Constant care in preparing charge and loading will avoid "missed holes." Next to warming powder with quick, dry heat, "picking out a shot" is the cause of the most fatal accidents. If a hole "misses" do not be in a hurry to return, and especially if the hole was tamped close. More accidents are caused from supposed missed holes than from actual. A small, sharp rock may be tamped into a piece of fuse, so that the fire will not pass that point for hours; this is often mistaken for a "missed hole." The hole is picked out, this particular rock removed, and an explosion follows. To fully demonstrate this, put some V-shaped clamps on a piece of fuse and see how long it will take to burn by certain points. Long after the fuse is supposed to be out, loosen the clamps and see how quickly it will "spit" at other end. Some holes do miss fire and have to be picked out. In these, great care should be exercised to clean down not nearer than 5 inches from cap, then reload with another charge, and, instead of using a small piece of powder, use plenty. A heavy charge on top may destroy the effectiveness of the lower charge, but it will explode it and get rid of a bad job. If the "collar" of the hole is simply blown off and the lower charge has not broken to the bottom of hole, do not drop in a drill or spoon to see "how much hole is left"; leave it alone as long as possible. The lower powder may have frozen, and all may not have been consumed.

Caps are charged with fulminate of mercury, one of the most violent explosives, and one of the most unstable chemically, and may explode from the slightest jar or least amount of friction. The caps at all times should be stored well away from the powder and at no time in or around a miner's pocket.

Powder should under no circumstances be stored underground. Poor ventilation with damp air will produce decomposition and decomposition explosion. There is practically no danger in transporting powder in cases; and especially when frozen. Even well thawed powder will not explode from any of the jars occasioned by wagon haul or pack train. A case dropped several hundred feet upon rock might explode, but separate sticks would simply break out of the wrapper and no explosion follow.

The Legitimacy of Mining.*

E. D. EDGERTON.

If the question as to whether mining is legitimate or not were submitted to any of us individually, or to those assembled around this board collectively, it is doubtful if there would be any other than a unanimous, affirmative answer. And still it is more than likely that fully 90 per cent. of the individuals giving this affirmative answer would recognize in their past experience and the observations that have come under their notice that a large portion of the entire world that is without and beyond the immediate confines of mining districts would give either a negative or an evasive answer to the question.

Years of experience in connection with mines and mining operations have fully convinced me of the entire legitimacy of mining. At the same time I have been persuaded that this view is not generally entertained by the moneyed and investing world. For years past it has not been a safe proposition for a western man to allow his eastern bankers to understand that he had much, if anything, to do with mining. Even the banks located in mining sections have had to be extremely careful not to allow it to be understood by their eastern correspondents that they had mining accounts. Until within the past year it would have been impossible in the large cities of the east to get any considerable proportion of the business men connected with financial matters, particularly banks and trust companies, to admit for a single instant that they were connected with any mining operation; and, indeed, you were a fortunate individual if you could get their attention sufficiently enlisted to warrant a thirty minutes' conversation upon the subject in any form whatsoever. They simply raised their hands in holy horror. Men who could cooly stand by and see the depreciation of fifty millions in the stock of a single railroad, and who could see the fortunes of a lifetime swept away from five hundred different homes and call it business, and the following day advance margins upon the collaterals that have been twice wrecked during the past week and still call it business, frowned with unswerving severity upon anything that bore the name of that rankest of rank uncertainties answering to the common denomination of mine, or mining.

This is not a theory, but a condition which the individual experience of many of us could vouch for. Now, where there is such a universal condemnation there must be a cause. Few were the men of any considerable means and business experience in the large cities who had not at some time or another in their past life had some experience with mining or mining schemes. There was scarcely a village or hamlet from the Missouri eastward to the Atlantic that had not at some previous time later than '49 been approached by the seductive smiles, the winsome manner and the beguiling tongue of the mining promoter. And reluctant as we may be to admit the fact, truth compels us to say that in 90 per cent. of these various experiences of hamlets and individuals the results had not been satisfactory. This does not in any way, in my opinion, militate against the business of mining, but it is a sad reflection upon the manner in which mining and mining schemes have been conducted. It would not be wise nor proper, in the brief space that is allotted me, to attempt to go into the details, by way of explanation, showing where in some instances incompetency of management, in others lack of funds, in others lack of intelligence, and in not a few cases actual rascality, have been the primary causes of these failures. It is enough to make the assertion, and in making this assertion we come face to face with the prominent feature of the proposition presented by the term, "legitimacy of mining;" and in the further discussion of this subject let us pause to consider what the effect of the admitted facts are upon the present and future, assuming for the sake of argument that the statements that I have made are literally true.

In the first place we are met with the proposition that more failures in mining occur through the lack of money for the proper development and placing of machinery than from all other causes combined. Inadequacy of capital is the breaker that has shipwrecked more mining ventures than all other causes. It may be laid down as a perfectly true, and I believe undisputed, proposition in a new country, and particularly in trying to solve the problems that confront the mining operator of this northwestern country, the necessity for additional capital is paramount. It may come in various ways; it may take the form of interesting partners of local reputation; it may be credit at the local banks; or it may take, as is quite usual, the form of interesting outside capital, which is but another name for floating a mining scheme or selling a property in non-mining sections of the country to capitalists.

Let this northwestern country once have solved the problem of securing the adequate money to develop and carry forward the mining work that lies before it, and you have transformed it with resources that will make this lovely city of Spokane not only a second Denver, but a doubly discounted Denver. Now, how can this best be done. In my opinion it all turns upon the one simple question of conducting our mining operations so that they will stand the test of legitimacy as a matter of fact; also, so that the world will recognize them as legitimate. In short, what we want is confidence; not confidence in ourselves, but the ability to create confidence in those who have money and are willing to back us in our operations.

