COAL AGE

McGRAW-HILL COMPANY, INC.
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Doctoring a Sick Industry

FROM a retailer comes a suggestion for satisfying the complaints of the public about the anthracite industry. He may not understand his subject completely. In fact he shows that in some ways he does not by saying in his opening paragraphs "What's wrong? Too many mines. Too many miners. Too much seasonal variation in consumption. Too much railway politics."

Every one knows that there are not any too many mines or too many miners in the anthracite industry. No recognized authority has ever said so. That is true no matter what may be said and rightly about the bituminous-coal situation. As for seasonal variation, every one knows that has not been true for years, though it may come about if peace reigns in the anthracite mines for a few seasons. As for railroad politics, that has not restricted coal production in the anthracite region for years; in fact every one knows the relation between railroads and mines, now nearing an end, has fostered the delivery of coal as fast as it can be mined.

* * *

But sometimes this retailer does not get "beyond his last." As representing the Hackensack Coal & Lumber Co., H. B. Blauvelt doubtless knows the retail trade. He is to be believed when he says in *Printers' Ink:*

> Much of the present public discontent arises from poor coal—abominable, unburnable stuff which in times of stress is shipped at outrageous prices by 'snowbird' producers. These are disreputable, illegitimate companies or individuals who ship anything they can scrape together regardless of its grade, and it is this class of 'independents' more than any other who have given the coal industry its blackest eye.

Believe this expert; he knows. "Its blackest eye," mark that! We agree with him.

He suggests that the bulk of the anthracite companies should assess themselves two cents per ton and form an association "for administration, research and advertising purposes" and let the public know that they are selling good coal with a certain maximum impurity. Then he tells the anthracite industry that the fruit growers have similarly combined and have been successful. The public now insists on receiving the trade-marked product of the fruit growers' associations.

* * *

But the fruit growers are of the farmer class and what they can do would raise a revolution if done with coal. A bill is even now proposed to guarantee the farmer $1.59 a bushel for his wheat and to seize the elevators and mills that will not pay it. That farmers, so far as legislation is concerned, can "get away with murder" is generally conceded.

Coal companies cannot attempt even the most harmless of combinations. Note the relation with the railroads which was fostered by legislation in earlier years and was popular with legislators and which is now a crime not to be contemplated. But suppose it could be done, there is still the retailer. If coal were sacked and sold in sacks, as fruit is boxed and sold in boxes, the trick might be turned, but coal is shipped in bulk and mixed by the retailer with the "abominable, unburnable stuff" which Mr. Blauvelt excoriates.

The retailer, in short, is the more general offender, for he, it is, who makes the clean product dirty. He even, in some cases, seeks out, aids and abets the "snowbird" operator for his own advantage. It is bold indeed for a retailer to put the blame on the producing end of the industry. True, Mr. Blauvelt may be, and probably is, ethical; some retailers are, but they are not justified in selling "abominable, unburnable stuff" to the consumer.

* * *

Still the problem remains. Rejecting Mr. Blauvelt's plan solves nothing. Let us look at other plans. The public probably would not approve of the companies retailing their own coal. It is easy to realize that the retailers would not like it and they would work effectually on the feelings of the consumer unless they were bought out and well recompensed. And the public would view retailing of coal by anthracite companies as they view transporting of coal by them.

No! if the hard-coal producers are to clear their skirts of selling this "abominable, unburnable stuff," they must have some consumer inspection of coal and then they must have some authority see that coal thus inspected is sold without subsequent mixing with uninspected coal. That is work for independent inspectors, for the public must have full faith in them.

* * *

As for his advocacy of advertising, we would say, "Nothing but true statements in advertising can make it pay." See that good coal gets to the consumer and then advertise the fact. Let the operator be able to say in his advertisement that his coal is inspected, at least in sample, by disinterested parties or by men interested only in protecting the public, that only inspected coal is used in making the retailer's mixture, or that each coal is marketed separately. Then the advertising will do a 100-per cent job, but not till then.

We believe firmly that an advertising job remains to be done, but the product must first be right, and the retailer is perhaps more to be censured than any one for the present "black eye" which is worn conspicuously by all branches of the industry. A campaign just now might be successful, because the coal coming to the market is at its best, but if a strike occurred and a shortage resulted, conditions of earlier years, if not met by inspection, would destroy the effect of the advertising and leave only a sore, disgruntled public.

Black Sheep in Good Families

NOT all the mines of any big company are destined to survive this period of low prices and restricted demand. Some will be closed so that the others can be run steadily. Which should shut down is often quite a puzzle. The high-cost mine may be among those kept running if the coal that it produces is expensive only because of certain inherent difficulties which still will have to be met if the mine is closed down. In most regions if a shaft mine is not pumped it will flood, and sometime or other it will have to be pumped dry. On the other hand, a drift mine in general will drain itself, and it will not be necessary to remove the rail or wire because it will not be submerged.

Still, by and large, the high-cost mines of any large corporation should be closed down, and money should be spent to reduce the cost of the rest. As such mines will run steadily, it will be possible to install the best and most efficient machines. What would be too costly to provide for all the mines can be purchased without excessive strain for the few.

An attempt will be made to get from a few mechanically excellent mines the whole tonnage desired. The best talent in the employ of the company will be gathered at these operations, and we shall see some unusual developments. If under the present stress too many irons are kept in the fire, they all unquestionably will be burned. Every company has its black sheep mines. Now is the time to start weeding them out for the benefit of those that are white.

From the Particular to the General

NO SWALLOW makes a summer but the presence of one such bird sometimes convinces the public that summer is at hand. One dishonest man in a cabinet does not prove that cabinet officers are crooks, but if one be found the public will be sure that there are many more, and good men will suffer with the rest. A charge against one is a charge against all. Because one man has been accused we may be years before we again believe in the integrity of the executive heads of the Government. The probity of no man defends him against suspicion if others with whom he is associated seem guilty of wrongdoing.

Many of us can remember when the Senate was regarded almost with veneration. Today that regard has gone. A few black sheep destroyed it.

A few scandals ruined the railroad business. It is slowly coming back to public esteem. Condescendingly and apologetically some of the large consumers of transportation are supporting the position of the railroad industry, but everything they say has the weakness of defense. No longer is the approval carried by acclamation. Yet in the nineties we boasted of our railroads and they were not as excellent or as mindful of public interest as today.

But that is not strange for the public makes almost everything unanimous. When anything is regarded as praiseworthy it is dangerous to attack it. When the majority swings the other way it no longer can be defended. The public never paints its pictures in subdued colors. Consequently care must be taken lest a few flagrant examples upset public confidence.

The coal industry, like other industries, has had its crooks, men who used it for a while to make money and left it when it ceased to promise excessive profits and when the market once more became discriminating. A handful of wilful men spoiled our foreign coal trade and now foreigners are not anxious to take the risk of buying American coal. We cannot afford to leave such matters to chance. Good business principles demand that something be done to prevent the sale of coal that has been adulterated with slate or has been sold from a dirt pile without first being washed.

Now, in this time of a decline in public interest in coal, can be found a chance to clean house. It might be presumptuous to insist that any particular make of broom should be used for that purpose. It might be the U. S. Bureau of Mines but perhaps the U. S. Chamber of Commerce or the American Engineering Council would be better, but whatever it is, a broom is needed to sweep the industry clean at all times, especially in times of stress, of those concerns who load down the railroads with rubbish and give the consumer coal he cannot burn or can burn only with difficulty.

We Have Some Heroes

AND so far, after all, the world's heavyweight knockdown, drag-out champion is not going into coal operating. Mr. Dempsey has decided not to invest his money in the Great Western Coal Mines Co., will not help develop several thousand acres of Carbon County, Utah, coal and have a new mining town named after him n'everything. How disappointing! Here we were, all set comfortably in ringside seats waiting for the gong. We wanted to see if the human pile driver could "take it." Nobody knows yet. Mr. Dempsey never met anything or anybody who could administer "it."

When the go with Battle Ax Coal was scheduled and duly advertised by Manager Jack Kearns with a carefree announcement that "me and the champ" had decided to invest in Utah coal and become great operators, there was some assurance that Mr. Dempsey really was a fighter. He wasn't afraid of old Battle Ax, the greatest meat chopper of them all. He really was willing to go in there and show the world that he could "take it." We crunched our peanuts and whistled and stamped our feet and bought another bottle expectantly. But now the Roman holiday is off. And we still don't know whether Dempsey can "take it."

But we know a lot of coal operators who can. Old Battle Ax Coal has mauled hundreds to a pulp and has draped thousands over the ropes, broken in spirit and bank account. But in every coal-mining field in this country are men who can "take it." Old Battle Ax hasn't maneuvered *them* into operating properties that have no economic excuse for existence. Their footwork is too good for that. His clever feints haven't tricked *them* into operating and marketing practices that look good for today but which take no heed for the future. His horrible grimaces haven't frightened *them* into spinelessness in their dealings with labor.

Although old Battle Ax has landed many a vicious jab to the wind, these men are always in mental and physical fighting trim and they saved their money when they made it. They are the men who know how in a bad round, to trim their mine costs with good management and machinery and "cover up" during a period like the summer of 1924, when the Battle Ax will do his worst—hitting only their elbows and shoulders. They can "take it." And the time will come when they will make old Battle Ax "take it" too.

Men Who Recovered Alden Mine

Fire, Largely Isolated by a Fault, Is Successfully Sealed by Men in Oxygen Breathing Apparatus

Sickness of Workmen and Near Fatalities Lead Company to Suspect Fire in Abandoned Workings—Tests Showed Increasing Percentage of Carbon Monoxide—Difficulties Encountered in Sealing Off the Fire

MOST dreaded of all mine disasters is a fire, particularly in the underground workings. No two mine fires are alike either in their development or in the extent of area covered. Fire can be fought more readily in the live workings of a mine than in an abandoned section, because in the former case the firefighters are better acquainted with the controlling conditions than they are likely to be in the latter. Fortunately, circumstances frequently favor the isolation of a fire and prevent its spreading to other sections of the mine. Physical conditions in anthracite mines often make it necessary to lay out a mine in separate and isolated sections or districts, and in this case a defense is prepared almost without intention against the spread of a mine fire. Nevertheless in the planning of a mine, due thought must be given to the possible occurrence of fire in the workings, particularly if the coal is relatively free-burning and friable or gas is present.

Bad Air Noted Without Anticipation of Fire

A well-designed mine plan will take into consideration the ready isolation of each section of the workings, will guard against possible danger and prevent the destruction of the entire mine if an accident occurs in any one section. The failure to do this has often proved a great handicap in the handling of a fire in the workings, and necessitated the flooding of the entire mine where this might have been avoided with proper care in the planning of the mine.

During the latter part of December, 1922, some men engaged in putting in an engine foundation in a certain section of the Alden Coal Company's mine, at Alden, Pa., came out several times complaining that the air made them sick. This happened at infrequent intervals every three or four days. The occurrence, however, caused little suspicion of fire in the mine and no one suspected any such misfortune until mine inspector Joseph J. Walsh detected traces of carbon monoxide in samples of the air he had taken.

About the same time two men at work in that section repairing stoppings, building mine doors and timbering, were overcome and nearly lost their lives. Knowing the air was bad, the inside foreman had cautioned the men to be careful. His anxiety for their welfare led him frequently to the place, and this proved the means of saving their lives. On such a visit the foreman found one of the men lying at the side of the road in a seeming stupor. The gas had rendered him delirious, and when the foreman roused him with, "Get up and get out of here," the fellow replied, "Take those rails off my legs so that I can get up."

The other man was found with his hammer raised in the air, in readiness to nail up a board. So strong

and firm was the man's grip on the hammer that it could not be removed from his hand till he had been taken to the outside of the mine and sent to his home. Both the men owe their lives to the watchfulness of the foreman, and the incident shows the speedy and fatal effects of carbon-monoxide gas when men are exposed to air containing only traces of it.

Inspector Walsh sent the air samples that he had taken in the mine to the U. S. Bureau of Mines where his results were corroborated. The question now was, whence did the gas come? The gangway in which the men were laying an engine foundation was a return airway from a slope that had been idle for nearly two years, for owing to a heavy squeeze, the workings from it had been made inaccessible.

A gasoline motor was operating in a tunnel from which this gangway had been driven. Naturally, the first thought was that the carbon monoxide in the air was generated by the exhaust from this locomotive. The result was that the machine was promptly taken out and replaced by a storage-battery locomotive. Work was discontinued in the gangway, the men withdrawn, and the place temporarily barricaded. The circulation of air in that section was increased "to sweeten up the workings," as Jack Morris, the foreman, expressed it.

The place was then left standing for about ten days when several more air samples were taken for analysis. These and others taken several days later showed that the percentage of carbon monoxide was increasing rather than decreasing as had been expected. It was then definitely decided that coal was on fire somewhere within that section of the mine and the problem was to locate and extinguish it with as little delay as possible.

This conclusion was made certain by the fact that tests taken in the several intakes gave no indication of the presence of gas either by the use of the carbon-monoxide detector or by the analyses made of the air samples taken at those points. On the other hand, both the carbon-monoxide detector and the analyses of air samples taken in all the returns from that section showed the presence of the gas. Furthermore, the tests also showed a low oxygen content in the return air. Indeed, at times, it was impossible to work in that airway without the use of breathing apparatus, and the Koehler lamps refused to burn.

Did Not Attempt to Use Faulty Apparatus

The rescue apparatus at the colliery consisted of five sets of breathing apparatus, one high-pressure oxygen pump, a number of oxygen cylinders and nearly 100 lb. of caustic soda. This equipment was supplemented by fourteen sets of more modern breathing apparatus, eight sets of which were purchased by the company, as the apparatus on hand was old and unreliable.

For the work in hand, twelve trusty and experienced mine workers were chosen and given training for three or four days in the use of the breathing apparatus. This was done under the direction of Jesse Hensen, whose services were kindly placed at the disposal of the company by the Bureau of Mines. The twelve men were divided into two working crews, one being placed in charge of Mr. Hensen and the other in that of James Jeffries, the company's fireboss.

In Fig. 1 is shown the larger portion of the mine operated by the Alden Coal Co., which adjoins on the west the property of the Susquehenna Collieries Co. The map shows the location of No. 2 shaft of the Alden

Fig. 1—Fire Area at Alden Coal Co.'s Mine, Alden Station, Pa., Was Confined to Slope in Cooper Bed

Recovery was made by first sealing up the intakes at points marked *S* and *T* followed by the placing of seals on the return at *A*, *B*, *C* and *D*. Water was directed into the sealed area and thus the temperature was lowered, though when the seals were being placed the return was at a temperature of 156 deg. F.

The roadway from No. 2 shaft to shaft No. 1 is not straight but takes a right-angled turn near No. 1 shaft just as it does near No. 2. In consequence No. 2 shaft is almost exactly north of No. 1. This fact will aid in allocating the cross-section shown in Fig. 2.

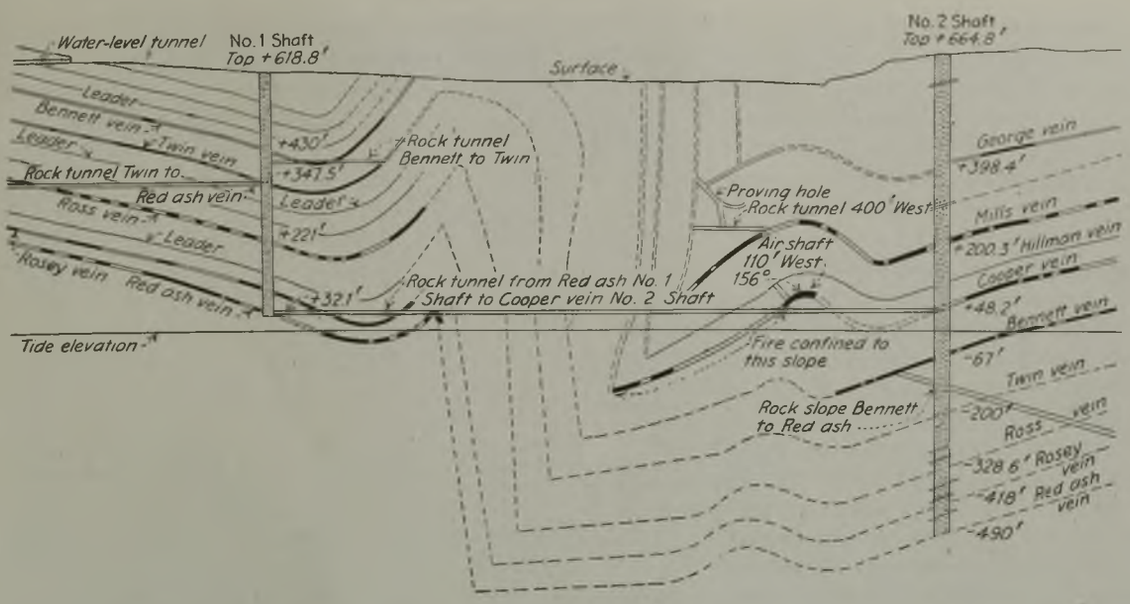


FIG. 2

Cross-Section

This shows how a heavy roll makes the bed almost vertical adjacent to the fire area. In fact the bed has been overthrown or lifted through an angle of over 90 deg. This fault, or should it not rather be termed "fold," aided in preventing the fire from spreading toward the South. Note the rock tunnel from the Red Ash bed at No. 1 shaft to the Cooper bed at No. 2 shaft. The tunnel is that shown in Fig. 1 as the tunnel to No. 1 shaft.

Coal Co., and the position of the tunnel projected from the old No. 1 shaft on the south. It also shows approximately the section of old workings in which the fire was assumed to be located.

Start Sealing Fire in Intake Openings

The intake current circulating through these old workings is indicated by the arrows shown in the gangway driven to the west of this tunnel. Following the intake air, the workers first started the building of a number of substantial stoppings to close the intake end of the section containing the fire. On the map these stoppings are indicated by *S*. All the stoppings were thus closed but one, which contained a trapdoor marked *T*, by which the quantity of air entering the section could be controlled, thus avoiding the formation of an explosive atmosphere within the inclosed area.

At the extreme west end of the fire section, it will be observed that a large door was erected in a tunnel which cut through an anticlinal in the Cooper seam. The purpose of this door was for the further regulation of the air entering that section. Much time had been consumed in investigation and preparation for the work, and the building of the intake stoppings was only started April 20, 1923. It was slow and tedious work. Boards, bags of sand, cement, ashes and water had to be carried from the base of supplies, marked *X* on the map, a distance averaging more than half a mile, much of the way being through old workings that were well nigh impassable.

The physical features in the Cooper seam were such that this section of the mine was cut off on all sides by two faults that isolated the section from other workings, a condition that greatly assisted the work of isolating the fire. Moreover, a large barrier pillar of virgin coal had been left for the protection of the two properties adjoining.

Although the work of building the intake seals was arduous, it was not performed under as trying conditions as that of building the seals on the return end of the section. As indicated on the map, there were but four of these openings to be closed. These are marked *A*, *B*, *C* and *D*. The approach to the last two openings on the east side of the tunnel is indicated by a line of crosses. The advance was made in face of difficulties more trying than any yet encountered. It called for the exercise of the highest degree of courage and devotion to duty, but the men were not found wanting.

At times the temperature in the return reached 156 deg. F. Tests of the mine air showed 8 per cent of methane and an oxygen content of 3.7 per cent. Under these conditions, it was necessary to carry compressed air along the passageways to cool and dilute the atmosphere and make it possible for the men to work. The way led up an old chamber, over an anticlinal and down another chamber dipping 45 deg. to a gangway in old workings made twenty-six years previous. The fireclay roof and the rotten timbers were enough to tax the endurance of the bravest workers, but no one asked to be relieved, though many were gaunt and thin by reason of their experience.

The last opening, at *D*, was reached Sept. 8 and the

Fig. 3—Some of the Fire Fighters

Heavy grades, bad conditions such as are found in abandoned places, absence of track and finally bad air and intense heat made the work of recovery almost insuperably difficult, but the men knew neither fear nor weariness and the work was successfully performed.

sealing completed six days later. The loyalty of the men reflected the confidence they had in their foreman, Jack Morris, who was always ready with a word of encouragement and appreciation throughout the nine months required to complete the work.

The tables herewith show the analyses of air samples taken in the current returning from openings *C* and *D*. The samples taken previous to Sept. 11, from the opening marked *D* were from a broadcast return. This was owing to the difficulty of near approach to that opening, as will be understood from the account given of the work of sealing that opening, which was started Sept. 8, but practically finished Sept. 11, the work being finally

Table I—Air Analyses in Return "C," Fire in Cooper Seam

1923	Jan. 3	Feb. 3	Feb. 5	Feb. 9	Feb. 27	Mar. 27	Apr. 3	Apr. 6[1]	Apr. 6	Apr. 9	Apr. 16	Apr. 19	Apr. 23	Apr. 27	May 12	May 7	May 14[2]	May 18	May 22	May 29	June 5	June 18	June 21	June 25	July 11	July 16	July 30	Aug. 27	Sept 11
Carbon Dioxide, CO_2	0.41	0.7	0.3	0.2	0.7	2.8	2.7	3.2	6.0	4.7	5.2	5.5	6.0	4.0	6.1	6.3	7.5	10.0	8.8	9.6	8.6	7.0	6.5	6.5	4.5	4.3	3.7	2.0	3.0
Oxygen O_2	20.6	19.7	19.0	20.0	19.8	15.9	17.5	15.8	13.5	15.0	15.0	13.9	13.9	15.0	12.2	12.4	9.5	5.5	8.6	8.4	9.8	11.5	12.4	12.3	14.2	14.9	15.8	17.8	16.5
Carbon Monoxide CO	0.11	0.00	0.1	0.00	0.00	0.4	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.5	2.2	1.6	1.0	0.4	0.4	0.3	0.3	0.00	0.00	0.00	0.0	0.1
Methane, CH_4	0.00	0.00	0.00	0.2	0.6	0.8	1.2	0.8	2.0	1.8	1.0	1.6	1.4	1.4	1.0	2.0	1.2	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	1.0	0.4	0.4
Barometer	29.2	28.8	29.6	29.1	29.1	29.2	29.1	28.9	28.9	29.0	29.1	29.1	28.8	29.1	29.1	29.0	29.4	29.3	29.4	29.2	29.1	29.1	29.2	29.0	29.1	29.1	29.3	29.4	29.3
Temperature, Outside top of Shaft	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	60	79	82	91	91	92	91	80	89	90	
Temperature, Inside at return	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	75	87	92	110	130	130	120	120	114	109	102

[1] These samples, April 6, taken at the same time and place, the first wet, the second dry. [2] Analysis showed trace of hydrogen.

completed Sept. 14. It will be observed that a few of the air samples showed traces of hydrogen. Also, the samples taken at *D*, Oct. 2 and 12 each showed a larger percentage of oxygen, owing to the stopping *B* having cracked, which defect was remedied later by sealing the crack.

Reference to the geological profile (Fig. 2) showing the general contour of the several coal seams with relation to No. 1 and No. 2 shafts and the position of some of the rock tunnels driven to tap and connect the workings in different seams, will give some idea of the difficulties encountered in the foregoing undertaking. The dotted portion of the Cooper vein where it passed through the syncline or basin is an indication of the work required to clear a passageway to the last return opening, which was on the anticline. As indicated in the figure, the fire was confined to the slope below this point.

The profile also shows the nature of the fault beyond, where the formations were in such a position that they appeared to overlap one another. It will be observed this condition is marked on the map where the live workings approach the section where the fire was assumed to exist.

In closing, it should be stated that emergency seals were built as a safeguard against the possibility that an explosion might blow out the main concrete seal in any opening. On one occasion, the concrete seal (*B*) was found to be cracked but this was thought to be caused by a settlement consequent on the burning of timber supports and old stumps of coal within the area. The crack did not appear to have been caused by an explosion in the district sealed. By careful regulation of the air entering the affected portion, together with tests made of the samples of the return air, it was possible to avoid a mixture of gases such as would otherwise have caused an explosion.

In the efforts to extinguish the fire, two 4-in. streams of water were run into the workings while were run into the workings ress. This was continued until the water rose to a point where it overflowed the anticline when

Table II—Air Analyses in Return "D," Fire in Cooper Seam

1923	Apr. 23	Apr. 27	June 25	Aug. 31[1]	Sept. 11[1]	Oct. 2[1]	Oct. 12	Oct. 30[1]	Dec. 31
Carbon Dioxide CO_2	1.5	4.0	6.5	9.3	10.5	3.7	2.7	9.7	8.2
Oxygen O_2	18.5	15.0	11.8	3.7	2.0	14.3[2]	15.3[2]	1.8	2.0
Carbon Monoxide CO	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Methane CH_4	0.4	1.4	8.0	5.0	8.0	8.0	7.6	2.8	3.0
Barometer	....	....	29.0	....	29.3	29.3	29.4	....	....
Temperature (Fahr.) Outside	....	....	92	....	....	80	....	....	42
Temperature (Fahr.) in intake slope	....	....	....	....	....	66	....	77	73
Temperature (Fahr.) of water in slope	....	....	....	....	....	83	....	83	83
Water gage	....	....	....	....	0.2	....	....	....	....
Temperature (Fahr.) in return	....	....	130	....	145	130	120	105	100

[1] Analysis showed trace of hydrogen. [2] Large percentage of oxygen due to Seal *B* having Cracked.

Note—Air samples in *D*, taken previous to September 11, were from a broad cast retur n.

pumping was discontinued. The progress of the flooding of the affected section is shown at two points on the map (Fig. 1), April 28 and June 11, respectively. It was at the latter date that it became necessary to stop the pumping to avoid the water finding its way into other portions of the mine.

Recent tests show that the fire has been completely extinguished. The temperature readings have fallen to normal and the return current contains no appreciable quantity of carbon monoxide. It is interesting to note that no accidents or loss of life occurred during the entire progress of the work. The mine continued in operation and the average daily tonnage was maintained throughout. The work took nearly nine months to complete. Nearly 2½ tons of Cardoxide and one hundred cylinders of oxygen were consumed in the course of the sealing.

