

COALAGE

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Those Massachusetts Coal Tests

IN THIS issue O. P. Hood records his findings in Massachusetts as to the quantity of ash in anthracite. It is a little disturbing to read that it is necessary to take 1,000 lb. samples. Portentously we are told that a correct method of sampling coal has been devised and that to this end 1,000-lb. samples must be taken. How bold it is to question such a redoubtable standard as this seems to be! But the dictum is so positive that it sounds convincing. However, perhaps it is not more necessary to take a thousand pounds than to carry *pi* to ten places when calculating horsepower from the area of a piston or to use ten places of decimals in calculating co-ordinates for a mine survey.

After all there is in the lives of all of us something more important than meticulous accuracy. Some people will haggle over a cent and lose a dollar, will fuss over three or four inches in the width of a farm and then to save the expense of another survey will take the next area on faith; measure to hundredths of a foot yet fail to close a survey by four or five minutes.

The Bureau of Mines seems possibly in danger of this. It would do well to have a standard less meticulous and apply it more often. It seems too much like cutting down a forest to find how many board feet can be obtained from it.

The public is not so much interested as to whether its coal has one or two per cent more or less ash than a certain standard, but it is interested in knowing that it does not have twenty or thirty per cent more and in stopping all those who are putting such unburnable rubbish in the home, the factory and the market.

The law is not so much to exhibit authority with the responsible producer but to make matting unbearably hard for the irresponsible man just as soon as he tries to get into the market.

Trying to make too close and too expensive a survey will result ultimately in no survey being made. As engineers and not theorists the Bureau of Mines should seek to serve the public in the most practical way possible, and that is done not by attempting too much refinement in analysis but by a broader survey of conditions with less perfect analyses.

We are not convinced by the argument that as the value of a ton of coal is greater than that of a ton of ore so large a sample should be taken. The ore is improved by crushing. That indeed is the first step in beneficiation. Coal is spoiled by the same process. Crushing coal is not a beneficiating step but a degrading one. The difference is not one of words but of facts. If all the coal were bettered by crushing, the operator willingly would let the government crush it all and take a 50-ton sample, but seeing that this is not true even a 1,000-lb. sample looks large.

To revert to another phase of Mr. Hood's papers, in large letters should be written the fact that the Bureau found dealers mixing dirty and clean coals together,

hoping to make the dirty coal salable. The extent to which this is done, especially in times of shortage, should make anthracite operators take action. The public is shown shipping slips from responsible operators and is delivered coal in which that company's product may form only a small percentage.

Against the Day of Rain

WHEN it is fine weather, says the old proverbial saying, it is needless to repair the roof, and when it rains the roof cannot be repaired. This holds true of correcting the evil of dirty coal. Just now there is not much trouble with coal quality and the public clamor is stayed, so why fuss about the matter? Let it lie, is the general dictum. Nevertheless during this fine weather is the best time to repair the roof of industry and not during the day or days of rain.

Today the industry can take matters in its own hands. It can convince the public that it means business. When a strike threatens or comes it will be too late. The public may—probably will—enact some statute the industry will not like. Before it does so the coal producer will be besmirched. He may get more than government inspection. He may get government regulation; even government ownership. A little shingling of the roof now may save more drastic action later.

No one can hide one's face to the fact that during all shortages of anthracite and bituminous coal all kinds of impure product found its way into the market. In the anthracite region men, either from that region or from others, loaded culm banks unwashed. Men who knew nothing more about coal than that anything remotely resembling it would sell went into the business of producing it or at least of gathering it up.

So bad was it along one line of railroad that the principal producer caused the coal in cars loaded by others to be sampled so that if an investigation came that company could assure Congress of the real source of the coal and exonerate itself. The investigation never came, but the indignation did, and the principal coal company on that road, the one connected with the railroad, unquestionably got the blame and yet had no chance to make a disclaimer.

In fact all the big companies in the anthracite region came in for a share of it, for when dirty coal comes into the market the outstanding companies must bear the brunt. It must be they who are at fault, says the man on the street, for see how rich they have become. The average man cannot understand that a large company more often grows on honesty than on crooked dealing.

In the bituminous field it was little different. The waste from washeries mysteriously disappeared being loaded into cars. Some of this inferior coal may have been sold for just what it was, and the buyer in that case may not have been deceived, but some doubtless were. Here again the whole industry suffered. How-

ever, it is not so detrimental when industrial purchasers are defrauded. As they buy in carload lots they can make their claims for damage direct, and they can go elsewhere in future. Buying in large quantities, it is worth their while to bring suit, and the producer, knowing that fact, is obliged to be reasonably careful.

But the domestic buyer is often obliged to deal with one merchant, no matter how ill he serves him, and even if he has a choice the dealer may be able to convince him that the coal was bought as a good product and that he is more sinned against than sinning. Furthermore, dealers can easily bring pressure on buyers. A purchaser often fears to complain. He might be refused coal when next he wanted it; he might even quietly be blacklisted. After all it is difficult to remove coal from a cellar, and once there it stays there and the buyer pays. Certainly it does not pay to go to court for a winter's coal or less.

"Let the buyer beware" may be good English and American law. If, however, a man gives us a bad bill or a bad dollar, do we believe that we are to blame and that we should have been on our guard? It is well to remember that much good law is bad morals and to quote bad law in defense of the questionable conduct even of our unfair competitors is little but a folly.

John, Rex, Still Rules

THE loose talk about an impending split in the United Mine Workers because of dissatisfaction with the rule of John L. Lewis is not convincing. Lewis is in no worse position before his own people now than most other presidents of the United Mine Workers have been at various times in their invariably tempestuous careers. Nobody can be head of the miners' union without serving as target for all the decayed fruit within the reach of the union malcontents. There always was and always will be rebels in the union and some day they will run Lewis out just as rebels so frequently have done to other presidents. But there are no signs that Lewis is now on his way. He has as much power as he ever had to make his people respect contracts.

The fact that reds made a loud noise in the miners' convention at Indianapolis last month means nothing much. The total number of real radicals did not pass 250, but 250 reds, seeing they could worry 1,700 in a convention, naturally kept up their disturbance. Quite a number of others joined in for fun, judging by their remarks. A two-weeks' miners' convention simply must have a bit of diversion to break up the droning of committee chairmen.

Even the fact that the administration had a close shave in the one roll call of the convention—a vote on the question of whether Lewis should be stripped of the power to appoint organizers—does not indicate that the union is on the point of splitting. It does mean, however, that dissatisfaction with Lewis on that particular matter is widespread and that the feeling has rolled up so much intensity that something will have to be done about it. Lewis is crafty enough to do something.

He will manage, before the next convention, to use his appointive power so judiciously that the issue will not be so formidable again. The chances are that organizers will give a better appearance, in the future, of earning their monthly \$300 pay checks. They will serve the whole organization instead of its president.

Anyway, Lewis will devote more of his undoubted genius to making those organizers popular with the rank and file. He nearly lost his right to choose them; he cannot afford such a loss. If he could not appoint them, a few disloyal organizers, elected by districts, might well produce a real schism in the union. There is no dangerous schism now. John L. Lewis, virile as a power plant, still rules.

"Consolidate!" They Cry

FEVERISH movement toward consolidations of mines in various bituminous-coal fields is gaining headway daily. Operators both strong and weak turn their thoughts upon it—the former in the hope that it will improve conditions of operating and marketing; the latter in pure desperation. In some regions the proposal is overshadowing almost every other subject except wages.

Of course, consolidations are logical at a time like this. An industry 30 per cent overdeveloped and for years harassed by cut-throatism within itself certainly needs stronger business units and fewer fly-by-nights. But consolidation is no panacea for all the ills of coal. It should not be looked upon as a rejuvenating monkey gland to be hastily and recklessly ingrafted on any and all devitalized coal companies. If such companies cannot justify their existence separately, consolidations should not and probably cannot save them.

The natural desire to bunch together for mutual protection has led operators to consider some grotesque schemes for business groupings. Most such schemes are hopeless. For instance, in a field where many small producers have worked their own undoing time and again by mutual distrust and stealthy price cutting, what hope would there be in a "consolidation" which consisted only in the various companies selling through a common agency? There would be no accurate control over the entire output of the mines involved. There would be no reduction of mine costs through central management. There would be much opportunity for discrimination as between members. The cohesion of the group would be weak. It would fly apart on small provocation and upset the market and conditions generally. It would be no consolidation at all. Any half-hearted plan for weakly linking up mines or partially pooling properties is a futile dream.

The only permanent and substantial benefits from consolidation will be enjoyed by those properties which have an unquestioned right to continue serving the public and which form natural and logical groups under single ownership and control. However, we may expect to see and hear a good deal during the next few months about other sorts of coal properties being buffeted about through one scheme after another until the elimination process has done its worst.

But this consolidation wave will not engulf every independent company. It will help natural processes wash out bone and dirt, leaving the industry somewhat purged. While this is going on, good operating men everywhere, both in consolidation and out, will continue to be surprised at their own ingenuity in whittling down the costs of coal, the mechanizing of mines will spread apace, and about 5,000 good properties will continue prosperously to supply the nation's tremendous demand for half a billion or more tons of coal every year.



Famous Old Merrimac Mine, which furnished Coal to Confederate Ironclad of that Name in Civil War

Mine is Owned by Merrimac Anthracite Co. and lies on Norfolk & Western and Virginian Railways

Can the Valley Coal Fields of Virginia Compete With Those of the Anthracite Region?

Coal Is Semi-anthracite, Slightly Lower in Rank Than the Lykens Valley Product, but That Is an Advantage —Ash Content High, Being from 14 to 28 per Cent

MORE promising than the rest of the coal areas of Montgomery, Pulaski and Wythe counties of Virginia are those which have been named the Valley coal fields. They recently were examined by the U. S. Geological Survey and the Geological Survey of Virginia to ascertain their extent and value.

The most important questions concerning these coal areas are: What is the quality of the coal? Is it an anthracite, and if so can it successfully compete with that of Pennsylvania? If it is not an anthracite, has it distinctive properties of its own that will please the consumer and lead him to continue its use?

The accompanying table contains all the recent government analyses of this coal. These should be carefully studied by anyone who contemplates investing in this field or handling the coal, for they afford the means of determining the rank, grade and market possibilities of the fuel.

COAL IS NOWHERE A TRUE ANTHRACITE

The Geological Survey reports unqualifiedly that this coal is not an anthracite. An anthracite, according to the accepted meaning of the term, is a coal so low in volatile constituents that it burns with a bluish flame only and not the short yellowish flame that is characteristic of the Valley coals. A comparison of the analyses of samples of anthracite shows that in coals which burn with a blue flame the volatile matter is one-tenth or even less than one-tenth of the fixed carbon.

As the supply of Pennsylvania anthracite is decreasing and its price is steadily mounting there is an eager and growing demand for a satisfactory and cheap substitute. Many of those proposed are more or less satisfactory, but one of the most promising, especially for use in the Middle Atlantic States, the Mississippi Valley, and the Great Lakes region, is a semi-anthracite that is mined in fields in southwestern Virginia, in or near the Great Valley, in Montgomery, Pulaski and Wythe counties.

This relation generally is expressed as the quotient of the percentage of fixed carbon divided by the percentage of the volatile matter. This is called the fuel ratio. The fuel ratios of the Valley coals are given in the last column of the table of analyses. This table shows that the coal of highest rank from the Valley fields has a fuel ratio of 8.5. The fuel ratio of anthracite of the lowest grade is 10, so that all the coals here considered are below the rank of a true anthracite.

This coal evidently is not an anthracite and should not be placed upon the market under that name. The next question is: Has it distinctive properties which will enable it to compete with Pennsylvania anthracite or which will cause it to be so liked by the consumer that he will prefer it to any other coal on the market?

The answer to this question must depend largely upon how well the Valley coal is prepared before marketing, but if it can be so treated that the ash will not exceed 8 per cent this coal may possibly obtain a market of its own that can be held against all comers.

The coal with which the Valley product is most often compared is the Lykens Valley coal, which occurs at the west end of the Southern Anthracite field of Pennsylvania. This coal commands a substantial premium above the highest rank or "dry" anthracite, because it contains more volatile matter and therefore burns with a short yellow flame that makes it attractive as a grate fuel. Its higher percentage of volatile matter also makes it ignite more readily than ordinary anthracite, and this is another point in its favor.

The Valley coals are slightly lower in rank than the

NOTE—The facts in this article are supplied by U. S. Geological Survey, which publishes a printed report.

Lykens Valley coal, but they are not low enough to be called smoky coals, and consequently there seems to be no reason why these Virginia coals should not find as ready a market as the Lykens Valley coal, provided the ash is reduced to the percentage above noted.

If the Valley coal is not an anthracite, what should it be called? It has just been shown that this coal should not be classed as anthracite because its percentage of volatile matter is too high, but the analyses show that it is only slightly below that rank. In other words, it must necessarily fall into the next lower rank. The next rank below anthracite is semi-anthracite, and this rank includes coals whose fuel ratios range from 5 to 9.9.

The table of analyses shows that practically all the coals of Montgomery, Pulaski and southern Wythe counties fall within this rank, though they differ considerably among themselves. The coals of the Price Mountain and the Pulaski fields head the list and are followed closely in descending order by the coal mined at Empire, at Gunton Park, and lastly by other coals of the Little Walker Mountain and Brushy Mountain fields.

The Valley coal now being mined should therefore be marketed as a semi-anthracite, but if properly cleaned it will perhaps be an even more attractive fuel for some purposes than the "dry" anthracite of the Pennsylvania fields.

The coals of the Reed Creek and Bland fields seem to fall below the rank of semi-anthracite, but as all the

samples available for analysis consisted of more or less weathered coal they may not correctly represent the real unweathered coal. If unweathered material were available analyses might show that the coal belongs to the same rank as the coal of the fields to the south.

SOME BONY COAL QUITE HIGH IN VOLATILES

At most places in these fields the coal beds that are mined show a great variety of coal, some of it very soft and flaky, some hard and bony, and some that resembles black sand. No two operators or even miners agree as to the real nature of these peculiar kinds of coal or as to whether they should be classed as coal or as bone. In order to settle some of these questions samples of two of these varieties were analyzed.

Sample 94,182 is so-called "sand coal" from the Merrimac mine, in the Price Mountain field. This coal is common in the Merrimac bed wherever it has been mined and prospected. The analysis is rather surprising, as the "sand coal" contains more volatile matter than the coal in the rest of the bed. Thus, a mine sample which was obtained in a cut across the coal bed and which included all except the distinctly bony layers showed on analysis 9 per cent of volatile matter and 17.1 per cent of ash, whereas the "sand coal" from the same locality showed 22.3 per cent of volatile matter and 25.2 per cent of ash.

The explanation of the high percentage of volatile matter is found in the composition of the coal. Under

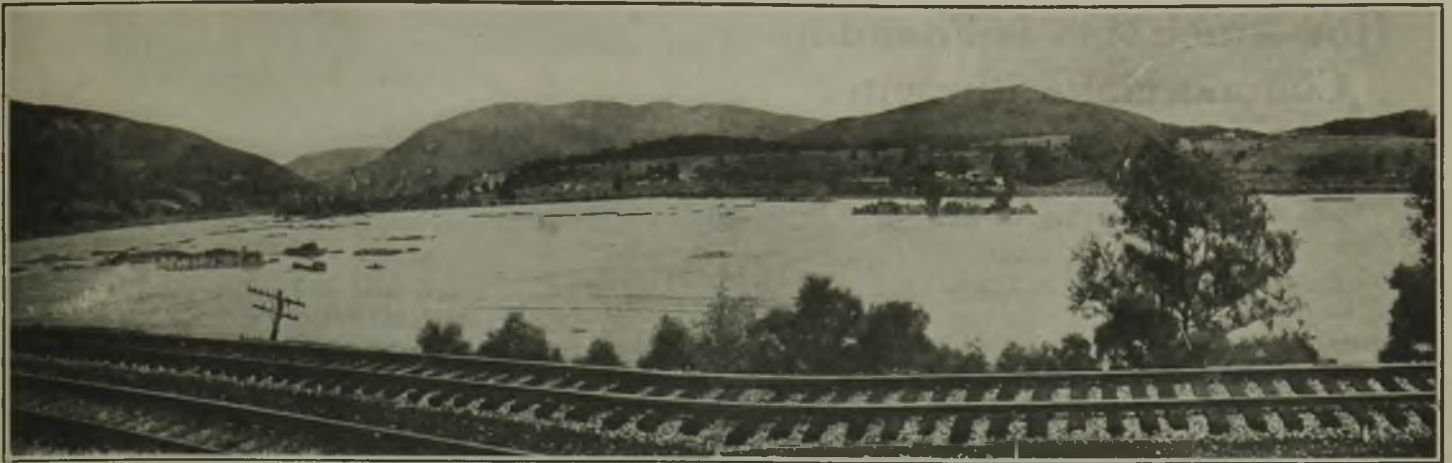
Proximate Analyses of Coal Samples from the Valley Fields of Montgomery, Pulaski, Wythe and Bland Counties, Va.

(All analyses made by the U. S. Bureau of Mines)

Name of Mine, Prospect, or Operating Company	Coal Bed	Lab. No.	Analysis of Sample as Received					Analysis of Pure Coal		Fuels Ratio FC VM	
			Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	British Thermal Units	Fixed Carbon		British Thermal Units
<i>Brushy Mountain Field, Montgomery County</i>											
Slusser & Doss	Merrimac	94,184	4.8	10.0	69.7	15.5	0.5	12,240	87.4	15,350	6.9
M. J. Slusser Coal Co.	Merrimac	19,358	1.9	12.3	66.8	19.0	0.7	12,160	84.4	15,360	5.4
M. J. Slusser Coal Co.	Merrimac	22,629	1.6	12.3	68.1	18.0	0.5	12,340	84.7	15,340	5.5
M. J. Slusser Coal Co.	Merrimac	22,630	1.9	13.5	69.8	14.8	0.6	12,710	83.8	15,260	5.2
M. J. Slusser Coal Co.	Merrimac	30,689	2.1	13.9	68.7	15.3	0.6	12,610	83.2	15,280	4.9
M. J. Slusser Coal Co.	Merrimac	30,690	1.7	14.1	69.4	14.8	0.5	12,850	83.1	15,380	4.9
Diamond Coal Co.	Merrimac	93,530	2.3	12.7	58.7	26.3	0.5	10,770	82.2	15,080	4.6
Diamond Coal Co.	Merrimac	93,531	2.7	12.9	68.2	16.2	0.5	12,460	84.0	15,360	5.3
Plunkett & Wall	Merrimac	19,357	2.5	12.4	67.5	17.6	0.5	12,360	84.5	15,480	5.5
Seymour Price and Co.	Merrimac	19,360	4.7	11.5	65.4	18.4	0.6	11,820	85.1	15,380	5.7
College Mine	Merrimac	93,536	2.4	11.8	70.5	15.3	0.5	12,760	85.6	15,500	5.9
College Mine	Merrimac	93,537	2.7	12.4	68.8	16.1	0.5	12,470	84.7	15,380	5.5
A. Dunphy Coal Co.	Merrimac	95,621	0.7	12.9	65.2	21.2	0.5	11,970	83.5	15,330	5.1
Linkous and Kipp	Merrimac	93,533	2.9	11.7	69.7	15.7	0.5	12,570	85.6	15,450	5.9
Linkous and Kipp	Merrimac	93,534	2.7	11.9	67.3	18.1	0.5	12,230	84.9	15,440	5.6
J. H. Keister	Langhorne	93,539	2.9	12.3	72.0	12.8	0.3	12,890	85.4	15,290	5.8
Superior Anthracite Coal Co.	Merrimac	95,615	2.0	12.7	65.0	20.3	0.8	11,900	83.6	15,320	5.1
<i>Little Walker, Mountain Field, Pulaski County</i>											
Pulaski Anthracite Coal Co.	Merrimac	19,431	2.4	11.6	63.3	22.7	0.7	11,310	84.5	15,100	5.5
Pulaski Anthracite Coal Co.	Merrimac	30,694	1.6	13.3	61.5	23.6	0.7	11,400	82.2	15,240	4.6
Pulaski Anthracite Coal Co.	Merrimac	94,186	2.1	12.0	61.9	24.0	0.5	11,230	83.7	15,190	5.1
Pulaski Anthracite Coal Co.	Merrimac	94,187	1.6	11.7	61.6	25.1	0.7	11,170	84.0	15,220	5.2
Cloyd Mine	Merrimac	20,722	2.5	10.8	63.1	23.6	0.4	11,250	85.4	15,220	5.9
Empire Anthracite Coal Co.	Langhorne	30,695	3.1	9.8	69.9	17.2	1.1	12,310	87.7	15,450	7.1
Empire Anthracite Coal Co.	Langhorne	75,888	4.4	10.1	71.5	14.0	0.5	12,520	87.5	15,330	7.0
Empire Anthracite Coal Co.	Langhorne	75,889	4.8	9.7	71.0	14.5	0.6	12,460	88.0	15,450	7.3
Empire Anthracite Coal Co.	Langhorne	94,189	2.5	9.9	68.2	19.4	1.6	11,980	87.3	15,330	6.9
Empire Anthracite Coal Co.	Langhorne	94,190	1.6	9.9	70.0	18.5	0.4	12,240	87.7	15,330	7.1
<i>Price Mountain Field, Montgomery County</i>											
Lykens Hill Coal Co.	Merrimac	19,403	1.7	9.4	66.6	22.3	0.7	11,570	87.7	15,220	7.1
Merrimac Anthracite Coal Corp.	Merrimac	30,692	3.6	9.5	67.6	19.3	0.5	11,850	87.6	15,380	7.1
Merrimac Anthracite Coal Corp.	Merrimac	94,180	1.4	9.0	72.6	17.0	0.5	12,510	89.0	15,320	8.1
Merrimac Anthracite Coal Corp.	Merrimac	94,181	2.7	9.7	70.5	17.1	0.5	12,110	87.9	15,110	7.3
Merrimac Anthracite Coal Corp.	Merrimac	94,182	1.6	22.3	50.9	25.2	0.3	8,690	69.5	11,890	2.3
Brunfield Coal Co.	Merrimac	95,619	2.5	8.8	74.6	14.1	0.5	12,880	89.5	15,420	8.5
Eureka Coal Co.	Merrimac	94,185	3.8	9.2	69.7	17.3	0.7	11,990	88.3	15,190	7.5
<i>Pulaski Field, Pulaski County</i>											
High Carbon Coal Co.	Merrimac	94,192	4.5	8.2	63.9	23.4	0.3	10,880	88.7	15,080	7.9
<i>Max Meadows Field, Wythe County</i>											
W. B. Gunton's prospect		30,696	3.8	9.4	62.2	24.6	0.8	10,960	86.9	15,310	6.6
Pulaski Smokeless Coal Co.	No. 1	93,937	2.9	9.6	63.8	23.7	1.6	11,200	86.9	15,270	6.6
Pulaski Smokeless Coal Co.	No. 1	93,938	3.1	9.7	66.6	20.6	0.7	11,700	87.3	15,330	6.9
Pulaski Smokeless Coal Co.	No. 2	95,461	1.8	9.8	60.0	28.4	0.6	10,530	86.0	15,100	6.1
Millers Creek prospect		20,721	6.1	11.1	49.7	33.1	0.3	8,950	81.7	14,720	4.5
W. Fork Millers Creek prospect	No. 3	93,540	3.1	11.4	66.2	19.3	0.5	11,920	85.3	15,360	5.8
<i>Reed Creek Field, Wythe County</i>											
Dr. J. P. Graham's prospect		95,620	1.3	18.3	70.7	9.7	2.3	13,830	79.5	15,520	3.9
C. C. Brown's prospect		93,670	2.8	20.4	53.2	23.6	0.6	11,330	72.3	15,410	2.6
<i>Bland Field, Bland County</i>											
T. C. Thompson's prospect		95,405	3.6	12.0	35.2	49.2	1.0	6,660	74.7	14,090	3.0
Howard Stowers' prospect		95,406	2.7	12.9	37.5	46.9	1.5	7,280	74.4	14,460	2.9

The form labeled "pure coal" is only moisture and ash-free coal. No. 95,621 is a grab sample of dull splint coal. No. 94,182 is a grab sample of so-called "sand coal." No. 95,620 is picked coal from a weathered stockpile. Nos. 20,721,

93,670, 95,405 and 95,406 are from old caved prospects, and the coal is doubtless affected by weathering.



New River from the Parrott Coal Mine, New River Field, Virginia

The Parrott mine is operated by the Pulaski Anthracite Coal Co., on the Norfolk & Western Ry. It is located in the Merrimac bed, the same which is operated by the celebrated mine of that name. The area across the New River is Montgomery County.

Though the river is the same, this field, despite its name, is far removed from the better known New River coal region of West Virginia, which is on the lower reaches of this same river. The measures here are far older than those in the West Virginia

field, the volatile content of the coal is much lower, and the coal has considerably steeper pitches. The dip varies from 35 to 50 deg., making the area of extractable coal only about half a mile wide, provided the dip continues thus far without diminution.

the microscope the granules, which resemble grains of black sand, were seen to be seeds and spores of plants—the most waxy or fatty material that is found in coal. This waxy material gives to the “sand coal” its high content of volatile matter. Its high content of ash relegates it to the class of bone, and it should be thrown out by the pickers unless in some way its good materials may be utilized and its bad ones eliminated.

The Merrimac bed in many places contains a layer of dull coal that resembles gray splint. A sample of this material was obtained from a car of coal from the mine of the A. Dunphy Coal Co., which is just south of the old College mine on Toms Creek, northwest of Blacksburg.

Sample 95,621 consists of dull splint-like coal, and the analysis shows practically no difference between this sample and one representing the entire coal bed in the College mine, except that the coal from the Dunphy mine contains more ash. Here again the material should be classed as bone and discarded unless the percentage of ash can be materially reduced.

THERMAL VALUE OF PURE COAL HIGH

The table of analyses shows the poor points of the Valley coal as well as the good points. The good points include the extremely low content of sulphur and the high heating value of the real coal substance expressed in British thermal units under the heading “Analysis of pure coal” in the table. The striking uniformity of the quantities in this column shows that even the possibly weathered samples would have a heating value comparable with the coals of higher rank were it not for their large content of ash. A comparison of the figures in the two columns headed “British thermal units” affords a ready means of finding the loss in heating value due to the ash and moisture in the coal as mined.

The worst feature of this coal is its high percentage of ash, which in the samples cut in operating mines runs from a minimum of 14 per cent to a maximum of 28 per cent. So high a percentage of ash really prohibits its successful marketing, and operators must make more vigorous efforts than they have made heretofore to reduce the ash, or else they cannot hope to establish a permanent trade in the face of keen competition. It is hardly possible to say what quantity of ash is permissible, but a strong effort should be made by

careful picking and washing to bring the quantity within 8 per cent. If such a reduction could be made it would increase the heating value to about 13,700 British thermal units and would provide a domestic fuel that need not fear competition in any market.

Boiler and Power-House Operation

“THE Supervision and Maintenance of Steam-Raising Plants,” by Charles A. Suckan, is the title of a new book just published by Ernest Benn, Ltd., 8 Bouverie St., E. C. 4, London, England.

In keeping with necessity and the development going on in large power plants toward the more economic and efficient use of fuel and advanced methods in steam raising, the author of this book has brought out many technical and practical phases of the work.

The book begins with a section entitled “Working the Power Unit.” Beginning with the organization of the power plant and describing various types of boilers, the author leads on to the subject of fuel combustion, which deals with different types of furnaces. In passing on through different methods of firing, many important details in connection with the power plant are ably discussed. Points on laying out the power plant, setting up the various structures, and their operation and maintenance are thoroughly practical.

