AN ESSAY

ON THE

MINES OF ENGLAND.

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AN ESSAY

ON THE

MINES OF ENGLAND;

THEIR IMPORTANCE

AS A

SOURCE OF NATIONAL WEALTH,

AND AS A

CHANNEL FOR THE ADVANTAGEOUS EMPLOYMENT OF PRIVATE CAPITAL.

By GEORGE ABBOTT, Jun.

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MDCCCXXXIII.

INTRODUCTION.

The following observations and details are submitted with the intention of showing that, when properly conducted, Mining is neither a speculative nor a precarious mode of employing capital; but, on the contrary, both a very secure and greatly advantageous mode of investing *spare* capital. The following details are also given with the view of proving, that—although the public feeling against all Mining Operations was formerly well founded, on account of their *then* precarious nature, and the many severe losses, occasioned by deficient scientific information and want of skill, and various other circumstances not naturally consequent to Mining Operations—the *present* dis-estimation of such undertakings is much to be deplored, as being *now* ill-founded, impolitic,

and unjust; and likewise injurious to *national* industry and wealth, as well as to individual enterprise and prosperity. The perusal of the following observations will prove, that the present general misconception of the nature and advantages of the Mine investments of the present day, has arisen from imbibed prejudice, created by persons ignorant of the great advantages which may now be derived from such investments, in consequence of the total alteration which a change in the conducting management, and a greatly improved scientific and mechanical skill, have caused in the nature and results of such undertakings.

But it is only after considerable hesitation, that these observations are committed to the press, and presented for perusal, as it is felt that, under the present general view and misapprehension of this subject, it may be very difficult to encounter and remove prejudices, which both tradition and late events have imposed on the minds of most people, to such a degree that, intent and fixed in their own feelings and opinions, they are only disposed to a continued observance of that which tends to support their misconception, and promote an obscurity of true position and result.

Unfortunately, many persons are prone to conclude, and even act, from prejudice; and many, previous to a final consideration, are apt to give an improper influence to misunderstood effect, instead of affording a just one to cause and circumstance. But if in this instance the mind can, during the perusal of the following details, in a certain degree, divest itself of the influence of prejudice, and keep the judgment suspended, so as to afford a proper attention to the matter now suggested for consideration, its advantages will be easily perceived, although, owing to an ignorance of its importance, the subject has been so very generally unheeded. In short, it will be seen that the operation of the Mineral Royalties and Mining generally, is now quite another sort of thing to what it was some years since; and that it is now not only divested of many circumstances which were opposed to success, but actually possessed of many circumstantial and practical facilities and advantages, insuring a successful result, such as easier access—security from interruption—good title—freedom of operation—a greatly increased geological and mineralogical experience—a better and more expeditious method of working the mineral with dimi-

nished expense by improved mechanism—a great reduction in the price of supplies of all kinds, as well as in the means of conveyance and transit of materials and ores to and from the mines—a ready, certain, and secure market, for the immediate sale of the produce, and a jealous attention to general economy.

To prove that, under proper management and good direction, Mining may be made highly productive and advantageous, I must be permitted to enter into some general details of many of the various causes, which have produced the strong public prejudice and misconception of the nature and results of Mining Operations; to advert to many of the practical and mechanical disadvantages, until lately, consequential on their commencement; to expose the fraudulent system which for many years prevailed in their management, and operated so powerfully to prevent any extended or general activity, and to divert attention from any proper consideration of the importance of the metalliferous minerals of this kingdom; to point out many combined causes which have been prejudicial to their profitable operation; and to direct a contrast of former ignorance, irregularity, and expense, with the im-

provements, information, and economy, of the present day.

As the operation of the Cornish Copper Mines has attracted much of the public attention, it will be as well to generally confine ourselves to matters and incidents relating to them, and only introduce, in the following details, such observations respecting other Mines and Mineral Royalties, as shall be necessary to direct a general attention to the whole.

With a view of placing the bearings and merits of an important branch of national industry in their correct position, an attempt has been made, in the following details, at a perspicuous exposition of the events and facts which have been opposed to a fair and full development of the peculiar advantages of Mining Investments. Mention has been made of conduct and a diversity of circumstances, the continuation of which may be considered as effectually checked; and there is now no longer cause for apprehension of any attempt at a repetition of the various irregularities and events adverted to.

It has been necessary to advert to these matters, in order to establish the fact, that "*when*

properly conducted, Mining is not, in itself, speculative or precarious, on the contrary, *both a secure and greatly advantageous* employment of capital.

These matters have also been mentioned with the intention of conveying useful information to those persons, who now are, or hereafter may be, shareholders in such undertakings; and with the hope, by giving an impartial explanation and detail, to direct a due attention to the subject, and obtain that fair and unbiassed consideration which may lead to a correct appreciation of the great national and private advantages derivable from well-selected and judicious Operation.

The facts and tables given in the course of these observations, prove that—*Mines are securely and largely productive* when due caution, skill, and integrity, are combined with a good selection and well-directed management. But, although there is an anxious desire to induce a proper consideration of the advantage of distributing *disposable* capital in well-chosen and well-regulated operations; let it not, for one moment, be supposed that, by the position and arguments taken and used, in the hope of causing a dispassionate and unprejudiced view of this subject, there is any intention to excite any of that indiscriminate

and intemperate rage for Mine Investment which existed a few years since, and was taken advantage of by designing and unprincipled individuals, to an extent that led to much devastation and ruin, and an almost universal condemnation of every Mine Operation.

Whether my attempt to draw the public attention to this most important subject will or will not be attended with any degree of success—the motive, and an intention to be strictly impartial, may perhaps be deemed sufficient apology for trusting that the following remarks and details may not be wholly useless or uninteresting.

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CHAPTER I.

It is notorious that many parts of Cornwall and Devonshire were anciently wrought for *Tin*, and many centuries since for Silver and Lead; (see Strabo, lib. iii. p. 147; Plin. lib. xxxiv. c. 16;) but the raising of Copper Ores or working Copper Mines in these counties is of comparatively recent introduction; for though the ancient workings of Cornwall and Devon produced Tin, Silver, and some Lead:—some centuries back, the greater quantity of Copper and Lead appears to have been raised from Derbyshire, Cumberland, Westmoreland, and part of Wales. Edward III., in the 15th year of his reign, granted to the

Duke of Gloucester certain COPPER Mines in the counties of Cumberland, Northumberland, and Yorkshire.

The most extensive, as well as the greater number of ancient workings, appear to have been in the west, south-west, and north-east parts of Cornwall; those of the east and north-east parts of the county were most productive of Silver and Lead, as were the western and other ancient workings in most departments of the county of Tin. Many of the ancient workings are very extensive near the surface, but it is obvious that, for want of mechanical power and material, they cannot have been wrought to any considerable depth; indeed, there are very few ancient, or old, *deep* mines, except such as have been recently abandoned. Many of those mines which have been wrought within the last fifty years, and upon which machinery has been erected, have, through a variety of causes, hereafter adverted to, been compelled to suspend their operations before the workings could be carried to any effective extent or depth, or the mine be sufficiently examined to enable any correct judgment to be formed, as to its natural capabilities.

The greater number of those mines which have had steam machinery erected upon them, have been undertaken as Copper Mines; as, until very lately, but comparatively few of the *Tin* Mines have been extensively wrought, in consequence of not having had any effective machinery erected upon them.

Though the Tin Mines of Cornwall and Devon have been so ancient, that it may be argued that metals and minerals never cease to grow (Wyatt, p. 158),—yet it is only within about the last half century that any positive or settled system of working them has begun to operate beneficially in this country. Our miners being totally unacquainted with geology, any induction from geognostic relations, was then totally, and even now is, too frequently, disregarded. Their mineralogical experience and skill were also very limited, as they were constrained to confine their attention to the observance of the few specimens and varieties of mineral within the scope of their individual operations or immediate neighbourhood. Habit and education precluded the possibility of an extensive or general experience; as it was, and even now is, the general practice of those engaged in Mine Operations, to introduce

their children on the mine at an early age, and employ them in wheeling the barrow, and in breaking up and dressing the ores, and other surface operations, till strong enough to go underground, where, by degrees, they are instructed in the arts of boring, blasting, and breaking the rock, as well as in dialling and all the other practical operations, until, through quick perception, personal activity, or family influence, they are, in early manhood, made underground agents or Captains of the Mine, under the superintendence of the chief or directing miner; in some instances retaining such situation during life.

Should circumstances cause the suspension or shutting up of the mine, the miners must endeavour to find employment elsewhere; this is most generally in an adjoining or neighbouring mine, by contracting to work on tribute with other miners. Those who cannot there obtain employment, go a little further off, where they continue working till some casualty or strong inducement takes them to another Mine. It thus happens, that comparatively few of our miners have any general knowledge of the country, strata, minerals, indications, or symptoms,—varying from those of their immediate field of observation,—

and consequently possess only a limited and *local* knowledge, instead of an extended or general experience.

There are some few, who having been employed in various unfortunate or profitless concerns, have been compelled to move from one district to another, and by this means have attained to a somewhat more varied knowledge than the absolutely local miner.

A very few, from family connexions, and the influence consequent on being Captains of extensive mines, have on certain occasions been called in at the onset and progress of new undertakings, as inspecting and consulting agents, not only in their immediate vicinity, but in different parts of the county; by which they gain some practical knowledge of the varieties, changes, and irregularities of ground, and of the different aspects of minerals under a change of circumstance and strata. But this information is extremely limited, as well as very vague, even in most of our best practical miners; as only very few among the most intelligent Mine Captains know any more of mineralogy than what the varieties and nomenclature of the district present to their observation. Any knowledge of the che-

mical combination, or of any mode of analysis, is so totally out of the question that they even deny its utility. Geological facts and deductions are not only wholly disregarded and deemed useless, but pretendedly scorned by most of those who are looked up to as the cleverest and best experienced Mine Captains, who are weak enough to flatter themselves that they hoodwink your reason, and give you sufficient answer to your suggestions of the utility and propriety of an attainment, at the least, of some degree of a competent knowledge of these sciences, by stating (as Captain —— does) that he has lived many years, and has been a practical miner from his childhood; that his relatives are all miners, and that he has had much benefit from their knowledge and experience, and yet never goes under ground in a strange place, but new features, difficulties, and phenomena, are presented to his observation, and that there are many matters and derangements connected with heaves and underground changes, which are quite inexplicable to him, and other most experienced miners of the day; and that, therefore, it is nonsense to talk of the utility or propriety of any application of a knowledge of geology, mine-

ralogy, or chemistry, to practical Mine Operations. Such persons forget, or appear not to know, that a comparatively slight geological experience would be sufficient to convince them, that many or most of those things which now appear to them irregularities and inexplicable phenomena are not so, but natural consequents, easily accounted for, as the matter-of-course effects of a certain arrangement and disposition of things, and easily comprehensible to those in the habit of regarding and reflecting upon the connexions of cause and effect. But we can scarcely believe that any persons who, from the nature of their occupations, must of necessity have, or from their opportunities of acquiring it ought to have, more than a common discriminative tact, can be sincere in making any such observations; and therefore we can only conceive them made for the purpose of furnishing excuses for their own ignorance of portions of useful scientific acquirement, which they feel conscious they ought to possess; or else, that they are made in an illiberal feeling and jealousy of the advantage and superior influence a requisite knowledge would give to the rising Mine Agents.

Such individuals are neither ignorant of the

various losses which have been sustained in consequence of an incompetent knowledge of these sciences; nor of the fact that, through such incompetency, a copper-miner from Gwenap would be a prejudiced as well as inefficient reporter and adviser upon a Tin Mine in the districts near St. Just, or of a Lead Mine in the east or north-east part of the county. In Instance I. will be found several circumstances exhibitory of this fact.

Many valuable mines have been lost, entirely owing to an ignorance of the effects of stratification, and of the causes and consequents of the dislocation of the veins, and an interruption of their stratum and their course by slides, heaves, flukans, &c. &c.; and, after a lapse of years, have been recovered, in consequence of the derivative information afforded by the operations in the adjoining or surrounding ground having induced a closer observance, and more intimate knowledge of the nature and prevailing irregularities of the district.

In the face of these mineralogical and geological deficiencies and blunders, our Mine Captains, generally, pretend to question any applicable use of these sciences, and actually take credit to themselves for their individual *practical*

talent and experience, instead of appearing to reflect that their knowledge is derived from combined causes, and acquired by chances not dependent on or resting with themselves, or their appropriate study and scientific attainment (which would have prevented many ruinous consequences); and that they ought to be ashamed of their scientific deficiency, instead of boasting and being content to pride themselves upon their present mechanical and practical experience—more especially when, even at this day, you may hear miners of the different parishes of Crowan, Redruth, Gwenap, and Saint Ann's, ridiculing each other for their professional ignorance of the gossans, capels, killas, slides, heaves, fluckans, &c. &c. of their several districts.

The Cornish miner is accustomed to very little variety of strata, chiefly granite, gneiss, and killas; and so far from having any general degree of information relative to foreign or other strata, he is absolutely very deficient in a proper practical as well as scientific experience and knowledge of the variety and changes of the growan and killas of his own country. A Gwenap miner knows little or nothing about the symptoms, strata, or produce, of Saint Just; a Crowan miner

knows very little of the strata, minerals, or indications, of Saint Agnes; a Redruth miner little or nothing of the geology or mineral habitudes of veins in the north-east of the county, which formerly produced various kinds of minerals, and now abounds in a variety of valuable veins and former workings.

The Cornish miner draws his conclusions, whether of Tin, Copper, Lead, or other mineral veins, from prejudice and his own circumscribed practical experience.

INSTANCE I.

Captains ——— and ———, two of the most respectable as well as most experienced mine agents, one from Redruth the other from Gwenap, were called in to inspect and give their report upon a Lead Mine in the eastern part of the county of Cornwall.

They were unaccustomed to the peculiarities of the mineral indications of the district, and as they differed from those of their own parishes, their opinion was unfavourable, and contrary to that of the miners on the spot and in the surrounding

neighbourhood. Their report was worded in terms consonant to their prejudice, and they condemned the mine as—"not being in a *district likely* to make a *lasting* mine," and as having "an unkindly lode (vein) with hard hungry stuff." It has since been wrought, and has *turned out very productive.*

One of these same captains was sent by the Committee of Shareholders to inspect and report upon a Tin Mine on the pink lode (vein), Tywarnehayle (the adjoining parish to Gwenap); and was perfectly confounded and unable to find the vein, which has a heave peculiar to that district. Had he not been assisted by the local agents, it is more than probable that a valuable vein would have been unfavourably reported, and any Mining Operations condemned.

It is notorious that there are very few Mine Captains capable of giving a fair, judicious, and comprehensive report upon the prospects of a mine or vein out of their particular districts.

In consequence of the prevailing ignorance of mineralogy and geology, Mines which have been undertaken for the production of one species of Ore, have produced a more valuable mineral in larger quantity than the particular Ore sought for

and expected; and yet, the valuable Ore has been disregarded and thrown away, or otherwise rendered useless, and left without any inquiry into its worth; and after a considerable outlay, the mines have been suspended or abandoned, under circumstances where large returns might have been made, if the Captain or those about him had been in any general degree conversant with mineralogical chemistry, or had had sufficient curiosity to have the mineral properly analysed, instead of being contented with the report of the bungling "assayer of Tin, Copper, and Lead," who contents himself with certifying that it contains none of those metals.

Instances could be given where Ores, rich in a particular metal, have been thrown aside or neglected by the miners and agents as worthless, and have been left for years without any inquiry into their nature or contents; and when at length they have been taken to the country assayer to be tried, he has been instructed to try it for Tin, Lead, or Copper, according to their notion of which of the three metals it was most likely to contain. If they think the Ore contains Copper, and the assayer reports "none," they are generally content to neglect the Ore without taking the trouble

of further inquiry as to Lead or Tin. Any assay for *other* metals is out of the question with *them*, and beyond the *power* of most of the County Assayers.

Thus scientifically deficient, the miners have neither curiosity or disposition to assay Ores which they consider useless, merely because they differ from those they have been accustomed to; and therefore it has happened that rich Copper and Tin and other Ores have been neglected or thrown away as useless, without any kind of previous assay.

It has often happened that Ores, rich in these metals, but of a different chemical combination to those which the country assayers are accustomed to, have been taken to different assay-masters, who, not knowing how to treat them, have been unable to bring out their produce, and have therefore reported them as valueless for Copper or Tin. The assay or analysis of Ores, for other metals, is scarcely ever attempted: as but few of the assay-masters encumber themselves with the possession of sufficient practical skill and knowledge enabling them to "*try*" Ores containing other metals. Still fewer are capable of a correct assay of a mineral contain-

ing Silver; much less of a correct *analysis* of the mineral containing that or any other metal.

These observations only apply generally, not to all—for there are some two or three very clever assayers in the county. However, there are but very few of the miners who are cautious enough to employ them, as they generally apply to the nearest assayer; who, perhaps, has amused himself for some time in trying a very limited number of Copper and Tin Ores, and then has become a professed assay-master.

In a mine only a few miles from Tavistock, in Devon, several hundred tons of *Tin* stuff were raised after a very heavy expense and extensive outlay upon surface erection. Expectation was sanguine, and the shares ran up to large premiums. After a time some of the *Tin* stuff was taken to a smelting-house many miles off, and then only—to their utter astonishment as well as bitter disappointment—did they find that it was not Tin, but "a nasty hungry stone."

It is Thummerstone; but of this they are still content to remain ignorant, no one troubling himself further about it. As it is not Tin, they neither know nor care what it is. It will scarcely be believed, that though the mineral has remained

on the surface of the mine upwards of twenty years, and part of the vein is rich in a metalliferous mineral, no one in the neighbourhood, nor any one interested in the mine, knows more about it than that "it is not Tin!"

In one mine, some thousands of pounds worth of rich Copper Ore were thrown away because "it was not Tin;" and some years elapsed before they discovered that they were throwing away the most valuable part of the mine.

In another mine, rich Copper Ore, called "Goose Ore," was thrown into the sea; and after the mine had been abandoned, with considerable loss, they found that the Ore thrown away would not only have saved the mine, but would have given them a profit.

Instances could be given of rich Silver and Copper and other Ores, having been thrown away and used with the shale to mend the high roads!

Shortly since, there were two extensive and profitable mines, which were considered to be under most efficient management and skilful superintendence, throwing away Silver Ores of great value!

In working Tin Mines, many valuable Copper Ores have been thrown away and neglected; and there is no doubt but there now are many mines throwing away *Silver* Ores. Yet, if inquiry were to be made, it would be generally answered, that in some few instances, such as in the Herland, Great Wheal Alfred, Wheal Mexico, Wheal St. Vincent, and Willsworthy, &c. Mines, some *native* Silver ~~Ore~~ has been found; and that in two or three other instances, they have found Silver *Ores* in small cross veins, not worth working; and that when they have occasionally heard of any Silver in the Ores from the main lodes, they have sent some of the same kind of Ore, and from the same place, or part of the lode, to be tried for Silver, when it has been found "not to contain any;" (probably the Ore had been sent to unskilful assayers;) and therefore they find the quantity of Ore containing Silver to be so small that they "now take no account of it." The truth is, carelessness and a want of discriminating power have misled them, and induced them to conclude that their Ore is all alike, since it appears very nearly so to the eye, and comes from the same place. Close observation would convince them, that the Ore containing the most Silver is most

generally either attached to one side of the main vein, or else in a leader in the centre of the lode. The lode, or Ore, is all broken or blasted away together; and therefore the Ore from the part of the vein containing Silver is so mixed with the greater quantity of other Ores, that it would be useless to attempt to separate them, even if the surface miners and bucking women were conversant with their peculiarities and external indications and appearances. The mode of saving these to the best advantage will depend upon the intelligence of the superintending miner, and his instructions to the tributers as to the mode of keeping it distinct.

The county assay-masters can manage to obtain Silver from the *Lead* Ores containing it; but when Copper or *other* Ore of a peculiar nature, and different from that they have been accustomed to, has been sent them to assay for Silver, some have reported "none," and others have found it rich in that metal.

One feels very serious regret at being compelled to observe, that from the illiberal education, local permanence, and limited field for

observation, the Mine Captain or superintendent of the present day—although in many instances incomparably superior in general intelligence and experience to those of a former period—is still very deficient in several requisite acquirements, and lamentably destitute of general information relative to the strata and mineralogy of his country.

This deficiency has led to the loss, suspension, and abandonment, of many mines; and tended to the preservation—if not increase—of the errors still prevailing in regard to the imagined limited and restricted local deposition of particular Ores and Minerals.

The consequence of this limited information and experience is, that when the Cornish miner is called upon to inspect the mines of other districts or counties, being in strata he has never before seen or even heard of, and producing a different species of Ores, dissimilar both in kind and appearance to those he has been accustomed to,—he makes up his mind to condemn the undertaking, and unhesitatingly reports that he cannot recommend the mines as likely to be lasting and productive: as in the whole course of HIS *experience*, he has never seen or known any mine to be lasting or profitable in such a situation, under

such symptoms, or in *such a stratum* or ground, or with such Ore. Parties who send them to inspect will, as a matter of course, be guided by their report; and perhaps we might praise the sincerity of the report of such individuals, had they the candour to state that they were totally unaccustomed to, and unacquainted with, either such kind of strata, or such species of Ores.

This kind of report has been made by some of the most experienced and reputable of the Cornish miners, relative to mines in Scotland, Ireland, Westmoreland, and Cumberland; and there are instances of their having condemned mines in the most favourable strata for the production of lasting and large quantities of Ore, merely because the stratum and mineral varied in appearance from that which they had been accustomed to; and not from any scientific knowledge, experience, or general information, as to the stratum most congenial to a particular kind of Ore, or from any consideration of the effects of the chemical components of either the stratum, the vein, or the mineral, as being most conducive to the production of an arseniate, carbonate, oxide, sulphuret, or other species of Ore. Hence, until lately, had any one proposed working a

Copper Mine north of Redruth, south of Gwenap, east of Truro, or west of Crowan, the undertaking would most certainly have been condemned; and the proposer would have been deemed a knave or a fool. However, the results of Great Towan, Wheal Charlotte, Saint George, and Wheal Leisure in the north; of Wheal Jubilee in the east; Great Crinnis, East Crinnis, Pembroke, and Fowey and Lanescot, in the south; and of Wheal Fortune, Botallack, and Wheal Rodney, &c. in the west, have proved the misapprehension and prejudice.

In defiance of these and many other facts, which could be adduced to show that the Cornish miners have only a very limited scientific knowledge, and that a more varied experience of localities and strata, with some knowledge of mineralogical chemistry, would be useful in the practice of their profession, they continue to treat such acquisitions as matters of very slight importance, and would wish to induce you to think them useless, by reminding you of their ancient fame, and of the general estimation and repute of "The Cornish Miner?" and by appealing to you, and asking whether they are not reckoned the best miners in the country: this one cannot but

admit. Yet they ought not to forget that they are chiefly indebted to the introduction of the steam-engine, and the great improvements in their machinery, for their present renown, and not to their geological, mineralogical, or chemical knowledge. In truth, an inattention to this part of their profession has caused them to be held by the Mexicans, generally, in much less estimation than the Germans, of whose skill they have a very high notion; and, unfortunately, the idle and assuming deportment and unconciliatory conduct of some of the Cornish agents has induced a feeling of disgust, and a tendency to an exhibition of contempt for their general skill, character, and disposition. It may be doubted whether those persons, who have been sent out to Mexico and other places, afford a fair sample of the general talent, tact, and disposition of the Cornish miner; if so, perhaps, the miners of Germany, Sweden, &c., may feel themselves equally entitled to the like consideration.

