

COAL AGE

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Mine Waters as Algicides

INQUIRY needs to be made into the value of the waters issuing from coal mines in destroying bacterial life. Those who live where the water they drink is thus treated without design assume that elsewhere the inhabitants are supplied with a healthful, sparkling, clear and palatable liquid free of all pollution and infection.

Far from it; complaint comes from everywhere. Waters from unoccupied hill country or from farms is often unpalatable. Much complaint has been made regarding the water supplied to Atlantic Coast towns because of unpleasant tastes and odors that have been traced in part to large decaying water plants and in part to saprophytic algæ—microscopic plants, that is, that feed on putrefying vegetable matter. These algæ are probably neither poisonous, nor infectious, but are certainly obnoxious. Some of them get into the pipes and die from lack of air and give the water an unpleasant odor and taste. But the ill effects can be obtained without this happening, and oftentimes reservoirs become befouled with these infinitesimal creatures.

Copper sulphate, a poisonous substance, has been used to free water of all these objectionable growths. It has been dragged in sacks through the reservoirs by poles and boats so as to give an even distribution through the water. Ferrous and ferric sulphate in a less potent and effective way do the same work, and it would be interesting to learn just what concentrations are necessary to enable the acids to perform their work most satisfactorily under actual stream conditions. The various bacteria have different reactions to different kinds of germicides and the effectiveness of the latter depends greatly on the presence or absence of albuminous matter. These mine-water acids remove not only the bacteria that give the water a fishy taste and a bad odor but the disease-bearing germs that multiply in the body of the victim like the *bacillus typhosus* that spreads typhoid fever.

One of the objectionable algæ is *crenothrix polyspora* which takes iron from water, converts it into the gelatinous ochreous iron hydroxide, coating itself with it inside and without. This forms streamers in pipes and in reservoirs and a black slimy coating on contact with the sides of tunnels. This alga increases the quantity of organic matter in solution, decreases the bore of conduit pipes and consequently the velocity with which the water will flow through the pipes. According to Kellerman, this bacterium is killed by 2.5 lb. of copper sulphate per million gallons, a concentration such as will kill carp, suckers and trout.

Furthermore, according to David Ellis the *crenothrix* may by creating carbonic acid cause tubercles to form in the iron of the interior of the pipe, and in this the *gallionella ferrugineum* may assist. Then again these organic bodies may be sources of incrustation of iron derived wholly from the water, for such incrustations

have been observed to form where the wall of the pipe was unaffected and the internal coating of asphalt was still intact. As further proof the *gallionella* organisms were found as cores of the incrustations.

Regarding the effect of iron sulphates on such organisms, something may be learned from "A Text Book of Bacteriology" by Surgeon-General George M. Sternberg, but more than he gives should be made available. If the requisite studies have not been made the necessary experiments should be instituted so as to ascertain the precise effect of mine water and what degree of acidification will give water a freedom from harmful and displeasing bacteria. Then the human organism should be studied to find what quantity of acid is physiologically harmless. Certain it is that if the water is to be treated with iron sulphates and hydroxides it may just as well be done by natural methods as by buying the crystals of sulphate or the hydroxide powder and applying them at the treating station as if a sort of ritual were needed and the work could be done only by people designated to perform the service under the direction of high-priced specialists.

Budgetary Control

AS THE BUSINESS structure of the country grows in complexity, it becomes increasingly important that responsible executives who would protect investment and prestige should plan income and expenditure intelligently. An instrument suited to this purpose is the budget. The more difficult it is to forecast the future, the more necessary it becomes to attempt, as far as possible, to do so. This point is made clearly apparent by the survey into the use of budgets by coal companies appearing in this issue of *Coal Age*.

As a matter of fact, the difficulty frequently lies not so much in a lack of data as in a failure to assemble the facts in orderly fashion for application. Much of the needed information is always at hand, for a well-ordered accounting department is a storehouse of valuable cost data. Banks, government bureaus, trade associations, private and endowed statistical bodies by their reports on general business conditions can render genuine service in working out the major plan. The very fact that a group of responsible executives, given a sales and production goal, sit down and analyze in detail every item that must enter into such production, will yield large returns. With the previous year's detailed cost statements before them, many economies will suggest themselves. Such a budget will be doubly effective if every executive in any way responsible for costs down to the foreman participates in its building. Every item of material and labor necessary to accomplish a given production will pass in review.

In other words, the budget starts at the top where the goal is set, but it is built up from the bottom where costs originate. Such a budget becomes more than a

chart; it has vitality. Every executive in the organization whose judgment and decisions affect costs, plays his part more intelligently. Actual results of operation checked regularly against budget figures serve to stimulate increased effort. This kind of definite thinking gives management a new consciousness of its job. From the top, where the objective is to utilize the financial and material resources of the company to fullest advantage, down through every department goes the determination to exceed planned performance. Special effort is put behind sales because it is around them that the operating budget must be built. The production department finds a new urge to develop standards of labor performance and economy in the use of materials. Obsolete equipment has small chance of maintaining its pension position in the path of such scrutiny. In fine, however difficult it is to operate a budget in the business of producing coal, the direct and indirect benefits fully justify the effort.

Accidents from Falls of Roof

IN GREAT BRITAIN a movement is on foot to induce the Safety in Mines Research Board to make more extensive and more scientific inquiries into accidents from roof falls which it is alleged it has hitherto neglected. A paper entitled "The Support of Underground Workings in the Eastern Midland Coalfield" shows that the Board has not been wholly indifferent to this important issue.

The U. S. Bureau of Mines has started an investigation into this subject, feeling that, even though it is difficult to see what can be done to lower the accident rate that is not already known to, at least, most technical men, an effort to uncover new facts relating to such casualties should be made, in view of the fact that more men are being killed from this cause than by any other.

A common belief is that the new concentration methods with the use of machines affords a similar degree of safety to that which is attained by the skater who glides rapidly over thin ice. Where coal is extracted speedily and completely over a wide area, the coal pillars do not disintegrate and crack, the floor is not softened by water and oxidation, the timber does not rot, and the roof which seems to pass through cycles of stress rather than to be subjected to a simple strain delays fracture till the miner is well away from the area at which that fracture occurs.