In general the book covers the latest practices in boiler and power-house operation and points the way to improvements and developments for the future.

Splices and Tapes

AN INTERESTING pamphlet on the subject “Splices and Tapes” just issued by the Okonite Co., Passaic, N. J., deals with the importance of a perfect splice, the important properties of tape and how to recognize these properties and make a perfect splice. The promiscuous purchase of rubber and fabric tape is altogether too common a practice. This is in part due to the fact that there is no definite understanding as to what qualities a tape should possess.

The best wiring job is sometimes spoiled because of the use of a poor grade of tape at the joints or a misapplication of tape. From the troubles that frequently result it is apparent that the difference in cost between a perfect and a bad joint is hardly noticeable.

How Much Ash Is Found in Commercial Anthracite?

Test of Coal in Massachusetts Yards Discloses Variation from Lowest Ash of 10.2 per Cent to Highest of 46.1

By O. P. HOOD

Chief Mechanical Engineer, U. S. Bureau of Mines, Washington, D. C.

DURING the past summer the U. S. Bureau of Mines took 127 samples of anthracite, each of 1,000 lb., representing nearly 30,000 tons of such coal in dealers' yards in seventeen cities in the State of Massachusetts. There were three objects in view: To discover the average and the variation in the quantity of ash in anthracite in some easily described area; to demonstrate standard sampling methods and to learn something about the feasibility of itinerant coal sampling. Massachusetts was selected because its principal cities could be visited in a single season. A demonstration of the standard sampling of coal seemed necessary in Massachusetts because a coal-quality law had been passed in the state which had to be administered by persons unfamiliar with the sampling of coal.

The technique of coal sampling has received the same careful study that has been given to the sampling of gold and silver ore, and as a matter of fact the value of coal per ton is greater than the value of many such ores as are bought and sold entirely on the value disclosed by proper sampling and analysis. The proper method of sampling has been approved as an American standard and should be followed. A standard sample must contain at least 1,000 lb. and be selected so as to be thoroughly representative of the lot under consideration.

This must be repeatedly crushed, mixed and quartered in a prescribed manner, until the last quarter is all finely crushed and weighs about 5 lb. Only in this way can the chance inclusion or exclusion of a piece of bone coal or slate produce a negligible effect, and the results of resampling be expected to check fairly well with the first sampling. The labor of handling and crushing so much coal, being considerable, is likely to be evaded, but in no other way can a just result be obtained.

Widely varying results obtained by different samplers tend to discredit such work, and poor sampling should have no standing in the courts. The Bureau samples were all taken in the prescribed manner, so that they are representative of the coal sampled. The Bureau used a small truck equipped with a coal crusher, arranged to be driven by the truck engine. They were taken between July 10 and Nov. 4, 1923. The cities visited and the number of samples taken in each are given in the accompanying table.

PLACES WHERE SAMPLES WERE TAKEN AND THE NUMBER OF SAMPLES TAKEN

City	Samples Taken	City	Samples Taken
Boston, Mass.	41	Brockton, Mass., (One Petroleum Coke)	11
Somerville, Mass.	4	Worcester, Mass.	16
Brighton, Mass.	1	Springfield, Mass.	10
Jamaica Plain, Mass.	1	Northampton, Mass.	2
Cambridge, Mass.	3	Holyoke, Mass.	2
Swampscott, Mass.	4	Providence, R. I. (R. I. Coal)	6
Lynn, Mass.	6	Welsh samples, Boston, Mass.	2
Haverhill, Mass.	1		
Bradford, Mass.	1		
Lawrence, Mass.	6		
Fall River, Mass.	5		
New Bedford, Mass.	5	Total	127

The weighted average ash content was: For furnace size, 13.2 per cent; egg, 13.7; stove, 13.7; chestnut, 16.2; pea, 15.6; range, 19; buckwheat No. 1, 18.9 per cent. In the 8 samples of furnace coal the lowest ash was 10.5 per cent and the highest 14.6 per cent; of twenty-nine samples of egg the range was from 10.2 to 17.5 per cent; of 20 samples of stove coal, 11.3 to 15.9 per cent; of 23 samples of chestnut, 10.3 to 46.1 per cent; of 20 samples of pea, 12 to 27.3 per cent; of 4 samples of range, 13.1 to 28 per cent; of 8 samples of No. 1 buckwheat, from 13.6 to 29.5 per cent.

In the chestnut coal the highest six samples ran 46.1, 40.7, 28.3, 25.6, 18 and 16.5 per cent ash. The six cleanest samples ran 10.3, 12.2, 12.9, 13, 13.2 and 13.4 per cent ash.

Some but not all of the high-ash coal had been condemned by the state authorities. Some high-ash coal was being mixed in dealers' yards with lower ash coal.

The coal producer judges the quality of the coal by taking a small sample and by hand separating it into three piles, one of coal, one of bone and one of slate. A piece which he guesses has less than 40 per cent ash would be called coal, a piece having from 40 per cent to 65 per cent ash would be called bone, and anything having a larger amount of unburnable material would be called slate. Material can be found having almost any proportion from a very low per cent of ash to a very low per cent of carbonaceous material. The operators' standards of preparation allow in each size certain percentages of bone and slate, and also a quantity of finer sizes, but it is impossible to translate this into the quantity of ash allowable. The figures obtained by this survey give an idea of the actual quantity of ash in anthracite sent to one district in the summer of 1923, when the opinion of dealers was that the quality of the coal in general was good.

To Clean Carbide Lamp Without Injury*

By CHARLES LABBE

The usual method of cleaning spent carbide from a miner's acetylene lamp is to tap the bottom part of the lamp against the shoe and to shake out the carbide into a waste can, tapping the lamp against the rim of the can until most of its contents are dislodged. A better way is to provide a steel wire brush made from a piece of $\frac{1}{4}$ or $\frac{5}{16}$ -in. wire rope a foot or less in length. One end is served with iron wire about an inch above the end, which is then frayed out. The other end is wire wrapped about one-half inch from the end. The center portion is wrapped with tape. The short stiff end is used to loosen the carbide and the longer end for brushing it out of the cup of the lamp.

One of the weaknesses of the carbide lamp is not found in its own defect but in the way it is used. It is hammered most woefully by its user. This swab will save the container from many a hard rap on its rim, edges and bottom.



Wire Brush for Cleaning Carbide Lamps

A handy tool to keep at the receptacle where spent carbide is dumped.

*Engineering & Mining Journal, Denver



“Befo’ de Wah” Mine Yields Curious Relics

Engineers Prowling in Long Abandoned 1844 Bell Property of West Kentucky Find Bull Wheel, Pit Cars and Track All Made Without a Nail or Scrap of Metal—Ancient Ventilation System Works Perfectly

BY E. W. DAVIDSON
Associate Editor, *Coal Age*
Chicago, Ill.

IT IS a bit difficult nowadays to go down into a coal mine of 1844. Yet three engineers did just that. They were examining the old Bell property, near Sturgis, Ky., famous three-quarters of a century ago, in the course of studies they made preliminary to the recent rehabilitation of the mines under the present name of the Bell Coal & Navigation Co. Two hundred and ten feet of little old shaft separated the three from coal-mining days of “befo’ de wah.” They negotiated the distance, turned time back so to speak, and entered a strange mine containing ingenious crudities of long ago which, crude as they are, command respect from good mining men of today.

UNCOVER MOUTH OF LONG ABANDONED SHAFT

The three men were W. F. Davis, of Belleville, Ill., general superintendent of the new Bell Coal & Navigation Co.; J. A. Richmond, of St. Louis, Mo., chief mechanical engineer, and William Herbert, an engineer of Bessemer, Ala. In their examination of the noted old coal property, four miles southwest of Sturgis, in western Kentucky, they uncovered the mouth of the long-abandoned shaft—an opening known down through local history as Miners’ Shaft—and decided to enter it.

NOTE—Headpiece shows equipment for clearing the way for an inspection of the mine. With a thrasher engine to raise steam, with a little winch to operate the “hoist,” and with a pump lowered on an improvised cage, Miners’ Shaft was more or less dewatered and opened up.

A 15-ft. headframe was built over the 4 ft. 6 in. x 12-ft. three-compartment hole, a small winch was mounted nearby to operate by steam supplied by a traction engine, and the adventurers on an improvised cage, made a few experimental trips downward.

A good deal of débris had to be cleared out of the bottom, and the hole had to be dewatered by a pump lowered on the cage before the men finally flickered their candles around the bottom—the first lights that had penetrated there in the memory of any but one or two of the oldest settlers in that part of the country. They stepped into a dank dead atmosphere.

Their first sight was of a well-preserved bottom of about 4 ft. headroom, with clean-cut ribs extending up the main heading. Evidences of geometrical exactness marked everything they saw. The ribs of that main entry running back from the shaft were as true and clean as a carefully concreted entry of today. The marks of skilled hand work were on the mine ribs.

OLD FURNACE WORKS “FINE”

Proceeding a short distance up the main entry, the men found a door, long decayed, leading through a breakthrough to the right into a parallel entry. Following this back toward the shaft, they arrived at the old furnace, close to the shaft bottom, which once had ventilated the mine. The next step was to board the upcast air compartment of the shaft and erect a low



Taking a Coal Sample out of the Mine

Two of the engineers with a helper are seen here in one of the entries. W. F. Davis, the third engineer, made the picture. Marks of a hand drill are plainly to be seen scarring the rib.

canvas and wood stack on top. Then a fire was kindled in the old furnace with some misgiving as to whether the inner workings of the mine were sufficiently open to permit the furnace to ventilate the place.

"But it certainly worked fine," comments Mr. Richmond. "In less than a minute the air stream was going strong, and before long we felt satisfied we could go back into the workings and see what was there."

With no map and with no knowledge of what they might see except such suggestions as they had gotten in a hazy description of the property by an old neighbor, they started again at the shaft bottom, this time with cap lamps as well as candles. The main entry and the parallel "Durham entry"—so called because local tradition had it that miners from Durham, England, drove it—ran about 1,800 ft. up an approximate 5 per cent grade to a junction with main cross entries.

According to local history the cross entry on one side led into workings operated on shares by Welsh miners and the other into Durham territory. These two sets of co-operative coal operators were reputed to have scoffed at each others' skill as miners and to have maintained such keen rivalry that it periodically broke out in free-for-all fights both in the mine and outside.

Standing at the junction of the main heading with the side entries, it was evident to the three explorers of the mine that the two entries had been driven by

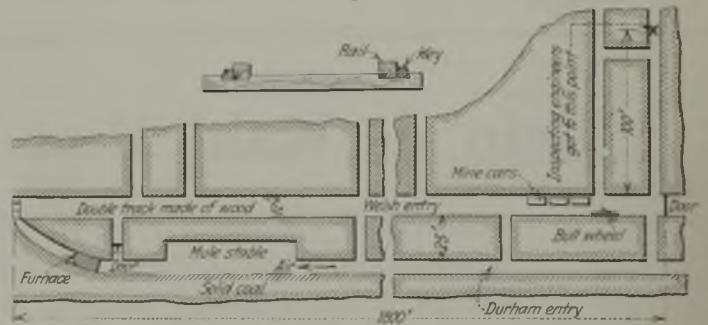
different types of miners. The Durham entry had been sheared on the right and shot from the left while the Welshmen—whether they were all left handed or not—had sheared on the left and shot from the right. The marks of skillful pick work were plainly seen on one rib of each entry and unmistakable drillhole traces on the opposite side. About 4 ft. of coal had been shot down at each fall.

NOT A NAIL OR BIT OF METAL IN CARS OR TRACK

Also standing at this junction, amid a collection of most interesting wooden construction—mine cars, tracks, slope-hoisting device and whatnot, all made without a single nail or bit of metal—it was easy for the three to get a general idea of the mine's main haulage. Loads had been brought in from both headings to the top of the main entry by animal power. Between there and the bottom gravity did the job.

A huge wooden bull wheel was originally mounted at the top of this 1,800-ft. grade. A single track ran from it down to the shaft, with a passing track at the half-way point. Obviously a load was lowered down the grade while an empty on the opposite end of a rope running around the wheel was drawn up.

The bull wheel is a rare piece of mechanism—one of



Bottom Layout of the Old Mine as the Engineers Found It

Old mines, of which examples may be found at Bostonia, near New Bethlehem, Pa., and near Shawmut, Elk County, in the same state being driven by mine workers of similar origin to those who worked at Miners Shaft, though at a slightly later date, show roadways just as meticulously perfect and track of somewhat similar character. Strap iron on edge, however, was used at the latter place in place of wood rails. This was notched and not spiked to the ties.

the rarest, probably, in American coal mining. Today it reposes cumbrously in the office of W. K. Kavanaugh, president of the Southern Coal, Coke & Mining Co., of



Displacing Air of Civil War Days

The engineers, anxious to enter the ancient mine, first built this little stack over the up-cast air compartment of the shaft, fired up the antiquated ventilating furnace 210 ft. below and awaited results. "It worked fine," says "Jack" Richmond, one of the adventurers. "In a minute the air flow was going strong." Soon they walked in—the first men to invade the place in the memory of the oldest settlers.



An Open Door Leading Direct to 1844

The mouth of Miners Shaft, and a peek down the shaft itself, four miles from Sturgis, in western Kentucky. Engineers entered it, descended 210 ft. and walked from today back into coal mining of long, long ago. There they found ingenious equipment lying just as it had been left two generations earlier.

St. Louis. Mr. Kavanaugh would like to put it in a historical museum if someone would convince him which one should have it.

The old wheel, about 56 in. in diameter, had broken down its wooden mounting, but it was intact. It is made of Southern gum and hardwoods of various kinds

The history of the place as compiled by Mrs. Clarence R. Wilson, of Sturgis, links up the mine with long-ago politics. The property was owned and operated in 1860 by John Bell, the nominee of the Constitutional Union party, for President of the United States in that year in the four-cornered race against Lincoln, Breckenridge and Douglas. John Bell operated two or three other openings into that same seam of coal. Little was done with the property after the war because of a confusion of litigation.

In early days Bell coal was recognized as high-grade fuel for steamboats. The late Captain John Nelson, who died almost a centenarian a few months ago in his home near the property, used to tell of the historic race from New Orleans to St. Louis of the river steam-



Old-Time Hand Mining Was Accurate

This snapshot, taken by flashlight in an aircourse in the mine as it appeared after standing idle since before the war, gives some idea of the geometric exactness with which ribs were sheared with picks.

and shows the skill of woodworking craftsmen. Not a nail was used to hold it together; pegs and glue served the purpose. Flat 2x8-in. spokes were keyed with wooden wedges into a hand-hewn solid ash axle—an octagonal log 4 ft. long.

Fragments of a wooden brake which had been operated on one end of the axle were to be seen lying about. It was merely a long 12-in. plank cut in one edge to fit the bull-wheel shaft and hinged at one end close to the braking point so as to allow powerful leverage. A good idea of the construction of the old wheel can be gained from the accompanying photographs of it. The ends of the octagonal log axle were sawed off so that the big relic could be hoisted up the little shaft.

A half dozen ancient pit cars were lying about the place, their running gear gone, but their wooden bodies still stoutly mortised and tenoned together as shown in another illustration. Each car was 3 ft. 6 in. long and about 26 in. deep. Only a few sections of the all-wood track used in the mine before the Civil War were to be

found. The rest had rotted away. In the track, too, there was no sign of any metal. Ties about 6 in. square supported 2x4-in. rails set edgewise in notches and keyed with hardwood. At the turns rails were bent into curves that appeared to be in nearly perfect alignment in spite of their age. No trace of the switches could be found.

The underground adventurers spent parts of several days in the old mine, but because of the obstacles they encountered they never penetrated much deeper into the workings than the top of the gravity plane. Peering into necks turned from the main entries, they concluded that rooms had been driven to great lengths, but exact measurements were not made. Most of the coal appeared to be about 48 in. thick.



Here Is the Old Bell Mine Bull Wheel

In the days "befo' de wah" it operated at the top of a gravity slope in a western Kentucky mine, long abandoned. J. A. Richmond, of St. Louis, who stands beside it, was one of three mining engineers who discovered it. The wheel, made without a single nail, is looking for a resting place in a museum.



What the Underground Adventurers Found

At the top of the gravity slope running 1,800 ft. from a junction of main entries down to the shaft bottom lay this collection of relics. Not a single nail was used in the construction of either the big sheave wheel or the little wooden cars, whose trucks had decayed with time. Wooden pegs and mortise and tenon joints were still tight. The object leaning against one of the cars is not a petrified, headless miner, but merely a slab of roof.

ers Natchez and Robert E. Lee, in which Bell coal played a part. The Lee, Captain J. W. Cannon, beat the better designed Natchez over the 1,252-mile upstream course by 3 hours and 14 minutes, taking Bell coal from a barge in midstream without stopping. The race is an epic of the Mississippi River, and the story of it once was much told around the three slope mines which grouped about the Miners Shaft.

Nothing else so spectacular ever happened in the history of this coal, but the output of the property is said to have maintained a good reputation as a fuel for metallurgical use in Civil War times and today part of it is used in gas manufacture. Some day it may be coked on a large scale if a large production is obtained.

REJUVENATION HAS BEEN BEGUN

The rehabilitation of the property, underground and on top, is beginning to convert the mines from potholes into real producers. Also it is giving the rolling mills around the top works something of the appearance of a forest park. An artificial lake lies in one of the little valleys, a small modern hotel for miners and a wide-porch lodge for company men perch on wooded hills, and winding roads add their contribution to the park effect. Modern engineering is having its way, top and bottom, in these mines, but nothing is going in that for picturesqueness can equal the old bull wheel that has come out and the old wheel's contemporary types of mine equipment which still lie where Davis, Richmond and Herbert found them, in "befo' de wah" surroundings.

The Miner's Torch

"Master Minds"

ON A diner between Cleveland and Washington recently I happened to be thrown with a lumberman and a clergyman. The lumberman remarked that his industry was the most misunderstood industry in America. "Why," said he, "the public seems to think that we are all robbers and crooks and they believe we are fighting the conservationist at every turn and playing fast and loose with the lumber reserves of the country. In fact the big men of our industry have become so worked up over the things that people are saying about us that they have raised a fund with which to carry on a national advertising campaign, the purpose of which will be to get the true facts about the industry before the public. In these articles no arguments will be advanced and no attempt will be made to draw conclusions. We will give only the facts and allow the public to draw their own conclusion."

Misery sure does love company! All these years I have been thinking that the dear public considered the coal industry the yellow dog of them all, and here comes a man willing to argue the matter.

I remarked that I was anxious to know what results they will get from their publicity as I had been thinking for years that the coal industry should make a similar investment. This brought the minister into the discussion. "Speaking of publicity," he said, "you must have noticed that we churchmen have been getting a lot of free publicity of late because some of our clergymen can't agree about the Creed, and now to cap the climax, as it were, I see by the *Literary Digest* that a New York newspaperman ridicules our profession as one that lacks the leadership of men with imaginations; in fact, is under the spell of second-rate minds."

How many times and in how many different places have I heard this same complaint made about the leadership of the coal industry! Give us leaders with imaginations and we'll sail through with flying colors is the cry at every important gathering of coal men.

Then I suddenly recalled a remark made by a professor in a history class while I was at college. "In looking back through the centuries you will discover that in each generation there are only a few brains that can be classed as first class," was about the way he put it. Think of it! Here I remembered a remark forgotten for twenty-seven years and recalled it when it was exactly what was needed to explain a paradox. Who says everything you learn in college is useless?

If there are only a few master minds in our generation why is it reasonable to suppose that they should all be found hooked up with the coal industry when the so-called learned professions can't attract their quota?

But if there are not enough first-rate minds to go around in our industry what's to hinder a lot of men with second-rate or even third-rate minds from getting busy and asserting themselves? Perhaps if they would, we would see an end to many of the problems in the lumber industry and the religious field and the coal industry; at least that is what we decided in the diner that night—the three of us.

Power Shovels Save Drudgery of Hand Mucking

Labor Scarcity Renders Mechanical Loading Necessary—Power Shovels Enable Bigger Cuts to Be Pulled and Obviate Blockholing—Specially Designed Rock Cars Facilitate Tunnel Driving—Spitting Trick Would Speed Work

DEVELOPMENT tunnels driven in the Pottsville district and Schuylkill Valley of Pennsylvania in most cases are either 7x10 or 8x12 ft. in cross-section. In a 7x10-ft. tunnel the quantity of rock brought down at a single blast approximates 50 tons. In the past all this rock had to be loaded out by hand labor during an 8-hour shift.

In order properly to appreciate what has been accomplished by power shovels in the way of rock mucking in the anthracite fields conditions existing prior to their installation should be considered. Many types of mechanical loaders had at sundry times been employed in this work, but for various reasons all had proved unsuccessful. Of course some were tried out before they had been perfected as they are today, while others were totally inadequate to the work in hand.

In making a 6-ft. cut in a rock tunnel 8 or 9 cars of rock would be shot down, each car having a capacity of 127 cu.ft. The loading of this rock by hand methods was about all that one gang of muckers could do in a shift. Such a gang was composed of a muck boss and 4 or 5 laborers. In some instances, of course, one gang might handle as much as 12 or 13 cars, but this performance was exceptional. Only after much persuasion, and then only occasionally, would the men handle more than the customary 8 or 9 cars per shift.

SOMETIMES THE MUCKERS FLATLY BALKED

In not a few cases they would refuse to handle the muck at all after they had sized up the pile and concluded that it contained, say, 12 to 14 carloads. Naturally if the muckers refused to work, the drillers lost the succeeding shift. As a logical result the drillers on the next shift would reduce the depth of holes drilled so as to decrease the rock brought down to a quantity that would suit the muckers. This, of course, reduced the average depth of cut pulled.

Measured over a period of two months, the depth of cut pulled by different operators averaged from 5 to 6 ft. The extreme independence of the mucking crews, of course, was traceable to a shortage of the kind of men who were willing to engage in this arduous work. Naturally, but few of these crews could compare with what the old timer knew as hard-rock muckers. Though some gangs were admittedly fairly good they were exceptions to the general rule. Throughout the anthracite fields most men preferred to engage in labor that was easier, even though they were paid lower wages for doing it.

POWER SHOVEL RELIEVES ACUTE LABOR SHORTAGE

The conditions outlined became so acute during 1923—throughout August and September many development tunnels were idle for lack of men—that it became obvious that some means other than man power must be found to load the muck. Early in the year, therefore, one of the largest operators in the Pottsville region installed a power loader for this purpose, the Hoar shovel being the type chosen. The tunnels in this

company's mines are 7x10 ft. in cross-section and are driven fairly level, only sufficient grade being given them to provide drainage.

The accompanying time study is typical of present-day performance of these shovels although on the particular day when this study was made conditions were more unfavorable to the machine than usual. This was due to two reasons: First, because the muck had been scattered further by the blast than usual and, second, because the muck crew on the preceding shift had failed to carry the track forward in proper shape.

In this instance, as in most cases, a single track of 42-in. gage was carried in the tunnel. The cars used in the run to be described stand 4 ft. above the rail and are 4 ft. 7 in. wide and 8 ft. 4 in. long. They are special rock cars built solely to serve the mechanical loaders and were developed by the coal-company engineers. A switch is placed from 250 to 350 ft. away from the working face. Mules haul the cars to the shaft, which is about 1,500 ft. distant.

TABLE I—RELATIVE PERFORMANCE IN HAND AND ROCK MUCKING

	Hand	Machine
<i>Colliery "A"</i>		
Cuts mucked.....	70	24
Feet driven.....	403	169
Feet per cut.....	5 76	7 04
Cost per cut.....	\$25 00	\$16 68
Cost per foot.....	\$4 34	\$2 37
<i>Colliery "B"</i>		
Cost per cut.....	\$33 00	\$15 79
Cost per foot.....	\$6 19	\$3 40

It will be noted in this time study that 41½ minutes was consumed in loading car No. 1. This total loading interval is made up of 24½ minutes of loading time and 17 minutes of time consumed in moving the shovel. The reason for this movement of the shovel was the scattered muck to which reference has been made. At no time during the loading of this car was the muck more than 6 in. to 1 ft. deep. From this the importance of keeping the muck close to the face will be appreciated at once.

Some drillers succeed in loading their holes so thoroughly in accord with existing conditions that they rarely scatter the muck any great distance from the face. In the case of car No. 2 the muck was still thin, this being shown by the number of moves made. Each move of the shovel means an advance of 5 ft. into the muck pile so that the total distance from the face to which the rock was blown in each instance readily may be approximated.

Switching time on each car varies from 4 minutes to nearly half an hour. Therefore it will be readily appreciated that the total time required for cleaning up a face could be greatly lessened by reducing the delay arising from this cause. It should be borne in mind, however, that this mucking crew, consisting of the machine runner, a laborer and a miner—the latter is responsible for the safety of the other two—is paid for a full 8-hour shift and that consequently speed in mucking is not of great importance to them so long as they get the cut cleaned up, the track laid and make all



Mechanical Shovel Loading Rock from Open Cut

Shoveling rock that has merely been blasted loose is hard work whether done by hand or by machine. This illustration shows a Hoar shovel working in a rock cut. The operation of this machine is much like that of a full-revolving steam shovel although its size, of course, is much smaller. By the use of shovels of this type in rock tunnels underground, blockholing, or the blasting of pieces of rock already shot down, has been entirely obviated, the machine successfully handling even the largest pieces.

other provisions for the next shift. Under advantageous conditions, as may be judged from this time study, this is easy of accomplishment.

It will be noted from this time study that although it required a total of 6 hours 11 minutes to clean up the shot, only 2 hours 46½ minutes was actually consumed in loading cars, and that of this 24½ minutes was taken up in loading the first car leaving practically 2 hours for loading out the rest of the muck. Switching caused a delay of 2 hours and 23 minutes and moving the machine entailed a delay of 32 minutes.

In contract work outside the mining regions where speed is a prime requisite rock blasts are being loaded out in a 4-hour period. This, however, means a split trick for the muck crew, which is not being used so far as is known in any anthracite mine. It is, however, being utilized by some contractors in tunnel work elsewhere.

Comparing operation of the power shovel with hand labor in tunnel driving in two separate collieries we have the results shown in Table I.

It will be observed that in colliery A the average length of cut made was 1.28 ft. greater than that obtained when hand mucking was employed. Only 5 hours 49 minutes of the 8-hour shift was actually consumed in mucking operations. It is obvious that muck from a heavy cut can be more advantageously and quickly handled if it lies close to the face. All data set forth refer to 7x10-ft. tunnels.

HIGH ROCK CARS INTRODUCE DIFFICULTIES

In considering the mucking of 8x12-ft. tunnels somewhat similar conditions are encountered, except that in most cases the cars to be filled are much higher, sometimes standing as much as 5 ft. 6 in. above the rail. The standard model shovel will not load these cars except in one end, so that a special form of this machine loader has been designed for this work. This was developed primarily for use in the anthracite mines of Pennsylvania. Basically it is the same as the standard model. Its frame, however, is higher and heavier.

Some coal operators have developed special rock cars for use in mucking and allow 12 of these cars to each

shovel. This arrangement, of course, necessitates that these cars be hoisted separately from the coal cars so that they may not be mixed with them. The many advantages resulting from the use of cars intended especially for the handling of rock more than offset the trouble on the surface entailed by their use.

