REPORT

of the

Ohio Coal Mining Commission

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COLUMBUS, OHIO, December 17, 1913.

HON. JAMES M. COX, *Governor of Ohio.*

DEAR SIR: — The Ohio Coal Mining Commission, appointed by you under the terms of the Joint Resolution adopted by the last session of the Legislature "to investigate and report an equitable method of weighing coal at the mines when the employees are to be paid for their labor on the basis of weight, measure or quantity and that will at the same time be to the best interest of the consumers and protect the coal measures of the States", begs leave to submit the following report.

PART I — CONSERVATION OF COAL RESOURCES.

ORIGIN OF COAL.

It is now generally admitted by geologists and by all scientific men who are entitled to give their opinions on the subject that coal was originally vegetable matter transformed into its present state by the action of water and heat and by the enormous pressure, exerted through long ages of the earth's history, of the over-lying deposits of mud, sand and other inorganic material. It is also generally conceded that "the vegetation which formed the coal grew where it is now found."[1]

The nearest analogy to the formation of the coal seams is that of the formation of the peat bogs. The vegetation which formed the coal originally grew on low lands near the sea and at about the sea level, and these swamps became gradually covered by sediment brought in from the adjacent sea and, at times, by sheets of limestone which grew in the waters. As these swamps containing their vegetable deposits gradually subsided, new vegetable growths sprang up on the over-lying mud and sand and were in turn covered by sandy deposits and thus formed the basis of new seams of coal. The first deposits of mud and sand in the course of time changed under pressure to shale and sandstone while the vegetable matter in the peat bogs changed to coal.

The swamps were not everywhere equally deep and vegetation formed more rapidly in some parts than in others so that the thickness of a seam of coal is by no means uniform. Furthermore, the growth of vegetation occasionally ceased for one cause or another and thin layers of mud were washed in. In this way were formed the bands of impurities frequently found in a given coal seam.

Coal, it has been said, is transformed vegetable matter. But plant growth is itself due to the storing up of sunlight through the agency of vegetable cells. Coal is therefore in final analysis merely stored-up sun power. Forests and peat bogs are also examples of stored sun power but they "shrink into insignificance when compared with the coal seams of the geological scale, which represent the forests and the peat bogs of earlier ages in the earth's history."[2]

"Sir William Dawson estimates that a foot of coal requires for its origin the patient growth and slow decay of a hundred of the forests

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[1] Edw. Orton, "The Coal Fields of Ohio," Geological Survey of Ohio, Vol. VII, p. 256.

[2] Orton, *loc. cit.* 265.

out of which it was formed, for of this vegetable growth only a remnant was saved. For many thousands of years, for every foot of coal, we can be sure the sun must have poured down its floods of light and heat upon these carboniferous swamps. The light and heat were absorbed there in the processes of plant growth, were locked up in leaf and stem and spore, were buried beneath the sediments of an advancing sea, were converted at last into stone, became a part of the earth's crust, but still retaining their original nature, still containing, literally and truly, the light and heat, the *power* of the ages of the early world in which they had their birth".[3]

As this Report is intended to be practical in its nature, for the instruction and guidance of law-makers, such a reference as we have just made to the origin and nature of coal would be out of place here were it not for the lesson which it teaches, viz. that in dealing with a natural product like coal *the people of Ohio are rapidly exhausting their supplies of a mineral which it has taken ages on ages to produce and which can only be reproduced by the same slow process.* Furthermore, the commodity which they are thus rapidly consuming is the one which lies at the foundation of our industrial progress. For a century or more the steam engine has been the chief productive instrument in both manufactures and transportation. But the steam engine and locomotive would have been powerless had it not been for the coal which they have consumed. No other fuel or power known to man has ever been able, or is now able to take the place of coal in these great industries. For some purposes wood, oil and natural gas have been substituted for coal but these substitutes are even shorter lived than the coal deposits. To quote again the words of that eminent authority, the late Dr. Orton, State Geologist and President of the Ohio State University, — "We are unable to see how the world can maintain the astonishing rate of progress which has been established within the last fifty years if our coal resources are cut off or materially reduced. But coal is not a mineral of indefinite amount, like limestone or sandstone or clay. On the contrary, its stocks are sharply limited. This fact, taken in connection with those already named, lays upon us the imperative obligation to make every pound of it go as far as it can; do all the work of which it is capable."[4]

COAL RESOURCES OF OHIO.

Having emphasized the need of conserving our coal deposits, let us turn our attention next to the question as to what are the coal resources of the State of Ohio.

The coal measures of Ohio are embraced in the great Appalachian Coal Field which extends through portions of nine different states and

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[3] Orton, *loc. cit.* 265.

[4] Orton, *loc. cit.* 267.

occupies an area estimated by various writers at from 50,000 to 60,000 square miles. Something like 10,000 square miles of this area are situated in Ohio and over one-quarter of the state is underlain with coal-bearing strata.

To say, however, that the coal fields of Ohio cover an area of 10,000 square miles is by no means to say that mineable coal is to be found under every one of these 10,000 square miles. There are large areas within the general field which, although the rocks go back to the Carboniferous age, contain no coal seams whatever. The coal seams either did not form or else they were removed by the processes of denudation or oxidation which went on for millions of years after the continents had worked their way above the level of the sea.

There are other areas, considerable in size, which, while they contain coal, are deficient in workable seams. The seams are either too thin or they have been so broken and filled with impurities that they have no economic value and will not justify the expense of working. To say, therefore, that Ohio has or did have 10,000 square miles of coal lands is an entirely erroneous statement.

There are within the State of Ohio fifteen or more seams of coal, formed in the manner described above, and varying in thickness from a mere black mark to a dozen feet. No one of these seams, however, is to be found in all parts of the ten-thousand-mile area mentioned above. Since the coal-bearing area was originally an arm of the sea or gulf around the shores of which were formed the swamps which were the nucleuses of the coal measures, and since the water in this sea was gradually expelled by the raising of the floor of the gulf, it does not follow that there are fifteen seams of coal, throughout the area, one seam being superimposed on top of another. Such a condition of affairs would have given us, Dr. Orton thinks, one hundred times as much coal as we possess. It would mean that in the centre of this gulf were to be found rich seams of coal at very great depth and that the upper seam covered an area equal in dimension to that of the entire gulf of which the coal-bearing area was formed. The facts, however, do not bear out either of these suppositions. Coal is found nowhere in Ohio at a greater depth than six or eight hundred feet, and the width of each seam of coal as we proceed from the circumference to the centre of the gulf is only about twenty or thirty miles. Some of the seams of coal are found, one above another, the intervening space being filled with sandstone, shales, limestone, iron ore, etc. In other cases, however, only the one seam is found, while throughour vast portions of the Carboniferous area, as has already been stated, no coal whatever is to be found.

There are, according to the late Dr. Orton, from fifteen to eighteen fairly persistent coal seams in Ohio which justify mining in either a large or small way, but only ten of these seams are really important.[5]

The classification of the coal seams of the Appalachian Field was originally worked out by Professor Lesley, a Pennsylvania geologist who designated each seam by a letter of the alphabet, the letter A being applied to the lowest seam. This classification was adopted in Ohio by Professor Newberry who, however, designated the seams by numbers, the numeral 1 being applied to what he supposed to be seam A of the Lesley classification. It so happened, however, that all the facts as to the Ohio series had not yet come to light when Newberry wrote. His system of numbering had, however, come into popular use and has continued to be used by the mining population. In this way it has happened that some "valuable seams were left without a number and again the same number was given to different seams and one and the same seam received different numbers in different localities."[6]

There is, therefore, a considerable variance between the scientific and popular classification of Ohio coals. For the purpose of this Report it seems best to adopt the classification and numbers in common use by the people living in the coal-mining communities, as these are the numbers used in references to the various seams made by witnesses appearing before the Commission.

Seam No. 1 or the Sharon Seam, the lowest seam in Ohio is now chiefly mined in Stark county and in Jackson county. Some of the names given to this coal as a result of local usage are Brier Hill coal, Massillon coal, Wadsworth coal and Jackson Shaft coal. It is one of the best coals of the state, breaks very little in handling, makes little slack and always commands a good price. The late Dr. Orton, in his report gave it the first rank among Ohio coals.[7]

It was for twenty-five years in the early days of mining the most important seam mined but the seam is now almost exhausted and all of the mines operating in this seam are small affairs. The basins in which coal is found are of small extent, seldom exceeding two hundred acres. In the Massillon field of Stark county shafts of considerable depth are required to reach this seam of coal. The coal itself is so hard that most miners object to under-cutting it with picks and as the use of coal-cutting machines is oftentimes impracticable owing to the hardness of the coal and the uneven floor, the coal is usually "shot-off-the solid", as the miners term the practice of blasting down coal which has not

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[5] Orton, Geological Survey of Ohio, VII, p. 269.

[6] *Ibid,* p. 269.

[7] *Ibib,* Vol. V, p. 151.

been under-cut. The days of coal-mining in this seam are about over as the deposits now being mined are nearly exhausted and there is no considerable body of this coal of a thickness sufficient to make mining worth while which has not already been attacked.

Seam No. 2 or The Quakertown Seam, is found in a thickness suitable for mining chiefly in Jackson and Vinton counties, where it is locally known as the Jackson Hill coal or the Wellston seam. The coal from this seam is of "unusual excellence" and is low in ash. It burns up rapidly and therefore requires careful stoking. On account of its purity it is in great demand, especially for steam purposes. The coal is soft and it therefore breaks easily in handling and tends to mine small. However, the nut coal commands a price but little below that of the lump coal.[8]

Although this seam of coal can not be regarded as one of the important ones of the state it has been extensively worked at a few points during the last forty years and there are still some mines operating in this seam. The coal is chiefly consumed within the state or is purchased by the railroads for use in locomotives. Owing to its softness it is not suitable for the Lake trade.

Seam No. 3 or The Lower Mercer Coal, is in some places known as Blue Limestone or Flint Ridge Cannel coal. It appears in many places but there are only a few points at which it offers any encouragement to mining even for neighborhood use. Such mining of this coal as does take place is for the most part confined to Mahoning and Carroll counties, and even here only a few thousand tons are produced each year. "Where thick enough to justify mining, as far as this factor is concerned, the seam is so mixed with slate, as to be a most unsatisfactory fuel. It is safe to say that the Lower Mercer coal will stay in the ground until fuel of all sorts becomes more scarce and more valuable than it is at the present time."[9]

Other seams of coal which are entirely unprovided for in the popular classification by numbers are the Upper Mercer (No. 3a) and Tionesta (No. 3b) coals. The Upper Mercer is mined to some extent in Vinton county near McArthur, but, like the Lower Mercer, it contains so many impurities that at present it can not well enter into competition with other coals. The Tionesta seam is mined to a slight extent in Tuscarawas and other counties but the yield is insignificant and the seam has little value in Ohio.

Seam No. 4. There is some difference of opinion as to whether we should apply the number 4 to the Clarion seam or to the Brookville seam—two entirely distinct seams.

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[8] Orton, *op. cit.* VII, 274.
[9] Orton, *op. cit.* VII, 275.

The Clarion or Ferriferous limestone coal is mined in Vinton, Jackson, Gallia and northern Lawrence counties, where it is regarded as an important source of fuel for both domestic and steam purposes. It breaks easily and is not suited for shipment to distant markets.

The Brookville coal is mined in a small way in Stark county and perhaps elsewhere. It is used chiefly for steam purposes. "It adds so little to our fuel resources that it would scarcely be missed if it were dropped from the scale."[10](2)

Seam No. 5, or The Lower Kittanning Coal. This is a fairly important seam and is mined in many localities where it is known by various local names. In northern Columbiana county it is known as the Leetonia Coking coal and makes excellent coke. In southern Columbiana and in Jefferson counties this coal and the clay which underlies it are frequently mined together and the clay is the more valuable of the two. This same seam appears in connection with another valuable clay vein in Tuscarawas, Carroll, Muskingum and Coshocton counties.

The quality of this coal varies greatly in the different localities in which it is mined. In some places it is relatively free from impurities but elsewhere it contains much foreign matter especially sulphur. The coal also mines small. It is tender and does not bear handling well. It is nevertheless an important seam especially when taken in connection with the accompanying clay resources.

Seam No. 6 or The Middle Kittanning.. This is one of the most important coal seams in the state. Although it is found and mined in many counties and bears many local names, it is in connection with the Hocking Valley that this coal is best known in this and other states. For many years the production of coal from this seam exceeded that from any other seam. Within recent years it has been passed by the Pittsburg, or No. 8 seam, which now holds first place among Ohio coals, at least as far as the quantity produced is concerned. The thickness of this seam of coal in Ohio varies greatly but where mined it usually ranges from four to seven feet in thickness and there are places where it runs as high as thirten feet. It bears handling well when it is carefully mined and for this reason it has long been an important constituent in our Lake trade.

The chief defect of the Hocking coal is the amount of impurities which is found in the seam. There are, separating the three portions or "benches" of the seam, bands of slate varying in width from one-half inch to four inches. These bands must always be removed as must also the bench of "bone coal" which is of such inferior quality that at present it is unsaleable in any large quantity. There are also other impurities in the coal. To remove these impurities it is necessary to

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[10] Orton, Geological Survey, VII, 27.

break the coal more or less so that a larger amount of fine coal is made than would be necessary if the problem were only to take the coal out of the ground.

The coal from the No. 6 seam is used for a great variety of purposes; for steam generation, for making gas, for iron making and as a domestic fuel. For many years its chief use was in the blast furnace but since the decline of iron-making in the Hocking Valley, it has found its most important market in the Northwest, to which it goes by boat from the lower lake ports. In the Northwest it is used largely for domestic fuel but the railroads are also large purchasers of this coal. As competition in these markets with coal from other states is especially keen. it is necessary for the operators in No. 6 to take care to secure a coal free from impurities and mined in large lumps, especially if the coal is to be used for domestic purposes.

Another seam of coal not provided for in the popular numerical classification is the Lower Freeport (6b). It is extensively worked around Steubenville where it is known as Steubenville Shaft coal, near New Lisbon, where it is the Whan seam, and in Lawrence county, where it is called the Hatcher coal. Around Steubenville it is an excellent coal but in Southern Ohio it is nowhere of the highest quality. It does not handle well and does not enter into distant markets.

Seam No. 7, or The Upper Freeport. This is the third in importance among Ohio coal seams. Although mined to some extent in other counties, the two counties, in which the greatest operations take place are Guernsey and Carroll. In thickness this seam is normally from five to six feet. It is a good steam coal but does not take high rank among domestic fuels. The seam is seldom pure but contains sandstone channels which occasion what the mined terms "wants" or "horsebacks" and which interfere with the working of the seam. There is also mixed in with the coal slate-partings or binders and oftentimes clay veins. This coal is lacking in physical strength and will not stand transportation well. It is therefore used mainly for steam production. It is often sold on a mine-run basis, although the coal is screened in order to ascertain the amount of lump coal which is taken as the basis for determining the miners' pay. Thirty years ago Dr. Orton predicted that in a quarter of a century the No. 7 seam would "be in the lead of our coal seams in production"[11] but this prediction has not been fulfilled and the No. 7 seam is now in third place rather than in second place as it was at the time Dr. Orton wrote.

Seam No. 8, or The Pittsburg Seam. We come now to the most important of the Ohio seams, which has only within the last decade come to surpass the numbers 6 and 7 seams in output. There are two important and distinct areas in Ohio in which this seam is mined. The first is in Belmont and Jefferson counties; the second in Meigs, Athens

[11] Orton, Geological Survey of Ohio, VII, 281.

and Morgan counties. Between these two areas there is a break filled in with sandstone.

The Eastern Ohio division of the Pittsburg coal seam has two parts, a roof coal and a main coal. The roof coal contains so much shale that it is of no commercial value. Between these two parts of the seam there is about one foot of fire clay, constituting the dangerous "draw-slate", as the miners term it. When exposed to the air it tends to break loose from the overlying coal and it is the fall of this draw-slate which is responsible for so many fatal accidents in the Eastern Ohio field.

The main body of coal is "a thoroughly approved steam coal and is especially valued for steamboat use because of the readiness with which it is kindled. It also ranks high as a domestic fuel, and, taken all in all, is a welcome addition to any market."[12]

Like the No. 6 seam, however, the Pittsburg seam has several bands of slate and it requires to be carefully mined in order to remove the impurities. It breaks up in blocks of a fair size and bears transportation fairly well when carefully handled. Like the Hocking coal, it enters largely into the Lake trade and holds its own in competition with other coals in this market only when it is properly mined and cleaned.

The Southern Ohio division of the Pittsburg coal seam is chiefly mined in Meigs county under the name of Pomeroy coal. Its main coal stratum is only from 42 to 48 inches thick and this alone is mined. The Pomeroy coal has long been recognized as a good fuel for steam and domestic purposes and at one time it formed the basis on which an important salt manufacture was established in the Ohio valley.

The Pittsburg seam seems likely to be the longest-lived of our Ohio seams. Provided that measures are taken to conserve this coal it should continue to be mined for many years.