I am not one who believes there is any lack of money. I would rather take the position of the old farmer who said "there was a great scarcity of collateral."

Just now the whole world—and for several years past it has been the same—is raising the cry of want of confidence. It is not necessary to go into a discussion of this subject even in a general way, but nowhere is it felt more potently and perhaps more deservedly than in mining operations. I do not believe there is any trouble in getting all the money that is necessary to carry forward any business that is recognized as legitimate, at less interest than ever before. All that we need to do is to convince parties having capital that the business represented is legitimate.

It would be unkind for me to take more of your time on this occasion by going further into the details, but having roughly hewed out these few lines, permit me in conclusion to say to this convention here assembled: First and always, let your efforts be to so conduct and carry forward the business of mining that there shall be no question as to its legitimacy and there will be no question as to the results.

*Delivered at the meeting of the Northwest Mining Association, February 22, 1896.

Mine Discipline.

Coal mining is necessarily a more dangerous calling than the average, but it requires only a glance at any of the reports of the various state inspectors of mines to convince the reader that its necessary dangers are greatly increased by the distressing lack of proper co-operation on the part of the workmen with the efforts of the employers to provide for the safety of human life and limb. It may seem a very small matter to John Hodge, miner, that he concludes to take out a few tons of coal easy to mine and handy to load, although orders have been given by the mine boss that it be left untouched. Similarly Evan Evans, company man, having work to do in the neighborhood of a door, finds that it gives him trouble to keep opening and shutting it during the prosecution of his work, and decides that it is mere crankiness on the part of his superior officer to insist on its being kept closed except when open for the passage of men and mules. So when the foreman's back is turned he may proceed to do as suits his personal comfort best. The unfortunate results of a fall of roof at an inopportune moment or of a disarrangement of the ventilating current producing an accumulation of gas and an explosion are not surprising under such circumstances.

It must be admitted that in days gone by many an accident has been due to lack of knowledge on the part of operators. Worse than that; lives have been sacrificed by the criminal neglect of employers who knew better, but who had rather risk the lives of their employees than spend the money necessary to render the workings and appliances secure. Those days are happily behind us now, and it is safe to say that, thanks to the beneficent effects of the mining laws of the various countries and states technical knowledge and a proper consideration for the safety of their laborers on the part of the operators is the rule and not the exception. Probably in nine times out of ten nowadays the provisions made for the protection of the men while at work are sufficient for any known contingency. Foremen and bosses and under-bosses and fire-bosses give a supervision that goes a long way toward counteracting the tendency to carelessness on the part of the workmen. But it has been proven on more occasions than one that even this close supervision by itself will not answer without a due regard for their own welfare being had by the employees themselves. It is passing strange that so many of them cannot seem to realise the importance of obeying the orders of the foreman. The welfare of the whole force depends on orders being properly carried out, and surely the fact that not only his own safety, but also that of all others in the mine, depends on the maintenance of strict discipline should have a greater effect than it does on the conduct of the underground worker.

In the beginning the mining laws were aimed at correcting the evils arising from ignorant and incompetent management of the mines. As matters began to mend in these respects the laws went further until in England and in some of the states, these laws now contain specific rules for the miners and underground workmen in general, these rules having penalties attached for their violation that are more or less strictly enforced. In the states that have not yet incorporated such regulations in their laws the need of so doing is being felt, and they will be added, let us hope, soon. A set of general rules can be made so as to fit the majority of cases likely to arise anywhere. But as an additional safeguard, special rules may be provided for to meet the local conditions of each colliery. Such special rules having been framed and adopted by the operator and having received the approval of the inspector of the district, are then to have the same force as if they were part and parcel of the mining law.

The intention of all mine laws and general and special rules is of course to render the work of the miner as safe as possible, and to maintain the necessary discipline every transgressor should have meted out to him the punishment to fit the crime. Unless the rules be enforced to the letter they are of very little value, and right here is where much of the trouble comes in, and where the mine officials as well are to be blamed. For a violation of a rule may often be attended by no serious consequences, and through a mistaken sympathy for the workman and those dependent on him the offence may be allowed to go without other rebuke than a verbal one, or perhaps left entirely unnoticed. This is wrong. The bars once let down, the whole fence of rules and regulations become valueless. Officials when besought to think of an offender's innocent family, should not fail to remember the equally innocent families of the many men whose lives were put in danger by the breaking of the rules. The greatest good to the greatest number is a principle that should be applied in such cases.

When the infraction of the law is one to be brought before the courts, punishment is perhaps even less likely to be had than when the offence is only one to be handled by the mine officials. For the eloquent attorney has a chance to ring in the wife and helpless children, and this is usually too much for the twelve men good and true who have the settling of the case. But it is believed that the tendency is towards a stricter code of rules and a more stringent enforcement of them. In the mining countries of England fines and imprisonments are of common occurrence, sometimes against operator, sometimes against workman.

The value of the strict discipline enforced in British mines is shown by the statistics of the mining industry in that country for the last forty or fifty years. In 1850 the first mines regulations act was passed. Several others have been enacted, each more strict than its predecessor. The early figures show that there was a yearly average of one fatal accident to every 233 employees; while in recent years, thanks largely to those features of the laws requiring strict discipline, the fatalities have decreased to but one for every 533 workmen.

Illuminants Used in Mines.

At a meeting of the Chesterfield and Midland Counties (England) Institution of Engineers, Mr. A. H. Stokes, H.M., Inspector of Mines, read a paper entitled "Photomeric Value of and Notes upon Various Illuminants Used in Mines," of which ad-