Where cars from 5 ft. to 5 ft. 6 in. high are used in a 7-ft. tunnel it is extremely difficult to build a shovel that will load them to capacity. This is because such a high car leaves so little room between its top and the roof. A hand shovel might be introduced into the space left available, but this space is extremely small for the introduction of any mechanical means of loading.

HARD WORK IN MUCKING IS NOW GONE

Through the introduction of the power shovel, blockholing has been entirely eliminated. No pieces are now blasted from the face that the shovel is unable to load, even though some of them weigh up to a ton. After a cut has been mucked out the shovel is withdrawn by a mule or locomotive and placed on the aforementioned switch located several hundred feet from the face, ready for the firing of the shots.

Power shovels have taken all of the hard work out of rock mucking. Since their introduction it has become difficult to find a hand shovel anywhere about the rock workings when one is needed in order to do a little cleaning up at the face.

TABLE II—TIME STUDY OF ONE DAY'S SHOVEL OPERATION

Car No.	Switching		Moving Cars to Shovel	Loading Cars		Moving Shovel Forward		Total Time Car
	On	Off		On	Off	On	Off	
1*	7:30	AM	Commenced mucking at 7:56 AM	Commenced to move shovel into heading at 7:56 AM				
				7:56	7:58	2	7:58	7:59
				7:59	8:01	2	8:02	8:02½
				8:02½	8:04½	2	8:04½	8:06
				8:06	8:08½	2½	8:08½	8:09½
				8:09½	8:12	2½	8:12	8:14½
				8:14½	8:15½	1	8:15½	8:18
				8:18	8:21	3	8:21	8:22½
				8:22½	8:26	3½	8:26	8:27½
				8:27½	8:30	2½	8:30	8:31½
				8:31½	8:35	3½	8:35	8:37½
						24½		17
2	8:37½	8:52	14½	8:52	8:55	3	8:55	8:56½
				8:56½	8:59	2½	8:59	9:01
				9:01	9:05	4	9:05	9:07
				9:07	9:10	3	9:10	9:11½
				9:11½	9:15	3½	9:15	9:17½
				9:17½	9:20	2½	9:20	9:21½
				9:21½	9:23	1½		
						20		11
3	9:23	9:44	21	9:44	9:58	14	Moved while waiting for car	
4	9:58	10:14	16	10:14	10:23	9	10:23	10:25
				10:25	10:31	6		
5	10:31	10:43	12	10:43	10:58	15		2
	Less 2 min. operator fixing lamp					2		
6	10:58	11:20	22	11:20	11:36	13		15
	10:58	11:16	10			16		16
7	11:36	11:46	10	Putting section of track ahead of shovel				
	11:38	11:55	17					
				11:55	12:06	11	12:06	12:08
				12:08	12:14	6		
8	12:14	12:38	24	12:38	12:47	9		2
	12:47	1:06	10					
				1:06	1:12	6		
9	1:12	1:16	4	1:16	1:29	13		15
10	1:29	1:48	19	1:48	2:07	19		13
								19

Last car cleaning up face (3 minutes taken up picking down loose rock in face). Total time to clean up cut including all delays 6 hours 11 minutes. Total switching time 2 hours 22½ minutes. Total time loading cars 2 hours 46½ minutes. Total time moving shovel into muck 32 minutes. On this cut much delay was caused by track being torn up and not replaced. This was an exceptional condition, not encountered under ordinary working conditions. Total weight of rock handled, about 48.6 tons. First car cleaning up scattered muck; muck very thin.

Best Shop Practices in Cutting and Tapping Machine Threads for Repair Work

Preparing the Material Before Cutting the Thread—Use of the Stock and Die—Tapping Threads in Different Metals—Sharpening the Tools

BY GUSTAV H. RADEBAUGH
Mechanical Engineer, University of Illinois, Urbana, Ill.

A TAP is a hardened, highly tempered steel tool for cutting internal threads and has a thread and flutes cut in it to give cutting edges. The blacksmith tap is tapered $\frac{3}{4}$ in. to the foot. It is used on tapping jobs where it is not necessary to maintain a standard. The set of machinist's hand taps, Fig. 1, A and B, are not tapered but maintain one size from the first thread to the last.

Of these two styles of taps many different sizes are made. Ordinary taps run in various sizes in steps of sixteenths, but taps one sixty-fourth or one thirty-second oversize also can be bought. The hole for a tap should be drilled of a diameter equal to that of the bottom of the thread. Some taps have marked on the shank the size of drill that should be used in drilling the hole for tapping.

The pipe tap, Fig. 1, C, is used for cutting pipe threads. The threads of pipe, which are different from those for machine bolts and machine screws, are made according to two standards, the Briggs and the Whitworth, the first being that more commonly used. A tap wrench is used for turning the tap in the hole. When tapping cast iron, oil is not needed, but in tapping steel a good fatty oil should be used. The die and die stock, Fig. 2, are used for cutting threads on bolts and screws. A die stock is furnished for each size of thread. The standards for die blocks are the same as those for taps. Thread standards always cause more or less difficulty because of the great number of sizes and designs. Thus the machine-bolt standard differs from that used for the threads employed in automobile construction. A common standard for $\frac{1}{2}$ -in. bolts is twenty threads to the inch; for $\frac{3}{8}$ -in. bolts, sixteen threads to the inch and for $\frac{1}{2}$ -in. bolts, twelve or thirteen threads to the inch.

Cutting Threads with Die and Tap.—On repair jobs, when fitting bolts, nuts and screws, the operative sometimes has difficulty because he does not fully appreciate the importance of thread standards. The pitch of a screw is the number of threads to an inch, and it is important when fitting a screw to know that the number of threads on the screw and in the job are the same.

In this country extensive use is made of the United States Standard thread, which can be identified by a

TABLE I—TAP-DRILL SIZES FOR U. S. STANDARD BOLT THREADS

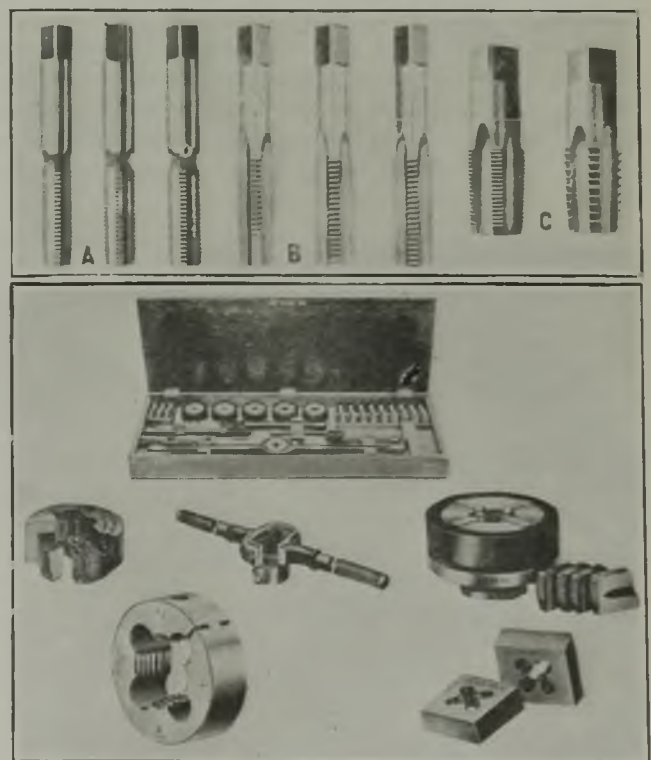
Diameter of Bolt, In.	Threads per Inch	Size of Tap Drill No. 7
$\frac{1}{8}$	20	$\frac{1}{8}$ in.
$\frac{5}{16}$	18	$\frac{5}{16}$ in.
$\frac{7}{16}$	16	$\frac{27}{64}$ in.
$\frac{9}{16}$	14	$\frac{27}{64}$ in.
$\frac{1}{2}$	13	$\frac{31}{64}$ in.
$\frac{5}{8}$	12	$\frac{17}{32}$ in.
$\frac{3}{4}$	11	$\frac{21}{32}$ in.
$\frac{7}{8}$	10	$\frac{49}{64}$ in.
1	9	$\frac{1}{2}$ in.
$1\frac{1}{8}$	8	$\frac{63}{64}$ in.
$1\frac{1}{4}$	7	1 in.

flat on the thread points. The V-thread, which is in the shape of a V with a 60-deg. angle, can be identified by the thread coming to a sharp point. There are one or two other styles of threads, but those already mentioned are the more commonly found. The shapes of the V-Standard, Whitworth Standard, United States Standard, Acme Standard, British Association Standard and Square Thread are shown in Fig. 3.

The number of threads per inch for bolts and nuts such as are used on mining machines usually conform to the United States Standard. This standard is shown in Table I. For bolts and screws used on automobile construction the American Society of Automobile Engineers some years ago adopted a standard which may be identified by its fine pitch. For instance the S.A.E. thread for a $\frac{1}{2}$ -in. bolt is twenty threads per inch. This standard has the U.S.S. form of thread.

For the convenience of the trade all tap and die manufacturers mark on the tool the standard number of threads per inch, size of thread, and sometimes indicate on the tap the size of drill which should be used to provide the hole for tapping.

When taps and dies are used to cut steel they must be lubricated. A good grade of animal lard oil, sperm oil or a mixture of graphite and tallow—10 per cent graphite and 90 per cent tallow—are the best lubricants to use when tapping or threading steel or iron. A good



Figs. 1 and 2—Taps and a Machinist's Set

The upper figure shows untapered sets at A and B and a tapered set at C for pipe threads. In the lower figure is a popular set of taps and dies.

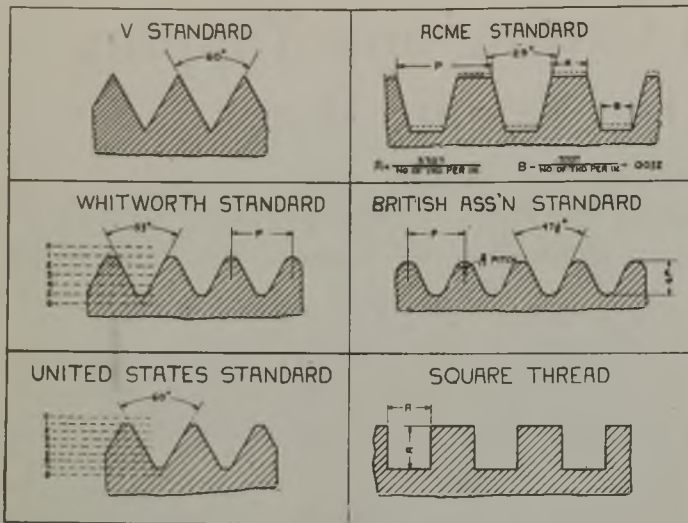


Fig. 3—Standard Screw Threads

Much confusion and difficulty often is experienced by the use of different styles and types of threads. Manufacturers of mining equipment can do much in the way of standardization and thus help to keep the equipment in repair.

soap compound is better than a mineral lard oil. Machine oil is a poor lubricant for thread cutting. When tapping cast iron, oil should be used sparingly, for it causes the chips to stick to the flutes of the tap.

If a hole is to be drilled for tapping, it is important that a drill of proper size be used. This can be determined by finding the diameter of the tap or bolt at the bottom of the threads or by referring to a chart of tap-drill sizes such as is shown in Fig. 1.

In threading soft steel by hand with the hand stock and die, the end of the material to receive the thread should be beveled, as in Fig. 4; that is, the sharp corners should be removed at an angle of about 45 deg. This can be done by using the coarse, or bastard, file, as shown in this illustration. This operation is important, for when it is done it makes it easy to start the die and enables it to do its work without injury. The threads also will be cut more correctly.

The end of the stock may be rounded, before cutting the thread, by the use of a hammer, as shown in Fig. 5. The end of the stock is struck medium hard blows with the hammer, the stock being held in about the same position as if it were being drawn to a point. To do this the stock need not be heated.

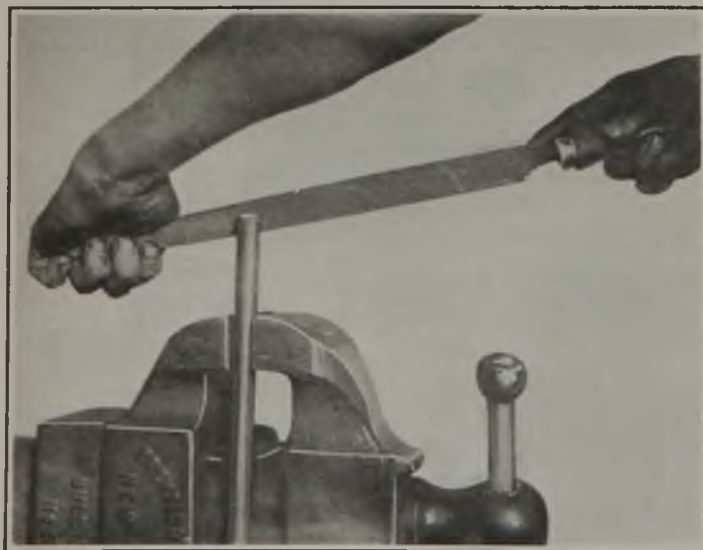


Fig. 4—Preparing the Material for Threading

The end of a piece of rod to be threaded is filed, making the work much easier, more rapid and indeed more nearly correct also.



Fig. 5—Shaping Rod for Reception of Die

This may be done without heating the material. It will enable the operative to cut a straight thread. The stock to be threaded is held while being shaped as if it were being drawn to a point and is usually done to assist starting the threads.

Dies are divided into two classes: Those which must pass over the thread several times in the cutting of the finished thread and those that complete the thread in one cut. In the latter class there are adjustable, spring and solid dies. They are made from tool steel and tempered very hard.

A die can be sharpened by grinding back the front face of the cutting teeth or chasers. Adjustable and spring dies are best suited for general repair work. When cutting a thread, the die block is held in a die stock, one of these stocks serving for several sizes of dies. As the die is not suited for reducing the size of the stock being threaded it is bad practice to use a standard-size die to cut threads on stock that is rolled $\frac{1}{8}$ in. oversize.

To cut the thread the piece to be threaded is placed in the vise with the rounded end up. The die is placed on the bar and with a downward twisting or turning motion it is forced on the stock, as shown in Fig. 6. After two or three turns forward the die should be given a slight turn backward. This enables the operative to remove the cuttings and allows the oil to find its way to the points of the cutting teeth. If a full thread up close to a shoulder is desired, the die is

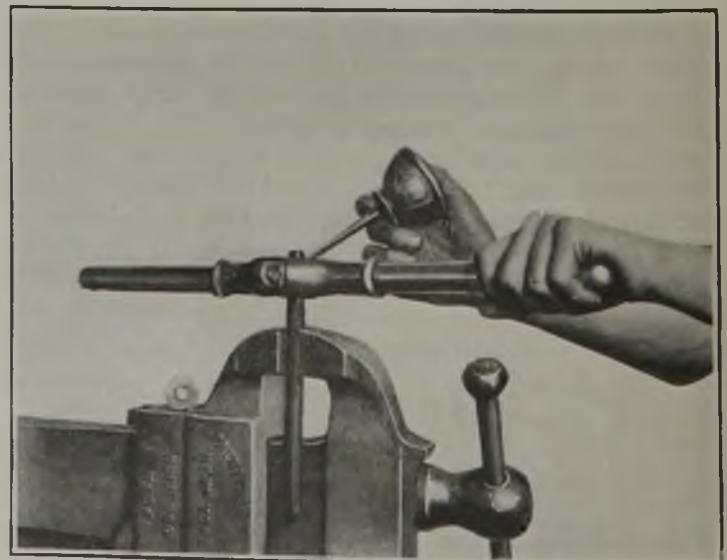


Fig. 6—Using the Stock and Die

Many thread-cutting sets permit of slight adjustment; this aids materially when repair work is being done.

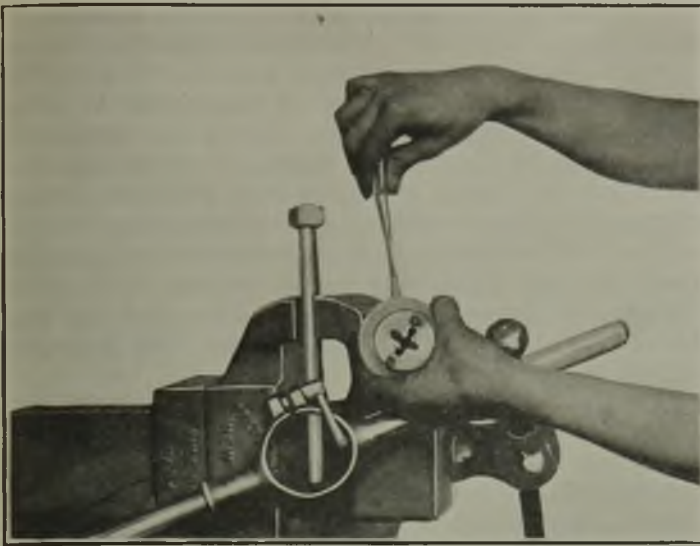


Fig. 7—Adjusting the Die

Slight variation in the threads in a nut are frequently annoying but are easily remedied with an adjustable die, which may be set to cut over- or under-sized threads.

turned over and the cutting operation is continued up to the shoulder. Dies are made for right- or left-hand threads. When using a left-hand die it should be turned counter-clockwise.

When cutting a thread with an adjustable or spring die, the size of thread always should be tested with a standard tapped nut. The die may then be adjusted, as shown in Fig. 8, by using a screwdriver. The designs of adjustable dies are such that this adjusting is simple and can be made quickly. The adjustable die can be altered as much as $\frac{1}{2}$ in. over or under the size marked on its side. The spring die will adjust about $\frac{1}{8}$ in. over or under size, but it is bad practice to extend this adjustment beyond these limits.

Tapping a Hole.—The tap is a tool used to produce internal threads. Hand taps are listed in sets, three taps comprising a set; the taper, plug and bottom taps. The taper tap is best suited for starting tapped holes. It can not be used, however, for completing a job unless it will pass clear through the work. The plug tap, which has the first three teeth tapered off, makes a full thread nearly to the bottom of a hole. The bottom tap is used to extend this full thread to the very bottom.

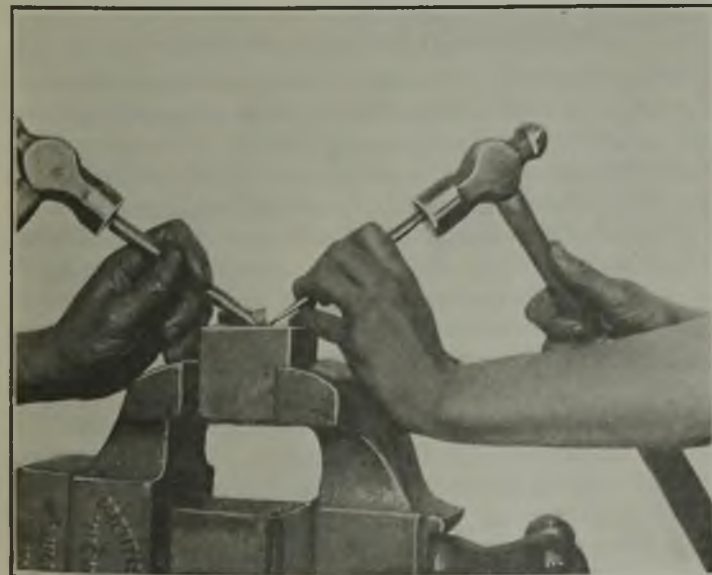


Fig. 9—Removing a Broken Tap by Drifting

This is one of the simplest methods for removing a broken tap. By wedging up on both sides at the same time the tap usually can be removed.

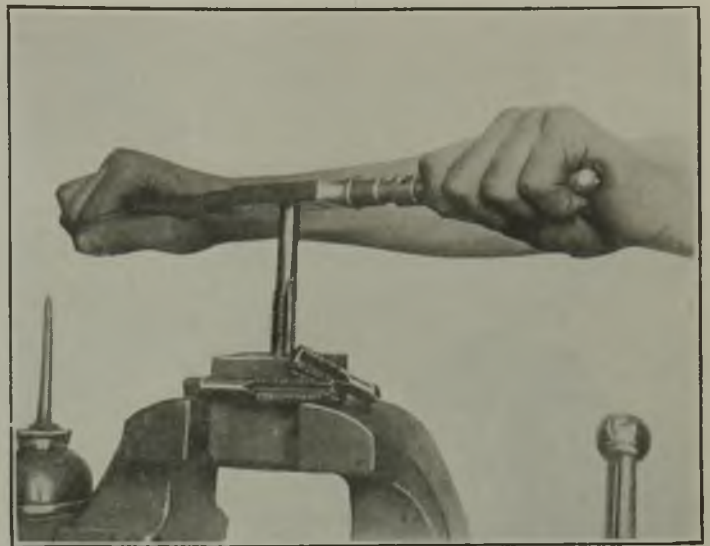


Fig. 8—Tapping a Hole

The secret of not breaking the tap in this operation lies in exerting the same effort at all times on both handles, unless this is done a slight side strain will break the tap.

It should be used after the plug tap to avoid breakage.

This tap is the best to use for all-around work. It must be understood that to get a hole tapped the proper size it is not necessary to use all three of the taps in a set. In Fig. 8 is shown the correct position for tapping a hole. The secret of proper tapping is to equalize the effort expended on the handles of the tap wrench.

How to Remove a Broken Tap.—Fewer taps will be broken if the proper lubricant is used. When a tap is broken near the surface of the metal it is cutting it can be removed easily by driving on both sides, as shown in Fig. 9. By doing this the tap is not wedged against one side of the hole as when using one drift, but the tap is forced to rotate.

Another method of removing broken taps is by heating the part containing the broken tap in a forge fire or with a gasoline blow torch, thus softening the steel tap. It is then drilled out. Injecting into the hole a solution of nitric acid—one part acid to five parts water—also has proved effective. The action of the acid on the steel loosens the tap and it can then be backed out by using a drift punch or a pair of pliers. The

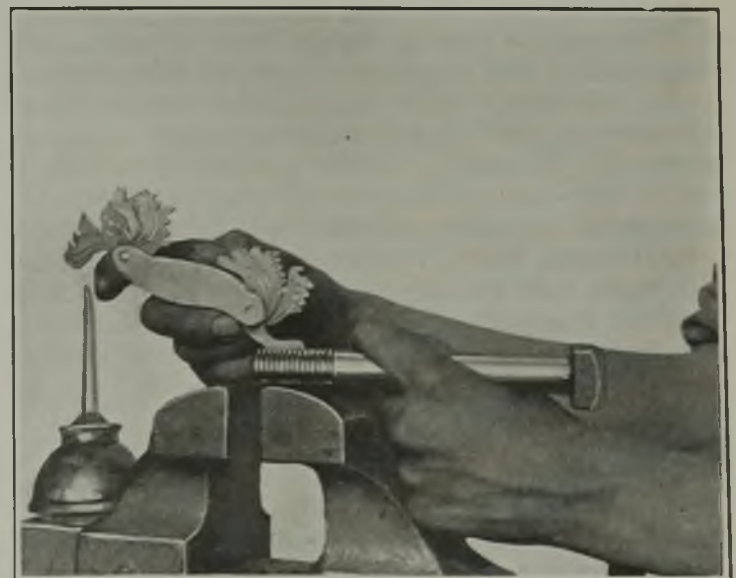


Fig. 10—How to Determine a Thread Size

Gages similar to the one in this illustration should be part of every machinist's repair kit. This is the only sure way to correctly determine the pitch of the thread.

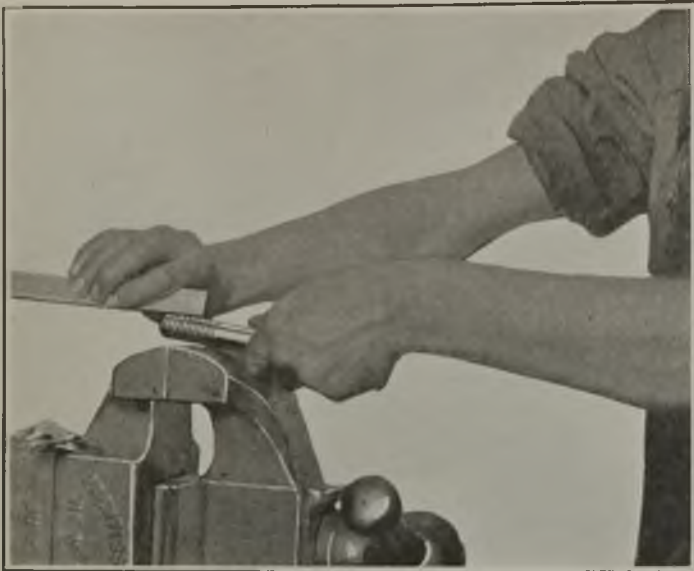


Fig. 11—Determining the Thread Pitch

The best way to determine the pitch of a thread is by the use of a gage, the pitch being marked on the side of each blade. The method shown here is not so accurate for determining the pitch of the thread because it is easy to count the threads incorrectly.

British Co-operative Coal Trade Making Giant Strides

Dominates Market in Some Cities—Private Dealers Almost Eliminated in Places—Movement Gained Impetus from War-Time Control

BY WILLIAM NOTZ
Washington, D. C.

AT THE present time a complete change is taking place in the coal business of Europe due to the increasing activities of co-operative consumers' societies. The trade in household coal is affected primarily. The movement is gaining such rapid headway that in several of the leading coal-consuming countries co-operative societies have already become the largest coal distributors. In a number of large cities they practically dominate the local market; in others they have developed into formidable competitors of the private coal dealers, and in a few cases have well-nigh eliminated the latter altogether.

One of the main objects of these societies is to bring the consumer as close to the producer as possible and thus eliminate the middleman's profit. They do not aim at making profit. While they sell their goods to their members for cash at the prevailing market price, all profits are ultimately returned to members in proportion to purchases in the form of dividends. These organizations gradually branched out from selling and went into the field of manufacturing. More recently they have been evolving plans to acquire and control the most important of the raw materials that enter into the production of the chief necessities of life, such as foodstuffs and coal.

CO-OPERATIVE MOVEMENT WIDESPREAD IN EUROPE

It is astonishing to observe what a large proportion of the population of European countries is linked up with the co-operative movement. In England about fifteen million persons are affiliated with such societies through some member of each family. In Scotland more than half of the population, and in Germany approximately three million families purchase a large part of their

acid remaining in the hole should then be washed out.

To find the number of threads per inch on a bolt or in a nut the screw-pitch gage is used as shown in Fig. 10. This gage has a number of thin blades on which are cut two or more teeth, the distance between which corresponds to the distance between two threads on a screw of given pitch, the number of which is stamped on the blade. By a comparison of the threads on the bolt with a selected blade from the screw-pitch gage the exact pitch of the bolt can be determined. On some of the coarser threads the rule is used as shown in Fig. 11. This is not an accurate method, but it proves helpful in finding thread pitches.

COMMON THREAD PITCHES CAUSE CONFUSION

Often in fitting a $\frac{1}{2}$ -in. bolt with nuts it is found that the nut will not screw on the thread, even though the diameter indicates that it is of correct size. By measuring the threads per inch on the bolt and in the nut you may find a 13-thread nut and a 12-thread bolt. There are two common thread pitches for $\frac{1}{2}$ -in. stock, namely 12 and 13 threads per inch. This fact frequently causes confusion.

necessities from co-operative shops. According to the latest estimate there are fully thirty million persons accredited members of co-operative organizations in different parts of the world, and the movement is growing steadily.

