

COAL AGE

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How Mr. Lewis Favors Machines

ON ANOTHER page John L. Lewis, president of the United Mine Workers, denies that the union opposes the introduction of labor-saving machinery. With entire willingness to be fair with Mr. Lewis, it is still easy to say that what Mr. Lewis says is largely fluff. The union favors such machinery but insists, he says, only upon receiving a fair share of the benefits in the form of wages. What is a fair share? Therein, of course, lies the nub of the situation. Judging by the recent Kansas cutting-machine case, the union's idea of a fair share is peculiar. The operators were willing to agree upon a machine differential of eleven cents, but the miners would not recede below five cents. So there is no machine scale in that state and the field is deprived of the economic advantage of machine mining.

Somebody is responsible. Mr. Lewis would say the operators are at fault for their grasping efforts. Somehow we cannot see it that way. Paying a machine runner only five cents a ton less than the hand mining scale is not our idea of a fair division of the benefits of machine mining. This sort of "fairness" on the part of organization is the direct means by which the union has delayed and handicapped labor-saving machines. It would be encouraging if the union's idea of fairness were to change with regard to the introduction of loading machines. The time is upon us when a loader scale must be fixed.

"The Won'ts"

A PREVALENT ailment in the coal industry is "the won'ts." Too many good men in coal "won't" help educate the public, "won't" meet the critic of the business halfway, "won't" recognize that perhaps something ought to be done at Washington about coal, "won't" this and "won't" that. In the present session of Congress they are interested only in blocking legislation that is offered—if they are interested at all. They are not trying to propose anything helpful. They do not purpose telling Congress or the nation what the coal man really wants. They are merely going to tell what the coal man does not want.

Of course defense against improper coal legislation is important. But it is unfortunate that, paralleling all the defense now being marshaled, there is so little offense. There is so little of it, in fact, that no ordinary citizen could say what the coal man's program is; nor could the ordinary coal man define it. There isn't any program. "Let coal alone" is as near an approach to it as can easily be set up in words. But that is a poor program to be frankly adopted by coal men who, everywhere, have been admitting there are all sorts of ills afflicting their industry. If there are all these ills, there must be ideas for cures.

What are these ideas? They ought to be laid before

the congressional representatives of every state in the Union, and laid there in sincerity. On the other side of the fence politicians and grandstanders, and honest but deluded gentlemen are saying and doing plenty about coal; but what constructive thing is coal doing for itself? Altogether too little. It is cheerful to note even so small an effort as is now starting among a little group of Midwestern operators. That few intend to say something constructive to Congress about coal, even at the risk of not getting much of a hearing.

They are going to say what they think would do coal some good, whether the rest of the industry agrees with them or not. They are at least constructives. They are not stricken dumb by "the won'ts," and that's something in their favor.

Man to Man

WHAT is the operator of a coal property to his men? What are the men to the coal operator? Only too little too often. A railroad president, Sir Henry Thornton, operating a 22,000-mile system, the Canadian National Railways, speaking at the Bond Club in New York City a few days back detailed a way in which he proposed to keep in touch with the thousands of men under his direction scattered over an area almost as large as the United States—only "almost as large," for only part of Canada is netted with railroads.

He said he intended to establish a "chain of broadcasting stations from the Atlantic to the Pacific at such intervals as will enable headquarters to keep in constant touch with the whole of the property." He added: "We propose to place at the disposal of our employees wireless sets for a moderate price. The sets can be bought either by paying for the entire outfit at once or at the rate of \$1 or \$2 a month. The result will be that in a comparatively short time most of our men will have equipped themselves with wireless sets, and we propose, as fast as circumstances may require, to talk to our men in the evenings at their own homes. I propose, myself, as president of the company, to speak at least once a week to our men."

Think what might be done in the coal industry if this were tried by the right kind of man, one who looked upon himself as one of the gang by which the job of mining coal was being done, a red-blooded man among red-blooded men helping to do a work that was worth the doing, inspiring other men to work with him in doing just that kind of work, thinking with them, of them and for them.

What would it not do for safety! How strongly would the message of saving one's life for the sake of the family and for the good of humanity ring through the air! Every man lives for accomplishment in the home and in the community. How earnestly could the message of avoiding injury be impressed on

those men in the virile words and convincing tone of a man moved by ambitions like those of his hearers!

What would it do for coal preparation, for co-ordination between various units in the organization, for clearing up misunderstandings. Out of it would come a new team work. The larger aggregations would re-align themselves into a body of men with one aim and purpose, inspired by a community of interest, actuated by a common ideal. It is no pipe dream. Some might not be able to carry that message; they are the men who have none, who have no common purpose with their men, who are ill fitted to be leaders. But to those who have the power of leadership the radio furnishes a voice, the *vox humana*. No more powerful tool for good—or for evil—has ever been devised.

Putting the "Eagle" on Coal

EVEN when a manufacturer has a monopoly it pays him to make a good article. He finds it brings him larger business and the amiable regard of the public. Had the manufacturer made the automobile a wheezy, rattling and uncertain means of travel the automotive industry would never have made the progress it has.

When, however, a product is competitive, like coal, it pays even more for every producer to make a good article and to have a ready way of convincing the public that his is a reputable product. No better way can be found than to get the indorsement of the industry corporately expressed or, better yet, to get the approval of the government.

When the goldsmith craftsmen of Great Britain found their product looked upon with suspicion because some of the dishonest workmen put excessive quantities of dross in their gold, they arranged to have their guild assay all gold and put a stamp upon it to show how much dross was mixed with it, dross being necessary in the metal because otherwise it would not be hard enough for any use. More dross is advisable where the metal is subject to much wear.

It would pay the coal operators to have their coal similarly assayed, so that the buyer would know what he was getting. Some coal is inherently less efficient than other, some is necessarily higher in ash or sulphur, some of it is not suited to boilers having high rating; but whatever the coal may be, the purchaser should know just what it is and the best of guarantees should be placed on it so that it could be bought with assurance.

To take an example from the publishing industry, a bureau has been created to find and record the size and character of the circulation of periodicals for those interested in knowing these facts. Is it paid or unpaid? Is it paid to date or does it consist of persons who are being carried along long after their subscription has lapsed? What is the character of the readers among whom it circulates? The larger publishers nearly all submit to this inquiry, for they have nothing to hide.

Similarly the coal operator with a good product with nothing to disguise, who has taken the dirt out of his coal, prepared it and perhaps washed it, wants the public to know that he has a good article. He would welcome the approval of a guild or bureau or the United States Government.

Some time ago O. P. Hood, mechanical engineer of the U. S. Bureau of Mines, advocated that any company that requested the Bureau so to act should have the product in several of its cars in various parts of the

country sampled at random. The Bureau would not take samples in cars indicated by the operator but take its own pick of all the cars shipped. It would then determine by this investigation the rating of the mine from which the cars came, that rating being above or below a correct rate of the coal in the face of the mine according to the degree of cleaning.

The mine would be permitted to sell the coal as being of a quality vouched for by the government, but should it prove in analyses of samples taken frequently thereafter that the rating should be lower or higher, a new rating would be issued, and the mine, whether it wished or not, would be obliged so long as it quoted the government approval to announce its rating so that all the world would know if the coal from that time was 12, 14 or 18 carat, so to speak.

The mine that failed to get government approval would find the going hard. It would be as difficult to sell such coal as it would be to pass a gold dollar which did not have the government's stamp of approval. The mine owner with the uninspected coal might soon have to leave the market, and dealers who failed to say that they sold only coal which was under the government cachet would automatically be ruled out of the market.

Definitions

SOME years ago it was decided in Great Britain that the coal industry should be put on the six-hour day and the mines nationalized. The day was reduced from eight to seven hours and when the suggestion was made that the industry would be better off for a change back to the longer working day, the labor leaders gave notice that they had not abandoned the six-hour day. Now that the Labor Party in England is second strongest and may become first there are some interesting questions arising.

Should the Labor Party take over the government they must carry out the policy of nationalization of mines and railroads, policies they have sponsored for years. But they have no clear conception of what they mean by nationalization of these industries. Their leaders are divided on definitions and schemes. Some, the more moderate laborites, profess to believe that nationalization can be interpreted to mean state control for the benefit and support of the entire community. Others maintain that what they mean by nationalization is "control by the workers." They likewise are divided on the question as to whether they intend to confiscate the property or compensate the owners.

JOHN LEWIS IS STAMPING ON ONE BRAND OF RADICALISM, if evidences displayed at the Indianapolis convention mean anything. Whereas two years ago the radical vote all but beat the United Mine Workers' administration, this year, on such important radical issues as the reinstatement of the Red and recalcitrant Livingston and McLachlan, of Nova Scotia, the recognition of Soviet Russia, and the alliance of the union with an all-labor political party, Lewis' forces soundly defeated the advocates of these measures. However, this does not mean there is less bolshevism in union ranks. It means there is less defection among big union leaders. Bringing Frank Farrington, of Illinois, into camp a year or so ago is the real reason. The bolshevist sentiment is still in the union but it lacks a powerful enemy of Lewis around whom to rally.



Making Coal-Loading Machines Work Successfully in Indiana

Ayrshire Coal Co. Cuts Loading Costs Even on Room-and-Pillar System with Machines Averaging but 75 tons Daily—With Snubbing More Lump Is Obtained Than With Hand Loading—Some Loader Speculations

BY DAVID INGLE*
Evansville, Ind.

FOR several years our company watched with interest the progress of mechanical loading of coal in mines. In December, 1922, we made our first entry into the loading-machine game by installing two loaders in one of our mines that had been lying idle for nearly two years. Later four more were added. The six machines and the method of using them in this mine have been developed to a point that enables them now to load out an average of 75 tons a day operating on a room-and-pillar basis, and their service is improving steadily. Already coal is produced cheaper at this mine than it ever was under the hand-loading system, the proportion of lump coal is higher, and we are fairly well satisfied with the results we are getting in this venture in machine loading, even

IT'S "FASCINATING"

It is fine that so many American coal operators have a pioneering spirit—a spirit that drives them to do by their own ingenuity the thing the other fellow thinks is impossible. There is a certain adventure into the unknown for Mr. Ingle, for instance, as he toils and cudgels his brain over the problems of fitting machine loaders into his mines. He calls it a "fascinating experiment." But he and many other mine operators all over the land must toil and cudgel their brains and invest their money and lie awake nights over this revolutionary machine, the underground loader. Nothing else will ever make it meet the conditions of this country. Inventors and manufacturers can do only a small part of it. The operator and the practical mining man, meeting heartbreaking obstacles in the path of their great adventure in loading, are making the new machine revolutionize coal mining. In the fascination of the quest lies the future of machine mining.

though we have a long way yet to go.

This mine, Ayrshire No. 6, was opened in 1917 on a coal tract of 200 acres lying near the railroad, but inaccessible from any of our other operations. During the war we worked this mine up to a production of about 800 tons per day. In January, 1921, the mine was closed down because we didn't need the tonnage from it, and because it was the one we could maintain idle with the least expense.

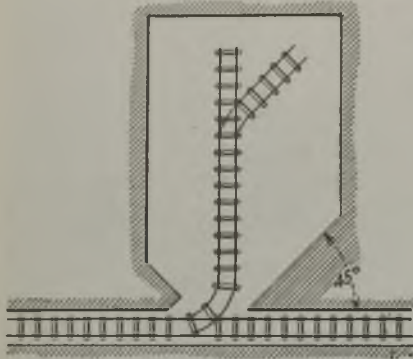
When we decided to try mechanical loading this idle mine seemed the natural place to try the experiment. The coal there is 5 ft. thick,

overlaid by a gray shale which is not reliable, standing fairly well in entries but requiring close timbering in wide working places. The fireclay bottom in places is soft and wet. The thickness of the overlying strata runs from 35 to 70 ft., and this accounts both for the uncertain roof and the quantity of water in the mine.

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The coal itself is of good quality, running only about 1.25 per cent sulphur and 6 per cent ash, with no partings of any kind. The mine was opened and worked by the usual room and pillar method, and the coal was all undercut by machines.

We started the two Joy machines working in rooms and entries that had been standing idle for nearly two years, and our first discovery was that the little loaders,



How Room Necks Are Turned

Making the turn at an angle of 45 deg. to the haulageway not only maintains the narrow necks necessary for the support of bad roof but enables the long loading machines to enter without hitting the ribs.

could get a foothold we had no further trouble of this kind.

We have tried operating various widths of working places and found that the best way, so far, to operate this particular loader in our coal is by regular room-and-pillar methods, with the room necks turned off the entry at 45 deg., in order to give the long loader a chance to get into the corners of the rooms. We are driving these rooms, where we can, about 24 ft. wide, leaving pillars between them from 6 to 8 ft. thick. Owing to the bad roof, it has been necessary usually to timber pretty close and to reneck many rooms. This has interfered greatly, preventing the attainment of results that the loaders might have afforded had the layout originally been made for their accommodation.

The cars used at this mine hold about 1½ tons as loaded by the machines. The tops are merely rounded up, as the loaders put the coal on the cars too quickly to permit of building. The loading machines are kept supplied with cars by mules, one mule and a driver being provided for each loader. The empty car is brought by the mule to the turnout, which is placed just as close to the loader as can be arranged conveniently. The mule is then hooked to the loaded car, and as soon as the load is pulled out, the loader's helper shifts the empty car by hand to the loading position.

Two men are used on each loader, one to operate the machine itself and the other, a helper, to lend a hand wherever needed, his main job being to shift the empty car to the loader, to shift it as it is being loaded, and to keep in shape the loose rails on which it stands. These loose rails are fastened at one end only, usually by steel ties, which are readily clamped to, and loosened from, the rail.

Of course, all the coal is undercut and shot down before the loader tackles it. In this mine one undercutting machine can easily cut all the coal two loading machines will handle, and the operation is conducted on that basis—one undercutter for each two loaders. Five or six loading places are allotted to each loader, principally in order that the cutting machine may keep plenty of coal cut ahead. Two men are used on the undercut-

ter. One man drills, makes the cartridges, tamps, and shoots for two loaders. This means that he drills, tamps and shoots anywhere from 15 to 30 holes a day, for in wide places we drill three holes over the coal.

Additional loaders have been installed from time to time, and at present, practically a year from our start, we are using six of them. Each of these loaders is producing, at present, an average of about 50 cars, or 75 tons, per day, making the day's hoist about 450 tons. This is much better than was done at first and is fairly satisfactory, but we hope to improve as we learn more.

To operate this mine, with its six loaders, the following 53 men are employed at present:

- 1 Mine boss,
- 1 Electrician,
- 1 Machine-repair man,
- 1 Dumper at shaft bottom,
- 1 Coupler at shaft bottom,
- 2 Motor men and trip riders,
- 3 Tracklayers,
- 2 Pumpers,
- 6 Jerry and timber men,
- 6 Drivers,
- 3 Shotfirers,
- 2 Snubbers,
- 6 Loader operators,
- 6 Loaders' helpers,
- 6 Cutters and cutters' helpers,
- 1 Top boss,
- 1 Blacksmith,
- 3 Railroad-car trimmers and yardmen,
- 1 Stable boss.

The coal is dumped into a hopper at the bottom of the shaft, and hoisted by a continuous bucket elevator, so no engineer or fireman enters into the calculations. The dumper also is the weigh master.

We have found many interesting things as the work has progressed; in fact, it is quite a fascinating experiment. In this mine conditions are far from ideal. Reference already has been made to the bad roof. It is so bad that less than half the working places are as much as 15 ft. wide. So much narrow work involves moving the loader from place to place too often and diminishes seriously the available time for the actual loading of coal. Roof conditions are a much more important factor in mechanical loading than they are when the loading is done by hand with a shovel.

For quite a while one of the major difficulties encountered was that of getting coal out of the corners of the working place with the loader. It seemed that in an average room-full of coal with, say, a 22- to 24-ft. face, having perhaps 30 tons of coal in each fall, it would take longer to load out the 5 tons or so in each corner of the room than it did to load out the 20 tons in the middle. The coal in the corners would be wedged in tight and hard to get down.

Recently this trouble has been almost entirely overcome by the simple process of snubbing each cut of coal before it is shot. The snubbing allows the powder to roll the coal over as the latter falls and seems to do away with the tight corners. Also much less powder is required to shoot a well-snubbed shot, and a much better percentage of lump coal is recovered.

Of course it costs something to do this snubbing, and the cost and the results obtained may not be so marked in inverse proportion in other mines and other coals, but it is very successful with us. Perhaps equally good results in this respect may be obtained by shearing either one end or the center of a room that has been undercut. We expect to try this out also when we get around to it.

One rather gathers the idea, from reading of the performance of loading machines, that the great difficulty in mechanical loading would be to keep empty cars supplied to the loader. So far, this has been one of the

least of our troubles, even though our cars are small as cars go nowadays. One driver with his mule could easily supply from 25 to 40 per cent more cars to our loaders than they have used so far, provided his track is in good shape and the train locomotive keeps cars on his parting for him. Not that the importance of transportation is to be minimized for a moment, but thus far it is the narrow work, close timbering, and soft bottom that have held us back and not transportation.

We believe that the loaders would work to much better advantage under good roof. A hard, smooth bottom greatly facilitates the operation of any kind of loading device, and, of course, one would expect proportionally greater results in a thick bed of coal than in a thin one, because it would enable the loader to handle a larger tonnage with less moving.

In spite of the adverse physical mining conditions under which we are operating, we are loading coal with our machines at somewhat less expense in this mine than it costs us to load by hand in our other mines, where similar physical conditions prevail. This reduction is enough to lower the total cost of producing coal even though the company does all drilling and shooting.

Many types of mechanical loaders are now in process of development and many are in actual use. We have had actual experience only with the Joy, but there are enough machines operating under diverse conditions to show that the mechanical loader is a thoroughly practical device. We have found some weak places in it, but these details have been promptly remedied in every instance by the makers, the operating results continually improving.

We are operating entirely with union labor, and the union has offered no objection to the introduction of these machines. Our men seem to like to work with them. After all, it is much better to let electricity do the hard, heavy work than to get human energy to perform it. Though it takes an able-bodied man to operate a Joy loader successfully, it certainly requires no more muscular effort to handle it efficiently than it does to

operate any of the standard undercutters now so universally used.

If the loading machine does away with the old back-breaking shovel, naturally the man who graduates to it from the hand shovel will like the change. If the use of mechanical loaders will enable a mine worker to realize just as much for his day's work, and come out of the mine at the end of his shift less tired, he is bound to be for it, when he learns about it. And if its use enables the miner to earn just as much and enables the coal operator to reduce the final cost of coal to the consumer, it will then have become no longer an experiment but will be a necessity.

Of course there are apparent disadvantages connected with the use of mechanical loaders. One of them is that coal is loaded too rapidly to permit the impurities to be removed while loading is actually going on. This can and is being done more or less successfully in loading by hand. Mechanically loaded coal must be picked and cleaned outside of the mine on loading booms and picking tables and by crushing and mechanical separation of the impurities. A dirty seam of coal loaded by machines will not be successfully marketed unless an elaborate cleaning equipment is provided in the tippie.

An objection that has been urged is that it will be necessary to shoot the coal too hard, and get it all down in a pile before a loader can handle it successfully. We found this true at first, but by snubbing and studying our methods of shooting we have succeeded in turning out just as good or a larger percentage of lump coal than before the loaders were used. And I am sure we will do still better in that respect in the future.

Still another objection, and a formidable one just now when the industry is so demoralized by overproduction and ruinous competition, is the cost of the machines themselves and the auxiliary equipment necessary to their proper exploitation.

To completely equip one of our modern 4,000-ton mines with Joy loaders would increase the invested capital in that mine by from \$250,000 to \$300,000,



This Machine Proves Economical Though It Averages But 75 Tons a Day

Six like it are operating in room and pillar mining in Ayrshire No. 6 and their tonnages are increasing as various changes in method are made to benefit them. The scheme of delivering cars to the loaders is 40 per cent ahead of the rest of the system, so there is no handicap there. Roof falls and too frequent machine moves due to narrow working places are the most severe checks on the loaders.

assuming that the loaders would turn out 100 tons each per day, which is more than we have been able to do to date.

It is fair to assume, however, that this initial expense will be offset to a large extent by a saving in development owing to the greater concentration of work that is possible by the use of loaders.

Working on the room-and-pillar system, in vogue in Indiana and elsewhere, to produce 4,000 tons per day would involve perhaps 500 to 600 working places. Operating, say, 40 loaders, the number of working places to produce the same tonnage might easily be held down to 200 to 250, or 40 per cent of the number now required for hand loading.

Fewer mine cars would be needed and less steel rail, although probably more mules or locomotives would have to be provided. The consumption of power in operation probably would be increased, but not so much as might be imagined. We do not notice as yet any marked increase in this respect, but it is reasonable to anticipate that machines which must be operated almost continuously during the shift will increase power consumption noticeably, and of course the loader must operate if it is to be efficient.

Most of the foregoing is written with the idea that the work of the loader is done on a room-and-pillar system. That is the only plan we have tried effectively so

far. But it is doubtful indeed whether the future coal loader will work on this system. It would seem that a continuous working face would be much more productive of tonnage.

I do not at this time know enough about the possibilities of working a continuous, or longwall, face to hazard much of a guess as to its merits. But of course the greatest advantage apparent in such a plan would be the ability to load an uninterrupted train of cars, reducing the delay due to the shifting of loads and empties.

LOADER NOW PAST EXPERIMENTAL STAGE

The development of machine loading is coming rapidly. I have no hesitation in saying that the machine we are using is past the experimental stage, and is an established dependable loading unit; it is being made in quantity. The loss of time from breakdowns is not much greater than in other heavy-duty mining machinery like undercutters and gathering locomotives.

The industry daily evinces greater interest in the subject. Hardly a day passes that we do not have visitors at this little mine. The boys have gotten so used to them that they do not even "play to the galleries" any more. It is all part of the day's work. Operators, miners and the public from all parts of the district come to look the proposition over, and they are all welcome.

The Miner's Torch

Certificates of Competence?

THE State of Connecticut has been receiving much distasteful publicity recently because some members of its medical examining board are under indictment for furnishing copies of examination questions in advance of the examinations, thus allowing "quacks" to qualify as physicians.

It would be pretty hard to think of a more despicable crime, and when one considers that at best the bribe money they receive could not have been considerable it seems rather hard to believe that any state official could stoop so low. In fact I have heard people, in discussing the press comments, argue that they never could be made to believe that men with enough standing to have been appointed on such a board could possibly be led to stoop so low.