George S. Rice advocated at the Coal Mining Institute of America that inquiry should be made statistically into the accident and death rates where such methods of extraction were being pursued. The general belief is that they are safer methods than hand loading in cars in room-and-pillar workings have proved to be. Whether or not this is an actual fact is a proper matter for inquiry.

The use of auxiliary fans for such concentration work speeds this development and makes it less expensive. Much complaint has been made that the initial preparation for concentration work takes so long that it is difficult to keep ahead of the rapid extraction by loading machines and conveyors working on a wide face. Should concentration prove a source of safe operation, no barrier should be put in the way of the use of auxiliary fans, when properly installed and used for justifiable ends.

In fact, concentration as usually installed gives such wide open spaces that a coal-dust explosion is less likely

to occur than in a narrow room or entry. An explosion of powder in the open air has far less effect than if confined, and in longwall or long-face workings, the nearest approach to open-air conditions is made that can be conceived of in a mine. So concentration of mine workings apparently protects not only as against the hazards of falls of roof and coal, but as against coal-dust hazards also. Whether the danger of accumulations of fire-damp is not also decreased is a question, though some concentration work has been planned in a manner that makes ventilation uncertain and difficult.

Not as the Repair Shop Does It

FAR TOO FEW of the men in charge of operation and maintenance of equipment such as mining machines and locomotives, have ever visited a plant where this equipment is manufactured. To watch the careful and systematic methods followed in designing, preliminary testing, manufacturing, and inspecting, raises the visitor's respect for the machine. He goes back to the mine convinced that the equipment is better than he thought. This state of mind is a distinct advantage in promoting better care of the machinery.

The visit also convinces him that many of the repair methods commonly practiced at the average mine are a waste of money. For instance, consider armature repair work. Only in exceptional cases does the rewinding performed in a mine shop compare favorably with that done in the factory. Factory methods of assembling commutators are so far superior that even in the well-equipped central shops of large mining companies the practice, once prevalent of reinsulating commutators has been discontinued.

The man who is directly responsible for the operation and maintenance of mining equipment should never pass up an opportunity to visit the factory. The mine management would do well to see that he is given such an opportunity and that he makes the most of it.

Banishing One Danger

ONE TYPE of mine accident that has a persistent habit of recurrence is that arising from the use—or rather the misuse—of explosives. If properly handled explosives are entirely safe and harmless; it is when they are mis-handled that mischief results.

Short fusing probably causes more accidents of this kind than any other one practice. This may take any one of several forms, but the result invariably sought by the miner is either a saving in time or in fuse. In any case is false economy of the grossest type.

Another kind of accident that is far too common is that caused by the miner returning to the face to find out why a shot has not detonated as it should have done. Sometimes he tries to light the fuse for the second time. Several accidents of the varieties mentioned have occurred within the past few months and tend to focus attention on a method of procedure long obsolete yet still countenanced by some mining companies.

Electric firing obviates both of the dangers mentioned. The Bureau of Mines has recently prescribed this method of firing as the means for detonating permissible explosives. If other methods are used the explosives are no longer considered permissible. Insurance companies and compensation boards reduce their rates if electric detonation is employed. This should serve as ample proof—if proof were needed—of the advantage of this means of firing.

Budgeting of Mine Expense Decreases Costs*

Some Companies Habitually Plan Their Expenses for Months or Even Years Ahead—Others Find Such a Process Extremely Difficult—In Any Case Budgeting Has What Might Be Termed "Byproduct Advantages"

INCREASED competition, changes in public demand, labor difficulties and numerous other problems have served in the past few years to add to the burden of successful management in coal mines. In two respects at least this industry has a distinct advantage over the ordinary manufacturing enterprise as far as the practicability of utilizing the principles of budgetary control is concerned. First, as a result of the establishment of the Fuel Administration during the war the need for cost accounting and the desirability of uniform systems of accounting was emphasized and brought to the attention of all coal operators. This interest, both in general and cost accounting methods has, largely through the activities of the Federal Trade Commission, made a favorable permanent impression on the industry. Second, by and large, the ability of the coal operator to produce is limited only by his ability to sell the volume of tonnage mined.

One of the outstanding problems in the coal industry is that of properly co-ordinating sales and production. In view of the fact that the establishment and operation of a plan of budgetary control involves the preparation of estimates of both sales and production requirements, it will be seen at once that one of the major advantages of budgeting coal mining activities is the establishment of a method whereby sales and production may be better co-ordinated. For example, one large producer writes, in part, as follows: "Our volume of tonnage mined is co-ordinated with the sales requirements by close co-operation between the two departments of the company. Our production goes largely into the same market year after year and our annual capacity on the one hand and the amount we can market on the other are fixed approximately by our own past experience. The business being one that requires the shipping of the product day by day as produced, the current operations are regulated by monthly, weekly and in some instances, daily reports between the selling and the producing departments as to what existing requirements are on the one part and what can be produced on the other. Current conditions influence not only the total tonnage of coal that may be handled but cause fluctuations in the relative proportions of the different grades that may be marketed."

The survey for this report clearly shows that in the coal industry, as in many other businesses, the installation and operation of a successful plan of budgetary control must

be preceded by the establishment of a proper system of cost accounting. Through a cost accounting system unit costs are secured for each past period and from these it is not difficult to establish an average or standard cost by units, which has obtained under varying conditions in the past and will probably continue to exist in the future. The monthly records of past performances may show that on the average office expenses have been approximately so much per ton of coal mined. When the point has been reached where records of past costs are used as a basis for establishing quotas or standards for the current period a company is, as a matter of fact, utilizing many of the fundamental principles of budgeting, even though it may not refer to such activities by that name.

This close relationship between cost accounting and budgeting is succinctly expressed by the Keystone Coal and Coke Co. as follows: "We know at the end of each day by your system of cost accounting just what our coal costs

us. We have a complete and accurate system so that at the end of each month a complete detailed cost and financial report is made, and we are able to follow our business in detail not only day by day, but to summarize the daily results at the end of each month within a few days after the close of the month. Our expenditures are based entirely upon the necessities of our business, the conditions of our physical property and the studies of our engineering department. So that while we say we do not operate under a budget plan as we understand the term, at the same time we believe that our close daily picture of our business, brought about by the co-ordination of all our departments, results in about the same thing."