While the co-operative system of distribution has been in operation for nearly a hundred years in parts of Europe, the sale of coal on a large scale by wholesale and retail co-operative societies is of comparatively recent date. It is largely an outgrowth of war-time conditions. When the government assumed control of necessaries of life in England and Germany, food and fuel controllers eagerly seized upon the excellent distributive organizations that the thousands of co-operative societies had built up. In Germany there are at present about 50,000 co-operative societies and in the United Kingdom approximately 1,400. Each society operates a number of retail establishments, and like a vast network of chain stores these organizations spread out over city and country and link together hundreds of thousands of families and millions of consumers into one organic entity.

SOCIETIES EXPANDED AFTER THE WAR

When war-time control ended, the success that co-operative societies had achieved in the handling of coal prompted them to continue and expand that line of business along with other commodities usually dealt in such as foodstuffs, clothing and household articles.

English Co-operative Wholesale Society.—The English Co-operative Wholesale Society led the way. It probably is the largest organization of its kind in the world. The co-operative retail societies of England, Scotland and Ireland have each a wholesale organization of their own. The largest of the three is the English Co-operative Wholesale Society, popularly known as the C.W.S. Its headquarters are at Manchester. It has more than 50,000 employees and the value of its wholesale distributive trade amounts to about four hundred million dollars per year. It owns and operates more than a hundred manufacturing plants, and proudly styles itself "The largest democratic trading institution in the world."

The C.W.S. has divided its coal business into three

districts, centering in Manchester, Newcastle and London. The general supervision rests in the hands of the board of directors of the C.W.S. at Manchester. Each of the district coal offices is in the hands of a district manager. The C.W.S. sells only to its own registered retail societies, no sales being made to outsiders or non-members. This is required by the Industrial and Provident Societies Act of 1893, under which the English co-operative societies operate.

Not all retail co-operative societies purchase their coal supplies exclusively from the C.W.S. In the London district only two give all their coal trade to the local wholesale office. The others distribute their purchases about 50-50 between the C.W.S. and private dealers. The largest co-operative retail society in London buys about 40 per cent of its coal from the C.W.S. But on the whole the various retail societies are steadily buying larger quantities from the C.W.S. Aside from other reasons, many are prompted to do this because the C.W.S. has on numerous occasions when a coal shortage occurred, taken good care of its loyal customers. Besides, it has made it a point to furnish good coal at as low a price as possible.

The distribution of coal in the Manchester district alone amounts roughly to one million tons a year. All three districts together annually handle approximately two million tons. Of this total about 90 per cent goes for domestic consumption and the rest for industrial purposes.

C.W.S. OPERATES ITS OWN COLLIERY

In line with the general policy of the International Union of co-operative societies regarding the control of raw material, the C.W.S. has already taken active steps to mine its own coal. Several years ago it purchased valuable undeveloped coal fields in Yorkshire, which it contemplates developing at an early date. Moreover, in 1917 it purchased the Shilbottle colliery, in Northumberland, which will have a weekly output of 7,000 tons after repairs now under way shall have been completed. The entire mine is being electrified.

In the absence of large collieries of its own the C.W.S. purchases its supplies on the coal exchanges of London, Manchester, Leeds, Birmingham and Newcastle. The district managers do the buying and deal with the pit masters at the exchanges. It is not customary to purchase on long-time contracts. Shipments by rail and water are made directly from the pits to the yards of the retail societies in quantities varying from a few carloads up to a thousand tons.

In addition to the railroad and colliery coal cars used for transporting its supplies, the C.W.S. owns coal cars of its own. The London district operates 712 cars or wagons carrying from 8 to 12 tons each. The Manchester district owns 130 coal cars. For these wagons the C.W.S. charges the current coal freight rate to the retail societies. At the rate obtaining at present this nets a handsome profit to the C.W.S., which it turns over to the shareholders, the retail societies and their members in the form of dividends.

The London district coal office of the C.W.S. stands well at the top in the general wholesale trade of domestic coal in that metropolis. It is under the efficient management of A. E. Cockbaine, who is a practical coal man and has been connected with the co-operative movement for 25 years. The membership of the London co-operative retail societies is so large that if they were to act as a unit through the London office of the C.W.S.,

they might readily become the controlling factor in that large consumers' market.

The co-operative societies in Plymouth (with a membership of 50,000 and a coal trade of 80,000 tons per year), Leeds and Edinburgh (the latter with a membership of 62,000) hold a similar commanding position in relation to local coal prices.

From 350,000 to 400,000 gross tons of domestic coal are handled annually by the London office. The average handling cost for the London district amounts to but 3½d. (7c.) per ton. Prior to the world war the gross profit for this district averaged 3d. (6c.) per ton. The above figures do not include the industrial coal handled.

Scottish Co-operative Wholesale Society.—The Scottish Co-operative Wholesale Society, Ltd. (S.C.W.S.), Glasgow, serves a similar function for the retail co-operative societies in Scotland. It is the largest dealer in house coal in Scotland and purchases domestic coal for upward of 200 depots in Scotland, besides industrial fuel for about 20 mills and works. Its coal department had a turnover in 1922 amounting to 283,552 tons of household coal. This was an increase of 41,852 tons over the previous year. The society paid for it at the mines a total of £304,281. The mills and manufacturing works of the S.C.W.S. during 1922 used 45,430 tons of coal as fuel.

While the English C.W.S. sells only to its registered retail member-societies, the S.C.W.S. sells also to private parties who are not members of a local co-operative society. But such orders must be sent in to the S.C.W.S. through a local retail member society. The S.C.W.S. owns 115 coal cars, of which several are hopper-bottomed and of 30 tons capacity.

St. Cuthbert's of Edinburgh.—St. Cuthbert's Co-operative Society of Edinburgh, though otherwise affiliated with the S.C.W.S., carries on an independent coal trade and is the biggest coal dealer in Scotland's capital, doing 75 per cent of the local coal business. It is the only consumers' co-operative society in Edinburgh and has a membership of 62,000. This society is considered by many to be one of the best operated in the world. Thomas Young is its manager.

BUYS COAL DIRECT FROM COLLIERIES

In 1922 the coal sales of St. Cuthbert's amounted to 130,000 tons. It buys its coal directly from the collieries and transports it in its own cars, of which it has 260 of 10 tons capacity each, to its coal yards in Edinburgh. The society operates 7 coal yards from which deliveries are made by its own lorries.

The total distributive expense is 8s. per ton from the railroad car to the consumer's bins. This covers all expenses, including feeding and shoeing of horse, veterinary charges, stable expenses, coal bags, depreciation, etc. The fact that the members of St. Cuthbert's live in close proximity to one another makes long delivery routes unnecessary and gives the society an advantage over private coal dealers.

ONLY A THIRD OF THE TIME GOBBING ROCK.—Mr. Brosky points out that in the article "With Hand Shoveling 10 Tons per Man and 26 Tons per Loader Already Attained," in the issue of *Coal Age* of Feb. 7, on page 202, it is stated that "At least two-thirds of a loader's time is utilized in gobbing the parting." In justice to him it should be stated that this was a printer's error and should read "At least one-third, etc."

News Of the Industry

Miners and Operators Agree to Renew Old Contract for Three Years

Special Dispatch to Coal Age

SCALE IS RENEWED

Late Monday, February 18, the present bituminous wage scale was approved at Jacksonville, Fla., for a term of three years by the unanimous action of the sub-committee of miners and operators of the Central Competitive Field.

In their second caucus last week the operators withdrew their former proposal for an indefinite wage reduction, and gave most of their time, according to Phil Penna, of the Indiana Operators' Association, to discussion of the miners' request for a four-year contract until they adjourned until the joint meeting with the miners the following morning. According to Penna, a motion was made for a return to the 1917 wage scale, which would mean 24c. a ton reduction for tonnage men and \$2.50 a day reduction for day men. There was no discussion of this motion.

DISCUSS DISTRICT SETTLEMENT

Considerable time was devoted to discussion of a proposal that the prospective joint wage agreement be made effective by districts, subject to settlement of internal differences, instead of in the entire Central Competitive Field at once. This would mean that separate districts might determine conditions and defer action on the wage agreement until district conditions were settled satisfactorily.

The sub-scale committee of operators and miners threshed over the question of a one-year or a four-year wage contract for four hours on Feb. 13 and adjourned without reaching any understanding.

Following adjournment Phil H. Penna declared that while nothing had been definitely settled there will be no strike April 1. "In my judgment," said he,

"there is not a possibility of a strike. Both sides realize that a process of elimination through the operation of economic laws is the only salvation."

The deliberation virtually came to a standstill on Thursday while the operators argued their differences and tried to agree on a contract term they would sign. The miners demanded that they sign for four years.

The operators agreed to a renewal of the wage scale, it was learned definitely, and are united in opposing the miners' request that "internal conditions" be referred back to the districts for solution in district joint conferences.

Operators of steam-coal mines are said to be willing to sign for three years, but some representatives of independent mines in western Pennsylvania declared opposition to anything longer than one year, it was reported.

Prosecution Decides to Put Keeney on Trial First

A surprise was sprung when the state elected to try C. F. Keeney, president of district 17, United Mine Workers, instead of William Blizzard, president of subdistrict 2, on the indictment from Logan County charging Keeney and others with being accessories before the fact in connection with the murder of John Gore, a Logan County deputy sheriff, at the time of the "armed march" of 1921. The cases against the union leaders were called in the Circuit Court of Fayette on Feb. 11.

The defense at the opening of the trial offered a number of special pleas, all revolving around the main contention that the defendant had not been brought to trial within three terms of court except in specified instances where continuances had been obtained by the defense. Prosecuting Attorney Love pointed out that three terms within the meaning of the law had not passed and alluded to the fact that most of the intervening terms were accounted for by changes of venue which carried the cases successively to Jefferson, Morgan and Greenbrier counties. It was contended by the defense that a default entered at one of the terms in Jefferson County covered only specific ones, the state holding that it covered all the indictments. Judge J. W. Eary supported the contention of the prosecution.

Nova Scotia Strike Ends; Miners Get Increase

The strike of the miners of the Dominion Coal Co., subsidiary of the British Empire Steel Corporation, in Nova Scotia, was ended on Feb. 11 when an agreement for one year was signed by representatives of the company and the United Mine Workers, at Montreal. The agreement, which is retroactive to Jan. 16, provides for the following increases over the rates in effect on Jan. 15: Datal men underground 30c. per day; datal surface men 25c. per day; shooters, loaders and contract men, including helpers, 7c. per ton; hand-pick miners, 8c. per ton; local contracts, 6 per cent.

It is estimated that the increases will involve an additional to the payroll of the 12,000 miners of over \$1,000,000 annually. The price of domestic coal supplied to the miners is increased from \$2.25 to \$3.60 per ton. Instructions were wired to the miners to return to work.

At numerous meetings held by the locals of the United Mine Workers of the Nova Scotia coal fields on Feb. 12 to consider the agreement made by their representatives with officials of the British Empire Steel Corporation, it was decided not to resume work until a referendum had been taken. Those opposed to acceptance of the terms agreed in contending that the increase in the price of domestic coal to miners from \$2.25 to \$3.60 per ton, largely wipes out the wage increases granted.

There also is some resentment against the order wired from Montreal to return to work on the ground that their representatives exceeded their authority in ordering a resumption of work before a referendum had been taken. On the morning of the 13th the whistles blew for work, but there was no response except at Dominion No. 1 Colliery, where the local had voted to return to work.

R. M. Wolvin, president of the British Empire Steel Corporation, signed the contract for the corporation; W. Dalrymple and Andrew Steel for the union. Silby Barrett and Robert Baxter signed the agreement for the Nova Scotia miners. Sir Newton Moore and F. W. Gray signed as witnesses.

The British Empire Steel Corporation regards the agreement reached as satisfactory in that it covers in more detail contracts previously entered into with the union, particularly as affecting working conditions in the collieries. It is hoped that an improvement in operating conditions at the mines and a more thorough understanding between the two sides will result.

"Exact Cause Not Definitely Known," Says Shanktown Explosion Jury

Inspectors Declare Source to Be Arcing of Rheostat of Mining Machine, Burning Gasket and Firing Gas and Causing Dust Explosion

A jury selected by Dr. A. H. Stewart, Coroner of Indiana County, to inquire into the cause of death of thirty-six men who lost their lives in the Lancashire mine at Shanktown, Pa., on Jan. 26, returned the following verdict:

"That on Jan. 26, 1924, about 3 o'clock p.m., in Lancashire Mine No. 18, located at Shanktown, Green township, Indiana County, Pa., the deceased miners came to their death as the result of an explosion of gas in said mine. The exact location of the origin of the explosion and the exact cause of said explosion is not definitely known." The inspectors who conducted the investigation and several miners who escaped following the explosion gave testimony.

The inspection commission appointed by J. J. Walsh, State Secretary of Mines, consisting of T. J. Lewis, Nicholas Evans and Thomas S. Lowther, inspectors of the twelfth, twenty-fourth and twenty-fifth bituminous districts, respectively, gave somewhat different testimony. Their report follows:

"The mine is a slope opening, mining the B, or Lower Kittanning, seam of coal, and is driven in a distance of about 5,700 ft., with an average dip of about 5 per cent. The system of mine development is with four main entries, the two center ones being used as inlet airways—one of them as a haulage road and the other as a traveling way—the two other entries, one on the right and the other on the left, being used as return airways. Flat mains are driven to the right and left from the main-slope entries and room entries are driven off the flat mains.

"The ventilation is produced by a 7x3-ft. reversible fan, driven by a 75-hp. motor using a.c. current, which operates as an exhaust and runs at a speed of 210 r.p.m., producing 75,000 cu.ft. of air per minute and a 2.5-in. water gage.

"On our examination of the record books of the mine foreman and fireboss, we found that on several occasions explosive gas had been reported at the face of one or more of the live entries, the reports showing that gas was being emitted in all the development entries that were being driven at the time the explosion occurred.

"All the live workings below No. 6 right flat were being worked with closed lights, the miners and daymen using electric cap lamps and the mine officials, shotfirers and machine runners using flame safety lamps for gas-testing purposes. The coal above No. 6 right flat is exhausted, and No. 6 right soon will be worked out.

"The employees in No. 6 right flat were using open lights, as explosive gas was never known to have been emitted in this section of the mine. It was ventilated by an independent inlet air current from an opening to the

surface on the right side of the mine above No. 6 right. After the explosion occurred all the employees in this section escaped safely to the surface through this opening, except one, who ran out to the main-slope haulage road and died from the effect of afterdamp.

"We entered the mine on Wednesday morning, Feb. 6, by way of the main-slope haulage road and proceeded with our examination of the conditions caused by the explosion until we reached the water near the face of main-slope entries. We found accumulations of explosive gas in these entries, but did not find any evidence to show that the initial point of the explosion had been at the face of the main slope.

"We then proceeded to No. 7 left flat and carefully examined conditions along the flat entries, room entries off the flat and also the rooms that were working in this section. We found some accumulation of explosive gas in all working entries and some of the rooms in this section. Thence we traveled into the No. 8 right flat section and worked until late in the afternoon without completing our investigation.

"We resumed our inquiry on the morning of Feb. 7, proceeding directly to the workings in No. 8 right flat.

"We found a closed-type electric mining machine at the face of the airway of that heading. This airway was being driven back and outward. Here canvas had been used to direct the air current to the working face. The machine was placed against the face of coal in position for undercutting. Explosive gas had accumulated in these flat entries.

"We also found a closed-type mining machine at the face of the airway of No. 1 butt room entry off No. 8 right flat. At these faces also explosive gas had accumulated. In this airway we found evidence of intense heat and much force developed outward, and this, connected with other evidence obtained, indicated that this had been the initial point of the explosion. The mining machine at the face of this airway had just completed the undercutting of the coal, and the machine was being re-

placed on the truck, to be moved to some other place, when the explosion occurred.

"By carefully examining this machine, we found evidence that caused us to suspect that defects in the electrical parts of this machine had caused the explosion. By dismantling parts of it, we found that an arc had occurred in the rheostat which caused intense heat and burned out the gasket between the frame of the machine and the plate by which the rheostat was covered. This gasket was consumed for a distance of about 6 in. This burning of the gasket would allow the flame to pass upward into the atmosphere.

"The whole machine must have become charged, and arcing possibly may have been produced at any one or at all grounding points. As this place emitted some explosive gas and as the machine had just completed undercutting the coal, raising a cloud of coal dust, the atmosphere of the place must have been in prime condition to propagate an explosion from the flame which the machine emitted.

"Therefore, we are unanimously of the opinion that due to improper and inefficient assembling of the machine, an arc was formed which caused an explosion in an atmosphere charged with dust and explosive gas.

"For the future safety of the employees and for the protection of this property, we recommend: that the mine hereafter be worked exclusively with approved safety lamps, that all mining machines used for undercutting the coal be of the improved closed type, approved by the U. S. Bureau of Mines, that no open-type motors be used except in places ventilated by inlet air currents, that no switches, circuit-breakers or fuses be of the open type, but be enclosed in explosion-proof casings or break under oil, as required in paragraph 65, Sec. 4 of Art. 11 of the mining law, and that no trolley wires be extended beyond inlet air currents.

"We also advise that all shots be fired by qualified shotfirers, using only permissible explosives, and portable shotfiring machines enclosed in tightly constructed cases. All holes charged for blasting should be tamped with clay or other incombustible material the full length of the hole and all airways should be driven in the same direction as the entries and maintained parallel at the working faces so as to eliminate the excessive use of canvas for ventilating purposes."

Surface Works at Shanktown Mine

Note the fan house on the hill. The fan housing leaked a little after the explosion but was easily put into working order. Probably coal dust played only a minor rôle in the explosion, the mine producing a large quantity of water.



Joseph Struthers, Secretary of Engineers Club, Dies

Joseph Struthers, mining and metallurgical engineer, former secretary of the American Institute of Mining & Metallurgical Engineers and secretary at the time of his death of the Engineers Club, died of pneumonia, at 10 a.m., Monday, Feb. 18.

Mr. Struthers was born in New York, his father being of Scotch origin and his mother of English. He was educated at the College of the City of New York, 1880-81, and graduated as Bachelor of Philosophy at Columbia University, becoming Doctor of Philosophy in 1895. He joined the staff of instructors of the departments of mineralogy and metallurgy at Columbia in 1885 and continued in that work till 1900. He became assistant editor and later editor of *Mineral Industry*, producing, or aiding in the production of, Vols. 8-11. He was field assistant, U. S. Geological Survey, in 1903 and special agent of the U. S. Census Bureau, in charge of reports on the mineral industry of the United States, in 1904. That year he became assistant editor of the American Institute of Mining & Metallurgical Engineers and finally secretary, during which time trips were made by that institute to the Panama Canal (1910) and Japan (1911). In 1904 he was secretary of the Division of Mining at the St. Louis Exposition. Since 1909 he had been secretary and treasurer of the Engineers' Club.

Senate to Approve Probe of Alaska Coal Leases?

The Senate is expected to approve the proposal that an investigation be made of the transfer by the Navy to the Interior Department of leasing unit No. 12, in the Matanuska coal field. This unit was set aside as a reserve by President Wilson, in 1920, following a visit to Alaska of Josephus Daniels, then Secretary of the Navy, and John Barton Payne, then Secretary of the Interior. After the two secretaries had given first-hand consideration to the prospects of naval coal development in the Matanuska field, the departments entered into an agreement to conduct extensive exploratory work to determine the value of that coal deposit as a reserve for naval use.

John E. Ballaine, an Alaskan constructor, in a letter to President Coolidge and members of the Senate insists that former Secretary of the Interior Fall and Secretary of the Navy Denby entered into negotiations for the transfer and lease of the rich naval coal reserves of Alaska to promoters.

Mr. Ballaine charges that big interests are at work trying to hinder the development of Alaska. He declared the coal lease was not effected, but the Navy Department, through the efforts of Rear Admiral J. K. Robison, had refused since to permit use of Alaskan coal by the navy. He added that proposals for the coal leases were like those used later in the Teapot Dome oil transactions.

The quality of the coal has been



F. W. Gray

Recently appointed assistant to the president of the British Empire Steel Corporation, which has many coal mines in Nova Scotia. Always a protagonist for Canadian coal, Mr. Gray recently read a paper on that subject before the Canadian Institute of Mining and Metallurgy, receiving the W. R. Wilson award for that contribution.

conceded for many years to measure up to Navy standards, but underground development revealed that the formation is faulted badly and that the coal seams are crushed to such an extent that the engineers who followed the work are convinced that it would not be possible to mine the Matanuska coal at a cost which would make it possible to compete with the high-grade coals of southern West Virginia.

The actual transfer of the Matanuska reserve was made on May 1, 1922. A study of the property was made by the Bureau of Mines and it finally was decided to close the mine. Before this was done it had been ascertained that no coal operator, who could show the necessary financial backing, was willing to undertake the operation of the mine. Coal deposits in Alaska can be operated only under the leasing system. Several properties now are being operated under such a plan by Alaskan capital. The output of Alaskan coal in 1923 was 40 per cent greater than in 1922.

Brydon Names Committee to Arrange for Convention

John C. Brydon, president of the National Coal Association, has selected the following committee to arrange for the next annual meeting of the association: W. E. E. Koepler (chairman), Pocahontas Operators' Association, Bluefield, W. Va.; C. E. Bockus, Clinchfield Coal Corporation; W. H. Cunningham, Cunningham, Miller & Enslow; W. L. A. Johnson, Southwestern Interstate Coal Operators' Association; F. S. Love, Union Collieries Co.; P. H. Penna, Indiana Bituminous Coal Operators' Association; W. J. Sampson, Witch Hazel Coal Co. After the place has been selected for the convention, two other members will be added to the committee.

Hoover to Continue Reports On Business Conditions

Reports on business conditions and industrial production published by the Department of Commerce will continue to be issued, an official statement issued Feb. 16 said, although Attorney General Daugherty in a recent letter to Secretary Hoover indicated that trade associations might be sharply restricted in gathering statistics which enter into the reports. The Attorney General held that the furnishing of such data to the government probably was lawful, but that dissemination of it by trade associations themselves to members probably was unlawful.

"The Department of Commerce will continue to publish its monthly survey of current business," the statement said. "The information which associations furnish will be used within the limits of department appropriations and facilities in the publications to the extent that it proves suitable.

"The department does not express any views as to the legal status of any association from which it receives the information or any approval of its activities."

Electrical Engineers Discuss Automatic Mine Equipment

Electrical engineers of the northern anthracite region were the guests of the Scranton Electric Construction Co., of Scranton, Pa., at the Engineers' Club, Feb. 8. After the dinner Chester Lichtenberg, switchboard engineer with the General Electric Co., gave an illustrated lecture on the automatic substation. In the course of his talk Mr. Lichtenberg showed the evolution and development of the automatic substation for converting alternating-current electrical energy to direct-current energy for use in and about the coal mines, and also showed illustrations of automatic alternating-current switching stations.

After the lecture E. B. Wagner, electrical engineer of the Lehigh Valley Coal Co., spoke about the success of the Drifton automatic substation, the first installation of this kind made in the mining field. This substation is one of three now operated by his company. In an appeal to the manufacturers to give greater consideration to the adverse conditions under which mine electrical equipment must operate Mr. Wagner gave some interesting figures showing that there is a potential market for about 1,500 locomotives in the anthracite region alone. It was estimated that 15 per cent of these would be of the storage-battery type. The generator capacity required would be about 108,000 kw., most of which probably will be furnished through 600 automatic substation equipments.

Discussion on the question of the motor-generator set versus the rotary converter for mine service brought out the fact that one large manufacturer found that in 1920 rotary converters for haulage service exceeded motor-generator sets in the ratio of 60 to 40; in 1923 the motor-generator set was predominant, the percentages being reversed.

High-Cost Operators Panicky at Likelihood Of Long-Time Wage Agreement

Intelligent Observers See Salvation of the Industry in Long Period of Uninterrupted Competition, Which Would Weed Out Superfluous Mines and Workers

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Operators of high-cost mines in the union fields are in a state of panic in the face of the probability of the negotiation of a long-time wage agreement, which carries with it the certainty of a long period of uninterrupted competition. Not all of them have learned that there is no salvation in a temporary shortage such as is created by a strike. It may be said, however, that it is only an inconsequential proportion of operators who are so shortsighted as to hope for a strike. An overwhelming majority of operators concede that surplus capacity and the surplus of men must be reduced drastically. Most of them agree with Secretary Hoover that the best way to bring this about is by the continuation of production without interruption.

While figures are not available to indicate the losses which are accruing because of the unproductive capital tied up in surplus mines and equipment, the extent to which the public is supporting coal miners can be grasped by a glance at the following figures:

	Men Employed	Output, Tons
1890	192,402	111,302,000
1900	304,375	212,316,000
1910	555,533	417,111,000
1918	615,305	579,386,000
1919	621,998	465,860,000
1920	639,547	568,667,000
1921	663,754	415,922,000
1922	687,958	422,268,000

This enormous increase in the number of workers which the industry is supporting can be accounted for only by the fact that the wage scales attract too many men into the industry. It is natural that the worker prefers to labor two days per week and earn \$1,500 per year than to receive the same annual income for six days' work per week. In considering the increased number of men in the industry, sight must not be lost of the fact that production by machine has been increasing constantly with a resultant higher output per man.

With the promise of a long period of peace in the industry it would seem that the principal fruits of such a situation would go to the non-union fields. On the face of things, the entire market would seem to be theirs, up to the point of freight-rate limitation. The remarkable success which is attending the mechanization of non-union mines has a serious portent for the union fields. The difference in wage scales even now is great. At some mines, at least, the minimum pay has gone as low as \$3. Drivers and other semi-skilled men are being paid \$3.50. There are non-union mines, it is understood, in which \$4 is the top wage. Cutters are getting 4c. a ton and loaders, in some instance, are getting 32c. a ton.

In the face of such costs, it would seem that the non-union fields could capture most of the market worth

having. To an increasing extent, however, the advantage enjoyed by the non-union producers is being met by unofficial understandings at individual mines between management and men whereby wage reductions are accepted to keep the property in operation. The practice is known to be spreading and some are of the opinion that the union will close its eyes to it so as to allow the employment of the maximum possible number of union men and because by this practice non-union wages will be forced to a level where a fertile field will be created for the seeds of union propaganda.

Mr. Lewis' recent emphasis of the fact that no questionable methods are to be employed by union missionaries is not taken to mean that there is any less determination to extend union territory. It simply means that the policy now in force is much more likely to be effective. The missionary work no longer is being done by the rough-neck element in the union. There is reason to believe that carefully picked union emissaries are now strategically placed in the ranks of the workers in most of the non-union operations. These men will not resort to intimidation. They were chosen because of their intelligence, their plausibility and their ability to gain the confidence and respect of their fellow workers. While it seems probable that a long period will pass without a strike, a battle royal, nevertheless, impends. Instead of being between employer and employee it will be between union and non-union interests.

Last of the Coal Mohicans

Last of the coal mines to be unionized in Illinois, the old Brush mine, at Carterville, about which such a struggle waged from 1898 to 1905, has passed into history. The tippie is all that remains intact. Removable steel from inside the mine has been taken out and soon the scene of Illinois' longest labor war will revert to prairie land. Troops were sent to Carterville when the struggle was at its height. Miners and strikers fought in bitter warfare, standing in the open without protection. They fired with a wild aim and wasted tons of ammunition, but all warriors came off without a scratch, as they aimed to miss. Houses around the mine still bear the marks of the bullets. Samuel T. Brush, the owner of the mine, finally gave up the struggle of fighting the union and sold the mine to the Madison Coal Corporation, which at once unionized the mine.