The geological attainments of our Cumberland and Derbyshire miners, and the superior skill of the Germans, Swedes, Russians, and Americans, in mineralogical chemistry, ought to cause a sense of *inexcusable* inferiority; yet taking them on the

whole, and as a class of men possessing great nerve, perseverance, and activity, engaged in a most useful and arduous as well as interesting variety of occupation, the Cornish miners compose a very valuable and intelligent people, with more combined knowledge than most of their grade; but still individually deficient, and wanting in a due cultivation of the several acquirements essential to a complete mastery in their profession.

This deficiency in competent science casts a material stigma and drawback on their character for general skill and knowledge, and makes us uneasy at being compelled to admit the inferior scientific attainment of the Cornish miner, when compared with those of most other Countries.

By thus particularly stating the absence of a proper degree of scientific attainment, it is by no means intended to impute or convey any impression of physical inaptitude, but only to exhibit that there has hitherto been a species of obstinate dislike to innovation, and an inveterate adherence to custom and rule, at the expense of improvement, justice, and interest; and to show that much of the loss, and present erroneous impression of the precarious nature of all Mine Operations, have been caused by former deficiency in

practical and derivative scientific information, rather than by any natural incapacity or barrenness of the mines. However, upon considering the way in which the practical Mine Captains have been brought up, and are now educated, their partial deficiency is not surprising, and is rather a misfortune than a reproach; for it is next to an impossibility for those who have been occupied on the surface of the mine during childhood, underground during youth, dependent on their personal labour for support in early manhood, with the intervals of work taken up in the study of the general details and more immediate practical branches of their occupation—to have any extensive knowledge of the changes and indications of strata and minerals, or to possess a requisite proficiency in the sciences connected with Mine Operations.

With a little more liberality and candour, the present superintending mine agents or captains, might do much for the advancement of science, by inducing the rising and junior mine agents to give a proper consideration to the importance of a competent knowledge of these branches of it. This has been urged upon the attention of Sir——, who has an incorrect view of the matter, and

thinks he refutes the position by asserting that the Cornish people are very well versed in the geology of their county, and that there is very much valuable and scientific information to be found in the productions of Messrs. Hawkins, Carne, and other members of the Geological Society of Cornwall. There is no question of this: but, after all, it in fact proves nothing more than that these gentlemen are scientific men, and have proved that *they* know something of the geology of their country. Sir —— has forgotten that these gentlemen are not Mine Captains, or superintendents, or practical miners; and that though it is very true that there are several gentlemen in the county who have written different works, and made many valuable communications to the Geological Society of the county, yet these works are of little or no use in promoting the general diffusion of useful knowledge and scientific attainment among the practical and operative miners; as, so far from being generally benefited, few or none of the miners have ever heard of them. It is very much to be regretted, that the Geological Societies do not periodically issue a useful publication, cheap enough for general purchase and distribution.

CHAPTER II.

Independently of what may be termed the peculiar or natural accidents and risks consequential to Mining Operations, there have existed almost innumerable other causes, adverse to a successful prosecution of them; and repeated and severe losses and disappointments have created an impression, that much speculation and great loss are the matter-of-course and certain consequences of such undertakings. But although the disappointments which have occurred through Mining Operations have been very numerous and great, it is certain that only a very small number of them can be justly attributed to what may be termed the natural accident and risk consequent upon such undertakings; and, few and limited

in extent as have been these losses and disappointments from such natural and legitimate causes, the present increased derivative knowledge and practical information—relative to the prevailing faults and irregularities of the various strata, and of the indicatory symptoms and contents of a mineral vein, together with the improved mechanism, and the very superior talent and information of the present period,—afford strong grounds to hope that henceforward we shall seldom or never hear of mines being lost or suspended through geological blunders, or any deficiency in general capacity; and that the instances of disappointment and loss from any such undertakings will be extremely rare.

There are very few *natural* risks, uncertainties, or accidents, appertinent to Mine Operations; and even these may be prevented in almost every instance, by a guarded attention to a proper selection and an effective material and machinery.

Through former incapacity, fraud, and bad management, the artificial and adventitious causes of disappointment and loss, *have* been almost innumerable; and although the system has of late years very much improved, there still exist many things prejudicial to that full degree of

success which cannot but result from extended or diversified Mine Operations, when under cautious and efficient management. It is true, that from a single or individual mine undertaking, loss may yet occur, both from natural cause and adventitious circumstance; but where due caution is exercised in the selection, and when proper advantage is taken, of the experience afforded by past indiscretions and faults, and a just consideration is given, to the improved and improving machinery, and increased skill and great practical economy of the present time, it is certain, that Mines are *now* so far from being dangerous and speculative concerns, that the result of any given number of Mines, properly managed, would certainly satisfy any reasonable expectations or wishes; and it is unquestionable but that—instead of their being a precarious property—capital may be embarked in them with greater safety than in any ordinary commercial enterprise or trade, as now they are less subject to accidents and revulsions endangering partial loss, and have the *certainty of realizing very much more than the usual returns of trade,* without in any way subjecting the invested capital to severe, much less, total loss.

On referring to the produce of the mines which have been put into activity within the last six years, it will be seen that, under cautious management, the average of success is more than two to one, and that one profitable mine will more than compensate the loss from four losing concerns.

In order to prove that the natural disadvantages are very few in number, as well as very limited in extent of loss, and to show that former fraud, incapacity, and bad management, have been the cause of more than three-fourths of the loss and prejudice relative to Mine undertakings, it will be requisite to mention in detail, and expose, some of the causes which have been prejudicial, and formerly occasioned so many failures. From the peculiar nature of these causes, it is utterly impossible to avoid a degree of repetition which may be thought somewhat tedious; but the details are instructive and absolutely necessary to a proper comprehension of the subject, and to evince that, when mines are judiciously selected and fairly conducted, money may be invested in them; both very securely and very advantageously.

Formerly, when parties determined on exploring a mine, a number of poor and labouring indi-

viduals of the neighbourhood subscribed a certain amount, and divided the concern into a given number of shares, and appointed, with the title of Captain, the man who had the repute of being the best or most experienced miner as a sort of foreman or director of the works and concerns of the mine. The operations of the mine proceeded under his control, either until the subscribed capital was profitlessly absorbed, or until, through extended or successful operations, the affairs of the mine became too burdensome, or so complicated as to render it requisite to appoint some one, under the title of *Purser*, to relieve the Captain, and enable him to direct his exclusive attention to the practical affairs of the mine.

By gradual innovation and change of system, the Captains and Pursers became self-constituted, and acted as such; not from any superiority of education or intelligence, or any better capacity than others, but in consequence of a cunning and reprehensible connexion and compact with the traders of the neighbourhood. So that the matter-of-course consequence of such a system was, that, until very recently, many ill-advised undertakings and worthless veins, were pursued and wrought with severe loss, in consequence of their

having been undertaken more in an eagerness for employment, and as a means of forcing a market for the consumption of the materials, than in a cautious and proper view of the natural merits and eligibility of the concerns.

For examples of the danger and effects of this system see the following instance.

INSTANCE II.

A miner having discovered a mineral vein of any kind, applied to an individual somewhat more influential than himself to obtain the set or grant, and to undertake the office of Purser, and obtain the names and sanction of some traders in the county, as proprietors of certain portions or shares, on the condition that they, or parties named by them, should have the supply of such materials as they usually dealt in. The concern was then divided into a certain number of shares, generally sixty-fourths or one hundred and twenty-eighths. When the traders had nominally taken up about half the shares, what was termed a meeting of the shareholders was held, at which meeting the originators of the undertak-

ing were formally appointed to the Captaincy and Pursership of the mine.

After some trifling operations, another meeting was held, at which it was declared inconvenient to some of the shareholders to advance a sufficient capital to make any effectual *trial* of the mine, and it was therefore determined that such and such shares only should be retained by the persons constituting the meeting, and that the remainder should be at the disposal of the Captain or Purser, who was authorised by that meeting to go to London or elsewhere, and empowered to make sale, or other disposition, of the shares, and enter into any arrangements they might think best calculated to ensure an effectual *trial* of the mine.

In accordance with such resolutions, the Captain generally formed a connexion in London, or elsewhere out of the county, and usually represented as effective, a smaller capital than they knew would, under such a system, bring the mine into any thing like a productive state. This was done under the feeling that parties would refuse to take shares where a large capital was required; but that the small outfit capital asked for (some two or three thousand pounds) would

induce people of small means to embark in the undertaking. The Purser and Captain were perfectly aware that the traders would support any lavish expenditure, as well as any future application for further advances of capital. They felt that it mattered not whether the subscribed capital was sufficient, or even how it was squandered, as they well knew that if parties could or would not come forward with more money, their shares would be forfeited or sold to others who could be induced to provide the necessary capital, till it suited the county people to take up the shares for themselves, at a period when the works had sufficiently advanced to divest the undertaking of any risk.

In confidence of the alleged respectability of the parties in the county, and of their appearing to hold considerable shares, many parties were induced to believe that the concern was not only likely to be good in itself, but likewise to be well conducted, in consequence of the large interest retained by persons conversant in such matters, who, it was but reasonable to presume, would be interested in attending to and enforcing an equitable and proper management. But, unfortunately, almost every one who has taken shares

with parties so connected has been deceived, and found substantial reasons for general complaints against Mining Operations.

Having succeeded in obtaining a preliminary capital, these Agents commenced their undertaking by furnishing some of the supplies *from their own stores;* and in consideration of support and patronage by the various traders, received materials from the iron-founders, and dealers in coal, tallow, rope, timber, gunpowder, &c. &c., equal to an available capital of 10,000*l.*, instead of an outfit of 2,000*l.* This was to be accounted for, as in some instances the Pursers and Captains received from the traders a per-centage on the amount of materials supplied; this per centage being given, not for the mere permission of supply, but as a premium for the liberty of charges, and as a species of gag-money, enabling them to furnish inferior articles, at a higher rate than better could be obtained for in an open market.

It also operated as an inducement to squander very large quantities of material in the erection of useless or premature machinery, in dressing-houses, counting-houses, and other unnecessary surface operations, before the under-ground workings had been sufficiently advanced to war-

rant the presumption that there would be absolute occasion for any of them.

Besides the frequency of this kind of wanton consumption of material, many instances could be adduced of very inconsiderate expenditure for crushing-mills, washing and dressing floors, and even for the erection of smelting-houses, before any quantity of Ore had been raised, or any under-ground research made, leading to a fair expectation that such buildings would be requisite. In some instances such erections have been made upon unbroken ground and unproved veins. In other instances, certain machinery and out-buildings have been erected in anticipation of the mine turning out productive in a particular kind of Ore, none of which has been subsequently found. Sometimes it has turned out a Copper instead of a Tin vein. Sometimes preparations have been made in expectation of a vein producing Lead Ore; but, after further research, it has proved to be a Copper vein. Sometimes Lead veins have been mistaken for Copper; and in some cases operations have proved the veins and ground to be altogether barren, after several thousand pounds had been expended in useless and anticipatory

surface-erections, instead of in *proper* preparatory and experimental *under-ground* workings. A very slight knowledge of mineralogy and geology would have prevented most of these mistakes, as well as have hindered any attempt to work unproductive ground and barren veins. However, during the continuance of such a system of agency and supply, it was of little or no consequence, as far as the *Pursers'* and *Traders'* interests were concerned, whether the mine would ultimately produce one mineral or another, or, in fact, whether it produced any or none, while the one party, obtained large profits by the materials furnished, and the other, made indirect gains by an extravagant consumption of supplies.

There used to be numerous instances where, subject to mismanagement, and such compacts between the agents and trading shareholders, the capital stated to be sufficient to bring the mine into a productive and profitable state was wholly expended previous to any kind of effective underground operations; and then applications were made to the shareholders for further advances of money. Influenced by the favourable reports, and the recommendation of the trading share-

holders, they were induced to provide the increased capital, which, from continued extravagance and incautious expenditure, was also consumed before the mine had been brought into any productive or decided state. Further applications of capital were followed by similar results, until vexation and alarm at the continual and unexpected applications for increased capital, determined the disappointed non-resident shareholders to withdraw from a concern which, notwithstanding the flattering prospects held out, appeared to them as likely to be productive of little else but disappointment or ruin. Upon this determination of the non-resident shareholders becoming known, the operations were forthwith suspended, and the account for outstanding claims, for materials furnished by the trading shareholders, was generally made up, and left for the non-residents to pay.

When the prospects were good, and the mines had been brought into such an advanced state as to require, under proper economy, very little further capital to bring them into a profitable condition, the shares of the retired and unfortunate non-resident proprietors were taken up by the resident and trading shareholders, who agreed to advance

among themselves sufficient capital for the effectual prosecution of the workings. This they could well afford to do, with perfect safety, out of the profits made by the *former* supplies of materials. From that period the shares were at premiums, and all persons being equally or equitably interested, the difference in the activity and economy of the operations was very perceptible, as in a short time afterwards the mines were brought into a productive state, and in the course of a few years realised very large profits. Under an existing unity of interest and feeling, some of these mines have continued prosperous to the present time. From a diversity of opinion, conflicting interests for the supplies of material, jealousies of contiguous properties, and other causes of disunion among the proprietors, various mines have been prematurely closed or abandoned, though presenting every prospect of large future gains.

It is right to observe, that in consequence of there now being a total alteration in the mode of conducting Mine Operations, both as regards the local agency and the managing direction, there is

no longer any chance of a repetition of the system, conduct, and state of things, mentioned in the course of this chapter. But although they no longer exist, it has been necessary to advert to them, because most people have heard of the *losses* through Mine Speculations, without knowing any thing of the indirect circumstances occasioning them. Many have imbibed prejudices and misconception, merely from an ignorance of the great change in attendant circumstances, and the cessation of all that *used* to be objectionable, and through being unaware of the great facilities and advantages which increased relative information, and improved science and mechanism, secure to the Mine Operations of the present day.

CHAPTER III.

An injudicious and untimely subdivision of the shares has occasioned heavy expenditure and waste, and even the abandonment of many very valuable Mines.

A variety of instances could be given, where Mines which have given very large profits have been prematurely suspended and brought down and ruined, entirely through an improvident mode of working, and an injudicious extension of the shares. This has caused much disappointment and loss from Mines which perhaps, previous to their suspension, have given profit at the rate of 200,000*l.* and upwards to the original and continuous shareholder; but yet have closed with severe loss to the purchasing shareholders:

not in consequence of the *natural* poverty and unproductiveness of the vein, but from an absolutely forced poverty, produced by circumstances purely adventitious, and wholly attributable to, and consequent upon, incautious conduct and want of energy in the purchasing proprietors; whose management has not only deprived the continuous shareholder of a very valuable property, but likewise brought upon themselves the most vexatious and ruinous consequences. It is to be regretted that persons, who by their own inconsiderate and heedless conduct, have subjected themselves to disappointment and loss, should (with a corresponding disregard of cause and effect) enforce a recollection of the effect, and conceal or overlook the cause; and unfairly increase the public prejudice concerning matters, their loss from which, is wholly attributable to their own folly or lack of common discrimination and care, instead of to the alleged "certain ruinous consequences of participation in *any* Mine undertaking."

This circulation of prejudice is the more unjust, as most of such persons know that some Mines similarly situated to those with which they have been so unfortunately connected (Instance III),

have been since resumed and wrought by other parties under a different system, to great advantage and profit.

Mine B., the subject of Instance III., is only one of many that, under a similar management, disposition of shares, and inconsiderate purchase, have led to much of the prevailing misapprehension and prejudice concerning such undertakings. This is the more to be regretted, because the extreme subdivision of the shares has proportionably extended the channels of splenetic misrepresentation and disappointment.

INSTANCE III.

The following is one of many cases where heedless and incautious conduct has subjected persons to severe loss, although the Mine has been very profitable to the original and continuous shareholder.

Mine B. was originally divided into one hundred shares. The workings becoming profitable, the shares sold at a large price, say 200*l.* or 300*l.* per share. This being an inconvenient sum to many who were disposed to purchase a smaller

interest, it was determined to divide the concern into two hundred shares: after a short period the two hundredth share sold for as much as the original hundredth; and a meeting of shareholders resolved to divide the undertaking into five hundred shares. After the mine had realized about 100,000*l.* upon the outfit and working capital, it was by various subdivisions and sales subsequently divided into three thousand shares. By this time the mine had given nearly 200,000*l.* to the original shareholders, and was still working profitably. Under an impression, that as the mine had realized 200,000*l.* profit, and was still giving as large returns as ever, it could not but be a most eligible concern; parties were found who eagerly purchased shares at the rate of 150,000*l.* for the whole mine; but in a short time the period arrived when the extension of the works, increased depth, and inefficient machinery, rendered it necessary to call upon the shareholders for a temporary suspension of dividend:—there being no reserves of Ore ground, and the machinery having been worked to nearly its extent of power. At this time the greater number of proprietors consisted of those who had been induced to purchase in at very large pre-

miums, with the unreasonable expectation that, as the mine had given such large annual profits for so long a time, it would indefinitely continue them, even without any provision for its being properly supported and judiciously wrought; and therefore when this unexpected call for a suspension of dividend, or an advance of capital, was made upon them, they were astonished and dismayed, and refused to afford the necessary assistance.

In the determination of backing out of the concern as soon as possible, the agents were urged to raise the usual quantities of ore; and although there were no proper reserves of ore ground, were obliged to do so at any sacrifice, and however detrimental to the future interests of the concern. With the intention of keeping up the price of shares, in spite of the advice and remonstrances of the superintending agents, the returns of ore were continued, in order that the new proprietors might be enabled to part with their interest and retire from the undertaking without loss. This arrangement was attended with the desired effect. Fresh proprietors were introduced into the concern, and were very soon informed that, unless they would come forward

with a temporary advance of capital for the erection of more efficient machinery, the continuance of the mine would be endangered, as *it had been very irregularly wrought for some time past*, and was then in an almost exhausted state; but that, by the prompt advance of a comparatively small capital, besides allowing the produce of the mine to be for a short time applied in the renovation of the works and bringing it into a proper and lasting condition, there was every probability that the returns would soon be as large as ever, and the mine be placed in a state for permanent production. Being totally unprepared, either for such information or the temporary advance, the new shareholders were perfectly panic-struck, and, under the fear of further disappointment and loss, refused to furnish the requisite funds; but again subdivided the shares, in the hope of securing themselves from severe loss, and of inducing the purchasers of the new shares to come forward with the necessary assistance. Under such circumstances, before this arrangement could be effected, a gradual decrease in the returns was soon followed by a breaking down and other accidents to the machinery; and profitless workings compelled the operations to be suspended,

after having given near 300,000*l.* profit upon the original working capital. Thus we see an improvident mode of working, bad arrangements, and the extravagant if not almost insanely heedless purchase of shares by the late proprietors, closing the concern with a loss of *one hundred thousand pounds,* for what may be called purchase capital.

These unfortunate purchasers have, strictly speaking, only grounds for self-reproach, for their carelessness and total disregard of common sense and caution in purchasing shares at such an exorbitant rate—after having been told that the mine had been working for many years and had given 200,000*l.* profit—without first satisfying themselves of the permanent state of the mine, or considering that, although it might be then giving a profit of 30,000*l.* per annum, and was returning a very large interest *to the moderately purchased share,* it would take some time to repay the purchase of upwards of 100,000*l.* and common interest for the capital invested; and without reflecting that, *from the various subdivisions of the shares* and *extended proprietory,* there was every reason to expect that as much as possible had been raised from the mine, *in order to enhance the temporary market value of the shares,* without any

regard to permanency, or the approaching period when fresh or additional machinery would be required.

The purchasers ought to have considered, that *under such circumstances*, there could be little or *no probability* of the mine having been cautiously or judiciously worked, or of there being that proper reserve of Ore ground which is so absolutely necessary to permanence and ultimate great profits. It is true, that by a certain manner of working a productive vein, comparatively large profit may be made *for a few years*, but by such a mode the most profitable mine may be prematurely closed or exhausted; that is, as far as concerns profitable and continuous workings, without occasional application for assistance from the shareholders.

There is always more or less unprofitable or dead ground in every vein, and therefore the mine ought to be so wrought as to give but moderate profits at first, in order to allow part of the ore ground to be kept in reserve, to make up the regular dividends, and provide the expenses of getting through the barren or dead ground to other courses of ore. In this way, every fresh course of ore provides the means of augmenting

the future dividends, and driving through more dead ground to other courses of ore. Worked in this manner, a mine will be put in a permanent, steady, and gradually-increasing state of production in a few years, without the danger of stoppage, from want of funds and effective workings, or of failure, through barren ground, or unproductiveness, or accident to the machinery, or other casualty. This mode of working also gives an opportunity of taking advantage of a rise in the market-price of ore, and throwing in an increased quantity when advisable.

Unless some caution of this kind is used, mines which have been very productive, and have in a very short period realized many thousand pounds profit, may be prematurely and very suddenly stopped or suspended, in consequence of there being no reserves of Ores, nor any available capital to provide increase of machinery, or to enable them to work through the dead and unproductive ground, till they regain the courses of ore.

Without any reflection upon their own careless and impolitic conduct, these inconsiderate purchasers are the most acrimonious and violent in their invectives against Mine Investment; and always endeavour to instill a general prejudice

against all similar undertakings, by declarations that they will never allow themselves nor any of their friends to be induced to embark in any mine,—however favourably represented, or be the prospects ever so attractive and certain,—for they are sure to be more or less involved, notwithstanding the representations of its every profitable condition. They state that the assertions of the immense gains which some of them are making are totally false, as they were persuaded to purchase shares in a mine which they were told had realized several hundred thousand pounds, and was then giving a profit of 30,000*l.* per annum, but that, to their sorrow, they found, very soon after the purchase, that the statements were far from correct, and they had every reason to think that the whole thing was founded in fraud, for they had not long held their shares before the dividends failed, and after a short time they were called upon for further advances, which they very fortunately refused to make, or they might have been ruined, for the mine was very soon abandoned as good for nothing, after having cost those who had lately purchased in near 100,000*l.*, under a full persuasion, from the statements made, that it was a very eligible

investment, and one of the most prosperous mines in the country, and therefore that the mere contemplation of any property in such undertakings would be absolute folly, and any participation or share in them sure to produce more or less deplorable consequences.

Such persons are often violent and careless in their statements and expressions, and appear well satisfied with what they think an exercise of their sound judgment and discretion in refusing the requisite advance and retiring from the concern; but this conclusion, like their purchase, arises from first impression and heedless reflection. Had they fairly and boldly met the application of the managers, and held a proper survey and investigation of the state and prospects of the mine, they would have been convinced that a timely support would, in many instances, have insured them a prosperous and permanent mine: as some mines which have been suspended under such circumstances, have been subsequently reopened by other parties, and when placed under efficient direction and agency, have produced large profits.

CHAPTER IV.

MANY extensive deep mines have been resumed after a long suspension of operations, and (through heedless consideration, heavy outfits, extravagant expenditure, and defective management) have occasioned such very severe losses, and so much disappointment, as to have produced much prejudice, and a general misconception of the nature and advantages of judicious operations. After a long interval in the prosecution of deep Mining Operations, there is not only great difficulty in obtaining full and faithful details of the capacity of production, the state of the underground workings, and the true causes of suspension, but even when persons have taken the trouble to satisfy themselves upon these points, the probable alte-

ration in the condition of the works, the different drainage, state of that and the surrounding ground, and various other accidental circumstances which may have intervened, are too generally, either studiously concealed by the one party, or altogether overlooked, or too lightly considered, by the other.

The opening, drainage, and resuscitation, of an extensive and deep suspended mine, necessarily require a very large outlay; and instances could be given of very large sums beyond the estimated capital having been absorbed, before the water has been drained from the old workings; and also where, after further advances of capital by the shareholders, the probability of working the mine to advantage has been found to be attended with the necessity of further outlay of money, to an extent beyond that which prudence would dictate, or any probable returns reimburse.

There are other instances where, after having expended near 100,000*l.* in the onset, clearing up, and drainage of old workings, the bottoms of the mines have been found poor, and the adjacent ground in such a very different condition to what was represented or expected, that the further

prosecution of the undertaking has been abandoned.