SOME SAY BUDGETING IS NOT PRACTICAL

Before proceeding to outline specifically the methods used by various coal companies to estimate sales and expenses and in order that the difficulties receive consideration it may be well to point out that budgeting is not thought by everyone to be a practical procedure. For example the vice-president of a Mid-western coal company has this to say regarding his firm's experience both with the establishment of standard costs and budgeting: "Time and again we have tried to work out a budget system that would really mean something to us in our peculiar line of business but each plan has proven a most dismal disappointment and in substance quite worthless. We have so little control of cost and realization that we have found no matter how carefully we undertake to build up a store of anticipated expenditures and income we are invariably far wrong. If we could control even one element, cost or expenditure, for instance, we could make ourselves more or less certain

To a large degree coal companies have made splendid progress with cost accounting. Records are now promptly and intelligently assembled. It is but a short step to making some plans for the future based on accurate records of what has gone before. Step by step such a plan builds up. Sometimes from merely trying to sense financial needs a few months ahead an intelligent budget is evolved. The name by which this is known is immaterial; the method of analysis and results secured are important.

This article is based on a report prepared by the Policy Holders' Service Bureau of the Metropolitan Life Insurance Co. as one of a series of reports on budget practices and business management methods issued by this organization. The information herein contained was secured from leading coal mining companies whose executives appreciate the value of exchanging information regarding business methods through this bureau. Reprints of this article may be obtained from the Policy Holders' Service Bureau, Metropolitan Life Insurance Co., No. 1 Madison Ave., New York City.

Form 1.—Locust Mountain Coal Company Condition as of December 31, 1923

E. A. No.	Description	Balance on Earnings as of Jan. 1, 1923	1923 Budget	Authorized During 1923	Total Under Authorization for 1923	Spent Dec., 1923	Spent Jan. 1, 1923 to Dec. 31, 1923	Balance on Incomplete Earnings	Balance on Complete Earnings	Over spent on Earnings
274	1 Ton Ford Chassis	.....	\$540.00	\$485.00	\$485.00	\$413.51	\$413.51	.....	\$71.49	.....

on that score but as this varies greatly based upon running time and the latter is controlled by the public we have given up the budget scheme as a bad job so far as our business is concerned."

A moment's consideration will show that upon the ability of a company's executives to estimate with some degree of accuracy the probable sales for a coming period largely depends the usefulness of the estimates of production, overhead expenses, budgets of labor requirements and other specific plans for the future. In this respect the coal companies would seem to be in a more fortunate position than many other industries because in a number of cases old customers can be regularly counted upon to order approximately the same tonnage each year. Moreover, vexing questions such as style changes, saturation points and other practical matters which are problems of major importance to many other industrial enterprises do not need to be considered by coal operators.

The Keystone Coal & Coke Co. is a specific example of a concern which is materially assisted in making its estimates of sales by this trade practice. This company has supplied certain concerns with fuel for a number of years. At the beginning of each year a certain volume of tonnage is set aside which the company endeavors to sell to these customers on contract. This volume is referred to as "backlog tonnage." The remainder of the output is then sold at the best price obtainable, the time of selling being determined by the condition of the market as the company sees it at the beginning of the year. Commenting specifically upon this practice an executive of this company says: "We have a production of 5,000,000 tons of coal annually. We set aside as a "backlog tonnage" approximately 2,500,000 tons. This is usually sold to customers such as railroads and public utilities which we know from past experience take their coal regularly throughout the year. The remaining

2,500,000 tons we endeavor to scatter among consumers of coal where we can get the best price under contract, and if we are unable to close at satisfactory contract prices, we carry along on what we term the spot market at the prevailing market prices until we are able to make satisfactory contracts.

Another company describes its methods of estimating sales as follows: "In estimating our sales of the different coals which we mine, the tonnage called for by contracts or arrangements covering future deliveries are separated into monthly quantities, based on the rate of shipment indicated in the arrangement; that is, the tonnage called for by each contract is spread over the period covered by the arrangement, which gives us in each case the probable amount we shall be called upon to ship each month.

"A large proportion of the contracts become effective on April 1 and run for a period of twelve months, but as some begin and expire at other times we do not have definite indications as to the tonnage to be shipped on contract sales more than a few months ahead. As the records show the amount of each kind of coal which has been sold, we can tell at a glance whether or not we are approaching a point where further contract obligations may be inadvisable. Normally we do not care to obligate ourselves for more than eighty per cent of the tonnage which it is estimated can be produced at each of our operations. The other twenty per cent is reserved for "spot" sales or to allow for unexpected deficits in production."

The Southern Coal & Coke Co., Inc. estimates its sales by going over with its salesmen the first of each year in detail the account of each customer in their respective territories. From this an estimate of what each account will probably buy from them in the coming year is made, as well as an estimate of what each salesman forecasts he will be able to put on the books. This estimate of sales, however, is more of a mark to aim at than anything else. The company executives of course draw their own conclusions as to the amount of business which will probably be secured, but it is their feeling that so many factors can enter into the situation during the course of the year that the value of preparing a highly detailed estimate of sales is questionable.

Form 2.—Pittsburgh Coal Company and Subsidiary Companies Estimated Cash Receipts and Disbursements
--Consolidated October, November and December 1926

(Amounts are shown in thousands of dollars)

Receipts	Company	Company	Company	Company
Sales of coal to constituent companies	\$	\$	\$	\$
Sales of coal and other merchandise				
Freight and passenger revenue				
Royalties from leased coal lands				
Hire of steamboats				
Hire of Cars				
Real estate income				
Mortgages and notes due or discounted				
Interest receivable				
Property sales				
Advances to constituent companies				
Miscellaneous				
Total receipts				
Total disbursements				
Excess of receipts over disbursements				
Cash balance at October 1st, 1926				
Cash balance December 31st, 1926				
Other cash resources Dec. 31st, 1926				
U. S. Liberty Loan Bonds				
Certificates of deposit				
Bills receivable not due				
Total cash resources				

PRODUCTION LINKED WITH SALES ESTIMATE

In the preparation of this report the survey made shows that in practically every case where a sales estimate is prepared an earnest attempt is made to plan production in accordance with the probable sales and to co-ordinate tonnage mined with expected shipments. In one company where a large portion of the tonnage is sold under contracts or arrangements covering deliveries for fixed periods of usually about one year, the company finds that it is able to forecast two or three months in advance approximately the minimum tonnage which will be required. The sales department prepares a schedule on Friday of each week indicating the probable amount of coal that it will be able to move during the following week. A tentative working schedule is

then arranged by the operating department. The company does not mine more coal than it can sell and carries no stock, the inventories at the end of each month representing coal enroute or standing at the piers at tidewater awaiting delivery to boats.