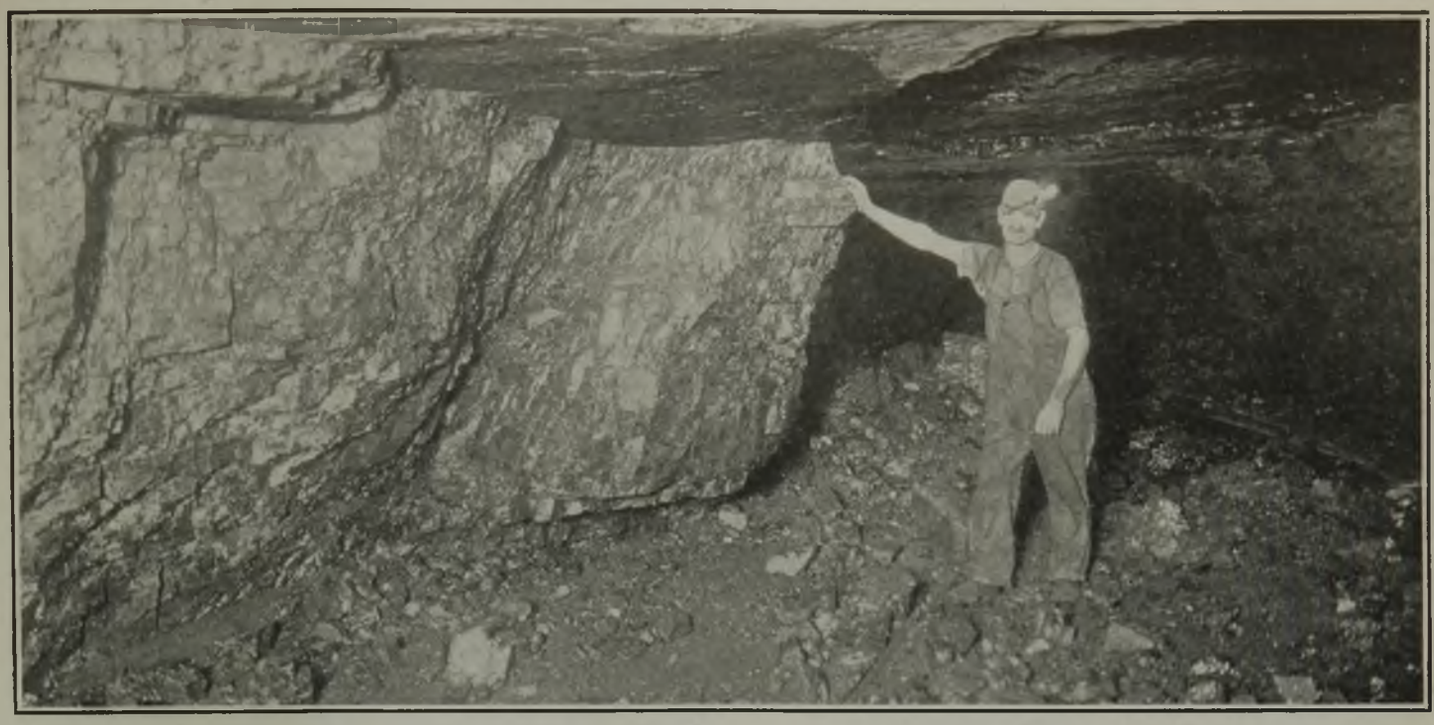
Permissible Explosives Reduce Costs

In the *Employees' Magazine* of the Union Pacific Coal Co. the results of several tests are given which, as far as the tests go, show that in wide work permissible powder is less expensive than black powder and that in narrow work the greater costs may be in either.

TESTS OF PERMISSIBLES AND BLACK POWDERS
UNION PACIFIC COAL CO.

	Wide Places — Cost with —		Narrow Places — Cost with —	
	Permissibles, Cents per Ton	Black Powder, Cents per Ton	Permissibles, Cents per Ton	Black Powder, Cents per Ton
Rock Springs	1.1	1.8	4.6	3.5
Reliance	1.6	2.3	3.3	2.9
Winton	1.6	2.3	2.7	4.0
Superior	2.2	2.3	3.9	3.6

DOUBLE TIME FOR PONIES.—Reports for some 46,000 horses used in Great Britain show that approximately 43 per cent were employed for six shifts a week, 26 per cent for more than six and less than nine, 20 per cent for nine, 6 per cent for more than nine but less than 11 and 5 per cent for 11 or more. The British Secetary of Mines said that except in a few isolated cases the condition of the horses in the mines was satisfactory. Much complaint has been made of the treatment of pit ponies in British mines, and efforts are being made by the Government to ascertain what types of storage-battery locomotives will best replace them.



Where the Miner Waits for Cars—and More Often Doesn't Wait

How Miner and Manager, Each with His Immediate Ends in View, Hamper Coal Production

Loaders Without Cars and Managers With Their Men Hurrying Home Early Make a Mine a Place of Deplorable Inefficiency—Miner's Other Duties Lighten the Monotony of Shoveling

AS A RULE the miner does not confine his efforts exclusively to shoveling coal. While he should be an adept in the use of the shovel, necessity demands that between filling successive cars, he vary his labor. Thus he drills holes, charges them with explosive, picks down coal, sets props and gobs refuse. This variation in employment materially relieves his muscles and gives him a diversity of occupation to vary the monotony of shoveling.

The miner and the management in most mines—and this applies to company or daymen as well as to those working on tonnage—co-operate less effectively than in most other industries. The miner fails to receive the necessary cars in which to load his coal. The men upon whose labor the miner depends fail to co-ordinate their work with his. Supplies are not furnished him as needed. No instructions are given him to assist him in performing his work, nor—and this is of even greater importance—is any analysis made of conditions and methods to find out how his work can be made as easy as possible. Left thus without support the miner is rendered irritable. Beyond question this lack of co-ordination is one of the major reasons why the miner is habitually dissatisfied with his life. As has been shown in previous issues of this report a miner may readily lose from one-fifth to one-third of his daily earnings through failure of the management to supply a needed mine car. Even supposing that this failure occurs only occasionally, the depressing effect upon the man is inevitable. When he sustains financial loss also because of inferior supervision, the aggravation arising therefrom is equally great.

The actual time spent by miners within the workings and also the hours of quitting work are shown for two different days in two mines in Figs. 1 and 2. These are presented merely as illustrations and are not intended to represent average conditions. Similar records made in other mines where, as will be noted, relatively full time is shown, are fairly representative of operations that are working only a few days a week, and where consequently miners are anxious to earn all they can each day.

Fig. 2 is more nearly representative of either full-time production or particularly good physical conditions where tonnage rates permit large earnings. This chart is the result of observations taken where a thick bed of coal with good roof and opportunity to make good pay prevailed. In this mine, for example, the miners were loading, on the average, at the rate of about 15 tons per day with a union rate of 84c. per ton. They are accustomed to earning therefore, on days when they work, about $12.60.

In Fig. 2, the time of the loaders and machine cutters leaving the mine is given separately. It will be noted that not only about half the miners left the mine before the end of the 8-hr. day, but that the cutters remained in the workings a much shorter period. This indicates an extremely uneven apportionment of work between the two groups of men. It is interesting and valuable in this connection, to state what reasons were given

Seventh installment of report on "Underground Management in Bituminous Mines" made by Sanford E. Thompson and associates to the U. S. Coal Commission. Previous installments may be found in Vol. 24, pp. 691, 733, 773, 811 and 845 and Vol. 25, p. 137. Other sections of this interesting report will appear later.

by the miners for leaving their places early. Though it was, of course, impossible to verify the truth of the miners' statements, the fact that 29 cutters left the mine before the end of the day because there was no cutting to be done and 80 miners left during the same period because their places were not cut is a specific example of the failure of the management to correlate the work of these men. In many instances, this lack of co-ordination is greatly augmented by local rules or customs limiting the number of working places assignable to each machine.

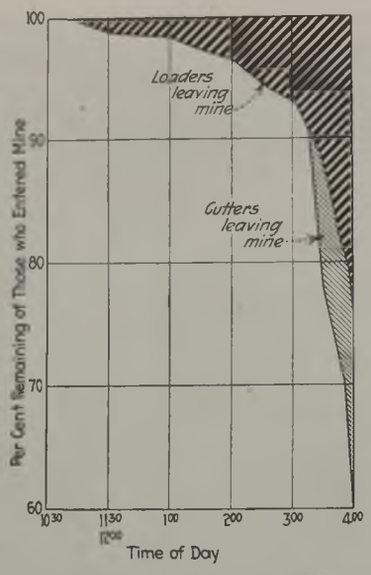


Fig. 1—How They Run Home

Percentage of loaders and cutters left in a mine at certain hours of the working day. Some loaders hastened back to lunch apparently and some of the cutters went home so early in the afternoon that they had to wait for their afternoon tea.

The record of more than 63 men leaving the mine because they had earned all they wished to earn that day represents a condition existing in various degrees in most of the mines visited. It arises in large measure from the fact that existing piece rates for coal mining have been based upon the consideration that the mines only operate part of the year and that when they do work conditions are not such that the miner can work steadily throughout the day. In periods of steady work at the mine the miner is not anxious to earn maximum pay. Consequently, if able to work continuously throughout the morning, the miner can earn a wage which will satisfy him in far less than the 8-hr. standard day, and he will leave the mine when this is accomplished.

Fig. 3 is from the records of a day's work in a mine where 39 miners were employed. This diagram shows the time at which each miner entered or left the operation. In the upper portion of the chart also will be found the length of time that each miner worked. This time, in general, is longer than is the case in most operations, this mine being on a profit-sharing basis.

Elimination of some of the high-cost mines, provision of a more regular car supply and storage of coal by the consumer might reduce intermittent shutdowns of the mine and level out the seasonal demand, to such a degree that the miner being able to earn enough in a few hours would so shorten his working day as to interfere seriously with the proper management of the mine. The operation of the mine cannot be planned so as to give the men an opportunity to work continuously while in the mine unless the miners show a spirit of co-operation. This, however, is a matter of education, not only of the miner, but of the management also, and not until both parties realize that their prosperity and success are interdependent, will it be fully accomplished.

Although lack of time prevented an analysis that would give data of statistical value, the detailed reports charted in Fig. 4 of a day's work performed by three loaders in three different mines located in different fields, is of interest from the standpoint of mine management. It shows the kinds of delays and changes in work that with many variations in detail and degree are common to all bituminous mines. This will be evident from a study of this chart.

Each division in the vertical columns represents not a sequence of operations, but the sum of all the periods throughout the day devoted to the same operation. Thus, for example, the lower section is an accumulation of all the time spent in shoveling, while those designated as "waiting" are the summation of all the short delays occurring throughout the entire day.

These data were made up from complete stop-watch observations taken in each working place. The two left-hand columns represent a complete cycle of work from clean-up to clean-up in each mine, in a place where two loaders were working together with two rooms available. The right-hand column represents pick mining; that is, none of the coal was cut by machine. The time lost during the day noted in the right-hand column, where the unnecessary time lost was more closely analyzed than in the other two, should be carefully inspected.

The time actually spent in loading appears relatively short, but this does not represent the total time necessary to the filling of cars, because some picking was done while the car was being loaded. Furthermore, the time lost while waiting for cars would not all have been devoted to loading, had cars been available.

Being based on observations of the work of three men, each for one day, these diagrams are not intended to illustrate average or even representative conditions, neither do they portray any particular part of the miner's work in its proper proportion to the others. These diagrams are given simply as illustrations of the nature of the work a loader has to do and the time spent on the individual operation in the three cases noted. The studies depicted were made with the co-operation of the miners themselves, who assisted the observer by furnishing information concerning the various operations.

In studying the variation in time spent by miners in loading their cars after they have been received, Fig. 1 in the article of Nov. 29, 1923, p. 811, is instructive. A miner will frequently stop loading and perform other work which more wisely might be done after he has

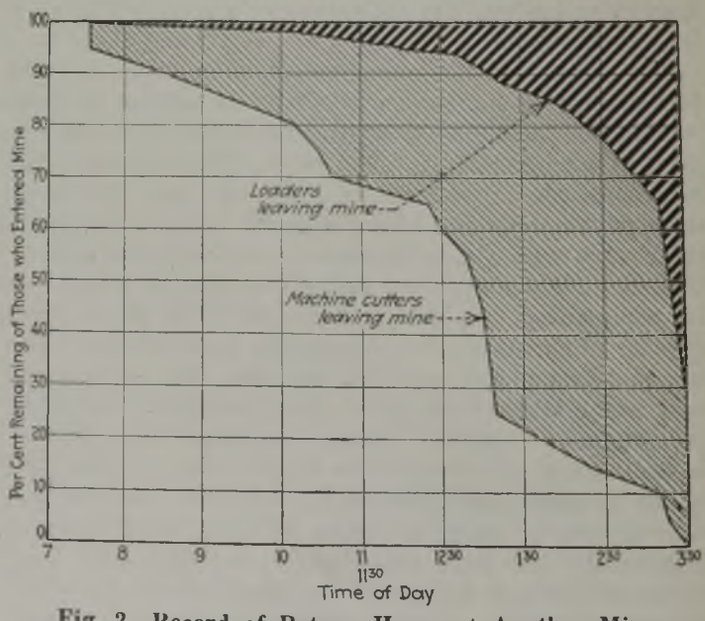


Fig. 2—Record of Return Home at Another Mine

Here some cutters and loaders left quite early. One cannot but surmise that the loaders found places uncut and the cutters' places not cleaned up. Twenty-nine cutters at this mine said they left it because no cutting remained to be done, and eighty loaders said they went home because no places had been cut for them.

finished his car. If a miner was accustomed to seeing cars delivered on a schedule he would begin to realize that he is a cog in a smoothly running machine and that failing to fulfill his part, will throw the whole mechanism out of adjustment.

Every hand operation performed in the industry can be executed in either a difficult or in a comparatively easy manner. Certain miners were observed who, under fairly difficult conditions, were handling their shovels with remarkable ease and deftness. One man, working in one of the seams visited, who, because of the thinness of the bed, could not stand erect and who had a comparatively small space above the side of the car, was shoveling with apparent ease and actually faster than any other man observed. This miner threw shovelful

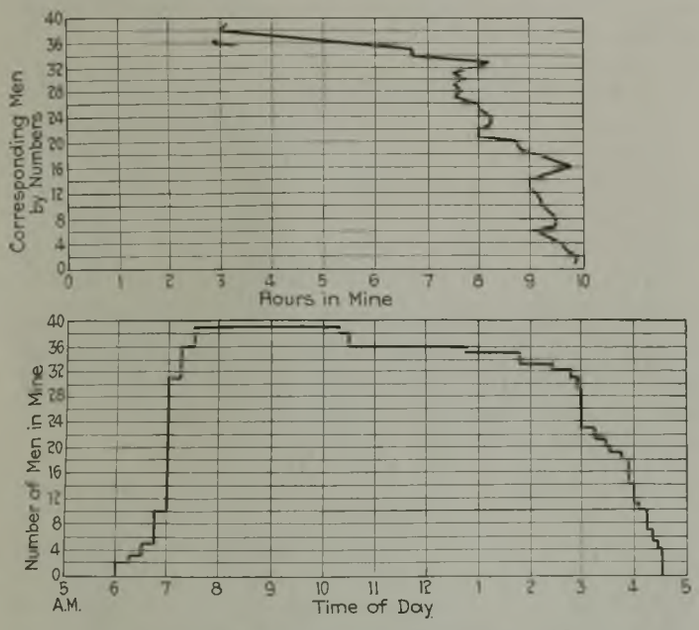


Fig. 3—Time in Mine of Thirty-nine Men

The upper chart shows the time in the mine and the lower chart the entering and leaving time of each individual.

after shovelful of coal against the roof from whence it caromed into the car.

One of the major functions of industrial management is now recognized to be the training of operatives to do their work in the best and easiest manner. It has been determined, for example, that if the shovel is handled in a certain manner the most favorable leverage and the easiest action will be attained.

In coal mining, therefore, there is opportunity for an analysis of the miner's work which will determine such details, among others as the best and most economical height and length of throw, the manner of handling the shovel, the procedure that should be followed in filling a car, the arrangement of the track and the proper location of the car in the working place. After standard practices have been established, the loader should be instructed in them and taught to do his work in the easiest manner. Similar analyses will be found of practical value for the operations of drilling, setting props and performing various other tasks of a more or less routine nature.

Operators may object that such studies will accrue solely to the benefit of the miner and that consequently they cannot afford the expense needed to establish the best method of working. This, however, is a narrow viewpoint, and experience has shown that it is not only good policy to aid a fellow man, but that such studies as have been outlined redound to greater harmony in the relations between employer and employee and result

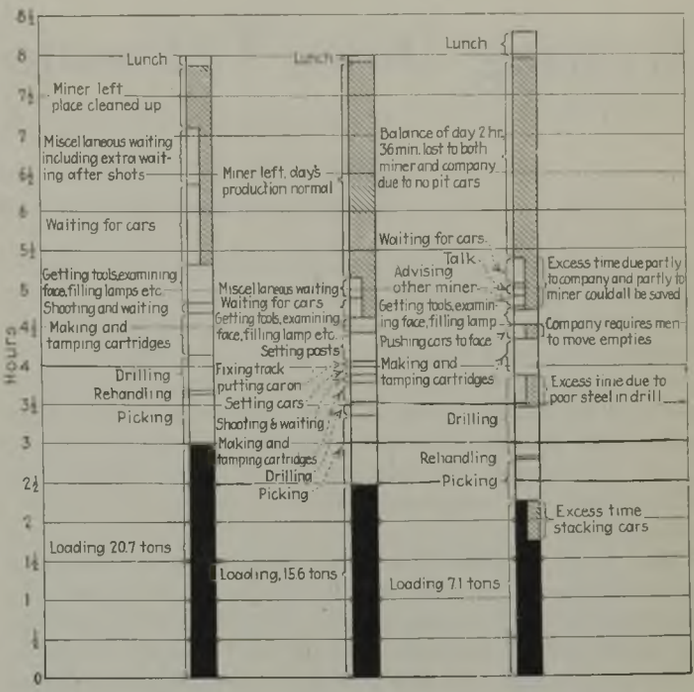


Fig. 4—Record of Three Loaders in Three Mines

What a short time is given to loading is made quite clear by the black portion of the three columns. The hatched portion shows the time lost unnecessary; either the miner was waiting or had gone home, or was delayed by moving empties, or by poor tools, the waiting period being hatched narrowly where the fault was lack of co-ordination rather than absence from the mine. Note also the loss of time due to building up the sides of cars with lump coal.

in a reduction in the actual unit cost of production. Many mines are working two eight-hour shifts daily and they have thereby effected an appreciable reduction in the cost of mining coal. The change has saved overhead and much dead work. In one of these instances, it is true, the double shift temporarily has been discontinued because an insufficient area had been developed and the operation could not be maintained without pushing the development work more hours than the rest of the mine. Cutting machines are run during a second shift in some mines in which the loaders and company men are on single shift only.

The effect of two-shift work should be carefully studied in every mine from the standpoint of economical management, equipment, development and personnel.

Fig. 5—Lots of Coal Ready and No Car in Which to Put It

The relation between miner and operator is a loose one. The price per ton loaded is about the only tie. The miner loads if he wants to and goes home if he doesn't want to load. The operator provides him with cars on a somewhat similar basis. Neither miner nor operator puts himself out to accommodate the other.

Wetting Down Colorado Mines Is a Real Problem

Low Humidity in That High and Dry Region Makes Dust a Serious Menace—C. F. & I. Co. Humidifies with Both Live and Exhaust Steam and Sprinkles Lavishly

IN THE high and dry region on the eastern side of the Rocky Mountains, many a mine makes no water at all. The result is that at such mines air humidification and other methods of protecting against dust troubles are given most careful attention by operating men. The methods used in such instances by the Colorado Fuel & Iron Co. were explained Feb. 14 to the Rocky Mountain Coal Mining Institute at Denver by R. L. Hair, the company's division engineer at Trinidad, Colo.

Mr. Hair showed how live steam is used both to heat intake air by the use of banks of pipe coils in the mouth of the incast and for further humidification by discharging it into the air stream through perforations in the pipe line 100 ft. inby. Low-pressure steam in great quantities is exhausted into the air stream about 225 ft. in. Atomizing sprinkler heads every 500 ft. leading from water pipes running through all entries carry the humidification deep into the mine.

Roof, Walls and Roadways Wetted Frequently

At 125 ft. intervals there are hose connections on the water pipes and a man with a piece of hose frequently washes down roof, walls and roadways. Empties are sprinkled on their way into the slope and loads on their way out. And to make certain that the quantity of loose fine coal through the mine is kept down to a minimum, the night shifts load it out frequently. Mr. Hair's paper was as follows:

"Though the annual rainfall in Las Animas County, Colorado—that part of the state with which my paper deals—in 1923 was 26.85 in., the normal yearly rainfall is only about 17 in. The moist warm air which leaves the Pacific Ocean headed in our direction deposits its vapor in the mountains as rain or snow, and when it reaches us in the foothills on the east side of the range, it is descending and its temperature increasing. In consequence, it is prepared to take up moisture rather than to deposit it. So for our precipitation, we must depend principally on the moisture in the winds from the Atlantic and the Gulf of Mexico.

"Temperature and humidity readings taken at the surface at several of our company's properties last month by Robert McAllister, the company's mine inspector, are as in Table I.

TABLE I—TEMPERATURES AND HUMIDITIES IN LAS ANIMAS COUNTY, COLORADO, IN JANUARY

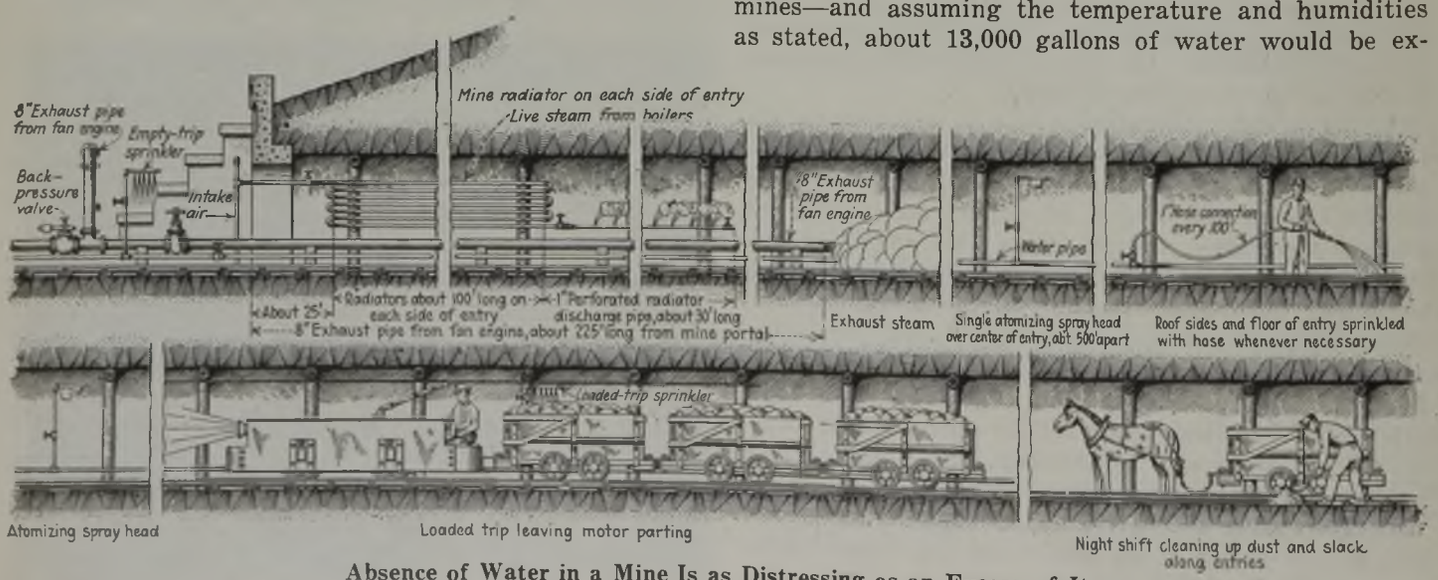
January	Temperature Degrees F.	Humidity Relative Per Cent
5	37	53
7	40	43
8	39	21
9	36	60
11	37	46
21	35	83
22	44	30

"The average temperature for the seven days was 38 deg. F., and the humidity 48 per cent. This means about two gallons of water was contained in each 100,000 cu.ft. of air. Readings in the return air during the same periods were as in Table II.

TABLE II—TEMPERATURES AND HUMIDITIES OF RETURN AIR FROM MINE

January	Temperature, Degrees F.	Humidity Relative Per Cent
3	65	100
7	62	100
8	61	100
9	65	100
11	65	100
21	66	100
22	60	100
Average	63 F.	

"At this temperature and humidity, about eleven gallons of water are contained in every 100,000 cubic feet of air. Assuming that this quantity passes per minute—about the average quantity at each of our mines—and assuming the temperature and humidities as stated, about 13,000 gallons of water would be ex-



Absence of Water in a Mine Is as Distressing as an Excess of It

These drawings represent what is done in Colorado Fuel & Iron Co.'s mines from slope mouth to side entry to reduce the ever-present danger of dust explosion. An even temperature of intake air is maintained by coils through which live steam passes to be vented into the air stream 100 ft. inby from the air intake. Low-pressure steam from the fan engine exhausts into the air steam about 125 ft. further in. The mine is watered on the entries by atomizing sprays every 500 ft. Roof, ribs and roadways are washed down frequently from hose connections every 100 ft. Loads are sprinkled on the way out and empties on the way in. Lastly, night men clean up slack dropped along haulage ways.

tracted from the mine each 24 hours. If no vapor is applied artificially, the under-saturated intake air must get its moisture from the dust on the walls, roof and floor of the mine, and the drier the dust is, the more it is to be feared.

"What we try to do is to heat the air at the mouth of the mine to the required temperature and give it all the moisture it can carry, before it proceeds on its way through the mine. In many cases, we raise it to a temperature higher than the mean temperature of the workings, so that its moisture will be deposited on the walls, roof and floor. By the application of plenty of water under a strong pressure on the roof, sides and roadways, the dust is moistened so that it will ball in the hand. We believe that dust thus thoroughly wetted will not propagate an explosion.

Air Preheated Before It Is Humidified

"The system practiced by the Colorado Fuel and Iron Co. for wetting the mines and humidifying the air begins by a method of preheating the air to the mine temperature and humidifying it. Radiators consisting of 1-, 2- or, even in rare cases, 4-in. pipes are lined along each side of the intake air course. Coils are ofttimes placed along the roof also. These are from 75 to 125 ft. long, according to the radiation desired. They are usually heated by live steam.

"The exhaust steam from the fan engine is carried into the intake air course, preferably a short distance beyond the radiators. This not only supplies vapor to the air but assists in raising its temperature. This steam is supplemented by fine sprays placed along the entry at intervals from 25 to 500 ft. depending upon conditions.

"The second precaution we take is to load up fine slack and dust along the roadways, and the third is to sprinkle profusely. Different types of cars distribute fine slack along the roadways, which is ground up by the traffic of men, mules and cars. This coal is loaded out at convenient times and the entire entry sprinkled by hose under a water pressure of 50 to 75 lb. With valves every 125 ft. one man, carrying 25 ft. of hose, can sprinkle 4,500 ft. of entry in an 8-hour shift.

"Each string of empty cars is thoroughly sprinkled by a heavy spray on each inbound trip from the tipple. This prevents the dust from the cars being picked up by the air current or sifting out through the cracks onto the roadway. Every trip of loaded cars is likewise sprinkled when leaving the partings.

"The average quantity of water applied per day, at each mine exclusive of exhaust steam is shown in Table III.

TABLE III—WATER SUPPLIED FOR HUMIDIFICATION OF MINE

	Gallons
7 hours sprinkling by hose at 25 gallons per minute	10,500
20 fine sprays working 4 hours per day at 3 gallons per minute	14,400
Water sprayed on trips at partings	500
Total	25,400

"Our company installed during 1922, over 72,000 ft. of sprinkling lines of 1-, 2-, and 4-in. diameter in seven coking-coal mines of Las Animas County. The extensions for the year 1923 were: 20,980 ft. of 1-in., 27,279 ft. of 2-in., 120 ft. of 3-in., 5,665 ft. of 4-in. pipe; besides 1,749 ft. of ½-in. and 1,444 ft. of ¾-in. pipe, making a total of 57,237 ft. of pipe of all sizes.

"The cost of labor and supplies for humidification and sprinkling for the year 1923 at seven plants totaled $34,400 or 0.021 cents per ton of coal mined."

The Miner's Torch

Oh, Doctor! Doctor!

A COMPANY attorney finds in trying a case that the testimony of a company physician has little weight with a jury, and he warns all of the operating officials to profit by the experience and not let the company officials get too close to the doctor.

A camp physician who has the reputation among the men of rushing all of his patients back on the job, especially when these men are drawing sick benefits, moves yearly if his job happens to be one where an annual election is the basis of his contract.