Urges Better Ventilation in Anthracite Mines

The Lehigh Coal & Navigation Co. has been requested by the State Department of Mines of Pennsylvania to remedy alleged dangerous conditions in the three collieries operated by it in Carbon County. A report just submitted to the department by three anthracite inspectors, appointed by Secretary of Mines Joseph J. Walsh, copies of which have been sent to Samuel D. Warriner, president of the company, and Thomas Kennedy, president of District No. 7, United Mine Workers, shows that ventilation conditions in the collieries were inadequate when the investigation was made and that there was not sufficient fresh air to dilute the dangerous underground gases. The inspectors reported that they observed "extreme laxity" in the use of safety lamps in the mines, many of the miners going into the shafts without being equipped with the locked safety lamps as required.

The inspectors, Frank Kettle, J. J. Strickler and Edwin C. Curtis, reported that they had inspected the Nesquehoning, the Greenwood and the Lansford mines and said that in each of these mines "the volume of air circulating along the faces of some of the chambers was not sufficient to dilute, render harmless and sweep away smoke or noxious gases as required by Sec. 4, Art. 10 of the act of June 2, 1891."

VENTILATION INADEQUATE

Continuing, the report stated that the system in use to ventilate the faces of certain gangways and chutes was "not good practice." The ventilating fans located on the surface of the mines, the inspectors reported, did not produce "sufficient pressure to force through the mines a volume of air sufficient to remove the danger from gases."

"Practically all of the runways and crosscuts through which we traveled," the report continued, "were too small to permit an adequate supply of air at the pressure produced by the ventilating equipment."

"We cannot impress too strongly upon the officials the positive necessity of seeing that every workman employed in the gaseous mine be equipped with a safety lamp for testing purposes," the report emphasized. "We also desire to call attention to an extremely dangerous practice indulged in by some of the miners, namely, that of hanging their safety lamps on props or timber long distances from their working faces and permitting them to remain there during the day. Those careless persons should be brought to realize that they have an obligation to meet in the way of protecting themselves and others employed in the mine."

"We also suggest that the man in charge of the station at the entrance to a locked safety-lamp section be empowered to prevent any person from passing his station until he has in his possession a locked safety lamp."

The inspectors appended to their report a statement that certain construction work was already in progress at some of the mines designed to improve the ventilation in the mines.

Calls Coal Commission Report On Wholesalers Unfair

The report of the U. S. Coal Commission on the business of the wholesale coal dealers, "through the method by which its conclusions are arrived at and through the language stated in announcing its conclusions, appears to be intent upon creating prejudice on the part of the public against the wholesale coal dealers," according to an analysis made by Edward E. Gore, business analyst, for the American Wholesale Coal Association. "The statements presented," the report concludes, "carry an unfair inference and the conclusions announced are not such as would be reached by those who are familiar with the manner in which business is transacted."

The report states:

"The periods selected for investigation and comment, being the month of November, 1922, as compared with the month of November, 1921, and the week ending Nov. 25, 1922, were a most unfortunate election if the Coal Commission intended to approach the subject in a spirit of fairness, since the periods referred to marked the most violent fluctuations in the prices of coal and the existence of the greatest panic among consumers of coal ever known in the history of the trade.

"Comment is made upon the fact that during the week ending Nov. 25, 1922, the fluctuation in prices resulted to the dealers in differences ranging from a loss of \$2.25 per ton to a gain of \$3.90 per ton on sales of bituminous coal, while the variations in the prices of anthracite during the same period amounted to as much as \$4.53 per ton.

"No better evidence could possibly be produced that the period selected was one of a panic in the coal market and manifestly not a period to be used as a basis for statements intended to inform the public of conditions in the coal trade.

"These violent fluctuations in price should, however, have the effect of convincing the general public that there is in existence between the wholesale dealers in coal no such arrangements as would result in stifling competition. On the contrary, evidence of the most active competition is complete.

"The U. S. Coal Commission seeks to limit the earnings of wholesale coal dealers to a fixed rate of return on their invested capital, wholly ignoring the fact that invested capital is a secondary consideration—the success of a wholesale coal dealer being predicated not upon the amount of capital that he controls but upon the amount of coal that he can sell."

Continuing, Mr. Gore says: "The Coal Commission intimates that an increase in the number of wholesale coal dealers must result in higher prices because of competition on their part in obtaining tonnage to sell.

"The Commission's attitude with respect to this matter is in direct contravention of the general understanding that there are in the United States facilities for the production of nearly double the amount of coal that the country can consume and it is well established that competition among coal producers is as keen, or keener, than



Erskine Ramsay

Mining engineer, coal operator and capitalist, who has presented the first \$100,000 for the construction of an Engineering Hall at the Alabama Polytechnic Institute, Auburn, Ala.

in any other line of like importance.

"The U. S. Coal Commission, while showing the average percentage of gross profit derived from the sale of coal by wholesale coal dealers, fails to make any comparison between the rate of gross profit in the coal trade with the rate of profit derived from the sale of other commodities by jobbers or wholesalers.

"There are few staple commodities and none of any other kind that are sold by wholesale dealers at a lower margin than that taken by wholesale coal dealers. This the public should understand before judgment of an unfavorable kind shall be formed with respect to the dealers in coal."

Washington State Mines Yield Three Million Tons in 1923

Fifty-seven operators in Cowlitz, King, Kittitas, Lewis, Pierce, Thurston and Whatcom counties, Washington, produced 2,946,007 tons of coal in 1923, according to William P. Reese, chief state mine inspector. Of this, 19,937 tons was from a sludge washery of the Renton Coal Co. The largest producer was the Northwestern Improvement Co., which has six mines comprising four district operations. Its output was 1,119,102 tons. The next largest producing company was the Pacific Coast Coal Co., with an output of 618,024 tons. The output per man varied from 0.30 ton per day in one of the smaller mines to 5.07 tons in one of the mines of the Roslyn-Cascade Coal Co. The average production was 3.18 tons per man-shift.

COAL PRODUCED IN WASHINGTON IN 1923

County	Coal Shipped	Total Output	Tons per Man
Cowlitz	114	2 37	
King	634,679	663,061	2 65
Kittitas	1,295,030	1,358,359	3 87
Lewis	95,544	113,114	3 42
Pierce	281,717	355,715	1 79
Thurston	256,582	268,202	6 06
Whatcom	172,680	187,442	3 83
	2,736,232	2,946,007	3 18

Missouri Retailers Charged With Unfair Methods

The Missouri State Retail Coal Merchants' Association is charged with unfair methods of competition in a complaint issued last week by the Federal Trade Commission. The organization, which is also known as the Mid-West Retail Coal Association, is composed of retail dealers in coal in Missouri, Arkansas and Illinois.

J. B. Sanborn & Co., of Chicago, Ill., a coal-trade directory publisher, and the following officers and directors of the coal association also are named as respondents in the case: R. D. Kelly, W. A. Storrs, H. R. Oglesby, P. L. Rupp, F. W. Schramm, F. A. Parker, F. W. Autenrieth, E. J. Wallace, Arthur M. Hull, S. P. Guthrie, W. R. Creasey, J. B. Hallquist, V. C. Elmore, W. F. Sprague, G. V. Montague, Frank Wilmes, H. F. Shrankler, William Farrell and J. E. Cowling.

According to the commission's complaint, the respondents co-operated in preventing the distribution of coal in the territory served by the association's members, except through the so-called "regular" channels and prevented "irregular" dealers, co-operative purchasing associations and other consumers from obtaining coal at wholesale prices, or from any other source than the so-called "regular" dealers.

Indiana Feels a Pick-Up

The opening recently of the Ventura mine, formerly the Riverside mine, by the Coal Bluff Mining Co., Terre Haute, and of Miami No. 10 mine is indicative of the general increase in activity felt by the industry in the western Indiana district. Twenty-one mines are now operating near Clinton and many mines that had been idle for long periods of time are now working steadily.

The Ventura mine, which had been idle for some, has been remade into practically a new mine. A steel tippie has been erected with the latest type of picking tables and loading booms for the sizing and preparation of the coal. The tippie is built to handle four tracks.

Some time ago the opening of the Dixie Vein mine, the Miami mines 6, 8 and 10, and the Oak Hill mine gave impetus to the business and furnished employment for hundreds of miners.

Statistics from the Indiana Coal Trade Bureau compiled for the week ending Jan. 26 show that the mines in operation worked over 51 per cent of the time. One hundred and seventy-seven mines reported in operation to the bureau, although many Indiana mines are not included in that number.

Causes for the sudden spurt in the coal-mining business are said to be the "getting ready for April 1" policy. Some of the railroads are storing coal and many manufacturers fear a coal miners' strike, it is said.

William L. Allen Dead

William L. Allen, of Scranton, well-known coal operator, died Feb. 18. He was president of the Scranton Coal Co., the Price-Pancoast Coal Co. and the West End Coal Co.



Practical Pointers For Electrical And Mechanical Men



Some Reasons Why Chemical Specifications Of Cast Iron Are Undesirable

IN RECENT years, as the consumer of iron castings is becoming familiar with the methods of foundry operation, there has come a marked tendency to include chemical requirements in the specifications for cast-iron products, evidently because of the success of such a procedure in the case of steel. The movement has gone so far that the new tentative specifications for chilled iron car wheels, as first reported, actually demanded the given analysis in full.

Cast iron, in contradistinction to steel, is an extremely non-homogeneous material, highly useful for its fine resistance to compression, ease in machining, cheapness and adaptability to simple melting and molding processes. Yet, while steel may be perfectly homogeneous throughout the piece, the surface and interior of a casting are widely different in their physical properties, as brought about by carbon condition changes due to the rate of heat abstraction during setting. Further, the subsequent heat treatment to which steel is amenable finds almost no counterpart in cast iron.

On the other hand, while it will be shown in what follows that the full chemical composition when specified in purchasing iron castings serves no useful purpose, it is eminently proper, and on occasion extremely important, that one or more injurious elements always present in cast iron be limited to given maxima. The experience of the foundryman and the consumers of his product would go for naught if this limitation could not be made part of the specifications governing their transactions.

The first reason why the introduction of chemical requirements into the usual specifications for iron castings is undesirable is that wherever this has been tried in a general way it has failed of its purpose. One prominent engineering society, which went into the subject very thoroughly, found that to include all the compositions of castings coming under each separate line of work for which special specifications were to be prepared would mean that the limits for the several elements in cast iron would have to be held so wide that no useful purpose would be served. The project was therefore abandoned.

Another engineering society, through its specification committee and in conjunction with a similar committee of the foundrymen interested, has just come to the same conclusion, after studying an elaborate series of tests

for which chemical data were available to check up with the physical results. They would not fit, though showing general parallel tendencies. Perhaps the reason for this in part lies in the variations in practice at the several foundries. Procedure in founding iron is cruder and hence more widely fluctuating than in the finer and more exact process of steel making.

The second reason why chemical compositions at given figures should not be required of foundrymen in specifications they are to work under is that the history of the development in foundry practice has shown that present-day compositions of castings are considerably different from what was considered necessary some years back. Silicon is a good instance of this.

With more knowledge on the bad effects of dissolved iron oxide in cast iron, and definite information on the progression of cupola melting, the same grades of soft iron castings are now produced with much lower silicons than formerly. Much of the trouble formerly attributed to sulphur is now known to have been caused by oxidation phenomena. Even phosphorus has come in for greater attention than formerly, though in the direction of limiting it more closely, for with the better irons that can now be made, the phenomena of segregation have become more acute, as the metal remains fluid longer.

The general use of steel scrap in cupola mixtures, for cutting down the total carbon and thus strengthening the iron, has upset many notions on compositions as going with physical properties, and with this new variable introduced into the problem, already complicated with many others, it is very nearly hopeless to formulate a series of constants such as could be used to build up a set of compositions that could be called standard.

None the less, the purchaser of castings, in the course of his experience with the product of the foundries he deals with, may develop a line of compositions which will give good results, and naturally he will want to apply this information for his own benefit. There is no reason why such compositions should not be given in the specifications issued as "recommended practice," but not as essential requirements. The foundryman who works under such specifications will do his best to comply with them and get the physical prop-

erties demanded. But should he find himself unable to do this, he will be free to use his own experience in getting the physical properties required by using compositions of his own, without having his product rejected.

The cases where maxima for certain elements may be specified are somewhat different. Where it is known definitely that when a given maximum percentage of an element is exceeded failure may result, it is the part of wisdom to apply this limit. The case of sulphur in cast-iron water pipe is an example. High sulphur here may cause breaking when the shock of water-hammer is applied. It is perfectly justifiable, therefore, to state in the specifications that sulphur shall not exceed a given percentage. Phosphorus, similarly, is known to give serious segregation troubles when sections exceed 2 to 3 in. in thickness. Hence a limit is proper where the work will exceed these sections.

The conclusion derived from the above discussion is that it is unwise to add to the troubles of the foundryman by imposing chemical requirements upon him in addition to physical ones. Either one or the other should be imposed, but not both. If the consumer wants a given composition, the foundryman furnishes it, but then the consumer is responsible for the physical characteristics of the work. But if the consumer wants the castings for his service requirements, the foundryman should be unhindered in working out the problem, so long as the service requirement tests are met.

RICHARD MOLDENKE. *—molder*

Allowing for Expansion and Contraction of Copper

For the same temperature a piece of copper will expand more than a similar piece of iron or steel. Further, it is usually found that in a motor, the copper becomes hotter than the other materials of which the motor is made. Therefore, it is necessary to provide means for the copper to expand and contract to take care of the relative motion between the different materials for the changes in temperature. A common error in this respect is to anchor the wiring around frame connections to the frame proper when it should have been securely bound to the windings, so that it would be free to move with the windings. It is obvious that this is more important with solid-strap conductors than with flexible cables.

Replacing Broken Gear Teeth

The building up of cast-iron gears offers possibility for wide use of the acetylene torch—for instance, in replacing a drum gear on a room hoist.



Fig. 1—Building Up Metal for New Gear Tooth

Here the operator fills in the section of the gear where a tooth has been broken.

By placing a strip of 1/4-in. steel plate on either side of a gear section where teeth are broken off and clamping these with a 3/8-in. round of soft iron, bent to a U so as to press the plates against the sides of the gear, a pocket may be formed. This pocket then should be built up with cast-iron welding rods by means of an acetylene torch. The gear is then placed on a boring mill and the built-up section faced off. Then it is placed in a shaper and teeth are cut from the solid metal.

The machine work is laid out as follows: The side of the built-up section is chalked, a templet is placed over the chalked area and the teeth marked out. A round-nosed tool is prepared by grinding to cut the exact tooth shape with only a downward feed of the



Fig. 2—Milling Out the New Tooth

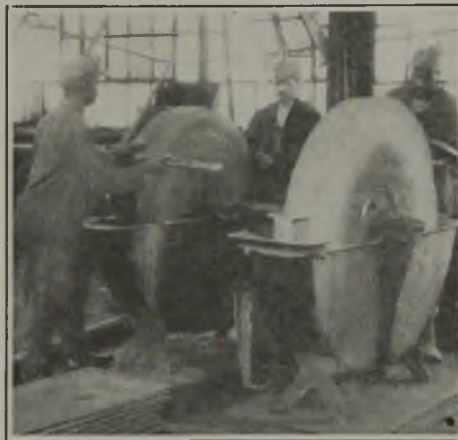
By working with a tool specially designed the new tooth is shaped in the metal which was built up with an acetylene torch.

shaper, the templet aiding in obtaining the correct shape of each tooth to be cut. The templet is cut in the rough from a piece of thin sheet iron and then filed to shape by clamping the sheet iron against a new gear which is a counterpart of the one to be repaired.

This job is a great money saver when many gears of the same size and shape are repaired. It also is economical to go through the entire process described for only one gear. The cost of making three new teeth, including materials and labor, is about \$1. Steel gears may be repaired in a similar manner, of course, using steel instead of cast-iron welding rods.

Grindstone for Sharpening Axes, Hatchets and Picks

One or two old-fashioned grindstones, depending upon the size of the plant, are as important a part of the equipment in a mine shop as they are a necessity on a farm. From the point of safety they are highly desirable, as they can be used by inexperienced men for many sharpening jobs which too



Mine-Shop Grindstones

Slow-moving stones like these may be used with relative safety by any workman around the mines.

commonly are done on the high-speed emery wheel.

Approximately, for every 1,000 tons of coal mined, 100 loaders are employed, each of whom should be provided with a sharp ax, because it is needed for efficient work in placing safety props in the chambers and along the mine roads. Members of timber crews also must have these implements; mine electricians and brattice men cannot work without good one-hand axes, nor can a carpenter do much without a sharp hatchet. A slow motor-driven grindstone of fine sandstone will give a keen edge to all these tools. And loaders can grind their own picks on them too.

At the Lynch Mines of the U. S. Coal & Coke Co. coal loaders and others fought for the use of emery wheels to sharpen their tools. The practice was both dangerous and bothersome, so the company installed two grindstones. On them, as the illustration shows, four men can work at one time. All danger

of injury is removed and interference with shop operations is eliminated.

Ignorant practices in the use of an emery wheel might cause it to burst or the tool being sharpened might be thrust back because of the great speed of the wheel, and thus a man might be severely injured by it. Worst of all, flying particles of emery are likely to cause blindness if the eyes are not properly protected with goggles. At best it is a difficult undertaking to teach these men to use goggles or to keep a supply of such glasses at the emery wheels when they are used promiscuously.

Nicking of Copper

The nicking of copper is an abusive practice to be avoided. It is very easy to nick copper with the sharp edge of a metal drift or other tools such as are used in connection with the winding of armatures. It is preferable to use a hard-fiber drift and drive leads down into commutator neck slots by using a copper filling piece placed on the lead to receive the blow from the hammer. Another source of trouble due to nicking of copper is found in field-coil cable leads breaking at the point where the insulation has been cut off with a knife, the break having been started by the knife nicking the strands of the cable. Such nicks are the starting point of breaks, as surely as are those which the glazier cuts in glass when he is cutting it for the window pane. Extreme care should be used in removing insulation on all cables and wires of small cross-sections.

Circumference of Western Red Cedar Poles in Inches

Length of Pole	Class AAA		Class AA		Class A		Class B		Class C	
	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt
30	28	40	26	38	24	36	22	34	20	32
35	28	42	26	40	24	38	22	36	20	34
40	28	44	26	42	24	40	22	38	20	36
45	28	47	26	44	24	42	22	40	20	38
50	28	49	26	47	24	44	22	42	20	40
55	28	52	26	49	24	47	22	44	20	42
60	28	54	26	52	24	49	22	47	20	44
65	28	56	26	54	24	52	22	49	20	46

One kilogram meter equals:

7.233 ft.-lb.

0.000003653 hp.-hr.

0.000002724 kw.-hr.

0.009302 heat unit.

One hp.-hr. equals:

0.7457 kw.-hr.

1,980,000 ft.-lb.

2,546.5 heat units.

273,740 kilogram meters.

0.174 lb. carbon oxidized with perfect efficiency.

2.62 lb. water evaporated from and at 212 deg. F.

17.0 lb. water raised from 62 deg. F. to 212 deg. F.



Problems In Underground Management



Shall We Protect Mines from Gob Fires by Stowing, Ventilation or Stoppings?

Most Gob Fires Occur in Thick Coal Because in That Case Many Pillars Are Left—Mine in Edmonton, Alta., Being Worked by Tunnels Cut in Solid Rock with Small Panels

DISCUSSING, in the *Monthly Bulletin* of the Canadian Institute of Mining and Metallurgical Engineers, the avoidance of gob fires in coal mines, J. B. De Hart, mining engineer, Cadomin Coal Co., Cadomin, Alta., a company that has experienced two of these fires, says that of the six fires mentioned by J. A. H. Church in a recent article, five are in thick pitching beds. These fires occurred in the following mines during the years shown: At Frank, in 1910; at Lovett, in 1916; at Cadomin, in 1920; at Yellowhead, in 1922, and at Cadomin, in 1923.

Every one of these occurred, as Mr. Church pointed out, in a seam having a thickness exceeding 12 ft.; none of them has been extinguished though in every case large sums of money have been expended and considerable risks taken in fire fighting.

SEALING AND VENTILATION CURES

Mr. De Hart says that spontaneous combustion undoubtedly arises from the oxygenation of the coal faces, with the consequent heating of the coal. If the air is excluded oxygenation is prevented; if a ventilating current is provided the heat is removed as generated. Consequently fires will be avoided if air is excluded from gob or if the gob is so well ventilated that any heat generated will be removed by the current.

He continues that in his belief thick seams do not heat because they are thick but because, being thick, the extraction is imperfect and much coal is left to become oxygenated. Thinness of seam offers no special immunity. If imperfectly mined it still would be subject to gob fires. Stowing would enable the coal to be completely removed, but, unfortunately, due to the lack of material for such stowing, the cost of filling the working with sand or other fine material would be prohibitive. However, broken rock could be fed in by chutes. With present methods only about 50 per cent of the coal is recovered, and, taking into account barrier pillars and fire losses, perhaps not more than 40 per cent.

Ventilation of the gobs, he says, would require an uncertain quantity of air at a water gage not determinable except by experiment. He is disposed

to think the cost would not be prohibitive; in any event much less expensive than a fire.

SURFACE CAVES FURNISH AIR

Coal piles sometimes will heat dangerously in six weeks from the time the coal pile is formed. Consequently heating of coal always is imminent. When drawing pillars, the roof caves, driving air to the surface if the fan is forcing air into the mine or drawing air from the surface if the fan is exhausting. Consequently the gob receives air and may heat before all the pillars are drawn. Earth might be hydraulicked with a monitor into the caves, but this could be done in the coal fields of Alberta only during the warm months.

If heating did not occur till the pillars were drawn the gob could be sealed off in the mine. If, however, the gob had heated, a current would be established between the surface and the gob, the heat furnishing the means by which the gob would be ventilated sufficiently to permit of further heating, but in insufficient volume to cool off the heated area.

It would seem well, says Mr. De Hart, to leave the pillars near the crop and to seal openings leading to the surface so that the ground will not cave to the surface, at least not till the pillars have been withdrawn and the place has been sealed. Along the crop, pillars should be left for a sufficient depth from the surface to prevent caves. Probably 75 ft. would suffice, much of which would be wash and worthless coal. With this provision the air circulation would be kept from the gob and concentrated at the working faces. The gob might then fill with methane, as in the Reaver method of North Staffordshire, when the gob is kept free of fire by drowning it with an accumulation of firedamp. The mine should be ventilated by an exhaust fan so that the gas in the interstices of the gob would be put under increased pressure should the fan stop. This method, Mr. De Hart thinks, would be safer than running the risk of a mine fire.

He advocates also drawing pillars up the pitch, thus making it possible to put

stoppings at the lower end of the room. This would give better extraction and less ventilation of the coal faces. Working downward, triangular pieces of coal are left projecting into the gob. These corners naturally squeeze and form dust, ideal starting points for fires.

Another method he considers is using small panels—so small that they can be completely worked out and sealed before a fire appears—but, he concludes, this would give a panel life too short for economical methods of working with a large output. As the pillars would be drawn in a confined area the percentage of extraction would be low and more coal would be left in the gob. The retreating method would, of course, be the ideal system, but it is too expensive to be considered.

Experiments are being made southwest of Edmonton in developing a mine by means of rock tunnels. This is good practice because it cuts the cost of upkeep of the main haulage road and gives some assurance that if, in spite of all precautions, a fire should occur, it can be sealed off in the rock and the seam opened beyond the fired area. Further, the size of the panels is being limited so as to supply about one and one-half or two years' coal.

Short Fuses Are Suicidal

BY W. J. GERMAN
Technical Representative
E. I. du Pont de Nemours & Co.

Few mine officials know how a miner uses short fuse. When he is ready to charge his shothole he cuts 7 in. or less of fuse, attaches a blasting cap to it and places the cap in the cartridge of dynamite, probably lacing the fuse through the cartridge as shown in Fig. 1.

If he intends to use three sticks for



Fig. 1—Badly Laced and Too Short to Reach Mouth of Hole

Fuse is laced through cartridge and is so short that it must be lit before the cartridge is inserted and before the tamping is wedged behind it.

the charge, he places two sticks at the back of the hole, then puts the primer stick in the mouth of the bore and lights the fuse. Next he rams the primer as far as it will go in the hole, puts in a 6- or 8-in. dummy of tamping material and tamps it reasonably tight. He then makes—or tries to make—his escape to the nearest cross-cut.

Frequently as the dummy is rammed back into the hole it curls up the fuse and this causes a misfire or delayed

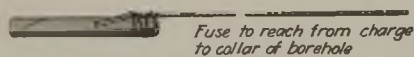


Fig. 2—Cartridge Properly Primed

The fuse is pushed into the side of the cartridge in a hole made for that purpose. It is then tied in place. The fuse is cut off so long that it will reach to the mouth of the bore hole.

shot. Then there are times when the miner gets in a hurry and fails to clean out the holes, in which case the charge with the lighted fuse gets hung up a part of the way back in the hole. He misjudges the time it will take for the fuse to burn, and through his efforts to force the charge back he stays too long and is injured by the shot.

The use of short fuse has been responsible for many serious accidents and it necessitates loading about a third more explosive than really is necessary to bring down the coal satisfactorily. In some states the use of short fuse is against the law, and it is contrary to good practice and common sense everywhere.

Safety in Extracting Coal and Salvaging Timber

Some people maintain that in mining coal the posts should be sacrificed and no risk should be taken to salvage them. In some mines, however, the reclaiming of timber is considered important not alone for the value of the timber but to control the fall of the roof.

Wherever timber is reclaimed the

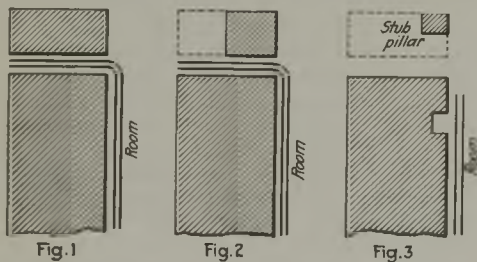


Fig. 1 Fig. 2 Fig. 3

Draw Pillars Right and Save Timber
The stages in withdrawal of timber. Fig. 1 shows the crosscut completed so as to provide a small pillar adjacent to the goaf. Fig. 2 exhibits the small pillar still further reduced at the far end. Fig. 3 shows the small stub pillar which protects the man who pulls the timber. This is finally shot out and lost.

work should be supervised intelligently and with care. If the miner were allowed to use his own judgment he probably would adopt such a dangerous system of robbing pillars that he at any time might be obliged to run out of the place, occasionally losing his tools and the mine car also. Under proper directions he might obtain the same quantity of coal at less risk and yet save practically all the timber.

A safe way in which this may be done is to drive a crosscut through the rib near its end and then remove the small pillar thus formed, starting near the gob and leaving nothing but a small stump near the main roadway of the room.

After removing the track in what was the crosscut take an axe and chip one of the remoter props at one side immediately under the cap piece, so that with a long chain and post puller the post can be pulled with safety. Continue this process until the forty or fifty posts are all out. Then a hole drilled into the stump which was left

standing should be filled with a small charge of powder and shot by an electric shotfiring battery. By this method it is possible to save all the posts and yet obtain 95 per cent or more of the coal. Thus the posts will be removed without destroying one of them and without a waste of powder.

ROBERT W. LIGHTBURN.

Gans, Pa.

Why Did the Shots Explode Prematurely?