With the estimate of sales and volume of tonnage to be mined prepared it is relatively a simple matter to work out a budget of the expenses which necessarily will be incurred providing actual performances are in line with the estimate. In one company an operating cost of so much per ton for the various mines and fields is secured based upon the previous year's experience together with the conditions of the present year. The operating expense budget therefore becomes simply a per ton amount cost.

SOME EXPERIENCES OF COAL COMPANIES

A number of companies find it desirable to prepare at the beginning of each year a definite budget of capital expenditures. The practice of the Locust Mountain Coal Co. is illustrative.

Form 1 illustrates the procedure followed by this company. "E. A. No." which is the heading of the first column on the form, is an abbreviation of "Expenditure Authorization" which refers to the number of the authorization sheet used when a request for money involving capital expenditure is made. This form is designed to show not only the amount spent and remaining, but also to draw attention to over expenditures. Even though the budget as a whole may be approved at the beginning of the year, each particular item must be approved and authorized. The estimating department, the engineering department, the local management, the general management, the cost accounting department and the authorizing officers' approval must each be secured. If expenditures in excess of an authorization are necessary, a supplemental authorization must be put through.

After detailed estimates of revenues and expenses are prepared the final logical step is the preparation of a summary of estimates, receipts and disbursements. Such summaries show by totals the amounts of money which it is expected will be received from various sources or spent for various items. Forms 2 and 3 used by the Pittsburgh Coal Co. illustrate this method. In this company a monthly budget report is prepared and

Form 3.—Pittsburgh Coal Company and Subsidiary Companies Estimated Cash Receipts and Disbursements—Consolidated October, November and December 1926

(Amounts are shown in thousands of dollars)

Disbursements	Company	Company	Company	Company
	\$	\$	\$	\$
Coal purchased from subsidiary companies.....				
Coal and other merchandise purchased from others.....				
Payrolls.....				
Supplies and purchased power.....				
Workmen's compensation premiums and claims paid.....				
Insurance premiums.....				
Taxes.....				
Rents.....				
Truck hire.....				
Construction.....				
Retirement of debt including bills payable and payments to sinking fund.....				
Interest on bonds, mortgages and notes.....				
Royalties.....				
Advices to constituent company.....				
Sundries.....				
Total disbursements.....				

Form 4.—Locust Mountain Coal Company Cost Review

	Standard	Current Month	Comparison		Remarks
			Over	Under	
Tons produced.....					
Hours worked.....					
Per cent time worked.....					
Hours lost.....					
Tons per hour.....					
Cars per hour.....					
Stripping.....					
Mines.....					
Total.....					
Mine-car yield.....					
Average men working.....					
Tons per man-hour.....					
Condemned coal.....					
Costs					
Stripping mining.....					
Cutting and loading.....					
Opening work.....					
Total.....					
Ventilation.....					
Transportation.....					
Water disposition.....					
Timbering.....					
Miscellaneous.....					
Total inside.....					

submitted to the executive officers covering the estimated cash receipts and expenditures for the succeeding three months. There is a separate sheet or set of sheets for each of the affiliated companies in which estimated receipts and disbursements are shown for each month separately as well as for the three-month period.

Where advance estimates of sales, production, expense and capital expenditures are made it is only natural to find that some definite plan exists whereby actual results may be compared periodically with the original estimates.

In the case of the Locust Mountain Coal Co., for example, monthly reports are made up in statement form, Fig. 4, showing how performances are comparing with the forecast. The budget for the year is set up in total and by months. During each month the results secured by the superintendent are watched daily and are compared with the budget for that month. In this company this is usually done by charts having a standard line representing the budget and a graph, with figures, showing the performance. If the performance is below the standard, a notation in red ink is made. It is of course understood that conditions may have changed since the beginning of the year to make the current month or standard budget differ from the projected budget at the beginning of the year.

George J. L. Wulff, president and general manager of the Western Coal & Mining Co., outlines a simple and practical method in use in his company for comparing the actual sales with the budget estimates and also with the experience of the industry as a whole. This plan is described by Mr. Wulff as follows: "Tonnage of contracts booked, and of customer's requirements based on previous experience, form the basis of the estimate of the number of tons. Weather conditions and other factors either advance or delay the normal movement, but with a going concern, low tonnage for the season may be expected to be made up later, if the experience of the shipper is in agreement with that of other shippers in the territory. Likewise, if the figures published by the U. S. Geological Survey (showing the weekly tonnages produced and the cumulative tonnages for the year to date) indicate that your own experience is prac-

tically identical with that of the rest of the country or of the rest of your state it is reasonable to assume that your total sales estimate may be approximately correct. The Illinois Bureau of Mines publishes monthly production statistics which are helpful in this respect. I would say that in a sales budget, a comparison with the U. S. Geological Survey figures and any other state or local field figures which are available, should by all means be made, to check the progress of the individual company."

No better summary of the desirability and practicability of budgeting in the coal industry can be given than to reproduce the comment on this point which was made by the president of a well-known coal company who co-operated generously in the preparation of this report. This executive sums up the advantages of budgeting as follows:

"It seems to me that the following practical advantages can undoubtedly be claimed for the use of a budget system by coal operators: 1. It gives the executive a chart based on the experience and information available of: (a) The probable production requirements, (b) the contract tonnage allotments, (c) the free coal to be handled by the sales departments, (d) the production and distribution costs, (e) the financial requirements, (f) the expected income from operations. These enable him to keep in touch with current performance of each department. 2. It enables the executive to lead instead of follow the business."

During First Year Machine Repair Cost Is Less than One Mill per Ton

After shortwall mining machines have been used a number of years and have become worn to the point where many of the original parts have been replaced, an average yearly cost of \$1½c. per ton for supply and repair parts is considered fairly low. This does not include mechanics labor.