I only wish that my contact with public officials could have been of a nature to make me feel that way about it, but while I was listening to such sentiments being passed I recalled, unfortunately, that once when I was a young man I knew of my own knowledge that a state mine-foreman's examining board allowed its questions to get out in advance so that a few favored ones could be sure of passing the examination. If an incompetent mine foreman is not capable of doing as much damage as an incompetent physician I miss my guess.

Personally, since that time I have never considered certificates of competency of any description of much value and I have always been glad that I came to that conclusion early in life because it has allowed me to explain to my own satisfaction many otherwise unex-

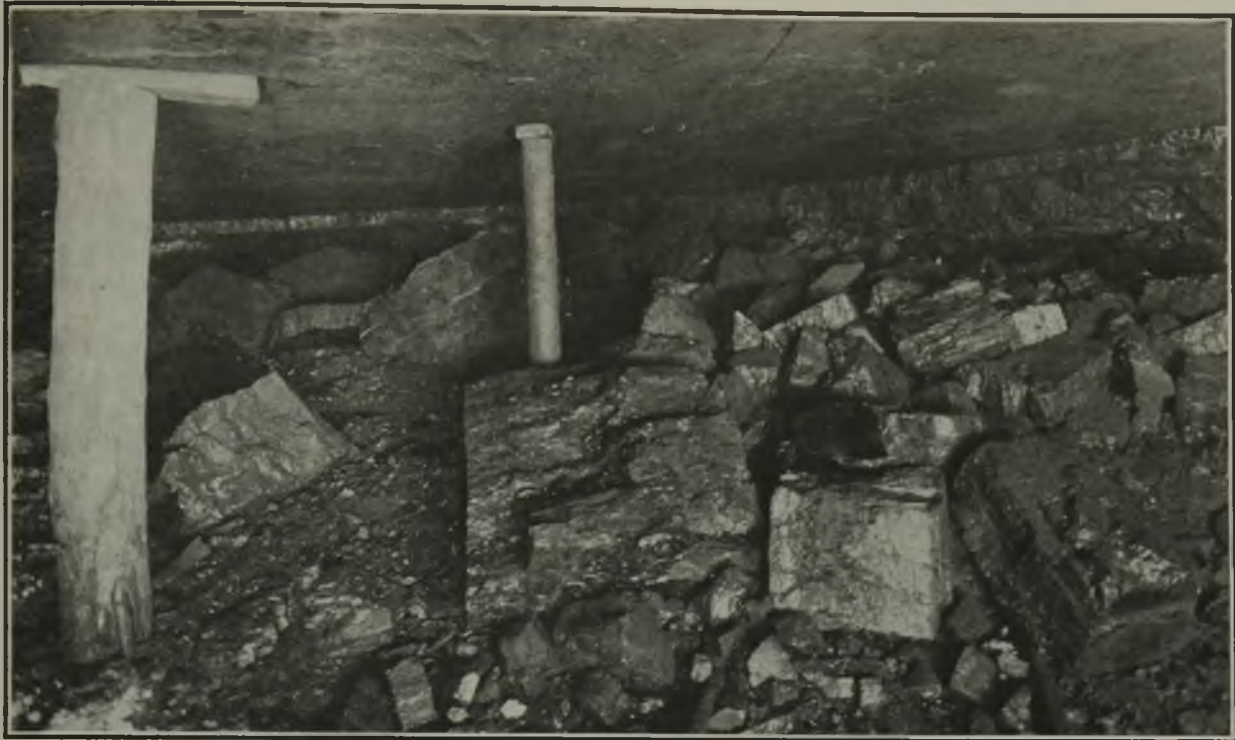
plainable errors of supposedly trained men with whom I have been thrown.

I recall, for example, several camp physicians employed by some of the companies for whom I have worked who, if they still are holding similar positions, are undoubtedly feeling very uncomfortable as this Connecticut publicity spreads around, and they do not live in Connecticut either. I never questioned their certificates or their diplomas but I questioned their abilities and I feel sure they have made little change for the better in the years that have passed since I was in close contact with them.

Let me hasten to add that I have no desire to offer an argument against the advisability or necessity of having state boards pass on the competency of physicians, mine foremen or other men having equivalent responsibilities to the public; but the okehs of such boards should be taken only for what they are worth.

The mine foreman examining-board leak that I knew about "of my own knowledge," as the lawyers would say, was not one that could be traced back to a money bribe, but it was chargeable to a popular and influential mining official's pull with the board; he had two men due to come before the board and he was uneasy about their chances of passing on examination and yet was anxious to have them pass because they were men whose services he required.

Just how he persuaded the board to do his bidding I do not know but I saw the questions the day before the examination and they were in the hands of one of the men who were to take the test. The man with the pull and the men who profited by his efforts have all been dead quite a number of years and, so far as I know, no harm ever came of the adventure; otherwise I would not record it here. Possibly you are wondering why the man who obtained the questions showed them to me the day before the examination. Very easily explained—the questions were of no value unless someone worked up the answers, and he thought that I could help him.



Heavy Shot of Coal in Anthracite Mine

Classification of Coal That Will Enable Buyer to Know What Kind of Fuel He Is Getting

Suggested That Coals Be Divided Into Ten Classes by Percentages of Fixed Carbon with the Ash Equated to Seven per Cent—Seven New Classes Added to Recognized Divisions—Graded Also for Quality

BY GEORGE H. ASHLEY
State Geologist, Harrisburg, Pa.

COAL has been much in the public eye in recent months, and the eye has not been altogether friendly. The complaints have been uncertain supply, high prices and uncertain or low-grade product. This paper deals with the last problem only. The first step toward meeting that problem must be an understanding among coal men as to what constitutes superior, good, fair and poor grades of coal, and the formal designation and adoption of standards for grading coal. Tied up with this question of coal grades is the larger, though possibly no more important, problem of the standardization, definition and naming of kinds and classes of coals.

I have been studying this problem for the last six years and have published several preliminary drafts of proposed schemes of coal classification and grading, which have been followed by a voluminous correspondence. Studies and correspondence have shown that while the classification first presented more than four

years ago was technically correct it was too complicated to be of the greatest service. This paper, prepared at the suggestion of the Executive Board of the Coal Mining Institute of America, presents the same scheme of classification reduced to its lowest and simplest terms.

Today one does not call his dealer and order "a ton of coal." The class and size and perhaps the grade are specified, for experience has shown that certain kinds or types of coal are best suited to certain uses. Furthermore, coals from different localities vary widely in physical and chemical characteristics and in adaptability to various uses. The most easily recognized classes and types have been long recognized and named as cannel coal, coking coal, anthracite, brown coal or lignite, and so on; or local names have been used to designate coals, as Clearfield, Pocahontas, Pittsburgh, Youghioghenny gas, Sea coal, Brazil block, and so on.

Many attempts have been made to classify coals both here and abroad. In Table I will be found examples of classifications that have formerly served the industries.

Detailed classifications of the lignites have been made by several German authors, and many of the distinctions made are commonly recognized in the coal fields. These classifications divide the lignites into four to

An article entitled "A Practical Classification for the World's Coals," presented at the December (1923) meeting of the Coal Mining Institute of America. A committee consisting of A. C. Fieldner, W. E. Fohl, A. R. Pollock, E. A. Holbrook, F. B. Lockhart and J. J. Rutledge was appointed by the institute to confer with Mr. Ashley and report on a classification that could be used in the marketing of the world's coal resources.

TABLE I—SELECTED CLASSIFICATIONS OF COALS AS FORMERLY USED

Ure (Dictionary of Arts, etc.), 1845
 (1) Cubical coal—(a) Open burning (b) Caking
 (2) Slate or splint coal
 (3) Cannel coal
 (4) Glance coal (anthracite)

Watts Dictionary of Chemistry.
 (1) Lignite or brown coal
 (2) Bituminous or caking coals—(a) caking coal, (b) cherry coal ("does not fuse"), (c) splint, rough or hard coal, (d) cannel coal
 (3) Anthracite, stone coal or culm
 (4) Steam coal

H. D. Rogers, 1858.

Anthracite	Hard or dry (volatile matter below 6 per cent) Semi or gaseous (volatile matter below 10 per cent)	
Common Bituminous coal	Semi-bituminous (volatile matter between 12 and 18 per cent)	Cherry Splint Caking Cherry Splint
	bituminous volatile matter about 18 per cent)	
Hydrogeneous or gas coal	Cannel coal (minimum yield of gas 9,000 cu. ft. per ton) Shaly (Torbanehill) Asphaltic (Albert mine)	

Pers for Frazer, Jr., 1877.
 (Based on "fuel ratios," or fixed carbon divided by volatile hydrocarbons)

	Fuel Ratio
	From To
Hard, dry anthracite	100 12
Semi-anthracite	12 8
Semi-bituminous	8 5
Bituminous	5 0

(This classification has been widely used in North America, but obviously it does not distinguish lignites, cannels, splints or a score of coals recognized by trade names from one another. It does not distinguish between the high-volatile and low-volatile bituminous coals nor between the low-moisture coals of the Pittsburgh region and the high-moisture coals of the Illinois region which differ greatly in heating value. It is followed in the classification here proposed as far as it applies.)

Regnault, extended by Gruner, revised by Bone (dry, ashless fuel)

	Per Cent Fixed Carbon	Per Cent Volatile Matter
(A) Lignites (non-caking)	Below 55	Above 45
(1) non-caking, long-flame	55-60	45-40
(2) caking, long-flame	60-68	40-32
(B) Bituminous	68-74	32-26
(3) hard-caking	74-82	26-18
(4) hard-caking, short-flame	80-85	20-15
(B.C.) Semi-bituminous, non-caking, short-flame	85-92	15-8
(C) Anthracites	92 or more	Below 8
steam-raising		
domestic		

Wedding (Dry, ashless fuel)*

	Per Cent of Volatiles
(1) Lean anthracite coals	5.0 to 10.0
(2) Sintering coals (old) poor in gas	10.0 to 15.5
(3) Caking coals (old) poor in gas	15.5 to 33.3
(4) Caking coals (recent) rich in gas	33.3 to 40.0
(5) Sintering coals (recent) rich in gas	40.0 to 44.4
(6) Sand coals (recent) rich in gas	44.4

* Grundriss der Eisen huttenkunde.

nine types, based largely on physical differences in plant composition and texture.

Besides practical classifications, of which examples have been given, many attempts have been made to classify coals by using the ratios of certain elements obtained by ultimate analysis. None of these classifications has gained practical recognition here or abroad.

During the war coals were pooled for more efficient handling. As no practical accepted classification existed covering the need, groups of mines producing coal of similar type and grade were grouped in numbered pools. Since then many analyses of the coals have been made, and average analyses of the coals in the several pools have been published by Dr. H. M. Payne. These reveal the differences that practical coal men deemed worthy of being distinguished by pool numbers. They also reveal the coal man's interpretation of "low-volatile," "medium-volatile," and "high-volatile."

The time seems ripe, therefore, to take advantage of all the work that experience has shown to be of real value to the coal producer and coal user, and from it prepare and adopt a classification of coals.

Coals differ, broadly speaking, in three ways:

(1) In type, as cannel, splint or caking coals, due to differences in origin, involving differences of plant material and conditions of deposition.

(2) In grade, as low-ash coals; high-sulphur coals, due to differences in quantity and character of mineral

matter contained in the plant material or washed in during the deposition of the vegetal material, or carried in later by circulating waters.

(3) In class or rank, as anthracite, low-volatile bituminous, high-volatile bituminous, lignite. Differences in class or rank are caused by pressure, heat and folding of the original deposits, resulting in progressive distillation of the volatile constituents of the original material (including inherent water) and an increased ratio of uncombined or "fixed" carbon. At the same time the original body of vegetal material underwent physical changes in texture, structure, hardness, weight, fracture and in other ways.

Any adequate classification of the several kinds of coal must recognize the three foregoing fundamental differences in type, grade and class; it must consist of three parts, one of which indicates the type, another the grade, another the class.

Types of Coal—Three general types based on origin are given in Table II:

TABLE II—THE THREE TYPES OF COAL

- (1) Common, "fat," resinous or "bituminous" coals.
- (2) Splint or "dry" coals.
- (3) Cannel or canneloid coals.

Coals of the "common" type are derived from various kinds of plant life that lived in the ages of coal. These coals were almost certainly derived from peat bogs where the plants grew and where the coal is found today. This type is commonly laminated with irregular bright and dull streaks. The bright streaks, usually lenticular, consist of woody materials altered to jet; the dull streaks are a mixture of woody and other plant fragments, spores and spore cases broken down into a nearly structureless mass. The Pittsburgh bed in the Pittsburgh region is typical of this type of coal. It is a caking coal in the middle stages of the change from peat to anthracite.

Cannel coal, in contrast, is believed to be a water-laid deposit composed mainly of plant spores and of plant detritus washed into open water within the swamps. Fish remains are occasionally found with the plant material. Cannel coal is easily distinguished from the common type of coal by its massive, non-laminated structure, its velvety luster and conchoidal fracture as well as in many other ways. It is characteristically a non-caking, long-flame coal high in volatile matter. True cannel coal has more volatile matter than fixed carbon.

EVEN SPLINT COALS VARY IN CHARACTER

Splint coals are of two types; one is dull gray and massive, apparently consisting entirely of plant detritus identical to that in the dull layers of common coal. Cross-sections of the other type reveal many thin layers of bright and dull coal. Splitting along the dull layers reveals a surface of "charcoal," "mother-of-coal," or "coal rash."

These charcoal-like layers consist of almost pure carbon and are thought to represent the dried surface of the swamp. This drying of the surface appears to have occurred with great regularity in some coals and suggests seasonal change. Both types of splint coal are distinguished by a splintery fracture like that of wood. Both kinds are non-caking. Cannel coals are characteristically low in moisture and splint coals are high, probably because the spongy charcoal layers absorb moisture.

Classes of Coal.—All three of these coal types are

found in various stages of alteration from their original condition as a bog deposit to anthracite or graphite. There are canneloid lignites and canneloid anthracites as well as bituminous cannels. For classification naturally they may form three parallel series. It should therefore be possible to plan one series showing the stages of the change of the common type and apply the same names to the other types. Attention may be confined for the present to the common type of coal.

The first step in converting peat to coal is bacterial action which may partially or entirely obliterate the plant structure. Then follows compression by overlying subsequent deposits. Later, horizontal pressure may throw the originally horizontal deposit into folds, induce vertical joints and fracturing, and drive off part of the "moisture" and more or less of the volatile hydrocarbons of the original deposit.

If this horizontal pressure becomes great enough the moisture is nearly all driven off and the volatile matter reduced to 20 per cent or less. The coal may be squeezed until it fractures easily along innumerable vertical planes. This is the stage of the "low-volatile" or smokeless coals. Still greater pressure may reverse the fracturing tendency and cement the bed into a hard anthracite.

Locally, as in Rhode Island, the pressure has been so great that the coal bed flowed like putty. Practically all the volatile matter and moisture was lost and only the fixed carbon left in the form of graphite. Similar changes may be brought about by the intrusion of hot igneous rock.

The ash of the coal is mainly an accidental ingredient varying in the same bed from point to point or even in the same mine. It must be either disregarded in any acceptable classification or the coal reduced to a "standard" proportion of ash.

As ashless coal does not exist in nature, and as "ash-free" analyses give slightly higher ratios of the other ingredients, a classification based on a selected "standard" amount of ash probably will be more useful, require less explanation, and eliminate much mental calculation in interpreting ordinary analyses.

The average of a large number of samples of "sea-board" coal suggests the use of 7 per cent ash for this purpose. There remains, according to the ordinary proximate analysis, the moisture, volatile combustible matter and fixed carbon.

SOME VOLATILE MATTER NOT COMBUSTIBLE

The alteration process involves the gradual chemical elimination of the moisture and volatile matter, resulting in an increased proportion of fixed carbon. Recent studies have shown that: (1) A part of the so-called volatile matter consists of hydrogen and oxygen in the proportion of water and having all the practical effect of water in burning—the so-called "inert volatile matter." (2) Under defined conditions the moisture of a coal is characteristic of the coal. It has been found that after dried coal is submitted to a moist atmosphere at various temperatures and vapor pressures a definite quantity of moisture will be re-absorbed and retained.

Where it is necessary to determine the amount of moisture with extreme accuracy, the suggested "standard moisture" of any coal should be its moisture content at a temperature of 68 deg. F. and an aqueous-vapor pressure of 15 mm. of mercury. The coal then may be considered to consist of fixed carbon, volatiles

TABLE III—NEW CLASSIFICATION OF COAL ACCORDING TO ITS CARBON CONTENT

Descriptive Names	Suggested Short Names	Suggested Code Names	Range of Fixed Carbon, per cent* (incl.)	Moisture	Volatile Matter	Fixed Carbon	Ash	Fuel Ratio	Suggested Technical Names
Anthracite or hard anthracite.....	Anthracite	Coal 88	83 or more	3	2 88 7	12+			Anthracite
Freeburning, soft or semi-anthracite...	Semi-anthracite	Coal 82	80-82	3	7 83 7	12-8			Semi-anthracite
Semi-bituminous "Admiralty".....	Loervol	Coal 77	74-79	3	13 77 7	8-5			Loervolite
Low-volatile smokeless bunker.....	Lovol	Coal 70	65-73	3	20 70 7	5-3			Lovolite
Medium-volatile coking byproduct.....	Midvol	Coal 63	60-66	3	27 63 7	3-2			Midvolite
High-volatile gas.....	Hivol	Coal 56	53-59	3	34 56 7	2-			Hivolite
High-volatile.....	Hiervol	Coal 49	46-52	6	38 49 7	2-			Hiervolite
High-volatile sub-bituminous.....	Moistvol	Coal 42	39-45	15	36 42 7	2-			Moistvolite
Sub-bituminous.....	Himoist	Coal 35	32-38	25	33 35 7	2-			Himoistite
Lignite.....	Lignite	Coal 28	25-31	40	25 28 7	2-			Lignite

* Based on 7 per cent ash and moisture determination after coal has been subjected to a temperature of 68 deg. F., and 15 mm. of mercury-vapor pressure.

(including moisture) and 7 per cent ash, making together 100 per cent of the coal. In the process of change from peat to anthracite the volatile decrease in ratio and the fixed carbon progressively increases.

Coal may be classified by either the decreasing quantity of volatiles or by the increasing quantity of fixed carbon. The use of volatiles may lead to confusion because, though in many early coal analyses the moisture and the volatile hydrocarbons were not separated, for many years "volatile matter" has been used to designate the volatile matter left after the drying of the coal at a temperature of 110 deg. C. or 230 deg. F. Less confusion will result if classification depends on the percentage of fixed carbon.

I propose to classify all coals of the common or "bituminous" variety on the basis of the percentage of fixed carbon in a "standard classification analysis," which may be defined as an analysis recalculated (if necessary) to 7 per cent ash, and one in which (if necessary) moisture has been determined at a temperature of 68 deg. F. and a pressure of 15 mm. of mercury vapor. Ordinarily the recalculation or use of "standard" conditions for moisture determination will not be necessary, because the range in percentage of fixed carbon is wide enough to allow some variation from standard ash or moisture. Recalculation is necessary only where the fixed carbon of ordinary analysis is very close to the line between two classes.

In the above table are given, first, some of the descriptive names now in use; second, suggested brief names, mainly new, which are presented and defined; third, a list of code names (in place of pool numbers); fourth, the range of the percentage of fixed carbon for each class; fifth, an average analysis for each class; sixth, the fuel ratios of each class; seventh, suggested technical names terminating in *ite* to correspond with graphite, anthracite, lignite.

CLASSIFICATION BY PER CENT OF FIXED CARBON

The names and limiting factors have been reduced to the simplest terms. The key to the scheme is the number seven. The code names, except for anthracite, are multiples of seven, as 77, 70, 63. Each of the numbers is in the middle of the range of fixed carbon for its class; thus, coal 70 covers coals having between 67 and 73 per cent of fixed carbon. In other words, the class of a coal will be expressed by the multiple of seven nearest to the fixed carbon of a proximate an-

alysis, provided that the ash is near 7 per cent. For example, a coal carrying 62 per cent of fixed carbon and 6 per cent of ash belongs in class coal 63. If the percentage of fixed carbon is nearly halfway between two multiples of seven (say 59.6) and the ash is very high or very low, it may be necessary to recalculate the percentage of fixed carbon to a 7 per-cent ash basis, in order to be sure of the classification. Usually a glance at the percentage of ash will show whether the recalculation would raise or lower the percentage of fixed carbon and may save the time of an actual calculation.

TABLE IV—EQUIVALENTS OF POOL NUMBERS IN NEW CLASSIFICATION

Short Name	Code Name	Pool Numbers
Loervol	Coal 77	1, 2, 3, 44, 54, 64, 84.
Lovol	Coal 70	4, 9, 20, 42, 71.
Midvol	Coal 63	5, 7, 8, 10, 11, 12, 14, 43, 53, 63.
Hivol	Coal 56	6, 15, 18, 21, 30, 31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 44, 45, 15 53, 54, 56, 60, 61, 62, 63, 64.

Accepting the average analysis of coal in each tide-water pool as published by Henry M. Payne in *Coal Age* for March 17, 1921, the coals are approximately classed as in Table IV.

The above relationships are not guaranteed to be true of all coal in each of the several pools, as a single average analysis has been used for each pool; some of the analyses are just within the limits of the claim.

Coal Grading.—By the grade of coal is commonly meant the percentage of ash. It is proposed that where ash alone is involved the letters A, B, C, D, be added to the code name to express four grades, for which the following limits are proposed: A (superior or excellent), below 8 per cent of ash; B (good), 8-12 per cent of ash; C (fair), 12-16 per cent of ash; D (poor), above 16 per cent of ash. Thus "coal 63-A" is a medium-volatile bituminous coal having less than 8 per cent of ash; "coal 42-C" is a high-moisture bituminous coal carrying between 12 and 16 per cent of ash.

In most transactions involving coal the ash is the only element considered in grading. For some uses, however, it is desirable or necessary, to consider either or both the percentage of sulphur and the fusing point of the ash. To cover these in the code it is proposed to use a second and third set of letters A to D to designate superior, good, fair and poor quality in the coal as regards those factors. Thus "coal 63" is a medium-volatile (or midvol) coal, of any grade. "Coal 63-B" is the same coal with the limits of ash designated. "Coal 63-BA" is the same coal with the ash and sulphur classified. "Coal 63-BAA" defines the content of ash and sulphur and the fusing point of the ash. Table V gives the minimum and maximum limits of each letter in each grade.

Grading Anthracite.—The grading of anthracite is a subject by itself. Grading usually has been on the basis of the percentage of slate and bone observable to the eye. In practice, 100 lb. of coal is taken from a car, drawing from not less than three places in the car, spread out and the slate and bone separated and weighed. During the war the Fuel Administration set the limits on anthracite of different sizes as specified in Table VI.