It should be apparent from this description of the various seams of coal that not all coal communities have the same concern in the continuance of the present screened-coal system. It is true that the screen is in general use throughout the state, because the contracts between miners and operators are based on the amount of lump coal produced. In some districts of the state, however, a change to a mine-run system could make but little difference to the operators, for the coal is either so hard, as in Seam No. 1, for instance, that good marketable coal would be produced even on a mine-run basis, or it is so soft that it is not demanded for domestic use, and for steam use it is not so important to have large lumps.

It is in the two great mining districts of the state, Eastern Ohio and the Hocking Valley, that the adoption of a mine-run system would pre-

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[12] Orton, *loc. cit.* VII, 286.

sent the most serious problem. The coal from these districts, it has been said, enters largely into the Lake trade and there meets the competition of coals from West Virginia and Kentucky, where the miners are for the most part unorganized and where the rates of pay for labor are much lower than in Ohio. In many respects the coal from these states is superior to the Ohio coals and there is but little difference in the combined lake and rail rates on coal from the Ohio and West Virginia fields. On the other hand, the Ohio coals meet the competition of Illinois and other Western coals which, while generally inferior to the Ohio coals for domestic uses, have an all-rail shipment and are therefore less liable to breakage in transportation. Unless the Ohio coals are carefully mined and are reasonably free from impurities they will reach the Northwest in a less satisfactory condition than the coal from other fields, and in such a keenly competitive field the margin of profit is very low. There is great danger, therefore, that unless, under a mine-run system, the operators can be guaranteed clean coal mined in such a way as to bear transportation in large lumps, the Ohio coals from seams numbers 6 and 8 would soon be driven out of their most valuable markets.

METHODS OF MINING AND THE CONSERVATION OF COAL.

Sufficient was said in the opening paragraphs of this Report to show the nature of coal formation and the need that great care be used in mining and using this valuable and apparently even indispensable product, if industrial progress is not to be impeded for lack of fuel, and if future generations are not to be deprived of the use of one of our most important natural resources.

Even with care, the no-distant future is likely to see the necessity of mining thinner veins of coal than are now being mined, of mining coals of inferior grade which at present are not being mined because of their impurities and low heating values, and of re-opening abandoned mines for the sake of extracting the coal which was left in the ground when the mine was deserted. While these things are not *impossible*, they cannot be done without a very great increase over the present cost of mining and to say that the cost of getting fuel is to increase is the same as saying that the cost of conducting industry and transportation as well as the cost of living is to increase by at least an equal amount.

The members of this Commission, as they have gone about in their investigations in different parts of the state, have repeatedly had called to their attention in a most startling manner the enormous waste of coal which is being caused by the present system of mining. They have also been convinced by their observations of mining in other states that this waste is for the most part unnecessary; that it is possible to mine coal, under conditions as difficult as now prevail in Ohio, in a manner which tends to bring out all, or nearly all, the coal in the ground, and, while

it is impossible to prove this point at the present time, it is the belief of the members of the Commission that changes can be introduced in the methods of mining coal in Ohio which will not only conserve in a large measure the coal that is now being left in the ground but which will accomplish this result without any considerable permanent increase in the cost of mining.

Article II, Sec. 36 of the Constitution of the State of Ohio, which was recently adopted by a vote of the people of this state, authorizes the legislature to enact laws necessary to preserve the natural resources of the state.

The Joint Resolution creating this Commission instructed us to consider, among other things, what influence an equitable method of weighing coal at the mines would have on the question of the conservation of the coal measures of the state. We believe that there is a very close and necessary connection between the system of weighing coal and paying for the labor of producing it and the methods of mining employed, and we hope later in this Report to be able to show that this is true. That the question of conservation is directly dependent on the methods of mining employed we shall now undertake to prove.

While we appreciate that it is only by a very liberal interpretation of the scope of the investigation laid down for this Commission by the Joint Resolution authorizing its appointment that the whole question of conservation is taken up in this Report, we feel that we should be derelict in our duties if we did not bring to the attention of the Governor and through him to the Legislature what we have learned with regard to the waste of coal now going on in this state and the possibility of preventing this waste by adopting systems of mining elsewhere found successful in preventing such waste.

We have had occasion several times to quote from the reports of the late Dr. Orton, made in his capacity as State Geologist. No one appreciated better than he did the enormous waste of our fuel which was going on at the time he wrote, and no one has written stronger words of warning concerning the dangers which we are facing from this source. "We are guilty," he says, "of the grossest and most reckless waste in all our dealings with coal, in mining, in marketing, and in utilization. The treatment that this precious form of wealth is receiving at our hands is a disgrace to our civilization."[13]

One of the wastes to which Dr. Orton referred is that caused by mining only one seam of coal where there are two or more seams, one above the other. One seam is usually inferior to the other, either in the quality of the coal or in the thickness of the seam. In such cases only the better coal is mined and the other is left in the ground. If the one which is mined is the lower seam, the upper seam is soon rendered valueless because the

[13] Geological Survey of Ohio, VII, p. 267.

roof has fallen in and the upper seam has become broken and so mixed with impurities that it will not pay to work it.

Another source of loss is due to leaving in the ground the upper portion of a thick seam of coal. This is inferior in quality to that which is taken out and the operator does not wish to incur the loss resulting from the depreciation of the value of what is extracted by mining along with it the upper portion of the seam. The rejected portion is, however, said Dr. Orton, better than the best coal that is produced in the entire coal fields of some of our Western states.

Another source of loss to which Dr. Orton referred, is now, happily, passed. This was the waste of the slack or fine coal, which until recent years had no marketable value. Even now it is worth much less than the lump or the nut of a good size. It is important, therefore, that the coal be mined with the utmost care so as to reduce to a minimum the amount of slack.

"The greatest loss of all", says Dr. Orton, "results from the failure to take out all the available coal in the operation of mining".[14] This statement is as true today as it was in 1893, when Dr. Orton penned it, and it is this loss to which the Commission desires to call the attention of the Legislature, with the hope of securing a remedy.

It is not possible to secure a complete remedy for this loss by the legislation of one state. In a large degree the loss caused by an improper system of mining is due to the low price at which the coal is sold. The inferior grades of coal are usually sold in large quantities to large consumers, especially to the railroads. The price which is received for these coals is always low and is oftentimes below the actual cost of mining, if the profits of mining have to be derived from this grade alone. The situation is the same in other states as it is in Ohio. It is the keen competition to dispose of the fine coal and of the inferior grades of coal which makes it possible for the railroads and large manufacturing establishments to secure their fuel at such low prices.

Under our drastic anti-trust laws, both national and state, any combination among producers intended to fix prices of coal is illegal and heavy penalties are provided for violation of these laws. Recent decisions of the courts have made possible the strict enforcement of these laws and the Federal Government has evinced a strong disposition to enforce them against all classes of producers. A number of the witnesses who have appeared before this Commission were strongly of the opinion that were it possible to permit combinations of producers for the purpose of fixing reasonable prices of coal, under the strict supervision of a Federal Commission, following the practice which has been adopted in Germany, it would be preferable to the existing conditions which compel the operators to secure their profits from the lump coal, thus forcing prices abnormally

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[14] Geological Survey of Ohio, VII, p. 268.

high on this grade of coal in order that it may be possible to dispose of the fine coal at the low price which the large consumers are able to secure under unregulated competition.

The Commission believes, however, that it is possible for the State Government to provide a remedy in part for existing conditions, viz., so to control the system of mining in this state as shall make it possible to get all the coal out of the ground. We have already observed that the failure to take out all available coal causes the greatest loss under present conditions.

How this loss occurs is well brought out in the testimony before this Commission of Edward Orton, Jr., Dean of the College of Engineering at the Ohio State University, who succeeded his father as State Geologist, and who, in addition to such information as he would naturally acquire in his official capacity, has a first-hand knowledge of mining. His testimony shows that he has himself worked in and about coal mines and that at the time he "had daily familiarity with the operations of the mines and with the maps of mines". In his testimony before the Commission (Proceedings of the Ohio Coal Mining Commission, pages 1092-1094), Professor Orton describes the situation as follows:

"I think that if I could summarize my information I would say like this, that when I was connected with the mining industry, the amount of coal, — the proportion of the coal which was mined there and which was taken from the hills and sold—was a low percentage, a lower percentage than I thought it ought to be. I think, judging from memory, that the maps of the mines with which I was familiar, probably twenty or thirty different mines, showed that they had not extracted above sixty percent of the coal that they had mined there. I doubt if it was quite that. There were many places where there were considerable areas left and the habit at that time was to run their entries right ahead, without leaving any very large block pillars at any point in the mine, so that they could not go to work and draw pillars from areas over which they had finished the mining for fear of starting a squeeze on the mine as a whole. The result would be that they would hasten to try to work out all available coal from that portion of the hill or property, and then if they could, would draw the pillars and entry stumps back and in that way would get some return of the pillar coal but not a large proportion. Generally the pillar coal would be more or less rotted and the roof would oftentimes have started to squeeze. Before they would attempt to mine the pillars the posts would have rotted and the result would be that the mine would be in a bad physical condition to attempt to draw the pillars by the time they get back to it. The result would be that they would get very little pillar coal. That is not always the case but it is generally the case, in my observation. I have been told that these conditions have been remedied to some extent but as I have said I am not now examining mines and do not

know to what extent that may be true. It was not true at that time that they were doing very much in the way of mining out the pillar coal and the pillar coal by actual areal measurements constituted a very considerable percentage of the total."

That conditions have not greatly changed since Professor Orton worked in the mines or even since he was State Geologist, is shown by the testimony of the present State Geologist, Professor J. A. Bownocker. In his testimony before the Commission, in answer to the question as to what opinion he could give that might be of value to the Commission in the matter of conserving coal, he said, (Proceedings, page 1113), "The two things that I have in mind are, first, the working of thinner seams of coal where they overlie thicker seams, and that the underlying thicker seams be not worked in such a way as may render the overlying seam worthless by reason of the rocks falling in below. That is clear of course to all coal men. Now the other one is, leaving a smaller proportion of the coal underground. That is a very pressing question."

Professor Bownocker gave it as his opinion that from 25 to 35 percent of the coal in the area mined was at present being left in the ground. (Proceedings page 1114).

Professor Frank A. Ray, Professor of Mining at the Ohio State University, and a mining engineer of great experience, gave it as his opinion that about 30 or 35 percent of the coal was being left in the ground when an area was mined over only once (Proceedings 1146-47). Inasmuch, however, as some of the larger companies are now planning to go over their territory a second time and take out the pillars as far as possible, Professor Ray was inclined to think that on the average the amount of coal left in the ground would not exceed 20 percent in the Hocking Valley, and slightly more than that in Eastern Ohio, where the roof is bad. It should be noticed, however, that Professor Ray's opinion is of necessity based on his experience with large companies who employ experienced mining engineers in connection with the operation of their mines.

In our travels throughout the state, it was the testimony of most men engaged in the operation of mines with whom we talked that in the mines which they were operating, as well as in others with which they were familiar, from 35 to 40 percent of the coal was left in the mines in the shape of pillars, ribs, stumps, etc., and that no plans had been made to withdraw these pillars and ribs to any considerable extent. At times the percentage of coal left underground in some of the mines we visited ran as high as 40, 45, and even 50 percent, and this does not include the inferior grade of coal,—the "bone" coal, as the miners term the upper stratum which, under the present condition of mining, is intentionally left underground.

DIFFERENT SYSTEMS OF MINING.

In order to appreciate properly the possibility of conserving coal in Ohio by a change in the methods of mining, it will be necessary to give a brief and non-technical description of the various systems of coal-mining which are employed in this state and elsewhere.

There are four general systems of mining employed in this country, all of which have been derived from British practice.

1. The first system, and the one which at the present time is more largely employed in Ohio than any other, is the *wide room and narrow pillar system.* Under this system the mine is laid out by driving from two to four entries from the foot of the shaft opening, if it be a shaft or slope mine, or from the opening on the side of a hill, if it be a drift mine. These entries are known as the main entries and are intended both for the transportation of the coal to the surface and for the circulation of air. From the main entries the butt or productive entries are driven, either at right angles to or diagonally from the main entries. The distance between the butt entries varies with the nature of the seam of coal and other conditions. From the butt entries on each side are laid off rooms or working places. These rooms are usually much wider than the pillars left; it being the intention to take out as much coal as possible when the mine is gone over and to leave in the pillars only as much coal as is necessary to sustain the roof. The width of the pillars varies, of course, according to the nature of the roof and the weight of the overlying strata. Wherever the coal lies near the surface, relatively thin pillars will suffice but wherever it lies to a greater depth underground, as is the case with most of the Ohio coal seams, the amount of coal which it is necessary to leave in the pillars is a very considerable proportion of the total coal in the area covered.

If an attempt is made to take out too much of the coal the weight of the overlying strata is such that there is produced what miners know as a "squeeze". Either the overlying strata press down upon the pillars, crushing them, or the floor "creeps", producing the same effect upon the pillars. It is very difficult, oftentimes impossible, to prevent either a "squeeze" or a "creep", and even where it is possible, it can be done only at a very great expense of timber in addition to the labor cost of putting in the posts.

There are several reasons why it is seldom practicable, under this system of mining, to go back and extract or draw the pillars after once the mine has been worked over. In the first place, it is extremely dangerous to do so, for any weakening of the support caused by the withdrawal of the pillars is likely to cause a "squeeze" or "creep" as above mentioned. In the second place, the coal which has been left in the pillars has been subject to such great pressure that it is in a crushed condition when the pillar is drawn and is, therefore, of little value.

One of the chief defects of the screened-coal system of payment, as we shall later see, is the fact that the miners are unwilling to work the pillars under present conditions of mining, since they produce so much slack in proportion to the amount of lump coal; the miner being paid only for the lump coal, under the screened-coal system.

The amount of coal which can be recovered under the system of mining which we have just described will vary greatly, according to the thickness of the seam, the nature of the roof and the depth of the mine. It very rarely happens that more than 75 per cent of the coal is taken out of the mine under this system, and more often in Ohio the percentage would fall to 65 or less.

Another defect in the system of mining is that the coal left in the pillars is subject to deterioration, due to exposure to the air. This of course affects only a small portion of the pillars but the proportion is naturally much greater in thin pillars than it is in thick ones.

2. The second system of mining is the *narrow room and thick pillar system.* Here the pillars are left of extra thickness and strength, with the object of withdrawing them after the rooms have been finished. In this system, after all the rooms have been worked out, the mining proceeds from the far end of the mine, the pillars being worked back and the miners retreating under the protection afforded by the remaining pillars.

It is rarely possible under this system to withdraw all the pillar coal. The pillars are usually trimmed down to a narrow width and under favorable conditions ninety per cent of the entire seam may in this way be recovered. It is seldom, however, that so large a percentage is obtained. In general, probably not more than seventy-five or eighty per cent of the total coal is secured, although it is obvious that this is a much better showing than the fifty-five to seventy-five per cent which is about all that is won under the thin pillar system. Many of the best mines in Ohio are today being worked under this system of mining, and for this reason it is probable that a better showing is being made in the way of extracting the coal underground than at the time Dr. Orton wrote the reports to which we have referred.

3. The third system of mining is what is known as *the panel system.* The mine is laid out in large districts or panels, each being several acres in extent, and large pillars, known as the "barrier pillars" are left surrounding the area being worked within each panel. The thickness of these barrier pillars varies according to the nature of the roof, the area to be excavated, and the weight of the covering, but it is not unusual for the barrier pillars to have a thickness of two hundred feet or more.

The heavy barrier pillars tend to prevent the "creeps" or "squeezes" so common under the room and pillar system, and they afford protection to the miner who is attempting to withdraw the room pillars.

Under this system of mining, it is usual to drive the main and butt entries to the far corner of each panel and to draw the pillars as soon as the rooms are exhausted. For purposes of protection, it is also customary to leave thicker pillars than are left under the ordinary room and pillar system. Indeed it is usual to leave pillars much thicker than the width of the rooms themselves. This not only affords protection in mining but leaves the pillar coal in much better condition. In withdrawing the pillars the roof is allowed to fall, so that as the work recedes the coal is all taken out of the panel and the worked-over area is filled in by the falling rock.

This system is not entirely practicable where the surface is level and is very valuable for agricultural purposes. In the State of Illinois, the Commission visited several mines worked on the panel system in which the pillars had not been withdrawn because the surface was worth from $200 to $300 per acre, and if the worked-over area had been allowed to subside by the withdrawing of the pillars, it would have made drainage very difficult, if not impossible, and would thus have ruined the land for agricultural purposes. In a hilly country, however,—and most mining districts in Ohio are in the hills,—this objection to the panel system would not prevail, for the land surface in our mining districts is not so valuable as in Illinois, and even if the surface were affected by the subsidence of the mined-over area, there would still be natural drainage and the utility of the land would not be affected.

After the coal has been taken out of a given panel, the barrier pillar is itself attacked and is worked out by the retreating system in the same way as was practiced in working out the panel itself.

The greatest economy of the panel system of mining results from the fact that under it practically all the coal is taken out of the ground. This system of mining, with the resulting saving in coal, is fully described by Professor Ray in his testimony before the Commission. (Proceedings, pages 1119 ff). Professor Ray therein describes the work accomplished in certain mines which he had laid out on the panel system and in which the percentage of coal recovered varied from 89 to 95 per cent of the total coal in the area mined over.

