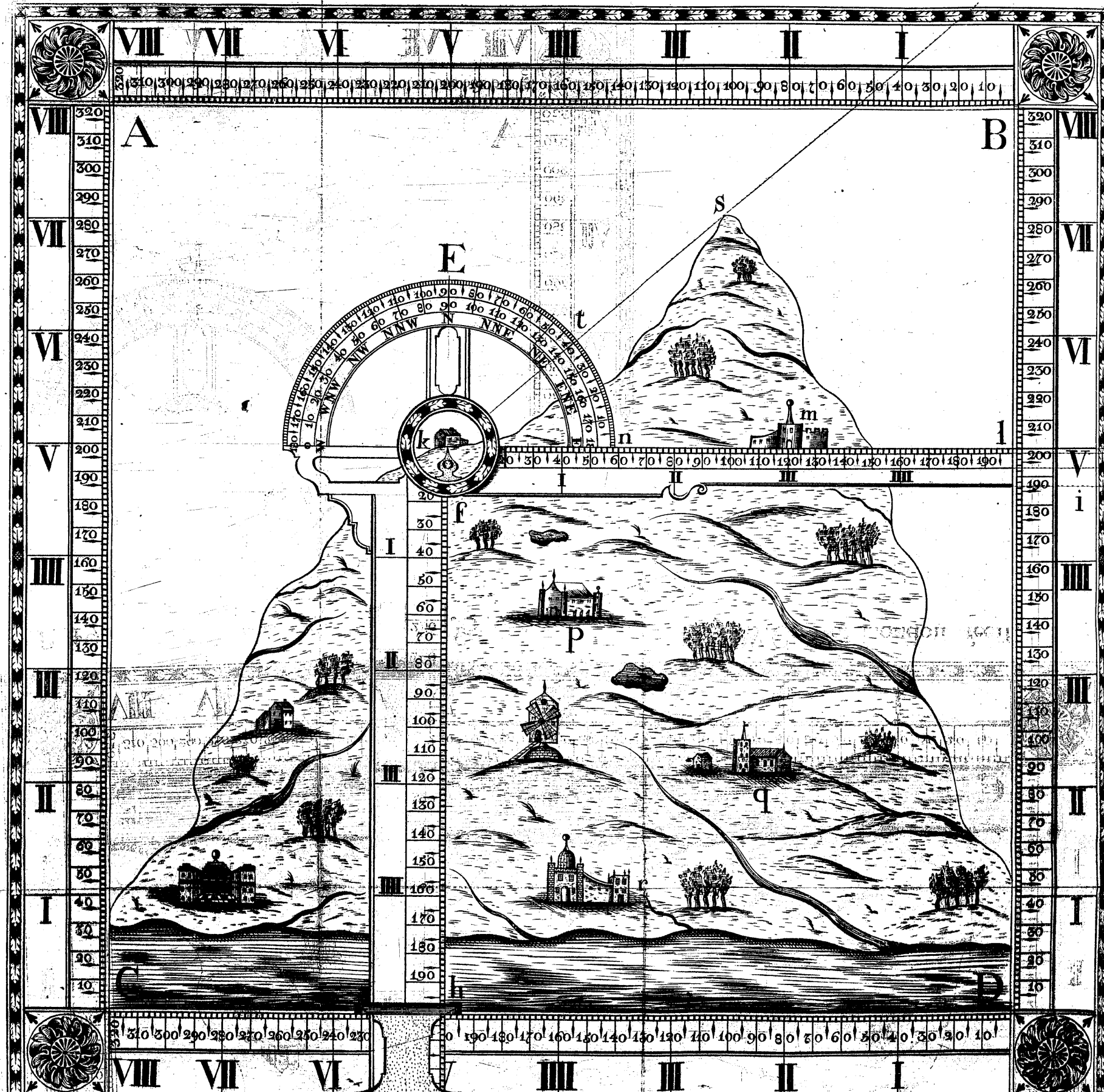
Counties in *North-Britain* being full of Veins, and *Scotland* having a considerably longer Stretch than *England*, upon the West Coast, hath therefore the greater Chance and Prospect of Mines. For to use no other Argument at present, I need but appeal to the constant Observation of all Ages, That there is not one Vein of any sort of Metal (Coal and Iron only excepted) discovered on the East Coast, for every thousand on the West and South-west Coast.