After a study of a large number of car inspection tests I propose the following limits for grading anthracite according to visible slate and bone contained. Secretary Walsh, of the State Department of Mines of Pennsylvania has co-operated in this study.

It must be remembered that the slate and bone is in addition to the ash in the coal itself. On the other hand the bone coal may have as high as 70 per cent of coal matter. It must also be remembered that in the alteration from bituminous coal to anthracite the ash increases in the same ratio as the fixed carbon. A bituminous coal having 56 per cent fixed carbon and 8 per cent of ash, if altered to an anthracite having 84 per cent of fixed carbon, should have 12 per cent of ash. It is therefore hardly fair to expect anthracite to be graded on the same low percentage of ash as bituminous coal.

Considering the cost of cleaning and sizing anthracite and that steam sizes may sell at the mine at one-fourth the cost of mining and preparing, it is not to be expected that the steam sizes will be cleaned with the same care as household sizes while they sell at present low prices.

Code Designation of Cannel and Other Coals.—The table of classes given in an earlier paragraph treats of the common type of caking bituminous coals and anthracites derived from that type, which may be taken as "standard" type coal. Letters may be added to the class name to express other types of coal as follows: "K" for canneloid coals or "semi-cannel coals" of any class; "KK" for cannel coals (coals in which the percentage of volatile matter exceeds the percentage of fixed carbon—or the fuel ratio is less than 1); "KKK" for boghead coals (in which the fuel ratio is less than one-half); "KKKK" for Torbanite or oil shale.* Sp designates a splint coal; X, a sub-bituminous coal; L, lignites. Thus "Coal 63 KBAA" is a canneloid, medium volatile coal having between 8 and 12 per cent ash, less than 1 per cent sulphur, and a fusing temperature of ash above 2,600 deg. F.

COAL READILY CAN BE PLACED IN RIGHT CLASS

All coals can be classified by this plan as closely as ninety-nine out of one hundred users need, with little expense for chemical analyses, as the "class" is determined by the percentage of fixed carbon and ash alone. If the percentage of fixed carbon is close to the limits of the class and the ash far above or below 7 per cent, recalculation of the fixed carbon may be necessary to determine the definite class to which the coal belongs. To recalculate, divide the percentage of fixed carbon by 1 less the algebraic difference between .07 and the percentage of ash.

Practical Application.—The results of the application of this classification to coals of many states will be interesting. The following notes apply to some of the better-known coal fields of the United States.

Pennsylvania.—Anthracite is cleaned as "anthracite" or "coal 88"; the grade is commonly BAA for large sizes. The coal of the western ends of the Western, Middle, Southern and Bernice fields is semi-anthracite or "coal 82."

At a few places in Huntington, Bedford, Cambria and Somerset counties the coal is of a "Loervol," or

TABLE V—GRADE OF COAL EXPRESSED BY LETTERS

Grade	First Letter Ash Per Cent	Second Letter Sulphur Per Cent	Third Letter Fusing Point of Ash in Deg. Fahr.
"Superior"	A = less than 8	A = less than 1	A = over 2,600
"Good"	B = 8 to 12	B = 1 to 2	B = 2,600 to 2,300
"Fair"	C = 12 to 16	C = 2 to 5	C = 2,300 to 2,000
"Poor"	D = 16 or more	D = 5 or more	D = less than 2,000

*For detailed description of cannel coal see U. S. Geological Survey. Bulletin 659.

TABLE VI—WAR-TIME LIMITS ON IMPURITIES IN ANTHRACITE

	Slate	Bone	Total
Broken.....	1	2	3
Egg.....	2	2	4
Stove.....	4	3	7
Nut.....	7	5	12
Pea.....	8	10	18
No. 1 buckwheat.....	10	10	20

"coal 77," class (semi-bituminous). In general, however, the coal of the eastern or mountain counties of the bituminous field is of "Lovol," or "coal 70," type, grade A or B. The coal of Indiana County and eastern Westmoreland and Fayette counties is "Midvol," or "coal 63," class, and all of the coal in the western and northwestern counties is of "Hivol," or "coal 56," class.

Maryland.—Most of the coal of Maryland is of "Lovol," or "coal 70," class.

Virginia and West Virginia.—The coal of the Pocahontas district in Virginia and West Virginia is "Lovol," or "coal 70," class, grading rapidly into "Hivol," or "coal 56," in Russell and Wise counties, Virginia, and in western Fayette and Kanawha counties of West Virginia. In Harrison and other western counties of West Virginia the coal is of "Hiervol," or "coal 49," class.

Ohio.—The coals in the eastern part of the Ohio coal field are of "Hivol," or "coal 56," class, and of "Hiervol," or "coal 49," class in the western part.

Eastern Kentucky and Tennessee.—Most of the coal in eastern Kentucky and Tennessee is in "Hivol," or "coal 56," class, but some "Hiervol," or "coal 49," class coal is present.

Indiana, Western Kentucky, and Illinois.—The coal of the eastern interior region is, in part, "Hiervol," or "coal 49," class, notably in the Ohio River areas and, in part, of "Moistvol," or "coal 42," class. The coal of the northern and western parts of Illinois particularly is of the "Moistvol" class, the percentage of fixed carbon decreasing from the southwest corner to the northwest corner of the state.

Missouri and Iowa.—The coals of Missouri and Iowa belong to "Hiervol" and "Moistvol" classes, or "coals 49 and 42," except in Barton County, Missouri, where the coal is of "Hivol," or "coal 56," class.

Georgia and Alabama.—Georgia has some coal of "Lovol," or "coal 70," class. The coal of Alabama ranges from "Midvol," or "coal 63," in the east to "Hivol," or "coal 56," to "Hiervol," or "coal 49," in the west.

Arkansas.—Some of the coal in the Shinn basin, Pope County, is of semi-anthracite, or "coal 82," class. The coal of Johnson County is mainly "Loervol" class, or semi-bituminous coal ("coal 77"). The coal of the western counties is in the "Lovol," or "coal 70," class. The lignite of Lester County is a canneloid lignite or, "coal 28-KK."

Texas.—The lignites of Texas are, in part, canneloid (28-KK), and in part the ordinary type ("coal 28"). The bituminous coals of the north central part and of

the Eagle Pass region are of "Hivol" ("coal 56") class, and "Hiervol" ("coal 49") class. The coal of the Laredo area is a bedded cannel of "coal 35" and "coal 42" classes.

Oklahoma.—The coal near the eastern Arkansas line is of "Lovol," or "coal 70," class. Westward the coal changes through the several classes to "Hiervol," or "coal 49," class, as in Coal County.

Kansas.—The coal of Kansas is of "Hivol" and "Hiervol" classes ("coals 56 and 49").

Western States.—The coals of the Rocky Mountain and other Western states are extremely variable from field to field, ranging within short distances from anthracite to lignite.

Book Reviews

Pros and Cons for Coal Debaters

"GOVERNMENT Ownership of Coal Mines," by Julia W. Johnsen, is an excellent compilation of 392 5x7-in pages, published by the H. W. Wilson Co., New York, as one of the series of the University Debaters' Annual. The entire book consists of a collection of papers, with the source given in each instance, on the aspect of coal as a public resource and considerations for and against the government entering upon a more direct trusteeship in the immediate interest of the people as against private ownership. Both the articles selected and their references have been classified as general, affirmative and negative, and there also is a brief. A separate section is given to government control or regulation of coal prices.

To all appearances the compiler has been impartial in her selection of material, for we find Herbert Hoover and J. D. A. Morrow alongside of John Brophy and Louis Bloch. Even W. Jett Lauck and John Spargo are drawn upon. The author also has drawn upon British sources for arguments pro and con on nationalization, where the matter has been more thoroughly argued out than in this country.

The book will prove extremely useful to the multitude of high schools and colleges that are now and have for several years been debating the subject of the nationalization of coal mines. This is the first book, we believe, that puts into their hands a compact summary of articles containing material possibly useful in preparing for such debates. From the number of inquiries that have come to the desk of the editor of *Coal Age* in the last few years, asking for just this kind of material, it is quite certain that this book will get a wide distribution.

Training of Oxyacetylene Welders

IN THE form of an outline of a course for the training of oxyacetylene welders the American Welding Society has just issued a report of its committee on welding. For the employer the text includes a discussion of the qualifications that a candidate for instruction should possess. There also is included fundamentals in gas welding and a description of various types of welding jobs. Copies of the report may be obtained from the American Welding Society, 29 West 39th Street, New York City.

TABLE VII—GRADING ANTHRACITE BY LIMITS OF SLATE AND BONE

(In per cent, or in pounds in 100 lb. of coal)

	Grade A Excellent Less Than	Grade B Good	Grade C Fair	Grade D Poor or Bad
Broken.....	2	2 - 3	3 - 4	4 or more
Egg.....	2	2 - 4	4 - 5	5 or more
Stove.....	3	3 - 5	5 - 7	7 or more
Nut.....	4	4 - 7	7 - 10	10 or more
Pea.....	5	5 - 7	7 - 10	10 or more
No. 1 buckwheat.....	5	5 - 10	10 - 15	15 or more

Why It Pays to Keep Electrical Equipment At Coal Mines in Repair

Production Delays Usually Due To Breakdowns Which Would Not Occur If Equipment Were Given Prompt and Careful Attention—Advantages of Training Motormen and Hoist Operators to Become Electricians

BY M. S. BEDDOW
Scranton, Pa.

THE hurried attention usually given to electrical mine equipment during a breakdown naturally brings forth the question: "Why not a little foresight before the breakdown instead of so much hindsight after the delay occurs?" Too often the energy of all concerned in the production of coal is used up in an all too careless a manner when a mine locomotive, for instance, is on the repair pit and the movement of coal to the foot of the shaft is temporarily stopped as a consequence. Repairs made during the delay usually are not of a permanent nature, serving only to keep the locomotive in operation for the remainder of the day.

Important parts of the locomotive sometimes are disturbed in making a hasty repair, and are not readjusted as they should be by regular overhauling. Electricians so skilled in their trade as to be considered experts do careless things in a time of excitement such as is brought upon them during a breakdown of important machinery. The old saying "What is worth doing at all is worth doing well" should have a peculiar significance to the mine electrician.

A mine locomotive can be made just as efficient or inefficient as those in direct charge of it are desirous of making it. Nothing better satisfies an electrician or mine foreman than a perfectly operating piece of equipment. The grinding of bad fitting gears, the vicious flashing of a commutator due to ill fitting brushes, the shrill squeaking of a trolley wheel crying for oil and a whole locomotive going to pieces due to double-flanged wheels pounding over latches and frogs are as so many stabs in the back to the man who really and truly cares.

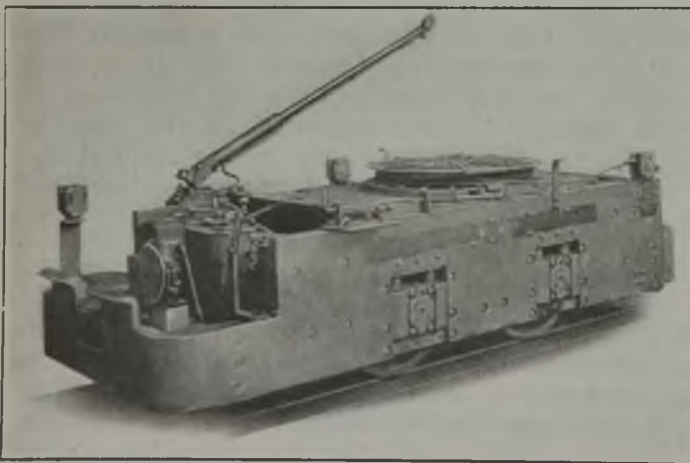


Fig. 1—Trolley Locomotive Complete with Cable Reel

This popular type of locomotive used in gathering work weighs 8 tons and therefore is capable of handling semi-main-haulage loads. The reel permits its use in gathering work. If every detail of a locomotive were maintained in as good condition as when new there would be fewer transportation delays and accidents.

General observation over a period of twenty years has convinced me that a smooth-working locomotive will not only bring more coal to the foot of the shaft in a given time but will tend to build up the morale of the whole operating force. A smooth working locomotive rides easier, and a motorman compelled to ride it all day probably can tell best just what this means. That this is so is obvious from the fact that it is not difficult to keep an operator on a locomotive which rides easily, whereas it is almost an impossibility to get a regular runner for the other kind. It is no difficult matter to keep a locomotive in good condition when every detail is promptly attended to and repaired.

Badly fitting gears and drive pinions need not be in this condition if proper measures are taken to see that they are brought into perfect alignment when first installed and are carefully maintained by having the axle bearings fit as snugly as possible with no great amount of wear at the bearing surface and shoulder, so that there will be little opportunity for the motor to slide sidewise on the drive-wheel axle. Axle bearings, or linings, as they are familiarly called, should be removed when it is noticed that they are worn sufficiently to allow the pinion and gear to get out of perfect alignment, for it is this loss of metal which allows the uneven wear across the face of the teeth almost invariably noticed on all discarded gears and pinions.

KEEP BEARINGS IN PROPER FIT

Insufficient hub liners or badly worn journal boxes serve only to allow the whole locomotive frame to move from its natural position; then there can be no true alignment of pinions and gears. Worn journal boxes are not easily prevented, but there is no getting away from the fact that hub liners are made for the purpose of taking up this wear, thus preventing the side motion referred to above. In this respect it is only necessary to take notice of how neatly this point is taken care of when a locomotive is first received from the manufacturer. If the general condition of the locomotive were taken as a pattern at this time and an honest effort put forth to keep it as near this condition as possible, what a splendid difference would be noticed in electric mine-locomotive operation!

The gear wheel, another important feature of a locomotive, should be put on the axle before the wheels are put under the locomotive and great care should be taken that the bore of the gear fits snugly down on all points of the axle. Due to the fact that the same axle is used over and over again, the worn wheels being pressed off and new ones pressed on at the foundry, considerable wear is found at the gear fit as well as at the axle lining fit, and sometimes an effort is made to install a gear over this worn portion. If a little more time is taken and extra care used a very serviceable job is

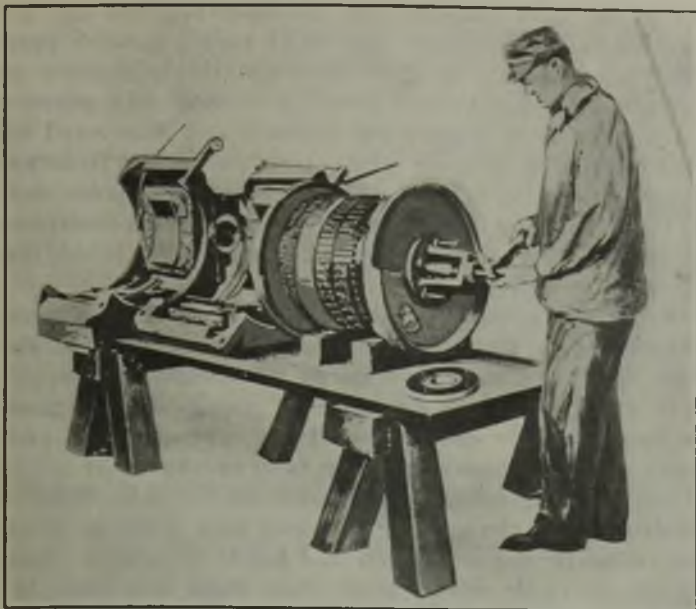


Fig. 2—Repairing the Motor

Whenever it becomes necessary to repair the motor all parts should be carefully removed and replaced. Pinion puller, ball-race pullers, etc., are essential and should be on hand; otherwise the parts will be hammered off and probably broken.

sometimes done, but it is questionable whether it pays to install an axle which necessitates this precaution being taken. In late years well-equipped foundries, by the use of welding equipment, fill in these low spots and then machine off the axle to the original gear-wheel fit. Axles are often installed upon which this has not been done, however, and the electrician is soon confronted with a loose gear wheel, which does considerable damage to the entire locomotive before it is attended to.

Special emphasis should be placed upon the great need for having in the locomotive pit at all times an extra pair of wheels upon which the gear wheel has been fitted with the greatest care. The reason for this is so that there will then be no need of a hurried job when it becomes necessary to change wheels on the locomotive during the day. Quite often a pair of badly worn wheels will break off a piece of a wheel flange 10 or 12 in. long and the locomotive must immediately be taken out of service. If there is not a spare set of wheels ready, completely fitted up with a gear wheel, it will be necessary to place the gears on hurriedly, and nine times out of ten it is done in an unsatisfactory manner.

The function of the axle lining is to hold the motor so that the pinion and gear will mesh properly. Any great amount of wear will prevent this. Just as properly lined up journal boxes prevent undue side motion, so do neatly fitting axle linings prevent the gear and pinion from meshing improperly. Nothing short of false ideas of economy will prompt the electrician to deliberately allow axle liners to remain in service when they are worn to the point where the pinion is allowed to pull away from the gear. The back lash which occurs results in the destruction of both gear and pinion, to say nothing of the unnecessary damage to the rest of the equipment. The babbitted type liner used on some of the earlier locomotives can be refilled and bored to the proper size for use again; the brass ones usually are turned in with the old brass scrap.

A locomotive which is not given regular attention will soon become a hindrance rather than a help to transportation. So many things contribute to keeping

it in or out of good operating condition that it is difficult to put one's finger on any particular point of most frequent trouble. However, it is doubtful whether any other one thing will aid in keeping a locomotive in service so much as a properly working controller. Here we have what has been aptly termed the brains of the locomotive with many working parts which will make or break its proper functioning. From this point the motors are made to work in series or parallel, depending upon the severity of the task put before them; from here proper steps are taken for cutting just enough resistance in or out of the circuit so that the right amount of current is allowed to flow to the motors in order that they may perform a certain duty.

Possibly no other part of the locomotive is so essential to its proper performance, and no other part is so badly abused and neglected. A network of wires leading to a score of different places, each with its separate duty to perform, offers an opening for just that many cases of trouble, any one of which might result in so seriously crippling the locomotive that it will have to be taken out of service temporarily at least. The controllers as used on mine locomotives consist generally of four important parts, viz., main cylinder, reverse cylinder, blow-out coil and the swinging pole piece, on which is the arc deflector with its division plates.

Going in by way of the blow-out coil the power is led through to the main cylinder, from which point it makes its way to the proper resistance box and thence to the motors by way of the reverse cylinder. As this entire path up to the point where the reverse cylinder is passed is all in series, it does not require much imagination to see that it needs only one open circuit, indeed a high resistance at any one of these innumerable contacts, to stall the locomotive.

Wiping contacts, such as are found in all drum controllers, have the disadvantage that they demand a certain amount of pressure and sufficient wearing surface. The path from a lead wire to a finger and through this to a wiping contact down through the segment on the cylinder must be as near a solid as it is possible to make it, and the very truth that it is not a solid should make the repairman doubly certain that all terminals

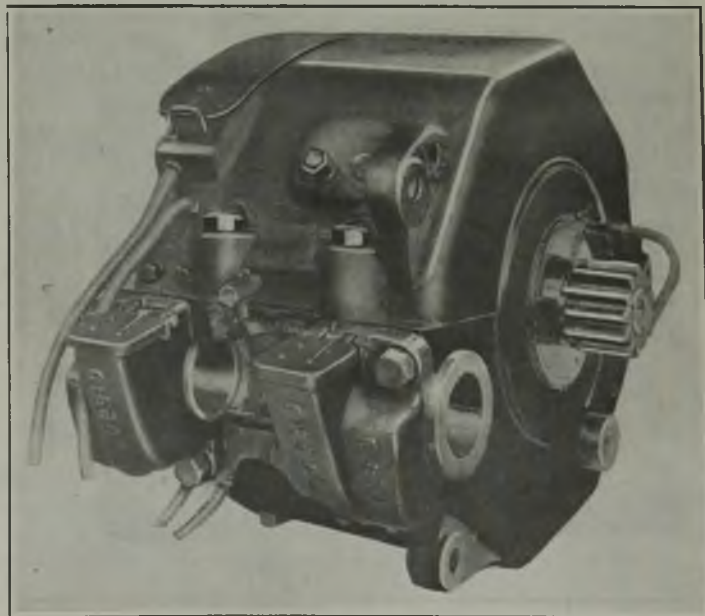


Fig. 3—The Locomotive Motor

The distance between the center line of the armature and driving axle is very important and must be maintained very accurately because it establishes the mesh of the driving gear and pinion. Note that the brasses are removable for replacement when worn.

are soldered properly, fingers screwed tightly to finger bases; finger bases in turn bolted fast to the main finger board, and last, but not least, the under side of the segment, which carries the power from the finger to the main cylinder, must be free of foreign substances which will creep in if it is not held tight to the block on the cylinder by the steel studs provided for this purpose.

A loose segment will soon gather a scale on its under side, which together with the loose segment will set up an almost infinite resistance to the passage of power and gradually develop heat which will pass back along the finger to the fingerboard, in time destroying the latter and making it unfit for further holding the finger solidly against the base. Much of the trouble experienced with controllers used on mine locomotives comes from burned finger boards, eaten away at the point where the finger base is fastened to it. Without a single exception this particular trouble can be attributed to either a loose segment or to the finger itself becoming loose and developing heat and passing it on to the board, with its consequent ill effects.

Very little trouble comes from the reverse cylinder and finger board, due no doubt to the fact that these are not subjected to the frequent strains that the main board and cylinder must bear. The contacts between the segments on the reverse cylinder and the reversing fingers are broken only when it is necessary to reverse the direction of travel of the locomotive, and this is so infrequent that little strain comes on the studs which hold the fingers in place. This pushing action, especially as it is repeated hundreds of times, as in the case of the main fingers, tends to loosen up the screws which hold the finger base to the board, and if these are not continually cared for the fingers become loose and lose their proper contact against the main segments.