There is great danger and always impolicy in resuming deep suspended or abandoned mines, without first exercising the utmost caution, by obtaining every particular relative to their past and present, as well as their probable future state.

Such undertakings always require the outlay of very large capitals, and render it questionable whether (excepting under very particular circumstances) they are as eligible an investment as mines of moderate depth. There are a few resumed deep mines very productive and profitable; yet, taking into consideration the large sums invested in them, and the great produce requisite to repay such capital, with an interest commensurate with the risk, one cannot but declare the resumption of deep mines, even under the most favourable circumstances, to be a less remunerative and a more hazardous investment, than the operation of well-selected shallower mines.

Even among deep mines which have been successfully resumed, there are but few such lucrative concerns as those deep mines which have

been continuously wrought, instead of resumed after long suspension.

Under *original* and *constant* operation, a yearly profit of 10,000*l.* will, on the average, be more than cent. per cent. per annum on *the outlay*, or original working capital; while the like produce will scarcely be adequate to the payment of more than common interest for the outfit expenditure of an extensive and deep resumed mine, much less so to an unreasonably extravagant purchase. Even with a much greater profit than the above, a resumed deep mine will take some years to provide for its establishment or permanent operation, without repaying the outfit capital and its interest.

Should the undertaking prove unsuccessful, there must be a very severe loss; and in this view, the appropriation of capital for the purpose of resuming extensive deep mines, is even more hazardous than an extravagant purchase in a deep productive mine; since, in the latter case, parties are sure to receive a great portion of their money back, notwithstanding that the mine should be under bad management and only last for a few years. See Instance IV., in which the difference of profits from investment in deep mines (even

when profitable, and such as can be commanded with a moderate capital) is clearly shown to be in favour of the latter.

The writer is aware that it has been a general fashion to recommend and undertake the operation of deep suspended mines, and that this is a very unpopular view of the subject, particularly as being exceedingly opposed to the interests of those agents and traders who have recommended the re-operation of deep mines. But, perhaps, such recommendation is not very surprising, when it is recollected that the deeper and more expensive the mines, the greater the produce of dues, and quantity of machinery, and consumption of supplies; and the greater the risk and smaller the profit to those advancing their money to work the mines, in a sole dependence of their returns, giving them good interest for invested capital.

A deep and extensive resumed mine may be returning upwards of two thousand pounds worth of Ore *per month*, and several thousand pounds per annum *for dues*, and yet be a profitless, or even losing concern, to the shareholder.

A species of vanity and jealousy of the increasing influence of neighbouring agents and pursers, has induced the prosecution of some extensive

undertakings, notwithstanding that the prospects of a successful issue must have been extremely doubtful, even to those recommending their operation; but, unfortunately, the consideration that the pursership, the large profits to be made by the supply of great quantities of material, the patronage of the agency, and the increased local influence, would very much more than amply compensate any loss which could possibly accrue to their share of the general outlay, has been sufficient to smother and neutralize any reflection or feeling upon the ruinous consequences, which the undertaking would entail upon those shareholders having no other means of securing themselves against loss, than their dependence upon a promised successful result.

INSTANCE IV.

To more clearly show the difference in the profits of investment in deep mines, even when successful, and such as can be commanded with a moderate capital, it will be as well to advert to some deep mines lately resumed, and some new and shallow mines which have commenced ope-

rations within or about the same period; and endeavour to direct a fair estimation of profit and comparison between deep mines and those which the traders and suppliers of materials call "little mines," meaning such as are *not expensive* in their operation, and consume comparatively small quantities of merchandise. Although they may be very extensive, and have great natural capacities, and are actually productive and very profitable, still, because they are shallow and *inexpensive*, they are only "pretty little mines."

The necessary outfit and consequent expenditure for the three deep resumed mines A, B, C, cannot be estimated at less than 150,000*l.*

Suppose two out of the three are successful, and realize a profit of 25,000*l.* per annum each, it will take many years to repay the outfit of 150,000*l.*, and interest for the invested capital. This 150,000*l.* invested in undertaking such mines, as Wheal Reeth, Wheal Trenwith, Wheal Elizabeth, Wheal Caroline, Wheal Strawberry, Wheal Trumpet, Wheal Tolgus, Wheal Leisure, Penstruthal, Treburgate, Lanescot, and Fowey, will afford upwards of 12,000*l.* for each mine, which is very much more than the actual aggre-

gate outfit capital expended in bringing those mines into a productive state.

Take the like proportion of success, and there will be *eight* profitable mines. Average the annual profit of the successful mines at 10,000*l.* each, and there will be 80,000*l.* per annum against the 50,000*l.* profit from the deep mines. The per-centage from the new or shallow mines will be rapidly and greatly increased, as the underground workings gradually allow more Ore ground to be opened, when each of the shallow mines may realize annual profits as large, or larger, than the two resumed deep mines.

Should accident or other cause occasion the abandonment or suspension of either of the two deep mines, there would be only one remaining to bear the burden of the 150,000*l.* outlay, and to yield a profit of nearly 30,000*l.* per annum, for ten years, before the principal and common interest on the embarked capital would be returned. Should any event cause the suspension or abandonment of either of the eight shallow successful mines, there would still be seven profitable and improving mines as security for 43*l.* per cent. per annum, instead of only one for 5*l.* per cent.

Each of the seven mines would, most likely, be improving and augmenting its per-centage of interest or profit, during the gradual extension of the workings, till each mine may be producing as large profits as the deep successful resumed mines; in which case there would be 210,000*l.* per annum against 25,000*l.*, and more than double the available value in machinery and material. This appears a large disproportion in the result of the investment, yet there is a very fair probability of such large return, and even of greater, in the one case, while there is but little or no chance of half such a return in the other.

It must be recollected that in resuming deep mines, there is often a permanent investment or sinking of capital, and always a comparatively lengthened abstraction; as, under the most favourable circumstances, it will require several years of active and successful operation before they can refund the heavy expenses of the outfit, and return a remunerating interest for the money invested. But when money is employed in the new or shallow successful mines, the investment is so far from being a permanent sinking of capital, that both principal and interest are very soon returned, even though the new mines were

giving only the comparatively small profit of 7,000*l.* a-year each. So that the outfit capital invested in such operations, is not only sure of being soon returned with good interest, but the mines are still left in an improving condition, and with ample means to provide for all contingencies.

From this quick return of capital, the shallow mines have the very great advantage of providing an accumulating fund for working other mines, without risking the loss of any of the original capital, and without causing any diminution of the regular dividend from those in productive operation; because, the profit from the successful shallow mines will be yearly largely increased, and enable those using due caution and activity, to confidently calculate upon a renewal or *return of original capital every fourth year*, without any interruption to a continuance of the most effective and full operation. On the other hand, in the instance of the investment of capital in the deep resumed mines, should any accident or contingency cause the suspension of the remaining deep mine, the *whole* capital is lost, excepting the proceeds from the sale of the surface machinery, which must be sold at a great depreciation and

sacrifice of cost. Accident to one, two, three, four, or more of the shallow mines, would cause no great diminution of dividend, and that only for a short time, as the remaining mines would, in their yearly increase, very soon make up the temporary deficiency; but by far the greater portion of the capital sunk in the outfitting and exploring the deep mines, is irrecoverably absorbed in labour and wasted material.

It is to be remembered that the same average has been taken in the number of profitable deep and shallow mines, but the chances are, that there would be a far greater proportion of *successful mines* among those which are shallow.

If only one of the three deep mines were to fail, there would be a loss of about 50,000*l.*, and only two mines left to repay the whole outfit, capital and interest; but not so if three or four of the shallow mines were to fail, as there would still be *eight* profitable mines, to the purposes of which the machinery and materials of the unsuccessful shallow mines would be available.

Deep and extensive mines are in great estimation with the traders, as they require large supplies of all kinds, and are exceedingly good things for employing the local labouring and de-

pendent population. Some of these deep mines have been set on and recommended by those interested in the dues or royalties, as well as in the consumption of supplies, and it cannot but be admitted, that about the 12th part of all Ore raised, a monthly profit of near 20*l.* per cent on the materials supplied, some patronage in the appointments, a per-centage for the trouble of agency, a decrease of parish rates proportionate to the magnitude of the concern, with other advantages, are very strong inducements for some people to recommend and continue the operation of undertakings insuring *them* so many advantages and profits, however unfortunate and ruinous the result may be to those differently situated.

In thus mentioning these circumstances, and some of the motives inducing the re-operation of deep suspended mines, it may be alleged that there is a disposition to invariably condemn the resumption of large undertakings, and an intention to have it inferred that sinister and unfair self-interests are always the incentives to the re-commencement of extensive concerns. There is no such feeling. There are some few extensive con-

cerns lately resumed, which under fair and judicious management have made very large profits. It is only intended to show that various personal and indirect interests have formerly caused the re-operation of many such undertakings; and to enforce that as such circumstances and motives have been acted upon, and still may exist, they ought to be taken into careful consideration, and their influence cautiously guarded against, previous to commencing any future similar undertaking. An oversight or concealment of the existence of such influences, coupled with a studiously-imposed ignorance of relative particulars, and the absence of a due consideration of all their disadvantages and bearings, *have* led to the resumption of many mines *insuring* benefits and profits to the suppliers of material, and those interested in the dues, with little or no chance of remuneration, or even a return of any portion of his subscribed capital, to the mere shareholder.

I once more state that, in consequence of the very large capital required for their outfit, and from the number of persons embarked in them, the incautious operation of resumed deep mines, has not only been productive of the most exten-

sive as well as severe disappointment and loss, but has also caused much erroneous impression relative to the general profit or aggregate result of any given number of well-chosen and conducted undertakings.

CHAPTER V.

The former extravagant agency of those having the management of the mines and supplies of material, together with the improper and inconsiderate resumption of deep suspended mines, have been especially conducive to popular misconception, and to too low an estimate of the average profits and large annual interest usually derivable from judicious Mine Investment, when under good and equitable management. The following instance will show, that it may be the interest of some mine Agents or Managers to mislead parties, and to underrate the natural capacity of mines, and to conceal what might and ought to be their annual profits, under fair and disinterested management.

INSTANCE V.

If application were made to the Managers or Pursers of many of the *extensive* mines, to know what they consider a very good concern, and an average of the yearly interest derivable from general and successful operation, they would answer, " We have many mines under our control, most of them extensive and throwing up large quantities of Ore, and we should be contented did we realize 20*l.* per cent. per annum upon the aggregate of our undertakings. We have some few giving very large profits, but most are little more than paying their working charges, and some are very losing concerns; but yet, on the whole of our engagements, we think we are as successful as our neighbours." So they may be in the number or proportion of productive mines, but not in the amount of *profits divided* among the shareholders.

In answer to your observations, that such and such mines are throwing up considerable quantities of Ore, and yet you hear that they are not more than paying working charges, they will

tell you that although Wheal ——— is making considerable sales of Ore, it is a very expensive mine, and therefore does not yet pay any dividend to the shareholder, but perhaps it may do better by-and-bye.

They do not explain why they are or have been so expensive, nor that more than 50,000*l.* has been expended in erections and supplies, to explore and extend workings, the produce from which was never expected to more than pay the current expenses for labour, and extravagant consumption of materials, and the lord's dues. Nor do they inform you that, as part lords or lessees of the dues, and agents and suppliers of the materials, they are interested in the extension of the workings; and that it is their interest to expend the proceeds and profits from the Ores raised in one part of the mine, in a questionable and hazardous extension of the workings at another part, generally only productive of benefit to those receiving the dues and supplying the materials, instead of distributing a great portion of the proceeds among the shareholders, to whom, if all were equally or similarly interested, the mine would be very profitable. They omit to explain that although, under its present manage-

ment, such a mine may perhaps never pay any great profit to the shareholder, or even reimburse the capital embarked, it is a very good concern to them as part-lords, pursers, and purveyors of materials.

They could inform you that "as the mine is now in good working condition and well supplied in material, it will continue working some years, and every now and then throw up increased quantities of Ore, and pay a small dividend to the shareholders."

On this principle mines have been wrought for many years, without giving *any fair proportion* of the proceeds among the shareholders.

Very large sums have been expended in a lavish supply of material and other extravagance, and after a few years the mines have been closed, with heavy loss to the shareholders, while the receivers of the dues and the *supplying* Pursers have been making large profits.

Some mines were wrought for years without profit, or any future chance of any, and were continued in operation for the benefit of those receiving the dues (such dues being paid upon all Ores raised, whether the workings are profitable or not), and for the advantage of those

interested in the supplies, and to relieve them from an otherwise burdensome population; till all the material and machinery have been exhausted, without making any provision for the return of any capital or interest to the non-resident shareholder. Under other management, or if the materials and supplies were sold at a timely period, instead of being thus unfairly or inconsiderately consumed, the non-resident shareholder would at length have received a considerable dividend.

Some mines, which under certain management give small dividends at intervals, would under good and equitably interested direction be very profitable concerns; but, subject to bad or extravagant management, mines which, under a different state of things, would have yielded a fair if not very large interest upon the invested capital, have too often been profitless and losing concerns, and have been needlessly suspended or prematurely closed, in consequence of the effects of lavish surface erections and general expensive management.

It may be well to observe, that in forming any general conclusion or inference respecting the produce, prospects, and duration of a mine, we

must not forget or overlook the indirect influences of such as are under particular or interested management, or wrought in a manner most beneficial to those interested in an augmentation of the dues; nor those in which the machinery and operations have been speculatively extended, for the purpose of an increased consumption of materials; nor those in which the workings have been kept up and extended for the purpose of benefiting a local population, at the expense of those who are entitled to a division of the proceeds of the machinery and materials, previously to an absorption, rendering a sale, or a division among the shareholders, a matter of indifference. Nor must we forget the conduct which was pursued in mines rendered tributary to the drainage or other assistance of adjacent workings, in consequence of the managers or others having a greater interest or share in the adjoining concern; nor those deep mines surrounded by, or adjoining, others less deep, and in which the managers or agents and their friends have a greater interest. Neither must we overlook the prejudicial effects to those mines, which the agents, Captains, or Pursers, have been permitted to supply with materials, either directly or indirectly, by private

or understood partnership, or other participation in the profits of the supplies,—an arrangement not very uncommon, but one which ought always to be most rigidly restricted.

Mines working under any of the above circumstances, are mostly those which have absorbed very large capitals in a resumed outfit, or those continuing a heavy monthly expenditure, consuming great quantities of supplies, and producing considerable sales of ore, without paying regular dividends to the shareholders.

CHAPTER VI.

To more clearly exhibit the effects of investment in deep and resumed mines, under extravagant and injudicious management, and in those which are equitably directed and carefully chosen, and to show that when fairly and cautiously conducted, mining is productive of much larger profits, and is of a much less precarious nature than the state of the public feeling would lead us to expect,—it will be as well to give a detail of the state of forty mines of various descriptions of mineral, and comprising old, new, and resumed deep mines, which have been wrought under able and equitable direction, though in some instances subject to unfortunate and injudicious selection and agency. See the state of these mines in the

following instance, which will show an annual profit of 47*l.* per cent. per annum, notwithstanding that a third part of the aggregate capital was totally absorbed through an injudicious selection and ill-judged resumption of four deep mines.

The capital thus inconsiderately appropriated would have been ample for the re-opening and efficient operation of twelve mines judiciously selected, each having prospects of success and capacity of gain equal to any of the four deep suspended mines, without subjecting a fourth part of the capital to more than ordinary risk, instead of nearly the whole to absolute loss.

INSTANCE VI.

State of Forty Mines of Tin, Copper, and Lead, occupying a Capital of 568,000*l.*

13—Profitable Mines in full operation, yielding, after payment of working expenses, and Lords' dues, an annual profit of £136,600

11—Mines, *all promising large returns,* but not yet advanced to a profitable

state: take only the same proportion as 13 to 40, and call four profitable mines	42,120
8—New Mines with favourable prospects, but not sufficiently advanced to enable a correct judgment to be formed of the result: say only two in the eight	21,060
	£198,780

8—Deep Mines, absorbing nearly half of the above capital of 568,000*l.*

Unless fresh discoveries were made, there would be an annual loss by continuing the workings in the deep mines; but as they can be stopped at any time, it will be better to consider them so now.

Suppose the proceeds from the sale of the machinery and materials of these eight deep mines, and of the thirteen which are calculated or supposed to be unprofitable (though several of them will doubtless be very profitable), to realise 75,000*l.*, and the value of the Ores raised from the unsuccessful and abandoned mines at 75,000*l.* more, we must deduct 150,000*l.* from the original 568,000*l.*

Here will then be an actual investment of 418,000*l.*

Annual income 198,780*l.*, or 47½*l.* per cent. per annum.

The above result is the actual relative state of the mines, with all the disadvantages and drawbacks resulting from injudicious selection, and the incautious and expensive resumption of the deep suspended mines.

It will be recollected that only 150,000*l.* has been deducted, as returnable for the produce of the eight deep mines, and those thirteen (in all twenty-one) which have been calculated as unprofitable, including the proceeds from the sale of their materials and machinery, and that some very promising concerns are included in the thirteen mines which, for argument or relative calculation, are put down as unprofitable.

In the present instance there were forty mines, and notwithstanding *many* of them have been injudiciously selected and managed, the collective result is a profit of 47½*l.* per cent. per annum divided among the shareholders, although only about half the capital is actually occupied in producing this per-centage of 47½*l.* per cent. per annum upon the whole capital invested: the

remainder was absorbed and lost by the unfortunate selection and resumption of the suspended deep mines. This result refers to the actual state of the forty mines more than three years since. The deep mines have turned out as calculated upon, several of the shallow have turned out very profitable, and upon particular inquiry as to their present state, it is found, that on the whole they are still *more profitable* than they then were.

The whole capital embarked in the above forty mines would afford ample funds for the operation of sixty well-selected mines, by which the chances of success are not only relatively increased to the results of sixty instead of only forty, but actually (in effect) to a much greater extent. The sixty mines would now be selected with every care and attention, and with *better* experience. Besides the increase in the number of mines, and the proportionate augmentation of annual profits consequent upon good management, a larger per-centage of profit than the proportional of sixty to forty would be insured; because, under proper selection and agency, we may calculate on a far greater proportion of profitable mines from such as require only a moderate

sum for their effective operation, than from those absorbing a large capital in their onset.

Independent of this consideration there is another advantage attending the application of capital to the operation of shallow mines, which is, that no serious diminution of capital is likely to arise, even in the event of some of the mines turning out unfavourably, as, in such undertakings as are here alluded to, a great portion of the capital embarked in each mine would be returnable in the shape of machinery and supplies, applicable to the requisites of the other mines; but in deep resumed mines the greater part of the capital is absorbed in labour, in unconvertible or lost material, and in unapplicable machinery.

CHAPTER VII.

WITH a view of leading to a perception of the great profits derivable from Mine Investment, when subjected to proper direction and management, it will be as well to furnish tables of the various Cornish Copper Mines now producing Ores, and selling them by public ticket, and to put down their past gains as well as present state and produce. For the purpose of more clearly distinguishing their present individual condition from the collective result, they have been divided into classes of

A.—Mines which have been continuously productive, and are still working profitably.

B. Mines which have given large profits in former workings, and have been successfully resumed.

C.—Mines which have been lately resumed after a change in the Agency, some of which are already profitable, and others are about paying charges.

D.—Mines comparatively new, and all put into active operation within about the last seven years; some of them have given large profits, others are beginning to be profitable.

E.—New Mines, not sufficiently advanced to enable any one to draw a just conclusion as to their profitable results.

F.—Mines which in former workings produced large profits, but have been injudiciously or unfortunately resumed and closed, or are likely to close, with severe loss.

G.—Mines which have formerly divided large profits:—some of these are working more for the consumption of supplies, and to the benefit of those interested in the royalties or dues, than for the advantage of the shareholders; others, from bad management and extravagance, or other adventitious circumstances, are in an almost inactive state, and

may be considered to have been brought to a premature close, and about to be permanently abandoned.

INSTANCE VII.

The following is a list of the Cornish Copper Mines, now working and selling their Ores by ticket or public sale.

Bassett Wheal.
Bassett S. Wheal.
Beauchamp.
Buller.
Brinner Downs.
Botallack.
Budnick.
Bussey.
Cardrew Downs.
Carharrack and Wheal Maiden.
Caroline Wheal.
Charles Wheal.
Crofty E. Wheal.
Chance Wheal.
Cooks Kitchen.
Condorrow.
Cock Wheal.
Crinnis, East.
Crinnis Consols.
Dalcoath, Great.
Dalcoath, S.
Damsel Wheal.
Darlington.
Elizabeth Wheal.
Edward Wheal.
Falmouth Wheal.
Falmouth E. Wheal.
George, Great St.
Gorland Wheal.

Harmony Wheal.
Herland, The
Hills, United.
Hope Wheal.
Jewell Great Wheal.
Jewell East Wheal.
Kayle Wheal.
Lanescot.
Leisure Wheal.
Leisure East Wheal.
Leisure S. Wheal.
Levant, The
Mines, The Gt. Consols.
Mines, Marazion.
Mines, Union.
Mary Wheal.
Music Wheal.
Montagu Wheal.
North Downs.
Poldice.
Poldice, West.
Penandrea & Sparnon.
Penstruthal.
Prudence Wheal.
Prosper Wheal.
Pembroke Wheal.
Penwinnick.
Retallack.
Relistian.
Roskear, North.
Roskear, South.
Stray Park.
Sperries Wheal.
Sparrow Wheal.
Strawberry Wheal.
Speedwell Wheal.
Tin Croft and Wheal Fanny.
Tolgus Wheal.
Towan, Great.
Towan, South.
Trannack Wheal.
Trenwith Wheal.
Tresavean.
Trevabyn Wheal.
Unity Wheal.
Unity Wood.
United Mines.
Vyvyan Wheal.
Vor Great Wheal.
Rock Wheal.
West Pink.

Spearm Wheal.	Penwith Wheal.
Andrew-Boscawen Wheal.	Great Work.
Anna Maria Wheal.	Harriat Wheal.

Many of the mines produce large quantities of *Tin* as well as Copper, some of them very much more, but the amount cannot be accurately ascertained.

A.—*Mines which have been continuously productive, and are still working profitably.*

	Names.	Profits. £.	Tons of Ore per annum.
1	Botallack	100,000	250
	Beauchamp and Buller	80,000	2,500
2	Consolidated Mines, & previous to consolidation	400,000	17,000
3	East Crinnis	100,000	2,200
4	Damsel Wheal . . .	100,000	1,200
5	Dalcoath, Great . . .	500,000	10,000
6	Gorland Wheal . . .	300,000	1,400
7	Jewell Wheal	200,000	2,800
8	Levant Mine	170,000	2,000
9	Maiden and Carharrack	60,000	1,500
10	Poldice Wheal & Unity	250,000	2,500
11	Pembroke	70,000	4,100
12	Tingtang	200,000	2,800

B.—*Mines which have given large profits in former workings, and after suspension, have been successfully resumed within about the last seven years.*

Names.	Profits. £.	Produce per annum.
Binner Downs . . .	160,000	4,500
Herland	90,000	1,000
Stray Park	40,000	2,000
Great Towan	250,000	3,000
Tresavean	200,000	15,000
Marazion Mines . . .	40,000	5,000
Roskear, North . . .	130,000	6,500
Unity Wood	40,000	2,800

C.—*Mines which have been lately resumed, and after a change in the management and agency, some are giving profits, and others about paying working charges.*

Names.	Tons of Ore per annum.	Names.	Tons of Ore per annum.
Cardrew Downs	2,200	Towan, South .	1,200
Great St. George	4,000	Relistian . . .	1,000
Wheal Mary and Parent . . .	700	Retallack & Hallamaning . .	3,200
Roskear, South	1,000	East Crofty . .	1,100
United Hills . .	1,000		

Good,

Good

King well

D.—*Mines comparatively new, most of them having been put* into activity *within about the last seven years, some are giving large profits, others are beginning to be profitable.*

Names.	Profits. £.	Tons of Ore per annum.
Charles Wheal . .	10,000	—
Charlotte Wheal* . .	50,000	—
Caroline Wheal† . .	—	—
Elizabeth Wheal . .	—	1,500
Fowey Consols . .	120,000	9,600
Lanescot . . .	100,000	5,600
Leisure Wheal . .	110,000	6,200
Penstruthal . . .	70,000	7,000
Sperries Wheal‡ . .	10,000	—
Strawberry Wheal .	—	1,800
Tolgus Wheal . .	80,000	4,100
Trannack Wheal . .	20,000	200
Trenwith Wheal . .	40,000	300
Vyvyan ‡ Wheal . .	—	—

Now working for British Company

* Stated to have been badly managed, and prematurely suspended.