Recently we have had some peculiar accidents in the firing of shots when coal was being blasted. We are anxious to obtain suggestions as to the cause of these dangers. We use only permissible explosives for blasting the coal and No. 6 caps and fuse for igniting the shots.

On two separate occasions the miner had tamped his dummies on the charge, lit the fuse and retired to safety when an explosion followed that sounded as if only the cap had fired and not the cartridges. On returning to the face, however, it was found that the blast had blown out the tamping. The fuse was seen still burning but the cap had not fired; it went off a little later. There is no gas here and we are at a loss to understand just what occurred.

Some years ago I recall that the same thing happened to me when sinking a well, and it seems probable that others have had the same experience at times and may be able to explain the true cause.

J. H. SMITH.

East Lynn, W. Va.

This question being submitted to three of the principal powder companies manufacturing blasting powder for mines, brought the following replies:

"What seems like a premature explosion of a cap can be caused by a tight pinching of the fuse. If a small piece of fuse is held and squeezed as tightly as possible between the jaws of rather broad-mouthed pliers and, while so held, the end of the fuse is lighted, when the fire strikes the compressed part there will be an explosion of considerable force.

"Now, it is conceivable that fuse in a borehole might be so pinched between pieces of rock that a sufficiently strong explosion would blow out some of the tamping. It might blow the fuse with the cap attached out of the hole; but it is difficult to believe that such an explosion would blow the main charge out from the hole, if that is what occurred."

A second letter reads as follows: "This occurrence as described appears to have been caused by an extensive 'side spit' of the fuse, due probably to breaks caused by unrolling it and straightening it out too roughly, the fuse being either cold or somewhat dry from age. In the case mentioned it is possible that the 'side spit' ignited some fine dry 'bug dust' or coal drillings used as tamping and that sufficient gas was formed in this way to blow out the remainder of the tamping and carry the fuse with the detonator attached,

drawing it from the explosive charge.

"If the primer was not the last cartridge loaded, the explosion could have been caused by ignition of explosives from 'side spit' of fuse, this ignition resulting in a partial explosion of the charge from high temperature and pressure.

"It seems most likely, however, that what did occur was the ignition of a small feeder of mine gas by 'side spit' of the fuse. This would have resulted in the slight explosion that the miner asserts that he heard. Such a partial explosion could easily have drawn the burning fuse and detonator from the primer. The similar occurrence, in sinking a well, was in all probability due to ignition or partial explosion of the charge from a 'side spit' of the fuse. It is quite likely that the primer was not the last cartridge loaded in this case. Assuming that dry coal dust was not used for tamping, there could have been no mine gas present and we are then unable to explain the occurrence, either in the shot in the mine or that in the well."

A third letter read as follows: "From the description given of this incident it appears that the fuse probably was laced through the cartridge or in close contact with it and that the burning fuse ignited the explosive at such points. The hole being well tamped, the gases produced by the burning of the fuse and explosive might develop sufficient pressure to blow out the charge with the tamping. This would not produce a loud report, and this would agree with the reported conditions, it being stated that the noise was not as loud as would have been expected from an explosion of the entire charge. The fuse, of course, would continue burning until the fire reached the cap, which would then explode. This is the best and most plausible explanation of such occurrences, which have come to our attention on previous occasions."

In the opinion of *Coal Age*, the most plausible explanation of this occurrence is that one of the explosive cartridges was ripped or torn by a sharp jutting piece of rock or coal in the side of the hole as the cartridge was being pushed home. The injury to the cartridge may have caused a trail of powder to be left from that point to where the injured cartridge finally rested.

Now, assuming that the primer, containing the cap attached to the fuse, was the last cartridge inserted in the hole and the injured cartridge was next below this, it is quite possible, and indeed probable, that the burning fuse ignited the trail of powder and this carried the fire quickly past the primer and ignited the cartridge below it. In that case the resulting explosion would blow out the primer, the tamping and the unburned portion of fuse with the cap attached. The primer itself may or may not have been ignited by the flame of the exploding cartridge, the latter being most probable. Such an explosion would most naturally cause a blownout shot, owing to the full force of the charge being developed slowly.

Discussion

Why Peat Grew Rapidly When Coal Was Formed

With Two per Cent of Carbon Dioxide in Air Tissue Was and Is Rapidly Developed, but for Seed Development Certain Rare Elements Are Needed

FOR some years I have been operating a greenhouse with an atmosphere in which the percentage of carbon dioxide is artificially increased. This has increased the rate of growth of any plant I have used—celery, pansies, etc. Unfortunately, another influence is to make the plants woody, without seed and with warty fruit.

It is well known that in the ages when coal was deposited, approximately 2 per cent of carbon existed in the air, whereas the present atmosphere contains only 0.03 per cent. In the interval since that time a large quantity of this gas was absorbed by the action of plants and certain small organisms, and, as a result, we have limestone, oil and coal deposits, etc. The carbon dioxide that the vegetables of that period absorbed is now locked up in Nature's safe-deposit vaults; an impoverished atmosphere is left for the plant, which assumes a commensurate feebleness.

Biochemically we find that, other things being equal, the percentage of carbon dioxide on the leaves determines the quantity of starch formed and the growth of the plant. In short, double the carbon dioxide in the air and you double the plant's growth. Quadruple it and you quadruple the starch formation. Multiply the percentage of the gas by sixteen and the plant grows sixteen times as fast as in the air of today. It is important that the gas come in contact with the stomata or the breathing cells.

Now, as was stated, it is unfortunate that this growth is uncontrollable and woody, for every power house pours out the equivalent of tons of fresh vegetables and fruit. We have obtained luxuriant rose bushes but without roses, cucumbers that were warty and seedless, celery that could be a caveman's war-club, with, of course, a lot of good fruit accidentally produced in isolated tests.

After years of research I have found out the scientific key to the matter. We have disturbed Nature's balance brutally, tried for production without regard for quality. We must find how to use tact with Dame Nature.

A companion research has developed certain facts and rules as to the effect of rare minerals and elements on the growth of organisms. For instance, I find in all the glands called "ductless" and made notorious by the "monkey-gland" operation certain rare elements

as lithia, zinc, vanadium, molybdenum, nickel, iodine, arsenic, manganese, tin, copper, and so forth, and that these play a dominating biochemical rôle even if present in such small proportions as one-hundredth of a grain in an organic form. For instance, as little as two or three milligrams of nickel, chrome, tungsten and other elements in an organic form in bread will enable the ductless pancreatic gland to make for a diabetic the insulin for sugar oxidation. This has been tested out in several clinical cases. Even trees and other plants have their own endocrine glands. They are merely storehouses for the rare minerals and factories for

working them up into products useful to the organism.

It remains to learn the application of this principle. Referring to "Principles of Biology" by Herbert Spencer, edition of 1898, Vol. 1, pages 272 et seq., we find the fact that there are in life two principles of growth, called by him "gamogenesis" and "agamogenesis." In short, the latter is the tissue-producing force; the former the seed-producing force.

Therefore, when we increase the percentage of carbon dioxide, we increase the tissue-producing force and produce a distortion of nature. Accordingly, we must increase it in proportion with the seed-producing force. Then, the plant gets an arrangement pleasing to its nature and we have speeded up the growth normally.

This can be done in a greenhouse by a soil rich in ordinary manure with which is incorporated certain organic compounds of lithia, manganese, nickel, chromium, tungsten, etc., to give life to the tissue.

The matter is now in shape for small-scale tests and I would be pleased to give any interested experimenter an adequate quantity of the gamogenetic fertilizer.

W. MCA. JOHNSON.
Argus, Pa.

Ignition of Gas by Sparks Struck by Falling Rock

Because of my former association with and employment in the Bellevue mine, of the West Canadian Collieries Co., Alberta, Canada, mentioned in the reply to the inquiry regarding the possibility of gas being ignited by sparks struck by falling rocks in mines (*Coal Age*, Nov. 8, p. 711), the remarks of the editor on that subject greatly interested me.

As he has already stated, a series of mysterious explosions took place at that mine, and the cause was generally believed to be the ignition of gas by sparks emitted by falling rocks. When the second of this series of explosions occurred I had been in charge of the mine only nine days.

Unfortunately, the verdict of the jury at the inquest seeking to ascertain the cause of the accident was based on an assumed theory of percussion advanced by James Ashworth, a mining engineer, who was called as an expert. The verdict read as follows: "We do upon oath say that thirty men came to their death by carbon monoxide poisoning and fractured skulls, as the result of a concussion of air caused by a fall of rock in chutes Nos. 76 and 78."

Realizing that the responsibility of reopening and operating the mine devolved upon me as superintendent, and not feeling satisfied that the verdict of the jury was in line with the facts, I proceeded in company with the mine foreman to make a careful and thorough inspection of the mine. The investigation satisfied me that beyond a doubt the explosion had originated in the neighborhood of No. 65 chute.

In that chute we found that a fall had occurred at the surface pillar above the fourth cross-pitch. According to the evidence of two witnesses, gas had been found at this point two days previous to the explosion, and in making my examination of the place I also detected an explosive body of gas.

Later, my conclusion was substantiated by the report made on this explosion by J. T. Stirling, provincial inspector of mines, and Professor John Cadman, of the University of Birmingham, England. In this connection, the detailed account of my investigation, which was published in *Coal Age*, Vol. 3, p. 985, under the title "A Gas Ignition Controversy," will be of interest.

Personally, I am of the opinion that there is much danger of an accumulation of gas being ignited in any mine where the roof is of such a nature as to emit sparks when subjected to the grinding action that occurs immediately before a fall. On certain occasions I have heard the roof rock crack with a sound like the report of a large gun. Bright sparks also are emitted when such rocks strike each other when pieces of the roof fall.

In my opinion, it is of great importance for the management of mines where explosive gas is generated, that samples of the roof rock be subjected to a practical test to determine their ability to emit sparks when weighting or falling. The results of such tests should afford valuable information that would guide the management in the selection of a method of working and a system of ventilation that would reduce this hazard to a minimum.

Welch, W. Va. J. W. POWELL,
Contracting Engineer.



Production And the Market



Gradual Increase in Buying of Soft Coal Noted; Quiet Spot Selling; Contracts Move Steadily

Without any considerable change in the situation that has ruled for several weeks, there has been a gradual but noticeable increase in buying of soft coal. Numerous large consumers have bought quietly of the free coals, while contract holders have taken steadily of their quota. Of course, the topic of conversation in the market has been the Jacksonville conference, and while the outcome is evident consumers hesitate to act for the future until the agreement is signed. Meantime contract making is practically at a standstill. In some quarters predictions are made of a lifeless market if a long-term agreement results.

Some markets are encouraged by the greater activity in steel operations, but these expectations may be offset by curtailments in the textile and other industries.

Coal Age Index as of Feb. 18 is at 186, a decline of two points from the previous week, the average price being \$2.25, also a recession of 2c. from Feb. 11.

Consumers' Eyes on Jacksonville

The accumulation of lump and middle sizes of coal in Illinois and Indiana and the difficulty in selling has caused numerous "no bills." Salesmen are experiencing difficulty in moving eastern Kentucky coals while central Illinois domestic sizes, due to warmer weather, have become sluggish. Cancellations of orders for the larger sizes have caused a cut in production and an upward movement in screenings, and as a result buyers have been looking to other fields for lower-priced coals. Consumers are watching the outcome of the Jacksonville conference.

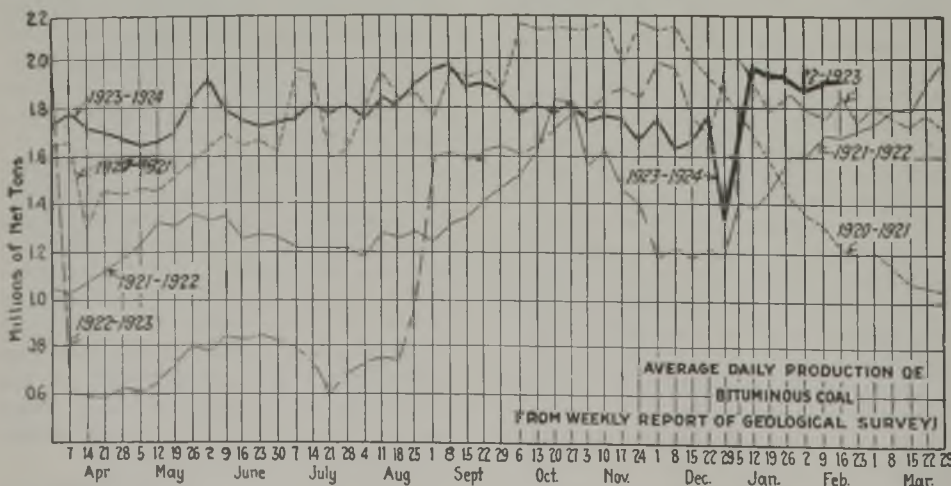
Retail dealers in St. Louis report a good trade for the middle grades and cheaper coals, with a slow movement for the higher grade coals, but scarcely any activity in smokeless, anthracite or coke. The southern

Illinois field was the scene of more trouble at Herrin, with the mines in the district generally working about four days a week. "No bills" are prominent in the Standard fields with the mines averaging two or three days a week. If car supply was adequate the mines in eastern Kentucky could work six days a week, according to some operators. As it is, supply is cut down to around 55 per cent. There is a good demand for coal as a result of winter weather and reduced stocks. The Northwestern markets are active.

The domestic trade in Ohio is brisk, but the contrary is reported of the steam-coal market. Consumers of steam coals are showing no disposition to increase their stockpiles and buy only for current requirements. Screenings are off because of the larger production of lump, while railroad buying has slowed down due to the favorable outlook at Jacksonville. Numerous local strikes are reported in the Hocking Valley district. Better market conditions are indicated at Pittsburgh. There are a few visible signs of betterment in New England, accompanied by an increase in the number of inquiries for small lots. Along the Atlantic seaboard everything is quiet and uninteresting. Tidewater business is quiet but more activity is reported from the line.

Production of soft coal during the week ended Feb. 9 jumped to 11,531,000 net tons, as compared with 11,337,000 tons the previous week, an increase of 194,000 tons, according to the Geological Survey, while the output of hard coal reached a total of 1,906,000 net tons, an increase of 13,000 tons when compared with the previous week. At present anthracite is being produced in smaller quantities than during the corresponding periods of 1923 and 1921, but is slightly above the figure for 1922.

A fair demand continues from foreign buyers and



Estimates of Production

(Net Tons)		
BITUMINOUS		
	1922-1923	1923-1924
Jan. 26	10,985,000	11,569,000
Feb. 2 (b)	10,686,000	11,337,000
Feb. 9 (a)	10,725,000	11,531,000
Daily average	1,788,000	1,922,000
Coal year	353,987,000	471,286,000
Daily av. coal year	1,339,000	1,791,000
ANTHRACITE		
Jan. 26	2,119,000	1,782,000
Feb. 2	2,056,000	1,893,000
Feb. 9	2,023,000	1,906,000
Coal year	42,472,000	80,070,000
COKE		
Feb. 2 (b)	348,000	264,000
Feb. 9 (a)	359,000	287,000
Calendar year	1,959,000	1,528,000

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

while not much actual business is reported the prospects seem good. Inquiries come mostly from France and Italy. The South American market is reported as quiet. Baltimore reports a disappointment in the export situation for the first ten days of February. Dumpings for all accounts at Hampton Roads during the week ended Feb. 14 were 395,464 net tons as compared with 369,171 tons in the previous week, an increase of 26,293 tons.

Middle West Has Too Much Lump

No-bills on the middle sizes and even on big lump are accumulating at most Illinois and Indiana mines and are hard to sell in Chicago and the Midwest markets. Eastern Kentucky lump coming into this region has a hard time moving at \$3.25, the average being close to \$3. Central Illinois domestic sizes are sluggish at the same price and the best southern Illinois runs from \$3.50 to \$3.75 with evidences of softening under a spell of warmer weather. Cancellations have not grown numerous yet, but they are expected.

All this has resulted in a definite upward trend of the screenings market. Southern Illinois is strong now at \$1.90 and central Illinois at \$1.50. This has driven some crafty buyers into such fields as western Kentucky in search of low-priced stuff. The effect there also was to push up the price. This process is expected to continue indefinitely, relieved, possibly, only by whatever short spells of cold weather there may be. It is confidently expected a settlement for a considerable term will be made in the miner-operator wage negotiations before April 1 and a lifeless market is the result.

St. Louis Keeps Busy

Seasonable weather continues and the St. Louis retailer finds his business good on the middle grade and cheaper coals. There is some movement of higher grade coals, such as Franklin County, but nothing to speak of in anthracite, smokeless or coke. Country domestic is fairly good, but calls are for cheaper coal as a rule. Dealers seem to keep a pretty fair supply ahead in their bins. Local wagon-load steam continues good, while carload shows an easing up and the production is greater than the demand. Country carload is easy.

Railroad tonnage shows up fairly good out of southern

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

Low-Volatile, Eastern	Market Quoted	Feb. 19	Feb. 4	Feb. 11	Jan 18	Midwest	Market Quoted	Feb. 19	Feb. 4	Feb. 11	Feb. 18
		1923	1924	1924	1924†			1923	1924	1924	1924†
Smokeless lump.....	Columbus.....	\$7.00	\$3.35	\$3.60	\$3.25@ \$4.00	Franklin, Ill. lump.....	Chicago.....	\$4.60	\$3.50	\$3.50	\$3.25@ \$3.75
Smokeless mine run.....	Columbus.....	4.35	2.10	2.10	2.00@ 2.25	Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@ 2.50
Smokeless screenings.....	Columbus.....	4.35	1.50	1.50	1.45@ 1.70	Franklin, Ill. screenings.....	Chicago.....	2.55	1.80	1.80	1.50 @ 2.00
Smokeless lump.....	Chicago.....	7.00	3.60	3.60	3.50@ 3.75	Central, Ill. lump.....	Chicago.....	3.35	3.10	3.10	3.00@ 3.25
Smokeless mine run.....	Chicago.....	4.75	2.50	2.50	2.50	Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Smokeless lump.....	Cincinnati.....	7.25	3.75	3.60	3.50 @ 4.00	Central, Ill. screenings.....	Chicago.....	1.60	1.35	1.35	1.40 @ 1.60
Smokeless mine run.....	Cincinnati.....	4.75	2.75	2.60	2.50@ 2.75	Ind. 4th Vein lump.....	Chicago.....	4.35	3.10	3.10	3.00@ 3.25
Smokeless screenings.....	Cincinnati.....	5.00	1.80	2.10	1.75@ 2.00	Ind. 4th Vein mine run.....	Chicago.....	3.10	2.60	2.60	2.50@ 2.75
*Smokeless mine run.....	Boston.....	6.70	5.05	4.80	4.65@ 4.85	Ind. 4th Vein screenings.....	Chicago.....	2.10	1.70	1.70	1.65@ 1.80
Clearfield mine run.....	Boston.....	3.85	2.05	2.05	1.65@ 2.25	Ind. 5th Vein lump.....	Chicago.....	3.60	2.60	2.60	2.50@ 2.75
Cambria mine run.....	Boston.....	4.50	2.60	2.50	2.25@ 2.75	Ind. 5th Vein mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Somerset mine run.....	Boston.....	4.10	2.15	2.25	2.00@ 2.50	Ind. 5th Vein screenings.....	Chicago.....	1.80	1.45	1.45	1.40@ 1.50
Pool 1 (Navy Standard).....	New York.....	4.80	3.00	3.00	2.75@ 3.25	Mt. Olive lump.....	St. Louis.....		3.10	3.10	3.00@ 3.25
Pool 1 (Navy Standard).....	Philadelphia.....	4.80	3.00	3.00	2.75@ 3.25	Mt. Olive mine run.....	St. Louis.....		2.50	2.50	2.50
Pool 1 (Navy Standard).....	Baltimore.....					Mt. Olive screenings.....	St. Louis.....		1.50	1.50	1.25@ 1.50
Pool 9 (Super. Low Vol.).....	New York.....	4.00	2.25	2.25	2.00@ 2.50	Standard lump.....	St. Louis.....	3.10	2.75	2.75	2.65@ 2.90
Pool 9 (Super. Low Vol.).....	Philadelphia.....	4.35	2.30	2.30	2.10@ 2.50	Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@ 2.00
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.60	1.85	1.90	1.70@ 2.00	Standard screenings.....	St. Louis.....	1.45	1.10	1.10	75 @ 90
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.70	1.95	1.95	1.75@ 2.10	West Ky. lump.....	Louisville.....	3.35	2.85	2.85	2.75@ 3.00
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.70	1.85	1.85	1.70@ 2.00	West Ky. mine run.....	Louisville.....	2.05	1.70	1.70	1.65@ 1.90
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	3.25	1.80	1.80	1.65@ 1.75	West Ky. screenings.....	Louisville.....	1.85	1.05	1.05	1.10 @ 1.30
Pool 11 (Low Vol.).....	New York.....	2.90	1.60	1.60	1.50@ 1.75	West Ky. lump.....	Chicago.....	3.60	2.85	2.85	2.75@ 3.00
Pool 11 (Low Vol.).....	Philadelphia.....	3.15	1.65	1.65	1.55@ 1.75	West Ky. mine run.....	Chicago.....	1.95	1.60	1.60	1.50@ 1.75
Pool 11 (Low Vol.).....	Baltimore.....	2.65	1.65	1.60	1.50@ 1.60						

High-Volatile, Eastern	Feb. 19	Feb. 4	Feb. 11	Jan 18	South and Southwest	Feb. 19	Feb. 4	Feb. 11	Feb. 18	
Pool 54-64 (Gas and St.).....	2.60	1.60	1.60	1.50@ 1.75	Big Seam lump.....	Birmingham.....		3.85	3.85	3.75@ 4.00
Pool 54-64 (Gas and St.).....	2.75	1.70	1.70	1.60@ 1.80	Big Seam mine run.....	Birmingham.....	2.10	1.85	1.75	1.75@ 1.85
Pool 54-64 (Gas and St.).....	2.45	1.50	1.50	1.45@ 1.55	Big Seam (washed).....	Birmingham.....	2.60	2.10	2.10	2.00@ 2.25
Pittsburgh sc'd gas.....	4.10	2.55	2.55	2.50@ 2.65	S. E. Ky. lump.....	Chicago.....	4.60	3.25	3.38	3.00@ 3.25
Pittsburgh gas mine run.....		2.30	2.30	2.25 @ 2.50	S. E. Ky. mine run.....	Chicago.....	2.85	1.85	2.00	1.75@ 2.00
Pittsburgh mine run (St.).....	2.75	2.00	2.00	2.00 @ 2.25	S. E. Ky. lump.....	Louisville.....	4.75	3.25	3.25	3.00@ 3.50
Pittsburgh slack (Gas).....	2.85	1.60	1.55	1.50@ 1.65	S. E. Ky. mine run.....	Louisville.....	2.60	1.80	1.80	1.65@ 2.00
Kanawha lump.....	4.30	2.60	2.60	2.50@ 2.85	S. E. Ky. screenings.....	Louisville.....	2.35	1.15	1.35	1.25@ 1.60
Kanawha mine run.....	2.60	1.60	1.60	1.50@ 1.75	S. E. Ky. lump.....	Cincinnati.....	4.00	2.75	3.15	2.85@ 3.25
Kanawha screenings.....	2.35	1.25	1.05	1.10 @ 1.25	S. E. Ky. mine run.....	Cincinnati.....	2.60	1.80	2.05	1.65@ 1.85
W. Va. lump.....	4.25	2.85	3.10	3.00@ 3.25	S. E. Ky. screenings.....	Cincinnati.....	2.35	1.30	1.25	1.25
W. Va. gas mine run.....	3.35	1.70	2.10	1.65@ 1.85	Kansas lump.....	Kansas City.....	5.00	5.00	5.00	5.00
W. Va. steam mine run.....	3.35	1.70	2.10	1.65@ 1.85	Kansas mine run.....	Kansas City.....	3.50	3.50	3.50	3.50
W. Va. screenings.....	2.35	1.30	1.25	1.25	Kansas screenings.....	Kansas City.....	2.50	2.25	2.25	2.25
Hoeking lump.....	4.25	2.75	2.75	2.50@ 3.00						
Hoeking mine run.....	2.50	1.85	1.85	1.75@ 2.00						
Hoeking screenings.....	2.10	1.15	1.05	1.10 @ 1.20						
Pitts. No. 8 lump.....	4.25	2.40	2.40	2.00@ 2.85						
Pitts. No. 8 mine run.....	3.20	2.05	1.80	1.80@ 1.85						
Pitts. No. 8 screenings.....	3.10	1.60	1.45	1.40@ 1.50						

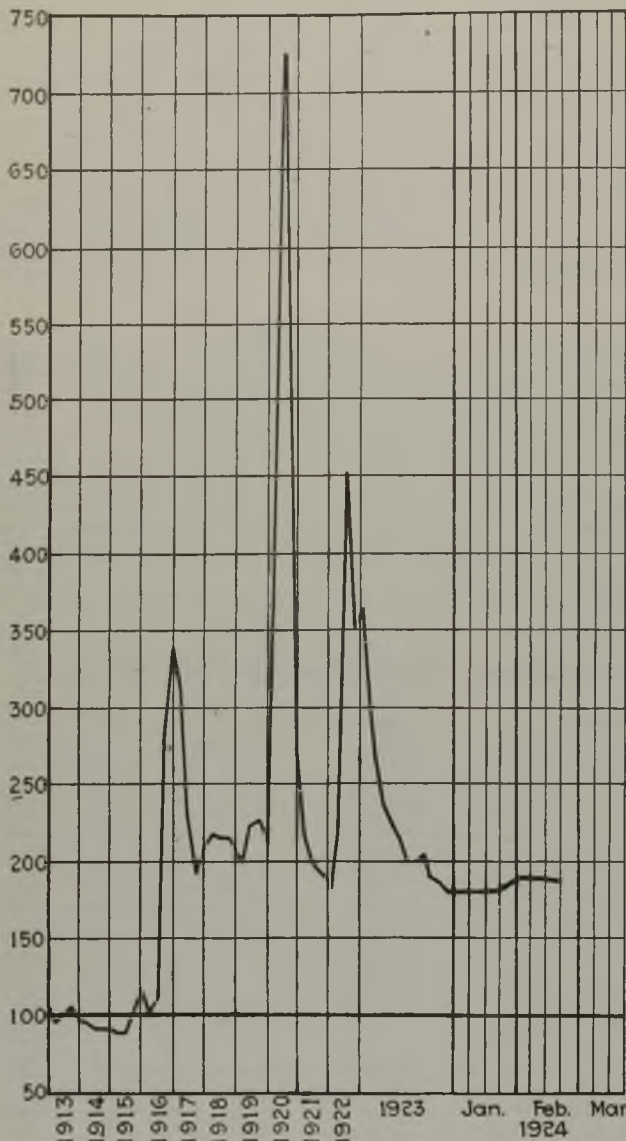
* Gross tons, f.o.b. vessel, Hampton Roads.