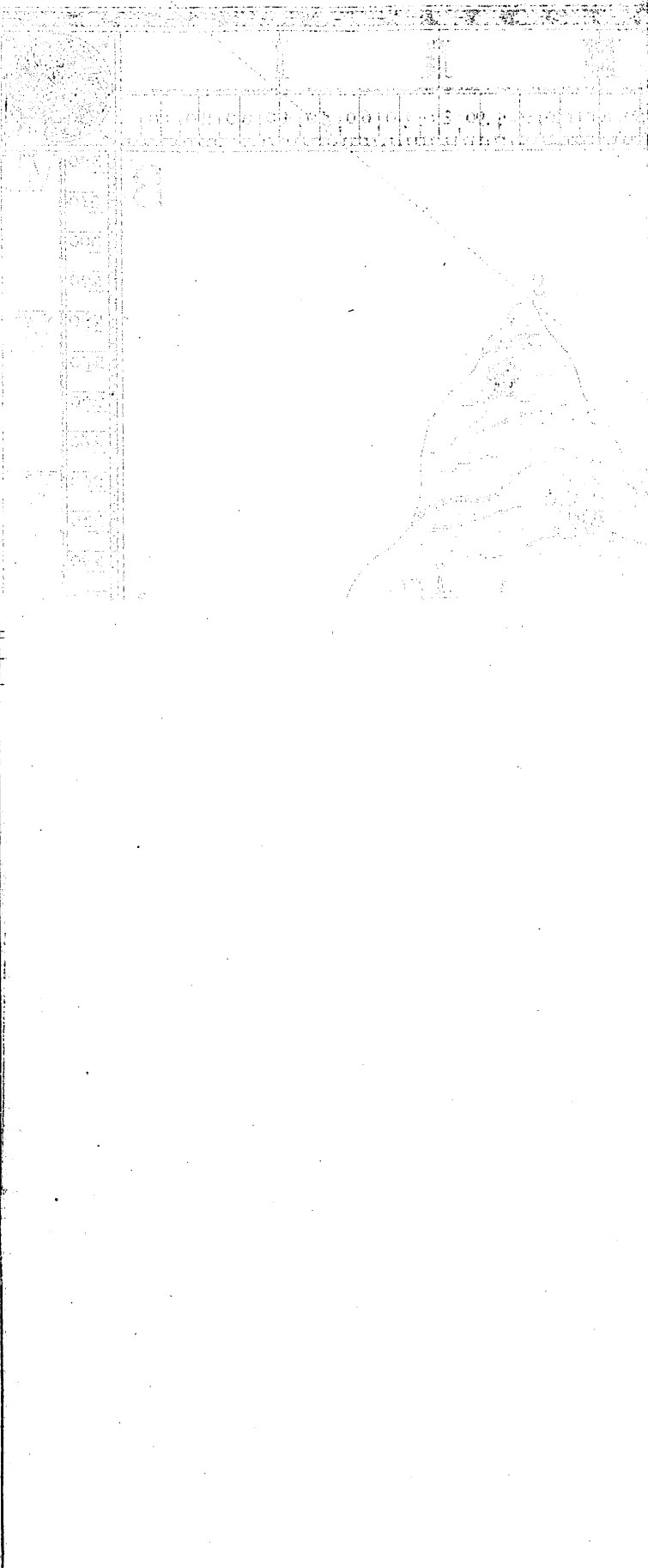
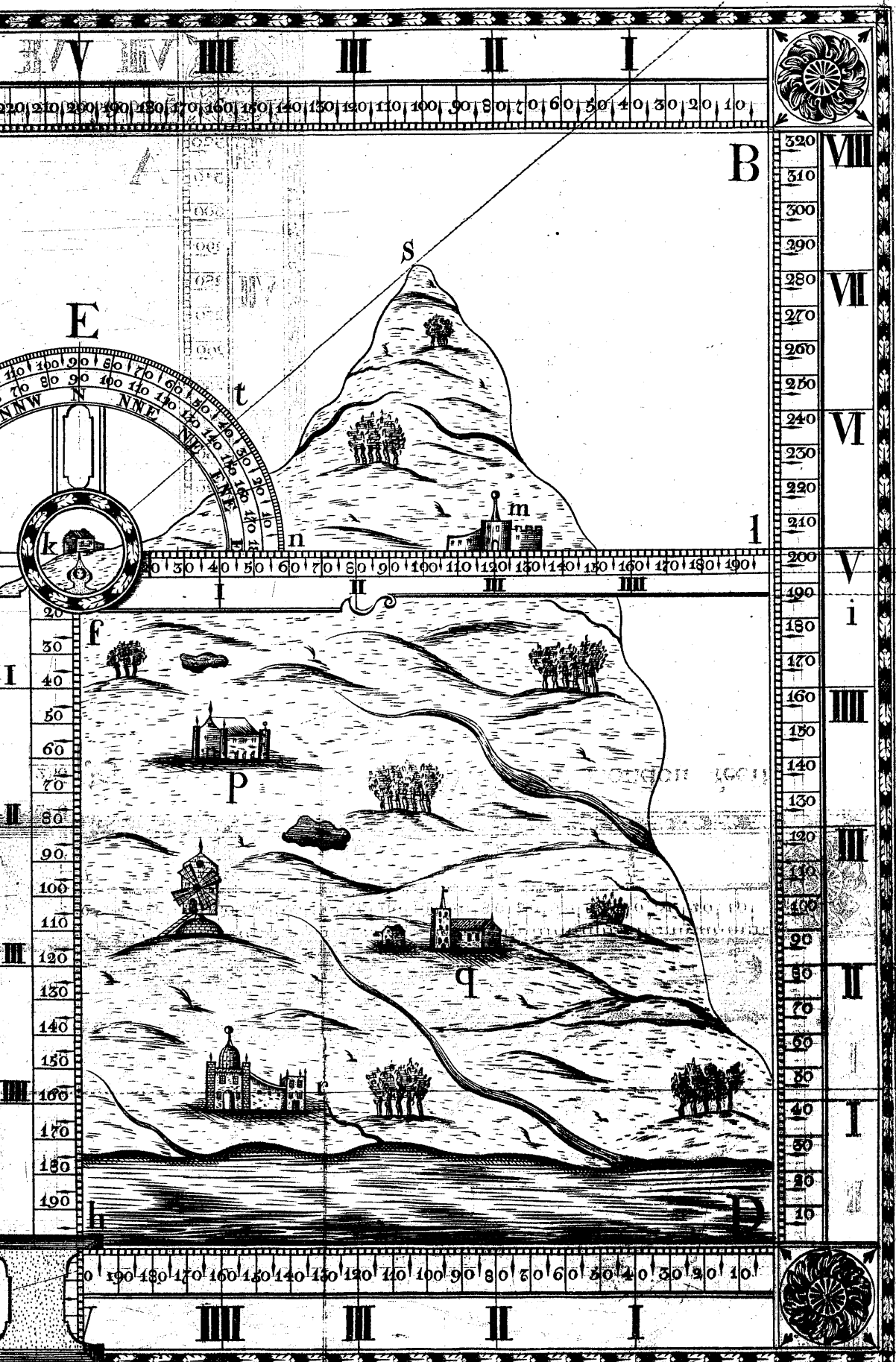
UPON the whole, I hope that I may safely conclude, that if so truly great and good a Statesman as *Xenophon* was, thought that he might rationally build a Scheme and raise a capital Sum sufficient for recovering the *Athenian* State, then sinking under the Weight of the Debt they had contracted during a long and expensive War, only upon their Mines, I hope I may be justified for my building this Scheme upon the Improvement of the Grounds and Mines of *Britain, Ireland*, and the Plantations ; and for my thus