† Stated to have great capabilities, and has produced much Ore, but is languidly wrought.

‡ Likely to make large returns when actively wrought.

E.—*Mines not sufficiently advanced to enable any one to form any correct conclusion as to their results, they are all selling small quantities of Ore, but are not yet sufficiently extended or opened upon in the Ore ground.*

Wheal Falmouth * (consols.)	Darlington Wheal.
	Wheal Sparrow.
Wheal Bassett, S. *	Wheal Budnick. *
Wheal Trevabyn.	Wheal Prudence.
West Wheal Jewel. *	Wheal Kayle. *
Penwinnick. *	E. Wheal Leisure. *

* Are spoken well of, and are likely to make good mines.

F.—*Mines which produced large profits from former workings, but have been re-opened and closed, or are likely to close with severe loss.*

1. Great Wheal Alfred, former profits 380,000*l.*—Resumed with large outlay, and then abandoned without extending in depth. Possible loss by re-opening 60,000*l.*

2. Chacewater, former profit 100,000*l.*—This mine gave large profits in former workings, but through interested agency it fell into decay, as

the Chacewater Mine, and suspended operations after costing to the purchasing proprietors about 50,000*l.* It then changed proprietorship, and was again resumed, as Wheal Bussey; but in consequence of the irregularity of the former workings, and a general poverty, the operations have not been extended in depth. The Mine is likely to close with a loss of 50,000*l.*

3. Crinnis Consols, former profit 250,000*l.*—Though the former operations were so profitable, it is stated that the present resumption is likely to be a failure, to the amount of 60,000*l.*, unless more energy is exerted.

4. North Downs, former profit 100,000*l.*—Expensive resumption, and is likely to close with a loss of 40,000*l.*, unless more productive.

5. Penandrea and Sparnon, former profit 50,000*l.*—*Some Copper, Tin, and Cobalt.* Resumed, and closed with a loss of about 40,000*l.*

Never [illegible] after the Red Coombe

6. United Mines, former profit 300,000*l.*; present produce 1,800 tons of Ore per annum.—These mines were very profitable formerly, but through extravagant agency they gradually fell into decay and confusion, and caused a loss of 50,000*l.* After much squabbling and litigation they were again resumed, with outlay and loss of

near 30,000*l.*; but they are now under better direction and agency, and from a reciprocal aid in connexion with the Consols Mines, now stand a much better chance of again doing well.

The outlay upon the above six deep resumed mines, would be sufficient for the outfit of tenfold the number of well-selected shallow and ancient mines, and thus make a difference of ten to one in the number and chances of good mines.

The chances of successful operation from the moderately shallow mines, are certainly much more than equal to those in the deep mines. Take them at the same rate, the average of success upon the resumption of deep mines, well-selected, is nearly equal: this will give three profitable deep mines out of the six, and thirty profitable mines out of the sixty shallow operations, each of which, under proper management, would be likely to yield, after a few years, profits equal to, or larger, than those from the deep mines. Suppose that the three deep mines give a profit of 20,000*l.* a-year each, and the thirty shallow mines only 10,000*l.* each, the profit on the investment would be as five to one.

The income from the thirty profitable shallow mines would for many years gradually increase, while the profits from the three deep mines would depend upon several contingencies, not affecting the other mines.

The machinery and materials from the unsuccessful shallow mines would afford the means of operation upon other undertakings; but the capital absorbed in the clearing up and re-operation of the deep unsuccessful mines, would prevent the possibility of working any others without the aid of fresh capital.

G.—*Extensive mines which have formerly divided large profits. Some of these are working more for the consumption of supplies, and benefit of those interested in the dues or royalties, than for the advantage of the shareholders; others, from bad management and extravagance, or other adventitious cause, are in an almost inactive state, and may be considered to have been brought to a premature close, and about to be permanently abandoned.*

1. Abraham Wheal, profits 100,000*l.*—Only occasionally selling Ore picked from the refuse.

2. Crenver and Oatfield, profits 50,000*l.*—A company was formed to resume these mines, but as yet they have made no progress.

3. Bassett Wheal, profits 100,000*l.*—Occasional sales of Halvan Ores. The mine is considered as permanently closed.

4. Camborne Vean, profits 200,000*l.*—This mine has thrown up large quantities of Ore. A few years since it was proposed to resume operations and connect this mine with another to the west.

5. Chance Wheal, profits 150,000*l.*—Considered closed, and now only working up refuse Ores.

6. Music Wheal, profits 100,000*l.*—This mine has produced nearly all native Copper, and may be considered a kind of stock work of small veins. The workings are now very languid, and produce only small parcels of Ore.

7. Spinster Wheal, profits 80,000*l.*—Closed.

8. Speedwell Wheal, profits 60,000*l.*—Closed.

9. Treskirby Mines, profits 200,000*l.*—Considered as worked out and permanently abandoned.

10. Unity Wheal, profits 250,000*l.*—Selling with Poldice, united.

11. Union Mines, profits 50,000*l.*

12. Tin Croft, &c., profits 300,000*l.*—This and the adjoining mine, Wheal Fanny, have produced at various workings upwards of 1,300,000*l.*; the operation of the two mines is about to be resumed by a united company; much Ore will be raised.

13. Vor Wheal, profits 150,000*l.*—The chief returns of this mine are in Tin. It is stated that it would have been very much more profitable had there been a different management.

14. Cook's Kitchen, profits 300,000*l.*

Though mines are stated to have been brought to a close, and to have been worked out and abandoned, it must not be supposed that it is a matter of course for them to become poor or exhausted as they proceed in depth; for the reverse is the fact. Although it cannot be denied that in a few mines the Ore has been found less abundant and of a poorer quality at a certain depth, yet, in most of these instances, the increased size and productiveness of the vein have more than made up for occasional deficiencies in quality.

Xenophon, speaking of the duration of the veins, in his "Discourse on the Mines of Athens," p. 541, says, "There is scarcely a diminution,

and in all probability they will never be exhausted." And Wyatt, speaking of the Estkyrkyr Mines, says, "They are wrought down for many hundred yards between firm sides, and still grow richer as they go further under the ground."

Dalcoath is mentioned as the deepest mine in Cornwall; and although the Ores are stated to be somewhat poorer in some places at the bottoms of that and the adjoining mine (Cook's Kitchen), it is by no means a frequent case; and even now these are very far from what are termed poor Ores, as they give an excess over the average produce of the county.

Compared with Dalcoath, most of the mines mentioned in the list G. are shallow; yet they have been brought to a suspension and premature close, by a combination of what may be termed fortuitous adventition, and not from a scarcity of Ore, or a working out, exhaustion, or a defalcation of the vein; but through extravagant management, bad direction, indirect and opposing individual interest, and other circumstances neither natural nor incidental to their operation.

Many mines have been brought to a premature close, by injudiciously working out and breaking away all the Ore ground as speedily as possible,

at an increased charge; without leaving a proper reservation of sufficient supply to meet any sudden exigency. In consequence of neither doing this, nor applying any of the proceeds of the mine as a provision for the extension of operations, when it becomes necessary to erect other machinery and incur expense, there is no way of obtaining the means, except by an application to the proprietors or shareholders, to refund a portion of their gains in supporting and extending the works. This used to be very seldom consented to, as most persons were disposed to retain their profit, and risk the continuance of successful operation, rather than afford any portion of a certain gain for what they feared a speculative or hazardous appropriation of capital—for further researches in a mine which had already been very productive, and therefore, in their opinion, unlikely to produce much more; especially when in the absence of any intimation that bad management had brought the mine into a temporary poverty, and was the cause of the application:—they were naturally disposed to regard the application itself, as an evident symptom of the failing resources of the mine. Under this impression the mines were suffered to work

on until the machinery was inadequate to any deeper or extended operations, and then, through irregular and partial workings, the produce gradually decreased, until the mines were suspended or prematurely closed, without having been wrought or explored to one-half of their capacity —and yet rendered difficult and expensive, if not altogether unavailable for future operation; because, when it is known that a large mine is about to be stopped, the agents are not very particular with the tributors, who, under such circumstances, raise Ore wherever they can, and destroy and choke up the levels and workings, by leaving the deads and refuse attle behind them in all directions, so that immense labour, time, and expense, must be incurred by those who may subsequently resume the workings.

CHAPTER VIII.

Many instances of vexatious disappointment and loss could be detailed, in cases where a few poor people have partially cleared up the former workings of an old shallow mine and have found the bottoms rich, or with flattering prospects; but having no means of working the mine to any productive effect, they have applied to some individuals in the neighbourhood, to exchange small parcels of materials for some shares and the management of the mine; and to assist them by recommending strangers to purchase other shares at premiums.

A reference to the following (Instance VIII.), will show the necessity of great circumspection previous to the purchase of shares in any mine,

and the necessity of first ascertaining the respectability and credit of the Purser, the talent and integrity of the Captain of the works, and the efficient means of the county shareholders.

INSTANCE VIII.

After clearing up some of the workings of an old mine, and finding themselves unable to prosecute their researches with effect, the poor miners have gone to some shopkeeper or trader in the neighbourhood, and for a small supply of goods and a few pounds, have given him the majority of the shares, together with the Pursership and the management of the concern, and the liberty of disposing of some of their shares. Some of these he distributed among his neighbour-traders, and the remainder to strangers at small premiums, giving them a flaming account of the value of the concern, and representing that a very small capital would enable them to explore the remainder of the ancient workings, and bring the mine into a productive state. He referred to reports from respectable Mine Captains, stating that the prospects of the mine were very good,

and that the proposed capital (perhaps 500*l.* or 1000*l.*) would be sufficient to effect the desired object. He further stated, that no more shares could be purchased, as they would shortly be at large premiums; that Captains —— and —— had shares, but would not sell for double that price; that the parties whose names were down in the list as shareholders were very respectable, and well able to bear their proportion of costs; that Mr. —— and Mr. —— were very rich and had an eighth of the concern each, and were thinking of increasing their shares, but were now too late, without giving a premium for them; that the stannary laws were a protection from liability beyond the proportion of each person's share of the undertaking; that the production of the cost-book was sufficient evidence of each shareholder's title; that, as the set was marked out by the Bounders, or the Lords Tollars, and signed by them in the cost-book, there was no occasion for any *lease* of the mine (true only as respects *Tin* Mines, for which under certain circumstances there is no necessity for leases); that every caution would be taken, and the propriety and progress of the Captain's workings would be decided upon and controlled by monthly meet-

ings of the shareholders; and that copies of the resolutions of these meetings, with copies of the accounts and of the costs, and reports of the state, progress, and prospects of the concern, would be forwarded to each shareholder monthly. All this being to a certain degree unexceptionable, when faithfully carried into execution, he succeeded in inducing parties to purchase large shares, which they very soon found productive of much vexation and anxiety.

It has most generally happened, that instead of such a mine having been economically and equitably managed, the incapacity of the Captain, the fraud or subterfuge of the Purser, the rapacity of the traders in supplies, and the inattention of the resident shareholders, have soon convinced the purchaser that he had but a very slender prospect of any fair participation in the promised gain; and that, so far from being likely to make a profit from his shares, he was not only in a fair way of losing the whole of his investment, but likewise of being called upon to pay a portion of the cost of some of the fictitious resident shareholders; some of whom were stated to have been struck off the cost-book, and their interest divided among the shareholders. Some excuse

was made for the non-payment of the cost by respectable individuals who had been represented as very anxious to increase their shares, when the fact was they were entirely ignorant of their names being used, never having taken any shares, or even heard of the mine; the Pursers having, in many instances, put down their names merely as a kind of decoy, to induce others to take shares.

After some ineffective operations, the out-shareholder was informed that some of the resident traders had relinquished their shares and retired from the concern, and that there were debts owing for labour and materials, which must be immediately settled for, or the workings be suspended. Sometimes it turned out that the Purser had used the shareholders' money for his own purposes and *private trade,* instead of paying the labourers' wages; and that the operations were suspended in consequence of the magistrates having issued an order for the immediate sale of the materials, to pay the labouring miners. Very soon after this, information was received that there were trade debts due from the Purser, on account of the mine, to the lately seceding *supplying shareholders;* who, finding that under such

management there was little chance of the operations being much longer continued, had retired from their responsibility as shareholders, and had selected certain out-shareholders to pay off their claims, and the other liabilities of the mine; because, if they were forced to press or annoy the Purser, it might be prejudicial to their *future* interests, and therefore they refrained from any recourse to coercive steps against him for the payment of their accounts, although they very well knew that he was the true defaulter and only party to whom they ought in justice to apply for a liquidation of their demands.

Under such circumstances, the purchasing shareholder soon found his expectations of profit disappointed, liabilities incurred, and his interest or shares in a naturally good concern, valueless, if not absolutely lost, by an arrangement between the Purser and lord's agent; who made an entry on the mine for a breach of covenant, and then the Purser gave up possession of the sett, upon an understanding that he should soon afterwards have another grant either to himself or his friends. A fresh list of shareholders was then made up for re-working the mine, and other strangers who might be induced to join in the undertaking, met

with similar treatment; which was again and again repeated, till the mine was brought into so forward a state that a very little more money and operation would render it productive: then the majority of the shareholders determined "to put the mine on with spirit," and resolved that a given amount per share should be paid by a certain time, or that the shares should be forfeited.

The non-resident shareholders, who had been from time to time, on various pretences, drained of more capital than they were at first led to expect would be required, got impatient, vexed, and disappointed; and fearful of being deeply involved, often refused compliance with the requisition, and in disgust of that and all similar concerns, relinquished their shares, which were then taken with avidity by the resident shareholders, and after a short time, sold at large premiums.

Sometimes, the Purser mal-appropriated the money remitted to him by the non-resident shareholders, and kept the names standing as defaulters in the cost-book. This having been done to large amounts, the resident shareholders very reasonably complained that they were working the mine for other people, and were determined

to shut it up rather than work for strangers. On being directed to apprise the presumed defaulters of this determination of the local shareholders, the Purser turned round, and as an excuse to the non-resident shareholders, alleged that several of the proprietors were backward in their proportion of cost, and that the traders had threatened to sue him for their demands; and therefore he had suspended operations, and the materials were ordered to be sold off.

*** Although the above system used to be frequently pursued, there is now no danger of its recurrence, the mode of conducting, managing, and directing Mine Operations being altogether changed.

CHAPTER IX.

Mines, positively good in themselves, were, from a variety of circumstances, formerly productive of much disappointment and loss; and although losses from such causes as those mentioned in the Instances VII. and VIII. have not been of great individual extent, they have frequently produced vexation and disgust, which, in conjunction with the apparently unaccountable loss of many valuable mines to the first and second set of shareholders, have propagated and increased the general prejudice and misconception.

INSTANCE IX.

A number of indigent persons frequently made up a list for working a mine; the facilities of operation and prospects of success being often peculiarly flattering, as such men generally had every opportunity of making a good selection, by looking out for some old shallow mine, some of the workings of which could be easily and cheaply explored.

The concern was generally divided into one hundred and twenty-eighths, and a small capital, sufficient to enable the incipient workings to proceed, was subscribed; several of the parties taking up much larger portions than their means would enable them to effectually provide for or retain.

Well knowing that, in the event of a majority of the shares being parted with, they would be compelled to retire from the concern, a meeting of the shareholders was held, consisting of the Captain, who was receiving 8*l.* per month as superintendent of the works, and owner of some eight or ten shares; of his two or three sons, holding two or four shares each; of his uncles,

brothers, nephews, &c. &c., all shareholders, and obtaining a livelihood by employment in the mine, as underground miners or surface-workmen: besides these, there were present, at the meeting, the Purser, receiving an income for keeping the books, &c., and his relatives and friends, as shareholders.

At this meeting it was determined that only a certain number of shares less than the majority should be disposed of, in order to prevent the possibility of their being controlled in their authority over the operations and management of the mine, or of their being put to further expense for their shares than the price of their labour. After a time, they resolved that some adit should be cleared up, or driven to such and such bottoms, for the purpose of getting under the old workings, where they "expect to raise Ore enough to pay the expenses of the adit, and future erection of the necessary machinery for effectually working the mine." As this is seldom or never the case, all strangers should be very cautious of participation in a mine to be wrought with a limited capital, in a dependance of Ore, sufficient to put the mine into effective operation, being raised from or above the adit level.

The strangers were called on for their proportion of cost, which was generally made to appear very moderate, and as it amounted to only a comparatively trifling sum per month for each share, it was cheerfully paid for a considerable period. But, moderate as the sum appeared to those unacquainted with such matters, it was often twice as much as it ought to have been, and much more than sufficient to pay the little work done, even if it were properly and substantially executed, and useful when done; but the truth is, it seldom mattered whether the workings were judicious or how they were conducted, as all they usually looked to was present employ, and sufficient progress in the works to keep up the hopes of the distant shareholders, who, in this way, were kept in good-humour, till the period was near at hand, when they expected to get the adit end under the old workings or into the vein.

But under such Agency, languid operation, and alternate accident and excuse, generally succeeded in tiring the patience of some of the out-shareholders, and in wearing down, into indifference or disappointment, the anxious expectations of others. The Captain, and his relations and friends, having the superintendence and un-

checked control of the mine, carried on only such operations as were necessary to furnish them with employment and wages to subsist, and enable them indirectly to hold their shares free of expense to their private purse.

The works are, therefore, not only almost always very languid in their progress, but likewise very temporary in their duration. The adit choked up—the timbers gave way, or the shafts fell in—and often money was wasted in repairing and re-constructing works, which were afterwards proved not only unnecessary, but positively prejudicial to future operations. The little that *was* done absorbed more than double the requisite expenditure, and took up more than twice the time that it ought to have been effected in; because sons, cousins, nephews, and other relatives, though working the mine as labourers, were proprietors or shareholders thereof, as well as the Captain and Purser; and, therefore, they refused to work longer, or at other times, or to drive the ground at a fair set, or less price per fathom, than they judged would allow them to work intermittently, and carry on their shares free of cost. The Captain, in consequence of such relationship and proprietorship, was unable to

exercise any proper energy or control over them, so that much time was lost, and unnecessary expenses were incurred at the public-house, the amount of which was entered indirectly in the cost-book, and paid by the out-shareholders.

Well knowing that whatever capabilities the mine might naturally possess, or however valuable it might be, it was nearly utterly impossible to effect any ultimate good under such a system and management; and finding that some of the out-shareholders were striving to get the mine into effective operation, they began to sell their shares at such premiums as their connexion and opportunity now and then afforded; till at length, after a tiresome and prejudicial state of comparative inactivity, the Captain and his friends contrived to part with all their shares, the operations became, very shortly afterwards, suddenly suspended, and the new and non-resident shareholders were left to manage the concern, and pay such debts as the Purser might have left unliquidated.

Sometimes, as in other instances, the mine remained idle for a long time. Most of the lurched parties were indisposed to take any trouble or incur further expense and risk, and others

were incapable of proceeding beyond their anticipated advances. When the prospects were good, and the works in a forward state, after a short interval, an arrangement was made with the Lords' Agent for a grant to fresh parties, who made up a list of new proprietors, and re-appointed the Captain and Purser, who were permitted to reinstate such of the old shareholders as might be prevailed on to expend further sums in operations, which, under such government, could not be productive of any thing but vexation and loss, even when the mines were possessed of the most unbounded capabilities and natural advantages. In some instances, the workings proceeded until the out-shareholders obtained a majority of shares, and afterwards finding it a naturally good concern, the whole mine repaid the expended capital, and became very profitable in a short time after being put into effective operation.

If inquiry were to be made, it would be found, that, until lately, most of the mines which upon subsequent operation have turned out very profitable, were previously, partially wrought by several or various sets of shareholders, subjected to the above kind of system and mismanagement.

Previous to their becoming profitable mines, the Crinnis, the Great Wheal Towan, Wheal Reeth, Penstruthal, Wheal Leisure, and also the Tresavean Copper Mine, now giving a profit of 60,000*l.* per annum, were for some years only partially and intermittently wrought, by several sets of adventurers or companies.

The above system, and that detailed in the previous chapter, have been adverted to in order to show how very injurious the effects *have been in former operation.* Circumstances are now so completely changed, that any repetition of these systems can scarcely ever occur, and if any were attempted, they would now very easily be discovered and effectually checked.

CHAPTER X.

The several instances of deficiency in talent or general experience, of interested and improper management, of incautious and unreflective conduct, together with the chicane and fraud, either already adverted to, or which will be mentioned in the course of these details, are those which have been the source of the most frequent and severe disappointment and loss.

Many other instances and circumstances could be mentioned, but as many of them are now easily seen and avoided, and others are neither productive of such extensive loss, nor even of such frequent occurrence, it will be sufficient to give a less circumstantial notice of them, and observe, that notwithstanding the greatest natural

advantages, or most favourable representations of flattering prospects, any share or participation in mining operations, subject to any of the objections mentioned in the following instance, ought to be most carefully avoided and determinedly rejected.

INSTANCE X.

First.—Use great caution, and obtain every information relative to such mines as are represented as capable of being commanded without machinery, of being wrought with an unreasonably or unusually small capital, and of being brought into a profitable state with Ore to be raised from an intended adit level. When a small sum is stated to be sufficient to drive an adit level, and make TRIAL of the mine, persons are very often misled, and generally calculate that the proposed capital will be sufficient to bring the mine into an effective and profitable state; but instead of being so, it is generally expended in useless or premature operation, and in other inconsiderate outlay or extravagance. Even in the very few cases where it has been judiciously

and economically applied, it very rarely happens that it is more than equal to prove the mine worthy of further research, and of the erection of a steam-engine and other machinery, "in order to make effectual trial of the mine."

The Cornish valleys are seldom deep, or with high precipitous sides, and there are but comparatively very few instances where the Ore raised from or above the adit level, has produced sufficient funds for the future efficient operation of the mine. In that county, it is but seldom that more than a forty fathom adit can be obtained, and this in most cases, and more particularly in new or unbroken districts, is very gradual in its increase of depth. In consequence of the easy slant or rotund undulation of the surface, much time is consumed and labour spent before the adit is brought into the vein, which, after this has been accomplished, rarely proves sufficiently productive to provide the necessary machinery for further and deeper operation.

In consequence of the time required to bring up the deep adit and its shafts, &c., there is, in proportion to the quantity of work done, a very large outlay in the agency and pursership, and there are likewise other extraneous preliminary

expenses continually feeding upon the subscribed capital; so that in many cases the funds have been exhausted even before the adit has been brought home. In other instances, when the anticipated or calculated requisite outlay has been expended without an effective result, the shareholders—in the absence of a proper explanation, and under the apprehension of a recurrence of disappointment—have refrained from further operation, although the vein has presented very flattering indications.