At Gary, West Virginia, the members of the Commission were shown mines being operated by the United States Steel Corporation under leases granted by the Pocahontas Coal and Coke Company, in which the panel system of mining is being followed and where the percentage of coal recovered varies from 90 to 95 per cent. Engineers of the Pocahontas Company told us that in some of the mines operated under leases granted by them the percentage of coal recovered reached 98 per cent. It was the opinion of those members of the Commission who are practical miners that the roof conditions and other difficulties connected with mining were as bad in some of the mines we inspected at Gary as are to be found

anywhere in the State of Ohio. It is also the opinion of the members of the Commission that there are very few, if any, mines in Ohio which could not have been operated successfully under the panel system. It would, of course, be impossible to apply this system in its entirety to many mines now in operation, although a modification of the system might well be adopted in many mines now being operated, so as to make possible the recovery of a larger percentage of coal than is now being secured.

According to the testimony of the engineers and superintendents of the Gary mines, the cost of operating under the panel system is not in the long run more expensive than under the ordinary room and pillar system. There is some increase in the expense at the time the mine is opened. It is necessary to run the entries farther, but this expense is, of course, more than balanced by the gains due to the larger amount of coal taken out.

If the question now be asked, why have not the operators of Ohio voluntarily adopted the panel system of mining, if it would enable them to secure a greater percentage of coal from their mines, the answer will be found in certain conditions which attend the present system of mining.

In the first place, among coal operators, as among other classes of business men, there is a good deal of inertia. So long as the present system yields fair profits and their competitors are following the same methods, there is not the incentive to adopt a new system, even if the advantages which it would ultimately bring are partially realized.

Furthermore, many coal operators have believed that the panel system involves a much greater initial expense than, as a matter of fact, is necessary. It has been the belief of many operators that the panel system meant that the entries must be driven to the extreme boundaries of a mine before it was possible to begin the working of rooms and pillars, and this meant very great expense in driving entries with little immediate return in the amount of coal procured. This plan, however, is not necessary. All that it is necessary to do is to drive the entries to the boundaries of the panel and begin at once working that panel. While the rooms and pillars in a given panel are being worked, the entry driving can proceed to the boundaries of another panel, preparatory to working that panel when the first panel has been worked out.

Probably the main reason, however, for the failure to adopt the panel system of working is due to the nature of the contracts entered into between operators and miners. Under the panel system, as we have seen, the rooms are usually narrow and the pillare are left very thick. The contracts between operators and miners call for extra pay for driving entries and working narrow places. So long as the operators could avoid this extra expense by working wide rooms, they have naturally done so. If they were required to work under a different system, they would of course endeavor to secure better contracts for the narrow work. Nor

would this necessarily be to the disadvantage of the miners. It is the testimony of the older miners that working the ribs is much easier than room cutting. The objection which the present-day miner has to the working of the ribs or pillars is that the amount of *lump coal* which he secures is so small a proportion of the total coal mined that he cannot earn a normal day's pay by working pillars. Under a system of working heavier pillars, this high percentage of slack or fine coal would not be found, and if the system of payment for coal should be changed from the present screened-coal basis, the main objection which the miner has to working pillars would disappear. There is, therefore, this great incidental advantage which the panel system has over the present wide room and narrow pillar system. Not only is there a much larger amount of coal taken out of the room but the percentage of lump coal is much greater since pillars are not crushed as they are under the wide room and narrow pillar system.

4. There is another system of mining which has high merit, known as the *long-wall system.*

Under this system all the coal is mined out as the workings progress. This is undoubtedly the best system of mining wherever it is practicable to follow it. It is being successfully followed in Northern Illinois at the present time and practically all of the coal is taken out of the mines operated under this system. Inasmuch, however, as it is generally admitted by practical miners and mine operators that this system could not be employed to any considerable extent in Ohio, it is not necessary to enter into any description of the method of working mines under the long-wall system.

CONCLUSIONS AND RECOMMENDATIONS.

The conclusions which the Commission has reached in the study of the present methods of mining coal in Ohio are that these methods are extremely wasteful of coal and that in the interest of conservation they should be changed. Our description of the panel system has been given with the view of showing that it is both possible and practicable to adopt a system under which, without any permanent increase in the cost of operation, a much larger percentage of coal could be taken out of the mine than is now being extracted.

It is not our intention to recommend that any one system of mining be directly required by legislation on this subject. Any attempt to write a system of mining into the Ohio laws would encounter difficulties due to varying conditions in different seams of coal and in different parts of the state which would make such laws extremely hard to enforce. Many mines now operating could not conform to such legislation, and others which might be able to conform could do so only at an expense that would be out of proportion to the benefits which their owners would gain from the adoption of the new system.

What we do recommend is that the whole system of operating mines in Ohio be placed under the direct supervision of the Industrial Commission of Ohio, and that said Commission be empowered to require that such changes in the present system of mining be made as shall lead to the greatest possible conservation of our coal resources and to the diminution of the number of accidents due to the present system.

There should, in the opinion of the members of this Commission, be created under the Industrial Commission of Ohio a Bureau of Mines and Mining, made up of men having a thorough knowledge of mining conditions, including one or more mining engineers of wide experience as well as one or more men having a thorough knowledge of the practical side of mine operations. To this Bureau should be submitted the maps and working plans of all mines being operated or to be operated in the State of Ohio. The members of this Bureau should make a thorough investigation of the plans submitted to them and of the geological and other conditions under which the mines must be operated, and they should submit plans and recommendations to the Industrial Commission intended to place every mine under such conditions as would bring about the greatest conservation of coal which is possible under given conditions. Due attention should of course be given to the commercial conditions under which operators in Ohio are obliged to operate their mines owing to the competitive conditions arising from the operation of mines in other states.

These plans and recommendations of the Bureau should be submitted not only to the Industrial Commission but also to the owners or operators of the mine affected. Before any order is issued requiring that a given mine be operated on lines laid down by the Bureau of Mines and Mining, the operator should be given a hearing before the Commission and be allowed to state fully any objections to the adoption of the plans proposed or any modifications which he thinks necessary to be made in such plans. The objections and possible modifications should be considered by the Commission before giving its approval or disapproval to the plans submitted by the Bureau of Mines and Mining, and its orders should cover such modifications or changes as it may seem desirable to make in the interest of all parties concerned, the operators and miners as well as the consumers of coal.

Such a system of supervision would be no different from that which is now being exercised by the Pocahontas Coal and Coke Company in connection with the leases granted by that company to mining companies operating on its lands in West Virginia. All mines must be operated under leases which permit such a degree of supervision by the leasing company as is necessary to bring out all or substantially all of the coal underground. In spite of this supervision, the mines operating under these leases are competing successfully, not only with West Virginia

mines which are not subject to the same restrictions, but also with mines in Ohio and other states which sell their coal in the same markets.

The companies operating under these leases are also doing, in some cases at least, everything in their power to prevent accidents to the miners and other employes engaged in the mines. Nowhere has this Commission seen such elaborate and complete precautions taken to prevent accidents as are to be found in the mines operated under these leases by the United States Steel Corporation at Gary, West Virginia. At all of the mines of this company, the rule that "safety is the first consideration" is constantly forced upon the attention of all employes of the company and everything which the company can do to prevent accidents is being done. We shall have occasion elsewhere in this Report to call attention to some of the things being done by the United States Steel Corporation to prevent accidents, and which might well be adopted in Ohio.

Our present purpose in calling attention to the conditions under which this company and other companies are operating mines is to show that conservation of coal can be secured in Ohio by means of strict supervision of mining operations and that there is no difference, so far as its effect upon the cost of production is concerned, between supervision by a private company, leasing its mining properties, and that which could be imposed by a State Government interested in preserving its natural resources as well as the health and safety of the laborers working in its mines.

PART II — PREVENTION OF ACCIDENTS.

INCREASE IN NUMBER OF ACCIDENTS.

The Joint Resolution under which the Ohio Coal Mining Commission was formed requires the Commission to give some consideration to the question of preventing accidents in mining, at least to consider what effect a change in the system of weighing and paying for coal would have on the number of accidents.

As in the case of the conservation of coal, the Commission finds that by adopting a liberal interpretation of its powers it is justified in calling the attention of the Governor and, through him, of the Legislature to the need of enacting legislation which would, we believe, lessen the number of accidents in Ohio mines.

It is not our intention to make a complete report on the question of accident prevention in coal mines. Most of these matters may well be left to the Industrial Commission of Ohio, which has the power to investigate the causes of accidents and to issue orders, either general or local in character, that, if obeyed, will tend to lessen the number of accidents. The Ohio Coal Mining Commission, nevertheless, feels that it would be negligent in the performance of its duties if it did not bring to the attention of the Legislature the information which it has gathered as a result of its observations in this state and elsewhere as to the possibility of lessening the number of fatal accidents caused by the falling of the mine roof. This has a direct relation to the question of mining coal under the present screened-coal basis of payment, as we hope later to show, and it is still more closely related to the question of changes in methods of mining intended to conserve coal, which we have recommended in the earlier part of our Report.

The adoption of the panel system of mining, since it would eliminate the practice of leaving thin pillars to support the dangerous roof, would not only conserve the coal but would, we are convinced, lessen the danger to the miner through falls of roof and coal.

During the eleven months, January to November inclusive, of the year 1913, there have occurred 157 fatal accidents in the coal mines of Ohio. During the entire twelve months of the year 1912 there were only 136 such accidents, and during the year 1911, there were only 109 fatal accidents. The largest number of fatal accidents in any one year in the history of coal mining in this state was in 1910, when there were 161 such accidents. There was a decrease in the number of accidents

following that year, which, it was fondly hoped, was due to the changes made in the mining legislation as a result of recommendations made by the commission appointed to codify the mine laws. Whether or not such changes were the cause of the reduction in the number of accidents during the years 1911 and 1912, we do not know, nor is it our purpose here to discuss. It is certain, however, that the year 1913 will show a larger number of fatal accidents in Ohio mines than has occurred in any other year in the history of mining.

Now most fatal accidents in Ohio mines are due to falls of the roof. Out of the 136 fatal accidents occurring in 1912, 93 were due to this cause alone. Most of these falls of roof occurred in Eastern Ohio, the No. 8 district, where the dangerous draw-slate, to which we have already referred in our description of the No. 8 seam, is the chief cause.

It is the belief of the members of this Commission that most of these accidents were preventable and that they would have been avoided if there had been in force in Ohio mines in this district such a set of rules as we have seen enforced in the mines of the United States Steel Corporation at Gary, West Virginia, where the conditions of mining are not dissimilar to those in Eastern Ohio and where the dangers from falling roof are fully as great as are to be found anywhere in this state.

More than one-half of the fatal accidents in Ohio mines have occurred to men of foreign birth. With the introduction of machinery in mines, the business of mining has ceased to be a highly skilled calling. It probably would be unfair to speak of mining as an unskilled occupation; it would be more nearly the truth to call it semi-skilled work. The facts are, however, that men today enter the mines and engage in the work of shooting down and loading coal who have never been trained for this work. Many of them come directly from foreign countries and are unfamiliar with our language, and for this reason do not readily receive such instruction as would tend to make them aware of the dangers which they encounter in their work. Some of the foreign-born have been miners in the countries from which they came, and these men not only make good miners but are probably fully aware of the dangers connected with their calling, since it is a fact that all European countries show fewer accidents, in proportion to the number engaged in mining, than are shown by the statistics of mine accidents in the United States. Probably the majority of the foreign-born, however, who are engaged in Ohio mines have never had experience in mining and do not know the dangerous character of the roof under which they are working and are, therefore, unlikely to adopt such measures as would tend to lessen the danger from this source.

NEED OF SAFETY FOREMEN.

The greatest defect in connection with the operation of mines in Ohio, if we look at the matter from the stand-point of accident-pre-

vention, seems to be the lack of sufficient and competent supervision of and careful instruction to the men engaged at work at the face of the coal. On every railroad in this country there is to be found, for every few miles of road, a section gang, composed of not more than six or eight men, under the direction of a section boss. In the coal mines of Ohio, there oftentimes are found many miles of underground workings in which are employed one or two hundred men, with only the supervision of a mine boss and possibly one or two assistants. Yet mining coal is a far more dangerous business than is working on the section of a railroad.

When one recalls the fact that these miners, working in small groups, usually only two in a room, are scattered throughout the numerous underground passages, many of them ignorant of the proper methods of preventing accidents and left to their own resources, with only the most general instructions issued by the superintendent or the mine boss to guide them, it is easily understood why there are so many fatal accidents in this occupation.

At Gary, West Virginia, where the rule that "safety is the first consideration" everywhere applies, and where every precaution is taken by the company and its officers to prevent accidents, the necessity is fully realized of providing a sufficient number of mine bosses or assistant bosses to have careful supervision of the working places and to make explicit the instructions given to the men working therein, so as to prevent accidents.

Probably the most important thing which has been done to prevent accidents in the mines at Gary, and the thing which the officials feel has been mainly responsible for their success in preventing accidents, is the provision that for every twenty-five men working at the face of the coal, that is, the men who are engaged in drilling the holes for the shots and in loading coal which has been blown down, there is employed one assistant boss or safety foreman. It is the business of these foremen to make frequent inspections of the working places in the territory to which they are assigned; to communicate clearly by oral instruction and by a system of chalk marks what is to be done by those working in the rooms to lessen the dangers from falling roof and other causes, and to secure the best results in the way of output obtainable under these conditions.

To give one example of some of the things which are being done in these mines: it is the rule that no matter what the roof conditions appear to be, there must be set a supporting post for every three feet of advance in the room, and that the lines of posts must be not farther than six feet apart. It is admitted by the officials that there are cases where so many posts are not needed, where the roof is probably sufficiently strong to support itself with fewer posts, but the officials prefer to err on the side of safety and recognize that if the question of setting posts were left to the option of the men, oftentimes the men would take risks too dangerous to

be taken. Hence the company has adopted this arbitrary rule with regard to the setting of these posts. It probably is not necessary in all Ohio mines to adopt such an arbitrary rule, but the desirability of issuing an order of this character to the operators in the Eastern Ohio district is respectfully called to the attention of the Industrial Commission of Ohio.

The safety foremen in the Gary mines have instructions to order out of a working place any man working therein who refuses to set the posts or carry out any other order of the foreman issued for the purpose of preventing an accident. The man is not necessarily discharged for refusing to obey an order, but he is not allowed to work in the mine the remainder of the day after he has disobeyed the order.

It seems to the members of this Commission that the State of Ohio might very well undertake to be as strict in its laws and orders intended to safeguard the lives of its citizens as is this great private corporation. The legislature might well enact a law requiring that every mining company in the State of Ohio which employs thirty-five or more men working at the face of the coal in any one mine should employ a safety foreman and one additional safety foreman for every twenty-five additional men. These safety foremen should be under the direction of the mine superintendent and the other officials of the company but they might well be entrusted by the State with police powers to arrest any man working in the mine who refuses or neglects to obey orders intended to protect the health or safety of the men employed in the mine. Moderate penalties in the way of fines should be provided for men who refuse to obey such orders, and it might be well to require that no man should be employed in mining who was guilty of a certain number of repetitions of disobedience within a stated period of time, -- say a month or six weeks.

These safety foremen should also be required to fire all the shots which have been prepared by the men working in the rooms or working places which are intended to bring down the coal, or at any rate to supervise the firing. This is the practice at Gary. It not only puts the business of firing shots in the hands of men who are experienced in this matter and who will see to it that before the shots are fired there are no men near at hand who might be injured by such explosions, but it also has the good result of making it necessary that the safety foreman shall actually enter each day every working place in the district of the mine assigned to him, in order to see that the rules of the company and his own orders are being adhered to. It will be necessary for him to do this, since the work of mining can not go on unless the shots are fired when they are prepared. Such shots would naturally be fired after the men had quit work in the evening, and the rooms would then be free of smoke before the men returned to work in the morning. Under present conditions of mining it frequently happens that the men leave their shots to be fired in the morning and then the rooms and passages are filled with smoke, which

increases the danger of accidents and makes it difficult to detect the impurities in the coal. The practice of having shot firers is not a radical innovation. The law now requires this in some states, notably in the State of Illinois. We were told by Mr. Martin Bolt, Chief Clerk in the Mining Department of that State, that the use of shot firers had resulted in a lessening of the number of accidents.

The objection which the operators might naturally make to the recommendation that a safety foreman be required for every thirty-five men employed at the face of the coal, is the additional expense of operation due to the wages of these men. How much weight should be given to this objection it is difficult to say. The expense of operation would not be increased by the full amount of these wages, and probably not at all. The extra supervision would, without question, mean a greater and better output, with considerable savings in the way of equipment and timber, less delay in repairing track, and cleaner and safer working places. It is also true that these safety foremen might very well perform certain duties now assigned to other men working in the mine and which would not prevent the carrying out of the duties assigned to them by law.