It is due, possibly, to the character of the service it performs rather than to any extra care it receives that not much trouble is experienced with the reversing feature of the controller. The current handled is the same

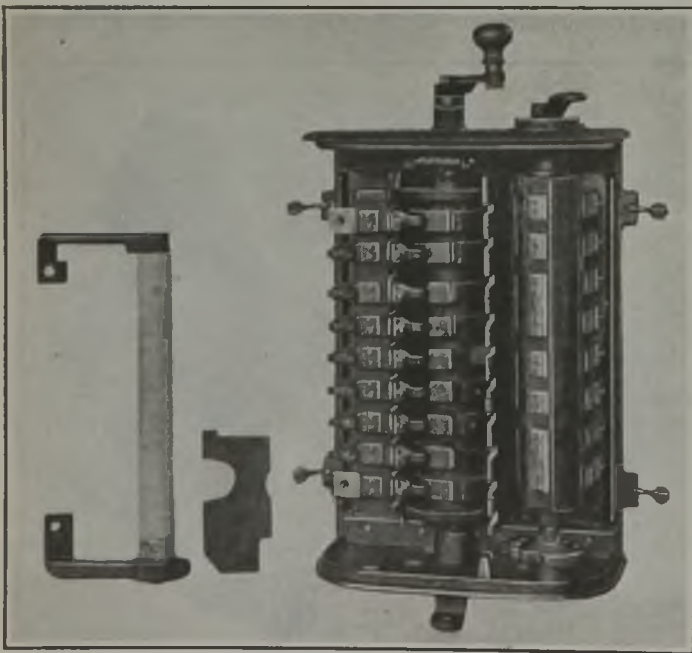


Fig. 4—Open View of Controller

From here every operation of the locomotive is regulated. Fingers and drum segments should be maintained in the best condition; otherwise heat will be generated at the contacts and not only burn the copper but the drum cylinder, thus requiring its complete renewal with the necessity of remounting each and every segment.

as in the main cylinder, yet it seldom requires any attention aside from that care which comes through periodic inspections. A little lubricant thinly applied at certain intervals at the point of contact will prevent burning of both fingers and contacts and thus ward off loss of tension in these members which comes from too great an amount of heat. Precautionary measures such as these will help immeasurably in keeping the controller in service over a longer period of time than would be the case otherwise.

Probably no other person having to do with a mine locomotive in its day's run has a better opportunity than the motorman to observe its actions and apply first aid when it can do the most good. And it must be said to their credit that little escapes them, and many a serious breakdown has been prevented by quick action on their part. Indeed some of the most capable electricians in the anthracite mines have come up from the ranks of the motormen and hoist operators. And this is not to be wondered at, since these men learn by force of circumstance rather than from any other reason.

It is seldom that an electrician can be located immediately following trouble of any kind, as he may be in another part of the mine. For this reason the operators have learned to look for the trouble themselves while waiting for the repairman to arrive. In this way these men have acquired much skill, and it is not to be wondered at, therefore, that so many former motormen and hoist runners are now expert electricians and electricians' helpers.

FITTING MAN TO THE JOB

A number of years ago one of the larger coal-producing corporations required an applicant for a position as motorman or hoist runner to possess a certain amount of skill in the performance of his duties before being given the position. This knowledge consisted, aside from a general understanding of the duties of the job, of knowing just what to do in the event that something happened to put the machine out of commission. The questions asked were not intricate and the applicant had a general idea of what they would be beforehand, so that it was an easy matter for him to study up on the subjects before presenting himself for examination. The very fact that the prospective motorman or hoist runner was compelled to study at all in anticipation of what was to come served to make him a better man for the position, and, naturally enough, this plan resulted in the best man being chosen for the place.

During the examination the applicant was impressed with the fact that his position was first of all a responsible one, fraught with dangers that could be increased or lessened according as he performed his several duties. He was made to understand thoroughly, for instance, that a locomotive must always be provided with a proper grade of sand because it is extremely dangerous to try to operate on the heavy anthracite grades with empty sand boxes. The difference between series and parallel operation of the two motors was explained in detail and made so clear that the applicant received a thorough knowledge of why the series position must always be employed wherever it is possible. The harm which ensues from a general practice of the parallel position when a series coupling of the motors can be employed was made very plain in the beginning.

These men, it is scarcely necessary to say, become excellent electricians in after years at the finish of a



well-spent apprenticeship, during which time they were taught many useful things which served them well at a time when this knowledge was most needed. Running too much on resistance notches in the parallel position of the controller in order to get a certain decreased speed, when the same result could be brought about through full-series operation subjects the resistance panels to a terrific amount of heat, which in time buckles them and makes them unfit for further service. These and many other valuable points which come up from time to time are made plain to the applicant, and the usual result of this tutelage is a better motorman in the beginning and an excellent operator after a year or two of actual work on the job.

The general construction of this furnace, which is set slightly closer to the boiler than the ordinary fire-bars, is shown in the accompanying illustrations. The furnace consists essentially of seven or eight longitudinal cast-iron trough bars, placed side by side according to the width necessary for the boiler, and a projection to protect the nozzles. The troughs are rounded at the bottom to a radius of 2 in., are 5 in. wide at the mouth and 6 in. at the firing surface, being shallower at the back than at the front. At each end the troughs are supported by lips which hook over bridges on the deadplate and on the bridge plate, as shown in the diagram, no drilling being necessary. The firebrick bridge is of the usual construction, but is combined with a second bridge shown in Fig. 1.

New Furnace Solves Problem of Burning Anthracite Dust

Difficulty in Ignition and Tendency to Clog Air Passages Overcome—Piles at Welsh Pits Hitherto Considered Only Waste Now Valuable

BY C. H. S. TUPHOLME
London, England

ONE of the problems confronting engineers at the anthracite pits in South Wales is the generation of steam for use about the mine. In the bituminous field coal is burned either in lump or as slack in pulverized form. The difficulty of igniting anthracite even in lump form is well known, while to throw anthracite dust and fines on a fire is about as effective in smothering the fire as a load of sand. In natural-draught furnaces it is more than likely that the fines will put the fire out by choking the air passage, while if forced or induced draught is used the dust will be blown off the grate before it can be ignited. Consequently most of the attempts to burn these anthracite fines, which, by the way, have a heating value of over 13,000 B.t.u. per pound and only about 10 per cent ash, have failed. As a result there are many large piles of anthracite dust which are regarded only as a waste product.

GRATE HAS AIR BLADES

Lately, however, a special type of furnace has been developed which seems to have solved the problem and which gives excellent results when fired with anthracite dust. This furnace is commonly called the "Turbine," on account of the fact that the passage of air into it is almost exactly similar to the passage of steam on the blades of an impulse steam turbine.

Located transversely in these troughs are a large number of cast-iron elements which slip into the trough, forming a composite grate. Each element rests on the upper edges of the trough and fits into the element in front and back. A length of trough containing forty-two of these elements constitutes a 6-ft. grate.

FREE AIR COURSES

Between each pair of elements is a small air space $\frac{1}{2}$ in. wide, so that the entire grate is a series of small air spaces, uniformly divided and communicating with the body of the troughs underneath. This construction insures an even distribution of air over the whole furnace.

The rear face of the blade of each casting is at an angle of 45 deg. to the top surface of the grate, while the forward face is at an angle of 60 deg. with the grate surface (see Fig. 4). The result of this design is that the $\frac{1}{2}$ -in. opening is maintained below in the form of an inclined and tapered air passage. The section in Fig. 1 shows that the lower edges of the sloping blades form a radius with the curved bottom of the trough, so that an air passage of approximately circular shape is provided. The area of this passage, through the angle at which the trough lies, narrows from front to rear so that as the air escapes into the furnace through one slot after another, the velocity of the air in the trough remains constant, which means also an even supply of air to every part of the furnace. This obviates the difficulty of most steam-jet furnaces, that the draught is unequal over the grate, because the air pressure diminishes toward the end of the bars.

The air combustion is supplied to each of the troughs by means of a steam jet through a gun-metal nozzle $\frac{3}{8}$ in. in diameter. The steam used is supplied by a $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. wrought-iron pipe from the boiler, as seen in Fig. 2, passing through the side flues so as to super-

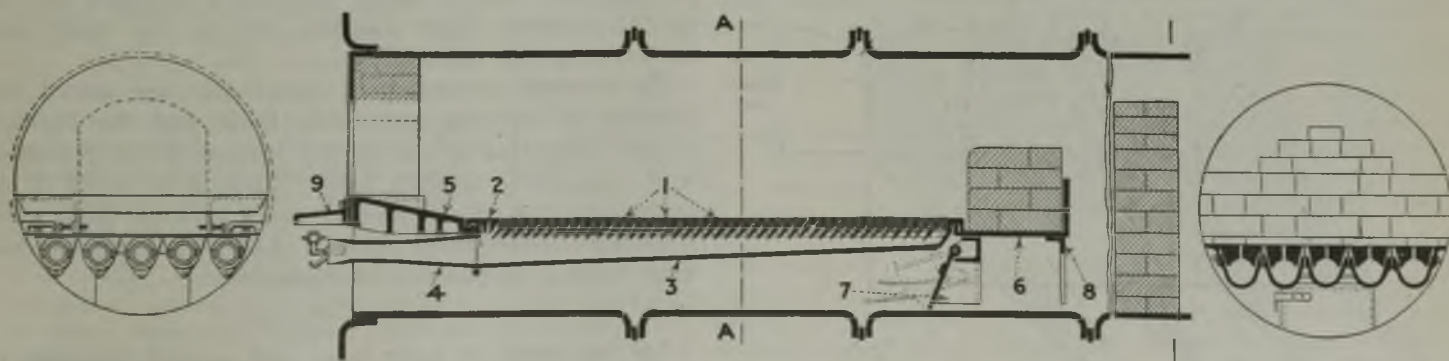


Fig. 1—Furnace for Burning Fine Sizes of Anthracite

The left-hand view is of the front of the furnace; the middle view shows a side elevation; the right-hand view shows a section at A A. (1) Fire bars; (2) fire-bar locking device; (3) air trough; (4) injector; (5) deadplate; (6) bridgeplate; (7) cleaning door frame; (8) bridge support; (9) ash guard.

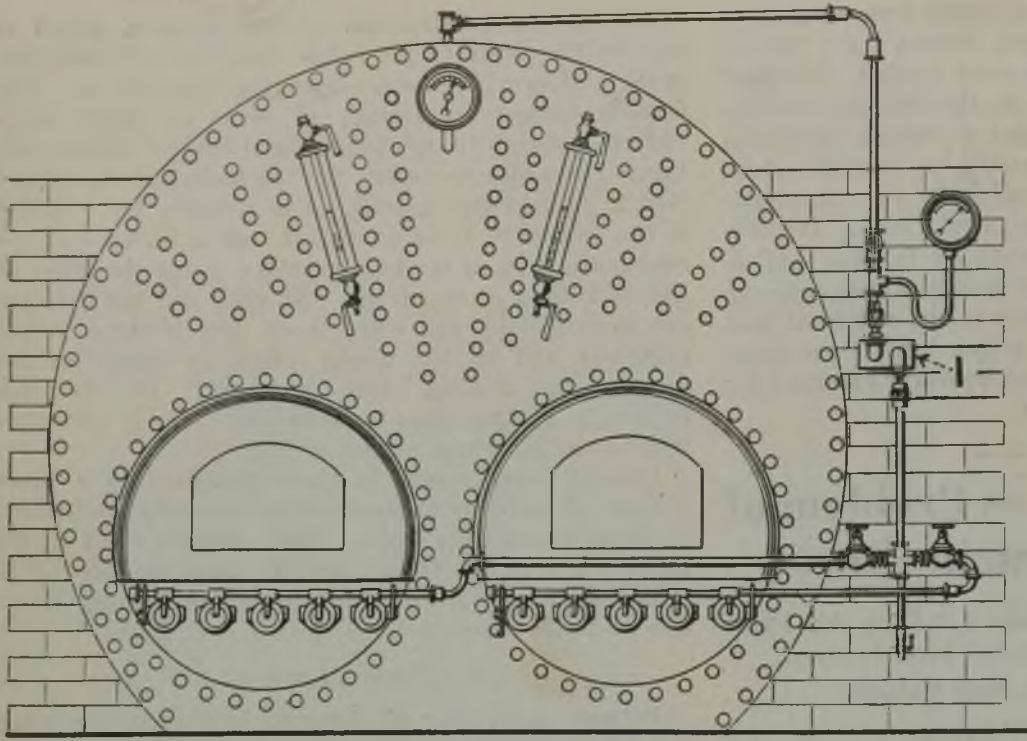


Fig. 2—Front of Furnace

This view shows how the air is introduced to the tubes by pipe connections to the boiler; (1) shows the location of a superheater wall box.

heat the steam, and along the front of the trough bars, so that one nozzle blows steam into each trough and forces a blast of air along the trough and through the $\frac{1}{2}$ -in. air spaces above into the furnace.

The steam-supply pipe is provided with a valve, the forced draught thus being under perfect regulation. A 10-lb. steam pressure indicated on the gage, Fig. 2, gives an air pressure in the troughs of 0.15-in. W.G.; at 20-lb., 0.25-in. W.G.; and at 35-lb. 0.35-in., W.G.; being, as already stated, constant throughout the whole length of the trough, so that the amount of air admitted is the same at all parts of the furnace.

Firing can be done by hand and the air supply regulated to burn more or less fuel as required. Any small amount of dust and fine ash that falls through the slots into the troughs is removed by means of a long-handled scoop inserted into each trough, but most of the ash falls between the two bridges. There is provided with the installation a cleaning door or flap operated by a chain from the front of the boiler, so that the ash and clinker falling between the two bridges can be raked out as required.

The small grate elements, as will be seen from the illustrations, are in the form of a V section lying in-

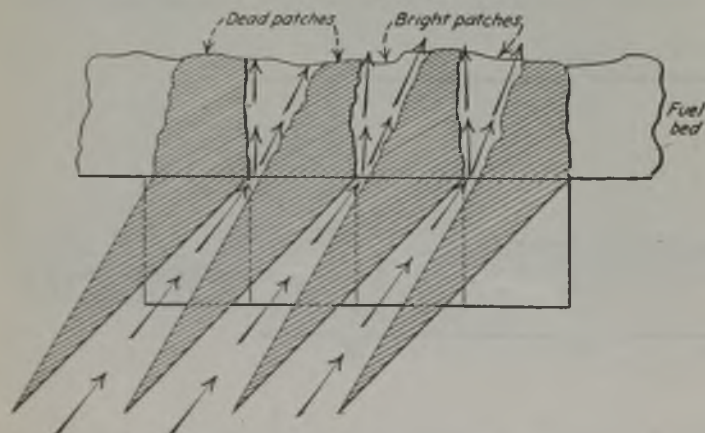


Fig. 3—Grates Which Do Not Distribute Air

Unless the grates are properly designed the air would not reach all the fuel, thus causing dead spots in the fire bed.

clined to meet the air blast—the name of the “Turbine” furnace is derived from the likeness of the arrangement to a steam turbine—the air enters the throat of the trough and passes through the furnace from between the elements.

When this furnace with the type of nozzle described was first used with fine anthracite it was found that it was possible to burn only a certain portion of the fuel charged so as to evaporate about 3,000 lb. of water per hour from a Lancashire boiler, using a limited air pressure of not over 0.6-in. W.G. under the bars. This, however, results in alternate black and bright patches, as seen in Fig. 3, the material on the bars being unburned, while any increase in the draught simply blew

the fuel off the bars. The solution of the problem is shown in Fig. 4. Instead of the unidirectional air slot between the elements, by means of a special design the air is spread in many directions. The design also is such that projection A overhangs into groove B, leaving an air space as shown in the section view at C. The projection A prevents any of the fine anthracite falling between the bars, and the air is so split up and subdivided that it has not sufficient strength to blow the material off the bars, but is strong enough to burn it

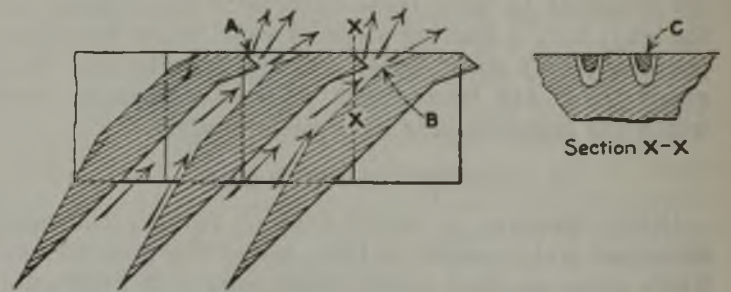


Fig. 4—Special Grate for Burning Fine Anthracite

Note that the air passageway is formed to distribute the air to burn all the fuel.

without any “dead” spots, whereas a straight slit, as in the ordinary bars, localizes the air too much and blows away the material.

This simple arrangement apparently has solved the problem of burning anthracite fines, and the furnace is now operating at one of the largest Welsh collieries with 1 in. W.G. or even lower, burning 20 to 30 lb. of anthracite per square foot of grate area per hour with a normal evaporation of over 6,500 lb. of water per hour from a standard 30x8-ft. boiler.

UP TO JUNE 30 LAST, coal and asphalt deposits in 93 tracts comprising 71,882 acres in the Choctaw and Chickasaw segregated areas, Mr. Merritt, of the Indian Bureau states, had been sold for \$1,975,934, leaving unsold deposits of 369,255 acres.

News Of the Industry

President Lewis Says Miners' Union Favors Loading Machines

But Will Not Talk Scale Until Loader Proves It Is Beyond Experimental Stage—Will Demand "Fair Share" of Benefits of Mechanical Loading

A settled plan for getting a continuance of the present agreement for a term of years continues to be the obvious program of the United Mine Workers of America. The end of the first week of their convention saw no important point brought out which was not apparent when the International assemblage opened in Indianapolis on the 22nd. The scale committee has not yet reported and may not bring in its message until its limit of time has arrived—on Friday—but the outcome is without much doubt.

The one interesting thing about the convention thus far is that the strength of the Lewis administration against the red and rebellious minority is proven. They failed to get the convention to reconsider the case of the Nova Scotia officers ousted from the union last summer for defiance of headquarters. They failed to get a resolution favoring the recognition of Soviet Russia and they failed in everything else except to get a long, loud voice. That has never been denied them.

The Lewis administration suffered its first real blow Tuesday, when the demand that Lewis be stripped of his power to appoint organizers swept the convention. The convention committee's report against the resolution for the election of organizers by the rank and file was rejected 760 to 734. Then 689 voted for a roll call on the question; only 570 votes were necessary. The roll call, which takes half a day, started immediately after noon. The drive to take appointive power away from Lewis has been growing throughout the convention and is backed not only by the so-called radical group but by many others. It is assumed that the strength shown against the administration on this matter will be about the same as will be shown in favor of demanding more wages later in the convention against President Lewis' program. Secretary of Labor Davis is to speak Wednesday against increased wages.

Take John L. Lewis' word for it, the miners' union favors underground loading machines. It is hastening rather than postponing, the inevitable day when loaders will revolutionize mining.

"The United Mine Workers favor the introduction of labor-saving machinery and always have favored it," said Mr. Lewis. "Anybody who says this is not so simply misrepresents the facts; that's all. We have always encouraged such machinery. The one thing the organization insists upon is that the mine workers be given their fair proportion of the benefits accruing from the use of machinery. The trouble has been that the operator has tried to keep for himself the entire benefit.

"This is exactly our position toward loading machines. The mine workers are co-operating all over the country in the development of loaders by permitting men to work the machines on day wage rates. This we are ready to do for any new loaders that are brought forward.

Important Convention Acts

Brought 1,500 delegates to Indianapolis from every union district for biennial meeting.

Displayed less defection than usual by the radical wing, which was firmly squelched by Lewis strength.

Reaffirmed original stand favoring nationalization of mines and railroads, but without positive action in the matter.

Declined to favor American recognition of Soviet Russia.

Declined to ally United Mine Workers, "an economic organization," with any united labor party because such a party would be purely political.

Supported the Lewis administration in its ouster of Nova Scotia district leaders charged with bolshevism and defiance of headquarters authority.

Referred to International Mining Convention at The Hague next summer the question of a worldwide strike of all labor to stop war.

Cleared Lewis of the radical charge that he "sold out" the union by ending the anthracite strike without getting the check-off.

"We recognize that mechanical loading is coming. It is going to revolutionize mining and the preparation of coal. The mine workers, however, cannot take part in negotiating a loader scale until loaders are developed to a point that will show definitely what these machines can do consistently. The experimentation has by no means progressed that far yet. Of course, it is known what certain machines will do for short periods under certain conditions, but this is only fragmentary information. Loaders are making progress in certain coal fields and I trust it will continue and will expand."

The convention opened quietly at 10 o'clock Jan. 22. No hoarse orators fought for the floor. Nobody hissed the chair. No maneuvering on the floor took place. There was hardly so much as applause even at the appearance of President Lewis, and during the international officers' reports. As reported in *Coal Age* of last week, President Lewis declared for a wage contract "for a period of years." Vice-President Philip Murray condemned bolshevism within the ranks and Secretary-Treasurer William Green showed the union to be clear of debt and to possess \$1,100,000 in bank. But nothing in the reports stirred up any enthusiasm. Only one or two gentlemen of the small radical opposition rose to protest Mr. Murray's sharp jabs and these were silenced by the president on the ground that debate could not begin until the committee on officers' report was made.

The various committees were appointed including the one on scale. The fact that Frank Farrington, Illinois president and one-time bitter enemy of Lewis, was made chairman of the committee on scale was indicative of the main harmony of the organization. John Hessler was made secretary. The resolutions committee was headed by Thomas Kennedy with Percy Tetlow secretary. Rules were made limiting speeches to 10 minutes, permitting a roll call on vote of 30 per cent of the delegates and forewarning belligerent speakers that a man can be expelled from the convention for refusal to abide by the rules of the session.

Samuel Gompers, president of the American Federation of Labor, in a verbose telegram, sent good wishes and urged the miners to support "superpower" plans as possible regularizers of working time in coal.

At the opening of the Wednesday session the report of President Lewis was accepted without argument. A

small storm broke over Vice-President Murray's report, however. Murray's condemnation of the efforts of the Progressive Miners roused much objection from the radical wing. He charged the Pittsburgh Coal Co.'s efforts to get wages reduced to the 1917 scale were behind the Axelton (Pa.) meeting of 500 men just after Thanksgiving, 1921, and the Dec. 4 meeting of 1,200 men soon after at Monongahela City, Pa. Defenders of the Progressives denied the meetings were held to reduce wages to the 1917 scale but merely to talk over what to do. Murray read the circular announcing the Monongahela City meeting, declaring no other interpretation could be placed upon it.

Defenders of the Progressives protested the ousting of the signers of the circular. P. T. Fagan and other union officers, however, condemned Tom Myerscough and the other principal leaders in the union defection in District 5.

The financial report was accepted after a brief discussion in which a hospital bill for Ellis Searles, union publicity chief was mentioned and in which John Watt, stormy petrel in Illinois, proposed that the Brotherhood of Locomotive Engineers' bank in Cleveland be condemned for refusing to lend the miners union money during the 1922 strike.

The first real fireworks of the convention were touched off during Wednesday afternoon, when the conclave got to work on the first of the 728 resolutions proposed from all over the country before the deadline 10 days before the convention opened. The resolutions ran the usual gamut from conservative to extreme radical points of view, including a number aimed directly at the embarrassment of the organization heads.