Bearing in mind the *present efficiency of our machinery*, as well as *cheapness of our supplies*, it is hardly questionable whether too much importance is not now commonly attached to the advantages of deep adits. Where there are *facilities* for getting a deep adit into a mine, it is certainly, for many reasons, very desirable that it should be brought up; but at a proper time, and *not as a first and preliminary operation.* A deep adit is unquestionably a great advantage in future operations; but as machinery and supplies of all kinds are so much cheaper than they used to be, when a shallow adit level can be speedily driven up, it is now both the safest and most economical plan to carry it in, and subscribe sufficient capital

for the employ of effective machinery, and then run down in depth as quick as possible. In most cases a small increase of the capital calculated or proposed to be expended in driving up the deep adit, will be sufficient to bring the mine into a decisive state, and most generally into quick production. Much time, as well as great expense in preliminary and ineffective operation, will have been saved, even in the event of a profitless result, as the sale of the materials will provide a return of some part of the capital to the shareholders, more perhaps than the difference between driving in the deep adit and the erection of machinery. By this course the shareholders secure every chance of a fortunate result, and also the satisfaction of an effectual trial, and a return of some portion of their capital; but by driving the deep adit in the first instance, there is a long suspense, much greater risk, and a more than probable necessity for an increase of the subscribed capital, even if the vein be favourably cut; if not, there must be a total loss.

Secondly.—Refrain from participation in any mine which is proposed to be wrought by steam-machinery, with less capital than 5,000*l.*; unless the fullest investigation shall quite satisfactorily

prove, that there are facilities for operation which can be made immediately available for effectually working the mine with the proposed capital. It is not to be denied but that some mines have been brought into a very profitable state with a very small outlay; but then such mines have had the advantage of the adits, shafts, and preliminary operations, of former workings and proprietors, and the prompt and efficient application of the capital to useful, prudent, and productive operations in the first instance; or otherwise a supply of sufficient water to propel machinery to effectually drain the mine, without the aid of steam-power. It cannot be doubted but that there are, among the ancient shallow workings, many mines possessed of peculiar facilities, and presenting everything favourable for the adoption of cheap and expeditious workings; but these were not held in the best estimation by many of the suppliers of materials, and therefore have been very seldom explored or sought after, although there can be no question but that many of them would be very productive under good selection and management.

Every relative inquiry should be made respecting a new mine, proposed to be undertaken with

a command of less capital than 5,000*l.* It is true that, with peculiar localities and facilities for operation, and with rigid economy and good management, much less than 5,000*l.* may bring a mine into a profitable state; yet *no mine ought to be undertaken with cramped means,* nor indeed *without a surplus capital;* for of the many mines which have been undertaken with extremely limited capitals, nine out of ten have been productive only of loss and disappointment, and have been obliged to be suspended or closed, for the benefit of subsequent parties, who have resumed the workings and brought the mines into a very profitable state.

Thirdly.—Be very cautious—when the Purser of the mine is a trader, or shopkeeper of any description—to make inquiry as to his means and repute, as the funds of the mine are sometimes applied to the extension of his private trade.

It is notorious that some Pursers make much more by the direct and indirect supply of materials, and the use of the mine funds, than by their income and salary as Pursers; and that not the mere pay, but the facilities which the large sums passing through their hands give to their private

trade, form the chief inducement to undertake the Pursership. The evils of this we have before seen: the operations of the mine are often retarded, and sometimes the mine funds are totally lost; the continuance of operation is jeopardized; and various subterfuges are resorted to in the endeavour to conceal the fact from the proprietors. In some instances, when mines have advanced to a profitable state, various pretences have been made for keeping large balances in hand; for delaying the dividends much longer than necessary; and for making a much smaller one than would be declared under other management.

Fourthly.—If there be a majority of resident shareholders in a mine, although profitable, avoid purchasing any shares in it, if it be *drained by*, or is draining, or is likely to be of other service to, an adjoining or neighbouring mine; as, notwithstanding its being profitable, it is likely to be suspended through dispute, and a manifestation of that littleness of mind and meanness which often lose sight of their best interests, by a display of chagrin at being instrumental to the welfare or profit of others, without participation, or receiving something in

the nature of a *quid pro quo* from the benefited party.

Under such circumstances it is by no means uncommon for the majority to purchase or obtain interests in the adjoining concern, and then make your mine subservient to their purposes. Sometimes an agreement is made with the proprietors of the adjoining mine, to consolidate or unite the two mines. Various motives may bring about an agreement for this consolidation, as—if one concern threatens the existence of the other, the Receivership of the dues or royalties, and the continuance of the Pursership and consumption of material, are endangered.

This consideration alone might be sufficient to induce a settlement for a consolidation advantageous to the resident and supplying shareholders, although prejudicial, if not directly unjust, to the non-resident or purchasing shareholder; as, instead of his share being regularly productive, he might not only find that the profits of his interest were diverted for the more expensive and less profitable operation of the united concern, but that he was unexpectedly called upon to contribute a portion of the joint capital, and that in default of doing so his shares would

be destroyed or merged in the union, in defiance of any remonstrance or opposition: because the majority resolved to suspend operations, as the easiest mode of getting rid of those parties opposing the consolidation. Fresh grants would then be obtained, and a fictitious "new company" formed, the operations would be resumed, and the mines would go on as usual, and the protesting shareholder would be left to his legal remedy for a redress, of which they had little or no fear, from the certainty that there would be few individuals possessing the means and inclination to enter into a chancery contest with them, and still fewer persons, who would have the temerity to litigate with parties who are too often incapable of conforming to the terms of a successful decree.

Disputes for the supply of materials, other opposing interests, and cabal and illiberal obstinacy, have caused the suspension of valuable mines, and a total loss to the purchasing shareholder, who may have given a large premium for his shares, perhaps only a very short period previous to the suspension or consolidation, and is therefore either unable or indisposed to hazardously increase his interest in the undertaking.

Fifthly.—Avoid mines of which the traders in supplies have the agency, and in which they or their friends have any considerable interest or controlling share.

Mines in which the resident shareholders have a less interest than in an adjoining mine, and are therefore likely to be induced to make your mine subservient to the drainage, or other advantage of the adjoining mine.

Mines in which the Captain and Purser, unless of undoubted character and respectability, have any share or interest; as they sometimes misconduct themselves, and upon any attempt being made to dismiss them from their situations, they may give much annoyance and trouble, and, in proportion to their delinquency and disrepute, promote disunion and litigation, as well as cause the unnecessary expenditure of much time and money.

Mines belonging to non-residents, the operations and produce of which are left to the unchecked and sole control and discretion of the Purser and Captain.

Mines where the Purser is solely intrusted with the transfer and registry of shares, by means of entries in the cost-book only.

Mines of any mineral, except Tin, the leases of which are incomplete, or have never been granted except by the set, and signature of the Lords' Agents in the cost-book.

CHAPTER XI.

Few or none but the Copper Mines of Cornwall have been or will be mentioned in the course of these details; but from the prevalence of similar errors, mismanagement, and frauds, the same observations upon the necessity of circumspection will apply to all descriptions of mines, whether resumed, deep, or shallow mines, or deposits of Tin, Lead, Antimony, or other Mineral; for although the various errors and irregularities have been much more expensive and ruinous in deep and suspended Cornish Copper Mines, than any others, many references could be made to the disastrous results of the like management and misconduct in Tin and Lead mines.

The re-opening and operation of many extensive mines, involving more speculation and risk than ordinarily belong to Mining Operations, have been recommended more in a consideration of the incidental advantages to be derived from getting such mines into activity, than from a conviction of a probable successful result to the shareholders. This has led some parties, who have had the direction of such mines, and others, persons who ought to know to the contrary, and possess better information on the matter, to express an opinion that there are but few eligible mines in this country that are not now either in operation or taken up with the intention of working. Nothing can be more erroneous than this belief; which can only be imagined to have originated in misrepresentation or interested advice, given to those parties who have only restricted means of information, and an inability of devoting their time and attention to a personal inspection of localities, and who are consequently compelled to rely on the fallacious and interested reports of others. Had they the opportunity, by personal inspection, of possessing themselves of the necessary intelligence, they could not for one moment have been impressed with such a misconception

on the contrary, they would have found various metalliferous deposits eligible for the investment of many millions sterling, and possessing facilities, capacities, and prospects, superior to some of those under recommendation. Perhaps the true cause of such an assertion and belief, may, with some justice, be ascribed to the activity and indirect influence of the Cornish Copper miners, and their purveyors of supplies.

The ancient and old Tin, Lead, and other workings, must not be confounded with those which have been wrought of late years, by steam and other machinery, and afterwards suspended or abandoned; for although they are much neglected, the old shallow workings include a very valuable class of mines, the *proper selection* and re-operation of some of which, could not but be attended with great advantages, as it is certain that they cannot be deep, or under efficient management, require either much time or capital to be explored and brought into a productive state. Neither must this description of mines be confounded with those comparatively new and recent concerns, which have been improperly or heedlessly and abortively undertaken, in unproductive and barren ground; but, whenever

we see the remains of extensive operations, with much of the vein stone carried away, and the coffins or cavities long and open, with little or no attle or deads, it is but reasonable to infer that the vein was formerly very productive, and that the workings would not have been pursued to such an extent unless considerable quantities of Ore had been raised; more especially, from its being evident that large quantities of *something* must have been produced, and from its being very improbable that such excavations would have been fruitlessly continued to such an extent, and additional labour and expense incurred by the transport of the poor and useless vein stuff: but yet, notwithstanding their presenting many indications, inferences, and advantages, these mines, as well as others, require the exercise of much caution and discrimination in their selection for operation.

Such of those Tin workings as have been hitherto explored, have almost all been cleared up by poor working miners, and afterwards sold at small premiums to more influential persons, who have been able, either by their own means or by the assistance of others, to bring them into effective operation. These mines are of great

importance in any consideration in reference to the proprietorship of the Tin Royalties, as there are some hundreds of those workings in different parts of the Duchy. Many of them could be put into effective production with small advances, and only a comparatively short time would elapse before the dues, from each mine, would be annually increasing to a considerable amount.

Upon inquiry, it will be found that scarcely any of those workings which have been so explored and wrought, have been losing concerns; but, on the contrary, that they have been almost uniformly productive, and very profitable. The reasons why so few of these old workings have been explored, are deducible partly from the difficulty of obtaining any grants or underleases of the Tin from the Lessee of the Duchy Royalties,—the *indisposition* of the merchants and traders in supplies, to attend to *inexpensive* concerns,—and from a want of reflection and proper consideration of their value by others.

It is not to the value of the ancient Tin workings only that these observations are intended to apply, but to old workings for other metals, in Cornwall, Devonshire, Cumberland, Westmoreland, and elsewhere. Some explanations why

they are now so little known, and have been so much unattended to hitherto, will be seen in the following pages, when alluding to the effects of the ancient and former monopolizing grants of the Mineral Royalties; and the effect of suffering to remain unrepealed the Act of the Fifth year of Henry the Fourth, against "the multiplying or reduction of the Ores of Gold and Silver for profit."

The remains of these ancient Tin and other mines are to be found in almost every district in Cornwall, a great many of Lead and other Minerals in Devonshire, parts of Wales, Derbyshire, and Yorkshire. In Cumberland and other places, there are many remains of old workings for Copper and other Minerals, some of which would make profitable and lasting mines, if effectually wrought.

For many years past there has been a strong feeling in favour of Copper Mines, which it is difficult to account for otherwise than by hazarding the supposition of its having been created by the introduction of Bolton and Watt's steam-engine, into the county of Cornwall, just about the period of their being interested in various government contracts for the supply of Copper for coinage and other purposes.

The erection of their steam-engines upon seve-

ral Copper Mines, enabled them to be wrought more expeditiously, and to a greater extent and depth, with a corresponding increase in produce and profit; and consequently excited attention, and induced their application to many other Copper veins, the large and quick returns from which, incited an eagerness to adventure, and an active engagement of as many Copper Mines as could be set into operation.

Some of these were profitable to all parties interested, and to an extent beyond any former example; others were very profitable only to the resident shareholders and traders, and those interested in the dues or Royalties; and, as might be expected, many were altogether unsuccessful, and losing concerns, either from bad and extravagant management or through injudicious selection; for, in the rage for Copper mining, and under an expectation that all Copper veins were to be very productive, many concerns were put on and wrought, which, under an exercise of common judgment and discretion, would never have been prosecuted or deemed worthy of operation. Notwithstanding some failures, the extraordinary profits derived from many of the Cornish Copper Mines, attracted a general atten-

tion to their operation, without any corresponding activity in those of other counties, and also led to a comparative neglect and disrepute of the Tin, Lead, and other Minerals. Besides this, the employment of steam machinery on the Copper Mines, in only some few of the Cornish districts, created an impression, even in that county, that *Copper Mines* were more certain, eligible, and lasting, than any others; and also caused the erroneous supposition, that only *those districts* were congenial to the production of such profitable and permanent Copper Mines. But the subsequent application of the steam-engine to many of the Copper veins in other districts of the county, having produced equally profitable results, the prejudices as to the limited local disposition of Copper Ores are fast wearing away.

The great activity in the application of the steam-engine to these mines, in almost total neglect of those in any other county (excepting the few in Wales and Ireland), has by degrees drawn an almost exclusive attention to them, though there are many valuable Copper veins in Westmoreland and other northern counties totally neglected, some of which possess peculiar facilities for operation, and frequently contain a

richer Ore than the generality of those in Cornwall. The rapid operation and great produce of the Copper Mines having steam machinery, prompted its application to some of the Tin and Lead Mines, and having been attended with success and great profit in most instances where it has been judiciously and economically applied, it has proved that Tin and Lead Mines, when carefully selected and properly conducted, have as great capabilities of produce or gain as the Copper Mines.

The great comparative activity and number, and the efficient machinery of the Cornish Mines, have given them an undue prominence (good and bad) in public estimation, and have so nearly eclipsed the Mine Operations of other counties, and so completely thrown their mineral products into oblivion, that most people imagine that there are no mines but those of Cornwall and Devon, and are quite unaware of the productiveness of some of the Welsh and Irish Copper and other Mines.

Perhaps there are other persons, as well as Sir ———, who may be of opinion that any reference to the veins of the north is injudicious, as perchance it might be prejudicial to the county of Cornwall, and some parties indirectly con-

nected with the Mineral Royalties; but on inquiry, it will be seen that formerly, and previously to the activity of the Cornish Copper Mines, those of the northern counties were better known; and it is more than possible that had similar machinery and activity been, in the first instance, directed to the mines in the north, those in the west would have been in a far less productive and prominent state.

Some persons suppose that only the Lead veins of Cumberland are worth working, and that the Copper and other mineral veins of that county, and of Westmoreland, Yorkshire, and Derby, are of little or no value; but the truth is, that although Cornwall and Devon are the only counties in which the Tin Mines have hitherto been wrought, the northern counties were formerly famous for their many valuable veins of Copper, Lead, and other Minerals; and although they have been so much neglected for a long time past, a great proportion of them, from their great size, richness, and facility of operation, might be wrought with very great advantage. Many possess greater claims to attention than some of the Cornish veins which have realized very large profits.

It is true that, at this time, there are but comparatively few metalliferous Mining Operations in Cumberland, Westmoreland, Derby, or Yorkshire; but this is accounted for by the activity of the Cornish Copper Miners, who have succeeded in drawing an almost exclusive public attention, by the employment of the steam-engines in drawing the Copper veins of that county, and in the application of steam-power to stamping-mills and other purposes, by which great improvements in the general economy of operation, as well as in the various mechanical arrangements, have been effected, and such increased expedition in the general result has been introduced; that the extraordinary produce and profits of the Cornish Mines have raised an impression, that the veins of that county are richer, more certain in their returns, of greater capacity of production, more permanent, and altogether more eligible, than any others. This supposition is far from being universally correct.

And the following extracts from well-known authors, will corroborate this assertion, and prevent its appearing to rest entirely upon individual bias or authority.

EVIDENCES.

WEBSTER, in his "Metallographia," page 20, mentions Brunghill Moor, in Slaidburn, where Sir B. Bulmer "got great store of *Silver Ore*, that held 67*l.* per ton;" also, that "at Rimington, Gisburn in Craven, in a field called Skilburne, belonging to William Pudsey, they got great store of *Silver Ore, which was coined.*" WYATT, page 6, mentions this one in the following way:—"In 1655, some persons in London sent an expert assay-master (who had been from England to settle the standard of the Russian coin) to Brunghill Moor. But not having sufficient money or enterprise for such an undertaking, they deserted the assay-master, whom a neighbouring gentleman employed to pick some Ore out of the rubbish of works that Sir B. Bulmer had left. Several tryals yielded near 67*l.* per ton, though it was none of the best Ore."

EDWARD the Fourth, in the eighth year of his reign, granted all his *Copper Mines*, containing *Gold and Silver*, in Cumberland, Westmoreland, and Northumberland, to Dodrick Waverswick.

Cæsar, in his "Commentaries," says, that one reason of his invading Britain, was because they assisted the Gauls with their treasures.

Giraldus Cambrensis affirms, that in his time there was a very rich vein of Silver discovered, in following which, "item est in viscera terræ."

Sir J. Pettus, in his "Fodin. Reg.," p. 11, says, "There is no doubt but the Silver, coined after the Roman way, in the time of Augustus, was taken from English mines."

Camden, in his "Britannia," (new translation,) observes, "This is *certain*, that both Gold and Silver were formerly extracted from several of our mines in Devon, Cornwall, and Cumberland."—Boyle, in his Useful Philosophy, says, "A friend of mine found, in his own land, a parcel of Ore which seemed to be Copper. After fusion it yielded very good Copper, but the person to whom he committed the examination being extraordinary skilful, found, besides the Copper, a *considerable quantity of Silver*, and in that Silver a good portion of Gold."

Dr. Fuller, in his "Worthies of Cumberland," observes, that "in taking the rich Copper Mine from the Duke of Northumberland, at Kes-

wick, it came to pass that this Queen (Elizabeth) left more Brass than she found Iron ordnance in the kingdom."

PLOWDEN's "Reports."—"In the tenth year of her reign, Queen Elizabeth took from the Earl of Northumberland his rich Copper Mine of Keswick, because of its holding so much *Silver* and *Gold* in the *Ores*."

DR. LEIGH, in his "History of Lancashire," p. 82, says, "We have, in England, quantities of Copper to supply all Europe. If the Mines of Copper Ore were rightly managed, we should not import *any* Copper." Also p. 82, "The right method of running *the Copper which is got in the north* is by reducing the Ore to a small powder, afterwards by roasting it; and then, by an addition of lixivial ashes, the Ore, in a proper furnace, will run into a *fourth* part of malleable Copper."

The average produce of the Cornish Copper Ores is only about seven and a half per cent.

ALONZO BARBA, in his "Art of Metals," p. 134, says, that "in following the *veins of Tin*, the miners *often meet with rich parcels of Silver*."

BOYLE, in his "Usefulness of Philosophy," observes, "Tin Ores very often contain *Silver*. I have also seen Tin containing chips of gold.

The owner told me, that one of his workmen profitably employed his children, in picking the Gold out of the Tin Ore after it was broken up."

In 1702, a patent was taken out by Mr. R. LYDALL, of Truro, "for refining and separating the Silver from Tin, by precipitation."

"Fert Britannia Aurum et Argentum," TACITUS, in "Vita Agricolæ," cap. 10.

PLIN. "Nat. Hist." "Plumbum in Britannia adeo large eruiter, ut lex altro dicatur ne plus certo fiat." L. 34. c. 17. "Ubicunque una vena inventa est, non procul invenita altera." L. 33. c. 6.

CHAPTER XII.

The Cornish miner is only conversant with one description of vein. In Derbyshire and some other counties there are the Rake-vertical-veins, the Pipe-veins, the Streak-veins, and the accumulated or Stock-veins; all of which have been wrought with varied success. Some of the Rake-veins have given enormous profits, and may be deemed interminable, and, on being judiciously selected and re-opened, some of the ancient workings on these veins would be very productive.

The accumulated or Stock-veins have also been very profitable: such are, the Obi, Beacon, Acton, Mixon, Parrey's mines, &c. &c., in Derbyshire, Staffordshire, and Anglesea.

The Streak and Pipe-veins have produced much vexation and loss. The Streak-veins are layers or floors of Ore, varying from a few lines to an inch or two in thickness, lying between strata, and often leading from or to a Pipe-vein, which is then frequently very productive, though always of comparatively short duration, as well as very sudden in its defection; being neither more nor less than a chamber or cavity in the rock, varying from a few feet to many fathoms in circumference, and sometimes lined or nearly filled with Ore.

These two veins—Streak and Pipe—are very variable in size, and uncertain in their duration and produce. Some of the worst of the Pipe-veins present more specious and tempting appearances, to the superficial observer and those unacquainted with their peculiarities and dependent nature, than many which have subsequently turned out very profitable: but the working these veins, even with good and skilful management, is always speculative, and but seldom advisable under any circumstances.

The very numerous unsuccessful and ill-judged operations on these two descriptions of veins, have occasioned frequent if not heavy loss and

disappointment, and have been greatly tributary to the general prejudice against all other metalliferous veins and mining undertakings. Thus, in these northern counties as well as others, a deficiency in competent scientific and mechanical skill, has caused a general apathy and wrong apprehension towards a branch of national industry, which, when correctly developed and understood, would be esteemed of the first consequence to public prosperity, as well as to private welfare.

The Beacon Rake lead vein, in Derbyshire, was wrought by the Romans with great advantage, and several centuries after it was partly reopened by the ancestor of the present Duke of Rutland; who made very large profits from the workings, but was compelled to abandon them in consequence of the then-prevailing ignorance of the geology or habitudes of the strata about the mine. There is little doubt but that the vein would be again productive, if explored under the toad-stone, and effectually wrought by competent machinery and means.

Consumblock, in Cardiganshire, is stated to have been wrought by the Romans and Saxons; and afterwards, with great profit, by the Patentees

of Royal Mines; and after them by "The Company of Mine Adventurers." The vein is larger than ever, and now yields above sixty ounces of silver in a ton of lead.—SHIERS' "Second Discourse."

There can be no doubt of the general permanence of these kind of veins; but it will be perceived, that *the duration* of operation and *profits* of a mine, mainly depend upon judicious selection and conduct. It may, indeed, be said, that all depends on the *circumspection* and economy of the *directing management*, and the adroitness of the local agency, as well as general method in the underground workings; by a regular extension of which, and keeping proper reserves of ore ground, the requisite increase of machinery, and every unexpected exigency, will be provided for without any remission of the regular division of profits; and the mine will be continued in a productive state for any period. So that by this means, the profits of a limited mine investment may not only be secured from exhaustion, but gradually and safely augmented; while, *without such circumspection, economy, and reserve,* any casualty, or a mere temporary poverty of the veins, may bring the mine to a premature close.

In reference to the continuance of veins, and the natural permanence of mines, we may quote a gentleman of great experience in such matters; viz.,

WALLER; who observes, "Nature is regular in its products underground as well as above, and when miners have once found the vein betwixt good or firm sides, they seldom or never lose such a vein, without an apparent reason above ground; especially in silver, copper, and lead mines, in which the veins lie nearly perpendicular: but in horizontal veins, as in coal, a perpendicular rock will cut its veins in two, and therefore the veins may fall or rise on the other side. But the bottom of any fixed large settled vein, with firm sides, was never found, but the works have been left off, when they have been carried as deep as the water would permit, and *not because the ore was worked out.*" Thus none of the old Tin workings and other mines are deep, because there was then no efficient machinery to enable the miners to get rid of the water.

SHIERS, in his "Second Discourse," tells us, that "Settled veins, which have ore near the surface, did never fail or miscarry, at the bottom of the deepest level that was ever driven."

Sir JOHN PETTUS, in his Metallic Works, page 88, says, "The mine at Goslar, in Germany, formerly belonging to the Duke of Saxony, afterwards to the Duke of Brunswick, has been in constant working for above seven hundred years."

Dr. BROWN's Travels, page 121 and 134, states the same of the Mines of Silver in Gottenburgh, in Bohemia, and at Frieburgh, in Misnia.

PLINY THE ELDER mentions the Silver Mine upon the Pyrrenian hills, which for a long time yielded every day two hundred pounds weight of metal.

Dr. HEYLIN, in his "Cosmography," says that they "rose three thousand pounds by tale;" and that "it was wrought for three hundred years, being at last near a mile and half deep" [quere long].—P. 221.