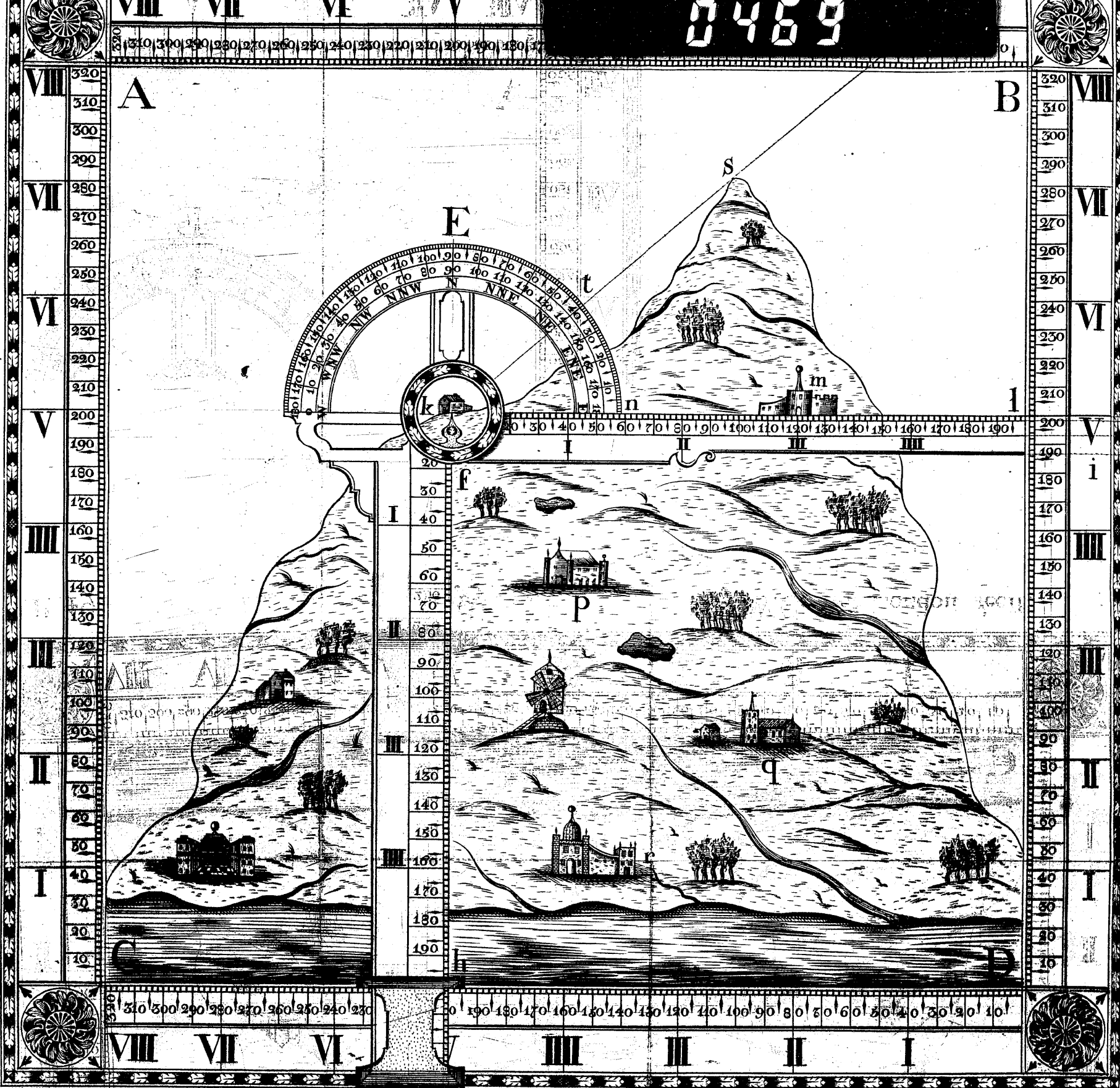
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thus proposing that a Company may be formed, and a capital Stock raised upon this Fund and Security, which will be allowed to be infinitely a more probable and more valuable Fund, than the Mines lying within the little *Athenian* Territory: more especially when at the same time, I thus propose to carry on the Mines safely with the certain Profits, which must arise from the Iron-works and Husbandry; and with the further great Probability of making a vast many new mineral Discoveries at so inconsiderable an Expence. And lastly, when I undertake, in a second part, to render the Execution of this Project easy in all its several Branches, and to yield a certain Profit to all Undertakers as well as to the King and People of all Ranks.