With new machines and by exercising reasonable care in their use, this item of operating cost should be much less. An average for the first year for four new shortwall machines in the No. 2 mine of the Newcastle Coal Co., Newcastle, Ala., was less than 0.1c. per ton. The detail figures for each month for a period of one year after the introduction of the last machine, are given in the accompanying table.

The total amount of coal undercut by the four new machines in this period was 267,500 tons, and the total repair and supply cost during this time was \$193.55, or

\$0.00073 per ton. New bits, wire ropes, and the like are included, but not oil. During the period, 29 new ½-in. tail ropes were applied, as well as 3 new ¾-in. feed ropes. No replacements of the No. 3 concentric "all-rubber" cables sent with the machines were made.

In this mine the machine men are paid by the day and each machine stays in a definite territory. To insure ample lubrication each crew must draw from the supply house 1 gal. of machine oil per day. Black oil is used on the cutter chains and is applied at noon and at night when the chains are warm.

During the period covered by the table, the average tonnage cut per machine per day was 230. Inasmuch as the coal bed is only about 5½ ft. thick and contains heavy partings, this is a relatively large tonnage. Perhaps a better measure of the work done by these machines is indicated by the fact that they cut 222,395 lin.ft. of face in rooms, entries and crosscuts, in a total of 1,157 machine days, or 193 ft. per machine per day.

Colliery Electrification in France

At a recent meeting of the French Society of Civil Engineers, M. Guerre, general director of the Courrières Mines, discussed at length the measures adopted for restoring the collieries in the Nord and Pas de Calais Departments of France, which were devastated during the war. Except where some reason existed for preserving a few steam-power installations, the essential characteristic of rehabilitation has been the general electrification of the pits. The electrical concessions had been unified on the basis of a 3-phase system at 45,000 volts, 50 cycles, for transmission to a distance, 15,000 volts for the distribution lines of the companies, and 3,000 volts for the final distributing service.

This led to the establishment of big steam operated power-generating stations. That of the Lens mines at Pont-a-Vendin supplies 50,000 kw. with a reserve of 10,000 kw.; that at the Noeux mines furnishes 16,000 kw. and is being doubled in capacity; the Beuvry station supplies the Drocourt mines, the *Société Electrique du Nord-Ouest*, and the *Compagnie Electrique du Nord*, at 45,000 volts and the Noeux mines and the *Société des Matériaux de Construction de la Loisine* at 15,000 volts. Near the town of Harnes, the Courrières company is establishing a station with a capacity of 80,000 kw. The Aniche mines station at Sin-le-Noble is to be equipped with four generating sets of 10,000 kw. each, and two sets of 5,000 kw. each. Of these three sets of the larger and one of the smaller are already in operation.

Performance Record of Four New Mining Machines

1925	Machine No. 1				Machine No. 2				Machine No. 3				Machine No. 4			
	Days	Tons	Lin.Ft.	Parts Cost, Dollars	Tons	Lin.Ft.	Parts Cost, Dollars	Tons	Lin.Ft.	Parts Cost, Dollars	Tons	Lin.Ft.	Parts Cost, Dollars			
Sept. 16	3,870	3,320	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oct. 23	5,550	4,800	.....	.....	5,107	3,405	.....	*1,969	1,790	.....	.....	.....	.....	.....
Nov. 25	5,744	5,025	\$4.90	.....	5,640	3,760	\$8.20	5,639	4,755	\$10.40	†2,766	2,515	\$0.48	.....	
Dec. 21	5,654	4,980	4.60	.....	5,157	3,605	4.60	5,016	4,870	.60	4,206	3,960	6.10	.....	
1926																
Jan. 26	6,043	5,615	5.20	.....	5,722	4,035	3.00	6,580	5,250	4.00	5,004	4,810	4.00	.....	
Feb. 24	5,502	4,965	.....	.....	5,191	3,740	9.00	6,010	5,035	1.20	4,723	4,295	13.70	.....	
March 27	5,963	5,160	.....	.....	6,478	4,380	8.30	7,061	5,485	4.00	4,335	4,270	.....	.....
April 26	6,290	4,955	4.00	.....	6,464	4,440	.....	6,941	5,995	.87	4,340	4,085	4.00	.....	
May 25	6,308	5,290	13.15	.....	6,122	4,290	13.30	6,673	5,560	6.00	4,182	4,290	10.50	.....	
June 22	6,202	4,890	.55	.....	5,344	3,975	3.85	6,086	5,055	2.75	4,149	4,410	7.30	.....	
July 20	5,841	4,995	7.25	.....	4,453	3,225	.....	5,868	4,825	.....	3,644	3,845	3.62	.....	
Aug. 19	5,675	4,810	.....	.....	4,412	3,075	2.75	5,188	4,220	.....	4,282	4,675	4.50	.....	
Sept. 18	5,201	4,290	6.40	.....	4,017	2,890	.....	5,100	4,130	5.40	3,870	3,760	1.00	.....	
Oct. 16	4,805	3,660	2.75	.....	3,414	2,435	3.98	4,319	3,410	.....	3,380	3,190	1.35	.....	
Totals	78,648		\$48.80		67,521		\$56.98	72,450		\$35.22	48,881		\$56.55			

* Machine No. 3 worked 11 days in October.
 † Machine No. 4 worked 19 days in November

Rapid Growth of Automatic Substation Control Due to Its Great Economic Advantages

Power Savings and Attendance Costs Are Reduced—Protection to Machines Better Than Possible With Human Attendance—Control of Synchronous Motors Readily Aids in Correcting Power Factor

By E. G. Peterson

Cutler-Hammer Manufacturing Co., Milwaukee, Wis.

THE IDEA of automatic substation operation is almost as recent a development as radio. Five years ago few such installations were to be found in the mining field but today they are almost as numerous as radio broadcasting stations. During these five years there has been a gradual trend toward standardized design. Many features that have been found unnecessary have been eliminated and improved mechanical designs have been incorporated from time to time as operating experience has dictated. It is the purpose of this article to describe automatic substation control as it exists today and indicate briefly some of the steps through which it has passed in reaching its present status.