Clever work by the resolutions committee, headed by Chairman Thomas Kennedy and Secretary Percy Tetlow, staved off a good deal of war from the noisy but inferior minority. On the issue of recognition of Soviet Russia the committee reported in favor of recognition when that government recognized the right of every other people to shape their own destinies and when the Soviet Government fulfilled "honorable obligations." This came as a surprise since it did not condemn the proposal to recognize Russia, and therefore disarmed and rather disconcerted the radicals. So the committee's report was adopted without a dissenting voice.

In the same way the committee met the radical demand for affiliation of the United Mine Workers with a United Labor Party. In the resolution the committee substituted for the several that had been filed, it is "recognized that the formation of a Labor Party proper has passed the visionary stage and can be made a reality." yet it committed the United Mine Workers to co-operation with the progressive, legitimate political forces of labor and the organized farmers already in existence but

Miners' Union Is 34

On Jan. 25, in the midst of the International convention, at Indianapolis, the union became 34 years old. President Lewis, paying tribute to the "little group of organizers," said they "builted better than they knew." The union has justified itself before the bar of public opinion in this country, he said. Mr. Lewis is ninth in the succession of presidents and he told the convention every one of his predecessors had retired with a feeling of sadness at the attacks always aimed at the president by sections of the union. Such is the lot, he said, of any United Mine Workers president.

held the union to be an economic organization for the increasing of miners' wages and the bettering of their condition and therefore should not affiliate with any purely political organization. This resolution, which included congratulations to the Laborites of England upon their winning control of their government, passed by a loud aye vote.

The real outburst came on the question of reinstating the ousted Nova Scotia district officers who long defied and embarrassed the International headquarters until they were dethroned by President Lewis last August. The administration's action finally was approved but not until much loud shouting had been uncorked and not until there had been a demand for a roll call with but 421 votes mustered for it out of the necessary 550.

The question of nationalization of mines, slated as another fighting topic, was skimmed over neatly. In place of the mass of nationalization resolutions the committee brought in one substitute which merely reaffirmed the past declaration of union policy favoring nationalization of both mines and railroads and the democratic management of all industry. The ayes had it loudly again.

Some Pennsylvanians and a few others were rousing in their demand that a new drive be made to organize the coke region and bewailed the fact that the union had quit the strike of 1922 without rescuing that region from the domination of union-fighting operators. Some said they were ashamed of the union for "deserting" the region. Secretary Green spoke in defence of the union's action only to draw a new fire. However, the 28 resolutions attacking the union's policy and calling for another coke-region war for organization, were replaced by one merely referring the matter to the executive board and urging it to continue the effort to organize the region 100 per cent. It passed easily.

Thus, all through the day, the Lewis administration was absolutely in control of the convention and rode the opposition down hard at every turn.

A delegate from the coke region,

James Chicolini, was refused a seat after a verbal battle by a vote of 840 to 250, on the ground that he is an officer of the Progressive International Committee, the radical wing of the union. This was followed by an attack on the administration for "railroading" reports of the resolutions committee. The committee's report against a resolution calling for the reading of all resolutions "as presented" was voted down.

The main reason for the outburst was the Wednesday action on the Nova Scotia matter. President Lewis also came in for a whack for not openly debating the charges made against him in Resolution 27 from local 155 of Weaver, Pa. It charged Lewis with having made statements that Frank Farrington, president of the Illinois Mine Workers, accepted \$100,000 in the strike period of 1922 to permit coal to be loaded out of the Herrin strip mine and that Farrington said Lewis accepted operators' money "for various reasons." The resolution demanded an investigation and "if these charges are true, these men are not fit to be members of our union, if the charges are not true a liar is not fit to be a member of the United Mine Workers, and that it is the sense of this convention that both men resign." The resolution committee merely found the charges "absolutely untrue" and the convention accepted this report.

The Brotherhood of Locomotive Engineers was bumped by Thomas Kennedy, who charged it with owning and operating non-union mines. This came up in defeating a resolution favoring affiliation of the mine workers with railroad workers. The committee's substitute resolution said everything possible had already been done to affiliate but it was futile because of the attitude of Brotherhood officers, but recommending that efforts continue to get a working understanding. Fred Mooney said he thought the time will never come when any affiliation can be made with the Brotherhoods—"the aristocracy of labor"—which never hesitate to desert the other railroad unions. Secretary Tetlow of the resolutions committee explained the Brotherhoods were not organized in a way that would permit affiliation with the miners.

The various resolutions to abolish war and vitriolically flaying capital for making wars for labor to fight were replaced by a substitute resolution abhorring the institution of war and referring the question of a world-wide strike in case of war to the International Mining Congress at the Prague next year. The final resolution was a subdued and sane document recognizing that this nation cannot disarm when other nations are "sounding their drums" and that the miners' union has no ability to cope with such a problem as world peace although the problem is worthy of the best union thought. John Wall and Freeman Tompson, radicals, of Illinois, made the usual capital-baiting speeches, but they were answered by such leaders as G. W.

Savage, of Ohio, who reminded the convention that capital, too, had given its sons and patriotically suffered its losses in war. The vote was a roaring "aye."

A resolution charging Lewis with "deliberately giving up the check-off" in the anthracite settlement was quashed after Tom Kennedy, of anthracite District 7, denied that allegation and explained how the miners got 10 per cent more wages, the universal 8-hour day with 12-hours pay, an equity clause in the contract and other benefits in such quantity that anthracite workers unanimously favored accepting even without the check-off.

Delegate Rooney, of District 1, an anthracite region, said the anthracite workers are able to take care of themselves and don't care a snap whether they ever get the check-off so long as they can keep their present solid union strength. Rinaldo Cappellini, another anthracite leader further emphasized the solidity of the union in hard-coal fields and its independence from influence outside that one group. Duncan MacDonald editor of a labor paper in Illinois, alleged author of an article against the check-off, was condemned as a non-union wolf in the union's sheepskin. He was defended by speakers of the radical group, but a demand was made that MacDonald be invited to the convention to defend himself. Philip Murray, temporarily presiding, would not permit a motion of invitation.

President Lewis, in his defence of his anthracite action, denied giving away anything belonging to the union but instead, got the men \$44,000,000 a year in increased wages. "The anthracite men," he said, "will tell you Lewis can sell them out any time for \$44,000,000.

In a tilt with John Watts, President Lewis denied he ever had written any letter charging Frank Farrington with receiving \$100,000 to permit the Herrin strip mine to run during the 1922 strike.

A resolution was adopted favoring restriction of immigration to as low a point as possible and the enforcement of the present immigration laws against smuggling of labor through Pacific and Canadian borders.

On Friday the convention declined to consider alliance with either the Amsterdam International or the Red International of Labor Unions, on the ground that both oppose labor and that the United Mine Workers "might as well ally with the United States Chamber of Commerce, the National Coal Association" or any other labor-fighting group. This action was taken over the heads of the radical wing without a "No." The convention demanded the repeal of such American laws as interfere with free speech and the freedom of assembly.

John P. White, former president of the union, addressed the convention, complimenting the present union administration.

So much noise in protest was made over the action of the convention in the Nova Scotia case Tuesday that at the

Safety by Radio

Radio as a life saver got attention from the United Mine Workers at the Indianapolis convention. Some locals wanted headquarters to set up a broadcasting station to counteract anti-labor broadcasting now going on. The convention's resolution, however, merely favored an investigation into the question of radio communication between top and bottom of mines. It was stated that within the last two weeks such communication has been established at a mine 1,000 ft. deep near Scranton, Pa.

beginning of the Friday afternoon session Vice-President Murray offered the opportunity to reopen the question. A mass meeting of 200 men the night before had damned President Lewis for "steam rolling" the convention in the Nova Scotia case. So debate on that case ran all afternoon and through Saturday forenoon before the convention once more supported the ouster from the union last summer of defiant Nova Scotian officers. The vote was overwhelming.

One of the thoroughly radical outbursts of the convention was a speech made Friday by John Watt. He condemned Lewis for publicly admitting there are too many miners in the industry, and declared the policy should be to reduce hours of labor so as to give everybody a job. He attacked the union for not stanchly and openly supporting "the brothers" who conducted the Herrin massacre of 1922, in which 21 non-union men were killed by an unidentified mob. Watt made sport of the union's public claim that the riot was due to communism.

"When good union men fought for unionism at Virden and Pana," said Watt, "they were heroes. Nobody called them communists and nobody should call the Williamson County men communists." Watt did not get a good reception with this bloody-shirt stuff. It appeared to send a shiver through the convention.

After beating the radicals on the Nova Scotian and other issues so many times, the administration thought best on Saturday to yield to the considerable demand for the reopening of the old Howat case and also the case of Myerscough, who had been booted out in Pennsylvania for leading the "Progressive Miners." This was announced Saturday for attention on Sunday by the grievance committee. The committee did not report on Monday but it was expected to report against reopening the two matters.

William Z. Foster, a recognized Red, came to Indianapolis to cause all the trouble he could. Saturday night he held a radical meeting at which he called President Lewis a liar in the statement that radicals in American labor had received millions from Russia. He urged the miners to "get rid

of the present reactionary leadership." Foster defended the Herrin massacre, saying that more such union acts would reduce non-unionism. The meeting was attended by the usual 250 or so rebels of the convention in a dark little back street hall. A squad of police was there but took no action.

After a long debate the administration suffered its first setback Monday morning at the hands of the radicals when the convention seated Nick Perkovich, of Dowell, Ill., against the credentials committee's report and against the administration speakers. The man was fired from a mine for absentsing himself from work for more than two days and therefore was ineligible for the convention. The administration favored standing by the contract with operators on the point of miners staying on the job, but the case was lost 668 to 611. The same radical group failed, however, to upset the committee in the case of John McGraw, of Kansas, who was finally denied his seat because he leased a mine and prepared it for operation during the 1922 strike.

A thousand dollars was appropriated to aid in the renewed defense of Tom Mooney and Warren K. Baling after Mrs. Mooney told the convention all about the famous San Francisco bombing for which Mooney is still in jail. She said new evidence has been dug up but it is secret. More community centers, athletic fields and playgrounds in mining communities were favored. Other resolutions opposed injunctions by courts and condemned interference in union affairs by such as Myerscough and Foster. An effort to change the constitution to permit members to join the Ku Klux Klan failed.

An effort to reduce the excess of miners in the industry by denying charter rights to all men except miners' sons and miners in newly organized districts was defeated without much discussion.

The entire convention stood silent for one minute Monday in sorrow for the dead of the Shanktown and Johnson City disasters.

California Coal Dealers Deny Trade Commission Charge

The King Coal Co., as a company, and Frank J. Foran, as an individual and vice-president of the company, have issued an answer denying that they are members of the California Retail Dealers' Association or have been guilty of practices complained of by the Federal Trade Commission.

The complaint of the Trade Commission charged that uniform prices on coal were fixed by the respondents; that distribution of coal through channels other than those determined upon by the association was prevented and that co-operative purchasing associations were prevented from obtaining coal at wholesale under any conditions, causing obstruction in the sale and transportation of coal in interstate commerce.

32 Succumb in "Mysterious" Illinois Mine Blast

An explosion Friday afternoon, Jan. 25, in the East mine of the Crerar-Clinch Coal Co., Johnson City, Ill., caused the death of 32 miners and eight others are in a hospital suffering from injuries from which two are not expected to recover. Illinois mine authorities, the Coroner and officials of the coal company have joined in an effort to determine the cause of the explosion, which is believed to have resulted from the ignition of firedamp with a consequent explosion of dust.

At the coroner's inquest, officials of the coal company testified to the effect that the explosion in the mine was caused by gas being ignited by a miner's open carbide light. On the other hand, miners, all survivors of Williamson County's greatest mine disaster, blamed the company's officials for the explosion, because of their failure to observe certain safety rules, stress being laid upon the attempt to find the man responsible for the miners being sent into an entry in which gas said to have been formed by a squeeze or the loosening of coal.

H. L. Goodnow, superintendent of the mine, asserted in his testimony that the danger sign had been posted at the entrance to the squeeze and that he believed that the gas which had been formed by the squeeze was ignited by an open carbide light carried by one of the miners. G. I. Evans, mine examiner, employed by the coal company, told of having found the squeeze and having marked the entry as dangerous. His testimony as to precautions taken to keep the men out of the danger zone was supplemented by the statement of Floyd Howard, assistant mine manager, who said he believed Jesse Ford, face boss and one of the victims of the explosion, had ordered the men into the entry where the squeeze had been discovered. He admitted, however, that it was he who told one of the loaders to get his tools, but would not admit that he sent this man into the dangerous entry. He added that no gas had been found in the vicinity that morning. William Johnson, night boss manager, testified he was the man who had placed the danger sign on the entry.

Miners who were at work during the time of the explosion contradicted the testimony given by the officials of the company as to the presence of the danger sign. All agreed that no sign was to be observed at the entry when the men were ordered to tear up the track in the chamber in which the squeeze had been found. Louis Owens, a driver in the mine, told of unloading some cars several of which contained dry and dusty coal which caused such dust that he could hardly breathe. This testimony was given to show the contention of the miners' officials that the force of the explosion had been augmented by the presence of the dust which was ignited by the gas explosion.

How forceful the explosion was was brought out by the testimony of several men who had assisted in searching for the victims. Some of the men who had been working more than 300 ft. from the place of the explosion had been found dead, with their tools either in their hands or nearby their bodies. Miners also testified that several of the dead were men who had been sent into the abandoned chamber where the squeeze had been found, to tear up the tracks, and that these men carried open instead of safety lamps.

State Inspector Plum Lee was called on the stand to testify as to the condition of the mine as found by the State Commission on the day after the explosion. He asserted that the mine was found in good condition during this inspection.

The blast in McClintock mine at Johnson City, Ill., occurred at 2:45 p.m., Friday, just at the hour when the miners were preparing their shots. Permissible powder is used throughout the mine, according to E. C. Searles, of Chicago, general manager of the Crerar-Clinch Coal Co., operators of the mine. About 40 men were in the 11th northeast entry where the blast started, and the casualties were suffered entirely by the men in that entry, including Mine Manager McCullough and Driver Boss Ford, both killed.

William Griffith, Engineer And Geologist, Dies

William Griffiths, well-known mining engineer and geologist, died at his home in West Pittston, Pa., on Jan. 19, at the age of 69 years. Born Jan. 12, 1855, he was a member of the class of '76 of Lehigh University being graduated as a civil engineer. In 1878 he obtained a position with the Union Pacific R.R. and surveyed and supervised the construction of railroads in Nebraska, Idaho, Montana, Utah and Colorado.

Two years later he returned East and became division engineer with the Lehigh Valley Railroad Co. In 1880 he became assistant geologist on the Second Geographical Survey of Pennsylvania and supervised the mapping of the Schuylkill, Lehigh and Bernice coal measures. He had charge of the completion of the geological survey of the Lackawanna and Wyoming coal fields in 1887 and then opened an office at Scranton as a consulting mining engineer and geologist.

Mr. Griffith investigated and rendered a report on the anthracite deposits of northern Peru in 1897, and from 1906 to 1908 he examined and reported on the coal resources of the Matanuska Valley, in Alaska. With Eli T. Conner, another well-known engineer, Mr. Griffith was appointed by the City of Scranton to investigate the risks to which that city was exposed by the extensive mining work being carried on beneath it and made an extensive report which later was published by the U. S. Bureau of Mines.

He was a frequent contributor to technical magazines, his last article in *Coal Age* appearing in the issue of June 7, 1923.

Mr. Griffith was a member of the American Institute of Mining and Metallurgical Engineers, the Mining and Metallurgical Society of America, the Scranton Engineers Club, the Wyoming Historical and Geological Society, and the Franklin Institute of Philadelphia. His funeral took place Jan. 22.

Keeney Sends Invitations to Non-Union Operators

Reports indicate that the hold of the United Mine Workers on northern West Virginia is in great danger of being loosened if further attempts to launch an offensive for the purpose of putting fear in the hearts of miners and operators, particularly in the Fairmont field, are no more successful than those recently attempted. It is believed that John L. Lewis and his followers cannot intrench and that either they must clean house of non-unionism in that section or move out.

Recent investigation has shown that there are 577 tippie mines in the Fairmont field, only 180 of which are working at this time. Of the 180 working mines 57 are non-union, or 30 per cent of the field's production. Just prior to the strike of 1922 all the tonnage from northern West Virginia came from union mines. The field was 100-per cent union. Though many mines are idle the production from the field is healthy, being obtained from low-cost mines aided by non-union operations. The return for 1923 shows a larger production in the Fairmont field than in the banner year of 1918.

Frank Keeney, president of the Seventeenth district of the International, is said to be at his wits' end in this situation, which so vitally concerns him. Like those in Illinois, most of the mines in the northern West Virginia district—on the basis of number and not tonnage—cannot participate in coal trade with the present wage scale. Mr. Keeney is said to realize the predicament, but its relief is not in his hands.

He seems much worried. On Jan. 12 in Clarksburg he asked the owners of the non-union mines in the vicinity to meet him. There was no response. Again on Jan. 14 he made a similar request, but was no more successful. The non-union operators say: "Mr. Keeney can receive little benefit from us; he must deal with his men single-handed." And so he headed for Morgantown, it is said, where he intended to try the same stunt.

The general impression among operators is that he is sore pressed and that he is trying to create the impression of one seeking to relieve a troublesome situation. There may be a possibility of sectional agreements in April if other union officials take the same stand as Frank Keeney, provided, of course, he is sincere. It looks as if he really desires what he appears to be seeking.

Senator Borah Introduces Pinchot Bill To Regulate Coal Industry

Legislators Manifest Deep Interest in Measure—Closely Follows Decision in Kansas Industrial Court Case—Enactment Considered Unlikely—Much Discussion Certain

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Senator Borah, of Idaho, on Jan. 24, introduced in the Senate the coal bill drafted at the instance of Governor Pinchot, of Pennsylvania. While Senator Borah told the Senate, on introducing the bill, that he had not had an opportunity to study its details, he did declare that he is in thorough sympathy with the object and purpose to be attained by proper legislation along the lines indicated by this measure. "The coal situation," said the Idaho Senator, "is a very serious one, and, in my judgment, one with which Congress ought to deal. The bill ought to go to the committee so that those who are in favor of it may be given an opportunity to urge it. After full examination, I may find myself in perfect accord with the entire measure."

The bill is of unusual interest to legislators in that it is recognized as being the most competently and carefully prepared measure which has come before Congress. Numerous proposals to regulate the coal industry have been introduced and some have been considered at great length, but without exception these measures have been more or less crudely drawn. There is every evidence that this is the product of capable talent.

It is apparent that the drafters of the bill gave much attention to the decision of the Supreme Court of the United States in the Kansas Industrial Court case. In that opinion, it will be remembered, the high tribunal recited that since the adoption of the Constitution it never has been considered that the price of coal could be regulated by the government. On the strength of that statement, some have deduced that the court holds it to be unconstitutional to regulate the price of coal. The more general thought in that connection, however, is that the court simply made a historical statement, because it goes on to say elsewhere in the decision that the justification for classifying a business as being charged with public interest and subjecting it to regulation is "the indispensable nature of the service and the exorbitant and arbitrary control to which the public may be subjected without regulation."

In other words, the court made it perfectly plain that the power to regulate turns on a question of fact, which is whether or not the public would be subjected to exorbitant and arbitrary control if there were no arbitrary regulation.

The Pinchot bill uses almost the exact language of that decision. It does not give the proposed coal division

of the Interstate Commerce Commission power to fix prices and margins except "where in the absence of such regulation there exist exorbitant and arbitrary charges or there is danger thereof to the public." The coal division can issue an order of that sort only after having conducted hearings and having studied the particular situation so as to establish certain facts. Even in cases where the commission may decide that power resembling monopoly is being exercised, its order is subject to review by the courts, and holds only if the court sustains the finding of fact. This is a formula quite different from that applied by the Lever law. It is regarded quite generally as being an ingenious formula. The regulation of prices under such a plan might not be effective but the first impression in Washington is that the plan is constitutional.

Another lesson of the Kansas Industrial Court case is that there is no hard and fast line between a business subject to regulation and one not subject to regulation. A popular conception is that businesses fall in two distinct classes. They are either absolutely independent or fall into the public-utility class where they are subjected to sweeping regulation. The Kansas case makes it plain that each instance of regulation must be justified separately. That decision, in the opinion of some members of Congress at least, is that no business, and least of all the coal business, is free from regulation. On the other hand, the decision shows that few, if any, businesses can be subjected to general governmental control. As a result of this decision of the Supreme Court, members of Congress are generally of the opinion that the question is not so much whether the business or commodity is charged with the public interest but whether the specific form of regulation proposed is justified by specific facts and conditions.

It is regarded that the application of the rule-of-reason policy in the Kansas Industrial Court case carries with it an indication of what the Supreme Court might do in a compulsory fact-finding case. If it were established to the satisfaction of the court that the coal business is an indispensable service and if it were made to appear to the satisfaction of the court that the public had suffered through exorbitant and unreasonable prices, through shortage or the element of monopoly, the opinion among the lawmakers seems to be that the court would approve of regulatory legisla-

Clever Red Water

An ingenious use of a chemical last week enabled engineers to discover the source of water flowing persistently into the Radium mine of the Aluminum Ore Co. of America at Belleville, Ill. Three men were drowned when the flood originally broke into the mine from adjoining abandoned workings. When pumps could not dewater the mine, a search began to find out the reason why. A nearby creek running over the property was under suspicion. A little phenolphthalein, a chemical containing highly concentrated red color, was put into the stream a short distance upstream. Soon the water flowing into the mine was intensely red. The stream had been caught in the act. Its course is to be changed.

tion. Though the court might hold that the fixing of prices might not be justified, under the rule-of-reason policy, it well might hold that publicity of accounts properly could be required by Congress.

The consensus of opinion on Capitol Hill seems to be that the Pinchot bill will not pass, but it is certain to give rise to much discussion. It has been referred to the Committee on Interstate Commerce, in which Senator La Follette is in a position to obtain hearings or other consideration of this measure. If any disposition to deny that should develop, he probably would be as well satisfied to carry the matter onto the floor of the Senate.

36 Die in Mine Explosion At Shanktown, Pa.

An explosion at 3:51 p.m., Saturday, Jan. 26, in Lancashire Mine No. 18, of the Barnes Tucker Coal Co., at Shanktown, Indiana County, Pa., entombed 48 miners, 36 of whom were dead when taken out. The explosion occurred near the main heading. The last body was recovered at 2:30 p.m., Jan. 28.