There is this further thing to be taken into consideration by those who argue that the expense would be too great. Under the Workmen's Compensation Act, which will be in force in this state on and after the first of January, 1914, it will be necessary for the operators of mines in Ohio to provide compensation for all deaths and serious injuries due to accidents in mines. Since the miner usually earns good wages for the time during which he is employed, such compensation in the case of most miners probably will amount to the full sum allowed by the statute, viz. $3750 for each death due to accident. If one hundred deaths occurring in Ohio mines are due to the falls of roof and coal, this will mean a total cost to the coal operators of $375,000 per year in the shape of compensation. Now if by adopting a system of careful supervision and adequate working rules, the operators could be saved a considerable portion of this expense, it would go a long ways towards making up for such additional costs as might be incurred by the employment of the safety foremen.

If a sufficient number of safety foremen, selected from among the miners because of their superior qualifications or intelligence, were employed and entrusted with the powers and authority which we have suggested, it is the belief of the Commission that in the future there would be a very material reduction in the number of fatal accidents in the Ohio coal mines, and that such additional expense as this plan calls for would be in a very large degree compensated for by the reduction of other costs to the operators and by the superior quality of the product which they would secure from their mines. Our opinions in this matter are confirmed by the experience of Mr. Martin Bolt, Chief Clerk of the State Mining Board in Illinois, a man who has had unusual opportunities to

study the causes of accidents and the best mode of preventing them. In giving his testimony before this Commission, (Proceedings, page 382) he was asked:

"Have you any suggestions to make as to a practicable method of reducing accidents, and by practicable I mean taking into consideration the prices at which coal must be sold."

A. "Well, there are a number of things that might be done. I think one of the most important and the one that I believe would give the best results is to employ a face-boss or assistant to the mine manager whose duty it would be to go into the working places one or more times each day and if he would find a workman doing some of his work in a way that was not considered practical, or he was not properly protecting himself, to suggest to him how better to take care of his working place and how better to take care of himself. Where that plan has been adopted we have noticed a decrease in the fatal accidents."

Q. "That plan has been adopted in some mines?"

A. "In some places, yes sir."

This plan has also been adopted to a limited extent in a few Ohio mines and the Chief Mine Inspector reports that these mines show a more favorable accident rate than do other mines in the same district. We understand that the companies which have adopted the plan are well pleased with the results.

EFFICIENCY TESTS FOR MINERS.

Several of the miners' witnesses who appeared before the Commission have urged upon us the desirability of recommending that the Legislature require certain eligibility or proficiency standards, determined by tests or examination, of men permitted to engage in mining other than as helpers. The idea of these witnesses seems to be that licenses should be issued by the mining inspection department to all qualified miners and only these men and their helpers would then be permitted to engage in the business of coal mining. Such examinations are now given in some states, notably in Pennsylvania and Illinois.

The objection to this plan is that under present conditions of mining, the standards would have to be so low as to amount to very little in the way of lessening the number of untrained men engaged in mining. Coal mining, as we have already seen, has ceased to be a skilled occupation. The old miner, who knew how to handle the pick and undercut his coal and block it for the purpose of mining, and who took with him into the room his son or some other boy and there taught him the art of mining, has nearly disappeared from the Ohio mines. Today the coal is undercut by machinery or is shot from the solid. There is very little use made of the pick and it is seldom we find that the coal is blocked.

Nor does it seem likely that we could go back to the old days, however desirable it might be to have only skilled miners employed. The coal operators do not find it necessary to employ skilled miners, and to require them to do so by imposing rigid standards upon all who enter the mines would handicap Ohio operators in competition with the operators of other states. Such competition is already too keen to make it desirable to impose any very serious burden upon the Ohio operators. If the examinations were made strict enough to accomplish their purpose, it would tend to create a condition not unlike that of a labor monopoly in the Ohio fields, by making it difficult for the operators to secure enough competent men to man their mines.

Without pretending to deny the fact that there are too many men engaged in mining in Ohio, there is great danger that a system of rigid examination of the men engaged in mining would tend to the other extreme and would prevent the employment of enough men to secure the present output. If the examination were not made fairly rigid, however, it would accomplish very little. We have been told that such is the effect of examinations now being given to applicants for license to engage in coal mining in the States of Pennsylvania and Illinois. We are not able to say how much truth there is in these statements, but since there are numerous men of foreign birth who have had no experience in coal mining to be found in the mines of Illinois, it seems likely that the tests there applied cannot be very severe. It is certainly true today that to apply in Ohio any test sufficient to prove a man's familiarity with mining methods would very materially lessen the number of men whom the Ohio operators may now employ.

It is, however, the belief of the members of the Commission that tests of some degree of severity should be applied to those employed in responsible positions and having under their care other employes in the coal mines of Ohio. Such tests or examinations should be sufficient to prove that the mine superintendents, mine bosses, safety foremen and other officials employed in the mine possess a practical knowledge of mining methods and are familiar with the dangers involved in the business of mining and the methods of lessening such dangers.

SOLID SHOOTING.

Elsewhere we discuss the effect of blasting the coal before it has been undercut—the so-called "shooting-off-the-solid"—on causing an increase in the amount of fine coal, and recommend that the practice be forbidden by law in Ohio except in those mines where it is absolutely essential. This matter is of importance also in connection with the conservation of life. The records of fatalities clearly show that there is increased danger in solid-shooting mines.

PART III — SCREENED COAL VS. MINE-RUN SYSTEM OF PAYMENT.

HISTORY OF THE CONTROVERSY.

We come now to that portion of our Report which has to do with the subject of inquiry chiefly in the minds of the legislators who authorized the appointment of this Commission, viz. the question of determining what is an equitable method of paying for coal weighed at the mine. We trust that it will not be regarded as impertinent if we remark that in the opinion of most members of this Commission this question is of far less importance than those which we have already discussed,—the questions of what should be done to conserve our coal resources and to lessen the number of accidents in coal mining.

The present system of paying the miners in nearly all the mines of this state is based on the amount of coal mined and passed over an inch-and-a-quarter screen. That portion of the coal which passes through the screen is not used as a basis of wage payment. It would not be strictly correct to say that the miner is not paid for mining this coal, for in all the scale districts of the state the contracts entered into beween miners and operators are based on the assumption that a certain fixed percentage of the coal will pass through a standard inch-and-a-quarter screen. This system of paying the miners has long been in operation in most of the mines of this state and the same system is applied, with certain modifications of detail, in some of the other states.

In this state, at least, the system seems to have originated at a time when only that portion of the coal which passed over the screen had a commercial value and entered into the market, and for that reason there was probably little objection offered to the system when it was first introduced. But when the consumers of coal began to find uses for the smaller grades of coal and the operators found it possible to dispose of a portion of the coal which had passed through the screen, miners began to criticise the system and the claim was advanced that the miner should be paid for all the coal as it came from the mine,—the well-known mine-run system,—instead of merely that portion which had passed over the screen.

There were other objections to the system which the miners made at that time. The screens in use in various portions of the state, and at different mines in the same district, varied considerably in length and in the size of the opening between the bars. In 1883 a commission which

reported on this subject found that the size of the openings in the screens varied from seven-eighths of an inch to two inches. This meant of course that in some cases the miners were being paid for a much larger percentage of the coal taken from the mines than they were at other mines.

Thirty years ago this controversy over the mode of payment became so keen that the Legislature was applied to for relief. In 1883 the Legislature appointed an able commission to investigate the subject. This commission was composed of Dr. Edward Orton, the State Geologist, and Messrs. John Brashears and David D. Williams. The Commission conducted a thorough investigation and made its report to Governor Charles Foster in the early part of 1884. This report was submitted by the Governor to the Legislature and was ordered printed, together with the testimony taken by the Commission.

In reading the report made by this Commission of thirty years ago, together with the accompanying testimony, one who is familiar with the testimony taken by the present Commission is impressed by the fact that relatively little new light has been thrown upon the subject as a result of the discussion which has continued for the past three decades. Aside from the fact that at the time the former Commission made its investigation, only that portion of the coal passing over the screen, which was known as nut coal, was being sold — the pea and slack at that time were usually unsaleable—the situation in Ohio with reference to the screened coal controversy remains much the same as at the time the Commission of 1883 made its report.

The present Commission has visited more mines than did the earlier one and has extended its inspection to points outside as well as inside the state. It has heard more witnesses and has secured a larger volume of testimony, largely due to the fact that the former Commission did not have the services of a stenographer. On the whole, however, the character of the testimony offered does not differ materially from that presented to the earlier Commission. The arguments made by the miners in favor of a change in the system of weighing coal and by the operators in opposition to a mine-run system, are much the same as were those presented to the Commission of 1883. In fact the arguments of thirty years ago are similar, even in language, to those made before the present Commission, as well as to those made before the Mines and Mining Committee of the Senate at the last session of the present Legislature.

Certain it is that little information that is new on the subject of an equitable method of weighing coal has been developed by the investigations of this Commission or at its hearings. We have, therefore, thought it not worth while to burden our Report with a summary of the testimony submitted on this matter. We shall have occasion to refer to

particular portions of it whenever it seems to have a special bearing on the question under consideration.

UNUSUAL CHARACTER OF MINERS' DEMANDS.

The demand of the miners made to the Legislature for a change in the system of weighing and paying for coal is somewhat unusual; not unusual in the sense that it is unreasonable or that the same claim has not been made before this to the legislatures of this and other states, but unusual in the sense that it is a demand for legislative interference in a matter which is usually left to contract between the parties concerned.

The ordinary grounds for asking legislative interference in fixing the terms of a labor contract are not present in this case. Such demands are usually in behalf of persons who lack the power to protect their own interests in the making of a contract and whose weakness is therefore likely to be taken advantage of by their employers. Such interferences in labor contracts in this country have usually been in behalf of women workers, or of children and young persons who have not yet attained the legal age. In some cases legislatures have intervened to prevent the parties from entering into contracts which threatened to impair the health and safety of the workers, even when they were males of voting age. There has also been some legislation to prevent the payment in kind and to prevent employers compelling their laborers to trade at company stores where there is no competition in the sale of merchandise.

In the case before us, however, the Legislature is asked to interfere to prevent coal operators from entering into a certain contract with the strongest labor organization in this country. This organization has had no difficulty in the past in securing fair wages for its members. It is probable indeed that the wages paid to the members of this organization constitute as large a share of the total wealth which has been produced in part by their labor as can be found in any other important industry, and when one considers the hazards of the occupation, he can not wish it otherwise. Every man working in and about a mine in the State of Ohio is obliged by the terms of the collective agreement to become a member of this organization before the employer can keep him in his employ. Furthermore, the members of this union are not found in this state alone. The organization is as complete in the States of Illinois and Indiana, and in portions of other nearby states, as it is in the State of Ohio, and the contract entered into by the United Mine Workers is made in a joint conference with the coal operators in all these states.

These statements are not made with the view of criticizing the work of the United Mine Workers' union or the principle of collective bargaining, which this organization has been so successful in having adopted. On the contrary, it is the feeling of all members of this Commission that this system of collective bargaining, as practiced by the miners and

operators of the states named, is a most successful and equitable system of wage contract. It has, for the most part, put an end to a long series of strikes and labor disputes, which not only hampered the industry of coal mining but which caused great losses and discomfort to other classes dependent upon coal as a fuel. Our purpose in calling attention to the character of the demand made by the miners and the organization which is supporting it is merely to show that this demand for legislative interference can not be sustained by the claim that the miners are too weak to protect themselves in the making of a contract.

MINERS' OBJECTIONS TO PRESENT SYSTEM.

When we turn from the question of the right of the miners to make this demand of the Legislature, and the strength of the organization which is supporting it, to the merits of the demand itself, viz.: that the miners in Ohio mines be paid on a mine-run basis, we find that there is considerable justification for their objections to the present system of payment on a screened-coal basis.

1. The *first objection* which the miner is inclined to make to the screened-coal system is that under this system he is *not paid for the whole produce of his labor.* Put in this bald form, with the implication that under the screened-coal system no attempt is made to consider the amount of coal passing through the screen when the contract is entered into, the statement is erroneous. All the contracts in every scale district in the state have considered this point and have attempted to allow for it.

In the Hocking Valley, which is the basing district not only for this state but for other states as well, the contract is made on the assumption that 28 percent of the coal which is mined and screened will pass through an inch-and-a-quarter screen, and this same assumption governs contracts in all districts of the state except the Massillon district. The present contract price is $1.00 per ton for pick-mined coal which passes over the standard screen. Wherever it is necessary, for one cause or another—possibly the destruction of the tipple by fire—to pay for coal on a mine-run basis, the contract calls for payment of five-sevenths of the lump price, or 71 3-7 cents per ton for coal paid for on a mine-run basis.

In the Massillon district, where experience has shown that not so much fine coal is produced incidental to mining, it is assumed that only 25 per cent of the coal passes through the screen, and this assumed percentage is considerably in advance of the actual amount of screenings which is obtained on the average in this sub-district.

While the above grievance of the miner against the screened-coal method of payment, viz.: that a part of what he produces is not paid for, will not bear analysis, it is probably true that this assumed grievance is

the most serious defect in the present system of wage payment. It is not our real grievances, but our fancied wrongs, which cause discontent. If we purchase a suit of clothes at a very low price, only to find that it is "shoddy" instead of "all-wool", even though no misrepresentation was made to us at the time of sale and although the low price asked should have put us on our guard, we are likely to consider ourselves as swindled.

The force of this objection to the present system of paying the miner was well expressed in the Report of the Commission of 1883, which said, "The miner finds it hard to realize that anything is paid for except the favored grade. Though he may be forced to acknowledge, when pressed with the obvious facts of the case, that his wages do cover, at least in some sense, all the output, the moment that the pressure is withdrawn he relapses into the old view, as our records abundantly show. All of his labor that is represented in the nut coal and slack is, in his favorite phrase, 'given to the operator for nothing', so long as he sees these grades going to market without being directly accounted for to him. The stubbornness of this misconception it is hard to overstate."

The answer which the former Commission made to this objection of the miner was to draw an analogy between the work of the miner in producing lump coal, with some incidental slack and nut coal, and that of the wood-chopper who is paid by the cord for the wood he has cut, and is not paid for the chips. "The chips," said the Commission, "may make good fuel and may take the place in market of some of the cord-wood, but the wood-chopper, when cutting by the cord, will scarcely claim that he is entitled to a part of the proceeds of the sale of the chips even though they are made by his labor. His labor has been already paid for."

However close may have been the analogy between the work of the miner and that of the wood-chopper at the time the former Commission made its report, we will not undertake here to discuss. The situation so far as the miner is concerned has changed to a considerable extent, owing to the fact that now all of the coal—the slack and pea coal as well as the nut size—is sold. At the time the earlier Commission rendered its report, only that portion of the coal which passed through the screen and which could be re-screened as nut coal commanded a price in the market. The miners now-a-days has all the more reason to feel that he is giving the operator "for nothing" a portion of the produce of his labor. Even in the case of the wood-chopper, we dare say, if he discovered that someone came regularly to his pile and gathered up the chips and paid the owner of the wood for them, he would sooner or later enter a complaint that he was not being paid for all that he had produced.

Without further discussion of the justice of these grievances on the part of the miner, it is sufficient to say that as long as the miners believe that they are not being paid for a portion of the product which they have produced and these grievances cause disputes and bitter feeling between miners and operators, it is desirable, in the interest of both parties as well as in the social interest, to eliminate these grievances if it can be done without material injury to either party.

There is another phase of this matter which is of some importance to the public. Under the present system of payment there is no incentive to the miner to load the fine coal which is produced as the result of his operations in mining. It is highly important that this coal should be loaded, not only in the interest of conservation of coal but because it is dangerous in gaseous mines to leave it underground. Our laws wisely provide that this fine coal shall be taken out of the mine. In spite of the law, it is a fact that the fine coal is not always loaded into the car and taken from the mine, as this Commission has had more than one chance to observe. Since the miner feels that his pay will not be increased by loading out this fine coal, he is oftentimes inclined to throw it back into the heap of slate and other impurities,—the "gob pile" as the miners term it—in the hope that its presence will not be detected. Under a system of paying the miners on the basis of all coal sent out of the mine, there would not be the temptation to dispose of the fine coal in this way.

2. The *second objection* of the miners to the present method of payment is that the *percentage of lump coal* which passes over the screen, and on which their rate of pay is alone computed, is *fixed in a more or less arbitrary fashion* and does not correspond to the actual conditions at many mines or even at the same mine under varying conditions.

The contract in the Hocking Valley field, as we have seen, is based on the idea that 28 per cent of the coal passes through the screen. The Hocking field is the basing-district upon which all contracts are entered into and no modifications of the contract are made for the other scale districts although such modifications would seem to be warranted by variations in conditions. No two mines are precisely alike in the character of the coal which they contain or in the percentage of fine coal which necessarily results from the operation of mining; indeed it frequently happens that there will be such variations in the character of the coal in different rooms of the same mine.

Furthermore, as we have already mentioned, the coal in thin pillars is more or less crushed and a larger percentage of fine coal results from drawing these thin pillars than comes from operations in the rooms. For this reason, miners in many mines refuse to draw the pillars unless there is an addition made to the ordinary contract price for mining coal.