Occasionally, we find camp physicians who could qualify as politicians of the first rank; if they would confine their efforts to keeping the men lined up for the yearly election, all would be well but unfortunately, they are sometimes induced to exert leadership that conflicts with the authority of company officials, and then things begin to happen.

We have considered a few of the "hands off" arguments about the company doctor. Now forget these and look at the matter from another angle.

If an employee is injured, and for lack of proper medical attention, loses two months' work when he should have been back on the job in two weeks, his employers may have suffered a greater financial loss than the employee's family, even though he did not receive accident insurance or any other kind of compensation. All well regulated companies keep a stock of repair parts on hand to take care of breakdown jobs and for the same reason have understudies, as it were, to take the places of men disabled by accident. But keeping a stock of repair parts up to date is quite a simple matter in contrast to having efficient trained men on hand—men ready to take the place of anyone suddenly disabled.

The contrast can be carried still farther. A piece of machinery generally has its maximum value the day it is put to work, and beginning with that day, it deteriorates in value daily until it is finally discarded. A human machine renders minimum service to a company the day it is put on the job and if it is a normal human it becomes more and more efficient day by day and does not reach its maximum for many years.

Some of our mining companies have been slow to realize the advisability of co-operating with the camp physician; the facilities offered some of these physicians in the way of instruments, furniture, etc., would suffer in comparison with the facilities possessed by the average cross roads veterinarian. I have seen offices designated "Doctor's Office" that would inventory something like this: one cot, three chairs, one water bucket, one first-aid cabinet, size 2 ft. by 1 ft. by 6 in. I almost overlooked the "Safety First" calendar.

Downward Trend Under Soviet Rule.—In 1917, the Donetz District in Russia produced 27,365,000 tons of coal. In 1918, the production under the chaotic conditions fell to 9,765,000 tons. In 1920 under Sovietism, the output had fallen to 5,017,000 tons, but in 1921, a slight impovement was noted, the production being 6,408,000 tons.

Accidents Add Four per Cent To Operating Cost*

To Losses for Compensation Must Be Added Those for Delay in Operation, Decline of Morale and Labor Turnover

By Sub-Committee on Education
Industrial Relations Committee
American Institute of Mining and Metallurgical Engineers†

TAKEN solely as a matter of dollars, the cost of accidents in mining in the United States, and, therefore, the cost to the individual mining company, is larger than any item on the books excepting direct labor payroll. Practically every mining state, within the past eight years, has introduced some form of workmen's compensation insurance. Of these states, the recent report of the U. S. Coal Commission says, "Competitive insurance under state control, as in Pennsylvania, with schedule and experience rating to evaluate individual mine hazards has given the best results from a safety viewpoint. Furthermore, Pennsylvania, of all the mining states, has the most complete information and analysis of its mine accidents. Therefore, the accident experience of Pennsylvania will be taken as a basis for the statements in this report.

The present basis of rates for compensation insurance under the Act, in the bituminous mines of Pennsylvania is $2.35 per $100 of payroll. Estimating payroll as 70 per cent of the total cost of operation, 1.65 per cent of the cost of operation is for accident insurance. In cases of substandard conditions at a mine, the rate may be as high as $3 per $100 of payroll and thus 2.1 per cent of the total cost of operation. In cases where most of the substandard conditions have been removed and the accident frequency reduced, the rate has been as low as $1.30 per $100 of payroll, or 0.91 per cent of the total cost of operation. The difference in cost between these extremes at a mine employing 500 men would be about $17,000 per year.

Lowest Accident Rate Is in Pennsylvania

The bituminous mines of Pennsylvania have the lowest accident rate of any group of coal mines in the United States, and probably lower than any group of metal mines. In consequence, the direct cost of compensation insurance is higher in most other districts. The insurance covers, however, only deaths by accident, and injuries where the man is disabled for more than ten days.

Statistically, of 151,022 full-time 2,000-hr. workers employed in the bituminous industry of Pennsylvania, taking an average of the years 1918 to 1922, inclusive, 414 per year were killed and approximately 10,446 injured severely enough to receive compensation. The average time lost by these temporary compensable accidents was 86.2 days, or a loss per year of 899,958 man-days. This means 3,600 men supported constantly who are doing no work.

Non-compensable cases reported are 14,833 per year with an average time loss of 4½ days or a total loss of 66,749 man-days, or 267 men supported constantly from this cause who are doing no work. The medical fees alone for these non-compensable cases amount to $9 per case, or a total of $133,000 per year. Summarized briefly, one out of every five men in the industry is disabled through accident for some time during the year, and each accident is a potential fatality.

When a man is injured at a mine the work, invariably stops. If the man is killed, work usually stops for the day, and ofttimes for the day of the funeral. In any and every case hoisting and output is delayed until the injured man is out of the mine. Every company or contract man underground stops to discuss the affair with his neighbor, and the morale of the mine is broken for that day. Not less than one three-hundred and sixty-fifth part of the total yearly overhead of the mine must therefore be charged to any accident that interrupts production for a day, or with a proportionate amount for interference with production for part of a day. This is a minimum estimate because it is often several days before the direct thought of the accident has worn off and the fellow workers are back to their usual efficiency.

Effect of Mine Accidents Is General

Every accident means breaking a new man into the job. Our efficiency friends have estimated variously this direct cost to the industry. It depends, of course, on the importance of the job. For example, if the man injured is a motorman, it is several days before trips are coming out of his section of the mine with the speed and regularity attained by him before injury. Oft times, the new man derails cars or burns out motors, and is directly responsible for additional accidents. Thus the chain of interference may reach to every part of the mine. Even in cases of accident to the contract miner, the effect underground is more general than first thought would indicate.

The indirect effects of accidents are important. They cause discontent among the men and strain the relations between them and the company officials. These are a real though intangible part of the cost. The high accident rate at mines is an important factor in causing employees to demand a high wage rate.

We believe that the indirect costs of any accident to the mining company are at least equal to the direct cost of compensation insurance itself, making the total cost of an accident at least twice the compensation insurance rate. Roughly then, between 4 and 5 per cent. of the costs of running a mine are due to injuries and fatalities.

Surely, with accidents in English coal mines, that have greater natural hazards than we ordinarily find in this country, only about one-third as frequent as in American coal mines, there is opportunity for constructive prevention work and education in this country. The details to be applied to an average mine are yet to be devised. A saving of 2c. of operating costs per dollar on accidents is as real an engineering feat and as necessary as the saving of a like amount through proper haulage, hoisting or other ordinary conditions demanding engineering skill.

Up to the present time in this country, accident prevention at most mines has been a matter for the attention of officials too burdened with operating details to take the time and study necessary to build up a technique of accident-prevention work. No prescription can be made for the average mine in the matter of mine accidents until the accident experience for large groups of similar mines has been tabulated and diagnosed.

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*Report of Sub-Committee on Education at Annual Meeting of American Institute of Mining and Metallurgical Engineers held Feb. 18, 1924, in New York City.

†Sub-committee consists of E. A. Holbrook, chairman; W. R. Chedsey, Rush N. Hosler, C. R. Hook and H. M. Wolflin.

Investigation Determines Best Furnace for the Burning of Small Sizes of Anthracite*

Tests Made on Furnace Fired by Chain-Grate Stokers—Ignition Improved by Increasing Incandescent Surface of Brickwork—High Boiler Settings Provide More Time for Completion of Combustion

By A. R. Mumford†
New York City

TO ASCERTAIN how different features of furnace design influence the combustion efficiency of small size anthracite, a series of tests was recently conducted by our company on a four-drum water-tube boiler, twenty-nine and thirty tubes wide and sixteen tubes high, having 10,000 sq.ft. of heating surface, and fired by two chain-grate stokers. In this boiler the gases cross the tubes three times and are deflected by baffles of the usual type.

A section through the center line of one of the stokers is shown as a background in all figures. Beneath the grate are four separate air chambers to which air is supplied through three wind boxes from a main air duct. For our purposes we will consider the grates divided into four sections, one over each air chamber. Each wind box is equipped with slide dampers to control the air pressure under the section of the grate above the corresponding air chamber.

The fourth chamber is divided by two vertical partitions into three compartments, each controlled by a damper, so that if a hole appears in the fuel bed, the damper to the lateral compartment under the hole can be closed to prevent too much air from entering the furnace.

Two Coxe chain-grate stokers under each boiler are placed side by side and operated by means of separate controls. A center wall separates the stokers and extends to within two-thirds of the distance from the front of the furnace to the bridge wall. This center wall is racked back from the bottom, near the bridge wall, to a curtain wall at the front. The curtain wall extends from the top of the front arch to the bottom of the front water leg.

Ideal Stoker Burns all Combustible Matter

The front arch is a sprung arch 10 ft. long, extending from the ignition arch to about 8 ft. from the bridge wall. The bridge wall rises vertically from the floor level to the boiler tubes and is joined to the first baffle. Coal is fed to each stoker through separate chutes, and the initial thickness of the fuel bed is controlled by the ordinary coal gates.

The function of the stoker is to carry coal into the furnace, remove the refuse from the furnace, and supply air to the fuel. By adjusting the pressures in the separate air chambers, air is furnished to the fuel in the required quantity so that, with the ideal stoker, all of the combustible matter in the fuel is gasified and only the incombustible matter passes over the end of the stoker to the ashpit.

The function of the furnace is to raise the temperature of the green coal entering on the grate to the ignition point and to mix the gases, rich in combustible, from one section of the stoker with oxygen from another section so that the gases may be burnt completely before they reach the boiler. If a furnace does not afford means for completely burning the gases with a reasonable quantity of air before they reach the boiler, its design is imperfect. The quantity of combustible gas and excess air present in the gases as they reach the boiler shows how well the furnace performs the mixing function; and the ability to maintain ignition at different ratings shows how well the furnace ignites the gases.

Losses Apparent with Ordinary Operation

Observation of the ordinary operation of the boiler, furnaces, and stokers in the plant on which the studies were made indicated that losses existed because of the large quantity of combustible in the ash, because of high flue-gas temperature, and because of the presence of carbon monoxide in the flue gases. The loss due to combustible in the ash was high, partly because it was necessary to carry long fires to attain the required steam output and partly because particles of solid combustible were blown from the front of the grate and carried in suspension by the gases until the end of the stoker was reached, when the particles settled out of the gases and fell to the ashpit.

The high flue-gas temperature was due to the combustion of carbon monoxide in the boiler. It is evident that any combustion which occurs after the gases have reached the boiler will result in a higher flue-gas temperature, because the further away from the furnace that combustion takes place, the less the boiler heating

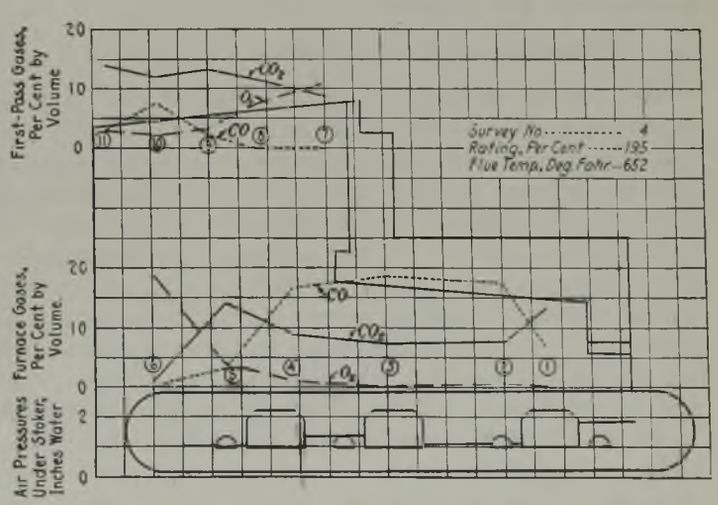


Fig. 1—Normal Operation with Low Arch

Immediately over the fuel bed at the front of the furnace there is little or no oxygen but much combustible gas. The fuel is being divested of its water vapor, and is ignited only near the surface. Consequently the air is not in contact with incandescent carbon long enough to use up all the oxygen.

*Paper presented at meeting of the American Society of Mechanical Engineers, Jan. 15, New York City.
†Fuel engineer, New York Steam Corporation.

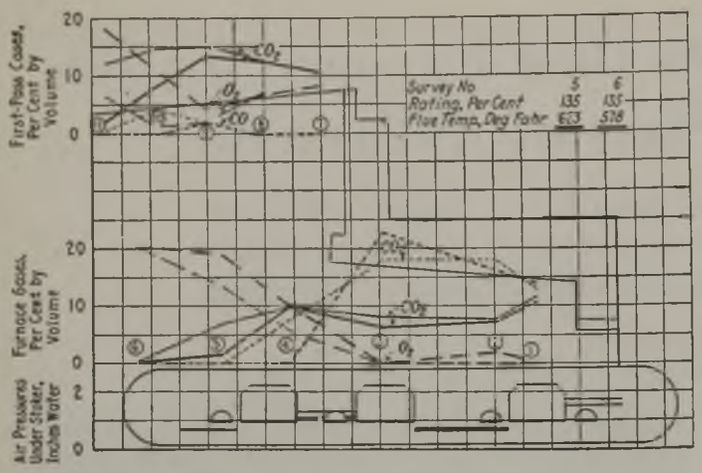


Fig. 2—Effect of Increasing Air Pressure in Last Air Chamber

At the rear of the furnace the oxygen is much higher with the increased pressure. At the entrance to the front pass the effect of increased air supply is quite evident. The gas composition did not change materially at the front of the furnace.

surface available for the absorption of the heat thus generated. The loss due to carbon monoxide in the flue gases and that due to high flue temperatures evidently were caused by the imperfect mixing of the gases in the furnace. Thus, to improve the operation of the plant, it was necessary to decrease the loss due to solid combustible carried in suspension by the gases, to burn out the refuse on the grates more completely, and to mix air with the combustible gases so that they would be completely burned in the furnace and away from the boiler.

In order to learn how the mixing action of the furnace might be improved and to outline accurately the path of the gases through the furnace, simultaneous samples of the gases in the furnace were collected at eleven points. Six of these points were on a horizontal line about 6 in. above the fuel bed and five on a horizontal line just below the boiler tubes. The flue gases were sampled simultaneously by means of a special sampling tube which drew gas from the whole width of the uptake.

The temperature of the flue gases was measured by copper-constantan thermocouples inserted in the openings between the drums just below the uptake. In order to eliminate any error from momentary changes in the fuel bed, the gas samples were collected over a period of twenty minutes. During this interval the flue-gas temperatures and the air pressures under the stokers were noted every five minutes.

Combustion Under Normal Conditions

The results of some of the studies of the furnace gases are plotted on charts, Figs. 1 to 7, inclusive. The holes through which the sampling tubes were inserted into the furnace are indicated by small circles inclosing identifying numbers. The composition of the gases at each point is plotted on the vertical line immediately above each sampling hole. The pressure of air in each of the four air chambers is represented by a horizontal line drawn across each section. In some diagrams, for the purpose of ready comparison, two sets of analyses are reported on the same chart and a heavier line is used for one of the sets in order to distinguish between them. The background of each chart is an outline drawing of the furnace and stoker during the study shown.

Fig. 1 shows the composition of the furnace gases under normal operating conditions. A study of the curves in this figure shows that immediately over the fuel bed at the front half of the furnace, little or no oxygen is present and much combustible gas. At the rear half of the furnace much oxygen is present and little or no combustible gas. In the first pass more oxygen is present near the curtain wall than near the bridge wall, and conversely no combustible gas is present near the curtain wall although a rather large quantity is present near the bridge wall. A study of these and other analyses enables us to trace the progress of combustion on the grates and in the furnace.

As the coal falls on the moving grate it is brought slowly forward and exposed to radiation from the furnace brickwork, and at nearly the same time it passes over the first air chamber in which the greatest air pressure is carried. The radiation evaporates the surface moisture in the coal, and the air forced through the fuel bed by the pressure in the first air chamber carries the water vapor into the furnace. After the coal is dried, its temperature is raised to the point of ignition by further radiation. Ignition occurs first of all at the upper surface of the fuel bed, and the air passing through the layer of coal unites with the ignited coal and combustion begins. The rise in temperature caused by this combustion at the surface is communicated to the lower layers of the coal by conduction, and these lower layers then ignite and burn. After the coal is completely ignited in this manner, combustion of the whole fuel bed continues until no combustible is left on the grates. From the point in the travel of the grate where ignition is complete to the point of dumping, the combustible content of the fuel bed decreases steadily and the proportion of incombustible matter increases correspondingly. The influence of these changes in the combustion of the fuel bed on the products of combustion is exceedingly important in the design of a furnace.

Evaporation of Moisture and Its Removal

The first change in the fuel bed is the evaporation and removal of the surface moisture, and as this change is not a chemical reaction it has no influence on the oxygen content of the air. The second change is the distillation of the volatile matter and the ignition and combustion of the surface layer of the fuel bed. At this point some free oxygen is present above the fuel bed and little or no combustible gas, because the layer of burning coal is so thin that the air is not in contact with incandescent carbon long enough to use up all the oxygen.

As the fuel bed becomes fully ignited the oxygen in the air passing through the fuel is completely used up in the lower layers where it gasifies carbon and forms carbon dioxide. As this dioxide passes through the upper layers of incandescent fuel some of it is reduced to carbon monoxide by contact with carbon. Fully one-third of the length of the grate is covered by the fuel undergoing this change, and consequently a large volume of combustible gas is formed. This action continues until the carbon or combustible content of the fuel bed is lowered sufficiently to allow carbon dioxide to pass through with little reduction of carbon monoxide.

The quantity of combustible on the grate diminishes rapidly from this point on, and more and more free oxygen passes through the fuel bed until no carbon dioxide or carbon monoxide is formed, and the gases rising from the grates consist solely of air. To summarize, free oxygen is present at the very front and at the rear, while in between a large quantity of com-

bustible gas is present. In order to burn the coal completely in the furnace these three streams of gas must be mixed.

Evidence That Gases Mix Above Grates

The extent of the mixing action of the furnace on the stream of gas can be seen by the changes in composition of the gases which have taken place between the grate level and the point of entrance to the boiler. At points 7 and 8, Fig. 1, no carbon monoxide was ordinarily present under normal operating conditions. The burning out of carbon monoxide was probably due to the fact that the air from the front of the stoker passed along just under the main arch, mixing with the combustible gas and burning it. The presence of carbon monoxide at points 9, 10, and 11 indicates that insufficient air was introduced into the main stream of combustible gas.

The gaseous products of combustion evidently acquire considerable velocity as they pass under the front arch, because the gas stream could be seen to pass toward the rear of the furnace beyond the end of the main arch before turning to enter the boiler. The stream actually impinged on the bridge wall which with the stack draft changed its direction toward the heating surface of the boiler. The presence of the main gas stream nearer the bridge wall than the curtain wall is confirmed by the analyses of the gases entering the boiler and by pitot-tube measurements, which indicated that the velocity at points 9, 10, and 11 was four to six times that at points 7 and 8.

Speeding Grate Lets In More Air at Front

It was found that combustion at point 1 is more complete when the grate travels fast and this indicates that more air enters the furnace at the front. An increase in air entering at the front of the furnace can only take place through green coal, and if the thickness of the fuel bed and the pressure of air in the first air chamber are the same, then there must be a larger area of green coal exposed to the pressure in the first air chamber at higher grate speeds to account for the more complete combustion at point 1.

In other words, as the grate travels faster, ignition takes place later. To check these deductions, the air pressure in the first chamber was reduced while the grate was moved at maximum speed, and it was found that the gas composition at point 1 was then the same

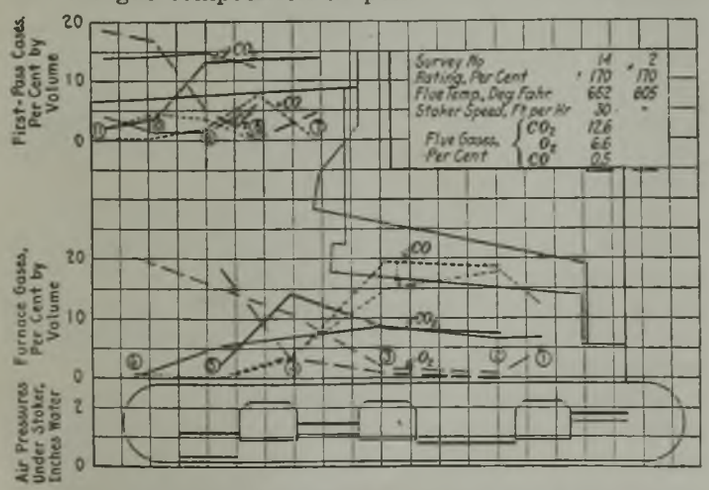


Fig. 3—Effect of Raising the Front Arch

This arrangement effected a reduction in the quantity of carbon dioxide and an increase in the quantity of oxygen showing the gas composition was not favorable to the high arch. There was little change in the quantity of combustible gas reaching the boiler.

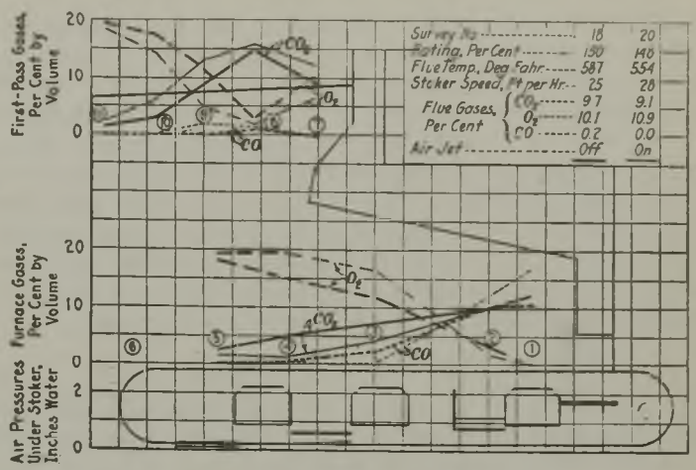


Fig. 4—Effect of Air Jet with Partition in No. 2 Air Chamber

The air jet reduced the quantity of carbon monoxide in the gases reaching the boiler, but it accomplished this with a large increase of excess air. The effect of an air jet in burning out carbon monoxide seems to be balanced by an increase in flue gas due to excess air, so that little real benefit is derived from the use of such a jet.

as at lower speeds. It was also found that the air from the front was responsible for the complete combustion of carbon monoxide by the time the gases reached points 7 and 8 for, with the reduced air pressure in the first air chamber, carbon monoxide was found at points 7 and 8. To circumvent the later ignition at higher grate speeds, radiation to the green coal must be increased by an increase in the area of radiating surface or by removing the obstruction caused by a thick ignition arch.

A study of the normal operating conditions indicates three possibilities for improvement. If the velocity of the gases as they pass under the front arch can be reduced materially, the number of particles of solid combustible carried to the rear of the stoker will be reduced. The obvious method of decreasing the gas velocity is to increase the cross-sectional area of the furnace under the front arch by building a higher arch. If this should improve combustion at the same time, because of the resulting increase in combustion space, it will be beneficial in solving two of the difficulties.

In order to burn out the combustible on the grates more completely, more air must be forced through the fuel bed on the last stoker section, with the single qualification that it must be possible to mix the additional air with the gases so as to complete the combustion in the furnace. In other words, it must be used so as to avoid losses due to excess air.

It might be advisable to introduce air into the furnace through jets under pressure in order to complete combustion in the furnace. All of these possibilities were tried and the results are shown in the following paragraphs.

Increased Air at Rear Undesirable

In order to study the effect of adding more air by increasing the pressure in the last air chamber, a set of samples was collected with no change other than the increase in pressure mentioned. The results are given in Fig. 2. The light lines indicate normal operation and the heavy lines indicate the effect of the additional air introduced through the refuse at the end of the stoker.

The results show that immediately above the fuel bed the gas composition did not change appreciably at the front of the furnace, but at the rear the oxygen is much

higher with the higher pressure. At the entrance to the first pass the effect of the increased air supply is very evident. The gas composition at points 7 and 8 is essentially the same for both trials. At point 9 there is evidence of a slight affect of the additional air, while at points 10 and 11 the rapid fall of the carbon-dioxide curve and the rise of the oxygen curve show that the additional air affected the gases passing these points materially. It is true that carbon monoxide was reduced, but the reduction in carbon dioxide and increase in oxygen showed the method to be impractical.

Raising Main Arch Not Recommended

In an attempt to reduce the loss from particles of solid combustible blown from the front of the grate and carried to the ashpit, the main arch was raised to the level shown in the background in Fig. 3. The arch was raised 1 ft. at the front and 2 ft. at the rear, thus

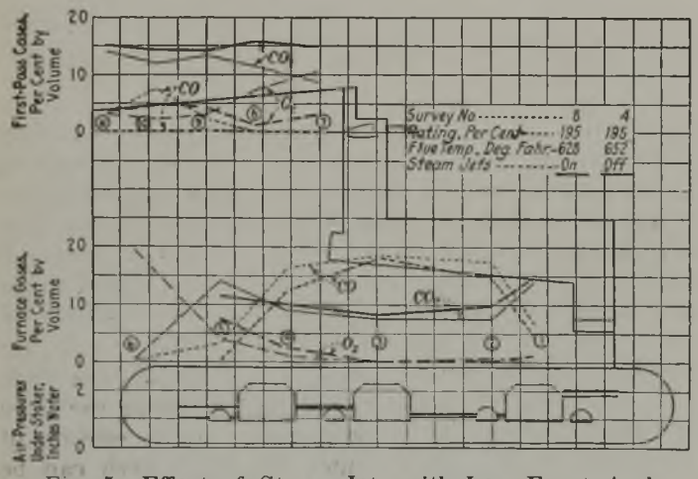


Fig. 5—Effect of Steam Jets with Low Front Arch

The air rising through the refuse is forced forward by action of the steam jets and mixed with the main gas stream. Thus the oxygen in this air is brought in contact with the combustible gas and combined with it burning the carbon monoxide and increasing the carbon dioxide. In the first pass the former is entirely eliminated.

increasing the cross-sectional area at the rear by about 16 sq.ft. and by about 8 sq.ft. at the front. This is somewhat greater than a 50 per cent increase at the end nearest the bridge wall, and ought to reduce the mean horizontal velocity by the same proportion.

The composition of the gases over the fuel bed and entering the boiler are shown by the heavy lines in Fig. 3. In this figure the background shows the two heights of arches. The light lines show the composition of the gases with the low arch, and the heavy lines indicate the gas composition with the high arch.

If raising the front arch is to improve combustion, the percentage of carbon dioxide found in the gases entering the boiler must be higher and that of carbon monoxide lower than with a low arch. It was impossible to determine exactly what weight to give the analyses at the various points, but if we assume that the points apparently in the main gas stream should be weighted according to the rough measurements of velocity that were made, points 9, 10, and 11 would have a weight of four to a weight of one for points 7 and 8, with the low arch in service. With the high arch, points 7, 8, and 9 would have a weight of four and points 10 and 11 a weight of one. Using the foregoing approximation the average composition of the gases entering the boiler shown in Fig. 3 is as follows:

	CO_2	O_2	CO	N_2
With low arch, per cent	13.8	2.9	2.9	80.4
With high arch, per cent	12.1	5.4	2.8	79.7

From this it is evident that there was little change in the quantity of combustible gas reaching the boiler, but that there was a reduction in the quantity of carbon dioxide and an increase of oxygen so that the gas composition was not favorable to the high arch.

It is evident that if more air were forced through the refuse it would rise directly to the boiler past points 10 and 11 without coming into contact with the main stream of gas at all. With the low arch such an increase in air supply raised the excess of air, but with a high arch the effect would probably be worse in that none of the combustible gas would be eliminated by the accompanying increase of excess air.