The slope is 950 ft. long and on an 8-per cent grade, requiring rope haulage. The mine, which is in the Miller seam, is gaseous, requiring shotfirers and safety lamps. On the day of the explosion 51 men worked. Four men left the mine a few minutes before the explosion. Eleven men in section 6, right where open lights are permitted, made their escape through an opening far distant from the seat of the explosion. One man refused to accompany these eleven, wanting to reach the slope, and was the only man killed by the attempt. The cause of the explosion is not known, but is thought to have been gas and coal dust. Inspectors will hold investigation after ventilation is restored and the mine drained of accumulating water.



Practical Pointers For Electrical And Mechanical Men



Fatal Accident Is Narrowly Averted On Motor-Generator Set Lacking Ground

I was greatly interested in the story told by Mr. Emerson, of Alabama, concerning a ground on a rotary which might have killed someone. I remember a similar circumstance which occurred at one of our mines. A motor-generator set was installed in a new tile building; the floor was of concrete and the building was set on an old fill. For about two years this motor-generator set had operated without any trouble and incidentally without a ground connection.

One day something happened to the machine which the men in the mine did not understand. Some time during the day the oil-switch, through which the power passes to the motor, tripped open and shut down the motor-generator set. This is something that occurred occasionally under very heavy overloads, so the station attendant went into the substation and proceeded to restart the set, but each time he operated the starting handle of the oil switch a fuse on the line outside blew or the main circuit breaker opened up.

NEW MAN SHUNNED A.-C. WORK

The electrician at this mine was a new man and like many other electricians always shunned any work on alternating-current machinery. However, he was called in and after several attempts to start the machine without succeeding, the mine foreman, being quite anxious about the output of the mine for that day and the cost for keeping his men idle waiting for power, 'phoned the electrical department of the company for assistance.

Fortunately the engineer in this de-

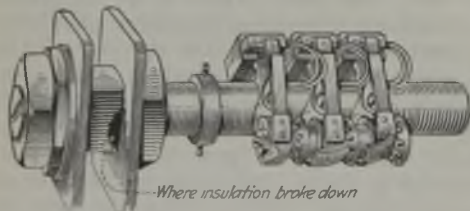


FIG. 1—BROKEN-DOWN STUD INSULATION

By puncturing this insulation the high voltage of the motor passed to earth and formed the circuit to ground, which caused the starting switch to trip open.

partment, to whom the superintendent had explained his trouble, was a thorough and practical man, having had considerable practical experience with

electrical equipment at the mines previous to his technical training. Sensing the situation or realizing the possible danger to the inexperienced men at the mine, he instructed the mine foreman not to make any further attempts to start the machine or start any investigation or repairs until he arrived.

It was some time before this engineer arrived on the job because the mine was about twenty miles from the main office. When he arrived everyone particularly interested in the supervision of the electrical equipment at the mine was greatly puzzled as to the cause of the trouble.

FLASH AT BRUSH RIGGING

It had so happened that while the electrician was trying to start the motor-generator set a flash occurred at the brush rigging on the d.-c. generator and just as soon as the engineer arrived this fact was called to his attention. Everyone naturally expected that the trouble was with the direct-current end of the motor-generator set because this was the only place where there was any visual indication of trouble. Naturally enough the engineer made a careful investigation of the damage done on the direct-current generator and, of course, he examined this most logical point of trouble.

Much to the surprise of all who stood around watching for the trouble to be located the engineer directed two men to repair the damage on the direct-current generator and called upon the electrician to disconnect the motor leads from the wires leading to the oil switch. This was a surprising thing because no one expected or thought there was any trouble with the motor, as there was no evidence of any trouble there and, everything considered, there is not a great deal about a squirrel-cage induction motor that can go wrong.

Test of the stator winding of the motor showed a heavy ground. Without very much trouble the grounded coil was cut out and by the time this was done the men working on the d.-c. end of the machine were through and the motor-generator set was quickly put back into service.

The negative lead of the d.-c. generator on this motor-generator set ran directly outside of the substation to a heavy ground connection in a nearby

creek and also tapped to the rail for the return circuit from the mine. The machine never had been provided with a ground wire and when the coil in the motor winding became grounded, there being no way for the current to leak from the frame of the machine through the concrete foundation, it passed along the base of the motor-generator set and into the frame of the generator. There it jumped across one of the brush studs to the negative or ground connection on the generator.

It has always been a wonder to me that some one was not killed in this substation. Who knows how long the

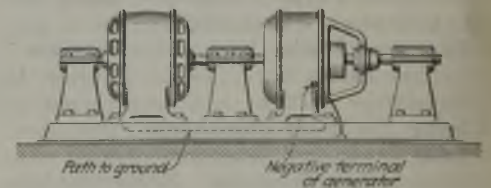


FIG. 2—HOW THE LEAK PASSED THROUGH THE BASE OF THE MOTOR-GENERATOR SET

The circuit from the grounded coil in the motor passed through the base of the machine to the generator, thus charging the whole machine with a high voltage.

2,200-v. motor winding was grounded to the frame of the motor before the breakdown occurred on the d.-c. generator to the negative lead? There is a possibility that this condition existed for some time before the trouble was actually noticed. The machine could operate properly for some time under these conditions and probably did, and anyone touching the machine would have been in danger of being killed, especially if he had touched the frame of the machine with one hand and accidentally had his hand or foot on the steam heater near the motor-generator set. Needless to say a ground wire was attached to this machine before it was started again.

It was no fault of the engineering department that this machine did not have a ground, because time and again letters of instruction had been sent out to the colliery on this general subject, but with this case as an example the engineering department was able to make the argument for ground wires quite forcible and I am glad to say that many a man with our company has learned an important lesson from this case. It is not always that we learn such a good lesson without having some bitter experience and I am hoping that someone will get this lesson as we did, before a fatal accident occurs.

ELECTRICAL STUDENT.

Visual Aids to Car Management

BY DWIGHT GREEN
Pittsburgh, Pa.

After all is said the eye is the quickest organ to sense values. A simple chart will tell more than a page of type. This chart, with a tabulation affording exact data, gives a clear visualization of the car-standing capacity at the various tippie trackages of a group of mines. It notes the capacities of the loaded tracks separate from those of the empty and the length of track space for any given size of coal. It also designates mines having special trackage facilities, such as loading tracks for box cars.

By other charts the total car-standing capacity of any individual mine might be summarized and the capacity of an entire group recapitulated, though for this a different scale would have to be used. It will be found convenient to make the chart of such a size that it can be posted in the office and be readable from any point therein. By reducing its size photostatically it can be placed for use under a desk glass.

When the original chart is made of such proportion that it will reduce to pocket data-book size (say Lefax proportion), an interesting and valuable page is obtained for the general manager's dope book. Many similar charts may be prepared to show relevant information such as the number of cars

loaded at each mine and the tonnage per month and per year.

The profile at the bottom of the chart is intended to outline track grades at any one mine or the general conditions sought for at all the mines constituting the group.

Hints on Pipe Gaskets

The greatest difficulty I have encountered during my experience with gaskets has been to convince users that it is not necessary to tighten a thick, flexible metallic gasket with the same extreme pressure as must be applied to thin non-flexible gaskets.

The idea seems to prevail that a gasket, in order to prevent leakage, must have as little thickness as possible and must be squeezed so thin that the distance between the faces of the flanges is a very close approach to absolute zero. Very often when applying gaskets we see the engineer or pipe fitter slip a pipe over the wrench, thereby increasing the wrench's leverage and making it possible to increase still further the pressure against the gasket. As a result the gasket is squashed. If it is made of corrugated metallic material it is pressed out so flat that the corrugations can do no good whatever.

It is poor practice to slip a pipe over any wrench on any gasket because wrenches are generally made of a proper and safe length to fit the nuts for which they are intended, and nut sizes usually are standardized to fit certain bolt diameters. This is a logical safety measure that has been almost universally adopted so that the bolt will not be subjected to too great tension. An extra long handled wrench, unless used with extreme care, is likely either to break the bolt or strip the threads.

One serious objection to the very thin gasket is that no matter how it is constructed it can have but little expanding or contracting capacity; consequently all expansion and contraction must be taken care of in some other manner—by means of pipe bends or expansion joints. A thicker gasket, having elastic properties, will naturally take care of considerable expansion and contraction. In many cases I have known thick, flexible gaskets to take care of all of the expansion and contraction in the line under ordinary temperature conditions of non-superheat practice.

Where temperatures are high or where temperatures fluctuate considerably, copper, brass and other metallic gaskets having a coefficient of expansion different from that of the joint should not be used. On account of the difference in the coefficient the gasket and the joint tend to expand and contract independently of each other. The tightly bolted joint, being much stronger than the thin gasket, will compel the gasket to expand and contract along with it. Breakage and leakage of a serious nature are, therefore, often the result. A gasket made up of steel which has the same coefficient of ex-

pansion as the joint overcomes this latter trouble entirely, but if it is thin and non-flexible it does not overcome or assist in overcoming the longitudinal expansion troubles.

Hence when applying thick, flexible metallic gaskets, be certain that a wrench of the correct length is used and then tighten only enough so that the leakage is prevented. Do not tighten too much. Any further tightening after leakage is stopped simply reduces the elasticity of the gasket and does not give it an opportunity to "breathe" as it should simultaneously with the expansion or contraction of the pipe line.

I therefore regard the matter of tightening as most important of all and want to impress it upon all users of flexible metallic gaskets. By being as careful in tightening the gasket as one is when tightening an ordinary steam-engine stuffing box, or when taking up the wear in a bearing, the best results will be obtained. Take it easy. Don't strain muscles, wrenches, bolts, gaskets, or anything. If directions are always carefully followed, much labor and fatigue will be avoided.

HENRY BOHMER, JR.

Use Your Head When You Use Your Hand

In a recent issue of *Coal Age* I read a story where a man touched with the back of his hand a machine that had an electrical leak on it. It is not my idea to encourage the practice of being careless in touching electrical equipment, especially when one knows that it is charged, but I think this is a point which may be stressed a little more than was mentioned in the article to which I refer.

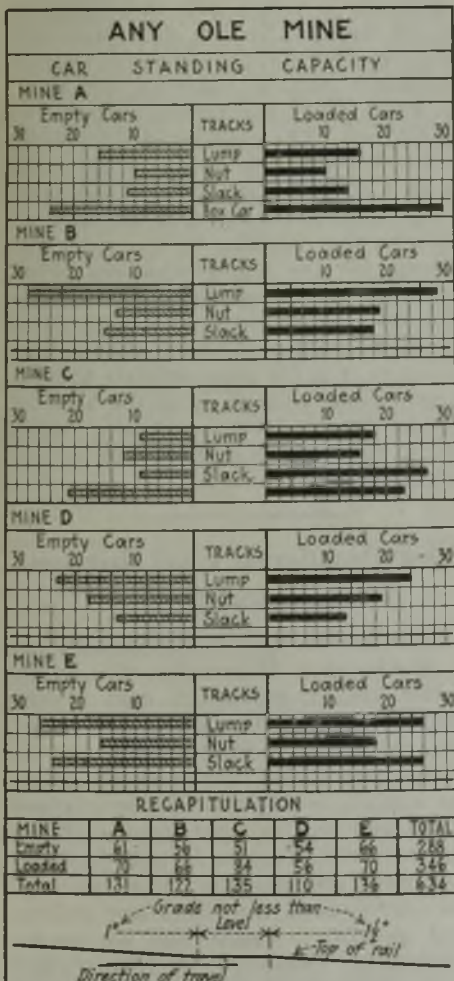
There is a strong tendency when the hand is placed upon an electrical conductor, or any piece of equipment which is charged with electricity, for the hand to automatically grasp the conductor and hold the person from breaking away. This is especially true with alternating current. Therefore, in testing for electricity if the back of the hand is used the fingers cannot close upon the conductor.

In this way it is very easy for one to be knocked away by the charge, or to pull his hand away quickly. This is no way to test a conductor for voltage, but where a person is going to work on a line and already knows that the switch has been thrown open it may be advisable to test the wires in this way to make doubly sure that it is safe to proceed with the work.

E. M. FORSYTHE,
Construction Foreman.

One lb. water evaporated from and at 212 deg. F. equals:

0.2841	kw.-hr.
0.3811	hp.-hr.
970.4	heat units.
104,320	kilogram meters.
1,023,000	joules.
754,525	ft.-lb.
0.066466	lb. carbon oxidized.



PUTS TRACK CAPACITY BEFORE EYE

A chart for office wall or desk which will convey at a glimpse what capacity for cars loaded or empty can be found at any of the mines of the company.



Problems In Underground Management



Loading Room Coal by Trips

By G. E. ALLOWAY
Lexington, Ky.

A system of gathering coal from rooms in thin seams of coal not exactly new but still not at all in general use is being received with much popular favor in the mines of eastern Kentucky. It would have been almost impossible of operation with mules or large locomotives, but it fits in nicely with the low gathering locomotives now available.

Under the old method when rooms were driven 35 to 45 ft. wide a roadway was laid on each side of the room and only one car at a time could be loaded on either of these roadways. When the gathering locomotive came round to collect cars it got two cars from one room, but it had to make two trips up to the face and back in order to get them, and the miner waited a long time for the locomotive to come.

Now a curve is laid around the room face and this allows three to five cars to be placed alongside the face handy to the miner, the number of cars depending on the length of the face. The gathering locomotive can hitch onto a trip like this and haul it into the place or when loaded can haul it out just as well as it could a single car. The advantages are obvious.

The output per miner also is increased 25 to 50 per cent, for the time he loses is reduced to a minimum, and the miner does not have to shovel any of the coal two or three times to get it to the car, as was the case when the place was 45 ft. wide and the old method of laying the tracks was in use.

This method does not involve any unusual expense in laying track. All that is necessary when steel ties are used is to remove two spikes at the end of the permanent track and bar the entire curve and track forward to the face, replacing the same two spikes.

This method of tracklaying can be applied to almost any seam, for it requires no more room than the old method, and timbers can be set as close to the face as has been the custom with the usual trackwork. The locomotives are built as low as 25 in., and this allows them to enter any coal seam that can be worked profitably.

It will be said that it is useless to make such a provision where the men push the cars to and from the room face and the gathering cost is nil.

That might be true enough with rooms of favorable and easy grades where the miner is willing to push the cars, but there are almost sure to be excessively steep or dipping gradients, where the cars cannot be pushed by hand, and then a low locomotive with a track which curves around near the face will make the miner 25 to 50 per cent more productive and not make the gathering cost much greater than with hand-pushing methods.

Is a Board a Good Stretcher?*

By GEORGE EDWARDS
Pikeville, Ky.

Many times it has occurred to me that some better means could be provided to carry an injured man. Stretchers of many designs are being sold, but most of them, unfortunately, are limber and cause so much movement to the patient when being carried that often he is so badly hurt in transportation that he never gets over his injuries. This is especially true when the injury is to the back, pelvis or thigh.

Just recently I saw an injured workman who, the doctor said, was in bad condition. The physician said much of the injury probably came from the long distance he had been carried without first placing splints to the thigh and knee.

I have been told that some coal companies have a board 7 ft. long and 20 in. wide (with three handholds on each side), the intention being that it should be slipped under an injured person regardless of his injury. He is lifted onto the board and onto the stretcher if there is one nearby. If not, he is carried on the board to the first-aid room in the hospital.

BACKWARD STEP FEARED

I have talked about this to several persons, and they feared that it would be a step backward and would encourage indifferent first aid, which, to my mind, is not true; for I believe a man who is capable would not hesitate to give the patient the best attention he could, and on the other hand should the unfortunate workman fall into untrained hands, which is often the case, if these boards which form a splint as it were, for the entire body were provided there would be fewer hopeless cripples. An objection has been raised

*This is an expression of opinion with which many readers will not agree.—EDITOR.

to the possibility that workmen would cut the boards into cap pieces and wedges. This could be overcome largely by painting a red cross on them and a sign calling attention to the object for which they were intended.

Dry Battery Always a Menace In Mine Blasting

By W. T. GERMAN

Technical Representative, E. I. duPont de Nemours & Co., Inc.

A highly dangerous practice all too common in the mines consists in the use of dry-cell batteries for firing electric detonators. The contact points of a dry cell always are alive, and therefore the instant that the wires of an electric circuit touch these points a current flashes through the wires and explodes any electric detonator that may be connected in the circuit.

Recently a miner who was using a dry-cell battery fired a first shot and then returned to the face to connect the second without removing his leading wires from the contact clamps of the dry cell. The moment he joined the electric blasting-cap wires to the cable the shot fired, killing him on the spot. It was against the rules of the mine in which he was working to use a dry-cell battery, yet the miner who was killed had been employed there for twelve years and was considered a very careful man. This incident shows how necessary it is for mine officials to keep an unceasing lookout as to the kind of electric firing devices actually being used in their mines if they wish to prevent disasters.

New Powdered Coal Burner Is Tried Out

Experiments are being carried on by Washington University, St. Louis, in the use of pulverized coal at the Barnes Hospital, St. Louis, Mo., under new patents. A "carburetor" somewhat on the order of the one on gasoline motors, where the proper mixture of air and coal is fixed, is one of the features. The results for the first ten days were overwhelmingly in favor of this coal against the hand- and stoker-fired systems. There was no smoke, which in St. Louis is a big feature, and four scoops of ashes was the result of the 10-day trial. The carburetor delivers forty parts of air to one part of coal under the system devised by Wm. H. Whittaker, of Schelbyville, Ill.

Discussion

Principles Which Underlie the Satisfactory Humidification of Mine Air

Not Necessary to Use Baffles or Radiators—Current Split to Prevent Loss of Heat and Moisture Before Reaching Live Workings

THAT the temperature of mines is only a few degrees warmer in summer than in winter is well known, while the change in the outside temperature varies greatly in these two seasons of the year. It also is well known that the capacity of air for absorbing and retaining moisture increases with its temperature.

Bearing these facts in mind, it is easy to see that summer air is capable of holding a far greater weight of moisture per unit volume than winter air. Air is said to be saturated when it contains all the moisture it can hold at its present temperature. Therefore, it is clear that a comparatively small quantity of water vapor will fully saturate a greater volume of air in winter than in summer.*

Many confuse the idea of saturation with the weight of moisture carried in a given volume of air, whereas the two expressions have no relation to each other. For example, the same weight of water vapor that will fully saturate a given volume of air at 30 deg. F. would give but 10 per cent of relative humidity in the same volume of air at a temperature of 100 deg. F.

The safe operation of a dry and dusty mine requires not only the systematic removal of the dust, as far as that is practicable, but the mine air must be humidified. For that purpose the simplest and most practical means employed is the introduction of exhaust steam into the intake air current.

As we all know, the steam entering the intake airway of a mine produces a fog that fills the passageway for a considerable distance beyond the point where it enters. As the heat of the steam passes into the air the fog gradually disappears. The water vapor forming the steam is absorbed by the air and the temperature of the latter is considerably increased.

The warm air current now laden with moisture carries this into the mine and, as its temperature falls to the lower temperature of the mine workings, much of the moisture is deposited there and serves to keep the dust in a more moist condition and renders it less dangerous.

One difficulty experienced in humidifying mine air is the tendency or desire to circulate the required volume of air under as low a water gage as possible, in order to reduce to a minimum the power required for ventilation. This naturally means a smaller quantity of steam exhausted from the engine driving the fan and a comparatively larger volume of air to be humidified. The result is that this large volume of intake air is not saturated and produces a drying action in its passage through the mine. This has led many to discount and abandon the idea of humidification by the use of steam.

Others have been led into the error of using live steam in addition to what exhaust steam was available. In one instance I found a 2-in. pipe installed to deliver live steam at 160-lb. pressure in a mine where there was insufficient exhaust steam. In another instance where the results had been unsatisfactory, the mine superintendent concluded that the trouble was because the steam and air did not mix thoroughly.

To overcome this supposed difficulty he had installed a system of baffles, deflectors and check plates in the intake air course. This so obstructed the flow of air into the mine and increased the water gage and power required for ventilation that it became necessary to bring into use a spare boiler in the power house and employ an extra fireman on the day shift. The power required to drive the fan was increased from 70 to 235 hp., and the volume of exhaust steam was 3.3 times what it had been previously.

Let me say here that the use of baffles to insure the mixing of the steam and air is wholly unnecessary. The expanding steam mixes rapidly with the air within a short distance after entering the current. It is a good plan to place the steam jet or orifice at the center of the entry, so that it will blow in the direction the air is moving.

Another costly operation frequently resorted to is the use of radiators to heat the air. To my mind, the use of a radiator for that purpose is inefficient, and the device is cumbersome and costly to install. Nothing is more efficient than the direct contact of the steam with the air.

In humidifying a mine, my practice has been to use all the exhaust steam available from the engine driving the fan and from other engines at the plant, as far as that is practicable. It always is advisable to ascertain if the volume of air entering a mine is

greater than what is required for its efficient ventilation, after repairing the stoppings and making any changes necessary to reduce the required circulation to a minimum. This is an important factor if the best results are to be obtained. To avoid the loss of heat and moisture before the air current reaches the live workings it should be conducted by the shortest practicable route.

In one instance that I observed in a West Virginia mine the intake air was well heated and humidified at the entrance, but the moisture was practically lost before reaching the live workings, because of the excessive distance the air had to travel. This was finally overcome by the erection of one or two air bridges and splitting the circulation. My experience is that steam humidification along the lines I have suggested is not only the surest way of solving the dust problem but does this in the simplest and cheapest manner possible. Applied intelligently, it will do more to lay the dust than any quantity of sprinkling.

F. C. CORNET,
Mining Engineer.

Quaregnon, Belgium.

Veteran Among Coal Producers

Your readers may be interested to hear of what in my belief is the oldest of producing mines on the American continent, Caledonia No. 4, an operation now being conducted by the British Empire Steel Corporation. This mine was opened in 1865 and is still in operation. It has produced 2,400 tons in a single shift and 3,300 in a double shift. It is still capable of a maximum output of 1,500 tons and has a daily average production of 1,200 tons. The coal is transported by an endless rope haulage over 28,000 ft. long. The depth of the shaft is 180 ft. This has been equipped since 1894 with self-dumping cages. I would like to hear of any mine having a longer life and a more extended rope or a longer haulage, especially one with such a well-sustained output.

ALEX McDONALD.
Glance Bay, C. B.

Cement Output and Shipments High for December

Production of portland cement during December, 1923, according to a report by the U. S. Geological Survey, based partly on estimates, totaled 9,997,000 barrels, compared with 12,603,000 barrels in the preceding month and 8,671,000 barrels in December, 1922. Shipments for the month were 6,408,000 barrels, compared with 10,251,000 barrels in the preceding month of November and 4,858,000 barrels during December, 1922. Stocks at the end of December amounted to 10,581,000 barrels, compared with 6,991,000 barrels at the end of the preceding month (according to revised figures) and 9,108,000 barrels at the end of December, 1922.