The same author, in page 222, says, "The rich Mines of Gold and Silver in Gallicia, in Spain, and the Asturias, and some part of Lusitania, for many long years afforded yearly unto the Romans twenty thousand pounds weight of gold."

CHAPTER XIII.

In all considerations of the past consequences of Mine Operations, it is of much importance to bear in mind that former deficiencies in competent scientific attainment and mechanical skill and power, combined with the cupidity and rapacity of some of the Cornish traders and pursers, have been the causes or sources of most of the loss and misunderstanding, as well as the origin of the *erroneous impression*, that success in mining operations is always extremely precarious, even when under the most favourable prospects and best management.

Observations have been and will be made, relative to many of the local circumstances and arrangements, which have been adverse to the

degree of success that ought to have been attendant upon, and naturally belongs to, most Mine Operations. In order further to manifest, that improper conduct, and matters quite foreign to the formation of a right conception of the nature of mines and mineral veins, have been jumbled together, and have produced the *misconception* that every mine investment or undertaking is naturally attended with a great degree of uncertainty and fortuitous event, it will be as well to shortly refer to some matters which, although not immediately touching on the local arrangement, have nevertheless gone hand in hand in propagating the public prejudice. But first, one may observe, that in all mines which are represented as controllable, and able to be brought into a productive state with a very small capital, it is absolutely necessary to look to the responsibility of the persons composing the proprietary, and to the talent and activity of the local management; to see that the Purser has no interest in the supply of the materials, and that he be so situate, that there will be no likelihood of the progress and funds of the mines being made serviceable to the purposes of his private trade; to choose a Captain and Director of

Works who is independent of adjoining and neighbouring operations, and persons who might use a prejudicial influence over his management of the concern; and, above all, to take every care that he be an experienced, active, and intelligent man, and fit to exercise the proper influence and control over the subordinate agents and labouring miners. Great expense, as well as ruinous delay, and even the *loss* of many mines, have been occasioned by a deficient energy or inaptitude for command in the appointed agent or Captain; who perhaps, very shortly previous to his being selected to oversee and direct the works of the mine, was a fellow tributer or labourer with those over whom adventitious circumstances have called him to exercise a temporary authority and control. Hence it often happens, that though he may be a very good and experienced miner (as a labourer or tributer), he is defective in the requisite commanding tact and influence, and backward or unable to enforce that rigid economy, activity, and perseverance,—so imperatively necessary to ensure a successful result with unusually restricted means.

It has been before observed, that besides the many things relating to their local arrangements,

there have been various extraneous matters which have engendered and promulgated misconception, and unjustly strengthened the prejudice against Mine Operations. Among these extraneous circumstances, we must not forget to mention and bear in mind, that the impatience, irritation, want of nerve, and absence of reflecting discrimination in the directing or managing proprietary, have very often caused severe loss, and the stoppage and abandonment of many mines, which have subsequently produced very large profits to succeeding proprietors.

This has more generally happened in those instances where parties have been induced to undertake the operation of a new or shallow mine, under the impression that the mine could be brought into a productive state by means of the ore to be raised by driving an adit level, and the expenditure of a comparatively trifling capital —a thing very seldom accomplished, as it is but rarely that quantities of ore of any importance are raised before the workings are *under* the *adit* levels of the *Cornish Copper* Mines.

In too many instances of this kind, parties have been led to believe that there was nothing to do but to drive a new adit, or continue the

old one over some three or four hundred yards of ground at a shallow depth, up to a given spot, where the mine would be profitable, as they fully relied upon the adit producing returns of ore sufficient to pay for the erection of the requisite machinery, and the cost of the future workings.

Such statements and mines require great caution and activity in the onset, both by the proprietary and by the acting agent or Captain, as under such circumstances, in nine cases out of ten, the small capital proposed to defray the expense of driving the adit is almost always frittered away in needless expense and by inconsequential operation. Very often, through a general lack of talent, experience, and influence in the Captain; by his tardiness in operation, and by his premature as well as injudicious surface-erections and workings, the capital is totally absorbed even before the underground-workings have been brought to a state enabling any conclusion to be formed as to the propriety of further operation or outlay.

Sometimes the capital has been found sufficient for all preliminary workings previous to an immediate productiveness, and then the mine has been allowed to be suspended for the want of a

comparatively trifling advance. In other undertakings, the improvidence or misconduct of the Pursers has caused the proprietors to suspend their operations, just as the works have been so far advanced as to commence their regular sales of ore.

Under these and similar circumstances, the managing proprietors have too often evinced a great degree of supineness and irritability; and through an exhibition of extraordinary apathy and inactivity, and an unwarranted and ill-judged invective, have often lost a valuable mine: vacillating between an anxious desire of gain and a prejudiced impression,—more solicitous to accuse and impute blame, than to apply a timely remedy, or take the trouble of seeking the real cause of the vexation and dilemma.

Through such conduct, much loss and frequent disappointments have been needlessly incurred, and many valuable undertakings have been petulantly suspended and given up, when firmness, justice, and deliberate consideration, would have convinced the parties that it was to the interest of the shareholders and themselves, that they should have secured and retained the mine; instead of improperly giving way to spleen and

unjust vituperation, to a degree imposing a confused perception of cause and effect; and a conglomerated condemnation of every mining undertaking, and of all persons in any way concerned in agitating or projecting their operation.

It would be extremely irksome to dilate upon every reason for asserting the conviction, that, under present circumstances, very great profits must be derived from cautious Mine Operations; and it would also be an unreasonable imposition upon the reader's patience to enter into every possible minutiæ and detail of every matter connected with mine management, and of all that ought to be done, and of all that is to be avoided, in order to secure success. It is a matter upon which much could be said, and one which has formerly been subjected to much impropriety, as well as many natural obstacles, difficulties, and disadvantages, which now no longer exist. Here we can only touch upon the most prominent faults and facts, and trust that candour and discrimination will lead to a perception of the effects of matters of minor importance; especially as there has been during the last five years, such a great improvement in the management, economy, and profits of Mine Investment, as to have

already had some effect towards exciting attention to the change which has taken place.

It has been already mentioned, that the permanence and profits of Mine Investment, depend upon *judicious* selection, and the general discrimination, judgment, skill, and energy of the Directing Agency. Through injudicious selection, many mines have been, and some few (yet working) will be, losing concerns, notwithstanding their now being under the most able direction. Although there will, henceforth, be little cause to apprehend severe failures in Mine Operation, when under good selection, and efficient and equitable direction, it is possible that, through bad management or other cause, an individual or single mine may be a losing concern; and therefore it is advisable that the capital, devoted to Mining purposes, should be invested in various undertakings, because the distribution of the investment, and the consequent division of risk, diminishes the severity of the effects of any partial loss or accident, and thereby insures a greater degree of success upon the aggregate undertakings.

Under proper management, it is scarcely possible that actual loss can ever occur, as the profits

from *one* productive mine will more than compensate the loss from *four* unsuccessful undertakings, and it is certain that the chances of *success* are more *than two* to *one* against failure; but yet, it is advisable that the money appropriated to Mine Investment, should be such as can be spared without a necessity of a quick return, as various circumstances, dependent upon a more or less judicious directing management and course of working, may now and then occur, rendering the exact period of return uncertain. For instance, in a temporarily depressed state of the market, it may be judicious to sell only a reduced quantity of ore, and for a short period defer or lessen the usual dividend, until a reaction in the market may enable an increased quantity of Ore to be sold at a better price.

In cases where a surplus capital has not been provided, parties should be prepared to make a small temporary advance, beyond that stated or anticipated as the actual requisite amount of the investment; as, sometimes, an event may occur, rendering such a surplus capital or advance absolutely necessary to the salvation and success of the undertaking.

CHAPTER XIV.

The assertion that mining is a precarious investment, and not sufficiently profitable on the whole, has not only been made by persons who are prejudiced, and by such as have been misled and are very little acquainted with the subject, but also by those who, having various motives for concealing the amount of profits, which judicious and fair management must develope, have, in the mistaken and narrow policy, prompted by overweening considerations of present self-interest, forgotten, that when, in a misconception of their best interests, they have cunningly succeeded in misleading and defeating the object of the inquiries of a Parliamentary Committee; they were likewise powerfully instrumental in the diffusion

of misunderstanding and prejudice, and in creating a distaste for undertaking operations, upon the number and success of which depended the public patronage, and with it,—their own prosperity.

The facts and tables in the previous pages, will prove that the employment of a large capital in equitable and well-selected Mining operations, is—*securely productive of a much larger profit than any other application of it will safely admit of;* less subject to violent fluctuations, and perhaps, on the whole, much more eligible than any other species of income, on account of its not being directly affected by parliamentary imposition or tax, or parochial assessment; and, more especially, in consequence of its being free from the influences so often causing losses and fluctuations in the value of funded, mercantile, and manufacturing investments, as well as a reduction in the value and rental of agricultural and other landed properties, whether freehold or leasehold.

Leasehold properties, whether land or houses, after a certain period, decline in income or marketable value; when, on the contrary, if properly managed, the Mine Investment greatly increases its value, and by its continual and rapid reproduction of capital, applicable to an aug-

mentation of investment, provides for the operation of fresh undertakings, without making any reduction in the regular monthly distribution of profit, or any inroad upon the invested capital. This is a special peculiarity and advantage, possessed by no other kind of investment. It is true that such a reproduction of capital may occur from fortunate and desperate mercantile speculation; but then the risk is great, and the success and its degree, are contingent or dependent upon many circumstances, both public and private, over which the speculator has no control. There are also instances of very fortunate leasehold land and house purchases; but then they may be said to be isolated cases, or exceptions to the general results of such investments, which are by no means productive either of large or early returns for the out-laid capital, especially house-leaseholds, which depend upon many contingencies; and even when they are in good situations, steadily rented, and in increasing and improving neighbourhoods, afford anything but large returns for the outlay, and after a time require heavy expenditure to keep them in repair, and by so much reduce the limited returns of the investment. Many house properties pay very little;

many, by depopulation or change of inhabitants, become much depreciated in value, and very many are a continual drain and source of vexation and ruin to those who have restricted means of repair.

The judicious Mine Investment will not only return a regular and large quarterly or monthly interest for the money advanced, but will permit a portion of the surplus profits to be applied in the gradual increase of the number and quantity of Operations; and thus continually augment the marketable value of the investment, without interfering with the distribution of annual bonuses, or requiring any portion of the regular interest, dividends, or bonuses, to be refunded for the support of the undertaking, as the increase of machinery, repairs, and other exigences, will always be provided for by appropriate reserves of Ore ground.

It may be objected that there are still some losses from Mine Undertakings; there is no question of this, but so there are in merchants' and traders' affairs, which are nevertheless very productive on the whole. The losses now occurring from Mine Operations, only confirm the correctness of that which I am endeavouring to

urge; namely, that as most people possessed of common sense, use some discernment, and exercise some caution, previous to investing money in any ordinary business, it is but right that an equal degree of trouble and circumspection should be exhibited in the selection, onset, and progress, of Mine Undertakings.

Many considerations and inquiries will suggest themselves, to those using due care and discrimination, previous to embarking in Mine Operations, and therefore, it is well to mention that care should be taken to seek information through persons and channels unlikely to be biassed by indirect interests and prejudices.

Individuals are apt to believe they have good sources of information from persons residing in the county, or neighbourhood of the mines: this is not the case, because those who are not directly interested in Mine Undertakings, are often inimical to their operation. Their knowledge of the frequency of former failures has possessed them generally, with all the common prejudices and misconceptions regarding the losses from Mine Operations, while they are still unaware of the artificial circumstances, and unconnected causes, producing them. Some persons, naturally

enough, imagine that they have the best means of intelligence by an application to friends, whom they know to have either deposits of Mineral, or Mines working in their own estates; and whom they therefore suppose to be well qualified to advise, as to their participating in any such undertaking as may be suggested for consideration; but they make a great mistake, as such Mineral Proprietors, with very few exceptions, are either altogether ignorant of the value of their own Mineral Properties, or are altogether indifferent to the results of Mining Operations, and therefore leave the whole management of them to their agents, upon whose judgment and prejudices they wholly rely, as they are seldom possessed of any *personal* knowledge of the matter, and are entirely indebted to *indirect* sources for their imbibed information or prejudice. This is very much to be regretted; for if the landed proprietors had paid a greater attention to their Mineral deposits, and given any proper consideration to their value, and the policy of inducing a more general operation, they would have been greatly benefited, the county would have been much enriched, and the manufacturing as well as labouring population, in a very different state.

As several really valuable undertakings have been much misrepresented and put down, by a discreditable want of candour and honourable perception, in some individuals to whom applications have been made for information and advice, it may be as well to mention a course which has been too often pursued.

Representation being made of the favourable prospects of a mine which can be profitably wrought with a moderate capital, persons disposed to take an interest in the undertaking, will prudently consider how they can obtain the best information and details of its eligibility and value.

Some persons who have been desirous of such guidance, have recollected a friend who has had some connexion with Mines, and have asked his opinion of the merits of the enterprise, when if prejudice does not altogether denounce any consideration of a share in the undertaking,—which has been most generally the case, without any attention to the peculiarities of the concern, and the great alteration in the attendant circumstances, which entitle it to exemption from the general condemnation,—he is told he had better make application to Messrs. ———, who are influential people, and have many large Mines of

their own as well as others, under their management and control. Application being made, one or other of the following answers was generally received.

"We have made inquiry, but cannot hear of any such mine as Mr. —— requests information about, therefore his friend had better not have anything to do with the concern."

"We have made inquiry, and find that a person of the name of ——— (who must be guarded against) had pretended to have found a good adventure, but we are told that it is quite unworthy attention."

"We have heard from one of our Captains, that there is such a concern, but that it is in bad hands; except which, there appears nothing against the concern."

"We find there is such a concern, considered a very promising adventure by some people; but we do not think it a concern likely to be of any importance, as *it is out* of the mining district. It cannot be of much value, or we should in all probability have had something to do with it; therefore it will be dangerous for your friend to embark in it."

"We have made inquiries and find that it is a

small unimportant adventure, and though some persons speak well of it, we much doubt its success; as, in the present hands, it is certainly very far from a desirable concern."

Such answers appeared very reasonable and cautious to those seeking information; and as they were totally unable to imagine the spirit of intrigue and jealousy prompting concealment and superlation, they gave a free reception to the intention of the jesuitical answers they received. These remarks very generally ended with observing:—"If your friends are disposed to undertake any thing of the kind, we have (or we shall in all probability shortly hear of) something we can recommend, and you will have the satisfaction of knowing that you will be in good hands as far as regards respectability, we having some of the largest and most productive mines in the county." (Yes; but not most *profitable*, though most productive.) "At the same time, we would observe, that if your friends determine to embark in this affair, we shall be very happy in taking an interest with you, and affording your friends the benefit of our experience in the management and agency of the concern."—Meaning, that they should he glad to take upon themselves the paid

agency, and the pursership, with the power of making it an expensive concern, by the supply to a needless consumption of materials, and thus dividing, in the event of success, 10*l.* per cent. instead of 60*l.* per cent. per annum;—the difference being swallowed up in expensive management,—an effectual indemnity against any possible loss through unsuccessful or injudicious operation.

Application being made to certain parties for information respecting Wheal ——, within three miles of their residence, answer was returned,—"There was no such mine." This was replied to, by proving that they themselves had spent a considerable sum on it formerly, and had highly extolled its prospects, and recommended its operation; but that in consequence of some difference or misunderstanding relative to the supply of that and some adjoining mines, they had discontinued operations, and had, only a few months before, been compelled to surrender the lease. On being reminded of this, it was observed, that in the multiplicity of their concerns, they had forgotten it; but that they had made more particular inquiries, and heard that the concern was going on and likely to do well.

Such answers as the above, and others very

like them, have been very prejudicial. The confidence of the proprietary in either the ability and integrity of the agency, or in the value of the concern, having been weakened, they have often been induced to withhold the funds for further working, and with bitter chagrin at the outlay and loss of money in incipient works, many mines have been ordered to be suspended or abandoned,—without any decisive operations, or even trial. Some of these have afterwards turned out very profitable and important concerns; and others, which otherwise would have been profitable, have been ruined by transfer to such expensive agency and extravagant management.

Perhaps an application to some intelligent and reputable Mine Agency in London, would be the best mode of gaining good and authentic information as to the propriety and eligibility of purchasing, or commencing, or continuing operations in any mine. Such Agents would have the means of obtaining a disinterested and unbiassed judgment, and could give an opinion, the result of a just consideration of the views and prejudices of contending or conflicting interests and feelings. Should this course be inconvenient,

then the best plan would be to obtain as many relative particulars as possible from the Purser or Captain of the Mine, and send them to some respectable Purser or Captain of Mines for their opinion and guidance, with instructions to personally inspect the mine and send up their report. *Things are so much altered,* that *now,* an honest and sincere, if not in all cases, a most judicious or correct report and opinion will be given.

CHAPTER XV.

Previous to adventure or participation in the commencement of any Mine Operations, inquiry should be made as to the repute and talent of the Purser and Captain, and the truth of the statements made by them should be examined into; as sometimes, in the details of the merits of the concern, scandalous and disreputable misrepresentations are made, with a view to mislead and induce parties to invest their money in undertakings badly selected, and ignorantly as well as viciously conducted, and from which little else than disappointment and loss are likely to result.

It may be very natural for persons to avail themselves of every fact and position which they think may enhance the value or estimation of

their mines, and some allowance can be afforded for the inadvertencies and sanguine calculations of eager and inconsiderate anticipators; but statements, untrue and drawn up with intent to deceive, ought never to be tolerated. Such statements should be instantly and thoroughly exposed, for the dishonesty of the few, causes a general disrepute, and reflects unmerited odium upon a whole class of men, the majority of whom would, on examination, be found to possess an acute perception of any impugnable course, and a disposition, to discourage every abuse of reposed confidence, and repress any attempted inroad upon integrity.

The following is a gross instance of the impropriety and exaggeration alluded to, and forms a great contrast to this simple and pithy recommendatory report of Messrs. Rowe and Thomas, two reputable and experienced mine captains.

REPORT.

"There is no practical miner but what would recommend this concern in the strongest terms, to any company of gentlemen inclined to engage

in mines; as it is our joint opinions that the specimens and samples produced from the lode together with a beautiful gozzan richly interspersed with fine lead ores, put it beyond a doubt. The machinery and local advantages are rarely equalled.

(Signed) "RICHARD ROWE,
"*Agent of Polberro Mines.*
"JAMES THOMAS,
"*Agent of Dolcoath Mine.*"

Copy of the Prospectus of the mine alluded to in the above Report:—

"On the north part of the mines a shaft has been sunk upon the lode, about *ten* fathoms in depth, and by *extending about six fathoms* upon the course of the lode, *more than a thousand pounds worth* of ore was raised. (**1**) This working was with very inefficient machinery,—a deficiency of skill, and a miserable want of capital. Since that period a new engine shaft has been sunk to about *six fathoms*, which, when fourteen fathoms deeper, will unwater and *adequately open the mine*" [*!!!*]

"In pursuing this lode and sinking the shaft, a rich copper lode will be cut, which, from its

appearance at a shallow depth, promises to be highly productive, whilst it can be worked by the same machinery, and without occasioning additional expense. To the eastward of the great lode there has been discovered a very rich antimony lode, capable of being worked with great facility by the same machinery; and there are other lodes not yet proved. There is now erected upon these mines a very powerful water-engine, equal to an eighty-horse power, with pumps, chains, capstan, and all apparatus complete. The supply of water is from a powerful and never-failing stream, conveyed by a leat a mile in length on the south side of the mines to the water-engine. (**2**)

"The lead lode has been proved also on the south, by sinking on its course from three to four fathoms, in doing which upwards of ten tons of rich ore were raised, by which the lode has been fully proved to a considerable extent. This lode in the engine *shaft* is from *five* to *six feet in the thickness, with a leader of solid lead* exceeding a foot in thickness, and *the remainder of the lode all good work.* (**3**)

"Scarcely anything remains to be done, with the exception of extending on the course of the

lode and at once raising produce. There are convenient smiths' shops, timber house, carpenter's house, &c. &c., all newly built, and the whole operations of the mines are effected by water-power, and no steam-engine required, by which a saving of several thousand pounds per annum will be effected."

The above Prospectus is very well as far as regards the indications of the mine, and if one can get proof of the truth of what is stated, there can be no reason to doubt its being a very promising and eligible concern. But the positive conclusion, that a shaft only twenty fathoms deep from the surface will be sufficient to "*adequately* unwater and open the mine," is far from a safe one. If **1**, **2**, and **3**, were facts, there would be no occasion for the 4000*l.* required as necessary to put the mine to work, as they could raise ore with very little expenditure, "scarcely anything remaining to be done but to extend on the course of the lode;" and everything, taking Captain Guard upon his own statement, being ready for immediate productive operation; but it is very difficult to believe, or repose any kind of confidence in, the assertions or recommendation of an

individual so palpably and extraordinarily lax and indifferent, to even the semblance to truth, and so totally regardless of the consequences of erroneous and incompatible statements.

Take the following *moderate* estimate and statement of Captain Guard, who it is to be hoped will be too much guarded, to be open to the effects of any similar laxity of common sense and consistency.

"Captain Guard says that he is *certain* of raising—

Lead, 100 tons per month, at 20*l.* [!!!] per ton			. . .	£2,000
Copper,	ditto	ditto	(standard 100*l.*)	1,000
Antimony,	ditto	ditto	(at 20*l.*)	2,000
				£5,000

Say 5,000*l.* per month, which Captain Guard considers the very lowest computation, for he expects four [!!!] times the quantity of Lead, four times the quantity of Copper, and twice the quantity of Antimony, will be raised.

"In the above estimate the Copper is only va-

lued at a standard of 100*l.*, whereas the standard is much higher.

"The Antimony is estimated at 20*l.* per ton, but Captain Guard has been offered 50*l.* [! ! !] *per ton* for as much as he can raise; even if IT BE AS MUCH AS FIVE HUNDRED THOUSAND TONS.

"The above estimate is made according to the best of my judgment and belief, *as I shall be ready to state on my oath*, if required.

4th Oct. 1826. (Signed) J. GUARD."

The above is an extreme instance of departure from truth, and wilful indifference to fact; a shameful laxity of principle, fortunately rarely, if ever, to be met with among the reputable Cornish Mine Captains. It must be recollected that Captains Rowe and James, who made the introductory Report, had nothing, directly or indirectly, to do with Captain Guard's Prospectus, Report, or estimate.

The natural advantages and good prospects of the concern were such, that there was no occasion to make assertions relative to it, which, from their positive and obvious mendaciousness, were

calculated to throw a suspicion and indifference on the whole affair.

Captain Guard volunteers to swear that he believes he can raise four hundred tons of *Lead Ore* per month, and sell it at 20*l.* per ton *(at a time when Lead itself was only* 18*l.* 10*s. per ton)*, four hundred tons of Copper Ore, and two hundred tons of Antimony Ore, per month, from one level, not yet opened, proved, or driven upon.

He calculates four hundred tons of Copper Ore per month (to begin with) from a vein or lode not yet properly explored, or even proved to be a Copper vein or lode.

The Antimony lode is in the same state, and yet he is ready to swear, that he believes he can raise two hundred tons per month, and that he can sell *five hundred thousand* tons of this Antimony *Ore* at 50*l.* per ton.

In the first place, it is rather more in quantity than a moderate supply; as it is *considerably more than* FIVE HUNDRED YEARS *present consumption of Antimony, in the United Kingdom and its Colonies together!!!*

In the next place, Captain Guard swears that he was offered a contract for more than a five

hundred years supply of Antimony *Ore*, at 50*l.* per ton; when the crude Antimony (requiring upwards of one ton and a half of Ore to make a ton crude) was selling at only 48*l.*, after paying smelting charges, freight, and duty. In fact, much better Ore than Captain Guard's was brought from India (Singapore) and sold at 8*l.* per ton; and Spanish Ore (from Bilboa) was then selling at 13*l.* per ton. The Spanish Ore smelted much more easily, gave a much greater produce, and refined to a greater purity, than any British Ore. And yet *Captain Guard is ready to swear*, that he can raise two hundred tons of Ore per month, *and sell five hundred thousand tons of Ore at* 50*l. per ton!!!*

CHAPTER XVI.