There is no doubt in the minds of the members of the Commission that this objection on the part of the miners to the screened-coal system

of payment is a valid one; indeed it seems to the Commission to be the strongest argument against the present system. We have found in our visits at the relatively few mines which we have been able to inspect the variations in the percentage of screenings ranging all the way from less than 5 per cent of the total output to 40 and 45 per cent; five per cent is of course an unusually low figure and very few mines in the state would show such a small amount of screenings.

It is apparent that if the percentage of screenings is less than the amount fixed in the contract for a particular scale district, the miners are receiving a higher rate of pay than was contemplated at the time the contract was entered into; on the other hand, where the percentage of screenings exceeds that assumed to exist in a particular district, the miners at such mines do not receive the full amount of wages which the contract was intended to guarantee. Generally speaking, throughout the Hocking Valley it is probable that the percentage of screenings corresponds fairly closely to the 28 per cent assumed to exist for this field. However, the same percentage is assumed to exist in the contracts made between miners and operators in the Eastern Ohio and Cambridge districts, the first and third districts in point of production in the state. Owing to the character of the coal in the No. 7 and No. 8 seams, it seems likely that this percentage of screenings is too low, that an average of more than 28 per cent of screenings would be found throughout these districts if an accurate record were kept of the percentage of screenings at each mine in the districts.

It is especially in these districts, therefore, that the screened-coal system of payment works hardship to the miners, although the same thing is true at some of the mines in other districts in Ohio. Even the operators have admitted to us that the present system of paying for coal gives an advantage to those districts which sell a large tonnage of mine-run coal. The operators in such districts profit not only at the expense of the miners but they also have the advantage over operators in those districts where an effort is made to secure as large a percentage of lump coal as is possible.

In spite of the validity of the argument which we have just presented, the Commission is more or less uncertain as to how much weight should be given to this objection to the present system of weighing coal. Under any system of collective bargaining, it must naturally occur that inequalities are found to exist and injustice is done to certain individuals. These inequalities and injustices will inhere in any contract whch is based on general conditions rather than on individual performances. If there were no disadvantages to the mine-run system of payment, the Commission would be inclined to attach a great deal of weight to the above argument against the screened-coal system of payment. We are obliged, however, to weigh this argument against arguments made by

the operators in opposition to the mine-run system of payment and to consider carefully where the balance of truth lies.

3. The *third argument* made by the miners is closely related to the above. They claim that under the present system of paying for coal it is to the *interest of the operators at some mines to produce a large amount of fine coal* in order to secure a larger percentage of screenings than is contemplated by the terms of their contracts. In order to do this, it is claimed that the coal is often dumped in such a way as to break it and send more of it through the screen. If the drop from the car to the screen is considerable, more coal will be broken than if the fall is a short one. Furthermore, if the pitch of the car is slight and the coal is slowly dumped, more of the coal will pass through the screen than when it is dumped rapidly and the fine coal is carried over on the lumps. On the other hand, the operators claim that the miners at times will not permit the coal to be dumped in such a way as to eliminate the fine coal which is in the car.

It probably is not true that either of these accusations could be proved against operators or miners as a class. The Commission has no desire to accuse operators generally of adopting any such expedients to obtain coal for which nothing is to be paid nor to accuse miners of dishonest practices in order to avoid the screening of the fine coal. This much is true, however, that inasmuch as most men are guided in a large part by motives of self-interest, when the coal is being sold on a mine-run basis, at low prices, there probably will be more carelessness in the handling of the coal and the operator will be less careful in his endeavor to secure a large percentage of lump coal than he would be if the coal were to be sold on a lump-coal basis.

4. The *fourth argument* made by the miners against the present system of determining wages to be paid is that the inch-an-a-quarter *screen begins to wear as soon as it is in use* and the openings between the bars soon exceed the inch and a quarter allowed for in the contract. The wider the opening, the more coal will pass through and the smaller will be the percentage of output on which the miners' wages are based. The miners furthermore claim that when the operator's attention is called to the defects in the screen, there is usually considerable delay in substituting a new set of screens, and the inference is drawn that it is to the operator's interest to have the screens out of order as long as possible in order that there may be a large amount of coal for which no wages are paid.

There can be no doubt that many screens now in use are so worn that the openings between the bars exceed the inch-and-a-quarter limit. Members of the Commission took the measurements of the screens at nearly all of the mines visited and it was seldom that we found a screen which could be said to fulfill the terms provided for in the contract.

Where the bars were bent, the wider openings were of course compensated for by the necessarily narrower openings between other bars, but in a number of instances the bars were badly worn. We found one instance on our inspection trip in which the same screen had been in use at the mine visited for more than three years. Under such conditions the bars would be badly worn and an amount of coal very considerably in excess of the percentage provided for by the contract would pass through the screen, for which the miner received no pay. In other cases the bars were worn but little and the amount of coal passing through would exceed by a very small amount the percentage provided for.

The contract entered into between the operators and the United Mine Workers provides for a check weighman at each mine, who is elected and paid by the miners. It is the duty of the check weighman to call attention to the condition of the screen if it is out of order, and he is supposed to provide himself with a steel gauge for the purpose of measuring the thickness of the bars and the distances between them. The operators, naturally enough, assert that this ends the responsibility for the care of the screens as far as they are concerned. If the check weighman calls attention to the defective character of a screen, the operator either must provide a new screen or run the risk of having his mine shut down until he does so. While there is no doubt that the failure to have new screens substituted for those in a worn condition is in a large part due to the negligence of the miners' representative, the operator cannot, we think, evade entire responsibility in this matter. It should be the business of the operator to keep on hand an extra set of screens in order that substitution may be made at once whenever it is made clear that the old screens are in bad condition. In some cases this is done. Probably in most cases, however, the operator waits until his attention is called to the worn screens; he then promises to obtain a new set and very likely does send in an order. Delays, however, frequently occur in receiving the new screens, and, in the meantime, the miners have no choice but to quit work or to work with the worn screens still in use. Sometimes this delay seems to be an intentional one, and miners' officials have repeatedly called our attention to delays of several weeks in substituting new screens, and at times they have had to resort to the expedient of closing down the mine before the operator succeeded in having his order filled. Several instances of unusual and unnecessary delay in getting screens are given in our Proceedings, pp. 1227-1229.

It need scarcely be said that a system which knows no remedy but a strike on the part of workmen in order to cure a disorder which ought to be remedied immediately is wrong in actual practice and reflects no credit upon the operator. At the same time, the members of this Commission have not been inclined to attach so much importance to the matter of defective screens in use as have the miners in their testimony before the

Senate Committee on Mines and Mining or in that offered to this Commission. It must be apparent that blame for failure to have the proper screens is shared by miners and operators alike, and if this were the only criticism which could be made against the screened-coal system it would not appear to the members of this Commission that the remedy lay in legislative interference with the contracts entered into between miners and operators. This might be the proper remedy if the miners were unorganized and were unable to protect themselves against this form of abuse, but, as we have already noted, the miners' union is a strong one and has not shown itself lacking in capacity to safeguard the interests of its members.

5. The *fifth objection* which the miners make to the present system of wage payment is that *the coal* which they undertake to mine differs in hardness and strength *in different rooms of the same mine,* and that it therefore *yields various percentages of fine coal* when it is passed over the screen. In this way, two miners, of approximately equal skill and ability, will employ the same energy in mining coal in two different rooms, and will be unequally paid for their labor owing to the differences in the quality of the coal mined.

This objection is probably not a very weighty one in-so-far as the rate of pay to miners is affected. The reason for this statement is that today miners generally refuse to work in those parts of the mine in which the coal mines smaller than in the average working places. The validity of the objection lies chiefly in the effect which this system has upon the conservation of coal. Owing to the fact that in some portions of the mine the coal mines smaller than in other portions and the miner therefore refuses to mine it, this portion of the mine is in many cases abandoned and good fuel is thus sacrificed. The same thing is true of the coal in the pillars and for the same reason the miner frequently refuses to draw the pillars. In both these respects, therefore, the present method of wage payment is opposed to the interests of the conservation of coal, and this objection undoubtedly would disappear under a system of payment by which all the coal mined was paid for.

6. The *last objection* to the screened-coal system of payment which we shall consider is the claim of the miners that under this system the *operators are indifferent as to the skill or training of the men employed* in their mines. They assert that poor workmen who break up their coal in fine pieces, owing to ignorance in the method of handling it, are more profitable to the employer than are practical miners who would mine coal in a more workmanlike fashion. It is for this reason, they claim, that there is a tendency today to employ foreign-born laborers and farm hands in the mines and that in this way the operators have reduced the work of mining from a skilled to an unskilled calling.

It is obvious that the force of this objection depends upon the validity of the claim that it is more profitable for the operator to sell his coal at

the low price which will be obtained for it if sold as screenings or on a mine-run basis, in order to secure the economy of labor costs resulting from the use of unskilled labor, than it is for him to obtain higher prices for the lump coal, even though such coal has to be secured by the payment of higher wages to more highly skilled laborers. This argument may be valid in some cases but we cannot conceive it to be to the interest of most operators to employ unskilled miners for the sake of obtaining a large amount of fine coal. The greater use of unskilled labor today is to be explained, not by the above reason, but by the fact that the introduction of coal-cutting machines and other mechanical devices has made it unnecessary to employ miners trained in the use of the pick.

OPERATORS' OBJECTIONS TO MINE-RUN SYSTEM.

Let us turn now to the objections offered by the operators to a law compelling the payment for coal on a mine-run basis, which is the change from the present system of wage payment that is demanded by the miners.

1. In the *first place*, the *operators object to any legislative interference* whatever in the making of a contract between them and the miners' union. They claim that legislative interference is not necessary to secure an equitable contract. They point to the strong organization of the miners and to their unity of action in presenting their demands at the biennial conferences which fix the wages in coal mining in the central bituminous field. They claim that the miners are better organized than the operators themselves and are thus better prepared to care for their own interests whenever a controversy arises between the two parties.

The operators say that if the miners are not wrong in their statements that a mine-run system of payment is necessary to secure an equitable wage agreement, the miners' organization is strong to demand it as the condition to entering into any contract. They point further to the fact that this same organization has secured the mine-run system of payment in other states,—notably in the great coal-mining state of Illinois—without any need of legislation.

The operators further claim that if the legislature takes this disputed matter of the mode of payment out of the realm of contract and makes it a statutory requirement that coal shall be paid for on a mine-run basis, it will have weakened the operators' bargaining power. The operators contend that if a mine-run system were to be secured by contract, the operators in return for this concession probably would be able to obtain some equivalent in the matter of wages to be paid, or otherwise. If, however, this weapon is taken from the operators by statute rather than by agreement, they will have to fight out the wage scale without the right to make a concession in the mode of wage pay-

ment. The operators claim that if it is logical to change the mode of payment by law, it is logical to fix the rate of payment by the same means, and that in this way it might be made possible for the operators to continue their business without an increase in the cost of labor.

In the arguments before the Commission, the operators have frequently challenged the miners to state whether they would be willing to accept the Illinois wage scale if the mine-run system is adopted. The miners have generally refused to answer this question directly and have simply stated that the present controversy was not over the matter of wages. This the operators deny and assert that the demand for the mine-run system of wage payment is in reality a demand on the part of the miners that their wages be increased; that owing to the weakness of the operators in bargaining power, due to their lack of complete organization and the willingness of operators in other states to see an increase in the cost of coal mining in Ohio, a mine-run system of payment made compulsory by law would be equivalent to a statute requiring an increase in wages.

The Commission realizes that it has nothing to do with the matter of fixing the wage scale, but some members of the Commission are willing to admit that there is much in the operators' contention that the miners are fully able to protect their own interests in a wage conference, and that to take from the operators the right to concede the mine-run or any other system of wage payment in return for concessions made by the other side, would seriously handicap the Ohio operators at the next interstate conference.

Nevertheless, the Commission feels that it can not push this objection to a change in the mode of wage payment very far. The Joint Resolution which created this Commission instructed it to report an equitable system of weighing coal at the mines, and if we find that the present system is inequitable we must endeavor to find out and report a satisfactory substitute.

2. The *second objection* of the operators to the mine-run system is that under this system *there would be a great increase in the amount of fine coal,* and that, inasmuch as the fine coal sells at a much lower rate than the lump coal, this would be equivalent to a great reduction in the rate of profits in coal mining, and they further contend that the coal-mining industry in Ohio is not in a condition to stand a reduction in the prices of its products.

A large part of the Ohio coal is transported by rail to various ports on Lake Erie and is there dumped on the boats and transported by water to points in the Northwest, especially Duluth, Minnesota, and Milwaukee and Superior, Wisconsin. Here it is unloaded by the same dumping process, and owing to the large amount of fine coal which has resulted from this method of handling the coal at the receiving and distributing

ports, it must be re-screened at the upper lake ports with a very great reduction in the amount of lump coal before the latter can be sold in competition with coals from other states.

Under a mine-run system, the operators claim that there would be carelessness in mining the coal. The miner, knowing that he must be paid on the basis of all the coal taken from the mine, would, they contend, use more powder in his shots, in order to bring down the coal and not be obliged to make use of the pick. This extra use of powder would not only increase the amount of fine coal but would also tend to shatter, more or less, the coal which left the mine in large lumps. When these lumps were dropped on the boat at the lake port, and again when they were taken from the boat by hoisting appliances and dropped on the pile of coal on the dock, being in a shattered condition, they would break and there would be a very considerable increase in the amount of fine coal, with a corresponding smaller percentage of lump coal which could be sold at profitable prices in the Northwest. Even as it is, the operators claim that they find great difficulty in disposing of the amount of fine coal which is produced incidental to the present method of handling. The Northwest is not a large manufacturing district and there is, therefore, little demand for fine coal for manufacturing purposes. The railroads are about the only considerable purchasers, and many of the railroads prefer to use lump coal. Furthermore, many of the railroads in the North and West own their own coal mines—in Illinois, Iowa and other states — and for this reason are not large purchasers of coal on the open market. The fine coal in the Northwest is accordingly a "drug in the market", and if the quantity were to be considerably increased it would be very difficult to dispose of it at any price whatever.

This argument on the part of the operators is a plausible one and there is no doubt that most of the Ohio operators are honestly convinced of its truth. They have brought before us as witnesses large purchasers and dealers in coal in the Northwest, to testify as to the condition in which the coal reaches the northern ports and as to the closeness of the competition between this coal and that from other states.

One of these witnesses, who, made a strong impression upon the Commission, not only because of his apparent honesty, but because of the thorough knowledge which he had of the subject, was an inspector for the Chicago, St. Paul, Minneapolis and Omaha Railway. This gentlemen has been an inspector of coal for this road for thirty years past and has had large experience with coals, not only from Ohio but from the states of Illinois, Pennsylvania, West Virginia, Iowa and Missouri. His work as inspector is not confined to the examination of coal at the docks but takes him into the mining districts where he endeavors to influence the operators and miners to produce their coal in a more satisfactory condition for use on his road. According to his state-

ments, (Proceedings, pages 612-615) the Ohio coal, after it reaches the northern docks and has been re-screened, loses from 35 to 40 per cent of the total amount shipped. It must be remembered that this is the second screening of the coal. The coal was screened over an inch-and-a-quarter screen at the mines, where, according to the assumption on which the mining contracts are based, 28 per cent of the coal brought from the mine would pass through the screen.

Some portions of Mr. McDonald's testimony, which bears directly on the subject under discussion, we have thought it desirable to quote.

"Question: If the coal—the large pieces for instance—were in a shattered condition, so that they would fall to pieces more readily, fall into smaller particles, what effect would that have on your handling of Ohio coals?

Answer: Well, I don't quite get the idea yet, but if anything occurred to give us a larger percentage of fine coal than we get now, it would certainly have its effect on the purchase of that coal.

Q. Well, how would you look upon it? Would you handle Ohio coals if the grade were reduced?

A. No, it would certainly work to the disadvantage of Ohio coals; if we have from 30 to 35 per cent of small coal in there now and that percentage were increased, it would have a tendency to have us seek coal elsewhere that would be in better condition than that.

Q. What would be the logical field that you would seek if you were not able, through the conditions just indicated, to take the Ohio coals?

A. The fields nearer home, Illinois, Iowa, Missouri.

Q. Would that be lake coal or rail coal?

A. All rail coal.

Q. What do you find in all-rail coal, as compared to lake coal, in the conditions in which it reaches your points of consumption,—I mean in the way of size and proportion?

A. Well, now, to answer that correctly, my answer might be a little misleading. The lake coal, coming to us from the dock, separates —the coarse coal separates from the fine. There are periods of the year when we will get a large run of coarse coal which would be quite satisfactory. At other periods the tendency would be to get a larger percentage of the small or the fine coal,—the dust. Now with our all-rail shipments we do not experience that difficulty; it comes uniform,—a uniform size, if you catch my idea.

* * * *

Q. If a larger quantity of powder was used in shooting down the Ohio coals, meaning the coals that you use from Ohio, and the large

pieces were cracked and shattered, so that in being dumped into the boats and from the boats onto the dock, so that they would break more than they now do, what would be the disposition on the part of your companies in handling that coal,—buying that coal?