The changes in the composition of the gases over the fuel bed were evidently not due to the change in arches.

In general as the raising of the front arch did not reduce the horizontal velocity of the gases sufficiently to stop the loss due to particles of solid combustible dropped from the gases to the ashpit, and as the composition of the gases entering the boiler was not improved, this change was not the most desirable.

No. 2 air chamber is that space under the grates between the first and second wind boxes. The distance between the sides of these two wind boxes, in the direction of the movement of the grate, is nearly twice the distance between wind boxes 2 and 3.

A partition was installed in each of the stokers of the boiler on which the investigations were made and is indicated by the vertical line in No. 2 section on the background of Fig. 4. The composition of the furnace gases at the several points is shown by the light lines in this figure, and, at low rating, the shortness of the fire is clearly shown. Because the carbon monoxide formed at the front of the fire had to pass under the front arch for a considerable distance before rising to the boiler and because oxygen was present in the gases below the arch, due to the short fire, there was somewhat less carbon monoxide in the gases entering the boiler. At the same time the greater quantity of oxygen passing through the fuel bed raised the excess air in the flue gases somewhat as shown by a comparison of the flue-gas composition for survey 14 (Fig. 3) and survey 18 (Fig. 4) at nearly the same rating.

Air Jet Near Front Arch Should Be Omitted

The heavy lines in Fig. 4 show the effect of an air jet on combustion. The air jet was introduced through the side wall of the furnace about a foot below the end of the front arch and was supplied with air from a railway-type compressor which gave a pressure of about 25 lb. at the nozzle of the jet which was formed from a piece of ½-in. pipe. The differences in the composition of the gases over the fuel bed were caused by slight differences in the lengths of the fire.

As shown in Fig. 4, the oxygen at points 7 to 11, inclusive, was higher with the air jet in service and the carbon dioxide and carbon monoxide were lower. Thus the air jet reduced the quantity of carbon monoxide in the gases entering the boiler, but it accomplished this with a substantial increase in excess air.

At high ratings also, a reduction in the quantity of carbon monoxide in the gases entering the boiler took place accompanied, as at low ratings, with a decrease in carbon dioxide and an increase in oxygen when the air jet was in service.

The effect of an air jet in burning out carbon monoxide seems to be balanced by an increase in flue-gas loss due to excess air, so that little real benefit is

derived from the use of such a jet. In addition, it is illogical to provide an air supply above the fire if air can be forced through the refuse and properly mixed with the combustible gases. That the logical place for the admission of any air necessary for combustion is through the refuse is evident from the fact that air entering the furnace in such a manner must gasify some carbon and so reduce the loss due to combustible in the refuse.

Steam Jets Used To Simulate Rear Arch

In order to simulate the action of a rear arch without waiting for its construction, a system of steam jets was introduced across the stoker at point 6 at the rear of the furnace. The steam jets were constructed by inserting sixteen ⅜-in. pipe nipples into a 1-in. pipe 8 ft. 8 in. long, and it was assumed that they would give an indication of the probable effect of directing the air rising through the refuse toward the front of the furnace where the necessity for such air has been shown.

The effect of the steam jets with the low arch in service is shown in Fig. 5. In this figure the light lines indicate the gas composition under normal operation and the heavy lines the composition with the steam jets in service. The combustion of the coal on the grates is, of course, unaffected by the steam jets. In the first pass, however, the effect of the additional air and the mixing action of the jet is evident.

The air rising through the refuse is forced forward by the action of the steam jets and mixed with the main gas stream. The oxygen in this air is thus brought into contact with the combustible gas and combined with it, burning the carbon monoxide and increasing the carbon dioxide. The composition of the gases in the first pass shows that by the time the gases have reached the boiler tubes the carbon monoxide is entirely eliminated. The following table gives a comparison of the two sets of analyses of the gases entering the boiler by means of averages weighted as formerly.

	CO_2	O_2	CO	N_2
With steam jets, per cent	14.8	4.0	0.1	81.1
Without steam jets, per cent	12.7	3.7	3.7	79.9

From these results it is evident that steam jets gave the greatest improvement of any change discussed thus far.

Best Condition For Use of Rear Arch

Because some of the arches in the boilers at the plant had been raised, it was desirable to learn the relative effect of steam jets on the combustion in a high-arch boiler. The curves in Fig. 6 show the results of an investigation on a high-arch boiler with and without steam jets. The heavy lines indicate the composition with the steam jets in service and the light lines the composition under normal operating conditions. The following tabulation gives a comparison of the weighted averages of the gas composition.

	CO_2	O_2	CO	N_2
With steam jets, per cent	12.4	6.6	0.5	80.5
Without steam jets, per cent	13.0	4.5	2.2	80.3

It is evident, therefore, that steam jets—used to simulate a rear arch—were effective with a high arch but not as effective as with a low arch. This fact is of importance in deciding the best arch arrangement over a chain-grate stoker burning small sizes of anthracite.

To confirm the conclusions drawn from the action of steam jets a Detrick flat-suspended arch was installed in the rear of a low-arch furnace. The rear arch was suspended 10 in. above the grate and extended 5 ft. forward from the bridge wall. The boiler was operated for several days at ratings varying between 250 and 270 per cent in order to learn the ability of the arch to withstand the heat of the furnace before a study of the furnace gases was undertaken.

During this period the dropping of particles of solid combustible matter from the gases to the ashpit stopped completely; this material dropped to the roof of the suspended arch instead and seemed to burn out, leaving a layer of ash which increased in thickness until it flowed slowly toward the grates, forming "whiskers" on the nose of the arch. The nose itself was brilliantly incandescent, although a layer of clear gas from the last stoker section seemed to cling to its surface. In rising to the boiler there seemed to be an expansion of the

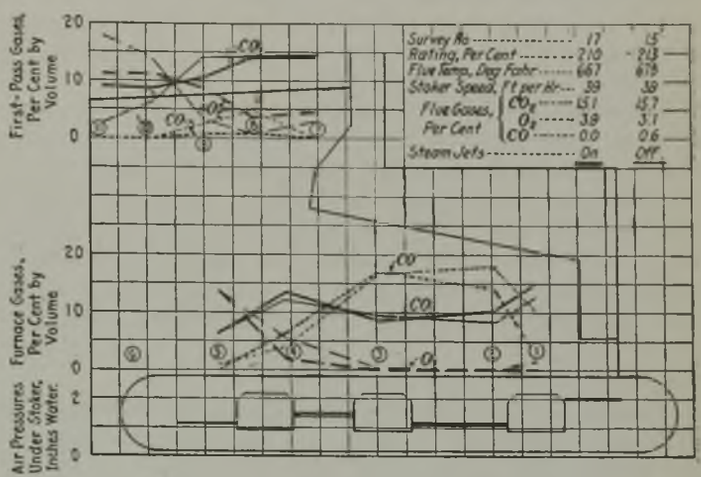


Fig. 6—Effect of Steam Jets with Raised Front Arch

The steam jets gave improved results. More carbon monoxide was burned to carbon dioxide. However, it is clear that the steam jets were not so effective with a high front arch as they were with one which was low. The weighted average of carbon monoxide was decreased only 1.7 per cent as against 3.6 per cent with a low front arch.

gas stream so that the whole width of the first pass was taken up by the gases entering the boiler.

The shape of the arch and its relation to the furnace is shown in Fig. 7. In this figure the results of a study of the furnace gases with the rear arch—heavy lines—are superimposed on those of a study of the furnace gases without the rear arch installed—light lines. Over the fuel bed the gas composition is different, although this is obviously not due wholly to the rear arch. The air pressure in No. 4 air chamber was maintained considerably higher with the rear arch in service and the refuse passing over the end of the stoker appeared well burnt out.

In the first pass the gas composition shows that the carbon dioxide is higher at all points and that the carbon monoxide is lower. The arithmetical averages of the gas composition show that without the rear arch about one-fifth of the carbon monoxide formed in the furnace entered the boiler and that with the rear arch in service only one-twentieth. These facts indicate that the rear arch as installed greatly improved the mixing action of the furnace.

The analysis of the flue gases shows a very favorable condition. The flue temperature shows a reduction of about 35 deg. F., which in itself is the equivalent of 1 per cent saving. The saving resulting from the favorable gas composition and apparent condition of the refuse cannot be estimated because no reliable figures are available for comparison. However, the plant records will eventually bring out the actual saving and

as the saving obtained by the operators is the true saving, this will be the criterion on which this form of furnace design will be judged.

The first function of a chain-grate-stoker furnace is to ignite the coal. Ignition is caused by radiation from incandescent brickwork to the green coal as it enters on the grate. Ignition can be improved mainly by increasing the area of incandescent surface and by decreasing the thickness of the ignition arch so that less coal will be in its shadow, or by both of these changes. It has already been pointed out that the nose of the rear arch became incandescent at high ratings and was hot at low ratings, and as this part of the arch faces toward the front of the furnace, radiation from it must be received by the green coal. Because the bridge wall never was heated above a dull red heat, the radiation from it to the green coal must have been less than from the nose of the rear arch, and therefore ignition was hastened by the addition of this form of arch.

The other function of the furnace is to mix the products of combustion so that the combustible gases from one part of the grate will be supplied with oxygen from another part and burned before they enter the boiler. The investigations reported here were made on a furnace of the Dutch-oven type and the indications are that some such type is necessary to produce mixing. Air and combustible gases are present at the front of the stoker and some arch over this section is necessary to force the two streams into contact.

Because the air entering the furnace at the front is generally insufficient to supply all the necessary oxygen, the combustible gases from the front must be forced to pass over the refuse section of the grate in order to come in contact with the free oxygen in the gases rising from this section. This action can be accomplished by placing the stoker completely under an arch and thus preventing any of the gas from entering the boiler until it has passed over the refuse section. This form of furnace would have obvious disadvantages from the standpoint of upkeep because intense gaseous combustion would probably take place over the refuse section and the arch would be subjected to the resulting high temperature at this point.

It is well, therefore, to shorten the main arch from this extreme length to a length that will permit the radiation to the boiler to cool the brickwork at the point where the most intense combustion will take place. If the front arch is shortened in this manner it will be necessary to install a rear arch to prevent the gases from the refuse section from rising directly to the boiler and to force them to travel toward the front of the furnace far enough to insure their mixing with the main stream containing combustible gas.

The front arch should be low enough to insure the gases having such a velocity as will enable their momentum to carry them beyond the end of the front arch and over the rear arch to the bridge wall. Combustion under the front arch can be made more incomplete than normally, if advisable, by a decrease in the air supply at the front; and the necessary oxygen for the completion of combustion can be supplied by carrying high air pressures under the refuse section of the grates.

The details of the dimensions of such a furnace would vary with the height of the setting available, because the higher the setting the more time there will be available for the completion of combustion. Conversely, the lower a setting is the more effective must be the action of the mixing devices in order that combustion be completed before the gases reach the boiler. However, it seems necessary to utilize arches in the manner suggested, because by that means the gas streams from the front and rear of the stoker will give velocities in opposite directions such as will insure complete combustion of the gases within the furnace.

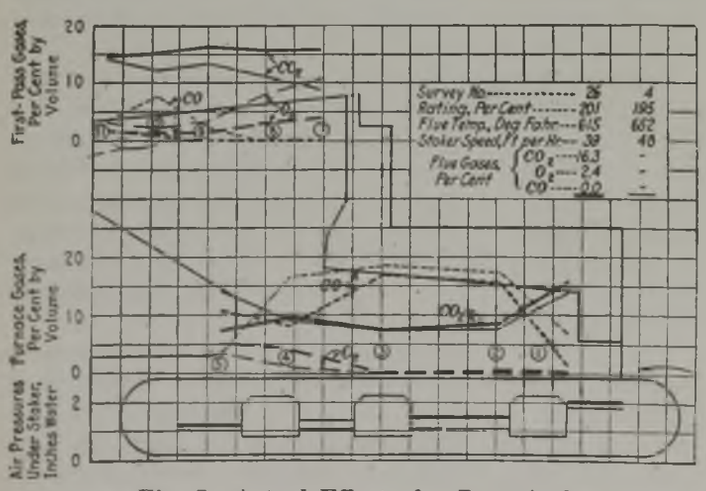


Fig. 7—Actual Effect of a Rear Arch

Analyses over the whole fuel bed showed marked improvements. The flue temperature showed a reduction of about 35 deg. F. The dropping of particles of solid combustible matter from the gases to the ashpit also stopped completely.

Bureau Seeks Way to Reduce Screenings

Coal mine operators in Illinois have requested the Department of the Interior to authorize the Central District Experiment Station of the Bureau of Mines, at Urbana, Ill., to conduct a study of the problem of reducing the proportion of screenings in the coal mined in that state. This is said to have become a quite acute problem with Illinois coal operators.

The market for Illinois coal is largely one for coal to be used in heating dwelling houses. The demand, therefore, is for the larger sizes. So acute is the situation that often there are hundreds of unbilled cars of screenings, but not one of lump. This problem of screens has been growing more intense since the plan of paying the miners for "run-of-mine" tonnage rather than for "screen coal" tonnage came into existence. While there are other factors involved one of the most important causes of this excess of screenings, according to the Bureau of Mines, is the method employed in the use of explosives.

Alaska Coal Field Making Haste Slowly

Plans for close co-operation between officials of the Alaskan Ry. and the U. S. Bureau of Mines, in all matters pertaining to mining along the railway belt have been developed. The arrangement is designed especially to facilitate the mine-rescue and first-aid service of the bureau. A distinct improvement in safety conditions in the coal mines of Alaska, particularly in the use of proper explosives and in providing adequate ventilation, is evident.

In the Matanuska coal field, the Evan Jones washery, put in operation in November, is delivering a satisfactory washed coal, for steam and domestic use in the towns of Juneau and Ketchikan. The ash content is reduced from 22 per cent to 14 per cent by washing, with an increase in heating value. After a prolonged shutdown, the Suntrana coal mine, in the Nenana field, is again operating.

News Of the Industry

Mine Blast at Castlegate, Utah, Takes Heavy Toll of Lives

Hope of Finding Any of 173 Entombed Miners Alive Is Remote—Company Officials Reluctant to Assign Cause for Explosion—One of Rescuers Succumbs—All Fires Extinguished

Special Dispatch to Coal Age

A series of explosions in Mine No. 2, of the Utah Fuel Co., at Castlegate, Utah, at about 8:40 a.m., March 8, entombed 173 miners. Three successive blasts wrecked the mine portal shortly after 116 men had entered for the morning shifts. There were also 57 night men within the workings when the disaster occurred. The bodies of 58 victims had been recovered when this issue went to press, and hope of finding any of the others alive had almost been abandoned.

The force of the explosion blew out the bulkhead of the old entrance to the property and scattered debris covered the mountainside across the canyon with soot and slag for several hundred yards. For several hours following the explosion the gases and smoke so filled the canyon that it was stifling.

U. S. Bureau of Mines rescue cars were rushed to the scene, one from Dawson, N. M., and the other from Butte, Mont.

Early reports of havoc wrought by fire proved incorrect. It is declared that all fires have been extinguished. Work of the rescue teams have been speeded up, but is still slow owing to the distance bodies have to be carried. The mine evidently was literally riddled by the explosion and it is feared that those whom the blast did not kill were poisoned by the gases.

There is no way of determining where the first blast occurred because of the obstruction near the entrance. There are both 12 and 18 ft. entries to the bottom of the mine. About 40 per cent of the workers were in the dip end more than 7,000 ft. from the main portion and more than one mile from the entryway opening, which are the only two means of egress from the workings.

The company has four camps in all with 10 or 12 openings. It is impossible to say anything at present regarding the probable property damage. The fan has been started again. The explosions were so great that the debris thrown into the passage to the mine entrance was considerable, making the work of rescue exceedingly difficult. It is feared some days may elapse before the men or their dead bodies may be reached.

There were three or four explosions. The first was not sharp, it is stated. According to the townspeople it sounded like the tremble of thunder reverberating across the hills. Telephone and electric light poles, timber and pipes near the manway were blown across the valley, almost a mile in width, so tremendous was the force of the explosion. As further evidence of the impact, poles were splintered into kindling and boulders and pipes were scattered everywhere. The second explosion, one minute later blew the wall out of the fanhouse. The third explosion followed 20 minutes later, causing a cave-in. The office building of the company, 100 ft. away, was partly wrecked.

Offers of relief are coming in from state and national organizations and Governor Mabey has decided to issue a nationwide appeal for funds to be used for relief of the widows and dependents. Estimated dependents number 868 women and children. In addition to the relief fund it is estimated that each family will have $5,000 from the workmen's compensation law.

Bureau of Mines officials have expressed the opinion that 72 hours is the minimum time it will take to remove the bodies from the mine. One of the victims is John Thorpe, general inspector for the company, who leaves a widow and five children.

Company officials are reluctant to express an opinion regarding the cause of the explosions. General Mine Superintendent Littlejohn said the mine was inspected and sprinkled as usual on Saturday morning and that at that time there was no indication of danger. So far the cause of the explosions appears to be a complete mystery. The mine was considered to be in first class condition by every one. The inquest is not expected to bring many facts to light as to the cause of the explosions, owing to the fact that hope of rescuing any of the victims alive is vanishing hourly.

No one, so far, seems to suspect any unlawful act on the part of an employee or other person. The men had been on short time, but a feeling of good will appeared to prevail and there is said to have been no agitation of any kind.

Castlegate Mine No. 2 of the Utah Fuel Co. has been the largest producer of that company for a long time. It was opened in 1912 and has been producing in excess of 1,500 tons a day. It was good for from 30 to 50 years more, it was stated at the chief offices of the company.

It is nearly 25 years since Utah had a mine disaster on anything like a scale such as that which befell her on March 8. On this occasion 200 men were suffocated by afterdamp. The tragedy occurred at Winterquarters, where the property also belonged to the Utah Fuel Co.

U. S. Supreme Court Upholds Kansas Industrial Court

In an opinion delivered March 11 the U. S. Supreme Court held in the case of August Dorchy that the provision of the Kansas Industrial Relations Court Act which prohibits strikes by coal miners must stand or fall on the decision of the Kansas courts. The decision of the lower federal court in issuing a writ of mandamus was reversed.

Justice Brandeis, delivering the opinion, said the Supreme Court could, if it desired, pass upon the validity of the section in question, but that it would rather leave that point to the state courts, and would accept their decision. He declared that the lower courts should not have passed upon the question.

Dorchy and Alexander Howat, district officials of the United Mine Workers, were indicted for calling a strike at the mine of the George K. Mackie Fuel Co. in Cherokee County, Kansas, and were convicted under the Kansas Industrial Relations Court Act, which designates coal mining as an essential industry affected with a public interest. They contended that a state could not arbitrarily make such a classification.

The state courts have held that application of the act to the mining industry was valid.

Central Pennsylvania Miners Convene at Altoona

Altoona, Pa., March 11.—The convention of United Mine Workers of District 2 (central Pennsylvania) was called to order at 10.a.m. today with President John Brophy in the chair. Mayor E. F. Gills made an address of welcome to the four hundred delegates present, after which President Brophy submitted a report reviewing his work during the last year. The convention probably will last all week and the miners' representatives will meet with the operators March 20.

Northern West Virginia Balks at Jacksonville Pact

A number of operators in northern West Virginia are outspoken in opposition to the Jacksonville agreement. As one operator expressed it, "the future of union mining in the county depends largely upon the attitude of the miners between now and March 31. Many operators contend that it is a foregone conclusion that the northern West Virginia field cannot accept the Jacksonville agreement and continue to operate. We will have to have a substantial readjustment of the scale or all of the union mines in the district will be shut down after March 31." There is already a considerable tonnage coming from mines operated on a non-union basis along the Monongahela R.R. and in other sections of northern West Virginia and the ranks of the non-union mines may be further augmented owing to the fact that the union mines may not be able to compete with the non-union mines owing to the lower scale of wages in effect at the latter.

Negotiations have been initiated for a conference between officials of the Monongahela Coal Association and the Northern West Virginia Coal Operators' Association at which time preliminary steps will be taken looking to a joint conference of operators and miners, when the mine owners will ask for a concession in wages. Union representatives are not expected to make any concession inasmuch as they never have in district 17 deviated from the agreement made to cover the Central Competitive Field. Hence it seems probable that many northern West Virginia mines after March 31 will either be closed down or where mines are continued in operation it will be on a non-union basis and with a lower scale of wages prevailing.

To Hold National Parley on Uniform Cost Accounting

A national conference on the development of uniform cost accounting will be held at the Hotel Astor, New York City, on Tuesday and Wednesday, March 25 and 26, under the auspices of the Chamber of Commerce of the United States. Invitations are being sent to the representatives of the three hundred principal manufacturing industries of the country. It is expected that there will be a large attendance of association executives and others interested in cost-accounting activities.

On the morning of the first day executives from important industries getting good results from uniform cost accounting will tell about it and answer questions. The afternoon will be devoted to the exchange of experiences as to "The First Steps in Cost Accounting in a Trade Association—How to Arouse Interest."

The second day will be devoted to the more advanced problems, among which will be considered "The Service of the Cost Accounting Committee in Developing Uniform Methods." In the afternoon attention will be given to "How to Get the Uniform System Into Use by the Members of the Industry."

William Newton Logan

Dr. Logan, who is State Geologist of Indiana, has been made a fellow of the Royal Society of Arts, London, in recognition of his work in geological science.

Pittsburgh Coal Co. Has Big Year; Earns $7,309,162

The Pittsburgh Coal Co. earned $7,309,162.31 in 1923, after full charges for interest, depletion and depreciation, but subject to federal income tax, according to the annual report of the company, issued March 10. Gross receipts were $63,069,472 and operating expenses were $51,710,916. The available working capital of the company at the end of the year, exclusive of U. S. Government bonds and other securities owned, was $18,528,767.23, a net increase during the year of $339,043.56.

The company and its subsidiaries produced 13,915,588 tons of bituminous coal last year. Of this, 12,531,575 tons was from mines in the Pittsburgh district, 1,152,061 from mines in Ohio and 241,952 tons from its mine in eastern Kentucky. This is the largest output by the company since 1919, representing an increase of more than 100 per cent over 1922, when operations were suspended for five months by the strike.

The company had 64 mine plants at the beginning of the year and 11 additional mines were acquired with the Great Lakes Coal Mining Co., bringing the total to 75, of which 1 was sold and 2 were not in commission. Of the total in commission, 64 were operated all or part of the year, 5 were idle and 3 were leased. In the Pittsburgh district the mines in operation in the first half of the year numbered 46; in July and August, 45; in September and October, 44; in November, 36, and in December, 27.

Declare Claim Not Justified

Since 1916 the Myers-Whaley shoveling and loading machines have been made in a completely equipped plant devoted exclusively to their manufacture. Mr. William Whaley, the general manager, in a letter of March 4 draws attention to that fact in correction of a similar claim made by another company which appeared on page 327 of *Coal Age* of Feb. 28.

Treadway Scores Pinchot for Anthracite Settlement

Governor Pinchot of Pennsylvania is severely critized for intervening in the anthracite strike in a letter to him made public in Washington, D. C., March 5 by Representative Treadway of Massachusetts. Referring to a brochure issued by Governor Pinchot, Representatives Treadway in his letter, says:

"You endeavor to justify the agreement you entered into on Aug. 27 last, whereby there was an increase of 10 per cent in wages of miners, and point out that this should not have led to any increase in cost to the consumer. As a matter of fact, you no doubt are well aware that it has resulted in an increase of 75c. to $1 per ton to all consumers in New England. At the annual meeting of the United Mine Workers in Indianapolis a few weeks ago, Mr. Lewis, the president, stated that the wages of the miners had been increased by $44,000,000 as a result of this adjustment, which laid a direct toll on the consuming public.

"It is surprising that you should defend the anthracite tax in your state. You say the repeal of this tax was before the Legislature of 1923, but failed to pass. Why do you not state the reason for its failure to pass, namely, your personal influence in opposition to it, even though your campaign committees published flaring advertisements of your support of repeal?

"Your argument of the small amount of this tax is a very weak one. In the aggregate it adds from $8,000,000 to $10,000,000 of expense to the coal-consuming public in order to care for, as it has been stated, deficiencies in the appropriations of your state."

Hero Medals to Four Miners, Including Jones, Who Died

Four coal miners whose acts stood out prominently in last year's mine disasters are to receive hero medals and diplomas on the recommendation of the Joseph A. Holmes Safety Association. One of the awards will be made posthumously. The medals and diplomas will be presented at the Seventh International First Aid and Mine-Rescue Contest at Huntington, W. Va., Sept. 11.

The miners and the deeds for which the awards are to be made follow:

Mike Pavlisin and Clifford Phillips of Frontier, Wyo., who, by "prompt and courageous action," saved the lives of twenty-one fellow miners after an explosion in the Frontier No. 1 Mine of the Kemmerer Coal Co., Kemmerer, Wyo., on Aug. 14, 1923, which resulted in the death of ninety-nine men.

Eben W. Jones, of Peckville, Pa., who saved six lives on the occasion of a roof collapse in the Mount Jessup Coal Co. (Ltd.), property at Peckville, Pa., on Dec. 8, and sacrificed his own life in attempting to rescue four others.

Isaac Cotton, of Jasonville, Ind., who rushed into a cloud of smoke caused by a powder explosion in the mine of the Merchants Heat & Light Co. at Jasonville, on April 18, and carried two men—their clothes aflame—to the surface. The two men, who were brothers, died from their injuries.

West Kentucky Upset by Consolidations And May Go Entirely Non-Union

Labor Policy Difficult to Determine While North American Co. Dickers for Control of Hart, Kentucky Block and St. Bernard Mining Properties

The western Kentucky coal field is in a perturbed condition. Nobody knows what the labor situation in the region is going to produce, and the pending consolidation of four of the main companies is leading to all sorts of speculation. It is now definitely known that the North American Co., owners and operators of public utilities throughout the Middle West, is negotiating not only for the St. Bernard Mining Co. but also for the properties of the Hart Coal Corporation and the Kentucky Block Coal Co. When all these are grouped with the non-union West Kentucky Coal Co. it is predicted that the whole western end of the state will scrap the union.

But the North American Co. has not yet bought all these properties. Engineering examinations and appraisals have been completed and the financiers interested in the proposal are negotiating without having reached a definite conclusion. An option on the St. Bernard properties running to April 26 is said to be bound by a forfeit of $75,000 if the purchase is not made. This option is about to be exercised. If the North American Co. adds all three of the companies to its west Kentucky holdings it will control a potential output of about 500 cars of coal a day.

What is the relation of these negotiations to the western Kentucky labor problem? They have sufficiently excited the entire field so that no man knows what he can say to the union until the consolidation proceedings have culminated and the North American Co.'s labor policy is determined.

District 19 May Go Non-union

There are two contracts with two sections of the west Kentucky field. An agreement between 5,000 miners of District 23 and operators of Christian, Hopkins and Webster Counties, excluding the St. Bernard Mining Co., has another year to run. The rest of the field has a contract with District 19 which expires March 31. Doubtless most of District 19 will now refuse to sign and will go non-union except in Muhlenberg County, where unionism is strong.

Of the coal properties about to be bought by the North American Co. the St. Bernard lies in that part of District 19 which no doubt will refuse to sign and will therefore go non-union. The Hart Coal Corporation, however, is in the three-county region of District 23, whose contract runs another year.