Much has been said relative to the local direction and agency, and the severe losses and prejudicial effects of imprudent and extravagant purchase have been alluded to; but though last mentioned, not the least effective in the extent of injury and promotion of general prejudice, has been the concoction of the many nefarious, ill-advised, and badly-arranged *Public* Mining Companies. To enter into any particular details or exposures of the various circumstances and inducements of their formation; of the absolute fraud of some, the total absence of proper direction, agency, material, and management of others; and of the direct and indirect causes of their failure; would fill a volume, and after all be an unentertaining and useless narrative.

Fortunately, the progress, acts, and errors, of many of them have been so glaring and notorious as to have attracted much public attention; and are so comparatively well understood as to save the necessity of adverting to them, further than to observe that, though the cause of the ill success of these undertakings is so palpable, and to be so easily accounted for, in the incompetency and bad constitution and imprudence of the direction, and extravagance and carelessness of the agency, the public still permit prejudice to so completely overcome discriminative justice, that instead of taking the trouble of any unbiassed reflection, there appears to be a determination to confound cause and effect, to refrain from any distinction between careless imprudence or ignorance, and equity and talent, and to conclude and assert that all mines are still very uncertain, dangerous, and ruinous properties.

Strange as such a position may appear, it is not an inconsistent statement of the general feeling and declarations relative to Mine Operations.

Perhaps, when one glances at past vexations, and recollects how rife heavy losses have been, *from adventitious causes only*, we can scarcely feel surprise at the degree of disesteem and suspicion

with which such undertakings are viewed, by those who, alike prejudiced and ignorant as to their nature, are incapable of discriminating their value; yet, I am anxious to remove undue odium and desirous to induce a just distinction and esteem towards a branch of national industry, of the very first public interest and private importance.

Of public interest, from the consideration that the value of the ores, to many millions sterling, annually raised from the bowels of the earth, is so much positively gained, or added, to the aggregate and actual floating or computable property and capital of the kingdom, beyond and totally apart and independent of the usual commercial gains, derivable by the merchant and manufacturer from the sale and consumption of large quantities of stores and manufactured materials, consumed in the various businesses consequent to and dependent upon active Mine Operation. It is also of great importance from the great service rendered to internal and domestic commerce, and from the activity and impulse it gives to the timber, coal, iron, leather, rope, gunpowder, and tallow merchants, and to various descriptions of manufacturers and shop-

keepers; and likewise for the employ it provides for many thousands of highly interesting and intelligent labouring families; and yet, notwithstanding these important considerations, there are but few, besides the Cornish Copper and Tin Mines, which, together with several of the Welsh and Irish Copper Mines, are now in general activity. The deposits of Copper Ore, of all the Antimony, and much of the Lead, &c., in other counties, are absolutely in an inert and unproductive state. This is very much to be deplored; particularly as, if cautiously selected and wrought, many of these mineral deposits would, in point of profit, be very superior to most in the world.

This country was not only anciently famous among the Phœnicians for its productive Tin workings, but also with the Romans for its Lead and other minerals; and many records and remains of these workings are to be found in various districts of Great Britain; the metalliferous deposits of which, from the reign of Edward III. to the present time, have been, in proportion to the quantity wrought, as productive as any in Europe. It is true that the importation of Lead from Malaga and other places, has within these

few years caused a general depression, and a suspension of operation in many of the Lead districts of the North; and consequently thrown many thousand valuable and industrious people into a state of inactivity and destitution, and compelled a great portion of them to a reluctant dependence upon the usually dreadfully stinted and debasing parochial support.

The fact of the importation of Lead Ores and other Minerals into this country, may, to a great many, appear indicative of the unimportance and inferiority of our deposits, and to show that we are unable to compete with foreign importation: this is far from the truth, under a different state of things. With proper encouragement and fostering protection, we should, after a few years, not only be able to supply our own consumption for Lead and other Minerals, but be able at least to compete with others for the supply of foreign demands.

If all things were duly considered, it might be perceived that there are many peculiarities and contingent circumstances attending a general activity and prosperous condition of our mines, rendering them of much greater importance than

they are usually held in, and demanding more encouragement, protection, and fostering care, than have yet been afforded to them.

The merchants of London, and others interested in the South American trade, have countenanced and encouraged the embarkation of many millions sterling, to aid the active operation of the Mexican mines; in order to give an impulse to trade, and enable the inhabitants to purchase some of their supplies and requisites from the European market. It cannot be doubted but that the many millions embarked in the purchase and operation of the Mexican mines, have been of the utmost importance to that country; which at present, and for some years to come, must wholly depend upon the activity of its mines, for all its means of support and prosperity.

Though some millions sterling have been returned to this country in another shape, and to the profit of the merchant instead of the mine-shareholder; though millions sterling have been absorbed and thrown away, and a great want of judgment and economy has been exhibited in their selection, and general mode of operation and management; and though there is still a deplorable inattention to the gradual introduction of

practical and economical improvements, for opening the ground, draining the mines, and preparing the ores, by which immense current expenditure would be saved, there is little or no reason to doubt but many of these mines will be ultimately profitable, provided they are left undisturbed in regular operation, and unchecked by internal commotion, revolution, or other political revulsion.

Some few years since, the very mention of a silver mine had a talismanic charm and effect upon a great many persons. The details of the immense quantities of gold and silver produced in the various Spanish provinces of South America, and the vivid narratives and romantic anecdotes of occasional discoveries of very extraordinary deposits of rich ores and metal, led to a common belief, not only that all the mines of Mexico must be amazingly rich, but that, as all the ores produced silver or gold, they must be of very great value, and therefore amazing profits must soon be made, as a very little of such ore must be sufficient to defray the working expenses.

People being possessed with such notions, it was at that time utterly useless either to represent the extra hazards, expenses, delays, dangers,

and comparative ineligibility, of foreign as compared with home mine investments; or to call attention to the superior value of the English ores, and their comparative inexpensive preparation; and the greater security of investment in the copper, tin, and other mines of this country. They incredulously heard all you might urge, or rather, they heard nothing, for you could plainly perceive a sympathetic effect of the wandering imagination, in the fixed and gleaming eye, which appeared to reflect the hundred thousand acres of burnished gold and silver upon which it felt to rest. When you explained that the Mexican ores were poor on the average, they would refer you to some extracts from Helms, Ulloa, and other narrators, and run over the names of all the marquises and counts who had been enriched and ennobled; nothing would move them, or convince them, but that you were incorrect in stating that it was from the *great capacity* of the veins, and immense abundance of the ores, and *not* from *their general richness*, that such enormous fortunes were derived; and that the generality of Mexican ores contained only about forty-two ounces of silver, or 9*l.* value to the ton of ore; out of which was to be deducted the heavy ex-

penses for purchase of the mines, all the expenditure and outgoings preliminary to operation, the expensive outfit and current working charges of the mines, the expense of preparing and amalgamating the ores, and of smelting and refining the metal, the payment of the government duties, and the expenses of exchange or transit for shipment and insurance and freight to this country. Notwithstanding you pointed out many contingencies which might prevent their receiving any returns for some five or six years or longer, and that even in the event of successful operation, political influences might present obstructions to the receipt of the produce; and although you represented the many advantages and peculiarities in favour of the British mine investments, such as their being easier of access and under more immediate control, requiring much less capital for outfit and operation, cheaper in their agency and working charges, and producing ores much less expensive in their preparation, and on the average realizing more profit per ton than the ton of Mexican ore containing the forty-two ounces of silver,—still these people were bent upon the venture of the more hazardous and less profitable foreign investment, to an extent which

has since been a matter of reproach to many, and of regret to some few, who have turned an attention to the large profits now making by many of the English mines.

The many millions sterling of British capital which have been sunk and invested in the South American Mines, have undoubtedly been productive of much benefit to that part of the world, and may have been the means of expediting an amicable understanding with the native merchants and traders, and of securing for a short time, a larger portion of commercial intercourse with England than any other country; but how much more and longer the merchant, the trader, and the public revenue, would have benefited; and how much more favourable would have been the position of the capitalist, and the condition of the miners, had the same number of millions sterling, or the half of them, been invested in the British Mines! It may be said that the revenue, the merchant, and the trader, are benefited by the present foreign demand for English manufactures; so they are, but then only for a short time, and to a very small degree, in proportion to that proceeding from the vast direct and indirect consumption of merchandise, manufacture, and

provender of all descriptions, required by a numerous, active, and prosperous mining population.

Open a productive vein in the barren valley, upon the black moor, or on the rugged mountain, and in a few years it shall present a neat town, with an intelligent and industrious population, containing various artizans and tradesmen, whose inventive energies and productive skill have been roused and supported by continual supplies to the requisites and necessities of the miners; who have not only supported themselves and families, but have also supplied the means of wealth to some, and profitable employment to others, besides having been largely contributory to the *Customs* revenue, by the variety and quantity of materials consumed for and in the mines; and likewise, *in proportion to* their *comfort* and success, largely *contributory* to the *Excise* revenue, for the supply of their necessaries, wants, and luxuries.

Perhaps mines, their operations and produce, might, upon investigation, be found proper subjects to form an exception to the received principle, that tariff restraints and restrictions of any description are always injurious to a country, and

prejudicial to an extended and reciprocal foreign commercial intercourse.

If raw silk or cotton, to the amount of one million sterling, is imported into this country from India or America, it is very probable that this is, as far as the countries are concerned, a barter or exchange business, and that the very parties importing the silk or cotton take an agreed quantity either of the manufactured article, or other goods, in return from this country. But suppose they do not, and that instead of its being exchanged for our goods or produce, it is all paid for in money; it is still a commerce highly advantageous to this country, on account of its being an introduction of raw *material which we cannot cultivate or produce* for the manufacturer, near so cheaply as we can import it; and, independently of this consideration, it is deserving of every encouragement and support, because, after importation, it undergoes a variety of processes; until, through art and mechanical skill, it becomes of very great increased value, and available to the purchase or exchange of very much more than the million's-worth of raw silk or cotton; and this too, after having been the means of employment and support to many hundred artizans and their

families, during the interval between its being imported, and fabricated for home consumption or foreign exchange; and after having afforded remunerative profits to each of the various houses of business through which it has passed.

The effects of the importation of Lead Ores, &c., are very different; as, so far from being a raw produce *unattainable in this country*, we have immense quantities of it, but unfortunately, an insufficient conversance with the consequences of supporting its production has allowed the consideration of its importance to be merged in the effects of a general Custom-House regulation, prejudicial and ruinous alike to the Revenue and the Miner.

If the introduction of Foreign Lead conduced to results similar to those from the importation of raw silks, cottons, or such-like, and produced employment and support to the artizan and labourer, profit to the various manufactures, and large returns to the merchants, who, from our inability to produce the article at a proper price, could not be supported, maintained, and enriched, but by such importation, then the consequences would be beneficial, instead of being, as they now are, very injurious to the revenue;

and prejudicial to the country. If due attention were paid to the interests of the British miner, and to the manufacturers and artisans connected with these active operations, it would be found that we could provide for the home consumption of Lead, perhaps cheaper than it is now imported.

Though it is a very essential consideration,—the mere fact of giving employ to many thousands of industrious and intelligent miners and their families, and preventing their being unproductive, and consequently burdensome to their country,—is not the only important matter to be regarded, in an attention to the advantages of an activity in the Mine Operations of this country.

If a million sterling were now employed in this country, in raising Lead Ore, it would be distributed for merchandise and supplies of various descriptions, very much more productive to the *Excise* and *Customs*, than the duty received for the introduction of as much foreign Ore; besides this, many kinds of trades would receive an impetus, a numerous and burdensome population would be supported, the local rates relieved, various descriptions of art and science would be stimulated, and the Capitalist embarking his

money would be amply rewarded by the produce of Ore; and all this good would be effected, to the benefit of the country and the great emolument of the Mine Proprietor, without *any* prejudicial effects to others:—since not only every profit and advantage that could be given and derived from the sale, smelting, and conversion, of the *imported* Ore, still remains open to the merchant, trader, and labourer, but—*much more*, as there can be no question but that the same amount, expended in well-selected operation in this country, would be productive of a much larger quantity of mineral than could be imported for the same amount of money, the raising of which, would give business and employ to the manufacturers, traders, and miners,—and yet leave increased means of occupation, employ, and profit, to the smelters and metal-dealers. Even were it less, the country and revenue would still be the gainers, as *there is a peculiarity consequential to Mine Operation, beneficial* to the country, manufacturer, and miner.

If 50,000 tons of Lead Ore &c. be imported into this country, money or money's-worth must be given for it, so that the transaction is merely that of exchange, worth for value, and thus

ended, and the countries are relatively equal as to the transaction; but if the price of the 30,000 tons of Lead Ore &c. were to be invested in working the mines of this country, the Customs and Excise revenues would be increased; the manufacturer, trader, artisan, and labourer, would all be benefited; the miner would have the value of his investment in mineral, ready for sale or exchange for money, the amount of which is actually gained from the interior of the earth, and is so much added to the computable and disposable property of the country; whereas, by the purchase or importation of the foreign Ore, nothing is added, as the transaction is only a barter or exchange of money for money's worth. But by the Operation of the English Mines, the absolute property of the country, as well as the revenue, would be increased,—without charge, expense, or prejudice to any; *as the cost of production would be still in the country,* distributed about for supplies of various descriptions, *and the value of the Ore raised,*—much exceeding the expenses of its productions,—will also still be in the country, and will be to such amount, a positive augmentation of the property of the kingdom.

I once more repeat, that by the investment of

the money in English Operations, the public revenue would be benefited; the capitalist largely remunerated; the manufacturer, trader, and artisan, stimulated; the miner and labourer supported; local rates relieved; and the tangible property of the kingdom increased,—without charge, loss, or suffering, to any; while by the importation of Ore, the miners and a valuable labouring population are thrown into a state of destitution; the parochial rates are increased; manufactures and trade are greatly depressed; the public revenue is greatly injured; and the property of the country greatly estranged.

It ought to be recollected that Mine Operation is nationally valuable and interesting, even were it only for the fostering aid and influence it has upon the progress and improvement of many important branches of art and science, and for its indirect agency, in forming a most reflective, intelligent, and moral class of labouring people.

Mine Operations require, more or less directly, the aid of the chemist and metallurgist, and also of the geologist and mineralogist, together with the assistance of the mathematician, engineer, machinist, and draughtsman; and also call into action a variety of subordinate artisans, such as,

the founder, builder, smith, carpenter, brick-maker, and bricklayer and mason, &c. &c. &c.

The labouring miner, who has the opportunity of witnessing the detail and progress of the different branches of these trades, and the numerous surface operations, in conjunction with the variety of underground practice, cannot but obtain a certain degree of intelligence and knowledge, especially as his immediate occupation, in watching and considering the effect of every slight alteration and symptom, peculiarly adapts him for acquisitiveness, and an habitual reflective observation. The constant change of circumstance, and the frequent difficulties which he is subject to, require discrimination, with promptness in conception, energy in execution, and habitual tact. This considerative occupation and derivative knowledge enlarges and developes the natural faculties of the Miners, and tends to the formation of an active, courageous, intelligent, and valuable population.

The Greek and Roman Miners were held in high estimation, and the ancient civil law granted them many privileges; alleging as a reason for so doing, that the miners were very useful and valuable to the public. [See Digest. lib. iii.

tit. 4, et lib. xlviii. tit. 19. Cod. i. ii. tit. 6, leg. 1, 2, 3. Justit. lib. ii. tit. 1, sec. 39.]

Queen Elizabeth, in the tenth year of her reign, by letters patent, discharged all miners, and all other persons occupied in finding, digging, and refining metals or minerals, from paying any taxes or impositions, and relieved them from serving on juries, and made them free from arrests.

Paracelsus de Metallis, lib. i. says "*Fodinæ sunt Scholæ optimæ Philosophorum.*"

Surely the above considerations ought to make Mine Operation a matter of great public interest, particularly as the secure and large remunerating profits derivable from such undertakings, when judiciously and equitably managed, make them a subject of the first private importance.

It is probable that the general prejudice has allowed but few persons to be impressed with this opinion, yet a reference to the state of the Cornish Copper Mines, which have been vigorously wrought for the last seven years, will at once prove the correctness of the statement, and clearly show that *when properly conducted, mining is a secure and very eligible appropriation* of capital; and this too, in many instances, in defiance

of obstacles to an economical operation, and to a just development of their natural resources and profits.

Those mines which have been efficiently wrought within the last *seven* years, *have been on the whole very profitable;* some few have been losing and vexatious concerns, but they bear a small proportion to those which have been successful.

If the causes of failure were inquired into, scarcely an instance of loss would be found to have been occasioned by the barrenness of the vein; but most of the failures would be proved to have originated, in abortive attempts for profitable operation, with very restricted or altogether incompetent capitals; and in disputes and difficulties between the shareholders, arising from various causes, such as opposing interests, participation in adjoining mines, attempts to consolidate, and in improvident arrangements and premature surface erections.

Some persons may say, that it is useless to endeavour to establish the *fact of the natural advantages* of Mine Investment, since it is connected with a variety of circumstances opposed to a due distribution of its benefits; and that, as

there are so many things to be avoided, and such care is required in the selection, it is on the whole an impolitic and questionable investment. To such it may be answered, that circumstances are so altered, and there is now such a vast improvement in the system of management and working, and in the mechanical skill, that mining is no longer dependent and precarious as it formerly was. *The average of success from operations of the present day, is more than equal, and one successful mine will more than compensate the loss from four losing concerns.* Although there have been so many, and now and then still may be some, things peculiarly objectionable; they are now mostly such as can, with common prudence and caution, be easily avoided.

On referring to tables B. C. D. and E. in Chapter VII., it will be found that those undertakings which have been lately put into active operation, have a great preponderance of productive mines, and that among those which have been fairly and properly wrought and managed, there are very few losing concerns.

Upon computation, it will be found that though there may be a loss on an individual investment, *any given number of well-selected mines*

may be undertaken with every guarantee of success, even with all the faults, and with only the partial improvements and general economy practised within the last few years; but now, economy and further improvements can be much more extensively and effectively introduced.

When judiciously selected, properly directed, and economically conducted, very *much larger profits* than have been hitherto distributed, *can be securely depended upon.*

CHAPTER XVII.

Independently of the many things which, in the foregoing detail, have been suggested as contributing to the general prejudice and misconception, there are many others, which if no longer of immediate practical or local relation, have yet indirectly tended to abuse the public estimation of Mine Undertakings.

Many persons have refrained from Mine Investments, under the impression that almost every undertaking, recommended to their attention, must either be worthless or very speculative.

If an old mine is suggested to their consideration, they conceive that it must have been abandoned as useless, and that it would not have remained idle so long, if it had been likely to be

productive, as persons in the neighbourhood, conversant with such things, and with large capitals at their command, would not be so indifferent to their interests as to permit a good mine to pass away from them. Perhaps such an inference may be very natural, but the truth is, there are very few persons in the neighbourhood of the mines who know anything about them, or who will take the trouble to give correct information respecting their nature or prospects; as such persons, in consequence of having heard of former losses without any explanation of their cause, are generally strongly prejudiced against such undertakings, and unhesitatingly condemn them, without any consideration of the total alteration which has taken place, in expense, system, science, and mechanical skill. There is nothing peculiarly tending to prevent a stranger from obtaining grants of valuable mines; indeed, the disputes occasioned by opposing interests often enable a neutral or stranger to obtain an extensive and highly-prized undertaking, upon very advantageous terms. How frequently we hear of merchants and traders overlooking the most obvious and facile opportunities of advantageous contracts, and beneficial investments, even when

directly connected with their general or immediate pursuits, until prompted to a view of their important advantages, by the suggestions and enterprise of those who have been the first to perceive the benefit derivable from opportunity and a change of circumstance! Again, most persons concerned in or connected with Mine Operations, have generally a disinclination to the activity of mines out of their immediate observation or control, and they often create prejudices by alleging various disparagements, as they are interested in giving their whole consideration to the activity of the mineral in their immediate district, not merely on account of the easy supply and distribution of materials in a neighbourhood of general operation, but because it allows them to give their attention to a plurality of salaries and profits appertinent to the agency and supply of various undertakings. Hence it is that mines of great value are very often allowed to remain idle, both from an ignorance of their existence, and a disinclination to operations which would be prejudicial to individual interest, by withdrawing public attention from their immediate and favourite mining field, and thereby not only rendering their agency more difficult, but less profitable, in con-

sequence of a decrease in the number and sources of yearly income or salary. This tendency to concentrated operation in a few districts only, has caused an oblivion or indifference towards many valuable mineral deposits, and presented obstacles to the development of the great mineral fecundity of several valuable, though inert, mineral deposits.

When the operation of a new discovery has been suggested, many persons have declined any participation in it under the feeling, that as the owner is rich he must have had it investigated, and that if it had been thought well of, he would have worked it himself instead of granting setts to others; or that, if good for anything, it would have been taken up by persons in the neighbourhood instead of being left open to strangers, and therefore there could be little or no probability of its being a valuable undertaking.

These and similar considerations, have often deterred persons from giving any attention, or making any inquiry into the merits or nature of such undertakings; but such conclusions are certainly ill founded: for, strange as it may appear, the majority of persons who have metalliferous mineral property, are not only perfectly

ignorant of its value, but indifferent as to its operation, and will sometimes sign grants and leases very prejudicial to their own interests.

Many proprietors of mineral have a variety of objections and prejudices, and are positively inimical to all Mine Operation, and will neither work the minerals for themselves, nor make any sett, or grant any lease of them to others; in consequence of which, some valuable deposits have been forgotten, and others have been kept idle, till the death of a party, the determination of a law-suit, or other favourable circumstance, has afforded an opportunity of their being wrought.

Some persons are afraid of a park, plantation, or farm, being destroyed or disfigured, and others fear the mine adit will be injurious, by draining the water from the brooks and farm land.

Most proprietors either forget, or are unaware, that former bad management and want of skill, and not the natural irregularity or poverty of the mines, have occasioned nearly all the failures and loss. They therefore give way to the popular prejudice and misconception, and very gladly lease the minerals to those who will chance the risk of working them.

Some proprietors of mineral grounds are unable

to procure the capital requisite to work their mines; and others, who have known or heard of certain abuses and expensive management, have preferred to lease their mineral and secure several thousands per annum by the reserved dues or royalties, rather than by individual operation be subject to the possible loss of a large sum, through indiscriminate and improvident workings and unskilful management.

One of the effects of former bad management and extravagance is, that many mineral proprietors, in the most active and productive districts, have been afraid of advancing money to work their deposits, in consequence of having witnessed and heard of the effects, without seeing or being informed of the *causes of* unsuccessful operation; and therefore have preferred to lease them out upon condition of receiving about a *twelfth part* of the mineral *raised.*

Seeing that the proprietors in such districts have fancied themselves compelled to join in the prevailing declaration of the precariousness and great uncertainty of Mine Operations, the proprietors of mineral in other districts have neither the means of getting their mineral wrought by leaseholders, nor any disposition to work it them-

selves; so that under the general and formerly correct—*but now erroneous*—impression of the uncertainty and ruinous consequences attending Mine Operation,—many valuable deposits have been left untouched and forgotten.

Since the proprietors themselves have not taken the trouble of proper investigation,—have confounded cause and effect, and have been the means of promulgating and materially strengthening the public prejudice,—we cannot be very much surprised at the general apathy and indifference to this valuable branch of our national wealth and industry

CHAPTER XVIII.