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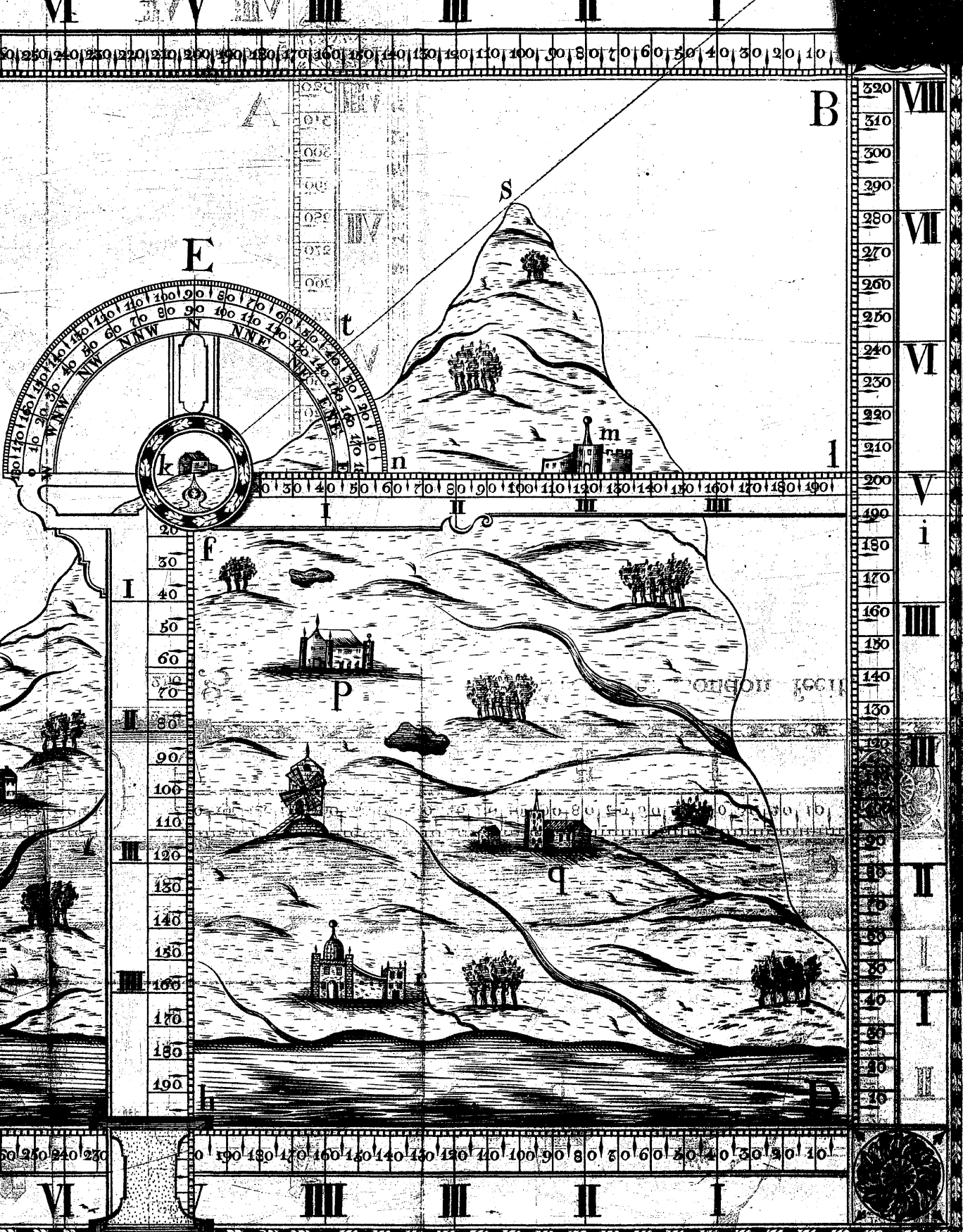