Of course the union would like to renew the three-county contract for three years and the other in 1925, for two years so as to run concurrently with the Central Competitive Field contract. There are many operators, however, who say they will never agree to a contract running longer than one year. Others are preparing to demand a return to the 1917 scale of wages and declare they will meet a strike rather than grant anything higher. The politics of the situation is such, however, that a short-term contract may be made to avoid a tie-up.

The strippers of the field are an important labor factor, and may become even more vital. Already there are fifteen plants either working or ready to run, in most cases able to load out coal much cheaper than can the shaft operations. Well-designed cleaning and washing plants may be installed at more of them so as to give the coal an equal break on the market coal from shaft mines. Some of these mines are practically non-union since the only union men in the pits are the shovel operators, whose organization is in bad odor with the United Mine Workers of America.

This western Kentucky coal meets in various markets a great deal of eastern Kentucky output produced by miners working for varying wages averaging about the 1917 scale. What the producers will say to the miners in conferences to follow the March 11 meeting of the union miners in Louisville remains to be heard. Last week the sentiment was by no means crystallized and there were evidences of difficulty in getting such crystallization.

First-Aid Meet to Be Held at Huntington Sept. 11-13

The Seventh International First-Aid and Mine-Rescue Contest will be held in Huntington, W. Va., Sept. 11, 12 and 13, under the auspices of the Bureau of Mines, with the co-operation of the American National Red Cross, the National Safety Council, and various mine operators' associations and miners' organizations. It is expected that as many as 80 teams of miners trained in the first-aid and mine-rescue courses of the Bureau of Mines, will compete.

$10,000,000 Stock Issue by Consolidation Coal Co.

Directors of the Consolidation Coal Co. have approved an issue of $10,000,000 7 per cent cumulative preferred stock. Holders of common stock as of March 8 will be entitled to subscribe at par at the rate of one share of new preferred for four shares of common held. The proposal will be submitted for ratification at a special stockholders' meeting March 19. Proceeds from the sale of the issue will be used to pay the balance of the purchase price of the Sandy Valley & Elk Horn R.R. and to reimburse the treasury for other capital expenditures.

Cincinnati Convention Plans Set in Motion

Cincinnati, Ohio, will be the center of the coal-mining industry during the week of May 12 to 17 when the National Coal Association and the American Mining Congress hold their joint meeting. At a meeting of the Cincinnati Coal Exchange, Colonel E. O. Dana was appointed president of a committee to arrange for the annual convention of the National Coal Association. James Layne, Jr., will be the secretary, and W. T. Slaughter the treasurer. The meeting was held in the office of Stewart McVeigh, vice-president of the Island Creek Coal Co., after word was received from W. E. E. Koepler, chairman of the Convention Committee of the National Coal Association, that the invitation to meet in Cincinnati had been accepted.

The Manufacturers Division of the American Mining Congress has arranged to stage an exposition of coal-mining equipment and machinery and to work out a program covering informal discussion of the practical everyday equipment problems with which coal-mining engineers and operating officials are constantly confronted. The machinery exposition will embrace exhibits of the very latest types of mechanical equipment from approximately 125 representative manufacturing concerns. The display will be held in the North hall of the Cincinnati Music Hall, which is conveniently located and which will make an effective setting for the exposition. The sessions of the National Coal Association will be held during the mornings, leaving the entire afternoons free for an inspection of the displays and for the open-forum discussions of practical equipment problems, which will be worked out under the auspices of the Standardization Division and the Manufacturers Division of the American Mining Congress.

The headquarters of the National Coal Association will be at the Hotel Sinton and the headquarters of the Manufacturers Division and Standardization Division of the American Mining Congress will be at the Hotel Gibson.

Further information can be obtained from the American Mining Congress, Washingon, D. C.

Canadian Miners Want More Pay

The agreement between the coal miners and operators in District 18, United Mine Workers, covering the southern Alberta and eastern British Columbia fields, expires on March 31, and the miners now are considering demands that are to be made for future operation. While nothing official has been announced, it is pretty certain that the miners' demands will include an increased wage and an agreement for a term of not less than three years. It also is quite certain that the operators will resist both demands. At the present time orders are slack, owing to the extended use of fuel oil on the railways and an unusually mild winter. Recently, the Crows Nest Pass Coal Co. closed two of its mines on account of no market.

Anthracite Safer and More Economical Than Oil

Anthracite is superior to oil for fuel purposes from the standpoint of safety, economy, practicability and desirability, according to a brochure issued by the Anthracite Bureau of Information, Philadelphia. The booklet is a reprint of an address by E. W. Parker before the Philadelphia Builders' Association.

Disastrous fires caused by oil-heating equipment in various parts of the country are cited as indications of the danger in its use. Issuance of a flood of summonses to court by the New York Fire Department for failure to obtain required permits as well as the refusal of the Fire Prevention Bureau to grant applications for dwellings with such installations also are cases in point. "It is different with anthracite. No rules are issued, no permits are required for the installation of an anthracite-burning equipment. It is absolutely safe."

In the matter of economy the booklet says: "The price of fuel oil in Philadelphia delivered in 500-gallon tank lots is 8c. a gallon, at which the cost of 153 gallons, the quantity required to produce the same amount of heat as a ton of buckwheat anthracite, would be $12.24. The price of buckwheat delivered is $8, the difference being $4.24, or a little more than 50 per cent."

The use of oil fuel causes such speedy deterioration of boiler tubes and fittings that a Rhode Island plant was obliged to replace 1,500 boiler tubes in one year after oil-burning equipment had been installed. Anthracite, on the other hand, being low in sulphur, causes a minimum of injury to metal surfaces, insuring longer life to boiler tubes.

For domestic heating, says Mr. Parker, anthracite combines safety, economy, practicability and desirability, a number of simple and inexpensive devices now on the market making low-priced buckwheat available for that purpose, so that householders and building owners should think twice before changing their heating systems by substituting oil for anthracite.

New River Output Jumps on Resumption of 1917 Scale

Plants of the New River Co., operating in the New River district of West Virginia, are now producing coal at the rate of approximately 7,500 tons a day, equivalent to 187,500 tons a month. Production reached the present figure during the latter part of January, soon after the mines resumed operation upon the request of the miners and on the basis of the 1917 wage scale. It will be recalled that the mines suspended production on Jan. 14 owing to the low price prevailing on coal at that time, which made it impossible to produce coal at a profit with the higher scale of wages in effect. It is stated that since the resumption of operation at the lower level of wages the company has been able to operate profitably. It was possible to readjust wages to meet market conditions owing to the fact that the mines of the company are operated on a non-union basis.

Dempsey Ducks Bout with Old Battle-Ax Coal

Jack Dempsey, champion heavyweight boxer of the world, has decided not to go into Utah coal with the Great Western Coal Mines Co. This appears in connection with the announcement that unless the public leases parts of two coal tracts totaling 1,600 acres in Carbon County which have just been segregated by the Secretary of the Interior, the company will take the lease and develop the land. The proposed mining town, which was to have been called Dempsey, probably will be called Coaltown. The initial investment that must be made in the two tracts within three years is $45,000. After three years the output of the property must attain 25,000 tons a year.

New Record Made in Output Of Briquets in 1923

A new high record was established in the production of fuel briquets in 1923. Reports to the Geological Survey show that the total output was 696,810 net tons, an increase over production in 1922 of 77,385 tons, or approximately 12 per cent. This increase may be largely attributed to improvement in demand for briquets in the Eastern States, which resulted in an increase of 48 per cent in the output of plants in that territory. Production increased slightly in the Pacific Coast States, but in the Central States, where the largest increase in 1922 occurred, there was a decrease of 5 per cent.

Fuel Briquets Produced in the United States in 1916-1923

Year	Net Tons	Value
1916	295,155	$1,445,662
1917	406,856	2,233,888
1918	477,235	3,212,793
1919	295,734	2,301,054
1920	567,192	4,623,831
1921	398,949	3,632,301
1922	619,425	5,444,926
1923	696,810	5,898,698

Of the 14 plants that operated 5 used anthracite culm or fines, 2 semi-anthracite, 2 a mixture of anthracite fines or culm and bituminous slack, 1 semi-bituminous slack, 1 bituminous slack, 1 a mixture of bituminous slack and sub-bituminous coal, and 2 carbon residue from the manufacture of oil gas.

The total quantity of raw fuel used was 682,490 net tons, an increase of 11 per cent over the quantity used in 1922. Of the total, 49 per cent was anthracite and semi-anthracite, 33 per cent semi-bituminous and bituminous slack, and 18 per cent sub-bituminous coal and oil-gas residue.

Raw Fuels Used in Making Briquets in the United States, 1920-1923

(Net Tons)

Fuel	1920	1921	1922	1923
Anthracite culm and fine sizes and semi-anthracite	356,877	190,964	254,563	331,102
Semi-bituminous and bituminous slack and coke	a 125,506	121,925	235,542	a 225,508
Lignite, sub-bituminous coal, and oil-gas residue	89,656	b 85,352	b 123,339	b 125,880
	572,039	398,241	613,444	682,490

(a) Includes no coke. (b) Includes no brown lignite.

State Completes Its Case Against Keeney

With the testimony of three witnesses the State of West Virginia on March 4 completed its case against C. Frank Keeney, president of district 17, United Mine Workers, which was begun on Feb. 11. Keeney is charged with being an accessory to the murder of John Gore, a Logan County deputy sheriff, and of complicity in the Logan armed march of 1921. Just as soon as the last witness for the state had testified the defense entered a motion to strike out the evidence of the state, whereupon extended arguments on the motion ensued.

The state sought through the last witnesses introduced to prove certain circumstances as to a conference between Keeney and others at the home of Henry Nichols at Dry Branch on Cabin Creek in which union officials and Walter Allen, alleged leaders of the armed march, too part. According to the testimony of Nichols, his wife and his daughter, Christine Nichols, there were present at the conference, Allen, Keeney, Fred Mooney, district secretary, and Harold W. Houston, chief counsel for the union in the present trial. The witnesses were unable give the gist of the proceedings at the conference other than frequent mention of Logan and Mingo counties. They declared that the conference occurred just before the miners began to assemble on Lens Creek for the march. Nichols and his wife both testified to seeing Keeney at Marmet.

The last witness for the state was the Rev. J. E. Wilburn, who had been on the stand earlier in the trial. He was recalled in order that he might be asked about a letter purporting to be from him to William Blizzard. Wilburn identified the letter but declared that some changes had been made in it.

J. F. Hayes, of Milton, and Joe Huff, former members of the Dobra local of the United Mine Workers, were important witnesses for the state, testifying as to a payment alleged to have been made by District Secretary Fred Mooney to Earl Hager for the purpose of obtaining guns and ammunition.

It was testified by William Swanner that several weeks before the armed march began, Mooney, in the course of a talk to the Clothier local members, had told the miners to get guns and had said "If you haven't got the money, the local has; and if the local hasn't got enough, the district and the International will back you up."

As a matter of fact most of the witnesses used by the state in its case against Keeney have been former members of the union, many of them participants in the armed march, according to their own admission.

Legality of Trade Statistics a Vital Issue As Keen Competition Looms Ahead

Failing Judicial Pronouncement, Statement of Administration Policy Would Be Important Help to Coal Industry—Opportunity Seen in Offer of Full Data to Commerce Department

By Paul Wooton
Washington Correspondent of *Coal Age*

It is so important to the coal industry to have reliable statistics if disaster is to be avoided during the period of intensive competition which is certain to result from the three-year agreement entered into with the United Mine Workers that attention at this time seems to be focussed on the question of legality of trade statistics. Steps are being taken to obtain the enactment of legislation that will make clear the rights of industry to have the information necessary to the intelligent conduct of business. In view of the existing situation, all agree that comprehensive and accurate statistics are more important to the coal industry at this time than to any other activity.

It has been suggested that the Department of Justice should bring a test case against an association engaged in clear-cut statistical activities. The department is understood to be disinclined to take such action, although it is believed to concede that these statistics are in the public interest. It also has been suggested, as discussed in this correspondence last week, that a friendly suit be brought against one of the local associations by a consumer of coal who could contend that he is being injured by the statistical activities of the association.

It is agreed that a long time will be required to obtain legislation. Moreover, it is a situation which could not be met in a legislative way without arousing the politician who believes he can profit by baiting industry. All agree that a judicial determination of the uncertainty would be best. In case there should be any hesitancy about initiating steps to that end, however, the next best thing, it is agreed, is to obtain a pronouncement of policy from the administration.

The situation is similar to that which arose when Pittsburgh operators appealed to Secretary Hoover for a statement of policy as to their participation in a wage conference with the United Mine Workers. Mr. Hoover assured them that such action would not be in contravention of the anti-trust statutes. While it was reassuring to the operators to have such an expression from the Secretary of Commerce, they realize that he had no control over the Attorney General. They were fully assured, however, when Mr. Hoover obtained from the President a similar expression.

It is believed some way can be found to obtain from the administration a definite statement of policy in connection with trade statistics. The position of the Secretary of Commerce is generally known. His efforts to clear up the situation thus far have been futile, as is indicated by his correspondence with the Attorney General. It now is suggested that one of the coal-trade associations might be able to obtain a pronouncement of administration policy were it to make a definite offer to the Department of Commerce to furnish it with its full statistical reports. The offer would be accompanied by a specific statement that it did not expect any guarantee of immunity from prosecution. It would be made plain that the issue is being raised to develop a method of making the information available so as to comply in the fullest degree with the law and with the hints which the courts have given that any information gathered must be made available to all concerned on equal terms.

The right would be conceded to the Department of Commerce to check against the original returns the accuracy of any reports furnished by individual companies. The association might promise to accept any suggestion from the department as to the time and method under which the information would reach its members. If such an offer were made along with a guarantee that the information is accurate and that it will be distributed in a way intended to prevent misuse of the information, it would seem that such an offer would have to be accepted or rejected. Sympathetic as is Mr. Hoover, it is not improbable that he would be willing to carry the specific offer to the next Cabinet meeting and try to get an expression of administration policy.

It is difficult to see how the administration could decline to accept such an offer. At any rate it certainly would put the trade association making it in a most favorable light. It also is possible that the discussion of such an offer by the Cabinet might result in the initiation of a test suit by the Department of Justice, which is the step most desired.

Central Pennsylvania Wage Parley March 20

March 20 has been selected as the date for the joint meeting of the operators of central Pennsylvania and the officials of District 2, United Mine Workers. The meeting will be held in Altoona and it is expected that an agreement will be reached as a basis on which a wage scale to take the place of the present scale, which expires March 31, may be formulated. It is probable that the plan adopted at the Jacksonville, (Fla.) conference, by the Central Competitive Field, will form the basis of the agreement in central Pennsylvania.

Line Forms On Left; Don't Crowd

A Klondike rush to buy western Kentucky coal may—or may not—start, now that R. F. Davis, 1224 South First St., Louisville, Ky., announces that he has perfected a chemical process that will take 2 lb. of silver out of 50 lb. of western Kentucky coal. The lower the grade of coal, the more silver he can get by soaking the coal 15 days in his secret solution. He is surprised, he says, that the chemists have been calling all this silver sulphur, and thinks it is too bad that so many million dollars worth have gone up the flues of the Middle West. Bar silver is quoted nowadays at $10.30 a pound, but he says he is in no hurry to start a silver soakery, even though he can get $834 worth of silver out of every ton of coal without hurting the coal much. Market news: West Kentucky mine run $1.50@$1.90.

Nova Scotia Miners Vote to Reject Wage Settlement

Coal miners of District 26 (Nova Scotia) on March 6 voted, 5,617 to 3,145, against acceptance of the wage scale recently negotiated between International officers of the union and the British Empire Steel Corporation. Semi-official reports were in circulation that the union would withdraw from Nova Scotia as a result of this action.

Unions of District 26 have been under a provisional government since last summer, John L. Lewis, president of the International, having ousted the regularly elected officers for calling an allegedly unauthorized strike. The latest suspension occurred in January, causing 12,000 men to remain idle for several weeks and ending when work was resumed under the wage agreement which failed of ratification in the referendum March 6.

Hundreds of Cape Breton coal miners quit work March 7 and a civic holiday was declared in honor of James B. MacLachlan, deposed official of the United Mine Workers, who arrived in Glace Bay on leave from Dorchester penitentiary, where he is serving sentence for sedition in connection with last year's strike.

MacLachlan, secretary, and Dan Lingingstone, president, were removed as officials of District 26 at the instance of John L. Lewis, International president of the miners' union, during the 1923 strike. The secretary later was sentenced to two years for having circulated handbills denouncing the government for sending troops to the strike zone.

MacLachlan's arrival at Glace Bay and his trip through the coal fields was a triumphant procession. A thousand miners greeted him with two brass bands and he was formally welcome to each town through which he traveled.

When he reached Sydney he was paraded through the city to Steel Workers' Hall, where the "Red Flag," song of the Third International, was sung.

Watson and McAuliffe Point Out Advantages Of Three-Year Treaty of Peace

Comment of President of Consolidation Coal Co.

In commenting on the Jacksonville agreement it may be wise to distinguish between the contract as a three-year peace treaty and as an economic fact. To avoid another nationwide strike at this time and to provide for uninterrupted production for three years is clearly to the advantage of both the industry and the public. The latter is assured of a continuous supply of coal and is, therefore, without any just cause for complaint. The industry benefits by the fact that those portions of it which can live and prosper only by strikes, shortage and public panic are given no chance to profit at the expense of established enterprises. As a peace measure, therefore, the three-year contract has undoubted benefits.

So far as the economics of the industry are concerned, the three-year truce, if wisely used, can be made to contribute to the future strength and stability of the industry. Though peace between operators and labor in itself alone does not guarantee a prosperous industry, it gives all constructive elements a chance to restore healthy conditions.

Though this process may be temporarily drastic for some, its results, in my judgment, will be beneficial to the industry as a whole. The free play of supply and demand usually has proved a good medicine for industrial ills. In the case of the present coal situation, whatever its temporary phases, the bituminous-coal industry may confidently be expected to retain its place as the country's basic business, fundamentally sound and vital to national prosperity. No temporary ailments can affect the essential work it has always performed, nor can any competitor permanently take its place in the industrial structure.

In my judgment, the clearest road toward profitable business this year, both for individual companies and for producing districts, lies in the direction of *cheap coal.* This does not mean the saving of a few cents per ton here and there, so much as it means applying every method of economy, efficiency and improved machinery. Those companies and those districts which are so situated as to put these measures most fully into effect will receive returns in proportion to their efforts. In addition, if labor will co-operate in all these economies and adjustments, it also will receive its reward in employment.

During the months ahead, no one expects profits to flow into the treasury without much intelligent selling and operating effort. But for those who offer on the markets the cheapest coal that can be produced under the most improved mining and management there seems no good reason to anticipate other than a normal share in the prosperity of the country as a whole.

C. W. WATSON.
New York City. President

Statement of Union Pacific Coal Co. Head

The three-year contract arranged for at Jacksonville undoubtedly will tend to eliminate surplus mines and mine labor, and most of all will it reduce the cost of coal to the consumer. This will mean financial loss to many companies owning high-cost mines, but that situation is one that the industry has been drifting toward since 1917; in fact before that year.

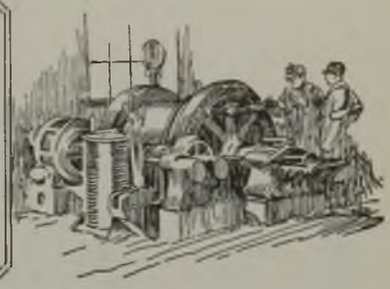
As to the effect the reconstruction process will have on the mine workers' union, it is hard to predict. Mr. Lewis certainly made a logical, temperate presentation of his wants to the operators, and his arguments were well received, making a deep impression on many accustomed to the old order of affairs.

The operators, as well as their employees, who see failure ahead of them will be loath to surrender their market and their day's work to other mines where more favorable cost conditions govern and to the competing non-union mines. An "honest to goodness' alliance between the union and union operators, expressed in the taking off of burdensome conditions, the taxes levied in the form of allowances for this and that, obtained by the workers in the past, coupled with a determination on the part of the men to get behind their portion of the industry rather than to harass it, would go far to carry such mines and their man power until the growth in demand for coal would perhaps restore prosperity.

Further progress toward coal-mining composure will automatically come from their gradual use of mechanical loaders and improved forms of mine transportation, and it behooves every operator to give serious attention to this line of endeavor. To venture any sort of prediction concerning coal is dangerous, but I am of the impression that if the rank and file of the workers fail to extend and amplify the apparent new spirit evidenced by their leaders at Jacksonville, the union will gradually suffer internal losses by reason of their men deserting the union mines to take employment in those working without the union. No one will gainsay the fact that union loyalty is built on the foundation of results obtained, and likewise even the dullest man knows that a high day or unit wage without work is an empty sinecure.

EUGENE MCAULIFFE.
Omaha, Neb. President

Practical Pointers For Electrical And Mechanical Men



Serious Damages Result from Hasty Repairs to Resistance Grids

It is a well known fact that mine locomotive equipment receives less attention and more abuse than any other piece of mining machinery. Locomotives, as a class, have been built very sturdy because of the kind of work they must perform and the bad conditions under which they operate. However, there are many points about locomotive equipment which must be given at least ordinary attention, in order to prevent serious damage or long delays.

One of the worst mine practices is hasty and improper repair of resistance grids. Frequently, resistance banks are exposed to falls of rock, coal and retracking equipment carried on the locomotive. In some mines it is not uncommon to find the rheostat very poorly repaired and jumpered by pieces of iron, steel or copper.

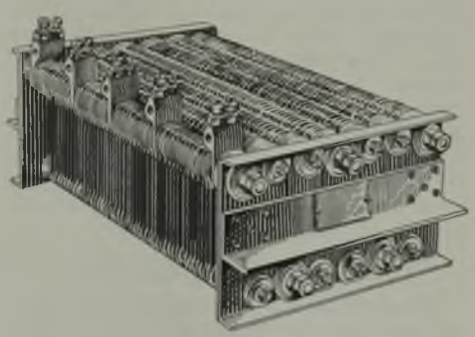
When a resistance grid becomes broken, some motormen have deliberately broken other grids in order to temporarily twist the broken parts so as to complete the circuit. Another common practice is to wedge a piece of iron, usually a rail spike, into the broken parts of the resistance.

Such methods as those are often very dangerous to the equipment, cause jerky operation and damage, to say nothing about the possibilities of starting a mine fire. The illustration shows what resulted after a motor runner had forced a mine spike into some broken grids and turned on the controller of the locomotive. This piece of metal very quickly fused together and soon dropped to the ground between the rails. It is not hard to imagine the fire hazard which very naturally resulted.

So as to eliminate the necessity for such dangerous forms of repair, it would probably be a good plan to equip resistance banks with several additional terminals so spaced that whenever a grid becomes broken it would be possible to jumper it by inserting a copper wire into two such terminals. This is illustrated in the accompanying sketch. If such a plan were adopted, it would be very easy for the motorman to make a very good repair on the resistance and thus not be troubled with the frequent delays that usually occur when makeshift repairs are made.

What Resulted from a Hasty Repair To a Resistance Bank

After the spike was driven between the resistance grids, the power was turned on and this hot molten mass fell to the ground. Obviously a serious mine fire might have resulted.



Locomotive Resistance Bank Equipped with Extra Terminals

A copper jumper may easily be attached to the spare terminals and an efficient and safe repair quickly made.

Novel Method Will Be Used To Anchor Power Towers

A unique method of anchorage will be used to anchor the steel towers of the new $1,250,000 electric transmission line to be built by the Illinois Power & Light Corporation from the power dam at Keokuk, Iowa, to Galesburg, Ill.

A hole 8 ft. deep and 5½ in. in diameter will be drilled where each leg of a tower is to stand. Dynamite will then be lowered into the hole and touched off, blowing a cavity at the bottom two feet in diameter. Concrete will be poured into the cavity and the legs of the tower set into it. After the concrete hardens, the tower legs will be anchored in solid balls of stone imbedded in walls of earth compressed by the exploded dynamite.

This will be the first trial, it is said, of the new anchor construction in Illinois, but one now being used in all modern building of steel transmission lines.

Material for the new line has been contracted for by the Illinois Power and Light Corporation. The Blaw-Knox Company, Pittsburgh, will furnish the steel towers; the Aluminum Company of America, Messina, N. Y., the wire; and the Westinghouse Electric & Manufacturing Co., East Pittsburgh, the insulators.

Hints on Coal Analyses for Clinkering Temperatures

The determination of the fusibility of coal ash has become increasingly important in recent years. Especially is this so in relation to the operation of mechanical stokers and production of gas. The composition of the ash is often far more important than the amount.

Alumina is the most refractory constituent of ash and its fusing point, 2,000 deg. C., is lowered proportionately to the amounts of alkalies, silica, and iron present. In many coals the amounts of all but the latter do not lower the fusing point sufficiently to cause great trouble; that is, below 1,400 deg. C. At this point, the amount of iron becomes of supreme importance, as is distinctly shown in the classification of coals such as white and red ash. The technical composition of the iron is of great importance also, as in the ferrous state it lowers the fusion point greatly while in the ferric state, it has but slight effect. The influence of sulphur upon fusing point probably depends upon the accompanying presence of iron as pyrites. In the presence of burning carbon, the ferric oxide may or may not be reduced to ferrous oxide, according to the amount of oxygen supplied and the care of the fire. This no doubt explains discrepancies occurring between actual clinkering of the coal on the grates and the fusing point as determined in a laboratory furnace. For the same reason the fusing point will be found to vary in different types of laboratory furnaces. Therefore, we should deem it advisable to choose such furnaces for laboratory tests as will give reducing atmospheres and hence lower the fusing point, indicating the proper results.

When a test is being made the coal should be burned to ash in clay dishes at as low a temperature as possible; then moistened with water and moulded

into the shape of a Seger cone (½ in. x 2 in.) by pressing into a mould that may be conveniently made of lead. A piece of thin paper may be moistened and laid in the mould to facilitate removal of the cone. Some coals may require a binder which may be made of a 10 per cent dextrin paste, although this is rarely necessary. The use of smaller cones has recently been advocated.

The cones may be set in triangular holes in a Dixon graphite block and placed in the furnace so as to stand horizontally. This position gives as concordant results as the vertical position and probably more accurate. The fusing point is noted when the cone droops to a vertical position. Care must be taken that the temperature does not rise too rapidly when nearing the fusing point. Satisfactory results may be obtained with a rise of about 5 deg. C. per minute. As reducing atmospheres preclude the use of metallic couples at high temperatures, the temperature may be conveniently read by a fixed-focus total-reduction pyrometer or an optical pyrometer of the Wanner type.

Several furnaces for high temperatures, suitable for the laboratory, are on the market, and a very convenient one for the test just described is the Hoskins Electric Furnace. Heat is generated by means of a heavy alternating current of low voltage passing through a series of carbon plates. This furnace uses a standard 60-cycle supply of current at 220 volts, and consumes about 40 amperes. By the aid of an air-cooled transformer, the voltage is lowered to a pressure of 10 volts. The maximum temperature produced by this furnace is about 2,000 deg. C.

Royce L. Grimes,
Electrical and Chemical Engineer.
Cleveland, Ohio.

Results of Study of Corrosive Action of Mine Water

Probably the most important corrosion problem to the mine operator is that of pumping equipment. Pumps which may give excellent service under ordinary conditions, where the mechanical strength, workability and other physical properties are the only factors to be considered, may not resist the action of acid mine water. Brass and bronze, as well as ordinary cast-iron and ordinary steel, corrode rapidly in acid mine water.