The economic factors affecting the development and application of automatic substations will be first considered. Competition is compelling the mine operator to study ways and means whereby he may reduce his production as well as his operating expenses. Methods of increasing the mine output are also receiving careful consideration. Since each ton of coal produced requires on the average from 3 to 8 kw.-hr. of electrical energy, a mine loading 100,000 tons of coal per month would require 300,000 to 800,000 kw.-hr. At 2.5c. per kilowatt-hour the power bill for such a mine would be \$7,500 to \$20,000. The possibility of effecting economies in the generation and application of electrical energy must, therefore, receive careful attention.

Central station and public utility plants have demonstrated that this power bill can frequently be reduced 50 per cent. In addition by drawing energy from a large station, the mine is freed from the bother incident to the operation, maintenance and repair of a small

isolated steam plant. The boiler house, steam engines, generators, etc., in such instances, are replaced by an outdoor transformer station supplying power to a synchronous motor-generator set or a rotary converter. This machine can frequently be so located that the hoist operator or fan attendant can take care of it. If the center of the load area is such that the motor-generator set must be installed at a remote point, or if the hoist operator is too busy or is incompetent to assume his duty, an automatic substation controller should be considered.

Another condition that may warrant the installation of an automatic substation is the growth of the mine. As the working face draws farther and farther away from the mine mouth, the increased length of the electric power lines will result in poor voltage regulation, lower motor speeds and decreased production unless means are employed to offset these disadvantages. An automatic substation installed near the working places will maintain the trolley voltage approximately at normal and prevent slowing up of the motors. If normal voltage is maintained fewer armature burn-outs occur. By this means maintenance expense and costly delays are greatly reduced.

Before the development of the automatic substation, the wages of an attendant for such an installation, where one would have to be employed for no other purpose, to a large extent offset the savings that could be effected by installing a motor-generator set near enough to the load center to provide good voltage regulation. It is now possible to install a motor-generator set with an automatic controller inside the mine itself or as an alternative to install it on the surface, and carry the

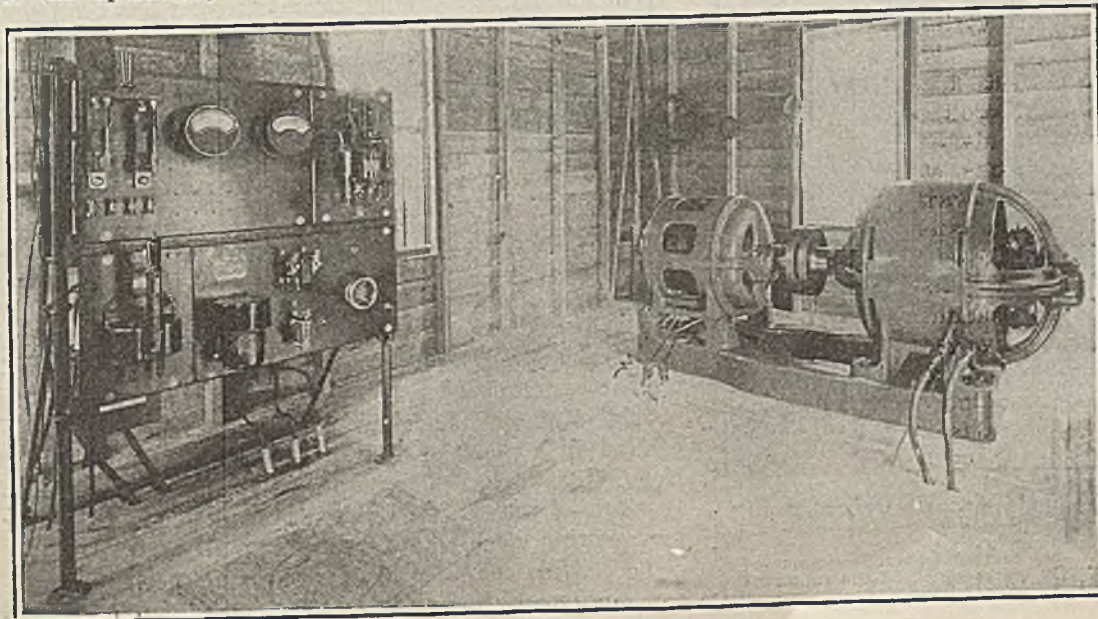


Fig. 1—Simple and Compact

This outfit is installed at the Cordova mine of the Mt. Carmel Coal Co. at Cordova, Ala. It consists of the 100-kw. motor-generator set on the right automatically controlled by the panel installed several years ago this outfit is still giving good service.

direct-current feeders to the working face through a bore hole. The motor-generator set when so equipped can be stopped and started from any desired point by operation of a snap switch. If this machine is above ground, this snap switch can be installed at some point within the mine along the haulageway. The automatic substation, therefore, frequently makes it possible to eliminate the wages of an operator, thus producing a direct saving. It also renders it possible to increase output by maintaining good voltage regulation.

These economic factors began to make themselves felt eight or nine years ago when the cost of labor began a rapid increase but they became particularly forceful when the lack of men developed during the war. The demand for an automatic substation controller was met by combining an automatic motor starter with an automatic reclosing circuit breaker for the direct-current generator. To simplify the equipment as much as possible, the motor first used was of the squirrel-cage induc-

tion type. The starter was a self-contained unit with main-line circuit breaker arranged to provide short-circuit protection. On the rear of the starter was mounted the oil-immersed starting contactor which was interlocked with an oil-immersed running contactor. The controller contained a phase-reversal relay to insure satisfactory operating voltage as well as the proper sequence of the phases before starting. The transfer from the starting tap on the auto-transformer to the running position was controlled by a direct-current voltage relay. This instrument had its coil connected across the direct-current generator and was adjusted to function at approximately 85 per cent of line voltage.

The direct-current generator was self-excited so that 85 per cent voltage at its terminals indicated that the motor was almost up to synchronous speed. The generator voltage provides such an accurate and convenient indication of the motor speed that this system of control is still used. A direct-current generator knife switch, direct-current voltmeter and direct-current load ammeter completed the outfit. Fig. 1 illustrates such an equipment installed at the Cordova Mine of the Mount Carmel Coal Co., the head office of which is in Birmingham, Ala. This station was placed in service in 1920.