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## M E T H O D

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M E A S U R I N G, &amp;c.

**B**Y this new Method any Lands, Hills, Houses, Towns, Rivers or standing Waters and Sea Coasts drawn by way of a Picture, or in the manner of a plain Sea-Chart, may in the whole, or any part thereof be exactly survey'd; *1<sup>st</sup>*, as to their true Quadrature or Areas in square Poles: *2<sup>dly</sup>*, The exact Distances and Angles of Position, or Points of the Compass that one Place bears from another: And *3<sup>dly</sup>*, supposing any Hills, Towns, Houses or Springs of Water to be drawn above the Level of the Sea, their exact Distance therefrom, perpendicular Height and Altitude, or Elevation above the Horizon

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rizon in Degrees and Minutes, and also the exact Distance, perpendicular Height, and Elevation of any one place above another, will be truly limited, and the whole will be instrumentally performed without confusing the Draught or Picture, with any Line drawn thereon, or the least Hazard of blemishing the same in the manner as follows, *viz.*

THIS Picture, Survey or Draught is supposed to be contained within a Square, the Sides of which Square are four Scales AB, AC, BD and CD; the Scale CD and AB are supposed to be east and west Lines, the former drawn co-incident with the Level of the Sea, and the Scales CA and DB are north and south Lines, which latter is supposed to be the utmost Bounds of the Draught or Picture in breadth, and the former in length, so that these Scales are to represent a certain Number of Leagues, or Miles, according to the designed Extent of the Draught, which here is supposed to be but one Statute Mile of 1760 Yards, which is first divided into 8 equal