A. From my standpoint as an inspector, I would certainly feel as though, to be just. I would advise our people to dispense with the use of that coal; that is to be conscientious about it.

Q. Then do I understand you that the natural result would be to seek the all-rail coal that could be reached?

A. Yes, sir.

Q. Which would be such states as Illinois and Iowa?

A. Yes, sir.

Q. And that you use from Ohio now approximately 750,000 tons annually?

A. Yes, sir."

At the urgent request of the operators, the Commission visited the coal docks at Toledo and saw the coal loaded by dumping on the boats, and also visited Milwaukee and there saw coal dumped on the docks, where Ohio coal was lying side by side with that brought from West Virginia. The operators desired us to see how coal was shattered, even under present conditions of mining. There was no difficulty in understanding this much from our observations.

Inasmuch, however, as there is no coal from these districts in Ohio which is paid for on a mine-run basis and which is shipped to the Northwest, we were unable to judge as to how much more, if any, fine coal would be produced by dumping coal mined on the mine-run basis than is now being secured from the lump coal. The whole question hinges upon the accuracy of the statements of the operators that under a mine-run system, the miners would use more powder and would overshoot their coal and that this would tend to shatter the large pieces so that they would be shipped in a far less satisfactory condition and would be more subject to breakage when dumped on the boats and on the docks.

We are undecided in our own minds as to how far this contention on the part of the operators can be sustained. All parties admit that where coal is shot from off the solid, that is, where it is not undercut either by machines or by pick, more powder must be used in order to bring down the coal and that the coal is therefore in a less satisfactory condition when taken from the mines. There is, however, very little coal being mined in this way in the State of Ohio, and even that which is so produced does not enter into the lake trade. Much of the coal in Illinois, probably a little more than one-half, is mined by shooting from off the solid. We saw the effect of this practice in the mines in Illinois and do not hesitate to affirm our belief that this is not a proper method of mining coal. It not only produces a less satisfactory grade of coal but it increases

the danger to the miners and for this reason we are recommending that shooting off the solid be prohibited by law in Ohio, as it now is in Pennsylvania. An exception should be ma le for mines like many in the Massillon district, where it is impracticable to undercut the coal and where neither the operators nor the miners seem to desire to have this practice discontinued.

Such uncertainty as we have regarding the results of mining under a mine-run system, so far as the increase in the percentage of fine coal is concerned, is with respect to the coal that is undercut, which constitutes from 90 to 95 per cent of the coal mined in Ohio at the present time. It does not require such large charges of powder to bring down this coal. Even the operators, at least those most conservative in their statements, do not claim that the miners would use much more powder than they are using at the present time. They say that today the miner knows that he must be careful not to break the coal, for this would cause a reduction in his earning capacity; therefore, he uses only enough powder to dislodge the coal and must oftentimes extract the large lumps from the dislodged portion by means of a pick, which involves hard labor on his part. Under a mine-run system, where he would be paid at the same rate for fine coal as for the lump coal, he would be sure to use enough powder to roll over the dislodged portion and to break up the coal in pieces small enough to be handled easily.

The miners claim that it would not be to their interest to overcharge their holes. They say that if the coal were shot in this fashion, it would throw it back in such a way as to dislodge their posts, causing more work in resetting the timber, and that it would scatter the fine coal throughout the room and in the "gob pile" and thus increase the labor in loading. They furthermore claim that it is to their interest to have large lumps of coal; that these large lumps are usually required to "crib" their car, that is, to build up the load above the sides of the car so as to enable them to get out a larger tonnage, and they claim that it is easier to load the lump coal by hand than it is to gather up the fine coal by means of a shovel.

The Commission is unable to decide as between these conflicting claims of operators and miners. The operators from the State of Ohio who have appeared before us are unanimous in testifying that the effect of the mine-run system would be to shatter the coal and to lessen the amount suitable for lake shipment. The miners, on the other hand, are just as unanimous in their claim that the mine-run system in mines where the coal is undercut would not have the effect predicted by the operators. There is no reason for the Commission to doubt the sincerity of either party. Such evidence on the subject as we have needed to enable us to decide as between these conflicting claims we have been obliged to get outside the state. Even here opinions differ, and furthermore, the

coals of other states are not always sufficiently similar to those in Ohio to make comparison of much value.

One or two witnesses called by the operators while the Commission was in Chicago, gave us, however, some valuable testimony on this point. Mr. Harry M. Taylor, who is an operator of wide experience and is familiar with conditions in the Hocking Valley, and is now operating mines in the states of Indiana, Illinois, Iowa and Missouri, gave valuable testimony in regard to the subject under discussion.

Mr. Taylor says that when he was president of the Illinois Coal Operators' Association he had under his personal knowledge the conditions in almost every mine in that state. His testimony was as follows:

"In the solid-shooting mines there is an enormous increase in the percentage of screenings and the quality of the coal has been deteriorated by the mine-run system. In the mines where the coal is undercut by machines I do not think that the mine-run system has materially affected the condition of the coal, because where the coal is undercut it requires in the neighborhood of two pounds of powder to shoot the coal and that is not an excessive amount of powder and does not injure the roof and does not deteriorate the quality of the coal; but where the coal is shot off the solid there is an opportunity for the man to make the powder do the work by putting in greater shots and doing less drilling, and where that is done the roof is weakened, the quality of the lump coal is deteriorated by the overshooting of the coal. It shatters the natural crystallization of the coal as it lies in the pit and makes an excessive amount of screenings. A greater part of the coal is put in a condition which is not as marketable as the screened coals and the principal trouble comes from the fact that the lump coal, being shattered by the shot, will not hold together all right, and later on, when it comes to transportation, if it has been shattered by the overshooting, deteriorates in the car and a large amount of screenings are made and the coal will not stock; but where the coal is undercut in this state by machines, that condition does not exist. The coal is not damaged in that way. It is only where it is shot off the solid and where the solid shooting gives the man an opportunity to use more powder in his holes, that is, putting bigger shots in and a less number of holes. Blowing the coal out gives a very much inferior grade of coal than it does where the coal is properly drilled and shot on the solid and where it is undercut."

The value of Mr. Taylor's testimony is due to the fact that in Illinois all the mines are paying the miners on a mine-run basis. Later on in his testimony, Mr. Taylor refers to the possible effects of a mine-run system on the coal in Ohio.

Question: "Before you came to Chicago, you were familiar with Ohio coal, were you not?

Answer: "Yes, sir.

Q. "You are particularly familiar with Hocking coal?

A. "Yes, sir.

Q. "You have had something to do with the mining and with the selling of that coal in former years?

A. "Yes, I have always kept my connection because I operated coal docks which handled Hocking coal continuously for thirty years.

Q. "Will you give the Commission your opinion as to what effect the run-of-the-mine system, if adopted in Ohio, would have on Ohio coal, and particularly on the coal that you are most familiar with,—the Hocking?

A. "I think it would have a bad effect because the Hocking coal finds its market there. It has to stand transportation by rail and lake, and if the coal should be overshot it would deteriorate the quality of the coal to such an extent that it would not stand the handling and therefore could not find this market.

Q. "Mr. Taylor, a bit ago you said that it was your experience that wherever machines were used the coal was not overshot.

A. "If all the Hocking coal is mined by machines it wouldn't have that effect.

Q. "Nine-tenths are mined by machine.

A. "You are making that statement. I simply say that if the coal is overshot, as it is where it is shot off the solid, it would take away the value of the Hocking Valley coal because the overshooting of that coal would rob it of the only quality that makes it possible for it to find a good market. As I understand, the conditions in the Hocking Valley have become so universally machine mining that that does not exist to a large extent, that is in the lake shipping coal."

Other Illinois operators gave testimony which tended to confirm the statements made by Mr. Taylor. Mr. F. C. Honnold, the Secretary of the Illinois Coal Operators' Association, said: "The principal difficulty we have had from the run-of-mine basis in this state has been largely in the hand or pick mines, where they substituted powder for muscle. In the mines where we have the coal undercut we haven't this trouble. The grade of coal is quite satisfactory and the run-of-mine standard is not particularly objectionable."

The operators in Ohio claim that the probable increase in the amount of fine coal under the mine-run system is the most serious danger that would be created by the adoption of such a system in this state. In view of the outside testimony which we have just quoted in regard to this point, the members of the Commission are not convinced that this danger is as great as the operators claim it to be. In our opinion, the chief danger to the operators comes from the probable increase in the percentage of impurities. However, if the mine-run system is to be adopted in Ohio as a basis for paying the miners, it would seem desirable that

these fears of the operators be quieted in advance by placing safeguards to the system. The operators should not be required by law to pay the same rates for the finer grades of coal that they pay for the lump coal. It is not practicable to prescribe in a law any differences in the rates of pay for the different sizes of coal, but the operators should be left free to make contracts of this nature if they care to and can convince the miners that this is necessary.

We are suggesting a system by which it can be determined by the two contracting parties, or, if they fail to agree, by state inspection, what amount of fine coal it is natural to suppose would necessarily result from the operation of a given mine if the work of mining were conducted in a workmanlike manner. The contracts between operators and miners to have the men paid on a mine-run basis might be made conditional upon keeping the amount of fine coal within the limits established by this fixed percentage.

There is one more phase of this fine-coal question which must be considered before leaving this part of the discussion. Within recent years there has been a very great increase in the demand for fine coal. Thirty years ago, when the former commission made its report, there was very little use made of any coal below the nut size; the pea coal and the slack were thrown together on large heaps, which still constitute one of the characteristic features of the landscape in most coal mining communities. A great many of these slack piles have been ruined by fire through spontaneous combustion and the coal that remains in them today is of little use. In some cases, however, the demand for fine coal has been so great that these piles of slack have been carefully cleaned, and the coal in them has been marketed.

Owing to the increase in the size of our modern industrial establishments, there has been a great increase in the size of the furnaces used in power plants, and as automatic stoking appliances have come to be employed there has followed a demand for fine coal. Occasionally the demand is so great that even lump coal has been purchased and crushed for use in these furnaces.

At the request of the miners, the Commission visited the power plants of the Detroit United Railways, in Detroit, Michigan, where the average daily consumption of coal amounts to from 600 to 650 tons per day. All of the coal consumed here is fine coal, and at times the company is unable to secure sufficient slack and then crushes the lump coal before it is used in the furnace. This coal comes mainly from the Hocking Valley and is purchased at a very low price. This is only one illustration, though an excellent one, of the growing demand for fine coal. In addition to this use of the fine coal, there is also that for cooking purposes. Not all coal, of course, is in demand for cooking purposes, but when this use is taken in addition to the other uses, they together constitute a large demand for fine coal.

It is not claimed, of course, by operators, miners or the Commission that the fine coal has the same value as the larger sizes, or that this increase in the use of the fine coal compensates entirely for the lowering of the value of the coal which, if the operators' claim be true, would result from the adoption of the run-of-mine system. It may be regarded, however, as a mitigating circumstance, if it should turn out to be true that the adoption of a run-of-mine system had the effect of increasing the percentage of fine coal coming from the mine.

3. The *third objection* of the operators to the mine-run system is that there would be *a great increase in the amount of impurities* mixed with the coal and brought out of the mine under such a system, which would greatly deteriorate the quality of the coal if it were sold on a mine-run basis and which would increase very much the cost of operating the mine if the coal were cleaned before it was sold.

In the minds of the members of this Commission, this is the strongest objection to the adoption of the mine-run system by law in Ohio, unless there can be included in the law ample safeguards for the operators.

Our review in the early part of the Report of the various seams of coal being mined in Ohio will show where this danger lies and the nature of the impurities. The impurities referred to include rock, slate, sulphur, clay, black jack, etc. We also include under impurities, for the purpose of this discussion, the lower grades of coal, especially the "bone coal", now left in the mine, which in the interest of conservation should be taken out of the mine, but which, if mixed with the superior grades of coal, would cause a deterioration of the product, compelling its sale at a much lower price.

All parties agree that the place to remove these impurities is in the mine, at the working places. The rock, slate and clay should be thrown back, along the sides of the entries where they will not interfere with the haulage of the coal, and they should be so disposed in the working places as not to require handling twice. If they are taken out of the mine, they add to the expense of haulage, without any corresponding gain to the operator, and a man must then be hired on the outside to remove these impurities. All parties agree that it is not possible to remove all of the impurities in the coal inside of the mine. The smaller particles of dirt have become mixed with the fine coal and could not be removed without a tedious sorting by hand, which it is not practicable to do. Other portions of the dirt adhere to the coal or are found imbedded in the large lumps. If these impurities are of the nature of slate or sulphur bands of considerable size, it is the business of the miner to break the lump in order to remove them. If they are only thin partings, they are left in, for the coal would be depreciated more in value by removing them than by leaving them.

Some of the impurities are hard to detect in the mine with only the faint light shed by the miner's lamp. This is especially true of the in-

ferior grades of coal, which in appearance resemble more or less the other coal. We do not mean to say that any considerable amount of this coal, or other impurities, need escape detection by a careful man who has had some little experience in a coal mine. If any considerable amount of impurities are loaded out, it can only have been done intentionally or through carelessness on the part of the miner. It is not, however, practicable, or even possible, to remove all the impurities in the mine.

Even under the present system of mining coal, the amount of impurities contained in the coal as it comes from the mine constitutes one of the most difficult and weighty problems in connection with the operation of a coal mine. The operators feel obliged repeatedly to insist upon the loading of clean coal, for their customers are constantly complaining of the large percentage of impurities which they receive and are quick to turn their patronage to other companies or to other coals whenever they have reason to think they can secure a cleaner product in this way. On pages 1246-1253 of our typewritten testimony are samples of complaints which one large company, operating in the Hocking Valley, has received from its customers who complain of dirty coal. It is of course quite likely that companies operating in other states receiver similar letters; for customers are liable to be unreasonable in their demands at times and to complain of that amount of impurities which could not have been avoided even by careful mining; these complaints show, nevertheless, how keen is the competition in the coal business and how far operating companies must go in their efforts to hold trade.

No operating companies can rely entirely on the efforts made to clean the coal inside the mine. All of them adopt one device or another, after the coal has come from the mine, to have it put in marketable shape before it is shipped.

The plan that is most often followed, especially in Ohio, is what is known as "trimming". Several men, the number varying from one to six, stand on the sides of the railroad car and rake the coal with picks after it has been dumped and sort out the larger impurities which are detected in this way. This is not a very efficient method of removing impurities. In the first place, the mine cars are likely to be dumped in such quick succession that there is not an opportunity to go over the coal thoroughly. This is especially true if only one or two trimmers are employed on the car. In the second place, this plan is not successful in removing the smaller particles of dirt. No effort is made to do so; the process would be too tedious, and would interfere too much with the dumping of the coal.

A much better method is the use of the picking tables. These are long platforms, slowly revolving on an endless chain, on which the coal is dumped before it goes into the railroad car. Since it is sorted out on these tables, it is very much easier to discover the impurities, and

for this reason a much larger percentage of dirt is likely to be removed than by the process of trimming. The installation of picking tables increases the cost of operation, of course, and whether or not it is worth while depends largely on the uses for which the coal is intended and the higher price obtained for clean coal. Even this system does not enable the impurities in the fine coal to be removed.

The only successful method for removing the impurities in the fine coal is by the process of washing. This may be applied to all the small sizes of coal. A coal washer is a highly complicated piece of mechanism and it costs a great deal to install it and to keep it in repair. The principle of washing is that the impurities have a different specific gravity than does the coal itself, and when the fine coal is placed in a current of water, flowing just strong enough to wash along with it the particles of coal, it will allow the impurities to sink to the bottom. Wherever washers are installed, the quality of the coal is thereby greatly improved and washed coal finds a more ready market and commands a higher price than unwashed coal.

In Illinois, where the mines are operated on a mine-run system, the large companies have generally installed washers. They have also adopted devices for screening their coal into different sizes, which undoubtedly makes the coal more suitable to the varying market demands. Inasmuch, however, as the market demands for the different sizes do not always correspond to the variations in the sizes of the lumps as they come from the mine, the operator who has a demand for coal of one size oftentimes finds it difficult to dispose of the other sizes.

The few washers which have been installed at Ohio mines have not, we are told, proved very successful from a commercial standpoint. Whether or not their use is unprofitable to the operators, we are unable to say, but nevertheless, with the Ohio coals paid for on a screened-coal basis and sold in such a way as to suit the present market demands, not many operators have felt called upon to install washers, and some of the companies which have installed them no longer use them.

Viewing the matter from the standpoint of the public, the Commission feels compelled to say that Ohio operators might well go farther than most of them have gone to get clean coal, even under present competitive conditions.

The miners claim that under a mine-run system of payment, they would clean their coal as well as they now clean it under the screened-coal system. They claim that it is always to the interest of the miner to bring out his coal in the best possible condition, and that the trained miner takes a pride in his work and therefore would be unwilling to load dirty coal.

These same arguments were made before the former commission which sat on this subject, and they did not greatly impress that commis-

sion. Neither do they greatly impress the members of this Commission. It may be admitted that the majority of miners do endeavor to perform their labor in a workmanlike manner and that they would continue to do so, at least for a time, under a mine-run system of payment. The operators themselves admit that this is true.