Logically, the next step in this development was the application of the synchronous motor in place of the induction machine. Because of the savings that have resulted from the better power factor obtained with the synchronous motor, it has almost entirely superseded the induction motor for this service. The change to the synchronous machine added a double-pole field switch, with a discharge contact and a dash-pot timing relay. The voltage relay instead of bringing in the running contactor, actuated the field switches and after a delay of a few seconds, as determined by the dashpot relay, the running contactor was finally closed.

AUTOMATIC CONTROL HAS BEEN A GROWTH

During the next few years various installations were made and additional meters were found desirable. It is now standard practice to supply the following instruments of this character: Alternating-current voltmeter for incoming line, direct-current ammeter for synchronous motor field, direct-current voltmeter for generator voltage, direct-current ammeter for generator load.

The automatic reclosing circuit breaker has been simplified and a more sensitive, differential type of load pick-up relay has been developed. The result has been a type of equipment that is neat in appearance, simple in construction and reliable in operation. Fig. 2 illustrates the low-tension alternating- and direct-current switchboard portion of a modern automatic control governing a synchronous motor-generator set. Fig. 3 shows the high-tension switching and starting equipment. This is usually installed several feet directly in the rear of the low-tension switchboard so that the manually operated circuit breaker can be connected by a simple system of bell cranks and levers to the face plate on the low-tension switchboard.

Fig. 4 shows such an equipment installed below ground in a plant of the Black Mountain Coal Corp., Kenvir, Kentucky. The motor-generator set is just visible behind and to the left of the controller. A better view of this machine appears in Fig. 5.

To provide complete protection to the power-converting equipment it is advisable to install an overspeed

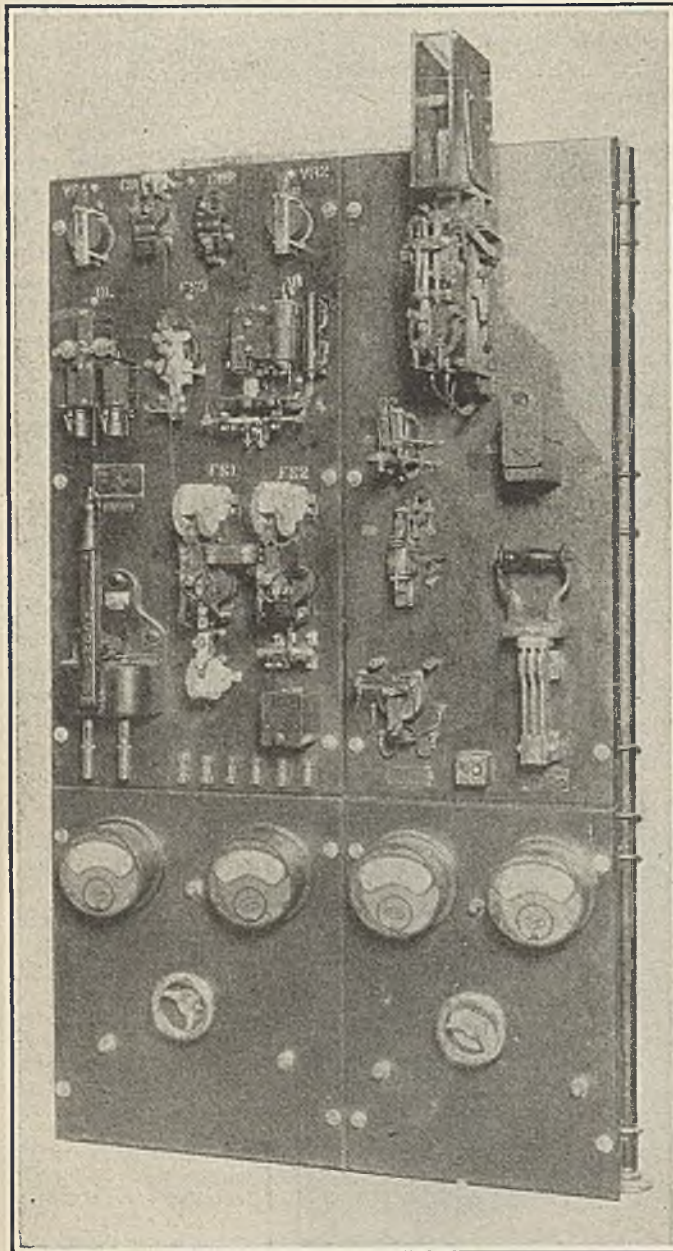


Fig. 2.—Complete Control Panel Takes Up Only a Small Amount of Space

Both the alternating and direct-current control equipment is mounted on these two boards. By being wired at the factory the installation of this equipment is greatly simplified.

device on its shaft and a thermostat at each bearing. A thermal-type overload relay can be installed to advantage on the machine and also on the starting auto-transformer. These devices embody a normally closed electrical contact, which when once tripped must be reset manually. They are all connected in series and serve to shut down the equipment immediately in case of overheating of the bearings or in the windings of the machine or transformer. After a shut down of this nature an inspection must be made and the safety device manually reset.

ADVERSE CONDITIONS PRECLUDE STARTING

The motor-generator set is prevented from starting if the alternating-current incoming line voltage is too low, or if one phase is dead. The machine will be shut down also if the generator fails to build up its normal voltage after several attempts to start. The generator will be disconnected from the load if the synchronous motor field should accidentally open or fail. Instantaneous trip and inverse time limit overload protection are provided for both the alternating-current motor and the direct-current generator. On this latter machine an overload of 100 per cent will cause the circuit breaker to open instantly: on lower overloads it will not open for several seconds.