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equal parts called Furlongs, and each Furlong divided into 40 equal Parts are called Poles, whereby the Area or Quadrature of any part of the whole Picture will be truly limited by the Instrument at E, which Instrument represents a Semicircle containing 180 Degrees and half; the Points of the Compass from the North to the East and the West, whereby their opposite Points are known and are therefore omitted. This Semicircle hath a Limb, *fg* fixed thereto, which Limb is made to slip up and down by passing thro' a Joynt at *h*, made to slide on the Scale CD from C to D or from D to C; and to the said Semicircle there belongs an Index, *fi*, which is here supposed to be continued beyond the Square, so far as to be long enough to measure the Diagonals CB or AD, or the greatest Distance contained in the Picture. But to measure any Distance only as to the Latitude or the Longitude of the Place, then the moving Index *fi* must be placed at right Angles with the fixed Limb *fh*, on

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the east and west Line of the Semicircle at  $n$ ; and then to know the Latitude and the Longitude of any place on the Picture and the Difference of Latitude and Longitude between any two Places, will be limited in the following manner, *viz.* 1<sup>st</sup>, suppose it was required to know the Latitude and the Longitude of the House at  $k$ , then place the Center of the Semicircle at  $o$  thereto; and the Number of Poles being here 200 Poles on the fixed Limb contained between  $o$  the Center of the Semicircle, and  $b$  the Surface of the Sea, will be the true Difference of Latitude from the Sea-side to the said House at  $k$ , and where the Index cuts on the other side of the Square at  $l$ ; will limit 200 Poles, the Difference of Longitude or the Distance that the House at  $k$  is to the Westward of  $D$ , the eastmost Part of the Picture. And also the said Index cutting or passing by the Castle at  $m$ , shews the Difference of Longitude or the east and west Distance from the House at  $k$  to  $m$ , the middle of the Castle being here 120 Poles;

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Poles; and it plainly appears, that by moving the fixed Limb downwards from  $k$ , the House towards  $b$ , the Sea, that the Index  $fl$  will then shew the east and west Distance, or the Difference of Longitude between  $k$ , the said House, and any other place, such as at  $p$   $q$  and  $r$ , whereby will also appear on the Limb  $fb$  their Differences of Latitude, or their north and south Distances between each other; and further it may be observed that this Figure generating a true Square  $bfld$ , and the Sides being here given 200 Poles, shews the Area of the said Place to be 40000 square Poles, in which manner may the Area of any Space on the said Picture or Draught be truly limited. And also supposing  $k$  and  $s$  to be any two Places given on the Sea Coast of a plain Chart, not only their Difference of Latitude and meridian Distance will be exactly known, as before mentioned, but also their Course and Distance will be exactly limited: that is, the Center of the Semicircle being placed at  $k$ , one of the Places, and the Index

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Index  $f l$  moved on the Semicircle to cut on the other Place at  $s$ , the Number of Leagues, Miles or Furlongs  $k s$ , contained on the Index between the two Places will be their true Distance, and the Degrees cut on the Arch at  $t$  by the said Index, will shew the true Course, which here is West  $40^{\circ}$  N. from  $k$  to  $s$ , or North  $50^{\circ}$  West.

*Lastly*, supposing  $CD$  to be the Sea Coast and  $C s D$  to represent a high Hill or Mountain on the Shoar, then will the Limb  $f h$  limit the perpendicular Height of any Point given,  $r q p k$  and  $s$ , by sliding the same up and down in the Index, &c. from the Level of the Sea or the Height of one Place above another; and also the exact Distance on a strait Line from one Place to the other, together with the Elevation will be limited: As for instance suppose it was required to know the exact perpendicular Height of  $S$ , the Top of the Mountain above  $k$ , a House on the Side thereof, and also the exact Distance on a strait Line from the said  
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House to the Top of the Mountain, and also the Angle that the said strait Line makes with the Plane of the Horizon, all which will be limited as follows, *viz.*  $1 f$  by the Limb  $f h$  measure the perpendicular Height of the Mountain and of the House from the Level of the Sea, and the Difference will be the Perpendicular of one above the other: Then the Index being moved on the Arch to cut the Top of the Mountain, will limit thereby  $k s$ , the Distance on a strait Line, and will cut  $40$  Degrees on the Semicircle shewing the true Elevation.

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### Advertisement.

**T**HE Engraver having unexpectedly disappointed us in not finishing the Plates of the Model, &c. which are necessary to give a just Idea of the whole; we are therefore obliged to postpone the Publication of the *Description of the Mechanical Part of the Scheme* for a few Days.