*How true this is may be seen by the rapidity with which the surface of the ground dries in summer as compared with the slowness with which it is dried in winter. In cold weather, however, the mine raises the temperature of its air and so reduces its saturation, whereas in summer it decreases the temperature and so completes the saturation.—EDITOR.



Production And the Market



More Inquiries for Soft Coal; Little Gain In Actual Business; Miners' Action Awaited

Inquiries from consumers of soft coal are growing, but actual business has not increased much, caution appearing to be the guiding influence of buyers, many of whom are awaiting the outcome of the miners' convention at Indianapolis. In the West the demand for domestic coal is much heavier because of the cold weather, and increased production is causing a growing volume of slack. Production continues heavy with considerable coal going on contracts or to stockpiles, while reports from some industrial centers show that current consumption is slightly heavier. The strike of the Nova Scotia miners increased the inquiries from Canada and some actual business is reported. Contracting continues to lag in most markets and while some contracts are reported as having been closed, the tonnage involved has not been large. Some operators are favorably situated as to orders between now and April 1.

Little Change in Conditions Observable

Conditions generally are little different from the early part of the month. Only in scattered sections have any of the mines reopened that were closed last autumn because of "no market" while operators in some parts of central Pennsylvania complain of the lack of labor in those mines that are working.

Coal Age Index registers 187 as of Jan. 28, an increase of five points when compared with the previous week, with an average price of \$2.26, an advance of 1c.

The Middle West markets are kept fairly active by good demand for domestic coals, although prices have not advanced. Some of the mines which were closed have been obliged to reopen and the entire outlook is much brighter. Domestic tonnage in both the Mount Olive and Standard districts is moving strong, but car shortage in both fields has interfered to some extent with coal movement. Dealers in St. Louis report movement to be 100 per cent, but the demand is for the

cheaper coals. Business in Kentucky is good, colder weather having created an active demand for prepared coals accompanied by a good car supply. There is better buying by utilities and heavier consumption of gas has resulted in a better demand for gas or byproduct coals. Stocks in yards in the Northwest are being rapidly depleted, forcing the owners into the market for replenishments.

A general improvement is noted throughout Ohio. There was a slowing down of car supply accompanied by slower movement of coal. Heavier demand for smokeless coals from Chicago buyers has tightened the various markets and there is a heavier call for domestic sizes. Reports are that many non-union fields are gradually getting back to the 1917 wage scale. Both steam and contracting situations are quiet. There is a trifle better outlook in the spot market at Pittsburgh.

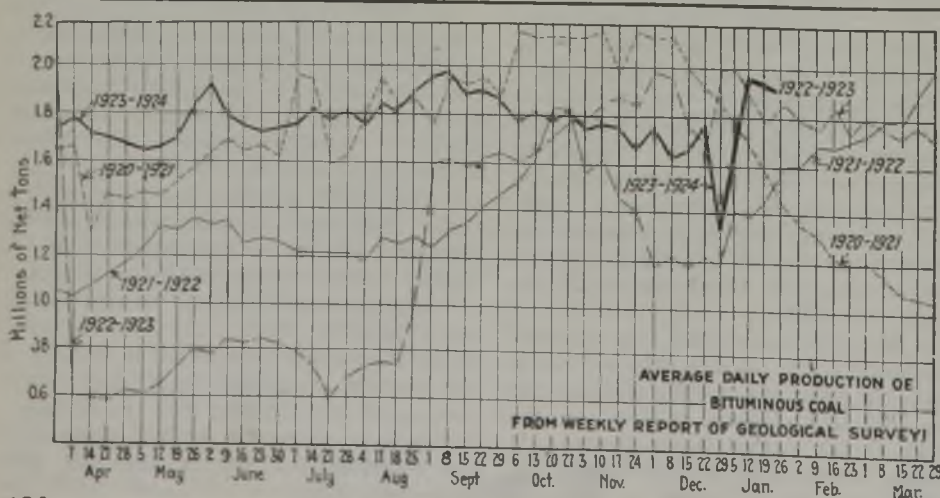
Restriction of production caused a slight stiffening of quotations for Southern coals in New England, but there are no favorable developments in the textiles and almost no signs of buying in any direction. Along the Atlantic seaboard everything is quiet.

The market for domestic anthracite is slow and some independent coals were quoted at figures close to company quotations.

Production of soft coal slackened during the week ended Jan. 19, according to the Geological Survey report, dropping to 11,621,000 net tons, a decrease of 328,000 tons when compared with the preceding week, while the output of hard coal during the same period increased 44,000 net tons when compared with 1,840,000 tons, the output of the week ended Jan. 12.

Midwest Works Hard

Reopening of a great many of the mines that had shut down during the autumn raised the early January output of the Midwestern fields tremendously, especially during the past week. Some mines have been running every day and



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Jan. 5 (b)	10,993,000	9,068,000
Jan. 12 (b)	11,217,000	11,949,000
Jan. 19 (a)	10,925,000	11,621,000
Daily average	1,821,000	1,937,000
Coal year	321,591,000	436,847,000
Daily aver. coal year	1,298,000	1,778,000

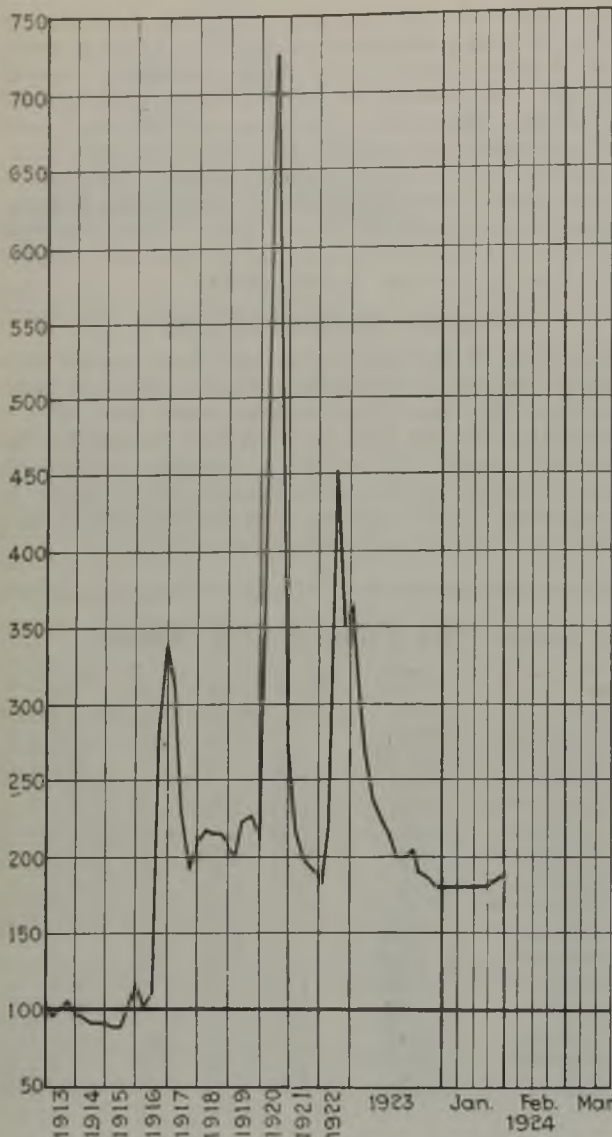
ANTHRACITE

Jan. 5	1,725,000	1,436,000
Jan. 12 (b)	2,113,000	1,840,000
Jan. 19 (a)	2,010,000	1,884,000

COKE

Jan. 12 (b)	323,000	258,000
Jan. 19 (a)	328,000	262,000
Calendar year	909,000	716,000

(a) Subject to revision. (b) Revised from last report.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

Index	1924			1923
	Jan. 28	Jan. 21	Jan. 14	Jan. 29
Index	187	182	182	342
Weighted average price	\$2.26	\$2.25	\$2.20	\$4.14

This diagram shows the relative, not the actual, prices on four-teen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Eastern Kentucky prime block coal has been a shade firmer, with the market running to a maximum of around \$3.50 on better grades. Egg and nut sizes, along with lump sizes, show no change, but screenings are somewhat weaker. Utility buying is better and gas companies, meeting with a heavy demand for gas, have been placing better orders for gas or byproduct coal. Car supply is holding up well.

Northwest Trade Brisk

A succession of cold waves throughout the Northwest has created an active demand for coal in both city and country. Stocks are moving out of the yards at a rapid rate, but there is plenty of everything in the way of coal and coke. Several cargoes at Milwaukee remain to be unloaded. Jobbers who depend on rail supplies complain that receipts are slow owing to weather influences and strikes at some Eastern soft coal mines. There have been no changes in prices.

A big run on coal has developed at Duluth within the past week and all Head-of-the-Lakes docks are working to capacity. The result of the run has been to strengthen the tenor of the market without actually increasing prices. In fact the losses recorded last week have not been recouped, and bituminous is at the same level as quoted last. The

anthracite market at Duluth is struggling to hold its own as best it can. Pea is reported as fast disappearing.

West Continues Busy

Mines through the Southwest continue to operate full time as winter holds on. However, none of those closed for the summer and not reopened at the beginning of the season has resumed operation as a result of improved business, and there has been no difficulty in obtaining sufficient cars to move the coal as rapidly as it has been mined. Retailers have been compelled to make delayed deliveries on some grades of domestic coal, but there always has been sufficient coal of other grades to tide over.

The slack market in Utah is stronger for office buildings and the like are buying again. Weather continues very cold. The greatest trouble row is the moving of intermediate sizes. If the situation does not improve it is expected that some mines will be closed temporarily. Some of the biggest operators are getting behind on their lump orders as a result of this condition. Working time is around four days a week.

The coal market in Colorado is still showing signs of life and mines worked an average of five days last week. Demand for all sizes is coming in steadily and very few unconsigned loads at the mines were reported. "No Market" is slowly declining with less than 20 per cent of the total working time lost last week attributed to this cause. Prices are unchanged. The transportation equipment and car supply have been very favorable throughout the state except in Routt County, where weather conditions have prevented considerable movement of commodities.

Domestic Demand Strong in Ohio

General betterment of prices and a slowing down of both car supply and the movement of coal were the features of the Cincinnati coal market last week. The advance in prices for smokeless coals was attributed chiefly to the demand of Chicago buyers for "car numbers." Cold weather and the demand for domestic coals caused an upturn. There is little or no talk of contracts and some buyers are waiting for the outcome of the miners' convention before committing themselves. Retail business is on the same basis as earlier in the month. Exceptional coals are being quoted at \$3.75@\$4 for block, and \$2.75@\$3.25 for egg.

At Columbus lower temperatures have stimulated the domestic trade to a small degree, but the general market is drabby. Although retail stocks are comparatively light, dealers are slow to order, and buying on the part of householders is on a hand-to-mouth basis. Steam coal demand is quiet, due to large reserves, and the utilities and railroads are making small additions to their present supplies. Mines in the Hocking Valley and other field are gradually resuming operation. Contracting is quiet, both operators and buyers watching the outcome of the Indianapolis convention. Reports to the Southern Ohio Coal Exchange show that for the week ended Jan. 12 the total output of 446 mines reporting was 196,178 tons out of a full-time capacity of 682,824 tons. Of the shortage "no market" was responsible for a loss of 453,115 tons.

There is an active demand by domestic consumers for Pocahontas and other smokeless fuels at Cleveland. Eastern Ohio operators also report a heavy demand for their coals. Retail dealers are busy replenishing their stocks and industrial plants are adding to their stocks of steam coals, not willing to take any chances. Buyers as a rule are watching the market for bargains and are keeping distress coal down to a minimum. Some of the mines in eastern Ohio which were closed during the past couple of months have reopened.

The spot market at Pittsburgh was just a trifle dull last week, but is not as poor as in the first week of the year. Production is somewhat heavier. The change is only slight, however, rail mines running a trifle over 50 per cent as compared with about 45 per cent before the holiday season. Only a small part of the increase is attributable to the demand for domestic coal. The Pittsburgh district continues to feel sharp competition from the nearby non-union fields.

The soft-coal market at Buffalo shows comparatively no change, the chief demand being for slack. Severe cold weather resulted in increased inquiry, but prices were not affected.

New England Sees Few Signs of Buying

In New England there are again some signs of firmer prices on Pocahontas and New River. The advance that materialized last week, however, was due far more to restricted production than to any appreciable improvement in demand. The light tonnage available at the Hampton Roads terminals made possible a gradual lift in quotations the first of the week from \$4.75 to \$4.90, and near the close of the week from \$4.90 to \$5.15. No actual sales at the latter figure were reported, but the fact that a few agencies are naming \$5.25 shows a purpose to try out the market on the basis of current mining. All these prices are per gross ton f.o.b. vessel at the loading port, but there has begun to be a corresponding movement on coal in storage for delivery inland. Prices on cars Boston and Providence have in some cases been advanced to \$6.15@ \$6.25, also per gross ton.

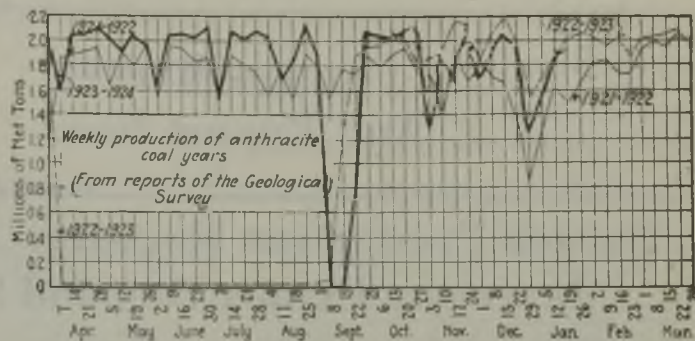
In the textiles, in shoes and in the paper trade there are no favorable developments. Reserves of coal in many cases are nearly at the maximum and there are few signs of buying in any direction. There is a certain response to strike talk, but it is by no means characteristic, and there seemed to be little chance that consumers will enter the market in any number during February.

All-rail there has as yet been no changes. It would take a material advance in the price of smokeless coals from West Virginia via the water route to approach the present delivered cost of coals from central Pennsylvania even at the minimum Clearfield rate. That one or two distributors of these coals are beginning to move their offices from Boston to Springfield, Mass., in order to be in closer touch with the actual buyers of those coals shows that the area nearer tidewater is being conceded to the shippers of Pocahontas and New River.

More Inquiries Along the Seaboard

Indications point to better buying and more inquiries for soft coal in the New York and Philadelphia markets. Some New York houses have been asked as to shipments to Canada and there has been an increased demand from the Dominion due to the strike of miners in Nova Scotia, both all-rail and water deliveries. Large consumers have shown a tendency to take in more coal, but they are not increasing their orders to a large extent. Most consumers are watching developments at Indianapolis. Contracts continue to be in the making and although \$3.25 is generally accepted as the contract figure for the better coals, some operators, it is said, are willing to take less. The market at Baltimore is flat, with prices remaining without change.

West Virginia reports a better demand for its coals in the West than in the East, but production has not been stimulated to any extent. Output in Virginia is about 60 per cent of capacity. Weather conditions have caused an improvement in the wholesale domestic demand at Birmingham. Dealers have been enjoying a better run of orders and are calling on the mines for replenishing stocks. Not much improvement is noted in the demand for steam coals.



The export market is a trifle more active, due to inquiries from Europe and from Canada, but the amount of new business placed is said to have been small. There was a sudden spurt in the movement from Baltimore, one vessel taking more than 10,000 tons to Genoa, Italy. During the first twenty days of January dumpings of cargo coal amounted to 38,458 tons, as compared with 3,390 tons during the corresponding period of last year.

No General Improvement in Anthracite Demand

Despite the more seasonable weather the anthracite trade fails to show any general improvement. Retail dealers are fairly busy, but production is sufficiently heavy to meet their demands. Yard bins are well filled and consumers of the domestic sizes are beginning to hold off in renewing their supplies. Stove and chestnut sizes continue to be the heaviest in demand, but there is no shortage. Straight lots of these coals of independent origin are held at slightly advanced quotations than when taken in conjunction with either egg or pea coals, which are draggy in most markets. Welsh anthracite is being offered to the trade in Baltimore as well as in New York, but comparatively few orders are reported as having been placed.

Utility Coal Consumption Gains Rapidly

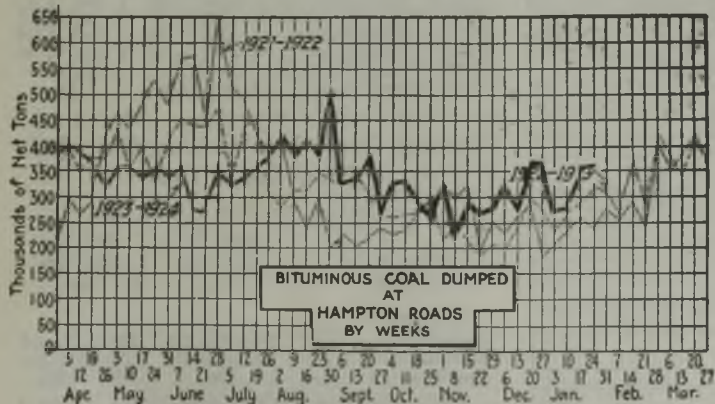
Central-station plants were heavy consumers of coal in 1923. The reports of the Geological Survey show that whereas in 1919 these utilities used 96,200 net tons of coal daily for the generation of power, the daily consumption rose to 101,400 tons in 1920, but fell to 93,700 tons in 1922. In seven of the first eleven months of 1923 the quantity of coal consumed averaged about 110,000 tons per day and the average for the year was over 100,000 tons. Oil used by central stations also gained in 1923, the average daily consumption ranging from 32,600 barrels to 45,000 barrels. The average in 1922 was 36,200 barrels per day.

AVERAGE DAILY CONSUMPTION OF COAL BY ELECTRIC PUBLIC-UTILITY POWER PLANTS IN THE UNITED STATES

Month	1919-1923 (In net tons)				
	1919	1920	1921	1922	1923
January.....	104,000	115,600	95,000	95,300	114,700
February.....	102,000	111,500	93,900	92,600	116,000
March.....	93,900	105,000	85,200	87,800	108,100
April.....	88,100	97,200	80,600	81,900	96,900
May.....	85,300	91,100	77,900	79,700	95,100
June.....	88,300	95,000	81,360	82,900	98,400
July.....	85,700	94,800	79,400	82,700	98,000
August.....	86,700	97,100	83,200	90,900	103,500
September.....	92,200	100,100	86,300	96,600	105,600
October.....	98,400	101,800	89,000	105,700	115,300
November.....	112,500	105,200	92,600	111,900	113,300
December.....	116,800	103,200	93,700	116,000
Year.....	96,200	101,400	86,500	93,700

Car Loadings, Surpluses and Shortages

	Cars Loaded		Car Shortage
	All Cars	Coal Cars	
Week ended Jan. 12, 1924.....	872,265	211,098
Previous week.....	703,269	159,471
Same week in 1923.....	872,730	198,770
	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
Jan. 14, 1924.....	292,921	129,846
Same date in 1923.....	28,282	6,155
Jan. 7, 1924.....	353,790	165,975



Traffic News

Rate Adjustment Hearing

A hearing will be held on Feb. 7 at New York City by the Coal & Coke Committee, Trunk Line Territory, on a carrier's proposal to adjust rates on anthracite from mines on the D. & H., D., L. & W., and the N. Y., O. & W. Rys. to stations on the Grafton & Upton R.R. It is proposed to reduce the rates on prepared sizes of anthracite from points on the D. & H. and D., L. & W. from \$5.04 to \$4.91 and on pea and No. 1 buckwheat coals to West Upton, Upton and Hopedale, Mass., from \$4.91 to \$4.79 per ton. Adjustments are proposed from points on the N. Y., O. & W. Ry to make rates similar.

M. & W. Removes Differential

Largely through the efforts of the Monongahela Coal Association the freight rate differential on carload shipments of coal over the Morgantown & Wheeling R.R., now a part of the Monongahela Ry., between Randall and Cassville has been removed. Heretofore coal shipped over the subsidiary of the Monongahela has had to bear a freight charge of \$47 per car. In the future, under the new ruling, coal shipped over the Morgantown & Wheeling will be subjected only to the same rate as coal shipped from points on the main line of the Monongahela.

Defers Rate Inquiry

The Interstate Commerce Commission has indefinitely postponed its investigation into rates on anthracite and on bituminous coal from points in Pennsylvania and West Virginia to New England and northern New York destinations. Hearings were to have been resumed Jan. 28, but were canceled because statistics that were to have been submitted were not ready. It is understood the investigation will be resumed about the middle of February.

Coal-Road Earnings Up

The Norfolk & Western Ry. reports gross earnings of \$8,074,152 in December, 1923, against \$6,960,753 in December, 1922, and \$7,218,894 in 1921. Net operating income amounted to \$2,377,969, against \$642,677 in 1922 and \$2,138,886 in 1921. Gross earnings for the whole of 1923 totaled \$95,494,687, against \$90,314,743 in 1922 and \$80,760,590 in 1921. Net operating income totaled \$19,877,677 in 1923, against \$18,624,468 in 1922 and \$14,870,021 in 1921.

The Delaware & Hudson showed net operating income of \$531,443 in December, 1923, against \$74,892 in the same month in 1922 and \$153,771 in 1921.

Net operating income for the full year 1923 totaled \$6,512,344, against \$1,216,689 in 1922 and \$7,076,803 in 1921.

The Delaware, Lackawanna & Western reported net operating income of \$1,091,959 in December, 1923, against \$329,130 in 1922 and a deficit of \$73,349 in 1921. For the year, this road reported net operating income of \$13,443,543, against \$6,669,022 in 1922 and \$12,997,084 in 1921.

N. Y. Central Loadings Heavy

Average daily coal loadings for the second week of January on the New York Central lines amounted to 2,505 cars, which was an increase of 33½ per cent over the daily average for the month of December, according to a statement issued by the company. The average for the second week of January was larger than the daily average for any month of 1923 with the exception of January, when the country had not yet caught up with the shortage due to the prolonged miners' strike. The daily average coal loadings for the first week of January was 2,161 cars.

Northwest Wants Rate Decision

The long delay of the Interstate Commerce Commission in giving a decision on the Illinois-Minnesota rate case, which was heard a year ago in July, is causing much adverse comment among coal men in the Northwest. It is pointed out that \$35,000,000 is invested in the docks at the head of the lakes and that these docks are supposed to supply the Northwest. Many feel that they are being unfairly discriminated against by the commission and that a continued delay will make the dock trade suffer.