The question arises, however, as to the work of the minority of miners and as to the effects of their work upon that of the larger number. A few men in any mine who were unwilling to take the trouble to clean the coal, and who believed that their careless work would not be detected, could by their dishonesty depreciate the value of the entire product of that mine. The miners admit that even under the present system there are men who do not perform their work in a proper manner, and that, unless restricted in some way, these men would shovel dirt in with their coal under a mine-run system. Several representatives of the miners who took part in the arguments before this Commission estimated that the number of men who would load dirty coal would constitute from 10 to 14 per cent of the total men employed.

If, under a mine-run system, the present incentives to get clean coal were removed, and if the loader were to be paid on everything which came out in his car, and if it be admitted that some men would take advantage of this situation to shovel the impurities in with their coal, thus succeeding in getting paid for a considerable percentage of dirt, would not other men employed in the mine be tempted to do the same thing? It seems to the members of this Commission that this temptation would exist, and that some men who are not tempted under the present system would yield to this temptation. Even if we are mistaken in our opinions, this much remains true, that even 10 per cent of dirty loaders at a mine would make it difficult for operators to get their coal in marketable shape.

The miners say that they do not demand pay for dirt, at least for that amount of dirt which could have been eliminated by careful loading and that if the operators desire to dump the mine car and take out the dirt before the coal is weighed, they are willing that this be done.

The original Green bill, introduced at the last session of the Legislature, provided for weighing the coal in the mine car. This would have made it impossible to remove any considerable amount of the dirt before determining the pay of the miners. The unfairness to the operators and the possible disadvantageous effect upon the consumers of coal were so apparent that the bill in the course of its discussion in the two houses was amended with the consent of the author so as not to require payment in the mine car but to allow the impurities to be removed before the coal was weighed.

The question, however, arises, how far is it practicable to secure clean coal by such a method? How is it possible to clean the coal on the tipple before it is weighed and before the miner is credited with

the weight of his car if he is to be paid for his work on the mine-run basis? If it were possible to do this and credit each miner with the total product of clean coal, this would be an equitable solution of the difficulty, at least so far as the question of clean coal enters into the controversy. Neither the miners nor the operators, however, have been able to show us how this is to be done.

Operators and miners who have worked under a mine-run system differ radically in their opinions as to the effect of a mine-run system upon the quality of the coal. The miners who appeared before this Commission were practically unanimous in stating that their experiences under a mine-run system in this and other states had demonstrated that the coal was as carefully mined and cleaned under such a system as under the screened-coal system generally prevalent throughout this state. The operators, on the other hand, were equally positive in stating that wherever the mine-run system had been applied, it had been found impossible to secure coal reasonably free from impurities and in a condition to be marketed. The operators called the attention of the Commission, as they did that of the Senate Committee on Mines and Mining at the last session of the Legislature, to the report of the State Geologist of Arkansas, as to the harmful effect of the mine-run system in that state.

The testimony of the operators in states operating on a mine-run system is generally unfavorable to that system, insofar as the quality of the coal is concerned; and the fact that in such states we found that such modern devices as picking tables and coal washers were in more general use than in Ohio probably tends to indicate not that the operators of those states are superior in business judgment to those in Ohio but that the mine-run system has made these devices necessary if the coal mined under such a system is to find a profitable market.

In this connection, the Commission again relies to a considerable extent on the testimony of Mr. Harry Taylor, formerly president of the Illinois Coal Operators' Association, who, as previously mentioned, operates mines not only in the states where the mine-run system of payment prevails, but also in Indiana where the double-standard system is in force. We feel that the miners may not properly question the candor and honesty of this gentleman's statements, since his testimony was on the whole in favor of their contention that the coal would not be overshot where undercut if mines were operated on a mine-run basis, and they have placed great reliance on this testimony of a well-known operator in their arguments before the Commission. If his testimony is to be relied on in reference to the fine-coal controversy, there is no reason to suppose that he is not equally reliable when he states that under a mine-run system there is an increase in the amount of impurities mined with the coal.

In his testimony before the Commission (Proceedings, pages 315-325), in answer to this question by the Chairman of the Commission,

"Now do you notice any difference in the miners — when they know they are loading run-of-mine coal? Do they put any more impurities in with the run-of-mine than they do with the coal that is loaded lump?"

Mr. Taylor replied,

"In most mines where the men get paid for mine-run coal, they get everything out they can load on a shovel where they didn't continue to do that when the product went through the screen; that is, if a man were cleaning up his place, he cleaned it up just as clean as this floor because he gets paid for it if it is being weighed and paid for mine-run."

Later on, in speaking of the work under the double-standard system in Indiana, Mr. Taylor stated, in answer to this question:

"Do you notice when you change, we'll say from lump coal to run-of-mine, the same day, that the miners will clean the coal better during the first half day, when they are mining lump coal, than they will the second half day?"

"They don't clean the coal any better, but they shovel the refuse of the rooms, that is, they load everything out that weighs anything."

Concerning his experience in Illinois, he said,

"Take in the long-wall mines of northern Illinois, where no powder is supposed to be used. The screenings up in those mines, they are loaded out where they were formerly left in the mines and they load up more clay with the screenings than they did before and by that way deteriorate the quality of the screenings. The screenings of northern Illinois coal have close to 30 per cent clay since the mine-run system went into effect; that is, the screenings that come from the screen when there is not a washer there, are so full of clay that they cannot be marketed in their natural condition; wash about from 30—20 to 30— per cent of impurities before they can be marketed, and that has been overcome by putting in coal washers to eliminate the impurities. You can't pick out that stuff; you have to wash it out."

Q. What does it cost to wash the coal per ton, approximately?

A. The first cost is thirty per cent of the raw material and the other then — the cost is regulated by the tonnage you put through the washer.

Q. I don't mean any particular case — the approximate cost, the average?

A. It varies, I would say, from ten cents a ton to twenty cents a ton, according to the tonnage you can put in, over the overhead.

Q. Operating costs?

A. Yes.

Q. That would be the interest on your investment?

A. Yes, and thirty per cent of your raw material that is washed.

* * * *

Q. Now I ask, Mr. Taylor, since you are familiar with Hocking coal, what in your judgment will be the effect on the Hocking coal if we go on the mine-run system, as to cleaning it? I do not mean cleaning it from slack but cleaning it from these slates and impurities.

A. There are two kinds of impurities in any bituminous coal, whether it is in the Hocking Valley or anywhere else. One is the slates and slips — clay slips and horsebacks — which exist to a larger or less degree in every coal field in the country, and in certain mines in certain fields. In the same mines you will hit a piece of coal that has more of these kinds of impurities than any others, and that has to be handled, because if you don't have a severe dock that really punishes the men, it is human nature for them to load it. I have seen them many a time take a large lump of coal with a band of sulphur an inch wide and take the trouble to take the black grease off of the car and cover that up, but when we detect a man of that kind the miners almost invariably sustain the company because it is so apparent an effort to cheat and with the same amount of labor he could have mined out the sulphur but they go to all that trouble to hide it rather than to put it through. Now these matters have to be handled by the dock, whether you are handling lump coal or mine-run. That particular case I cited would be lump coal — a lump possibly weighing 150 or 200 pounds — but the class of impurities that the mine-run system puts upon the operator is the bug dust (the clay in the bug dust), and the way the clay is cut and the amount of loose clay in the rooms that is cleaned up and put into the car and weighed and paid for and cleaned; the operator has to dispose of it and he not only is paying for something he cannot sell but it has deteriorated the rest of his product, that is, there is so much clay in his screenings that it makes it impossible to sell his screenings, and, since the introduction of the mine-run system in Illinois, in addition to the change in the method of screening the coal and the rebuilding of tipples and the new construction of tipples in the new work here, washers have sprung up all over the state, to eliminate these finer impurities which go into the screenings, until today there is hardly a big operation in this state that hasn't a washing plant to overcome and remove these finer impurities from their fine coals, that is, the bug dust and clays. As I tried to explain a while ago, the entire method of handling coal in Illinois has been changed and has adapted itself to this condition of mining; incidentally, too, the entire buying public and consuming public have changed their plants to take care of the product as it is now produced, until it has become so thoroughly established that whether we wanted to or whether we didn't want to, we could not, until we re-educated our public over a long period of years, we could not go back to any other system.

Q. "Where the machine cuts the finer clay, is the miner careless about loading that?"

A. "Yes, whether the coal is cut low or high, why, the men will load everything that is loose in that room, where under the lump-coal system, they formerly left that in because it didn't do them any good."

Q. "How did you dock them?"

A. "You can't dock them, you can't catch them."

Q. "There is no way of catching a man on the run-of-mine system?"

A. "Under that system you can't catch that class."

Our conclusions are that the adoption of the mine-run system in Ohio would cause a considerable increase in the amount of impurities brought to the surface, unless some way were found to protect the operator from the carelessness or indifference of the miner.

4. The *fourth objection* which the operators make to the mine-run system is that this would involve them in considerable *expense in rebuilding and re-arranging their tipples.* They have not placed a great deal of emphasis upon this matter in their testimony before the Commission and their objection is largely incidental to their discussion of the disadvantages of the mine-run system in increasing the amount of fine coal and the amount of impurities. The expense of changing tipples would be insignificant if all the coal mined were to be sold on a mine-run basis; all that would be necessary to do would be to cover the screens and continue to dump the coal and clean it, insofar as cleaning was possible, by the present method. The real expense would doubtless be that referred to by Mr. Taylor in his remarks which we have just quoted. In order to sell coal in their present markets, the operators of Ohio, especially those operating in the No. 8 and No. 6 seams, would probably have to introduce the same mechanical devices for cleaning the coal, both the lump and fine coal, that have been installed in Illinois and elsewhere. This might not be wholly disadvantageous, especially to the buying public, but it is a factor which nevertheless must be taken into account in considering the effect upon the operator of a change to the mine-run system.

CONCLUSIONS AND RECOMMENDATIONS.

To what conclusions now has the Commission arrived as a result of its attempt to balance these arguments for and against a change in the present system of weighing coal and paying for the labor employed in mining and loading it?

1. It is the belief of the Commission that the present *mode of payment* by which the miners and loaders are paid on the basis of only a part of their saleable product is *not an equitable one.* We express no opinion as to the proper rate or amount of the wages of miners, but we consider that the method of *measuring* the amount of their payment is wrong. Doubtless the principle was correct at the time of its adoption, for at that time only that part of the coal which passed over the screen

was sold. Today it is all sold, and although, when the wage scale is fixed, this is taken into account, the assumption on which the rate of pay is fixed, viz. that a certain fixed percentage of the coal passes through the screen, is an assumption which does not correspond to the facts. For that reason the present system is responsible for inequalities in the pay given to miners for the same amount of work in different districts and in different mines in the same district and, to a slight extent, in different rooms in the same mine.

Such a system is bound to cause discontent, especially when coupled with the fact that many miners actually believe that they are not being paid for *any* of the coal which passes through the screen. The contracts, it is true, make allowance for the fine coal, but only a very few of the men employed in the mines have anything directly to do with the making of such contracts. Many of the miners are new arrivals in this country and know nothing of the reasons which led to the making of a contract to pay for coal on a screened-coal basis. They only know that their pay is measured by the amount of coal which passes over the screen and yet they see carload after carload of fine coal being sold which has been produced by their labor and for which they imagine they have received no pay whatever. In order to remove these inequalities and to allay discontent, we feel that the present method of basing the miners' and loaders' pay on the amount of screened-coal which they have produced should be abandoned.

2. When we turn to a consideration of the mine-run system of measuring the amount of payment, which is the system employed in many states and which is the system the miners desire to have adopted by law in Ohio, we encounter the operators' objections to such a system, based on the notion that there would be a great increase in the amount of impurities and fine coal sent out of the mine under such a system.

We are inclined to give full weight to their objections insofar as they relate to a probable increase in the amount of impurities. The experience of other states, especially that of Illinois and Arkansas, shows these objections to be real. If the mine-run system of payment is to be adopted by law, it should apply only to clean coal, i. e., coal cleaned in such a way that the operator is able to market it.

We are also convinced that there would be a great increase in the amount of fine coal in solid-shooting mines, if the mine-run system were adopted, and for this reason and because it would reduce the number of accidents, we recommend that solid shooting be prohibited by law, except in those mines where it appears to be absolutely necessary to continue the practice.

In those mines where the coal is undercut by pick or machine,—and this includes not far from ninety-five per cent of all Ohio mines—we also believe that there would be *some increase* in the amount of fine coal.

Some of this increase would be warranted and would be in the interests of conservation. There would be an incentive for the miner to put in his mine car the fine coal which he is obliged by law to send out of the mine but which is now in part left underground because the miner realizes that under the present system he is not paid for this coal. It also seems probable that the miner would be more willing to draw thin pillars which, as we have said, contain more fine coal than is mined in the rooms, and that he would consent to work in certain portions of some mines where the coal is in a crushed condition and where he today refuses to work, because he claims he cannot earn a full day's pay.

As to whether or not the adoption of the mine-run system would cause miners to shoot their coal harder, even when the coal was undercut, and thus would result in an increase in the amount of fine coal, we are unable to determine in light of the conflicting testimony which we have received on this point. It would appear to be the part of wisdom to provide safe-guards for the mine owners, which shall operate in case their fears in regard to this matter are realized, but the restrictions on the miners need not be so carefully defined nor enforced by the same penalties as in the case of the impurities.

Accompanying this Report will be found the drafts of several suggested bills which cover the various recommendations made by this Commission.

We also transmit herewith a copy of the Proceedings of the Commission and the testimony taken by it.

We have the honor to remain,

Yours very respectfully,

THE OHIO COAL MINING COMMISSION

PHIL M. CROW, *Chairman*,
JOHN C. DAVIES,
J. M. ROAN,
MORRIS ALBAUGH,
M. B. HAMMOND, *Secretary*.

APPENDICES

NUMBER ONE.

A BILL

To supplement section 936 of the General Code and to conserve the mineral resources of the state by requiring plans of proposed mining operations to be first submitted to The Industrial Commission for its approval.

Be it enacted by the General Assembly of the State of Ohio:

That section 936 of the General Code be supplemented by the enactment of sections 936-1, 936-2, 936-3, 936-4, 936-5 and 936-6 to read as follows:

Sec. 936-1. Every person engaged in the operation of a coal mine in this state shall cause the same to be operated by the double panel system, the single panel system, the long wall retreating system or the long wall advancing system or some such other system or combination or modification of such systems as:

1. will result in he least ultimate waste and loss of the coal deposits therein and will best conserve the same:

2. will best protect and preserve the health, safety and welfare of the persons employed therein; and

3. will permit such mine to be operated at a fair and reasonable profit.

Sec. 936-2. The owner, lessee or agent of each mine, shall, semi-annually and in the same manner as required by the provisions of section 936 of the General Code, file with The Industrial Commission of Ohio, for its approval, duplicate copies of an accurate map on a scale of not more than two hundred feet to the inch, which map shall show clearly delineated thereon all the proposed excavations and workings which are to be made in such mine during the six months immediately succeeding the date of such filing. Such map shall bear endorsed thereon the certificate of the engineer making the same and of the mine foreman in charge of such mine at the time of such filing, which certificate shall be acknowledged by such persons before a notary public in the following form:

I. ....., mining engineer of ....., hereby certify that this map is correct and shows all the excavations and workings which are proposed to be made in such mine during the six months beginning .....

.....

I, ..., mine foreman of ....., hereby certify that I have carefully examined this map and it correctly represents the excavations and workings which are proposed to be made in such mine during the six months beginning .....

.....

The State of Ohio } ss.
..... County. }

Be it remembered that on this ..... day of ....., 19...., before me, a notary public in and for the county and state aforesaid, personally appeared the above named ..... and ....., and acknowledged the signing by them of the above certificates to be their free and voluntary act.

.....
Notary Public.

In the event that such proposed excavations and workings receive the approval of such Industrial Commission, that Commission shall make and enter on its records such an order as is just, reasonable and proper and shall cause such approval to be noted in writing on one of such copies of maps and shall forthwith return such copy to the person by whom the same was filed. From and after the taking effect of this act no owner, lessee or agent of any mine, shall cause or permit any work to be done or excavations to be made therein unless in carrying out the details of and in strict accordance with the proposed excavations or workings as shown on the map above provided for and as approved by such Industrial Commission.

936-3. Whoever as owner, lessee, or agent, desires to open a new mine, shall, at least thirty days before beginning operations thereon, file with The Industrial Commission of Ohio, for its approval, duplicate copies of an accurate map on the scale provided for in the preceding section, showing the location of such proposed mine and also showing clearly delineated thereon all the proposed excavations and workings which are to be made therein during the six months immediately succeeding the date of such filing. Such map shall bear endorsed thereon a certificate made by the same persons and of the same general form as that provided for on the map mentioned in the preceding section. In the event that such proposed location, excavations and workings receive the approval of The Industrial Commission, that Commission shall make and enter on its records such order as is just, reasonable and proper and shall cause such approval to be noted in writing on one of such copies of maps and shall forthwith return such copy to the persons by whom the same was filed. From and after the taking effect of this act no person shall cause or permit any new mine to be opened or any work to be done or excavation to be made therein unless in carrying out the details of and in strict accordance with the proposed opening, excavations or workings, as

shown on the map provided for in this section and as approved by such Industrial Commission.