† 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	Feb. 19, 1923		February 11, 1924		February 18, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34	\$9.00	\$7.75@ \$8.25	\$8.00@ \$8.50	\$8.00@ \$9.25	\$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	8.25@ 9.00	8.75@ 9.25	8.25@ 9.00	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	9.50@ 10.25	8.75@ 9.25	9.50@ 10.25	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	9.50@ 10.25	8.75@ 9.25	9.50@ 10.25	8.75@ 9.25
Chestnut.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 11.50	8.90@ 9.25	9.85@ 11.50	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	4.75@ 6.25	6.15@ 6.65	4.50@ 6.25	6.15@ 6.65
Pea.....	Philadelphia.....	2.14	7.00@ 9.00	6.15@ 6.20	5.25@ 7.25	6.35@ 6.60	5.25@ 6.60	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@ 5.50	4.00@ 4.10	2.25@ 3.50	3.50	2.25@ 3.50	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	5.00@ 5.50	4.00	2.00@ 3.50	3.50	2.25@ 3.50	3.50
Rice.....	New York.....	2.22	2.25@ 3.00	2.75@ 3.00	2.00@ 2.50	2.50	2.00@ 2.50	2.50
Rice.....	Philadelphia.....	2.14	2.75@ 3.00	2.75@ 3.00	1.50@ 2.50	2.50	1.75@ 2.50	2.50
Barley.....	New York.....	2.22	1.50@ 2.00	1.50@ 2.00	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley.....	Philadelphia.....	2.14	1.50@ 2.00	2.00	1.00@ 1.50	1.50	1.25@ 1.50	1.50
Birdseye.....	New York.....	2.22		2.10		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 Bituminous Coal F.O.B. Mines

Index	1924			1923
	Feb. 18	Feb. 11	Feb. 4	Feb. 19
Index	186	188	187	288
Weighted average price	\$2.25	\$2.27	\$2.26	\$3.49

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

Illinois the past week, although the movement of cars is slow. Several mines around Herrin, in the Carterville field, have been idle on account of the trouble between the law-enforcement element and the bootlegging element. At the present time there are 1,700 soldiers in the field and this has had some effect on the foreign miners who are refusing to work with the American miners who belong to the law-enforcement organization, which is affiliated with the K. K. K.

The mines in all southern fields are getting from three to four days per week work, which is good and is accounted for by the cold weather. The Mt. Olive district is doing remarkably well, with good demand for domestic, and screenings seem to keep moving. The railroads are taking the egg and nut. In the Standard field there is an overproduction of all sizes and nearly all mines have no-bills, excepting on a cold day when they may clean up. Working time averages only two or three days.

Kentucky Finds Trade Good

It is asserted by the eastern Kentucky trade that a good many mines would be operating six full days a week if the car supply was adequate, but, due to increased general

buying and the fact that a good many cars are on long haul, supply is now down to around 50 or 60 per cent in eastern Kentucky. Practically all large mines are operating. General demand has been good, as utilities, gas and by-product plants, industrial plants and railroads are all needing more coal as a result of a hard winter and the fact that stockpiles are low.

Favored by a steady car supply the western Kentucky operators are managing to get out a good tonnage and there isn't much trouble experienced in getting orders. The South is buying an abnormally large amount of coal this winter, having experienced more bad weather than for years past. Western Kentucky screenings have been advancing, due in part to alleged buying on the part of Chicago brokers for the Commonwealth Edison interests. At any rate screenings, which had been selling at 80@90c., suddenly have advanced to \$1@1.10 to the trade on pea and slack, and \$1.20@1.35 on nut and slack. Prepared sizes show no change. With a range of from \$1 on screenings to \$3 on best block coal, the field could be in much worse shape.

Business at Duluth was good last week, with orders plentiful, and coal men taking the attitude that a large amount of the coal on the docks will be sold by the time navigation opens. The general opinion is that a strike will not occur, but even at that few can see any definite loss, as the way coal is going shows that a large surplus will not have to be held over. It is estimated that 4,200,000 tons remain. Exactly how much of this is free is uncertain, but the major portion is already contracted for. The prices of soft coal are firmer. Screenings as a whole are showing strength. The fall-off in prices reported last week has done much to stimulate trade. The failure of water power in the iron ranges also has taken much coal.

There is a brisk demand at Milwaukee for coal both for local and country delivery. The dock yards are well supplied with all grades of coal, but jobbers of rail coal say prepared Pocahontas and western screenings are a little hard to get at present. One cargo of soft coal which was held afloat was unloaded this week. Prices of coal and coke remain unchanged.

A slight decline was noted in the sales of Colorado coals during the past week. "No market" reports show that 20 per cent of the working time lost was attributed to this cause. Prices remain unchanged and the present supply of labor seems plentiful. The transportation and car-shortage situation has been favorable throughout the state except in Routt County, where more than 85 per cent of the full working time was lost for this reason.

A slight surplus of all grades of coal has begun to accumulate at Kansas mines, which, after six weeks of almost full-time operation, again are cut down to approximately two-thirds time. The present slump marks the end of one of the most profitable periods since the war for the Southwest.

Slight shading of prices again has developed in Kansas City, though it is encountered little throughout the rest of the Southwestern district.

Published quotations remain unchanged. Kansas lump is quoted at \$5; nut at \$4.25; mine-run at \$3.50 and screenings at \$2.25.

The domestic market at Salt Lake City is absorbing the greater part of the output of Utah mines. Consumption has fallen off as a result of the sudden break in the weather. Mines are now working about three days a week. Stocks in Salt Lake City coal yards have increased during the past ten days, due to pressure from operators who desired to keep mines open. The situation in regard to intermediate sizes, which threatened to close several mines, is a little better.

Stock at the mine is stated to be \$1.75 for screened and \$1.25 for straight. Other grades are: Lump, \$4.50; domestic lump, \$3.75; stone, \$3.75; nut, \$3.50. Retail prices are: \$9.50, \$9, \$8.50 and \$8 respectively.

Ohio Steam-Coal Market Slow

Large consumers of steam coals in the Columbus market are buying only for current needs and are showing little indication of increasing surplus stocks. The market, however, is absorbing all steam sizes although there is little special demand and prices continue low. The larger production of lump, rather than a reduction in demand, has forced lower prices for screenings. The railroads have eased up in buying because of the belief that there will be a satis-

factory agreement on the wage scale. Domestic trade is rather brisk. Users of these coals are buying in small lots, but retail dealers are generally busy. Pocahontas is showing considerable strength.

Production in the Ohio fields is better, with an output of about 30 per cent in the southern Ohio field. There have been several small strikes in the Hocking Valley district, resulting in a curtailed production.

Contracting for steam sizes is slow. Utilities are buying but not as heavily as earlier in the year, while several of the larger utilities in central Ohio are reported out of the market because of storage-pile fires.

The Cleveland market is sluggish with demand dull. Prices show no change from the previous week. Production in the eastern Ohio district for the week ended Feb. 9 was about 393,000 tons.

All attention at Cincinnati has been centered on the conference in Florida and buyers have been rather timid about placing orders. As a result of this condition there is some unsteadiness in the domestic market, both for smokeless and high-volatile. In the low-volatile market there has been less demand for "car numbers" from the West. On the other hand, the steady business in the Pocahontas and New River fields put the local sales agents in a position where they are selling now on a March delivery basis. Special coals are quoted as follows: Egg, \$3.25@3.50, and lump, \$3.75@4.

Pittsburgh coal operators are watching the Jacksonville conference carefully and the prediction in the trade is that if the present scale is continued the union coal mines, as a body, will have rather little business during the period, except as railroads may be unable to serve fully the non-union mines.

Altoona reports considerable correspondence and conferring on contracts, but not many being signed. A slight increase in production in central Pennsylvania was reported during the week ended Feb. 9, the loadings amounting to 16,597 cars as compared with 15,266 cars the previous week.

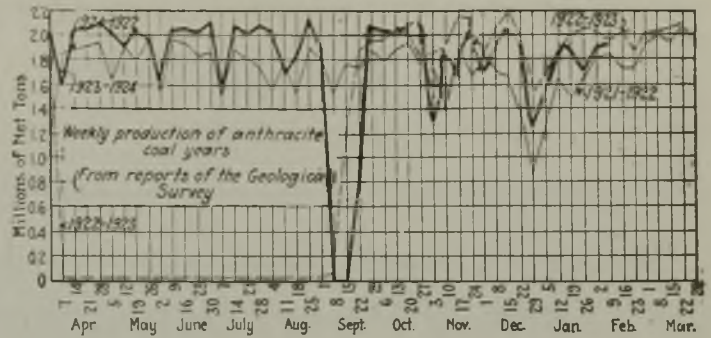
But little soft-coal buying is being done at Buffalo and there is little optimism.

New England Shows Slight Improvement

In New England there are few visible signs of improvement. There is scattering inquiry for small lots, but a close canvass of buyers in this territory discloses no prospect of comprehensive business for weeks to come. Several factors are offering No. 1 Navy standard grades from the Southern field at \$6.25@6.75 per gross ton on cars, but the larger consumers know that any quantity, however small, can be had at not over \$6. There is therefore little confidence in present quotations, and not even the possibility of labor troubles in April will induce more than hand-to-mouth purchases.

At Hampton Roads there is a steady increase in receipts from the mines, a condition that is reflected in an occasional price of less than \$4.75 per gross ton f.o.b. vessel. The agencies are combing over the market with great care in the effort to place spot coal, but aside from deliveries on contract there is little doing coastwise. Almost nothing is heard of contract engagements for the year beginning April 1, but doubtless many of the arrangements now in force will be renewed through the same channels from month to month, if not for the twelve-month period.

All-rail from central Pennsylvania the market is in the same quiet state that has obtained since last summer. Poca-



hontas and New River via Hampton Roads are still low enough in price at rehandling points here to exclude all-rail deliveries from the largest part of this territory. Medium grades in the Clearfield district can still be had at less than \$2 per net ton at the mines, and not even quality coals from Cambria County command more than \$2.75@2.90. Now and then there is an occasional call for screened coal to take the place of anthracite, the retail dealer being in position to offer high grade fuel at from \$3 to \$4 less than the present retail price of hard coal.

Inland Demand for Soft Coal Better

The topic of comment along the Atlantic seaboard is the Jacksonville conference. There has been no change in conditions. Buying at tidewater is slow, but demand from the inland is better. Some contracts have been reported as closed but a number of consumers are holding back awaiting developments. Increased inquiries have resulted in more orders and there has been some extra buying. Some of the railroads are considering new contracts to take the place of those that will expire soon. While the cotton and woolen textiles are quiet there is a better feeling in some of the other industries and the trade is encouraged to some extent. There has been no distinct line of improvement shown in the Baltimore market with the exception of more inquiries.

Anthracite Market Quiet

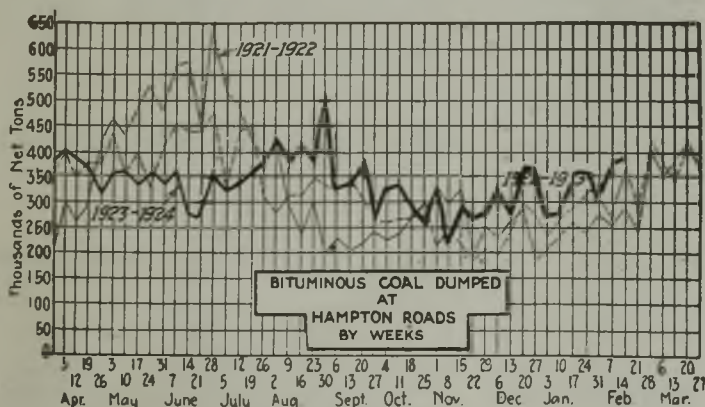
There is no real activity in the anthracite market. Domestic coals are plentiful and, contrary to past years, there has been no rush to replenish stocks. Mild weather conditions have not caused heavy consumption and producers of independent coals find it difficult in some instances to keep their product moving. The demand centers around stove coal, but there is a good demand for chestnut. Egg and pea are moving slowly and it is reported that some pea is being stored by the producers. The steam coals are easier but in good demand. Barley is the strongest of the three sizes and the better grades are being quoted at more than company circular. Some Welsh anthracite is being received at Baltimore, but the tonnage is not large.

Spot Furnace Coke Stiffens

Production of beehive coke during the week ended Feb. 9 was 287,000 net tons, as compared with 264,000 tons in the previous week and 359,000 tons during the corresponding week of last year. Spot furnace coke is stiffer in the Connellsville district and second-quarter contracting is reported easier. Recent buying of spot furnace coke cleaned up floating supplies very well and there were some prompt lots sold, which absorbed the extra production beyond regular contract requirements. As a result offerings in the spot market are very light. Heating coke has stiffened lately, some production being cut off on account of low prices.

Car Loadings, Surpluses and Shortages

	Cars Loaded		Surplus Cars	Car Shortage
	All Cars	Coal Cars		
Week ended Feb. 2, 1924	929,936	198,955		
Previous week	891,326	204,396		
Same week in 1923	865,414	190,425		
	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
Jan. 31, 1924	169,036	67,578	4,598	
Same date in 1923	26,588	7,208		
Jan. 22, 1924	236,174	100,781	2,484	



Foreign Market And Export News

Strike of Dock Workers Likely to Affect British Mines; Output Increases

While not yet affected by the dock workers' strike, which became effective at noon Feb. 16, it is expected that unless work is resumed soon the South Wales coal mines will be compelled to suspend operations, due principally to the scarcity of props and other mine timber.

Congestion at the docks is reported as steadily growing and many vessels are reported waiting for cargoes. Rail service has been retarded, but this did not prevent the mines from producing 5,245,000 tons of coal during the week ended Feb. 2, according to a cable to *Coal Age*. This was 528,000 tons more than was produced during the previous week but a decrease of 603,000 tons when compared with the output of 5,848,000 tons during the week ended Jan. 19.

There is no indication at present of a resumption of the third working shift in the mines. There is a good foreign demand for coal and prices are stiffer. Best Admiralty grades are being quoted at 30s. 6d. @ 31s. 6d.; bunker smalls at 21s. @ 23s.; cargo smalls at 18s. @ 20s.; mixed bunker throughs at 23s. @ 28s., and coke for export at 47s. 6d. @ 57s. 6d.

The settlement of the recent railway dispute came too late to enable the Welsh market to show any material improvement. At that time about 70 per cent of the collieries were operating and others were already closing down. The railway companies, however, got into their stride quickly and other mines were saved from suspending operations. As a result the market is very uncertain but operators are asking slightly increased prices for forward business.

Similar conditions exist in the Newcastle market, though there is considerable pressure for prompt delivery. The output has been well maintained and not many pits have had to close down. Stocks accumulated during the

strike are now being cleared at firm prices.

Various public corporations on the Continent are placing contracts for quantities ranging up to 10,000 tons.

Export Permits to Insure French Coal for Home Needs

Permits regulating the export of French coal have been re-established in order to save the largest portion for home consumption and to avoid the necessity for buying foreign fuel. These permits will be effective throughout the country and also will apply to foreign steamers entering French ports for replenishing their supply of fuel.

The prices of all kinds of coal were reduced 3 fr. effective Feb. 1, as a result of the request of the French authorities; this despite the higher cost of labor and raw materials of all kinds. To the railway strike in Great Britain occasioned considerable uneasiness in regard to prices and arrivals fell off to a marked degree for a while. Transportation difficulties are interfering with the arrival of Belgian coals, but in France both land and water traffic have greatly improved but are still below normal.

An improvement in the supply of metallurgical coke is reported but the receipts from Great Britain and Belgium are slightly smaller because of the railway and dock troubles. The French authorities have fixed a price of 143.5 fr. for German coke delivered at the frontier.

Hampton Roads Market Dull

Business at Hampton Roads was generally dull last week, with an occasional good order reported. Foreign movements were fairly brisk, but mostly on old contracts. Inquiries for

foreign business were not numerous.

Bunker trade held its own, with a substantial increase in general shipping. Coastwise business showed little increase, though movement was fairly active chiefly on old orders. The spot trade was generally fair.

Prices about held their own, although various price levels were being maintained by shippers who desired to get coal off of demurrage. The tone of the market was dull.

Export Clearances, Week Ended Feb. 16, 1924

FROM HAMPTON ROADS		Tons
For Africa		
Ital. SS. Valtellina, for Dakkar		8,071
For Brazil		
Br. SS. Holms Light, for Puerto la Plata		5,254
For Canada		
Br. SS. Wabang, for Halifax		6,839
Br. SS. Lingan, for St. John		6,871
For Cuba		
Br. SS. Berwindmoor, for Havana		9,631
Amer. Schr. Theoline, for Santiago		830
For France		
Br. SS. Picton, for Marseilles		7,390
For Hawaii		
Amer. Schr. Orleans, for Pearl Harbor		9,129
For Porto Rico		
Du. SS. Banka, for Sabang		1,391
For West Indies		
Nor. SS. Wascana, for St. Thomas		7,558
FROM BALTIMORE		
For Italy		
Ital. SS. Aster		9,048

Hampton Roads Pier Situation

	Feb. 7	Feb. 14
N. & W. piers, Lamberts Pt.:		
Cars on hand	1,628	1,018
Tons on hand	113,135	65,824
Tons dumped for week	125,431	181,046
Tonnage waiting	15,000	12,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand	1,133	1,276
Tons on hand	75,100	85,450
Tons dumped for week	91,474	98,132
Tonnage waiting	3,580	21,260
C. & O. piers, Newport News:		
Cars on hand	1,291	1,274
Tons on hand	64,330	63,290
Tons dumped for week	112,712	73,915
Tonnage waiting	5,550	

Pier and Bunker Prices, Gross Tons

	PIERS	
	Feb. 9	Feb. 16†
Pool 9, New York	\$4.90 @ \$5.25	\$4.90 @ \$5.25
Pool 10, New York	4.65 @ 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	4.90 @ 5.00	4.80 @ 4.90
Pools 5-6-7 Hamp. Rds.	4.25 @ 4.35	4.35
Pool 2, Hamp. Roads	4.65	4.60 @ 4.70

BUNKERS

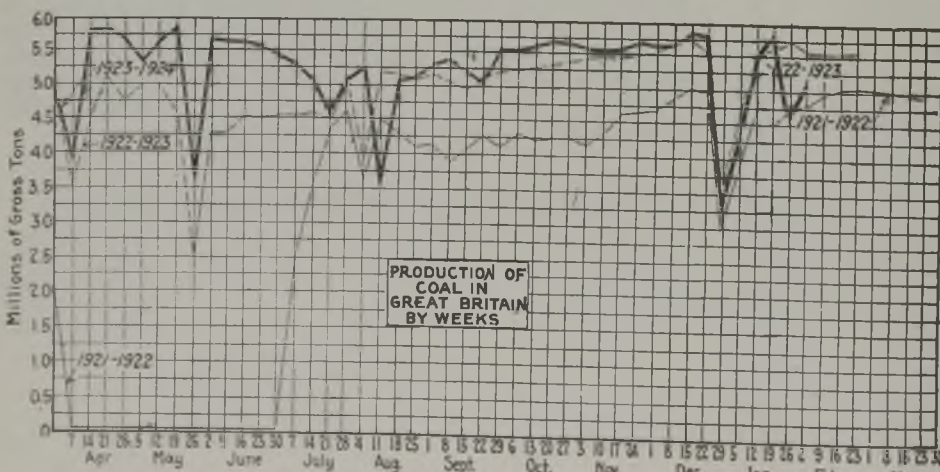
Pool 9, New York	5.20 @ 5.55	5.20 @ 5.55
Pool 10, New York	4.95 @ 5.30	5.05 @ 5.30
Pool 11, New York	4.80 @ 5.05	4.80 @ 5.05
Pool 9, Philadelphia	5.15 @ 5.55	5.15 @ 5.55
Pool 10, Philadelphia	4.90 @ 5.20	4.90 @ 5.20
Pool 11, Philadelphia	4.65 @ 4.90	4.65 @ 4.90
Pool 1, Hamp. Roads	5.00	4.90
Pool 2, Hamp. Roads	4.75	4.70

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

	Quotations, by Cable to <i>Coal Age</i>	
	Feb. 9	Feb. 16†
Admiralty, large	30s. @ 31s.	30s. 6d. @ 31s. 6d.
Steam smalls	23s.	22s. @ 23s.

Newcastle:		
Best steams	26s.	25s. 6d. @ 26s.
Best gas	25s.	25s.
Best bunkers	25s. @ 26s.	25s. @ 26s.

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



Traffic News

West Virginia Intervenes in Lake Rate Hearing

The State of West Virginia, through its Public Service Commission, has taken a hand in protecting coal cargo rates to the lakes by asking to be permitted to intervene in the petition of the Pittsburgh Coal Producers Association and the Pittsburgh Vein Operators Association against the Ashland Coal & Iron Ry. for a change in lake rates. The West Virginia Public Service Commission was represented at the hearings in Washington during the second week of February by B. S. Stathers, a member of the commission, and F. Livezy, general counsel for the commission.

In its petition filed with the Interstate Commerce Commission, the West Virginia Public Service Commission sets forth that "for many years the rates of rail carriers have had an established relationship as between the coal-mining districts of the State of West Virginia and other districts shipping lake cargo coal, including the districts represented by complainants, and petitioner believes complainants seek by this proceeding to change such relationship and to have established rates which will give complainants or the operators represented by complainants an advantage over operators in the State of West Virginia, in the sale of lake cargo coal, and thus prevent the operators of the State of West Virginia from competing in the sale and marketing of such coal."

N. & W. Buys 4,000 Coal Cars

Among the largest equipment orders since the beginning of the year was that of 4,000 seventy-ton hopper cars placed Feb. 13 by the Norfolk & Western R.R. While no statement was given as to the total amount involved, it was estimated that the order would equal about \$12,000,000. One-half of the order went to the Ralston Car Co. The Pressed Steel Car Company received an order for 1,000 cars, and the remaining 1,000 cars will be constructed by the Virginia Bridge & Iron Co.

Would Extend Coal Road In Pennsylvania

The Conemaugh & Black Lick Railroad Co. has applied to the Interstate Commerce Commission for authority to acquire and operate an existing line of railroad in Cambria County, Pennsylvania and to construct and operate a 16-mile extension of that line so as to form a direct connection between the main line of the Pennsylvania and the line of the Baltimore & Ohio at Johnstown. In addition to facilitating the handling and interchange of freight, it is stated that the extension will "open up new territory for manufacturing sites and for the mining of coal, fire-clay and other minerals."

Asks Exemption from Rate Order

The Central Railroad of New Jersey has petitioned the Interstate Commerce Commission that it be exempted from the provisions of the so-called "New England rate" order, handed down in 1922 and upheld in a decision of the U. S. Supreme Court a year ago.

By the terms of the New England rate decision the terminal New England railroads were granted an increase in their proportionate share of through rates on shipments from other sections of the country, the cost of the extra apportionment being pro-rated among the carriers contributing to such freight movement. The plea of the Jersey Central is based on the contention that it is more properly a terminal railroad than a through freight line and that, moreover, its earnings are not on a level sufficiently high to enable it to bear its share of the burden.

Hearings on the petition are expected to be held within the next few weeks, and it is understood that other roads are considering taking action similar to that of the Jersey Central.

New Freight Record in 1923

A record amount of freight traffic was carried by the railroads of the country in 1923, according to complete reports filed with the Bureau of Railway Economics. Traffic handled during 1923 amounted to 457,589,846,000 net ton miles, which exceeded by 2.3 per cent the 1920 total, the previous high record. Compared with 1922, this was an increase of 21.7 per cent. For the month of December, however, there was a decrease of 7.9 per cent, in comparison with the same month in 1922. The average load per freight car in 1923 amounted to 27.9 tons, or one ton above the average for 1922, but a decrease of 1.4 tons compared with the record average established in 1920.

Revised Rates in Effect March 1

The Louisville & Nashville R.R. has notified the Alabama Public Service Commission that it will put into effect March 1 the revised interstate coal and coke rates prescribed in the commission's recent order.

Industrial Notes

The J. B. Engineering Sales Co., Connecticut sales representatives of the Conveyors Corporation of America, Chicago, have moved their office from Hartford to Chamber of Commerce Building, New Haven, Conn. This firm handles the sales of American steam-jet, ash conveyors and other power-plant and engineering specialties.

The St. Louis Steel Casting Co., will open a new foundry for the production of commercial steel castings March 15, at 100 Malt St., St. Louis, Mo. The officers of the new company are Joseph Teipel, president; W. F. Heinecke, vice-president; W. F. Exner, secretary, and F. G. Langbein, treasurer.

Recent Patents

Mine-Car Coupler. George H. Norris and Edward A. Ernest, Milwaukee, Wis., 1,472,988. Nov. 6, 1923. Filed April 7, 1922; serial No. 550,450.

Retort for the Distillation of Shale, Bituminous Coal and Other Materials. Claude M. Garland, Chicago, Ill., 1,473,616. Nov. 13, 1923. Filed Feb. 11, 1921; serial No. 444,090.

Mining Machine Anchoring Device. Nils D. Levin, Columbus, Ohio, assignor to the Jeffrey Mfg. Co., Columbus, Ohio; 1,473,729. Nov. 13, 1923. Filed Sept. 11, 1918; serial No. 253,633.

Explosive for Use in Blasting Caps. John Marshall, Swarthmore, Pa., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.; 1,473,825. Nov. 13, 1923. Filed Oct. 5, 1921; serial No. 505,599.

Mining Machine. Edmund C. Morgan, Chicago, Ill.; Olive E. Morgan, executrix of E. C. Morgan, deceased; 1,474,000. Nov. 13, 1923. Filed May 22, 1916; serial No. 99,015.

Mining Apparatus. Charles W. Wyman, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago, Ill.; 1,474,311. Nov. 13, 1923. Filed July 25, 1919; serial No. 313,206.

Miner's Ticket Box. Samuel T. Pratt, Nanticoke, Pa., assignor of one-fourth to M. J. McDonald and one-fourth to A. V. McDonald, both of Nanticoke, Pa.; 1,474,553. Nov. 20, 1923. Filed May 16, 1923; serial No. 639,351.

Skip Hoist. W. E. Hale, Fort Washington, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa.; 1,474,902. Nov. 20, 1923. Filed Dec. 29, 1922; serial No. 609,618.

Cutter Chain and Bars for Mining Machines. Frank Cartlidge, Terre Haute, Ind.; 1,475,364. Nov. 27, 1923. Filed May 13, 1920; serial No. 380,955.

Process of Preparing Coal for Coking. Henry Dannettell, Evansville, Ind., assignor of one-half to Burtis U. Cain, Evansville, Ind.; 1,475,543. Nov. 27, 1923. Filed Sept. 20, 1919; serial No. 325,236.

Weighing and Loading Apparatus for Roist Skips. Daniel F. Lepley, Connellsville, Pa.; 1,475,637. Nov. 27, 1923. Filed Aug. 31, 1922; serial No. 585,542.

Pit-Cage Arrester. Morgan Williams, Ogmere Vale, near Bridgend, Wales; 1,475,668. Nov. 27, 1923. Filed Nov. 20, 1922; serial No. 602,182.

Obituary

Robert Fleming, president of the Fleming Coal Co. and of the Banner Coal Co., both located at Bannervane, Va., died of Bright's disease at Norton, Va., Feb. 12, at the age of 68. Born in Scotland he came to this country with his parents when 15 years old, the family settling in Pennsylvania. In his early youth he worked in the coal fields of Pennsylvania, later removing to Iowa, where he spent several years trying to develop a mine in the coal district of that state. In the early nineties he went to Norton, Va., and became a pioneer in the development of the Clinch Valley, opening the first coal mine in the valley, the Virginia Gas Coal Co., in Tazewell County.

S. M. Cawood, former sheriff of Harlan County, Kentucky, coal operator, and prominent business man, died suddenly on Jan. 31, at his winter home in Asheville, N. C., where he had gone for his health. A wife and five children survive. Death was due to a sudden attack of heart trouble.