In many mines it has been the practice to babbitt the pump chambers. This will partially solve the problem, but is not entirely satisfactory for mechanical reasons. Lead-lined chambers give good service, if the lining is tight against the outer wall and does not permit leaks. Porcelain plungers are giving good service, and, if properly cared for, may be safely substituted for the brass and bronze or cast-iron. One advantage in the use of porcelain plungers is that packing troubles can be reduced if this type of plunger is placed in the pumps true and level. If there is any appreciable give or flexure after mounting, the porcelain may crack. The shell of porcelain must be attached and held firmly to the plunger rod. If allowed to run "dry" in the pump, it is liable to overheat and crack.

Packing Trouble Eliminated

The connections should be of some proved acid-resisting material. If care is not used in selecting the connections, corrosion may cause the failure of the connecting part, allowing the shell to wiggle and crack. Little packing trouble is encountered with a plunger of this type. If it costs, say, $150 to install a 10-in. porcelain plunger, and $125 to repack a pump, it can readily be seen that if packing troubles and "corrosion of plunger" troubles can be reduced, the extra cost is soon made up. The plunger rod may be made of a material such as a high-chromium-nickel-silicon steel. Such a rod was recently removed from a mine pump after four months of service. It had failed at the threads, but not elsewhere. On bronze rods it was customary to obtain about one month's service under the same conditions.

Another serious problem is that of the corrosion of pipes. Ordinary iron or steel pipe, or even wrought-iron pipe, does not last long in very acid water. By lining the pipes with wood it is possible to obtain a satisfactory period of service, providing the pipe can be kept on a grade so that there is no trap. Wood pipe will have a tendency to clog up, if a dip or trap of any kind is in the line.

Lead-lined Pipes Suggested

Substitutes for the wood-lined pipe or for iron or steel or wrought-iron pipe have been suggested. Lead-lined pipes might be expected to be of value, and would be if the joints were always tight and if no cracks or leaks developed as the result of buckling of the lead lining, or by attrition by sand or other material wearing through the lining. Lead-lined connections at the pumps might be expected to be of value, but the velocity and pressure of the water are high and the joints must be perfect, or leaks result. For pipe of small diameter, all-wood pipes can be used; say, up to four inches in diameter, or even above that, if bored. Stave pipe may fail, because even a tiny leak, or water from outside, may rapidly corrode the binding wire.

On pumps, acid-resisting alloys or porcelain can be substituted for the materials which fail rapidly. In pipelines, wood can be used, but for track corrosion there is nothing cheap enough which can be substituted. Track will corrode very fast if exposed to the action of acid water. Obviously it is expensive to tear up old track and buy and install new track. The remedy for track corrosion seems to lie in grading the track out of the way of the water. Frequently this can be done by shooting down the roof and building a ditch line alongside the track. In many cases the expense of grading would be more than the amount saved, but on main haulageways care in the grading may save considerable expense.

There are paints which will resist the action of acid water fairly well, if abrasion and friction or strains do not break the protective film. Of course, paint is widely used, and if properly chosen will aid considerably in lengthening the life of some of the equipment exposed to the action of the acid water.

The corrosion of other equipment, such as shovels, bars, picks, car-wheels, etc., can best be avoided by keeping them out of the water rather than by attempting to substitute a resistant material.

The question as to the effect of acid mine water on concrete, especially when used in dams and stoppings, has not been definitely answered. From such information as is available, it would seem that, if the mixture is correct, there is not much trouble experienced.

Acid Neutralized with Lime

Frequently, it is necessary or desirable to use mine water in the boilers of the power-plant. Of course, if the water is acid it will quickly corrode the boiler tubes unless previously neutralized. This neutralization can be accomplished by treating with lime rock, as is done at the Calumet mine of the H. C. Frick Coke Co. The resulting precipitate finds a limited market.

It has been suggested that if the water were neutralized underground the pumping equipment would not be corroded. Lime-rock and blast-furnace slag have been suggested as suitable neutralizing agents. There are serious objections to attempting to neutralize mine water underground: (1) large settling and overflow tanks are required, which would involve considerable extra expense in excavating the room; (2) water would probably have to be pumped to one central sump before treating, so the corrosion of pumping equipment would be only partly eliminated; (3) the neutralizing agent would have to be taken into the mine and the product of neutralization removed, involving considerable extra transportation or hoisting.

Tinning Stranded Copper Beyond Support

Bad effects often result from tinning stranded copper beyond the point where the joint is made. For example, instead of coming out through the end of the connector, the solder should stop just inside the connector, so that the stresses will not localize on the strands where the tinning stops and where the strands are not supported against vibration.

One hp. equals:

745.7	watts.
0.7457	kw.
33,000	ft.-lb. per minute.
550	2 ft.-lb. per minute.
2,546.5	heat units per hour.
42.44	heat units per minute.
0.707	heat units per second.
0.174	lb. carbon oxidized per hour.
2.62	lb. water evaporated per hour from and at 212 deg. F.

Problems In Underground Management

Indicating Mine Conditions by Placing Colored Tacks on the Mine Map

Room and Pillar Miners, Heading Men, Pumps, Hoists and Locomotives Symbolized by Red, Yellow, Green and Other Pins Spotted at Appropriate Points

By Jerome C. White
Penker Coal Mining Co.
Portage, Pa.

"Records and reports," says a prominent industrial engineer, "should be immediate, reliable, permanent and accurate." In the coal industry, one of the records which should be describable in these terms should be the mine map. Every mining man recognizes that necessity so its advantages need not be discussed.

On most maps not only is the completed work plotted but the proposed development also, broken lines being used for that purpose Unfortunately, the map usually lags behind in its record of active workings, and many superintendents and mine foremen correct that deficiency by drawing the extensions in pencil on the blueprint.

Nevertheless, the map thus corrected does not convey information of a much needed character It does not show, for instance, whether the places are working or standing idle nor the number of men at work at their extension if they are being worked. This can be accomplished by the use of glass-headed tacks or push pins of varied colors. The method of using these pins is susceptible of wide variation and may be expanded in detail as the user becomes adept in the portrayal of information by the means chosen. Any one can use the method I am about to describe which requires nothing more elaborate than the tacks to which I have referred.

Each pin represents a man; a red pin, let us say, represents a miner loading in a room; a green pin, a heading driver, and a yellow pin, a miner removing a pillar. This system, by the way, has been found to be particularly valuable in widely scattered pillar sections. Any variety or number of different designs can be secured and used, let us say, to show the location of pumps, hoists or any other pieces or machinery that are moved from place to place and that cannot be posted justifiably on a permanent map or are not ordinarily shown thereon. For instance, if desired, it is possible to show the number and type of any locomotive serving any entry or section. Thus the company with which I am connected has a No. 5 locomotive that serves the 5th Left and 1st North headings. Now, a pin bearing the number 5 can be placed at the opening of each of those headings. Consulting one's notes or memory it is found that locomotive No. 5 is an 8-ton trolley type machine fitted with a cable reel.

Every measuring day the mine foreman can move his "men" forward; but as far as this is concerned he can move them ahead every time he has the necessary measurements which, in the case of important headings, he will receive daily as advances are made. As men quit or are shifted to new positions the pins can be relocated accordingly. The picture presented can be used by the mine foreman or the superintendent to strengthen their arguments that an additional haulage unit or some other piece of equipment is necessary by showing forcefully the density of the workers or the degree of concentration employed.

Though it is admitted that mine foremen and their assistants usually know the mine and carry such facts in their heads, yet the advantage of putting these records in concrete form for the use of every one concerned will be at once appreciated. This information is highly useful on such occasions as the periodic visits of the superintendent, general superintendent, inspectors, etc. Numerous other advantages are possessed by this system, and with the exception of the first work of planning the nomenclature and placing or locating the pins, the total time daily expended in keeping this record abreast of actual work will not be more than five minutes. The total cost for the equipment will not exceed $5, even for the largest mine. Some soft backing can be used for the mine projection such as pine, wall or beaver board. The pins can be stuck in plaster if necessary.

It should be understood that I am not suggesting this method as a substitute for, or to take the place of, any checking system. I am sure, however, that any one who cares to try it will be pleased with the results. This system is applicable to large and small mines alike, and with it one can quickly, intelligently and forcefully explain his work, methods and progress and illustrate his explanation to the intelligent understanding of all interested parties.

It has this further advantage, that at a glance it will show to the operating officials in charge all the work in hand, together with its location and progress. This is true visualization. The records are thus immediate, reliable and accurate and the map is permanent. In this respect it puts the mining man on a par with the best of other industrial officials, and if immediately adopted, for the time being at least, will place him who uses it in advance of some of his brother operators.

To Replace Flame Safety Lamp As a Gas Indicator

In order to give the miner the advantage afforded by the use of the flame safety lamp when using electric illumination an instrument known as the "methanometer" has been devised by L. Williams. It consists of a combustion chamber in which the methane in a methane-air mixture under pressure is burned by a heated platinum wire, and a long capillary glass tube containing a column of liquid which rests at one end on the elastic membrane by which the combustion chamber is covered and at the other engages a column of air against the sealed end of the tube. By this column of liquid the changes of volume after combustion are measured, the volumetric changes, of course, corresponding with the percentage of methane in the air.

The instrument acts slowly, for the combustion chamber does not contract promptly but gradually cools. This cooling is, however, sufficiently uniform that allowances can be made for it when calibrating and using the instrument. Thus if the time of heating the wire is five seconds and the time allowed to elapse after the current has been interrupted is always fifteen seconds, constant readings for a given percentage of methane are obtainable.

The British Committee on Miners' Lamps says of this device: "Inasmuch as the principle upon which this instrument works is that of combustion analysis, it will be understood that incorrect readings will be obtained if the inflammable mixture to be analyzed contains more methane than can be burned completely by the oxygen of the air, that is more than 9.45 per cent of methane. This should not militate seriously against its use, which we imagine will be mainly for the determination of small percentages of methane that cannot be estimated accurately with the flame safety lamp."

Production And the Market

Waiting Game Is Policy in Soft-Coal Market; Consumers Seem to Hold Off for Inducements

A disposition to hold back prevails throughout the coal trade. The habit at this time of year of "laying low" to see what will happen April 1 has grown to such a degree that it is observed as a sort of ritual. There is no doubt, however, that the action of the miners in voting March 12 on the Jacksonville agreement is awaited with interest. Then too, wage agreements are still to be negotiated in the Kanawha field, western Kentucky, central Pennsylvania and northern West Virginia. Meetings to draw up pacts in the latter two districts are about to be held.

In some regions consumers are waiting for new price circulars to appear before committing themselves, continued mild weather aiding and abetting them in their policy of "playing safe." In some quarters there is a strong belief that a favorable attitude by government authorities toward the compilation of trade statistics is one of the greatest needs of the coal industry at this time with the keenest kind of competition looming ahead.

Coal Age Index declined 2 points to 181, as of March 8, the corresponding average price being $2.18. This compares with $2.21 on March 1.

Midwest Sogginess Unrelieved

Even the most optimistic seller of coal in the Middle West can see little cause for encouragement in the present condition of the market. The usual slowing down of domestic business is in evidence and even steam coals, which were on the upgrade a week ago, have softened a little. Only one railroad, the Grand Trunk, has invited bids on fuel for the year, nor does industry show a disposition to let long-term contracts, though the operators show a real willingness to sign them up. Big consumers seem to have adopted a program of keeping the producers on the anxious seat for awhile, with the apparent hope of being offered inducements to come in. Prices in the southern Illinois and Mt. Olive fields have fallen sharply and a number of mines in the Standard field have suspended for lack of business.

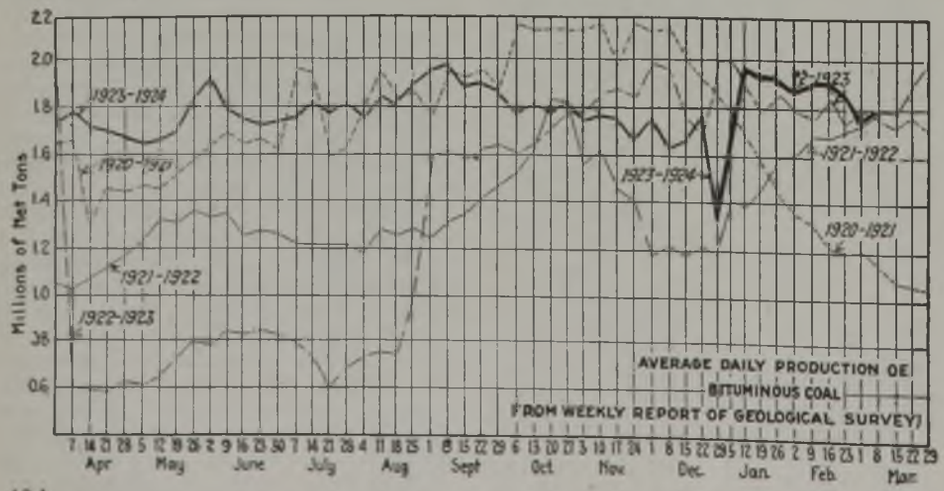
Western Kentucky Maintains Values

Operators in western Kentucky are maintaining values despite discouraging competition from non-union fields and strip operations. A strike is likely in April that will affect more than half the field's output.

Northwestern consumers shrewdly wait, with soft spring weather prevailing and a heavy supply on the docks, some of which may have to be moved in a hurry before the navigation season opens. Power companies seem to be the only buyers, some large orders having been placed to make up for lack of water power. Mines in the Southwest are working only a little better than half of normal, with a growing accumulation of lump and nut "no bills" and a shading of list prices on domestic grades.

The Ohio trade is completely at sea over the new conditions prevailing in the market. Dullness reigns in the Pittsburgh and central Pennsylvania markets. New England reports no new developments to relieve the funereal calm that has settled over the market. Dealers in Atlantic seaboard markets find customers scarce.

Bituminous coal produced during the week ended March 1 totaled 10,705,000 net tons, according to the Geological Survey, an increase of 338,000 tons compared with the previous week, which was a holiday week, but a decrease of 434,000 tons from the week ended Feb.



Estimates of Production

(Net Tons)

	1922–1923	1923–1924
BITUMINOUS		
Feb. 16	10,431,000	11,139,000
Feb. 23 (*a*)	10,324,000	10,367,000
March 1 (*b*)	10,946,000	10,705,000
Daily average	1,824,000	1,784,000
Coal year	385,688,000	503,467,000
Daily Average coal year	1,366,000	1,792,000
ANTHRACITE		
Feb. 16	1,826,000	1,900,000
Feb. 23	1,838,000	1,655,000
March 1	2,104,000	1,866,000
Coal year	48,246,000	85,491,000
COKE		
Feb. 23	371,000	277,000
March 1	402,000	319,000
Calendar year	3,110,000	2,418,000

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

16. Production of anthracite also recovered, 1,866,000 net tons being produced, compared with 1,655,000 tons during the preceding week and 1,900,000 tons in the week ended Feb. 16.

Midwest Markets Soft

Nothing came along through the Midwest during the past week to bring much relief to the soggy condition of the market for all coals. Even steam coals, which were on the rise a week ago, seem to have overstepped themselves and softened a little during the last days of the week. Southern Illinois and Fourth Vein Indiana, which showed signs of passing $2, settled back to $1.75@$1.90 and central Illinois and Fifth Vein Indiana range from $1.75 down to $1.50.

Domestic business on all coals continues slowly to slow down toward the customary May low speed. The Franklin County Operators' Association has not yet announced its new circular, however, and this appears to have prevented others from doing so. It is expected that southern Illinois lump, which sets the pace for the Midwest, will drop a cold dollar from $3.75. As the market stands now, some of it already moves at $2.75.

A real willingness on the part of Midwest operators to make long-term contracts has not rounded up much business. Only the Grand Trunk, among the railroads, has invited bids on the year's business. Most of the others appear ready to live for awhile on the stockpiles they bought last summer. There is no rush of industry to contract yet, either. "Let's wait until these operators have suffered awhile; then we'll get a price," is a common program.

In all southern Illinois fields a noticeable decline in business is in evidence. Operators generally are offering lump and egg at prices ranging $2.85@$3, while nut is being offered at $2.75, but orders are being taken for as low as $2.50. In the Mt. Olive field lump prices have been reduced from $3.25 to $3, with very little demand. Screenings have advanced 25c. per ton and are being offered at $1.50@$1.60. Other steam sizes, however, are sluggish. In the Standard field a number of mines have suspended, and most of those operating find it difficult to move prepared sizes at any price.

Mild weather, which has prevailed for the past week, has caused St. Louis consumers to withhold orders, expecting a price drop April 1. Local demand for screenings is good and dealers having storage space for their forkings are holding them rather than selling them, since every indication points to higher prices on fine sizes. Country domestic trade is flat.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†
Smokeless lump	Columbus	$7.00	$4.10	$4.10	*$3.75@$4.00*
Smokeless mine run	Columbus	4.50	2.10	2.10	2.00@ 2.25
Smokeless screenings	Columbus	4.45	1.55	1.55	1.45@ 1.70
Smokeless lump	Chicago	7.00	3.60	3.60	3.50@ 3.75
Smokeless mine run	Chicago	4.00	2.50	2.35	*2.15@ 2.25*
Smokeless lump	Cincinnati	6.85	3.75	3.50	*3.25@ 3.50*
Smokeless mine run	Cincinnati	4.85	2.60	2.50	*2.25@ 2.60*
Smokeless screenings	Cincinnati	4.50	1.85	1.75	*1.50@ 1.75*
*Smokeless mine run	Boston	7.00	4.70	4.70	4.65@ 4.75
Clearfield mine run	Boston	3.30	1.95	1.95	**1.65@ 2.40**
Cambria mine run	Boston	4.00	2.60	2.60	2.25@ 3.00
Somerset mine run	Boston	3.60	2.30	2.25	*1.85@ 2.60*
Pool 1 (Navy Standard)	New York	4.50	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard)	Philadelphia	4.60	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard)	Baltimore				
Pool 9 (Super. Low Vol.)	New York	3.80	2.25	2.25	2.00@ 2.50
Pool 9 (Super. Low Vol.)	Philadelphia	3.85	2.30	2.30	2.10@ 2.50
Pool 9 (Super. Low Vol.)	Baltimore	4.00	1.85	2.05	2.00@ 2.15
Pool 10 (H.Gr.LowVol.)	New York	3.10	2.00	2.00	1.75@ 2.25
Pool 10 (H.Gr.Low Vol.)	Philadelphia	3.20	1.85	1.85	1.70@ 2.00
Pool 10 (H.Gr. Low Vol.)	Baltimore	3.00	1.70	1.80	1.75@ 1.85
Pool 11 (Low Vol.)	New York	2.45	1.60	1.60	1.40@ 1.85
Pool 11 (Low Vol.)	Philadelphia	2.70	1.65	1.65	1.55@ 1.75
Pool 11 (Low Vol.)	Baltimore	2.25	1.55	1.65	1.60@ 1.70
High-Volatile, Eastern					
Pool 54-64 (Gas and St.)	New York	2.20	1.60	1.60	1.50@ 1.75
Pool 54-64 (Gas and St.)	Philadelphia	2.15	1.70	1.60	1.50@ 1.75
Pool 54-64 (Gas and St.)	Baltimore	2.25	1.50	1.60	1.55@ 1.70
Pittsburgh sc'd gas	Pittsburgh	3.60	2.55	2.55	2.50@ 2.65
Pittsburgh gas mine run	Pittsburgh		2.30	2.30	2.25@ 2.40
Pittsburgh mine run (St.)	Pittsburgh	2.55	2.10	2.10	2.00@ 2.25
Pittsburgh slack (Gas)	Pittsburgh	2.75	1.50	1.50	*1.30@ 1.45*
Kanawha lump	Columbus	4.25	2.60	2.60	2.50@ 2.75
Kanawha mine run	Columbus	2.60	1.60	1.60	*1.40@ 1.65*
Kanawha screenings	Columbus	2.10	1.15	1.10	*1.00@ 1.10*
W. Va. lump	Cincinnati	3.75	3.00	2.85	2.75@ 3.00
W. Va. gas mine run	Cincinnati	2.85	1.60	1.55	*1.35@ 1.65*
W. Va. steam mine run	Cincinnati	2.75	1.60	1.55	*1.35@ 1.65*
W. Va. screenings	Concinnati	2.50	1.20	1.05	*.85@ 1.00*
Hocking lump	Columbus	4.00	2.60	2.60	2.50@ 2.75
Hocking mine run	Columbus	2.40	1.85	1.85	1.75@ 2.00
Hocking screenings	Columbus	2.00	1.10	1.10	**1.10@ 1.20**
Pitts. No. 8 lump	Cleveland	4.00	2.10	2.35	2.00@ 2.75
Pitts. No. 8 mine run	Cleveland	2.90	1.80	1.80	1.75@ 1.90
Pitts. No. 8 screenings	Cleveland	2.75	1.35	1.35	*1.25@ 1.35*

Midwest	Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†
Franklin, Ill. lump	Chicago	$4.60	$3.50	$3.35	*$3.00@$3.50*
Franklin, Ill. mine run	Chicago	3.35	2.35	2.35	2.25@ 2.50
Franklin, Ill. screenings	Chicago	2.35	1.95	1.95	*1.75@ 1.90*
Central, Ill. lump	Chicago	3.10	3.10	2.85	2.75@ 3.00
Central, Ill. mine run	Chicago	2.60	2.10	2.10	2.00@ 2.25
Central, Ill. screenings	Chicago	1.45	1.50	1.70	*1.50@ 1.75*
Ind. 4th Vein lump	Chicago	3.60	3.10	2.85	2.75@ 3.00
Ind. 4th Vein mine run	Chicago	2.85	2.60	2.35	2.25@ 2.50
Ind. 4th Vein screenings	Chicago	2.10	1.70	1.85	*1.75@ 1.90*
Ind. 5th Vein lump	Chicago	3.35	2.60	2.60	2.50@ 2.75
Ind. 5th Vein mine run	Chicago	2.60	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings	Chicago	1.35	1.45	1.60	1.50@ 1.75
Mt. Olive lump	St. Louis		3.10	3.10	*2.75@ 3.00*
Mt. Olive mine run	St. Louis		2.50	2.50	2.50
Mt. Olive screenings	St. Louis		1.35	1.35	**1.50@ 1.60**
Standard lump	St. Louis	3.10	2.75	2.75	*2.65@ 2.75*
Standard mine run	St. Louis	2.25	1.95	1.95	1.90@ 2.00
Standard screenings	St. Louis	1.35	1.15	1.15	1.15
West Ky. lump	Louisville	3.05	2.85	2.85	2.75@ 3.00
West Ky. mine run	Louisville	2.00	1.70	1.70	1.50@ 1.90
West Ky. screenings	Louisville	1.65	1.30	1.30	**1.25@ 1.40**
West Ky. lump	Chicago	3.10	2.85	2.60	2.50@ 2.75
West Ky. mine run	Chicago	1.80	1.60	1.60	*1.40@ 1.50*
South and Southwest					
Big Seam lump	Birmingham		3.85	3.85	3.75@ 4.00
Big Seam mine run	Birmingham	2.10	1.80	1.80	1.75@ 1.85
Big Seam (washed)	Birmingham	2.60	2.10	2.10	2.00@ 2.25
S. E. Ky. lump	Chicago	4.60	3.10	3.10	3.00@ 3.25
S. E. Ky. mine run	Chicago	2.85	1.85	1.85	1.75@ 2.00
S. E. Ky. lump	Louisville	5.00	3.25	3.25	*2.75@ 3.25*
S. E. Ky. mine run	Louisville	2.60	1.80	1.75	1.50@ 2.00
S. E. Ky. screenings	Louisville	2.20	1.30	1.30	*.90@ 1.25*
S. E. Ky. lump	Cincinnati	3.75	2.85	3.00	*2.50@ 3.00*
S. E. Ky. mine run	Cincinnati	2.75	1.75	1.60	1.50@ 1.75
S. E. Ky. screenings	Cincinnati	2.25	1.10	1.00	*.85@ 1.00*
Kansas lump	Kansas City	4.50	5.00	5.00	5.00
Kansas mine run	Kansas City	3.50	3.50	3.50	3.50
Kansas screenings	Kansas City	2.60	2.25	2.25	2.25

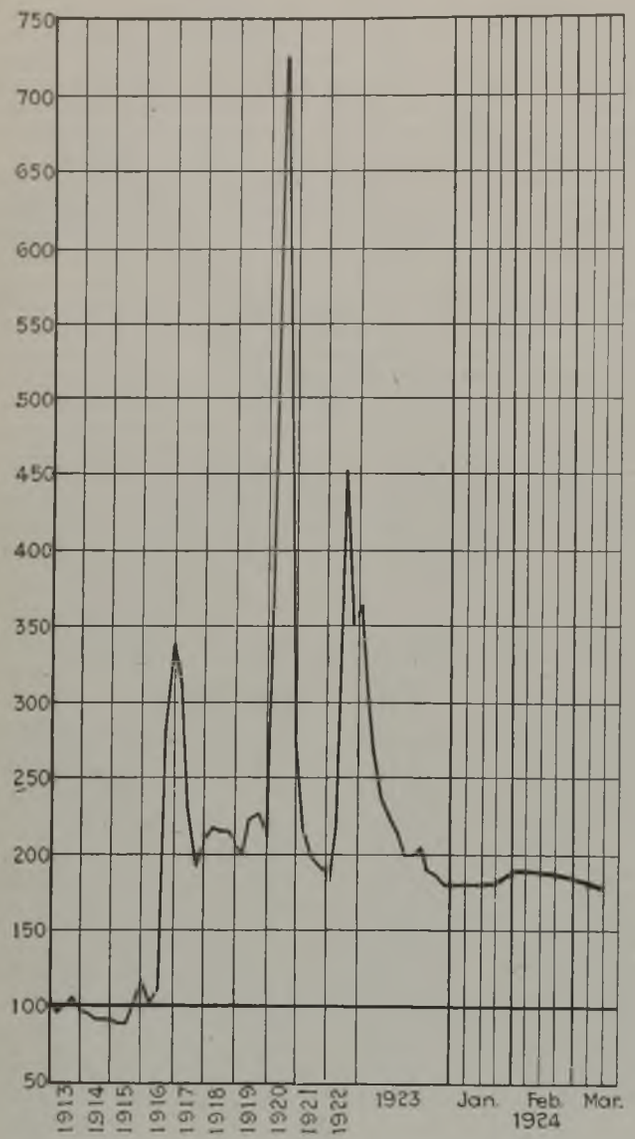
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in **heavy type**, declines in *italics*.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	March 12, 1923 Independent	March 12, 1923 Company	March 3, 1924 Independent	March 3, 1924 Company	March 10, 1924† Independent	March 10, 1924† Company
Broken	New York	$2.34	$9.00	$7.75@$8.25		$8.00@$9.25		$8.00@$9.25
Broken	Philadelphia	2.39		7.90@ 8.10				
Egg	New York	2.34	9.25@12.00	8.00@ 8.35	$8.00@$8.50	8.75@ 9.25	$8.00@$8.50	8.75@ 9.25
Egg	Philadelphia	2.39	9.25@11.00	8.10@ 8.35	8.50@10.00	8.75@ 9.25	8.50@10.00	8.75@ 9.25
Egg	Chicago*	5.06	12.00@12.50	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.50@ 8.80	8.00@ 8.35
Stove	New York	2.34	9.25@12.00	8.00@ 8.35	9.25@10.00	8.75@ 9.25	9.25@ 9.75	8.75@ 9.25
Stove	Philadelphia	2.39	9.25@11.00	8.15@ 8.35	9.85@11.00	8.90@ 9.25	9.85@11.00	8.90@ 9.25
Stove	Chicago*	5.06	12.00@12.50	7.35@ 8.25	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Chestnut	New York	2.34	9.25@12.00	8.00@ 8.35	9.25@10.00	8.75@ 9.25	9.25@ 9.75	8.75@ 9.25
Chestnut	Philadelphia	2.39	9.25@11.00	8.15@ 8.35	9.85@11.00	8.90@ 9.25	9.85@11.00	8.90@ 9.25
Chestnut	Chicago*	5.06	12.00@12.50	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Range	New York	2.34		8.25		9.00		9.00
Pea	New York	2.22	7.50@11.00	6.15@ 6.30	4.50@ 5.50	6.15@ 6.65	4.50@ 5.50	6.15@ 6.65
Pea	Philadelphia	2.14	7.00@ 9.00	6.15@ 6.20	4.75@ 6.50	6.35@ 6.60	4.75@ 6.50	6.35@ 6.60
Pea	Chicago*	4.79	7.00@ 8.00	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	4.50@ 5.60	5.40@ 6.05
Buckwheat No. 1	New York	2.22	4.50@ 4.75	4.00@ 4.10	2.25@ 3.50	3.50	2.00@ 2.75	3.50
Buckwheat No. 1	Philadelphia	2.14	4.00@ 5.00	4.00	2.25@ 3.50	3.50	2.25@ 3.50	3.50
Rice	New York	2.22	2.25@ 3.00	2.75@ 3.00	1.75@ 2.50	2.50	1.75@ 2.25	2.50
Rice	Philadelphia	2.14	2.75@ 3.00	2.75@ 3.00	1.75@ 2.50	2.50	1.75@ 2.50	2.50
Barley	New York	2.22	1.40@ 2.00	1.50@ 2.00	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley	Philadelphia	2.14	1.40@ 2.00	2.00	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Birdseye	New York	2.22		2.10	1.60	1.60	1.60	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in **heavy type**, declines in *italics*.