Sec. 936-4. In the the event that The Industrial Commission finds that the proposed opening, excavations or workings, as delineated on any such map filed under the provisions of sections 936-2 or 936-3 are not such as will accomplish the ends prescribed in section 936-1, it shall make and enter on its records such an order of disapproval in the premises as is just and reasonable. It shall also forthwith return the duplicate copies of maps provided for to the person by whom the same were filed and along with them furnish to such person a statement showing the changes which must be made in the plans for such proposed locations, excavations or workings before the same will receive the approval of the Commission; or, for the better information and guidance of the persons interested, the Commission may furnish along with such statement such a revised set of maps or plans to be used in the operation of such mine as will in the opinion of the Commission best accomplish the purposes of this act. Until such changes have been made and maps showing such amended locations, excavations or workings filed and approved as provided in said sections, no work shall be done or permitted to be done on any new location, excavation or working which did not theretofore appear on some such map of said mine filed with and approved by such Commission.

Sec. 936-5. When any owner, lessee or agent of a mine desires at any time to deviate from any plan of working the same which has been approved by the Industrial Commission as herein provided he may file a written application therefor with such Commission in which he shall specify clearly the location, nature and extent of such proposed deviation and thereupon such Commission, if it finds such deviation reasonable or necessary for the proper and profitable operation of such mine, shall make an order approving the same, which order shall be made and entered as other orders of such Commission and shall have the same force and effect as the other orders provided for in this act.

Sec. 936-6. Whoever shall fail to comply with the provisions of the four preceding sections herein or shall alter any of such maps after the same have been approved by The Industrial Commission or shall cause or permit any workings or excavations to be made in any mine other than as shown on such maps and as approved by such Commission, unless such deviation from such approved plans shall first have been approved in the manner provided for in section 936-5, shall be guilty of a misdemeanor and shall be fined not less than twenty-five dollars nor more than five hundred dollars, and each day a mine is operated in violation of any of the provisions of the five preceding sections shall be considered as constituting a separate offense.

NUMBER TWO.

A BILL.

A bill to amend sections 954, 965, 974-2 and 976 of the General Code, defining the duties of safety foremen of mines.

Be it enacted by the General Assembly of the State of Ohio:

SECTION 1. That sections 954, 965, 974-2 and 976 of the General Code be amended to read as follows:

Sec. 954. *The owner, lessee or agent of a mine employing more than ten men, whose duty is to mine and load coal, shall provide a safety foreman, and each owner, lessee or agent, employing more than thirty-five such workmen, shall, for each additional twenty-five such men, provide an additional safety foreman. Such safety foreman shall have had not less than five years' practical experience as a miner. He must be a citizen of the state, must have a knowledge of all laws relating to the safety of the persons under his control and shall not have charge of more than thirty-five at any one time. It shall be his duty to visit all working places under his charge each morning before the miners under him enter the same and as often thereafter as may be necessary to supervise the safety and care of each such working place. When leaving at night he shall leave with the person or persons in charge of such mine all necessary and proper notices and instructions for the information, protection and safety of any night men who may be employed therein. He shall instruct and supervise proper timbering of each working place and see that all loose coal, slate and rock, overhead in the working places and along the haul ways, be removed or carefully secured so as to prevent danger in working places and haulage ways under his charge, and that sufficient props, caps and timbers are furnished as are prescribed by the mining laws. He shall instruct each inexperienced miner or loader committed to his care as to the particular dangers incident to his work in such mine and furnish him a copy of the mining code of this state and the rules governing the operation of mines. Such safety foreman shall also supervise the blasting in all places under his control in such manner as to promote safety and good workmanship in the preparation of the coal. He shall perform all such duties, not inconsistent with those required of him as safety foreman, as he may be directed to do by the mine boss or mine foreman. He shall devote all of the time for which he is employed to the territory in which the men under his control are employed, and shall not absent himself therefrom for over one hour at any one time unless he has first notified the mine boss or mine foreman of the necessity of his absence so that his place can be filled by a competent person. I shall have the same power as a deputy mine inspector to arrest or prosecute any person or persons disobeying any law or any order of the*

industrial commission relative to the mining of coal. Nothing in the foregoing shall prohibit or prevent a mine boss, mine foreman or fire boss from fulfilling the duties of safety foreman.

Sec. 965. Each person desiring to work by himself at mining or loading, shall first produce satisfactory evidence, in writing, to the mine foreman of the mine in which he is employed, or to be employed, that he has worked at least nine months with, under the direction of, or as a practical miner; provided, however, if the mine in which such person is to be employed generates explosive gas, or fire-damp, he shall have worked not less than twelve months with, under the direction of, or as a practical miner. Except as hereinafter provided, until a person has so satisfied the mine foreman of his competency, he shall not work, or be permitted to work at mining or loading unless accompanied by a competent miner. The provisions of this section shall not prohibit a person not so qualified from working in a mine by himself, or with another inexperienced person, when such person or persons work under the direction of a competent * * * *safety foreman,* as hereinafter prescribed. Until such person or persons have been employed in a mine for a period of not less than three months, the * * * *safety foreman* shall visit the working place of such persons not less frequently than once in each four hours that such persons are in the mine, and instruct them as to their work and safety, and assist them in caring for their safety. After such persons have been employed in a mine for a period of three months, and until they have been employed not less than six months, the * * * *safety foreman* shall examine the working place not less frequently than once during each six hours that such persons are in the mine, and shall instruct them as to their work and safety, and assist them in caring for their safety. After such persons have been employed in a mine for a period of not less than six months, the * * * *safety foreman* shall examine the working place not less than once each day until such persons become qualified by having worked the period of time hereinbefore provided. The * * * *safety foreman* shall instruct such persons not to handle or use any explosive, except in his presence, until they have been employed in a mine not less than three months, and not then until he is satisfied that such persons are fully competent to handle and use same with safety. The * * * *safety foreman* shall visit the working place of such persons oftener than required herein, when, in his judgment, it is necessary to do so for the proper safety of such persons.

Sec. 974-2. No person shall use in any mine any other illuminant than those provided for in sections 974 and 974-1 of the General Code, unless with the consent of the * * * *industrial commission of Ohio.*

Sec. 976. Any county coroner who, after receiving notice of a fatal accident, or of an accident which has resulted in the death of a person, at, in, or around a mine, from the owner, lessee or agent of such mine, or the * * * *industrial commission of Ohio*, willfully refuses or

neglects to comply, so far as such provisions relate to him, with the provisions of section 921 of the General Code, shall, upon conviction thereof, be fined not less than twenty-five dollars nor more than fifty dollars, at the discretion of the court.

Any owner, lessee or agent of a mine, or any person, firm or corporation opening a new mine, having * * * *information in writing* of a violation of this act, who willfully refuses or neglects to comply with the provisions of sections 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, or 971 of the General Code, shall, upon conviction thereof, be fined not less than twenty-five dollars nor more than fifty dollars, and for a second or any subsequent offense shall be fined not less than fifty dollars nor more than one hundred dollars, at the discretion of the court.

Any superintendent, mine-foreman, foreman, *safety foreman,* or over-seer, who willfully refuses or neglects to comply, so far as such provisions relate to each of them with the provisions of sections 951, 952, 953, and 954 of the General Code, shall upon conviction thereof, be fined not less than ten dollars nor more than twenty-five dollars, and for a second or subsequent offense, shall be fined not less than ten dollars nor more than twenty-five dollars, or imprisoned not less than ten days nor more than twenty days, or both, at the discretion of the court.

Any person or persons who willfully refuse or neglect to comply with the provisions of section 955 of the General Code, or enters a mine generating fire-damp before it is reported by the fire boss that it is safe for persons to enter, or goes beyond a danger signal indicating an accumulation of fire-damp, as forbidden by the provisions of section 959 of the General Code, shall, upon conviction thereof, be fined not less than twenty-five dollars nor more than fifty dollars, and for a second or any subsequent offense shall be fined not less than twenty-five dollars nor more than fifty dollars, or imprisoned not less than ten days nor more than twenty days, or both, at the discretion of the court.

Any person, or persons, who violate the provisions of sections 956, 957, 958, 960, 961, or 962 of the General Code, or violate the provisions of section 959 of the General Code other than to enter a mine generating fire-damp before the fire boss reports it safe, or to go beyond a danger signal indicating an accumulation of fire-damp, shall, upon conviction thereof, be fined not less than five dollars, nor more than ten dollars, and for a second or any subsequent offense shall be fined not less than five dollars, nor more than ten dollars, or imprisoned not less than five days nor more than ten days, or both, at the discretion of the court.

Any person who willfully violates the provisions of sections 964, 965, 966, 967, or 970 of the General Code, or violates the provisions of section 959 of the General Code relating to loitering and intoxicants, at, in or around a mine, shall, upon conviction thereof, be fined not less than five dollars, nor more than ten dollars, and for a second or any subse-

quent offense shall be fined not less than five dollars nor more than ten dollars, or imprisoned not less than five days nor more than ten days or both, at the discretion of the court.

Any person, firm or corporation who violates or willfully refuses or neglects to comply with the provisions of section 973 of the General Code, shall upon conviction thereof, be fined not less than one hundred dollars and not more than five hundred dollars, and for a second or any subsequent offense shall be fined not less than two hundred dollars and not more than one thousand dollars, or imprisoned not less than thirty days nor more than six months, at the discretion of the court.

Any person, firm or corporation who compounds, sells or offers fo sale to dealers any oil or paraffine wax; fish oil or any other illuminant whatever, other than those specifically provided for in sections 974 *and 974-1* of the General Code, unless with the consent and approval of the * * * *industrial commission of Ohio,* for illuminating purposes in any mine in this state contrary to the provisions of sections 974, *974-1, 974-2* and 975 of the General Code, shall, upon conviction thereof, be fined not less than fifty dollars nor more than one hundred dollars and for a second or any subsequent offense shall be fined not less than one hundred dollars nor more than two hundred dollars, or imprisoned not less than thirty days nor more than sixty days, or both, at the discretion of the court.

Any person, firm or corporation who sells, or offers for sale to any employe of a mine for illuminating purposes in a mine any oil or paraffine wax, fish oil or any other illuminant, other than those specifically provided for in sections 974 *and 974-1* of the General Code unless with the consent and approval of the * * * *industrial commission of Ohio* contrary to the provisions of sections 974, *974-1, 974-2* and 975 of the General Code, shall upon conviction thereof, be fined not less than twenty-five dollars nor more than fifty dollars, and for a second or any subsequent offense shall be fined not less than twenty-five dollars nor more than fifty dollars or imprisoned not less than ten days nor more than twenty days, or both, at the discretion of the court.

Any person who knowingly uses for illuminating purposes in a mine, any oil or paraffine wax, fish oil or any other illuminant whatever other than those specifically provided for in sections 974 *and 974-1* of the General Code, unless with the consent and approval of the * * * *industrial commission of Ohio,* contrary to the provisions of sections 974, 974-1, 974-2, and 975 of the General Code, shall, upon conviction thereof, be fined not less than five dollars nor more than ten dollars, and for a second or any subsequent offense shall be fined not less than five dollars nor more than ten dollars, or imprisoned not less than five days nor more than ten days, or both, at the discertion of the court.

SECTION 2. That said original sections 954, 965, 974-2 and 976 of the General Code be and the same are hereby repealed.

NUMBER THREE.

A BILL.

To regulate and prohibit solid shooting in coal mines.

Be it enacted by the General Assembly of the State of Ohio:

SECTION 1. Whoever being the owner, lessee or agent of a coal mine causes or permits any solid shooting to be done therein without having first obtained a permit to do so from the Industrial Commission of Ohio shall be fined in a sum not exceeding one hundred dollars.

SECTION 2. A permit to do solid shooting may be issued by the Industrial Commission of Ohio in the case of any mine when application shall be made therefor by the owner, lessee or person engaged in the operation thereof and by a majority of the miners employed therein, and when such Industrial Commission shall be satisfied that such method of blasting is necessary for the just and reasonably profitable operation of such mine. Such permit may be revoked at any time by said commission after sixty days notice in writing to such owner, lessee or person operating such mine. Any person in interest who is dissatisfied with any order of said Industrial Commission made under the power conferred upon it by this section, may commence an action to set aside, vacate or amend such order in the same manner and for the same reason as other orders of such Commission may be set aside, vacated or amended.

SECTION 3. Each section of this act is hereby declared to be an independent section and the holding of any section to be void or ineffective for any cause shall not be deemed to affect any other section thereof.

NUMBER FOUR.

A BILL.

To amend section 934 of the General Code, relative to emergency supplies which are to be kept for use at the mines.

Be it enacted by the General Assembly of the State of Ohio:

SECTION 1. That section 934 of the General Code be amended to read as follows:

Sec. 934. The owner, lessee or agent of a mine at, in, or around which, more than ten persons are employed, shall * * * *furnish for each thirty-five men so employed a properly constructed* stretcher, * * * a woolen blanket, * * * a waterproof blanket, * * * a sufficient quantity of bandages and linen * * * *and such other necessary requisites for use in case of accident as may from time to time be pre-*

scribed by the Industrial Commission of Ohio. At mines generating fire-damp so as to be detected by a safety lamp, a sufficient quantity of olive or linseed oil shall be kept * * * for use in emergencies. *It shall be the duty of each safety foreman to keep in a safe and dry place in the territory over which he has charge such stretcher, woolen and water-proof blankets and other supplies. He shall care for the same and keep them in a dry and sanitary condition always ready for use.*

SECTION 2. That said original section 934 of the General Code be and the same is hereby repealed.

NUMBER FIVE.

A BILL.

To regulate the weighing of coal at the mine.

Sec. 1. On and after the first day of October, 1914, every miner and every loader of coal in any mine in this state who under the terms of his employment is to be paid for mining or loading such coal on the basis of the ton or other weight shall be paid for such mining or loading according to the total weight of all such coal contained within the car (hereinafter referred to as mine car) in which the same shall have been removed out of the mine; provided, the contents of such car when so removed shall contain no greater percentage of slate, sulphur, rock, dirt, or other impurity than that ascertained and determined by the Industrial Commission of Ohio as hereinafter enacted.

Sec. 2. Not later than the date set forth in section 1 hereof, and thereafter as hereinafter provided, said Industrial Commission shall ascertain and determine the percentage of slate, sulphur, rock, dirt, or other impurity unavoidable in the proper mining or loading of the contents of mine cars of coal in the several operating mines within this state.

Sec. 3. On and after the date set forth in section 1 hereof it shall be the duty of such miner or loader of coal and his employer to agree upon and fix, for stipulated periods, the percentage of fine coal commonly known as nut, pea, dust and slack allowable in the output of the mine wherein such miner or loader is employed.

At any time when there shall not be in effect such agreed and fixed percentage of fine coal allowable in the output of any mine said Industrial Commission shall forthwith upon request of such miner or loader or his employer, fix such allowable percentage of fine coal, which percentage so fixed by said Industrial Commission shall continue in force until otherwise agreed and fixed by such miner or loader and his employer.

Whenever said Industrial Commission shall find that the total output of such fine coal at any mine for a period of one month during which

such mine shall have been operating while the percentage of fine coal so fixed by said Industrial Commission has been in force, exceeds the percentage so fixed by it, said Industrial Commission shall at once make, enter and cause to be enforced such order or orders relative to the production of coal at such mine, as will result in reducing the percentage of such fine coal, to the amount so fixed by said Industrial Commission.

Sec. 4. After the date set forth in section 1 of this act said Industrial Commission, shall, as to all coal mines in this state, which have not been in operation prior to said date, perform the duties imposed upon it by the provisions hereof.

Sec. 5. Said Industrial Commission shall have full power from time to time, to change, upon investigation, any percentage by it ascertained and determined, or fixed, as provided in the preceding sections hereof.

Sec. 6. It shall be unlawful for the employer of a miner or loader of the contents of any car of coal described in section 1 of this act, to pass any part of such contents over a screen or other device, for the purpose of ascertaining or calculating the amount to be paid such miner or loader for mining or loading such contents, whereby the total weight of such contents shall be reduced or diminished.

Any person, firm or corporation violating the provisions of this section shall be deemed guilty of a misdemeanor and upon conviction, shall be fined for each separate offense not less than three hundred dollars nor more than six hundred dollars.

Sec. 7. A miner or loader of the contents of a mine car, containing a greater percentage of slate, sulphur, rock, dirt or other impurity, than that ascertained and determined by said Industrial Commission, as hereinabove provided, shall be guilty of a misdemeanor and upon conviction shall be punished as follows: for the first offense within a period of three days he shall be fined fifty cents; for a second offense within such period of three days he shall be fined one dollar; and for the third offense within such period of three days he shall be fined not less than two dollars nor more than four dollars. Provided, that nothing contained in this section shall affect the right of a miner or loader and his employer to agree upon deductions by the system known as docking, on account of such slate, sulphur, rock, dirt or other impurity.