Although mines were, many centuries since, wrought for Tin, Silver, Lead, and Copper, in various parts of Cornwall, Devon, Wales, Somerset, Derby, Yorkshire, Westmoreland, Cumberland, and Durham, at that period, and until very lately, mining must have been very uncertain and precarious in its success and duration, not only on account of the very limited mineralogical experience of the people, and a total absence of any notion of there being any regularity in the structure and contents of the different strata, or that the causes and effects of the various interruptions and intersections of mineral veins could be easily accounted for and recovered, but also from an absolutely general geognostic ignorance,

and a belief that mines and mineral veins were to be found in *all* soils and in *every* description of rock.

The productiveness of some of the veins led to an eager expectation of wealth from every deposit of mineral; and as there were then no means of general intercourse between the miners of the different districts or countries, nor any way of obtaining a collected or combined knowledge of their discoveries, progress, and mode of operation by any general investigation concerning the various symptoms, deposits, and peculiarities, we may easily conceive a positive knowledge, or any rational consideration or conception of the nature of the strata, or of the peculiarity of a vein or other mineral deposit, was then quite out of the question: especially when an author of great general experience in the mining operations of his day (1700) expresses his surprise "*that more pains are not taken to search Essex for mines of different sorts of metals.*"

Several learned people assert that the money which Cunobeline, Prince of the Trinobantes, coined at Camelodunum, in Essex, was drawn from a mine in that county. This is certainly a mistake, although Sir John Pettus appears to

believe it [see Fodinæ Regales, p. 11]; and though AGRICOLA, in his book De Re Metallica, p. 26, speaking of those parts, uses the words, "naturalia venarum signa observavi," he did not mean the usual metalliferous deposits, but veins of Ruddle and Iron Pyrites, some of the latter of which, it is possible, might occasionally produce very small quantities of gold.

Henry the Fourth, in the second year of his reign, having received information of a concealed gold mine in Essex, commanded Walter Fitzwalter to "apprehend all persons concerned in concealing the said mine, and bring them before the King and his Council, to receive what shall be ordered."—TOWER RECORDS, ROT. 34.

About one hundred and sixty years since, two gold mines were stated to have been discovered: one at Polluxhill, in Bedfordshire, and the other at Little Taunton, in Gloucestershire. "The Society of Mines Royal *seized them*, and granted two leases of them to some refiners, who extracted some Gold; but they did not go on with the work, as the Gold sometimes would not repay or requite the charge of separation, *though often it did*."—ESSAY ON METALLIC WORDS.

It required the lapse of centuries to gradually

introduce, between the miners of the different counties and districts, that kind of communication—leading to innovations and improvements upon their several modes of working, and that interchange of information relative to the varieties and difference of the strata and mineral deposits in their respective districts; enabling them to form some definite conclusion as to the kind of vein and mineral deposit most eligible for operation, instead of giving way to that indiscriminate chance which formerly led the African miner to dig pits and work them for Gold—" without any the least knowledge of there being any vein or deposit near him" [BOSMAN'S GUINEA]; or the uncertainty that prompted our Derbyshire Peak miners to search for Ore at a venture, and by way of propitiation say, " *By the grace of God and what I may find.*"—BARGE-MOOT COURT, by MANLOW.

By degrees our miners obtained a local information, and a certain portion of mineralogical experience, which was diffused and interchanged by little and little; but they took no effective measures to institute any inquiries into the nature and cause of the various geognostic phenomena continually presented to their consideration.

Indeed, whatever progress the science might have made, if free scope had been left for its advancement, was kept in continual check by the restraints put upon the owners of mineral veins; by penal interdictions against the refining and conversion of the precious metals from any Ores containing them; and by the advantages taken of the proprietors, workers, and adventurers, of mines by the royal and patent lessees. In fine, although there have been many parliamentary enactments relative to the minerals and miners of this country, it is certain they have never been considered with that degree of attention which their value and importance deserve.

The grants made by Edward the Third, of the Copper Mines in Northumberland, Cumberland, and Yorkshire; those of the same king, of *all his Gold and Silver Mines* in *Cumberland, Westmoreland,* and Devonshire; those of Richard the Second, Henry the Fourth, and Henry the Sixth, of the same mines; a grant of Henry the Sixth to John Boatright, of all Copper, Tin, and Lead, possessing *Gold* and *Silver;* more especially the grant of Henry the Seventh, who, in the first year of his reign, constituted the Duke of Bedford and others Commissioners of *all* the mines, not only of Gold

and Silver, but of Tin, Lead, and Copper, in England and Wales, upon paying to the King the fifteenth part of the *Gold* and *Silver*, and to the lord of the soil the eleventh part; and also the grant of Queen Elizabeth, who, in the sixth year of her reign, granted all Ores, mixed or compound, and all other metals, minerals, or treasures to be found in earth or ground, in England and the English pale in Ireland, with license to dig and search for the same, and build houses &c. &c. for their own use (the disturbers of the grantees or their miners to be imprisoned for six months without bail or mainprize), with power to take up and use all necessaries for their workings, and *to fell timber*, &c. &c.; "the Queen to receive for every hundred weight of Gold Ore *eight pounds* weight of Gold*, and of the Silver the twentieth part;"—were all very prejudicial to the progress of mining, and operated directly contrary to the intention and expectations of the Crown and grantees, who had the power not only of seizing upon people's mines and working them, but of destroying their land and estates; for though there were clauses in several of the Crown

* Ounces, instead of pounds, must have been intended.

grants, obliging the lessees to repair any damage done to the estates, the grantees seldom or never paid any attention to the proprietors of the land, but tore it up, sunk shafts, and made roads at their pleasure, and left the proprietors to their remedy:—so that, instead of leading to the discovery of new veins, or the increase of the number of mines and workings upon those veins already known, those grants caused a general inactivity and stagnation. Under the fear of being dispossessed by the patentees, the people not only generally ceased to work the mines, but joined with the proprietors of the land in concealing as many as possible, and in opposing every obstacle to the operations of the Crown lessees.

These grants were also pernicious, because the field for operation was much too extensive to admit of more than a very small portion or number of the mineral veins, being wrought by the grantees by means of their own pecuniary resources; and in consequence, it seldom happened that any but well-known spots or veins were explored, all others being either unheeded or totally neglected,—as, although the parties to whom these grants were made could not, even if disposed, work a thousandth part of the mineral

deposits,—their exclusive grants and monopolizing privileges precluded any attention to them by that portion of the community who might, under other circumstances, have been disposed to undertake their operation.

In the tenth year of her reign, Queen Elizabeth took the rich Copper Mine at Keswick from the Duke of Northumberland, and incorporated the society of "*Mines Royal*," and also the society of "Mineral and Battery Works."

James the First confirmed these grants or charters to the Earl of Pembroke, Lord Cecil, and others, and to their successors, with all the powers and immunities formerly granted by Elizabeth. The counties of Cumberland, Westmoreland, Yorkshire, Lancashire, Devon, and Cornwall, and the principality of Wales, were granted to the Mines Royal, as being "the counties where Gold and Silver mines were most abundant."

The incorporation of these societies had a still more baneful and discouraging effect upon the general activity and estimation of Mine Operation, than the previous privileged ~~results~~ grants, and presented an effectual check to any general activity, not only on account of the comparatively exclusive and limited opportunity of operation, but

of the hostility of the proprietors and farmers of the soil, who would at all times conceal every mineral deposit; and when in their power prevent and obstruct the progress of the patentees' works upon those veins which were known, by watching for every opportunity of destroying their workings, and of engendering among the miners and neighbouring farmers and populace as much contention and strife as possible.

Although the directors of these corporate societies possessed a complete monopoly, and were invested with extrinsic powers and extensive immunities, they were not only without a proper spirit of enterprise in themselves, but were deficient in management, discrimination, and general tact. Instead of setting an example of activity and enterprise, and giving an impulse and a liberal encouragement to the discovery and working of mines, they exhibited an incapacity, and an ignorance of their best interests, in an unvarying display of a disposition to take illiberal advantages alike of their own sub-grantees and of the owners, occupiers, and workers of any ground wherein there was any mineral or Ores, affording a pretence to their claims under their exclusive privileges.

The illiberality and total want of judgment in the conduct of "The Society of Mines Royal," in hindering the workings, and always claiming profitable mines, under an allegation of their belonging to their Company, in consequence of the Gold and Silver contained in some of their Ores, excited much vexation and dispute, and caused a general inactivity and an indifference in those disposed to work the mines, as well as a concealment of many valuable veins containing Silver and other Ores.

CHAPTER XIX.

The references given by many authors who have formerly written, either partially or immediately, concerning the mineralogy of this country, leave no doubt of there being some Gold, and many deposits of Ores containing Silver, in various counties.

Many extracts could be given, but the few herein recited, from authors of repute, will suffice to show the existence of such deposits. The writer knows three lasting deposits of what may be termed *rich* Silver *Ores;* and there is scarcely room to doubt but that many deposits of Ores containing this metal, would have been effectively wrought in this country, had not the exclusive royal grants, the subsequent incorporation of the

societies of "The Mines Royal" and of the "Mineral Battery Works," and the prejudice and inactivity created by their oppressive and reckless conduct, combined with the unrepealed continuance of the act of the first year of the reign of Henry the Fourth against the conversion to profit of the Ores of Gold and Silver—together with the claims of the Crown, until the time of William and Mary, "of all mines containing Gold and Silver Ores, not in grant to the corporation of "Mines Royal,"—had the effect of producing a disinclination or indifference to any general activity, research, or discovery. Though Gold has been found in small quantities in several counties of England,—no veins or other regular deposition of that metal have yet been discovered; but it is certain that some Gold, as well as very considerable quantities of Silver, have been extracted from several mines of Tin and Copper in Devon and Cornwall, and from Copper and other mines in Cumberland, Yorkshire, Westmoreland, and Wales.—See *Camd. Brit.*

"A gentleman digging for Copper Ore found a quantity of *red earth*, which, by knowing mineralists, was guessed to be only bole; but being melted with martis stellatis, by a skilful

trier of metals, it often richly recompensed, by affording pure Gold."—*Boyle's Hydrostatic Balance.*

VANNOCHIO, the famous Italian mineralogist, tells us, that soft and crumbly *red earth* often contains the richest minerals and metals. It may be as well to remark, that the *red earth* mentioned in the above paragraphs is the gossan of our miners, and most commonly contains some small quantity of Silver or Gold. Sometimes it is very rich in Silver, and in considerable quantity, but it is generally unheeded, being only esteemed by our miners as an indication of great productiveness below for Copper, Lead, &c. &c. There is not one in a hundred of these gossans properly examined, although they ought always to be tried, as large gains would be made by extracting the Silver from many of them; but our miners and assayers are mostly incapable of assaying them, as they are generally surprisingly deficient in competent attainment, being, with very few exceptions, incapable of any assays but those of the ordinary Lead, Copper, and Tin Ores. The assay of a complex mineral, containing Silver, is very rarely accomplished, and even then very incorrectly;—fortunately, we have a few assayers

of great skill, but they are very different from the *usual* Copper assay-masters.

Boyle, in his *Sceptical Chemist*, says, "I remember a candid mineralist, famous for his skill in trying Ores, that he obtained near one-third part Gold from a mineral or earth which was taken to the *public assayers*, who were unable to bring it to a fusion or regulus; but yet a particular flux separated a third part Gold."

"An expert man was desirous of my procuring Tin Ores for him. He had met with a sort that after a long digestion in lixiviate liquors, afforded him a very considerable portion of the richer metals; having a larger quantity of that sort he succeeded constantly."—*Usefulness of Philosophy.*

A very celebrated author says, "I know *Gold* and *Silver* to be blended with the predominant metals of mines, as appears from some of the *Copper Mines* of Cumnitz, where a *considerable* quantity of *both* is obtained."—Alonzo Barba: *Art of Metals.*

Acosta says, "Gold and *Silver* are most commonly found with *Copper*." "In following the veins of *Tin*, the miners have often met with rich parcels of Silver."

Dr. Brown, in his *Account of Windschot Mine*, says, "Often in following a vein of Copper they have met with a vein of fine Gold, but *it is more usual to have the veins change into or carry Silver*."

Alonzo Barba says, "The Mine of Osloque, in the Lypes, was *at top in a manner all Copper*, but every spade's depth, as they dug *downwards, the Ore grew more rich in Silver*; but the water increasing, hindered them from prosecuting further riches."

In Ireland some quantity of Gold has been gathered, particularly about the Wicklow Hills, where pieces of some considerable size have been found. It is to be regretted that the authorities not only interdicted any operations by the public, but were inert and indifferent to the possible important consequences of discoveries, through a proper investigation and activity by their own agents. A careful consideration of some of the specimens leads to a conclusion, that if free scope were given to industry and cupidity, it is probable a considerable deposit would be discovered.

"Among the wastes in Scotland, on Crawford Moor, the people find pieces of Gold, some of which are of a considerable bigness."—*Camd. Brit.* pp. 915, 922. New trans.

Boyle, in his hydrostatical way of examining Ores (p. 182), says, that he had several of these pieces of Gold given him, which he "presented to that curious examiner of Ores, Prince Rupert."

From what Dr. Nicholson (a former Bishop of Carlisle) says in Scott's *Historical Library*, it is clear that there have been Gold Mines or workings in that kingdom. There can be no doubt of there being numerous veins carrying Silver, in various parts of Scotland. King James is stated to have received 10,000*l.* in *Silver* out of a Scottish mine. (*History of the First Fourteen Years of the Reign of King James the First*, p. 13.) "About seventy years since a Silver Mine was working very profitably, but was suddenly interrupted or cut out, and the workings were abandoned" (in consequence of the geological deficiency of the directing miner).—*Williams's Mineral Kingdom.*

Martin, in his *Description of the Western Isles of Scotland*, says, "there are valuable mines or veins of Silver, Copper, Tin, and Lead, in the Isles of Orkney."

Atkinson's *Manuscripts* give an account of the finding and losing "a valuable *Silver* Mine at Hilderstone, in the county of Linlithgow." Speaking of another mine, he says, "a partner in

the mining concern got as much native Gold as to make a bason to hold an English gallon, which the Earl of Morton presented full of Gold to the King of France, assuring him that both were from the mines."

"A master of mines and minerals was appointed in 1607, and the *Gold* and *Silver Mines* of Lesmahago were bestowed on the Marquis of Hamilton, in 1620. In thirty days after, eight pounds of native Gold were brought to the Mint. The workmen also obtained Gold which they sold for forty shillings per ounce."

All those who have written concerning metals appear to agree that there is naturally a small quantity of Gold or Silver in most metalliferous Ores; and the smelters and refiners of former times affirm, that there *is in Copper* Ore naturally *Gold* and *Silver*, and in *Tin* and in *Lead* Ores naturally *Silver* only; and that there is scarcely a mine without some small portion of the one or the other.

It is more than probable that a great many deposits of Silver Ores would have been long since explored and made known, and some of them successfully wrought, had not the interdictory statutes, corporate grants, and injurious

monopolizing privileges, by depriving parties of their fair proportion of the resulting benefits, presented an effectual barrier to any active and proper investigation.

Some Kings of England have challenged or claimed all the mines out of which Gold or Silver could be extracted; in consequence of which there have been continual disputes between the Crown and the subject, and afterwards between the Corporation of Mines Royal and the subject; such as,—that between them and Sir Thomas Chaloner, relative to Copper Mines in Yorkshire, and that relative to other mines in that county, *from which the silver coinage called "Pudsey's coinage"* was extracted.

In mentioning the great trial between Queen Elizabeth and the Duke of Northumberland, Dr. FULLER, in his *Worthies of Cumberland,* observes, that "At the trial at law between these parties, it was resolved by *nine* out of the *twelve* judges, that though Henry the Eighth had granted the manor of Keswick, with all mines within the said manor, yet the mines could not pass; and although the grant of the manor was very good, the King could not alienate the mines." But CAMDEN's *Britannia,* p. 821, says, that the suit was carried

in favour of the Queen "*by reason of the mixture of the Gold and Silver* found in the veins of Copper." And Sir WILLIAM DUGDALE, in his *Baronage of England*, speaking of the Duke of Northumberland, says (p. 283), "The rich mine of Copper found in the lands of that noble lord *was adjudged a royal mine from the quantity of Gold and Silver it contained*, and *consequently* belonged to the Crown."

After the settlement of these disputes, followed many between the owners of the mines, the lessees of the Crown, and the Governors of the Corporation of Mines Royal; such as,—that between Sir Hugh Middleton and Sir Richard Price, concerning the mines at Tallabout, whether royal mines or not; that of Sir Charles Price and the Governors of the Mines Royal, relative to the productive mines of Estkyrkyr, which, after several trials at bar, was by a *noli prosequi* from the Crown given in favour of Sir Charles Price, and occasioned the following clause in an Act of the first year of the reign of William and Mary.

"No mine of Copper, Tin, Iron, or Lead, *shall hereafter* be adjudged, reputed, or taken to be a

mine royal, although Gold and Silver may be extracted out of the same."

The fifth of William and Mary states, that "notwithstanding the good provision of the Act of the first year of their Majesties' reign, many doubts and questions have been entertained, whereby great suits and troubles have arisen to many owners and proprietors of mines, wherefore, for the better explanation of such statutes, Be it enacted and declared, &c. &c., 'that any Person or Persons, subjects of the Crown of England, Proprietors or Owners of any Mine or Mines in the Kingdom of England, Dominion of Wales, or Town of Berwick-upon-Tweed, wherein any Ore now is, or hereafter may be, opened, found, or wrought, and *in which there is* Tin, Iron, Copper, or Lead, shall enjoy and continue in possession thereof, *notwithstanding such mine shall be pretended to be claimed to be a Royal Mine.*' "

This Act contains a Proviso that their Majesties and their successors, and all claiming Royal Mines *under them*, shall have the use of any such mine, other than *Tin Ore* in the counties of *Devon* and *Cornwall;* but paying to the proprietors or

owners of any such mines, within thirty days after such Ore is laid on the banks of any such mine, and *before* removal from them, the following rates, that is to say:—16*l.* per ton for Copper Ore; 2*l.* per ton for Tin Ore, except as excepted; 2*l.* per ton for Iron Ore; 9*l.* per ton for Lead Ore;—"*Proviso,* that nothing in this Act shall alter or make void the Charter granted to the Tinners of Devonshire and Cornwall, nor any of the liberties, privileges, or franchises, of the said Tinners, or to alter the customs of the stannaries of Devonshire and Cornwall, or any or either of them."

The exclusive grants and charters before-mentioned, and also the Act of the fifth year of the reign of Henry the Fourth, against the multiplying and extraction of Gold and Silver, operated so injuriously, and were so very pernicious and effective in checking a proper progress in the investigation or analysis of the various Ores and Minerals of the country, that Webster's *Metallographia*, p. 233, states, that "the Dutch, for a long time, came over to this country and bought Ores, which were sent to Holland to be smelted and refined."

It is true that some few persons in this country,

who were fond of the metallurgical art, procured specimens of Ore, and smelted and analyzed them experimentally, but then they were almost always ignorant of the actual locality of the Mineral, which was concealed by the proprietor or the grantees, who were both, in effect, debarred from working their minerals; first, by the charters given to parties of distinction, and subsequently, by the monopoly of the incorporated societies.

If the metallurgist found the mineral himself, or had it brought to him by some friend, he was compelled to be satisfied with his experiments upon it, and felt indisposed to communicate either its contents or the place from whence it came, as the law prevented him from exercising the art for the purpose of increase or gain. But, even if the law had not prevented a profitable conversion of the mineral containing either Gold or Silver, there was such a mal-administration of the Mineral Royalties, that there was almost every impediment to any available or advantageous operation. Even the Patentees and Company of Mines Royal, were so extraordinarily inert and inefficient for their object and duties, as to allow the Act of Henry the Fourth, against the multiplica-

tion of Gold and Silver, to be enforced and remain unrepealed until the first year of William and Mary.

At last, it was perceived that this Act of Henry the Fourth had been very injurious, and had caused the localities and contents of many valuable mineral veins to be kept secret and concealed; and therefore, the Act of the first year of William and Mary repeals that against the multiplication of the precious metals, in the following words:—

"Whereas by a statute made in the first year of the reign of King Henry the Fourth, it was, amongst other things, enacted, that *none* should use to multiply Gold or Silver, or use the craft of multiplication, and if any the same do, they shall incur the pain of felony; And whereas, since the making of the said Act, divers persons have by their study, industry, and learning, arrived at great skill and perfection in the art of melting and refining of metals, and improving them and their ores, *which very much abound in this kingdom*, and extracting Gold and Silver out of the same, but yet dare not exercise their skill in this realm, but exercise the said art in foreign parts, to *the great loss and detriment of this king-*

dom: Be it therefore enacted, &c. that the aforesaid branch, article, or sentence, contained in the said Act, shall be repealed, annulled, revoked, and for ever made void, anything herein contained to the contrary, &c."

This Act, together with that of the same year of their Majesties' reign (before mentioned), had a very beneficial influence, in inspiring such a confidence, and in inducing such an activity in mining operations, as never before existed; but, unfortunately, too great an eagerness to participate in an expected enormous gain, caused heedless investment and injudicious operation, and in many cases went near to create a reaction in the public prejudice. And, although several able and skilful persons afforded very valuable information and assistance, the distrust of mine engagements was still further promoted by the vain and impudent pretensions of many of the adepti, or alchemists of the day; some of whom scrupled not to offend both morals and common sense, by their impertinences and abortive attempts.

But if some of the alchemists exceeded the bounds of prudence or reason, and brought themselves into general ridicule, it must not be forgotten that it was very different with others, to

whom we are very much indebted;—as their researches and operations certainly very much progressed the science of metallurgical chemistry, and not only led an inquiry into mineralogical relations and position, but first presented the dawn of geognostic indication and dependence.

Well would it have been, had the importance of geological attainment been considered by all persons subsequently having the direction and practical management of mines, as it would have prevented much severe disappointment and loss; and instead of our Mine Captains being generally deficient in the requisite degree of mineralogical science, they would probably have advanced sufficiently to challenge an equality, if not a pre-eminence, in science, as well as—practical experience.

It will now, I trust, be perceived, that,—the unfortunate and unpropitious circumstances of *former* times, and the absence of a proper degree of mineralogical knowledge, together with an almost total deficiency in geological and chemical science,—have occasioned a species of prescriptive or traditional record of the uncertainty of Mine Operations. Fortunately, however, derivative knowledge has so totally altered the state

of things, that the prosecution of Mine Undertakings is no longer trammelled with that intricacy and geological uncertainty which have caused so many failures. Indeed, we may say, that from the experience and information derived by an insight into the geology, mineralogy, and practical operations, of the various mines, both of the *old* and *new* continents, and from the improved state of metallurgical chemistry and mechanical science, it is now hardly possible to think that we shall henceforth hear of disappointment or failure, occurring from natural difficulties or absolute unproductiveness; and that, under present circumstances, there can be no rational doubt of successful operation, in proportion to a *judicious selection* and *proper management.*

Among many mines in operation there may be an occasional loss causing a temporary fluctuation; but if there be, it will in almost every case be found to proceed from bad selection and adventitious cause, and from effects altogether independent and apart from the consequentials of judicious and equitable operations.

In conclusion, one may repeat, that of the matters and details spoken of,—some no longer exist; others are of comparatively rare occur-

rence; and the rest may be easily avoided by a slight exercise of common discernment. They have been alluded to with a wish to guard individuals from any possible repetition of suffering from such causes, and not in any feeling or intention to augment the prevailing misconception, by the exposure of difficulties and matters tending to deter persons from investing money in Mine Operations. These matters have been adverted to—with the view of proving the incalculable mischief which has resulted from *their former existence;* and it has been the desire of the writer to convince parties that their prejudices and misconception have not been caused by any *natural uncertainty,* or barrenness of the mineral deposits, but by *former mechanical* and *scientific* deficiencies, and an *injudicious* system of management, now no longer existing.

Y

Abbott -
An essay on
the mines of
England.1833.