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

	1924			1923
	March 10	March 3	Feb. 25	March 12
Index	181	183	184	268
Weighted average price	$2.18	$2.21	$2.23	$3.24

This diagram shows the relative, not the actual, prices on fourteen 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.

West Kentucky Faces Trouble

Although demand is off and western Kentucky operators are not loading out any large quantity of coal it can truthfully be said that the operators are maintaining values in the face of rather hard competition from non-union fields and strip mines. Demand for prepared coal has slumped, causing some cancellations and rejections, but production of screenings has been small, and prices have advanced to $1.25@$1.40 asked for pea and slack and nut and slack. Prepared sizes continue steady, with block at 2.7@$3; lump and egg, $2.40@$2.75; nut, $1.75@$2.25. Mine run is quoted at $1.50@$1.90, but some stripper mine run has been quoted as low as $1.30, it is reported.

There is every indication that production of the field will be materially reduced in April, as there are indications that there will be a strike, which will affect more than half the production of the field. Ordinarily this would tend to force prices upward, but as it will come at a dull season, it probably will affect only screenings to any material extent.

Prices have weakened about 25c. a ton on all sizes in the eastern Kentucky field over the week. Operations in most of the state fields have slumped and there are not many mines with much business on their books, while cancellations and rejections on account of warmer weather and lower markets have resulted in more coal on track. It is doubtful whether any coal is being quoted at over $3.25 a ton today, while some screenings are offered as low as 90c. for nut and slack in the Hazard field.

Northwest Awaits Price Cuts

A softening all along the line was noticeable throughout the Northwest during the past week, although no changes in prices have been announced. This applies to the Head-of-the-Lakes and all the way down to Milwaukee, where soft spring weather did its worst. The supply on hand on the docks is heavy and buyers wait shrewdly. Some of it may have to be moved hurriedly before the spring navigation season opens.

At Duluth Youghiogheny and Hocking were especially weak. About the only customers now are the power companies, which are placing large orders to make up for the lack of water power. The Northern States Power Co. is reported to have contracted for 30,000 tons recently, and to have had the shipment sent to the Twin Cities. Ordinarily these companies would be buying no coal.

A relatively good demand for Pocahontas exists. This is because of the scarcity of desirable hard coal and its high price. The use as a substitute for househeating is the only reason for the demand for Pocahontas.

Official figures of shipments from the docks in February have not been announced, but it is safe to say that the number of cars from the Head-of-the-Lakes will not be more than 14,000. This is practically the same as in February last year and compares most unfavorably with the 25,000 odd cars shipped here in January of this year.

Little Doing in the West

Strengthening of the demand for screenings with an accompanying weakening of the demand for lump and slack resulted in an advance of 25c. a ton on Kansas screenings, to $2.50, March 1. Mines in the Southwest are working from 50 to 60 per cent of normal, with a steadily growing accumulation of lump and nut "no bills." Shading of list prices on domestic grades continues to increase as the market falls off. Kansas coal is quoted at $5 for lump; $4.50 for nut, $3.25 to $3.50 for mine run and $2.50 for screenings.

The market in Colorad is low. The working time dropped to an average of twenty-four hours per mine last week. The chief point of interest is the reduction on March 1 in the prices on all coals from northern Colorado, Crested Butte and Canon City districts. These prices are absolutely the lowest that have ever been quoted from these fields, considering the cost of production. Walsenburg and Canon City lump and nut are $4.25 and $3.75 respectively, Trinidad lump and nut are both $3.50, and Crested Butte anthracite furnace and baseburner sizes are $6.50.

Utah mines do well to get two days a week nowadays. The heavy cut in prices on domestic two weeks ago produced little business. Low mine production has boosted slack 25c., however, to $1.50, with screened slack $2.

Ohio Trade All at Sea

At Cincinnati the whole price line-up shivered this week with the impact of overproduction and disinterestedness of buyers. From top to bottom—from the top grade of specialized coals to the lowliest of the slacks—the shock had a telling effect. The result is that the trade is completely at sea. Coal on consignment has been clogging the avenues of trade for the past week. Again the purchasing agents of large plants north and west from here are using the most effective weapon in their hands—rejections. And while this liquid tonnage is only a small percentage of the total going through this gateway, yet it is, in truth, creating the market price and settling the values in its time accustomed way. Lake buyers ar coy—they are not in the market and even tempting offers of price to extend over several months has not caused them to rush in. Slack prices have slid off this week in a surprising way in view of the fact that domestic, egg and other sizes are below normal in the making. Domestic naturally is soft with the retailers refusing to load up with more than immediate requirements. The increase in the make and take out of the smokeless, also has softened that market. There has

been no change in the retail situation. Specialized coals are quoted at $2.75@$3 for egg and $3.50@$4 for block.

The Cleveland market is simply marking time until some of the stockpiles accumulated in anticipation of labor difficulties are used up. Steam consumers generally still have thirty to sixty days' supply on hand, the railroads have ample fuel and are taking only a minimum amount at this time, and public utilities are heavily stocked. Therefore, the producer is receiving little inquiry for fuel and the market is more dull than it has been in many months.

Quiet prevails in all branches of the coal trade in Columbus. Both steam and domestic buyers are using caution in placing orders and there is no disposition to increase stocks under present conditions. This is seen most strikingly in the steam trade, where many large users had accumulated stocks in anticipation of a suspension. With the settlement of the wage scale these users shut off orders and are now gradually reducing reserves. This is having its effect on trade and buying is limited to only a small amount sold off the open market to fill in or where prices have been made attractive. Utilities are not buying to any extent and the same is true of railroads. Iron and steel plants are taking some tonnage, but not sufficient to cause much stir in the market.

The spot market at Pittsburgh is extremely dull, but this makes little difference as at no time recently has there been much tonnage moving in the spot market. The chief movement has been on regular contracts for the coal year and on less formal arrangements whereby shipments were continued and prices were agreed upon periodically, generally from month to month. Spot prices show no change except for a decline in slack. In mine-run and lump operators are simply holding prices, despite the light demand in the spot market, as they see no advantage in cutting. Operators report that there has been little if any decrease in coal production in the Pittsburgh district in the past two or three weeks.

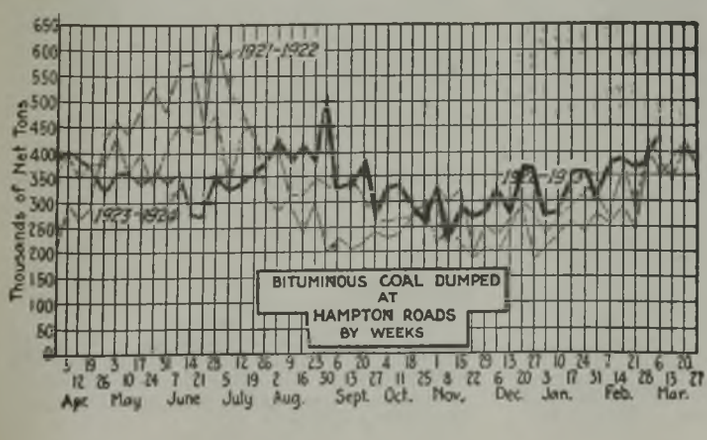
Operators in central Pennsylvania report a dull market, with prices low. Manufacturing plants generally have a sixty-day supply of fuel on hand. Contract prices range from $2.10 to $3.

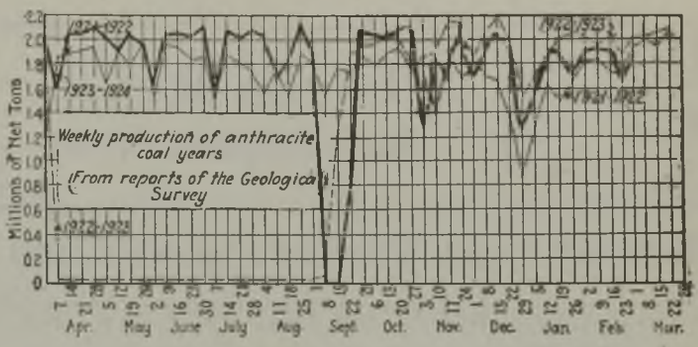
Demand at Buffalo is up to normal and promises to continue so right along, but output still is in excess of needs, and so long as that lasts the market must remain dull.

Inquiry Lacking in New England

In New England the past week brought forth no new developments whatever. Both all-rail and by water there is a dearth of inquiry, and shippers are hard put to it to find places for coal. Practically every large consumer is determined to let his present stock run down to the narrowest prudent margin, and certainly in the current situation there is no inducement to make purchases much in advance of actual consumption.

In the smokeless districts mining is barely on a 40-per cent basis, and except for certain contract requirements there is nothing even approaching stable demand. The Virginian piers have a reasonably large supply on hand, but few agencies now care to take the chance of sending coal down more than a short time in advance of requirements. Coastwise trade is dull, and offshore there is relatively little tonnage moving. From day to day there are occasional inquiries for spot cargoes, and on these the price varies from $4.60 to $4.80 per gross ton f.o.b. vessel. No. 1 Navy Standard Pocahontas and New River are selling at $4.70@$4.75, but among buyers here there is a feeling





that quotations are bound to be lower later in the month, a $4.50 level being anticipated for April. This would make the net price at the mines somewhat less than $2 per gross ton, and should any such price carry through it is easy to see there will be only a very restricted market in New England for coals other than Pocahontas and New River.

The all-rail situation shows no hopeful sign. East of the Connecticut River, smokeless shippers have every reason to expect that they will have the call, and so long as railroad tariffs are maintained on their present scale central Pennsylvania tonnage reaching this market is certain to be small. Both at New York and at Philadelphia only minimum tonnages are being dumped over railroad piers, and in this market Pennsylvania coal even by water is seldom heard from.

Inactivity Prevails in Seaboard Markets

The recent condition of inactivity in the Atlantic seaboard markets still prevails. New York dealers are order hunting, but with indifferent success. At Philadelphia the trade runs along quietly, there no longer being any disturbing factor to cause the consumer to be anxious about his future coal supply. While this market has shown no outward signs of taking an unusual tonnage since the first of the year, still much coal has been moved. The price situation is unchanged, there having been little variation for a couple of months.

Feelers for contracts have appeared at Baltimore. Closings on this class of business are not heavy as yet, but there are signs that the policy of purchasing in the open market at prices still some 15c. off the spot level is beginning to break. A meeting of representatives of the Monongahela Coal Association, the Northern West Virginia Coal Operators' Association and the United Mine Workers to be held in Baltimore during the coming week is expected to settle the wage situation in northern West Virginia for the period after April 1.

Various factors have combined to depress prices not only of high-volatile but of low-volatile coals as well in West Virginia since the first of March. Settlement of the wage controversy, milder weather and a material increase in the car supply have all been factors tending to weaken prices owing to the fact that buying is on a limited scale and fuel supplies at the mines and in the market are plentiful.

Anthracite Now a Weather Proposition

With spring officially only two weeks off, the anthracite situation in New York is swayed by temperature—if not temperament. Stove is in good demand; but some of the yards have none. Some companies are breaking egg to stove and nut sizes.

March having been quite mild thus far, the Philadelphia consumer is doing his best to get by the balance of the season with as little coal as possible. Dealers do not have the least trouble now to get all the coal they want, and of any size; just now they seem to be trying to manipulate their stocks so as not to have an excess on hand when April 1 arrives. Similar conditions prevail in Baltimore.

Car Loadings, Surplusages and Shortages

	Cars Loaded — All Cars	Coal Cars
Week ended Feb. 23, 1924	845,898	175,834
Previous week	935,109	194,295
Same week in 1923	830,187	188,558

	Surplus Cars — All Cars	Coal Cars	Car Shortage
Feb. 22, 1924	125,177	48,252	5,944
Previous week	127,415	46,293	7,397
Same date in 1923	20,786	5,322	

Foreign Market And Export News

British Coal Market Shows Firm Tendency; Output Declines Slightly

The firmness of the Welsh coal market is very well maintained, probably due to the fact that the collieries are still in arrears owing to the rail and dock strikes. As a result many Continental buyers are clamoring for coal, fearing a miners' strike in April and desiring to lay in stocks. There are rumors that much business has gone to America and Germany because of the tardiness of Welsh deliveries. The Italian and Near East business has fallen off, though the demand from South America is satisfactory. The Egyptian State Rys. has purchased 50,000 tons of steam coals.

Coal production at British mines during the week ended Feb. 23, a special cable to *Coal Age* states, totaled 5,802,000 tons, according to the official reports. This was a decline of 19,000 tons from the week ended Feb. 16, when 5,821,000 tons was produced.

The situation in Newcastle is unchanged though prices are showing a tendency to rise. Though the dock strike introduced an element of doubt on the part of buyers, the collieries kept busy clearing off arrears.

Negotiations between the miners and the colliery owners were resumed on March 6 and there is good reason to hope that a mutually satisfactory basis for a new wage agreement will be arrived at before the expiration of the present one, on April 17.

Market Tone at Hampton Roads Dull; Prices Tend Downward

Business at Hampton Roads shows little change, with considerable movement in all branches of trade, but practically all activity on direct orders or old contracts. Spot business is dull, and prices show a downward tendency.

Actual movement is fairly heavy, coastwise, foreign and in the bunker trade. Italy is getting a big share of the movement, while several large cargoes were noted bound for French ports. The tone of the market is dull.

Increase in general shipping continues to affect the bunker trade, and the outlook is pronounced by shippers to be bright. No big contracts have been reported, though several were rumored.

French Industrial Inquiry Brisk; Domestic Demand Better

Industrials, anxious to escape the high prices for British coal, are taking to French coal whenever possible. Inquiries are in greater volume than production. The demand for house coals also has increased, due to the cold weahter

The 3 fr. cut in coal prices is now applied in all the mines, except the Houve and Petite Rosselle collieries, in Lorraine, and the Mines Domaniales de la Sarre.

French consumption of Sarre coal has increased, having now reached an average of 45 per cent of the capacity of the field, compared to 30 per cent in 1921.

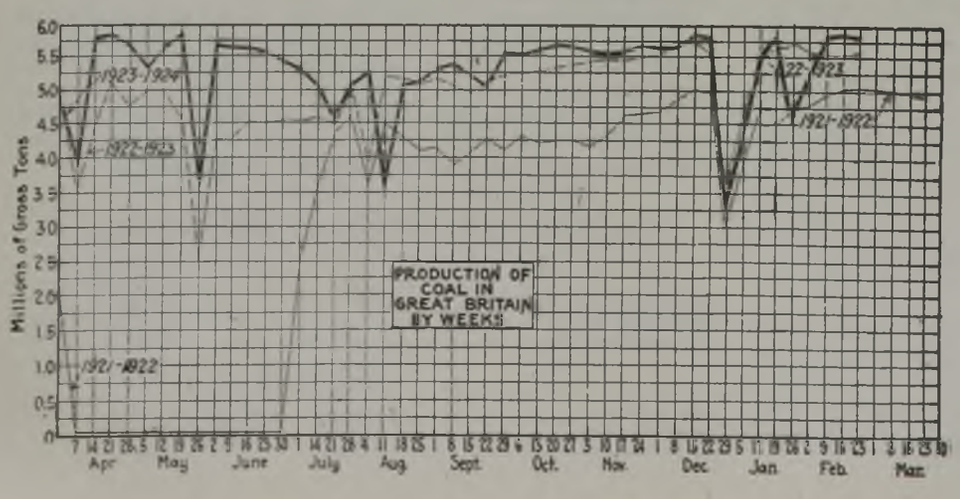
In the matter of indemnity fuels the Office des Houillères Sinistrées is not filing any new orders, only furnishing coal on contracts in course of execution. Prices remain unaltered.

Coke deliveries continue to come through in fair volume. Renewal of the agreements for the delivery of indemnity fuels expiring on April 15 is now being discussed between the Inter-Allied Mission and German industrials.

United States Coal and Coke Imports During January

(In Gross Tons)

	1923	1924
Anthracite	11,331	8,228
Bituminous	337,649	43,751
Imported from:		
United Kingdom	142,349	3,675
Canada	179,639	37,854
Australia	11,525	.....
Other countries	4,136	2,222
Coke	8,307	7,979



United States Coal and Coke Exports During January

(In Gross Tons)

	1923	1924
Anthracite	356,016	272,005
Bituminous	1,092,084	1,045,587
Exported to:		
France	.....	15,285
Italy	6,361	95,172
Netherlands	1	.....
Other Europe	511	2,092
Canada	1,001,650	745,232
Panama	9,440	.....
Mexico	6,534	5,828
British West Indies	1,139	4,026
Cuba	59,664	50,529
Other West Indies	6,253	28,912
Brazil	.....	49,790
Chile	.....	7,097
Egypt	.....	7,418
French Africa	.....	7,950
Other countries	531	26,256
Coke	77,759	53,117

Export Clearances, Week Ended March 8, 1924

FROM HAMPTON ROADS

For Canada	
Amer. Schr. Margaret Spencer, for St. Georges	1,209
Br. SS. Bonny, for Second	1,018
For Chile	
Br. SS. Mount Berwind, for Iquique	3,000
For France	
Fr. SS. Wesserling for Marseilles	6,667
Fr. SS. P. L. M. 21 for Marseilles	7,913
Fr. SS. P.L. M. 20 for Marseilles	7 849
Nor. SS. Asator for Nantes	4,365
For Greece	
Br. SS. Wearpool for Piraeus	7,661
For Italy	
Ital. SS. Pelotas for Trieste	6,987
Ital. SS. Indipendente for Genoa	4,528
Ital. SS. Labor for Genoa	5,878
Ital. SS. Robilante for Genoa	9,447
For Jamaica	
Dan. SS. Borglum for Port Antonio	3,233
For West Indies	
Amer. Schr. Albert H. Willis for Santo Domingo	637

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Feb. 28	March 6
Cars on hand	1,236	1,403
Tons on hand	80,705	85,399
Tons dumped for week	145,514	185,418
Tonnage waiting	20,000	25,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand	1,006	1,429
Tons on hand	71,200	96,950
Tons dumped for week	95,587	117,679
Tonnage waiting	8,226	9,562
C. & O. piers, Newport News:		
Cars on hand	1,226	1,469
Tons on hand	69,200	69,555
Tons dumped for week	93,694	88,361
Tonnage waiting	9,400	4,840

Pier and Bunker Prices, Gross Tons

PIERS

	March 1	March 8†
Pool 9, New York	$5.00@$5.25	$5.00@$5.25
Pool 10 New York	4.75@ 5.00	4.75@ 5.00
Pool 11, New York	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads	4.75@ 4.85	*4.75*
Pools 5-6-7 Hamp. Rds.	4.25	*4.15@ 4.25*
Pool 2, Hamp. Roads	4.50@ 4.60	*4.50*

BUNKERS

Pool 9, New York	5.30@ 5.55	5.30@ 5.55
Pool 10, New York	5.05@ 5.30	5.05@ 5.30
Pool 11, New York	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia	4.65@ 5.10	4.65@ 5.10
Pool 1, Hamp. Roads	4.85	*4.75*
Pool 2, Hamp. Roads	4.60	*4.50*
Pools 5-6-7 Hamp. Rds.	4.35	*4.25*

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to *Coal Age*

Cardiff:	March 1	March 8‡
Admiralty, large	28s. 6d.	*27s. @ 28s.*
Steam smalls	20s.	*18s. @ 20s.*
Newcastle:		
Best steams	25s. 6d. @ 27s.6d.	**26s. 6d. @ 26s. 9d.**
Best gas	25s. 6d.	*25s. @ 25s. 3d.*
Best bunkers	25s.	*24s. 6d. @ 25s.*

† Advances over previous week shown in **heavy type** declines in *italics*.

Traffic News

Indiana Intrastate Rates Drop April 1

An advance copy of the decision of the Public Service Commission, which orders a reduction in the rates on bituminous coal from Indiana mines to practically all consuming points within the state, has been received by Jonas Waffle, secretary of the Indiana Coal Traffic Bureau. The order requires the carriers to establish the reduced rates effective April 1, 1924. The extent to which reductions will be made from the Linton and Clinton groups to typical consuming points is shown in the following statement:

	Brazil-Clinton		Linton-Sullivan	
	Old Rate	New Rate	Old Rate	New Rate
Anderson	$1.58	$1.48	$1.58	$1.48
Angola	2.36	1.90	2.46	2.00
Bloomington	1.51	.95	1.13	.95
Connersville	1.70	1.48	1.70	1.48
Fort Wayne	1.76	1.65	1.81	1.75
Greencastle	1.13	.95	1.13	.95
Lafayette	1.45	1.38	1.55	1.38
Michigan City	1.70	1.60	1.90	1.70
Muncie	1.58	1.48	1.58	1.48
Stroh	2.33	1.90	2.43	2.00
Union City	1.76	1.58	1.76	1.20
West Lebanon	1.45	1.20	1.55	1.20

Mr. Waffle states that while the reductions ordered by the commission are somewhat less than those suggested at the hearing, the new rates will be a big improvement over the present adjustment and will eliminate to some extent the discrimination which exists between the Indiana rates, on the one hand, and those from the Eastern producing fields on the other.

Assigned-Car Order Postponed Yet Again

The Interstate Commerce Commission has again postponed the effective date of its order restricting the use of assigned cars to bituminous-coal mines from April 1 to June 1, 1924. This is the seventh postponement of the order.

To Discuss Lignite Rates

Rates on lignite from points of origin in North Dakota to points of destinations in South Dakota and Minnesota as well as to intrastate destinations, will be discussed at an Interstate Commerce Commission hearing to be held in Bismarck, N. D., April 21. Examiner Wagner will preside.

Frisco About to Build Nine-Mile Cut-Off

The Frisco railroad will begin construction this spring of the nine-mile cut-off from Schulter, Okla., through the new coal field west of Henryetta, Okla., to again connect with its main line at Creek mine on the south according to report. The survey of this line was made and the right of way purchased last summer. This cut-off will open up the new coal field on the western limits of Henryetta. This report previously has been regarded merely as a device to keep the M. K. & T. out of Henryetta. An application by the M. K. & T. road is now before the Interstate Commerce Commission seeking an extention of its line from Oktaha to a junction with the Okmulgee Northern short line, which would be extended to Henryetta. The coal west of Henryetta is said to be much harder than that produced closer to town, and has no middle band, thus permitting it to be mined at less expense.

Virginian and N. & W. Cuts Rates to Washington

It has been announced by the Virginian and the Norfolk & Western rys. that the rate on coal from mines on those roads to Washington will at once be established at $2.84 per gross ton. Shippers in the New River district have been enjoying the same rate for some time over the Chesapeake & Ohio. The action of the Norfolk & Western and the Virginian simply puts the Washington rate on a parity with the rate already established by the Chesapeake & Ohio.

C. & O. Reduces Rates Outside New River Field

Freight rates on coal from points on the Chesapeake & Ohio other than the New River field have been reduced to the extent of 5c. a ton, as the result of a conference between W. P. Tingley, manager of the traffic department of the Jobbers and Manufacturers bureau of the Huntington Chamber of Commerce, and A. P. Gilbert, general freight agent of the road. The new rate will be $1.08 per ton instead of $1.13 and the new rate into Huntington from the New River district will be $1.28 per ton instead of $1.33, which previously prevailed.

It is estimated that the reduction will result in a saving of at least $5,000 a year to the users of coal in Huntington. In Kenova it is estimated that from 160,000 to 170,000 tons of coal yearly are consumed, so that industries in the city named will effect a saving of from $8,000 to $8,500 per year.

Southern Roads Plan Betterments

The Central of Georgia Ry. will expend from $5,000,000 to $6,000,000 in eliminating heavy grades, sharp curves and grade crossings on its line between Birmingham, Ala., and Columbus, Ga., contracts to be let about April 1.

The Southern Ry. will begin work at an early date installing a complete block system of signals between Birmingham and Atlanta. A telephone line also will be constructed which will carry a double circuit for use in dispatching trains and another line for miscellaneous company business.

W. D. Beck Moves Up

W. D. Beck, having been appointed chairman of the Chicago Operating Committee, American Railway Association, also has been apointed district manager and manager refrigerator department of the Car Service Division, in place of J. M. Egan, resigned, to accept position of vice president, Missouri Pacific R.R. The change became effective March 1, 1924.

Would Build New 16-Mile Line In Cambria County, Pa.

The Conemaugh & Blacklick R.R. has applied to the Interstate Commerce Commission for permission to issue $1,000,000 of capital stock, the proceeds to be used in the construction of sixteen miles of new line in Cambria County, Pennsylvania.

Obituary

Morgan R. Morgan, aged 76, one of the best known mining men in the Wyoming Valley, Pennsylvania, died March 8 at the City Hospital, Wilkes-Barre, Pa., following a six months' illness of diabetes. For many years Mr. Morgan was general inside superintendent of the Lehigh Valley Coal Co. in charge of the Wyoming Valley operations. He retired from active duty about five years ago. Mr. Morgan was born in Llandovery, Wales, in 1848, and came to America in 1867, settling in the Wyoming Valley, where he was first employed as a miner at the Empire Colliery. In 1887 he was made mine foreman of the Wanamie and Stanton mines of the Lehigh & Wilkes-Barre Coal Co., and in 1891 became general superintendent.

Robert L. Hearon, 59, traffic manager of the Colorado Fuel & Iron Co. and vice-president and general manager of the Colorado & Wyoming Railway Co., died in Pueblo, Colo., March 1 after a long illness. He had been traffic manager for the fuel and iron company since 1907.