As the situation stands Illinois coal can be brought to Twin Cities for \$3.46 a ton, a distance of 700 miles. Eastern coal comes to Buffalo from the mines for \$1.82 and from Duluth to Twin Cities for \$1.76, or \$3.58 for the total rail haulage of 250 miles. To this must be added the water freight of \$0.45 a ton, making a total of \$4.03. The docks contend that they cannot exist long against this competition.

Even Duluth itself is not immune from the Illinois coal bugaboo. It is being sold there under the name of "Illinois lump," and the dealer charges \$11.25 a ton, or two tons for \$22. Household buyers buy it under the impression that it is "part anthracite," and it looks much like it in the medium sizes. Added to other Illinois advantages is that cars can be reloaded with grain or other material for the return trip.

Arguments will be heard Feb. 19, in Minneapolis, on the request that has

been made by the docks for \$1.66 increase in the anthracite rate to Twin Cities, all rail. Minneapolis independent dealers are opposing this, as they can at present undersell the Duluth coal.

Association Activities

The eleventh annual meeting and banquet of the Cincinnati Coal Exchange was held at the Hotel Gibson, Cincinnati, on the evening of Jan. 24. About 150 members of the organization and friends were present. Vice-President Edward Harper, in the absence of R. S. Magee, who is in California, presided. Colonel Charles A. Moriarity acted as toastmaster. A. Julius Freiberg, president of the Cincinnati Chamber of Commerce, of which the coal exchange is the largest subsidiary, was present and felicitated the coal men upon the work that had been accomplished during the year. One striking utterance was the statement that the onslaught of public opinion against coal, railway and other business interests should be met four-square. "When an issue develops," said Mr. Freiberg, "there is only one way to meet it, and that is to stand and fight." Other speakers of the evening were W. S. Battle, Jr., claim agent for the Norfolk & Western Ry.; W. C. Hull, assistant to the traffic vice-president of the Chesapeake & Ohio Ry., and J. M. Dewberry, coal and coke agent for the Louisville & Nashville. Tribute was paid to Victor White, Kuper Hood, Charles A. Tribbey and Jacob Brady, who died during the year.

The Southern Ohio Coal Exchange held its annual meeting at Columbus, Jan. 25, when it was voted that the exchange be represented in the four-state meeting between operators and miners at Jacksonville, Fla., Feb. 11. Dr. T. R. Biddle and J. S. Jones were chosen as delegates and James H. Pritchard and O. S. Newton as alternates. The following officers were elected: T. R. Biddle, president; George H. Barker, treasurer; W. D. McKinney, secretary, and James H. Pritchard, commissioner of mining.

Obituary

Ryburn Pinckard, superintendent and general manager of the Norton Coal & Coke Co., of Nortonville, Ky., died at Nortonville, Jan. 18. Mr. Pinckard was superintendent of the byproduct plant of the Woodward Iron Co., Birmingham, Ala., for several years, going to Nortonville about three years ago. He was 41 years of age and spent a great part of his life in the Birmingham district, where he was well known in industrial circles. Burial took place Jan. 20.

George W. Leckie, chief engineer of the Leckie Coal interests in southern West Virginia and Kentucky, died at his home at Welch, W. Va., on Saturday, Jan. 19. Mr. Leckie was born Feb. 2, 1881 at Shendoah, Pa., and after being graduated from Girard College, at Philadelphia, he entered the employ of the Wentz interests, spending fifteen years with that company at the Mary D. and Lehigh Collieries. In 1917 he was made chief engineer of the Leckie Coal companies and moved to Welch. He is survived by his wife, and by four children. Funeral services were held at the Presbyterian Church at Welch on Tuesday, Jan. 22, burial being at Bluefield, W. Va.

Coming Meetings

Rocky Mountain Coal Mining Institute. Winter meeting, Feb. 13-15, Albany Hotel, Denver, Colo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

American Institute of Mining and Metallurgical Engineers. Annual meeting Feb. 18-21, 29 West 39th Street, New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

Northern West Virginia Coal Operators Association. Annual meeting Feb. 12, Fairmont, W. Va. Secretary, J. O. Caldwell, Fairmont, W. Va.

Upper Potomoc Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

The Nelly Coal Co., Macksburg Village, has been incorporated with a capital of \$10,000 to mine and sell coal. Incorporators are Elmer Hostetler, A. D. Kline, C. M. Dilley, H. E. Schultheis and George J. Ackerman.

The Hope Coal Co., Cleveland, has been chartered with a capital of 2,000 shares, no par value, designated to operate coal mines and sell coal and coke. Incorporators are C. H. Judkins, George R. Blackburn, C. G. Collins, Paul R. Brown and Hiland B. Wright.

Receivers for the Lexi Coal Co., Columbus, won their case in the Ohio Supreme Court when the receivers for the Ohio Consolidated Coal Co. attempted to have a judgment for \$32,000 against the Lexi Coal Co. for alleged breach of contract affirmed. The Court of Appeals had reversed the lower court and the Supreme Court affirmed the reversal.

Circuit Court Judges L. E. Knappen and A. C. Denison and District Judge A. M. J. Cochran at Cincinnati on Jan. 18 denied the petition of the Buckeye Coal & Railway Co. and the Sunday Creek Coal Co. of Ohio, asking that the 2c. per ton royalty on coal mined on certain lands conveyed by the Hocking Valley Ry. Co. as security for a mortgage be enjoined. The petition also asked that the lands of the Buckeye company be released from the mortgage given by the Hocking Valley Railway Co. to the Central Trust Co. of New York. The supplemental petition of the United States asking release of the lands of the Buckeye company from the mortgage lien and discharge from paying the royalty also was dismissed. Both the government and the Buckeye and Sunday Creek companies charged that the continuation of the royalty provision of the mortgage was in contravention of the former decree of the court, ordering the dissolution of the so-called coal trust.

Bids were received by the Board of Purchase of the City of Columbus, Jan. 23 for coal to be delivered before March 31 in the following amounts: 5,000 tons of nut, pea and slack for the Municipal Light Plant, Boblo Coal & Sales Co., Pittsburgh, \$1.35, and the Gene Miller Coal Co., of Columbus, \$1.40; 3,500 tons of nut, pea and slack for the Water Works Department, Boblo Coal & Sales Co., Pittsburgh, \$1.30; Gene Miller Coal Co., Columbus, \$1.40; 2,000 tons of nut, pea and slack for the Garbage Disposal Plant, Boblo Coal & Sales Co., of Pittsburgh, \$1.25, and the Gene Miller Coal Co., of Columbus, \$1.40; all bids are f.o.b. mines.

PENNSYLVANIA

The board of directors of the Central Pennsylvania Coal Producers' Association and the executive committee of the Association of Bituminous Coal Operators of the district held meetings Jan. 25 at the headquarters in the Lincoln Trust Building in Altoona and the decision was reached to enter into a general investigation of freight-rate schedules as they affect the district. No action was taken on the question of the coming wage conference with the United Mine Workers, although there was some discussion of the situation. A general meeting of the operators of the district will be held about March 1. The two boards received and accepted the resignation of John S. Sommerville and elected Edgar W. Tate of Pittsburgh, president of the Allegheny River Mining Co., to succeed him on the boards. Mr. Sommerville resigned his official connection with the Rockville Coal & Iron Co. and is locating in New York. President B. M. Clark, of Indiana, presided at the meeting, and others in attendance included Harry Boulton, John C. Forsythe, W. R. Craig, M. J. Braeken, James W. Cook, Rembrandt Peale, H. B. Scott, C. B. Maxwell, E. W. Robertson, J. William Wetter, G. Webb, Shillingford, A. M. Liveright, William Leamont, W. G. Calkins, F. D. Lambert, J. R. Caseley and R. H. Sommerville.

Governor Pinchot has announced that the thirty bituminous inspectors have followed the example of the twenty-two anthracite inspectors and have agreed to take a month's "leave of absence" without pay. In reality this means they will work during this period of a month without compensation, running the risk of getting the \$400 a month allowed by the state at a future date. The lay-off is occasioned by lack of funds in the State Department of Mines, whose appropriation for 1923-1925 was severely cut by Governor Pinchot.

Hyman Michaels Co., Chicago, dealers in new and relaying rails, have placed Al Michaels, assistant treasurer, in charge of their Pittsburgh offices. Mr. Michaels formerly was located in Chicago.

The following officers have been elected for the ensuing year by the Wilkes-Barre Mining Institute: John B. Tamblin, president; J. S. Hammonds, Edward Flynn and Edward Griffith, vice president; F. M. Devendorf, secretary and treasurer. New members elected on the board are: Paul Warriner, of Lehigh Valley Coal Co.; Thomas Gambold, of Lehigh & Wilkes-Barre Coal Co.; B. S. Morris, of the East Boston Coal Co. and Henry Nothoff of Haddock Mining Co. A speakers' committee was appointed to arrange a program for the banquet to be held in Irem Temple Jan. 30.

The Lehigh Coal & Navigation Co. has awarded the contract for erection of a new breaker to supplant the present one at Lansford. The plant, which will be a steel and concrete structure, will involve an expenditure in the neighborhood of \$1,250,000. Work will be started in the early summer and the new plant is expected to be in operation in the early fall. During the course of construction the present breaker will be operated since the site for the new structure will be east of the old one. The capacity of the new plant will be about 5,000 tons of prepared coal daily. The plans call for a structure similar in design to the present Coaldale breaker.

The convention of the United Mine Workers of District No. 2 will be held in Altoona, March 11. This is the first time in many years that the convention has been held outside of DuBois. So far as the local district is concerned, no schedule of demands has been arranged. Work in District No. 2 has been in bad shape for the union workers, and operators have been suffering with them. What demand there has been for coal in the union section of the district has been supplied by working the men of some of the mines on part time, while many of the smaller operations have been closed entirely. If the convention in Indianapolis can present a plan which will improve conditions in the mining industry in central Pennsylvania, it will find a hearty welcome in this field both by the miners and the operators.

Joseph Linden, who for many years was mine inspector for the Carnegie Coal Co., Pittsburgh, has been appointed general superintendent of that concern, to succeed G. F. Osler, who resigned to become vice-president of the Pittsburgh Terminal Railroad & Coal Co.

VIRGINIA

W. W. Houston, coal broker and former manager for the Pan Handle Coal Co., Norfolk, has been elected chairman of the industrial committee of the Norfolk-Portsmouth Chamber of Commerce. Mr. Houston was chairman of the committee which last year raised a \$1,000,000 industrial revolving fund in the two cities.

WEST VIRGINIA

As the result of a conference held in Huntington on Monday, Jan. 21, between R. M. Lambie, chief of the West Virginia Department of Mines, W. J. Parker of the Pennsylvania Bureau of Mines, and H. E. Mathews, secretary of the Huntington Chamber of Commerce, it has been announced that the seventh annual International First-Aid and Mine-Rescue Meet will be held in Huntington, Sept. 11, 12 and 13. Arrangements will be begun immediately. Widespread interest is being evinced, which it is believed presages a large attendance and the sending of teams from many different sections of the country as well as from other countries.

A charter has been granted to the Mine-to-Consumers Coal Co., of Martinsburg. This concern is capitalized at \$25,000. Its incorporators are Solomon J. and Reuben Fine of Martinsburg; Nathan Fine, of Hancock, Md. and Harry Fine of Baltimore, Md.

In connection with the ejectment suits filed by the Francois Coal Co. against 19 miners formerly in its employ for the possession of company houses, Magistrate R. E. Kidd rendered a decision for the plaintiff in each of the 19 cases, in which the miners had signed written contracts with the company regarding possession of the mine houses. Only about 10 of the miners are affected as a number have already relinquished possession. Counsel for the United Mine Workers has taken an appeal to the Circuit Court of Harrison County. The Antler Coal Co.'s suit against several miners in its employ at Lumberport, in Harrison County, also has been tried and decision reserved.

According to figures compiled by the Kanawha Operators Association, 103,834-

836 tons of coal was produced in West Virginia during 1923, December tonnage in some instances being estimated. The N. & W. Ry. handled 28,818,430 tons of the state's output, and the C. & O. 28,831,600 tons. Transportation of 7,273,375 tons by the Virginian Ry. and of 4,533,981 tons by the Kanawha & Michigan brought the total production of southern West Virginia mines up to 69,557,386 tons. In the northern West Virginia field proper there was an output of 27,827,450 tons, supplemented by an output of 5,200,000 tons in the Northern Panhandle and 1,250,000 tons in the remaining districts of the state. It is shown by the association that 76,057,677 tons or 73.3 per cent of the total output, was produced at non-union mines, as compared with only 34.6 per cent of 92,047,487 tons produced in 1920.

W. E. Deegans and associates of Huntington have sold the New Pocahontas Coal Co., operating at Deegans, in McDowell county, to a group of southern West Virginia operators who have organized the Monarch Smokeless Coal Co. The deal follows closely upon the sale of the Deegans properties in the Logan district to the George M. and Herbert Jones interests. The new company formed to take over the company is capitalized at \$400,000. Such well known coal men as W. D. Ord, of Land-graff; James Elwood Jones, of the Pocahontas Fuel Co.; John J. Lincoln, of Elk-horn; Frank S. Easley, of Bluefield; I. J. Rhodes, of Welch, and Captain D. H. Barger, of Shawsville, are interested in the newly organized company. Included in the transfer were 1,350 acres of fine coal land, this lease representing a merger of the Atlas and Pando leases, a part of the lease running for a period of 20 years or more. The New Pocahontas company had been operating for a period of about eight years in McDowell and had one of the best plants in that section. Mr. Deegans and his associates still maintain their interests in the Margaret Coal Co. and the Frances Coal Co. now engaged in developing smokeless coal properties in the Greenbrier field on an extensive scale.

WASHINGTON, D. C.

Bids are being opened today (Jan. 31) by the U. S. Navy Department for transporting the following tonnages of Navy coal from Hampton Roads in vessels of American registry: On Feb. 12, 3,500 to 5,000 tons to the Portsmouth (N. H.) Navy yard; Feb. 25, 3,500 to 5,000 tons to the Boston Navy yard, and on Feb. 18, 3,500 to 10,000 tons to the Melville (R. I.) Naval fuel depot.

Bids will be opened by the U. S. Navy Department on Feb. 6 for furnishing and delivering at Sewalls Point 40,000 gross tons of bituminous coal from mines on the Navy acceptable list. Total delivery is to be completed by April 1.

CANADA

Premier Ferguson has returned to Toronto after a conference in Ottawa with Sir Henry Thornton and other C. N. R. officials, who assured him that they would reopen the question of freight rates on Alberta coal to Ontario points. The plan suggested involves a rail and water haul, instead of an all-rail haul, from Alberta. It is believed that the government is considering the advisability of transporting coal by ship from the head of the lakes to Toronto and distributing it from there to the various centres of southern Ontario. Shipments for more northern points could be landed at Parry Sound, Midland and other points on Georgian Bay.

The year 1923 was one exceptionally free of fatal accidents in the coal mines of British Columbia. Had it not been for the disaster of last February in the Cumberland Mines of the Canadian Collieries (D), Ltd., Vancouver Island, the record would have been so low as to stamp the year as one of the most gratifying in the history of coal mining in the province. As it is, in many respects the year stands alone. The Crow's Nest Pass field was free of fatal accidents, which, according to the records had never before been achieved. Neither were there any fatalities in the Nicola-Princeton field. Vancouver Island was not so fortunate, but some of the collieries in this field have a clean record in this regard. The Extension Collieries of the Canadian Collieries (D), Ltd.; the Nanoose Collieries and the East Wellington Colliery Co. are those ranking in this class. William Sloan, Minister of Mines, forwarded congratulatory messages to the collieries which have been without fatal accidents at the close of the old year.

New Equipment

Lightweight Welder for 500-600 Volts

This lightweight resistance arc welder for 500-600 volt direct-current service is virtually an enlarged model of the Ohio Brass Co. 250-volt machine, with slight modifications necessary for the higher voltage.

It is made portable, having four carrying handles that fold down out of the way when not in use. The machine without accessories weighs only 170 lb. It can easily be conveyed to a bond welding job and then transported as the work progresses. It also can be used for various other jobs around the repair shop and mines.

Plug connections are used on the ebony asbestos panel board for both the trolley cable and welding connections. A magnetically operated switch, enclosed inside the frame, is connected to make contact when the electrode touches the work. It opens as the arc is broken. A pushbutton snap switch adjacent to the electrode handle is provided for completely de-energizing the magnetic switch-closing coil, thus making the electrode absolutely dead.

With the snap switch open safe replacements of electrodes may be made and the electrode may be handled without danger of accidental ground. The magnetic switch is connected into the line on the trolley side, so that when it is open all parts of the machine are dead except for the one connection from the trolley plug socket to the top of the switch. With this assembly it is never necessary for the operator to operate any knife switches on the 500-volt cir-

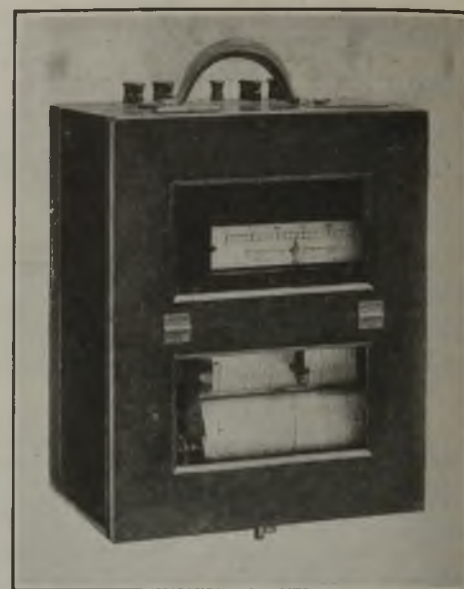
cuit except when they are completely de-energized.

The frame is of a substantial welded construction and affords ample ventilation for the resistance elements. The resistance consists of nickel-chromium wire rigidly supported in special refractory cement, and will not sag. These resistance elements are joined in such a manner that with the three selective single-pole knife switches and two welding cable connections, 14 values of welding current are available—from 30 to 210 amperes. The resistance units are insulated from the frame with mica tubes and washers.

Actually this welder will operate efficiently on voltages as low as 400 and one of the welding plug connections provides for cases where the voltage is comparatively low. Regular welding accessories are provided with the welder, such as welding cable and electrode, operator's helmet, wire brush and trolley contact and cable. A slow burning fuse is furnished in the trolley contactor, the time element being such that the current will be entirely cut off before damage is done to the machine.

Portable Recording Instrument of Great Accuracy

Among the recent developments by the Westinghouse Electric & Mfg. Co. is a new portable recording instrument known as Type R. It is made for applications where records as accurate and reliable as those obtained with large switchboard instruments are necessary. Such applications include analysis of



Portable Recording Wattmeter

This meter is one of a new type designed to give greater accuracy in testing, including as a new feature an electric self-winding clock mechanism.

motor operation, typical consumption curves of large industrial consumers, and records of power distribution.

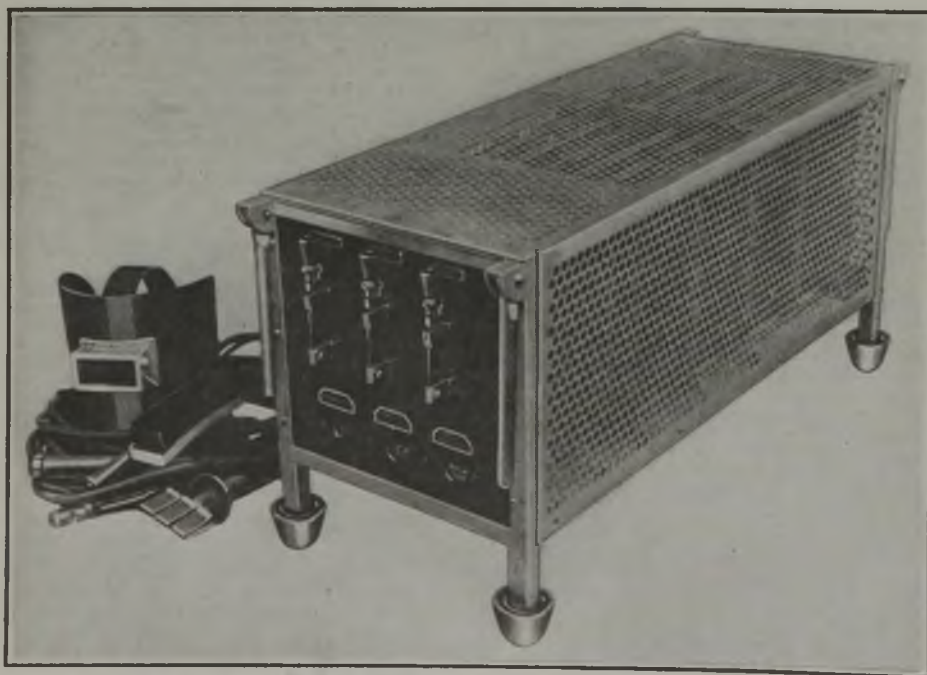
The Type R instrument is an adaptation of the switchboard recording instrument, with the element as a whole mounted in a portable carrying case. An electric self-winding clock is used for speeds up to 24 in. per hour. For slower speeds, up to 4 in. per hour, a hand-wound clock can be used.

Alternating-current ammeters, alternating- and direct-current voltmeters, and single and polyphase wattmeters are made in these portable recording instruments.

To Prevent Slippery Floors

To prevent slipping and at the same time add durability to floor surfaces, the Abrasive Co., of Bridesburg, Philadelphia, Pa., has developed Sans-Slip, an abrasive in loose granular form especially adapted for combination with cement. This is an aluminous oxide material quite similar in character to that used in the manufacture of grinding wheels. The angular formation of the grain presents sharp fractures which readily bond with plastic cement and consequently prevent slipping. The material, it is asserted, ranks between the diamond and sapphire in the scale of hardness, which gives some idea why cement laid with it resists wear to a considerable degree and largely prevents "dusting" of the surface.

The application of Sans-Slip in cement work entails no extra labor to speak of. Before the final set of the top surface of the cement, it should be sprinkled over the surface and lightly troweled in. For ordinary non-slip and durability purposes from $\frac{3}{4}$ to 1 lb. per square foot of surface is sufficient. One pound equals about 14.5 cu.in. Its specific gravity is about 3.8. It has pronounced surface capillarity qualities but is non-absorbent; causes no discoloration after it is applied, and can hardly be detected with the eye



Welding Outfit for Mine Repair Work

An important safety feature—always essential on high-voltage welders—is a magnetic switch to cut off the current when renewing electrode or changing the welding current.