Coming Meetings

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

Northwestern Pennsylvania Coal Operators' Association. Annual meeting March 4. Butler, Pa. Secretary, T. F. Diefenderfer Butler, Pa.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

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

News Items From Field and Trade

ALABAMA

The Southern Ry. is making extensive improvements at its Finley Yards, Birmingham, and it is understood will add car-building and repair shops at a cost of \$5,000,000, though no official confirmation has been given of the extent and nature of the work now under way.

Investigation by the Shelby County Grand Jury into the recent mutiny of convicts in the Montevallo Mines, operated under lease with convict labor by Messrs. Thomas and Weller, absolved the officials and warden of blame in the matter and recommended the restoration of the lash as a last resort in the punishment of unruly prisoners. Equipment in the mine was damaged to the extent of more than \$25,000 by dynamite in the hands of the convicts.

The large frame commissary building and contents at the Mary Lee Coal Mine of the Alabama Company, was destroyed by fire Feb. 2 with a heavy loss. The origin of the fire is unknown. The building will be replaced.

The Youngstown Mining Co., of Blount County, has increased its capital stock from \$2,000 to \$300,000 in accordance with papers filed with the Secretary of State at Montgomery. The incorporators are W. H. Young, H. M. Norwood and J. A. Simpson, of Birmingham.

It is reported that the Brilliant Coal Co. will make another opening at Calumet, Walker County, and will construct a number of tenant houses in connection with the new development. The offices of the company are in Birmingham.

Charles H. Nesbitt, for the past twelve years chief mine inspector for Alabama, serving under the appointment of the three previous governors, has been reappointed for a term of four years by Governor Brandon. Through an increased appropriation by the last Legislature Mr. Nesbitt expects to extend and perfect the work of his department so as to render the service much more valuable to the mining industry during the next four years.

The Birmingham office of the Sullivan Machinery Co., of Chicago, has been removed to 2108 5th Avenue North, where ample ground floor space provides more adequate accommodation for the company's business. G. P. Small is local manager for Alabama.

William Goodwin, of Birmingham, W. P. Smith, Rock Castle, and George Kuffner, Kellerman, have been named associate mine inspectors for a term of four years by Governor Brandon.

ILLINOIS

The Peabody Coal Co. operating and engineering department heads from all over the country assembled in the annual operating conference at Chicago Feb. 4 and 5. Various problems of management and production were discussed.

Federal stamps placed on the deed of the transfer of the Bickett Coal & Coke Co. mining property in Franklin County, to the Franklin County Coal Co., formerly the Taylor Coal Co., represented \$1,200,000, indicating a value of the total properties at \$1,200,000. The papers were recently drawn up by Marion Hart, attorney at Benton, the land being located near Royalton, in that county.

Fred Truebger, assistant engineer for the Union Colliery Co. at its Kathleen mine, at Dowell, has been made civil engineer, succeeding Arthur S. White, of Chicago, who held the position for the past three years.

Julius F. Yarp, for some time assistant to the commissioner of the Chicago Coal Merchants' Association, has been appointed commissioner, succeeding Colonel A. C. Earnshaw, who has resigned.

The Lumaghi Coal Co. has reopened its No. 3 mine, at Collinsville, after a six weeks shutdown.

C. E. Campbell, of the Consumers Company of Chicago, joins the Globe Coal Co., wholesalers, of Chicago, April 1.

New electrical equipment now being installed in Old Ben mine No. 16, at Sesser, is almost completed and will be in use in a short time.

INDIANA

The Consolidated Collieries Co., of Indianapolis, has been incorporated to deal in coal and other fuels and to operate mines. The company has a capital of \$25,000. Roy C. Bain, Warren F. Smith, and James E. Bingham are directors of the company.

Judge John E. Cox, of the Superior court, Terre Haute, has named Ciem Richards receiver for the Burnett Coal Co. (the Devonald mines), and fixed his bond at \$25,000. The receiver was named on the application of the Mid-American Mutual Casualty Co., which carries the mine compensation. The mines were recently operated by a group of miners as a co-operative project.

The Dixie Vein Coal Mining Co., Indianapolis, with a capital of \$50,000, has been incorporated. Jacob S. White, Burrell Wright and Paul Kirk are the directors of the company. The Dixie Vein mine near Terre Haute, closed for 18 months, will soon be reopened.

IOWA

The Shuler Coal Co., while drilling on the W. A. Snyder farm, two miles east of Alpha, where their mine is located, struck a vein 5 ft. 4 in. thick.

The property of the Consolidated Coal Co. at Buxton, has been disposed of in a trade to Gavrousky & Goldstein, of Centerville, for a 323-acre farm in the northern part of Appanoose County, and other considerations. The Buxton property consists of a tract of farm land, the large company store and several other buildings. Coal mining has been abandoned on the property and it will now be used for other purposes.

Joe Pestotnik, one of the veterans in the coal mines of Boone, recently received a wage check for \$205.98 for eleven and one-half days work. This is the record wage check received at Boone.

KENTUCKY

Senator Bannie Tabor's scrip bill, passed in 1922 and lost before it was enrolled, has been passed again by the Kentucky Senate, and will undoubtedly become a law. The bill provides that persons, firms and corporations which issue scrip must redeem it at face value for any person presenting it. The bill is to prohibit speculation in scrip, and to prevent mine-operating companies from being able to buy it up at a percentage of its value.

The Dawson Daylight Coal Co. of Dawson Springs, controlled by the K. U. Meguire interests, Louisville, plans to start loading coal from its new stripper operation within about thirty days.

MISSOURI

John A. Sargent was made a vice-president in charge of the coal department of the Central Coal & Coke Co., Kansas City, by the directors at a meeting Feb. 6. Since July 20 Mr. Sargent has been general manager of the coal department of the Central, and had been acting manager of the department since the resignation, Feb. 1, 1923, of Harry N. Taylor, vice-president in charge of the coal department, to become president of the United States Distributing Corporation. Before Mr. Taylor's resignation Mr. Sargent was sales and traffic manager of the Central.

The sale of the Blackfoot coal mine, at Prathersville, by the receiver, S. F. Conley, to W. R. Prather, who for several years has been manager of the mine and a large stockholder, has been approved by Judge David H. Harris of the Circuit Court. The mine is one of the largest in the county and the coal is mined with the aid of electrical machines.

John Mammen has purchased a steam shovel and will use it in mining coal on his farm, northeast of Golden City. Mammen has a large acreage of surface coal and his new equipment will enable him to do a much larger business.

NEW YORK

Lieutenant Eugene C. Roberts, of Buffalo, who has been second in command of Troop A, state police, has resigned his position and will go into the coal trade, in which he was formerly engaged. He and his two brothers, Paul and Clark T., have formed the Roberts Coal Co., which will have headquarters in Detroit, Mich. They will handle both coal and coke at wholesale and also represent the "Electric Furnace-man." The three young men are sons of Eugene C. Roberts, a member of the Hedstrom coal concern, Buffalo.

OHIO

The work of organizing the Columbus-Pocahontas Coal Co., of Columbus, incorporated three months ago with a capital of \$300,000 is progressing satisfactorily, according to F. A. Garen, and the work of developing a large property in the smokeless field will be started. Chicago capitalists are interested in the new company.

The Fuel Sales Co., Canton, has been chartered with an authorized capital of 5,000 shares, no par value designated, to produce, buy, sell and deal in coal and other minerals for fuel. Incorporators are E. L. Hang, Edward Reiser, H. S. Roose, J. R. Beiter and E. A. McCuskey.

The Whitesburg Coal Co.'s branch office in Cincinnati has been closed after a year's participation in the trade there. The Old Dominion Coal Corporation has reopened its Cincinnati office with N. K. Howard in charge. The Riddle Coal Co. has opened a branch office in Cleveland.

Harry Young, head of the Utilities Coal Co., of Huntington, Ind., was in Cincinnati recently and has arranged to take over the output of the Harlan Coal Co., at Ages, Ky., and the J. L. Smith Coal Co., at Draper, Ky., by the Kearns Coal Co. Both produce about ten cars a day each. Mr. Young will become a member of the Kearns concern and will retain his Indiana headquarters.

The Ogle Coal Co. has taken offices in the new Frederick H. Schmidt Building, Cincinnati. Several changes have been made on the eighth floor of the Dixie Terminal. The Creech Fuel Co. and the Wallins Creek Coal Co. have changed their locations.

After being idle for several months, work was resumed at the Palos mine, near Glouster, but a fire destroyed the power house, throwing 100 men out of work again. The loss was about \$30,000. Steps will be taken to repair the damage at once.

OKLAHOMA

The Grace B. Mining Co. has been organized at Picher to develop raw coal lands owned by this company in that immediate vicinity. The company is capitalized at \$300,000 and incorporators are D. O. MacKaller, E. L. Morris and A. C. Wallace, all of Picher. The company has under lease and owns in fee considerable coal lands in the vicinity of Picher and it is planned to develop these lands at an early date.

The John T. Cole Mines Co. has been organized at Schuler for the purpose of developing extensive coal lands. The company is capitalized at \$50,000 and the incorporators are John T. Cole, A. M. Cole and I. W. McAlister.

PENNSYLVANIA

There were 506 fatalities in the anthracite mines of Pennsylvania in 1923, according to a preliminary report of Joseph J. Walsh, Secretary of Mines. This total is said to be smaller in proportion to the number of miners employed and the number of days the mines operated than during any period in the past fifty years. The actual number of fatal accidents was larger, however, than in some of the recent years. Secretary Walsh said, but when the number killed was smaller the number of workers employed and the number of working days were smaller. The fatalities occurred in fifty-six of the 137 companies operating in Pennsylvania last year. Seventy per cent of the accidents occurred before noon, Mr. Walsh pointing out that the morning period of work is that of the greatest activity. The preliminary report classifies the causes of accidents as follows: Falls of roof and rock, 221; crushed or killed by cars, 63; gas explosions, 43; premature blasts, 46; crushed or killed by machinery, 12; miscellaneous, 121. Of those killed 245 were miners; 83, miners' laborers, and the others were employed in various other capacities. Approximately 160,000 miners in the anthracite region worked an average of 273 days last year.

City Purchasing Agent Lafferty, of Philadelphia, has awarded contracts aggregating more than \$1,016,282 for furnishing coal to the various municipal bureaus for the current year. The amount of the award made to each of the successful bidders was: Philadelphia & Reading Coal Co., \$750,000; Bell Coal Co., \$71,500; Jenkins & McCall Coal Co., \$64,000; George B. Newton Coal Co., \$62,250; Mason-Scholes Coal Co., \$60,750; E. O. Kelly, \$4,500, and John C. Hancock Co., \$3,282.

The H. C. Frick Coke Co. fired 1,000 additional beehive coke ovens last month and is firing 1,000 more this month, and a number of other companies in the Connells-ville district also are increasing their output or are preparing to do so. The Hillman Coal & Coke Co. has fired the balance of its idle ovens at the Isabella plant and all the ovens at the Tower Hill No. 2 plant which had been idle since last autumn. There are 254 rectangular ovens at this plant. The Etna-Connellsville Coke Co. is getting ready to start its plant at Simpson with 119 beehive ovens; W. J. Parshall is doing the same at his 100 beehive oven plant near Uniontown. Both these plants have been idle since autumn.

The state tax collected on anthracite this year on last year's business, based upon reports so far filed with the Auditor General's department, will reach \$6,000,000 to \$7,000,000, fiscal officers of the state contend. Approximately 250 anthracite producing companies will file reports. Several of the large producers who have filed reports sold more coal despite strike conditions last year than in 1922. The period for filing the reports ended with the close of January, but owing to details connected with the making up of the reports Auditor General Samuel S. Lewis has granted extensions of fifteen days in most cases.

A state charter has been issued to the Jordan Coal Co., of Scranton, with a capital of \$50,000, the purpose of which is to buy, own, sell and operate coal lands. William R. Willis, Pershing, is treasurer, and the three incorporators are William Mack, Scranton; Albert Zenke, Scranton, and P. R. Jordan, Hazleton.

The Pittsburgh Coal Co. Employees' Association reports that the total of employees' savings and investments through the association during the year 1923 was \$492,099.46, of which \$361,359.13 was by mine employees in the Pittsburgh district. During the year 1923 1,901 employees contracted to purchase 11,906 shares of stock; 5,027 shares of stock were delivered to 598 employees on completed contracts; 2,384 employees received \$1 per share additional to the dividends for the year, authorized by the directors of the company to be paid to employees and or their dependents holding stock of the company purchased through the Employees' Association. Since this association was organized 26,872 shares of stock have been delivered to employees on completed contracts.

John Barnes, Barnesboro (Cambria County) coal operator has become the owner of the Tobias Mishler farm of 263 acres near Red Bridge, now Kring's Station, in Conemaugh township, Somerset County. The tract is underlaid with valuable coal deposits and has been the object of attention of coal operators for many years. Acquisition of the tract is taken to mean that a huge coal operation will soon be started with a town on the level lands bordering on the river.

State charters have been issued at Harrisburg to the following coal companies: Pennsalt Coal Co., Natrona, mining and preparing coal for the market. Capital \$25,000. Incorporators: Warner T. Over, 1435 Cayuga Street, Philadelphia, treasurer; Charles M. Butterworth and L. A. Smith, Philadelphia. Tyrone Coal Co., Uniontown, \$30,000, mining and preparing coal for the market. Incorporators: George H. Bortz, Uniontown, treasurer; Anton Luxner, Dawson, and Charles E. Bortz, Uniontown. Stevens-Chapin Coal Co., Wilkes-Barre, which will mine and prepare coal for the market. The company's capital stock is \$25,000. Nat D. Stevens, 800 East Main Street, Nanticoke, is treasurer and one of the incorporators, the others being Ernest M. Chapin, Brookline, Mass., and James R. Scouton, Wilkes-Barre.

The H. H. Robertson Co., manufacturers of Robertson process asbestos protected metal, skylights, ventilators, mineral rubber and special asphalt, has announced the appointment of James S. Ervin, formerly in charge of the sale of mineral rubber and special asphalt, as manager of sales, with headquarters at Pittsburgh, to succeed C. D. Mercer, resigned.

WASHINGTON

Announcement has been made at Longview by the American By-Products Co. of the incorporation of a \$2,000,000 corporation which plans to develop the byproducts of the Cowlitz County coal fields, the building of a 250-ton commercial plant on the Cowlitz River two miles north of Longview and Kelso, and the ultimate intention to serve this district with gas. Purchase of the coal deposit, estimated as containing 20,000,000 tons, will involve the expenditure of \$1,000,000.

Clarence L. Wickstrom, mining engineer of Spokane, and associates recently bought an interest in the Beacon Coal Co. of Allentown, of which he has been made manager. In discussing the deal Mr. Wickstrom said: "The company has three seams of coal of workable width, 10,000,000 tons blocked out above the tunnel level, a property valuation in excess of \$1,275,000 and nothing to sell but its products. But besides coal and coal residuum these products include benzol, gasoline, gas ammonium sulphate, tar, creosote oil, lubricating oil and pitch, all produced from the coal with the Green-Lacks process, equipment for the use of which the property is supplied."

WEST VIRGINIA

The R. S. Lumber & Coal Co., of Martinsburg, has just been organized, with a capital stock of \$25,000. Interested in the new concern are J. P. Rensburg, of Capon Bridge; R. A. Snyder, of Markleton, Pa.; I. D. Van Meter, of Kearneysville, Pa.; G. J. Shaffer and G. P. Morrison of Martinsburg.

That it is unlawful to employ a boy under 16 years of age in the mines or elsewhere in West Virginia is the substance of a decision of the West Virginia Supreme Court in connection with the damage suit of Ray Jackson against the Monitor Coal & Coke Co., originally tried in the Logan Circuit Court, the plaintiff asking damages of \$25,000. The court held among other things that "such employment is not rendered lawful by the fact that at the time of his employment the boy misrepresented his age; nor by the employer requesting and receiving from the county superintendent of schools and keeping on file, a certificate showing that such child is over 16 years of age."

A tippie at Wilmoth, in the Barbour County field, was destroyed by fire late in January. The large coal bin, being full of coal, also burned and continued to burn for several days. Only a few men were at work when the fire occurred, but preparations were being made to operate on a larger scale.

There were 36 deaths incidental to the mining of coal in and around West Virginia mines during the month of December, 26 being due to fall of roof and coal and 5 being due to mine-car accidents. McDowell County mines had 9 fatalities; Fayette had 6 and there were 3 each in Logan, Mingo, Monongalia and Raleigh; 2 each in Brooke and Kanawha, and 1 in Boone, Marion, Mercer, Nicholas and Wyoming.

Frank L. Bowman, at the head of several companies operating in the Monongalia field and with headquarters at Morgantown, has announced his candidacy for the Republican nomination for Congress in the Second West Virginia district.

A three-year old fire in the mine of the A. L. Black Coal Co. near Madsville not only threatens to destroy all the coal in a 14-acre tract of Pittsburgh coal owned by the company but also is menacing adjoining mines in the same region. Unless it is possible, according to W. B. Riggelman, State Mine Inspector, to confine the fire to the 14-acre tract, it may spread into the adjoining operation of the Warner Collieries Co. In order to prevent the spread of the fire, fourteen brick walls are being rushed to completion by a force of twenty-five men, through the construction of which it is hoped to cut off the supply of oxygen from the Black mine and thus cause the fire to extinguish itself. The fire broke through the outcrop on Feb. 6, great sheets of flame ascending from the outcrop and dense clouds of smoke enveloping the community in which the fire has been raging. As showing that it has sought in every way possible to protect its own interests as well as the interests of other mines, the A. L. Black Coal Co. states that it has spent between \$50,000 and \$60,000 in endeavors to control the fire and has done everything that expert advice seemed to direct in an effort to control and extinguish the flames.

WYOMING

J. H. Slate, a mining engineer from Pittsburgh, has been making a thorough inspection of the Conroy coal mine, situated about nine miles north of Kemmerer, it is reported on good authority, to reopening the mine at an early date. Slate was shown the interior workings of the mine by Joe McDonald, who has been in charge of the property since it was shut down several years ago, and he is convinced that coal can be mined and marketed profitably. If this meets with the approval of the Pittsburgh owners of the mine it is practically certain that operations will be resumed during the coming summer.

WASHINGTON, D. C.

The United Mine Workers, it is announced, are preparing to fight Governor Pinchot's coal bill as introduced in Congress by Senator Borah. It is declared the measure aims at anti-strikes and for that reason organized labor is against it. An official of the miners in Washington is quoted as opposing the bill because it would tie up the funds of the organization and threatens to jail the officers. The bill provides that in the event of an emergency growing out of a strike threat the president may exercise through a proposed coal division of the Interstate Commerce Commission all the powers conferred by the Lever act in effect during the war. The courts have interpreted this act as giving the authorities power to enjoin the calling of a strike in any industry affecting the nation's fuel and food supply.

CANADA

The Coalmont Colliery, in the Princeton coal field of British Columbia, has opened a new 14-ft. seam of high-grade bituminous coal, and, as a consequence, is increasing its working force. The coal from this mine is in demand in the city of Vancouver, which is capable of absorbing the whole of the output of the mine.

The Crows Nest Pass Coal Mining Co. has found it necessary to close down "B" North and No. 1 North mines, owing to the slackness of trade. This is unusual at this time of the year and is attributed to the competition of fuel oil and the Fordney tariff.

Coke-oven gas from the new \$2,500,000 plant of the By-Products Coke Oven Co., Hamilton, Ont., was turned into the mains recently. The city's supply has thus been increased 1,500,000 ft. a day. Some 200 men are at work in the plant. An effort will be made to use Nova Scotia coal.

Edward T. Devine, a member of the U. S. Coal Commission, in a public address in Toronto recently said that instead of the United States putting an embargo on coal shipments to Canada, it should be encouraging exports to the Dominion and extending its market there. He stated that the United States still had large coal reserves and, if mining could be carried on steadily, could produce half as much coal again with the same number of miners. Exports to Canada are comparatively small.

Following the announcement of the reorganization of the Western Fuel Corporation of Canada, Ltd., which has large coal mine holdings on the east coast of Vancouver Island, mainly centered in and around the Nanaimo, B. C., a group of financiers of San Francisco and Los Angeles, Calif., have been visiting and inspecting these mines and properties. At the head of the party was Guy H. Kinsley, of Peirce, Fair & Co. The corporation now has a capitalization of \$5,000,000 divided into \$1,000,000 8-per cent cumulative preferred shares of \$1 each and 4,000,000 common shares of \$1 each. The new company is assuming the present bond issue of the old company of \$3,000,000, which is secured by trust deeds held by the Montreal Trust Co.

The City of Nanaimo is facing what may prove a serious problem. It is built on old coalmine workings and a short time ago a cave-in occurred in a residential section and water began to seep through to the surface. An effort was made to drain it but it continued to rise until there was danger that a firehall would be flooded. The city council then closed the block affected to traffic and, in the meantime, an effort is to be made to locate the workings, of which no reliable maps are available, with a view to filling them in and taking whatever other measures may be found necessary to protect city property.

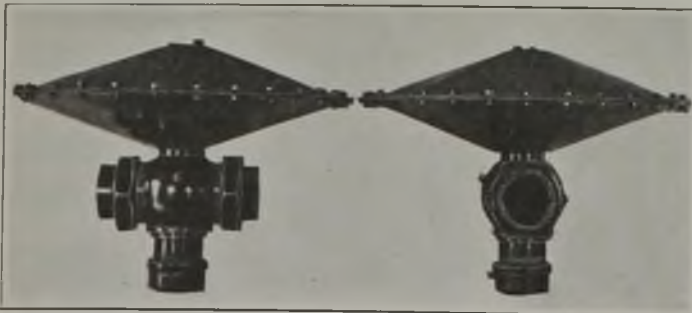
New Equipment

Automatic Suction Valve for Mine Gathering Pumps

This valve is to control automatically the suction inlet of a plurality of suction connections on mine pumps, and eliminate the necessity and expense of valve operators. The elimination of the hand-operated system of suction control makes it practical to pump from a number of places at the same time, which permits a considerable reduction in the size of branched suction pipes without sacrificing economy. From an efficiency standpoint automatic suction control approximates the equivalent of reaching all the water through a single suction connection for each pump because of the fact that all the pumps have access to all their water at any and all times through these automatic valves.

These valves are designed to work anywhere in a branch suction between the point of branch and the water to be pumped. They are simple and rugged in construction, having no levers or floats. Each valve is a complete unit within itself and is not dependent on any mechanism whatever at the source of water. The valves are of the diaphragm type and are automatically opened by the pump suction against a spring by a vacuum of about $\frac{1}{4}$ lb. per square inch when the suction inlet is submerged. They are closed by the spring when the water is lowered sufficiently to allow the system to begin to receive air.

The entrance of air into the valve weakens the vacuum in the vacuum chamber, causing the opening of a vent valve to the atmosphere, which immediately destroys the vacuum under the diaphragm, allowing the spring to close the valve without hesitation. The opening again of the main valve is dependent on the sealing of the suction inlet with water and the return of the vent valve to its seat, the latter being controlled by a mechanical time-limiting device which can readily be adjusted to suit conditions in the place to be pumped.



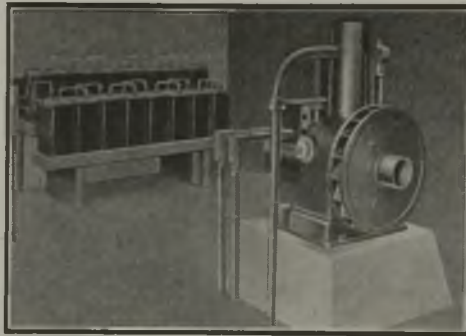
Automatic Suction Valve

Each valve on the system operates to cut off its suction as soon as the water has been pumped down in its sump. When the water fills up again the valve automatically reopens.

This valve has been developed by C. E. Rogers, electrical engineer for the Logan Mining Co., Logan, W. Va., and is being manufactured by Dravo Doyle Co. of Pittsburgh, Pa., and marketed by the Rogers Manufacturing Co., Logan, W. Va.

110-Volt Light and Power Plant

A new 110-volt direct-current light and power plant, manufactured by the Westinghouse Electric & Mfg. Co., has been developed to solve the problem of supplying current for light and power in locations where central-station service is not available. The plant consists of a gasoline engine, electric generator, and electric starter and control all built into a single, compact unit. It



Small Light and Power Station

This engine develops 3 hp. and is suitable for direct-lighting service or for charging the batteries so as to provide for heavy lighting or power drafts.

also includes a battery in which to store the electricity from the generator. The fact that the engine is air cooled makes possible its installation in an unheated outhouse.

This light and power plant supplies ample energy for the operation of electric lights, small motors for various needs, water-pressure pumps, buzz saws and similar mechanical appliances. It is economical in fuel and oil consumption, and its slow operating speed and rugged construction provide for long life and dependable service under the most rigorous conditions.

The plant operates on either gasoline, kerosene or natural gas and is particularly suitable for mine service in regions remote from electric-lighting lines and also for emergency service.

Either of two batteries may be had with the unit. One has a

capacity of 7,850 watthours at 8-hour rate and the other has a capacity of 15,750 watthours at 8-hour rate.

The single-cylinder four-cycle engine has a bore and stroke of $3\frac{3}{8} \times 5$ in. A fan in the flywheel draws air into the cylinder dome and over the cylinder fins, assuring cool operation under all conditions. The engine is lubricated by a splash feed system which supplies an equal amount of oil to the moving parts at all times, regardless of the depth in the crankcase.

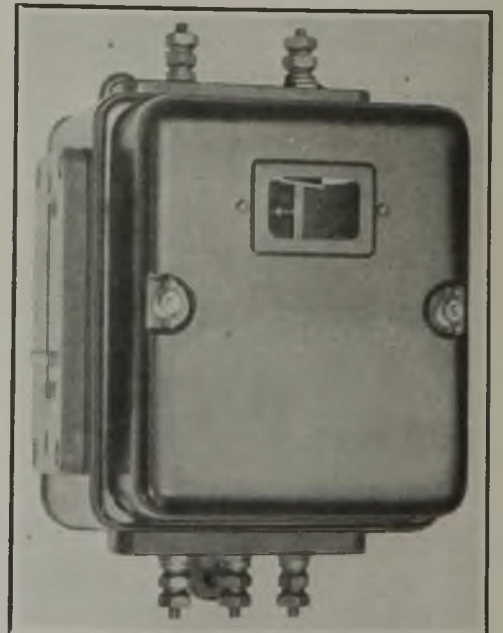
The 1,500-watt four-pole generator, which is bolted to the engine frame, is of the sleeve type on the engine shaft. It has a shunt winding and a series field to start the engine.

Low-Rate Battery Charger

The Magnar battery charger, a device marketed by the General Electric Co. for the "trickle" or "floating" charging of railway signal batteries, is being applied to new fields, such as time clocks, bell systems, burglar alarms and tripping batteries in power plants and substations. It has been found that on such installations the batteries may be discharged continuously at a very low rate or intermittently at a higher rate, the average discharge rate being low in either case.

By the "trickle" or "floating" charge method the charging equipment operates continuously. The average rate at which the battery discharges being first determined, the equipment is regulated to supply the battery just enough current to compensate for the discharge plus a small additional quantity to allow for internal leakage. Among the advantages claimed for this method of charging are the continuous maintenance of a fully charged battery, a constant voltage, longer life and the necessity of a minimum amount of attention.

For hoisting signal service on the many shaft and slope hoists of the coal mines this device no doubt will meet with favor because it eliminates the necessity for dangerous high-voltage signal systems and obviates the need for continual attention and renewal of batteries of the primary or secondary type.



Charger for Small Batteries