Coming Meetings

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

Association of Iron and Steel Electrical Engineers. Fuel Saving Conference, April 2 and 3, William Penn Hotel, Pittsburgh, Pa. Secretary, J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont., Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24. Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meet-May 14-16, Cincinnati, Ohio. Executive Secretary, H. L Gandy, Southern Building, Washington, D. C.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

News Items From Field and Trade

ALABAMA

A report from Gadsden is to the effect that a **$25,000,000 St. Louis syndicate is negotiating for the purchase of 25,000 acres of coal and ore lands** in Etowah and DeKalb counties, the same company having recently acquired 41,000 acres of these mineral properties in Marshall County. It is reported that the erection of several furnaces near Attalla is contemplated and also on the Tennessee River, near Guntersville. It is said that plans are under way in connection with the Scullin Steel Co., of St. Louis, to develop that city as a steel-making center.

Organization of the **Deep Water Coal Co.**, with a capital of $15,000,000 was announced at Birmingham, March 1. L. B. Musgrove, of Jasper, Ala.; C. A. Meade, formerly vice-president of the DuPont Powder Co., and C. A. Lask, New York attorney and capitalist, are the three leading officials of the new company, which recently purchased 500,000 acres of coal lands in Jefferson, Walker and Winston Counties. The main office will be at Jasper. Mr. Musgrove said this will be one of the largest coal companies in the United States. Tipples will be constructed immediately, and Mr. Musgrove thought that the company would be in operation soon.

ALASKA

Complete electrification of the Evan Jones mine, in the Matanuska field, will soon make that the most modern coal mine in Alaska. A tunnel 1,300 ft. long will be driven from the bunkers at the foot of the hill directly into the underground workings, eliminating a slope. The mine is owned by Oscar Anderson, Z. J. Loussac and Jack Collins.

COLORADO

The Crown Fuel Co., with mines in the northern Colorado lignite fields, paid $6,604 in back wages to ninety miners in the Crown mine at Marshall, last week. These settlements came about through the combined efforts of the State Industrial Commission and the Attorney General's office, after the case was placed before them by the men. When the miners were not paid, they refused to work on Feb. 2, conducted a mass meeting and sent representatives to place their case before the state officials. According to the members of the Industrial Commission the miners will return to work immediately.

The new **Oliver Fuel & Coal Products Co.** mainly made up of Kansas City, Mo., capital, has organized to develop coal land near Paonia, in the Canon City field.

ILLINOIS

The Chicago Section of the American Institute of Mining Engineers, held its annual election on Feb. 14, at which time the following officers were elected for the ensuing year: Chairman, John A. Garcia, vice chairman W. R. Wright, secretary-treasurer, Keith Roberts, executive committee members, H. T. Walsh and H. P. Gillette.

A new mining record was set for Saline County when on Feb. 28 the Harco mine of the Harrisburg Colliery Co. hoisted, screened and loaded into railroad cars 4,780 tons of coal in eight hours. This surpasses the previous Saline County record by 593 tons. It was only recently that Big Creek No. 3 mine hoisted 4,187 tons of coal in eight hours, taking the honors previously held by the Harco mine by 25 tons.

The Andrew mine of the Springfield District Coal Co. has been closed for an indefinite period, laying off 250 men.

Prepared to spend a half million dollars in its development, the **Crerar-Clinch Coal Co.**, of Chicago, has completed plans for the opening of **a new strip mine** on an acreage about two miles north of Du Quoin. The operating company is the new Gayle Coal Co. The company has purchased 183 acres of land located immediately on the east side of the main line of the Illinois Central right of way, and is a part of the old Williams and Henry H. Kimmel farms. The vein underlying is 6 ft. and over in thickness with about 25 to 28 ft. of overburden. The equipment will be electrically operated. The Illinois Central has begun construction of the switch and it is estimated that approximately three miles of track will be used in handling the output of the strip mine when operating. Elmer Mayor, of Du Quoin, will have charge of the operations at the new strip pit. This is the third new strip mine in the Du Quoin district. The other two are the mines of the Scott, Smith Coal Co., a large stripping concern just south of Du Quoin, and of the Hartshorn Coal Co. just west of Elkville, controlled by the Hartshorn interests, of Danville.

F. F. Green, of Christopher, who was chief engineer, has been promoted to be superintendent of the Valier Coal Co.'s mine at Valier. **Charles E. Anderson** also of Christopher, who was former mine manager when the New North mine of the Old Ben Coal Co. reached its highest record in tonnage output, has been appointed as mine manager for the Valier mine.

INDIANA

Are railroads in Indiana weighing coal shipments as required by law? The Indiana Coal Merchants Service Bureau, Inc., acting for six complaining coal companies of Indianapolis argued before the I. C. C. in a recent hearing, that the Monon, Big Four and Nickel Plate railroads are not, and that, as a result, coal is billed by the roads at excessive weights and these errors were not corrected. A commission report is expected early in the summer.

Three shifts of men are working on the bottom of **Francisco mine No. 2**, which was opened recently near Princeton, after having been closed for several weeks because of a fire. Falls of slate in different parts of the mine caused the most damage. The debris is being cleaned away and port timbers replaced. The mine will be ready to resume operations this week.

Walter Bledsoe & Co., recently added the Ventura coal mine in Indiana, on the Big Four railroad, to its list of collieries. The new mine has a daily capacity of 1,500 tons and its coal is No. 5, seam.

Union miners in District 11, which includes all the Indiana coal field except the block coal district, which is No. 8, held a district convention in Terre Haute, March 11. Only matters pertaining to the district organization and constitution were discussed. John Hessler, of Terre Haute, is president of the district, and William Mitch, also of Terre Haute, is secretary-treasurer.

IOWA

Many small coal mines of southern Iowa would be saved the expense of constructing a second opening to their shafts by an amendment by the Senate to the general mining law. The House of Representatives has passed an amendment providing that **all mines should have at least two exits for safety purposes**, but Senator Shane, of Wapello County, successfully sponsored an additional clause, giving the mine inspector discretion as to the enforcement of this section in the case of small mines, where only a few are employed. Without this amendment, he contended, the new law would work a hardship on many small companies.

The Shuler Coal Co., with mines at Alpha, Ill., has opened offices at 506 Kuhl Building, Davenport. S. K. Marsh has been appointed manager of the Davenport office.

KENTUCKY

The federal court at Maysville, recently issued a temporary **injunction against striking employees** of the Liberty Coal & Coke Co., Pineville, to prevent them from interfering with the company, or carrying out alleged threats of violence. Thirty-eight workers, members of the United Mine Workers of America, and President John L. Lewis, are named in the order. The miners went out on strike over a disagreement as to wages.

Following a meeting of the board of directors of the **Reinecke Coal Co.**, Madisonville, on Feb. 26, a statement was issued to the effect that it had been **decided to close down the mines** for an indefinite period due to high production cost, low prices and inability to operate profitably under existing conditions.

Involuntary bankruptcy proceedings have been instituted at Covington against the **Green Rock Coal Co.**, of Riceville, and the **Harlan Co-operative Coal Co.**, of Harlan.

The Storm King Coal Co., at Storm King, on the L. & N. RR., near Whitesburg, **closed down indefinitely** on March 1 following six months of unprofitable operation. Over 150 men are employed in the mines.

MICHIGAN

The firm of Charles A. Floyd & Co. has been organized for the purpose of handling securities, particularly in connection with coal properties and the coal business with offices in the Dime Bank Building, Detroit. The company is capitalized at $50,000 and the officers are as follows: Charles A. Floyd, president of Kennedy, Floyd & Co., president; A. H. Green, Jr., president of Charcoal Iron Co. of America, vice-president; H. J. Eckenrode, president of the National Plate Glass Co., secretary and treasurer; Merlin Wiley, formerly Attorney General of the State of Michigan, general counsel.

The new representative of the **Falk Corporation** in Detroit is Charles C. Walsh, 1500 Real Estate Exchange Bldg. He will sell Falk herringbone gears and Falk-Bibby flexible couplings.

MISSOURI

In an effort to find a domestic market in St. Louis for their coke, the **St. Louis Coke & Chemical Co.**, with plants in Granite City, has opened up sales office with H. S. Graves in charge, formerly of the Graves Coal & Coke Co.

The Mitchell & Lovell Coal Co. has closed the mine known as the old Mitchell mine but is placing additional men in the Busy Bee mine as fast as possible.

NEW YORK

Bids have been requested by the New York, Susquehanna & Western R.R. for 32,240 gross tons of No. 1 buckwheat, to be delivered as may be designated during the period April 1, 1924, to March 31, 1925. Bids are to be submitted by noon, March 19.

The Erie R.R. has asked for bids for its coal requirements during the period April 1, 1924, to March 31, 1925, proposals to be submitted not later than noon, March 19. The requirements consist of 1,040 gross tons grate coal; 500 tons each of egg and stove coals; 1,000 tons chestnut coal; 7,800 tons pea coal; 174,200 tons No. 1 buckwheat; 20,800 tons rice coal; 190,000 net tons bituminous mine run, 5,000 net tons fine washed blacksmith; 20,800 net tons screeenings; 20,800 net tons prepared stoker coal and 1,458,400 net tons bituminous mine run. The specifications provide that prices are subject to readjustment in case existing rates for mine labor are changed.

The annual banquet of the Bituminous Coal Association of the Buffalo district took place in the neighboring village of Williamsville on Feb. 28, with about 75 in attendance, including several from Pittsburgh, Cleveland and other coal centers. A. L. Stubbs, local agent of the J. P. Burton Coal Co., of Cleveland, was in charge of the program.

Directors of the **Lehigh & Wilkes-Barre Coal Co.** have declared a dividend of $5 a share on the capital stock payable March 1, to stockholders of record Feb. 20.

The Steamship Fuel Corporation, of New York City, which also has offices in Philadelphia, Boston, Baltimore, Springfield and Norfolk, announces the opening of a sales office at 872-74-76 Ellicott Square, Buffalo, N. Y., in charge of J. Fred Morlock.

The Pittsburgh Terminal Coal Co. has opened an office in the Prudential Building, Buffalo, and placed it in charge of J. E. Doran, of Pittsburgh.

NORTH DAKOTA

State officials are directing forces fighting a **fire of mysterious origin in a mine of the Haynes Coal Mining Co.**, at Haynes. Officials hope to keep the blaze from spreading to adjoining lignite mines owned by North Dakota and South Dakota. The two states have been asked to advance $50,000 each to help extinguish the flames. The Haynes Mine was damaged last year by a fire set by a crazed miner.

OHIO

A fire at the mine of the North Hocking Coal Co., near Murray City, destroyed the tipple and much valuable machinery. Work will be stopped for some time and about 75 men are thrown out of employment.

A meeting of a number of locals of the United Mine Workers of Southern Ohio will be held soon, when **steps will be taken to iron out a number of difficulties with the operators on the mining scale.** A movement is on foot to have the miners waive payment for all dead work, which has been costing the operators about 50c on the ton for all coal produced in the district.

Failure of the Rome Coal Co., of Columbus, to pay its delinquent premiums under the Ohio Compensation law caused action to be taken for a receiver in the local courts. Willis Liggett was named receiver in the action brought by Attorney General Crabbe of Ohio. The delinquent premiums amount to $1,171.78.

William J. Hamilton, head of the **W. J. Hamilton Coal & Coke Co.,** Columbus, has filed a petition in voluntary bankruptcy in the federal court at Columbus listing liabilities at $281,079.95 and assets of $126,753.48. Of the liabilities $156,534.82 are unsecured and $55,792.26 are secured. The assets consist of land in Morgan and Perry counties, underlaid with coal valued at $13,238, accounts receivable of $100,951.37; promissory notes of $6,524.29; office furniture, $4,137.26 and a small amount of cash. Mr. Hamilton has been in the jobbing business in Columbus for about 20 years.

The Majestic Coal Co., Marion, has been chartered with an authorized capital of 500 shares, no par value designated, to mine coal and deal in coal and coke. Incorporators are E. G. Fickell, R. B. Baldwin, Arthur S. Burket, E. L. Kaiser, and M. V. Kessler. Offices of the company are at 150 Center St.

Papers have been filed with the Secretary of State, authorizing the **increase in capital stock of the Beluan Coal Co. from $450,000 to $650,000.** C. A. McFadden is president and O. G. Beans, secretary of the company.

The accounting department of the **Ft. Dearborn Coal Co.** has been moved from Chicago to Cincinnati and will be under the direction of Lake Bobbitt. Sales offices of the company will continue in Chicago for the Western territory. The headquarters of the company will be moved to enlarged quarters on the eighth floor of the new Frederick H. Schmidt Co. Building.

The Hatfield-Reliance Coal Co., of Cincinnati, has been chartered with an authorized capital of $10,000 to produce, buy, sell and deal in coal and building materials. Incorporators are: John G. Metcalf, J. T. Metcalf, F. J. Ed. Bramlage, John W. Stinkorb and William J. Mulhivill.

OKLAHOMA

The Montezuma Creek Coal Co. has been incorporated at Okmulgee with a capital of $50,000. The incorporators are Harlan Reed, H. D. Loyd and Ruth Barnett, all of Okmulgee.

A labor lien claim totalling $23,299.10 has been filed at Henryetta by United Mine Workers union local No. 3061 in the case of W. H. Crume as trustee against the Southwestern Coal & Oil Co., of Okmulgee. The miners allege a prior claim over and above the First National Bank of Okmulgee, the petitioner in the receivership action. Harlan Reed, an official of the coal company, and W. T. Bowling are receivers.

The Black Diamond Coal Co., which recently began operating in the Garland district, shipped its first carload of coal early in February. It went to northeast Arkansas. There are approximately a dozen strip-pit enterprises now in operation.

PENNSYLVANIA

Wurley W. Gillett has resigned as purchasing agent of the Hillman Coal & Coke Co., of Pittsburgh, and has taken an interest and part of the management of Gellatly & Co., manufacturers' agents, Oliver Building, Pittsburgh.

George S. Baton, of Baton & Elliott, consulting mining engineers, Pittsburgh, has been placed by the Union Trust Co., of Pittsburgh, in charge of the operations taken over from the receivers of the **American Coke Corporation** a few months ago. The plants consist of American Nos. 1 and 2, at Linn and Martin respectively, both in Fayette County. No. 1 has 142 beehive ovens, but is nearly worked out, having only about 25 or 30 acres of available coal left. No. 2 has 240 beehive ovens and has a large body of unworked coal still remaining. No move has yet been made to resume operations at either of these plants, which have been idle since last November.

The General Grievance Committee of the Hudson Coal Co. adopted a resolution March 1 **protesting against the order of Governor Pinchot,** and concurred in by Joseph Walsh, State Secretary of Mines, that "all mine inspectors shall work for a period of two months without compensation" and asking that "vacancies in three anthracite districts" now existing be filled, "so that proper care can be taken that life and limb shall be preserved about the anthracite mines." The resolution was accompanied by a letter to the Governor requesting reconsideration of his order and that action be taken along the line suggested.

A threatened strike of 800 employees at the Pine colliery of the Glen Alden Coal Co., was **settled** at a conference, March 4, between Rinaldo Cappellini, president No. 1 district, United Mine Workers of America; W. W. Inglis and S. B. Dimmick, president and general manager Glen Alden Coal Co. This controversy has been three years in process of settlement.

Earnings of the Bucyrus Co., of Milwaukee, during 1923 were $25.50 per share on the common stock, which was the largest in the history of the company, according to President W. W. Coleman's letter to stockholders. The total earnings for the year after all deductions was $1,299.932, as compared with $746,301 in 1922 and $1,010,985 in 1920, the best previous year. The company went into 1924 with a larger volume of orders on its books than it had at the opening of 1923.

The Carnegie Coal Co. with big holdings in Washington County, has filed with the recorder a mortgage of $7,500,000, given to the Colonial Trust Co. of Pittsburgh, to secure the first mortgage 6 per cent serial gold coupon bonds issued by that firm.

The following coal companies were incorporated recently at the State Department at Harrisburg: **W. G. Robertson Coal Co.,** Scranton, mining and preparing coal for the market; capital, $50,000; treasurer, A. A. Sweetser, 1402 Price Street, Scranton. Incorporators: W. G. Robertson, A. A. Sweetser and J. Henry Jones, Scranton. **Ampere Coal Co.,** Scranton, mining and preparing coal for the market; $75,000; incorporators, A. A. Sweetser, 1402 Price Street, Scranton, treasurer; W. G. Robertson and J. Henry Jones, Scranton. The Homer Coal Coal Co., the Purity Coal Company and the Grazier Coal Mining Company have notified the State Department they have merged into the **Cosgrove-Meehan Coal Co.,** of Pennsylvania, with a capital stock of $315,000. J. E. Graham, Johnstown, is treasurer.

WEST VIRGINIA

Net earnings of the **Clinchfield Coal Corporation** in 1923, according to the annual report of the company, just out, were $1,011,690.67 before fixed charges, the latter item amounting to $107,881.70, leaving net income after fixed charges $903,808.97. During the year $246,104.35 was expended on improvements and developments. Output was 2,323,183 tons, an increase of 44,101 tons over 1922 and the largest yearly output in the history of the company. The cost of coal, including selling expenses, for the year averaged $2.3979; the average price for the year, f.o.b. at the mines, for all coal was $2.7549, and the coal earnings, before interest, dividends and federal taxes, were 35.7c. per ton.

A heavy fire loss was sustained by the **Low Moore Co.** when the large tipple at the No. 1 operation, at Kay Moor, was completely destroyed by fire, the loss amounting to $125,000. This was one of the largest tipples on New River and among other equipment destroyed was the crushing plant conveyor and three storage bins in which there was fully one thousand tons of prepared coal for use in coke ovens. It was possible to save the incline leading to the mine only by tearing out a portion of it in order to block the spread of the fire. The power house was not damaged, being of stone construction. It will require several months to replace the tipple. It will be replaced however by a tipple even larger and of more modern design than the one destroyed. In the meantime a temporary tipple has been constructed so as to permit continuous mining of coal for use in the company ovens.

The Kenova-Lincoln Coal Corporation has been organized by Virginia and West Virginia capitalists for the purpose of developing coal lands in Wayne and Mingo Counties. This company, with a capital stock of $100,000, has purchased 500 acres of coal and will begin the development of the acreage acquired within a short time. Organization of the company has been perfected by the election of the following officers: W. R. White, Bristol, Va., president; E. A. Schubert, Roanoke, Va., vice-president; W. H. Shelby, Huntington, treasurer. The company will have its principal office at Kenova.

The Katherine mine of the Antler Coal Co., at Lumberport, has been **sold to the Sitnek Coal Mining Co.,** together with 200 acres of Pittsburgh coal. The new purchasers include Louis Sitnek, of Philadelphia; Ralph L. Rankin, secretary and treasurer of the Sitnek Fuel Co.; H. H. Staggers and Edmund Cramp, of Fairmont. Mr. Sitnek will become the president of the Sitnek Coal Mining Co., for which a charter has been applied, this company to be capitalized at $500,000 consisting of 5,000 shares of a par value of $100. Fairmont people will be interested in the new company. The company now being organized contemplates the expenditure of about $100,000 for additional equipment. The Antler Coal Co., of which Col. Thomas W. Arnette is the president, will continue to operate two other mines—one at Round Bottom, on the Connellsville division of the Baltimore & Ohio, and the other known as the Sue mine, on the Charleston Division of the Baltimore & Ohio.

Organization of the **Spice Creek Land Co.,** in which McDowell County business men are interested, has been perfected by the election of the following officers: E. W. Cullen, president; S. J. Cooper, vice-president; L. J. Signiago, secretary; Jno. M. Cook, treasurer. The stockholders, at their organization meeting, authorized the lease of coal land owned by the company.

WASHINGTON, D. C.

The Interior Department has **classified more than one and one half million acres of land in Montana, Utah and Wyoming as coal land,** and nearly 900,000 acres in California, Montana, Nevada, New Mexico, Utah and Washington as non-coal, of which 15,000 acres in New Mexico had been previously classified as coal lands. In Montana 1,700,000 acres previously withdrawn as coal lands were restored to entry.

CANADA

The annual meeting of shareholders of the **Intercolonial Coal Mining Co., Ltd.,** was held at Montreal, March 5. The financial report showed results of operations to have been more satisfactory than for many years past. Operating profits, after allowing for depreciation and depletion, amounted to $153,364, as compared with $136,471 in 1922 before depreciation had been deducted. Net income on the common stock was equal to 29.27 per cent, as compared with 13.83 per cent in 1922. The balance sheet showed the company to be in a strong position with net working capital increased by more than $40,000.

Another chapter has been written in the case of the **Minudie Coal Co.,** which operated bituminous-coal mines at River Hebert for some years. For the past two years, the existence of this company has been sprinkled with strikes, labor disturbances, financial disaster, and now the property of the company has been seized and the assets auctioned for the benefit of creditors. The gross indebtedness is $125,000. When the property was sold at auction the highest bid was $10,500, which was accepted because of the need for ready money to pay claims of miners for wages. The purchaser was the provincial government, which has claims against the company totalling $111,000 for workman's compensation, royalty, etc. For some time the government has been keeping the pits in repair, at a cost of about $11,000.

According to the December report on the coal statistics of Canada just issued **for the month of December the coal made available for consumption in the Dominion was 2,692 000 tons,** a decrease of 12 per cent from November and 20 per cent from the three-year average of the month. For the whole year the coal made available for consumption showed an increase of 21 per cent. The output from Canada's mines for the month was 1,231,600 tons, a decrease of 17 per cent from November and 23 per cent from the three-year average for the month.

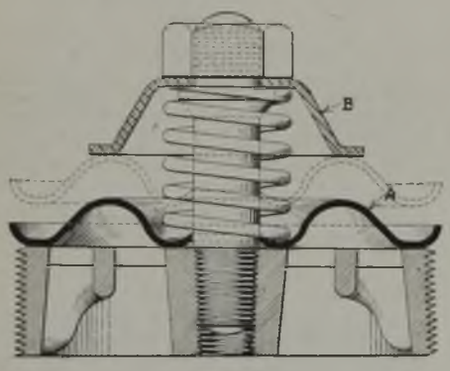
McGill Coal Co., Ltd., of Toronto, has been incorporated with an authorized capital of $250,000. George H. Sedgewick, James Aitchison, John W. Pickup and others are the provisional directors.

New Equipment

Acid-Resisting Valve for Reciprocating Pumps

The Durabla Manufacturing Co., New York, has recently placed on the market a monel metal valve particularly suitable for reciprocating type mine pumps. The view of the valve shows a disk *A* arched so as to close upon an inner and outer valve seat. This construction makes possible a strong disk made from a very thin sheet of material. This latter feature is highly desirable because it prevents the tendency to chatter regardless of the position of the valve. The guard *B* is a protector to the spring and also limits the movement of the valve disk.

Aside from being acid-resisting, the material of the valve and its construction is such that it is suitable for use with many different kinds of liquids at various temperatures and pressures.



Monel Metal Valve

An acid-resisting valve specially suitable for use on reciprocating type mine pumps greatly reduces the idle time usually necessary for renewing worn or corroded parts.

Low-Freezing Dynamite

Tests were recently conducted at Hibbing and Virginia in northern Minnesota which prove that ordinary straight 40 per cent dynamite now being made by the du Pont Company on a low freezing formula was practically unaffected at a temperature of 35 deg. below zero. A continuous series of tests which had been made during the comparatively mild winter weather at those points when the temperature was at zero or a few degrees below, proved that the low freezing dynamite would detonate without difficulty. In the test made at 35 deg. below zero, it was shown that one cartridge would detonate another at a distance of one foot.

The development of this low-freezing dynamite is considered to be the greatest advance made in the explosive field since the invention of dynamite by Nobel. It makes possible the use of dynamite in road building and all kinds of open construction work under any temperature encountered in the United States.

This low-freezing dynamite created a sensation last year when it was used in some ditch blasting work in the Northern states. The night before the ditch was shot, the explosives had been subjected to a temperature of 10 deg. below zero. The ground was frozen and covered with snow. The next day the holes were punched through the frozen ground, and the dynamite put down. It was shot by the propagation method where the detonation of one cartridge sets off the others. There was no difficulty whatever experienced. The dynamite showed the same qualities which it would show in the summertime.

Fountains for Wash Room

The Bradley Washfountain Co., of Milwaukee, Wis., is now manufacturing a washing fountain suitable for installation in mining company offices and wash houses.

Because of its circular shape, it easily accommodates a large number of people and at the same time gives them more available elbow room. The washroom equipment and floor space is thereby materially reduced, as is also the time ordinarily required for washing. Each fountain has only one water inlet and one large open drain. This eliminates the continual nuisance of clogged waste pipes and leaky faucets. The spilling of water on the floors and walls is almost completely eliminated, thus materially reducing the cost of upkeep.

The fountains may also be provided with special fixtures, such as enameled trays for holding cake-soap and liquid soap containers.

Sanitary Type Wash Fountain

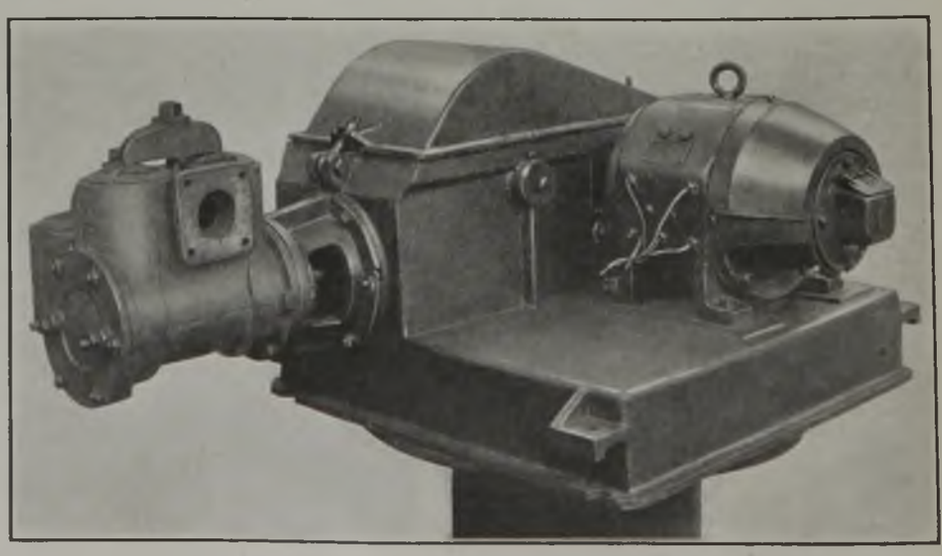
One inlet and one outlet control eliminates water wastage, and provides continuous flow of water which is always desirable for carrying away the dirt after it is loosened by the soap.

Self-Contained Gathering Pump

The Diamond Machine Co., of Monongahela, Pa., has recently developed a new self-contained pumping unit. The power frame is cast integral with the motor sub-base and forms a compartment for the working parts and a reservoir for lubricating oil which is closed with a removeable cast iron cover. A bored crosshead guide, bolted to the power frame is extended to carry the water end.

The gears and eccentric are keyed to seamless steel sleeves, fitted with removable bronze bushings, and turn on stationary axles as separators extending through the frame. The gears are duplicates as well as the sleeves, bushings and axles. A small quantity of oil in this compartment provides ample lubrication by the splash system to the gear teeth and all moving parts except the motor bearings. Brackets for truck axles are provided on the subbase and are so placed to give the lowest possible height above the track.

The water end is exceptionally heavy and is furnished in acid-resisting metal or is cast iron bronze fitted. A removable cylinder liner held in place by two studs through the rear cylinder head, is regularly furnished in acid-resisting bronze. A special liner of extreme hardness, great durability and resistance to wear, can also be furnished. The cylinder is reversible end for end so that the suction and discharge openings can be placed on the side most convenient for piping. All studs are of acid-resisting steel.



Pump Motor and Gear Reduction Unit

This equipment is substantially built so as to require continuous operation at low maintenance cost. All parts are carefully protected against corrosion and dirt.