This permits the circuit breaker to be set at a safe value for the generator yet still allows peak loads of short duration being carried without tripping this instrument, thus cutting off power to the mine. If an overload or short circuit occurs, the generator breaker is tripped and locked out until the overload or short circuit is removed. A short time delay is provided before the circuit breaker recloses, after conditions have been made right. A reverse current relay protects the

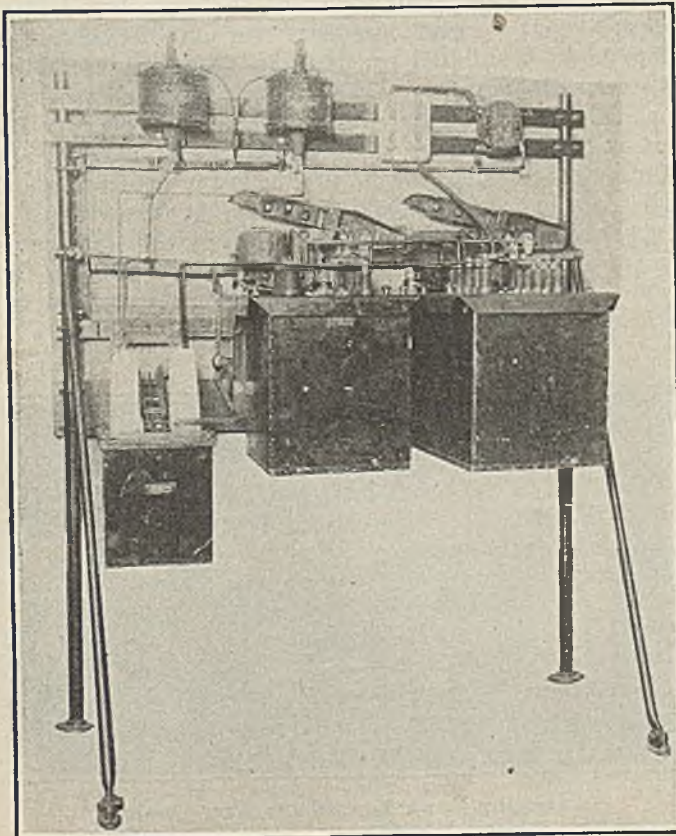


Fig. 3—Starting and Running Switches Mounted Together
Oil-immersed switches like these completely mounted behind a slate board provide added protection to the equipment.

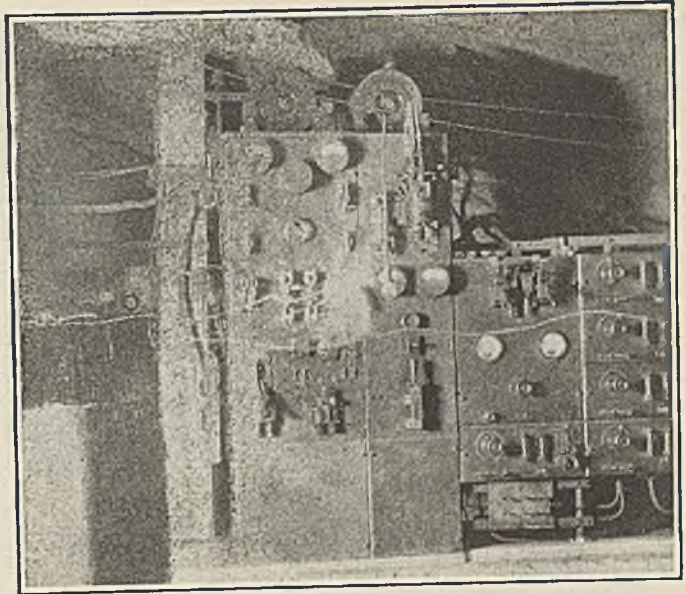


Fig. 4—Underground Where Attendance Is Expensive
Underground installations can now be safely made without the additional expense of an attendant. Another advantage of automatic control is that it lends itself to locations near the load-center.

generator against reversal of direct-current power. The upper left-hand panel shown in Fig. 2 is the master control panel for the high-tension switches and governs the starting of the motor. It carries the following instruments:—two alternating-current control relays, two direct-current control relays, one dashpot timing relay, one double-pole field switch with discharge contacts, one field switch, one thermal timing relay and one time limit overload relay.

PRESSING A BUTTON MAKES THE START

In order that the simplicity of the automatic controller may be fully appreciated the following brief description of its operation is here given. If the voltage of the incoming alternating current is normal, pressing the snap switch brings the five-pole starting switch into action. This connects the motor to the auto-transformer on the 60 per cent tap, and joins the auto-transformer to the line. The motor starts to turn over and accelerates as an induction machine with the field connected across a discharge resistor by the bottom contact on the field switch. When the direct-current generator voltage has built up to 210 volts a voltage relay functions. The synchronous motor field is partially energized, the starting contactor drops out and the running contactor closes, applying full voltage to the motor. A few seconds later the synchronous motor field is fully energized by closure of the field contactor and the machine pulls into step. The closing circuit for the automatic direct-current circuit breaker is interlocked behind the alternating-current self starter thus preventing it from closing until the motor is running at synchronous speed.

The automatic controller is almost human—in some respects it surpasses the best human substation operator. It checks all conditions first to make sure everything is satisfactory to start the machine. It starts the motor in the best possible way, and shuts it down at the first indication of trouble. The generator is protected against dangerous overloads of long duration or sudden short circuits on the power system. There is no unnecessary delay in restoring electrical

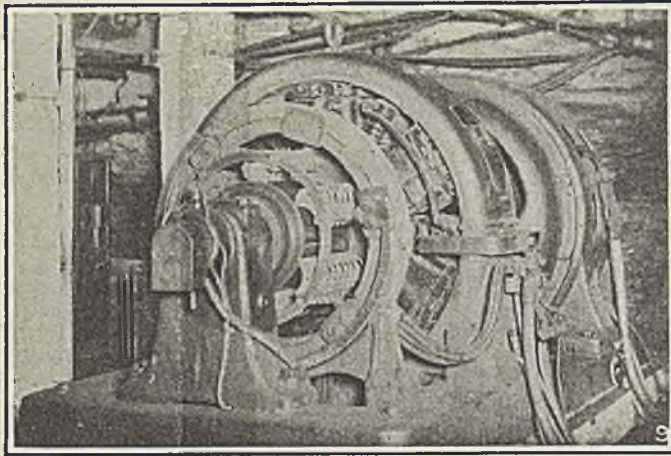


Fig. 5—Load Centers Are Easily Followed

Automatic control protects machines like these, even though located within the mines, better than was formerly possible when they were out on the surface but where manual attendance had to be relied upon.

service to the mine and 100 per cent protection is provided for the electrical machinery. At some mines 440-volt alternating-current power is available because it is used for the tippel machinery, fan drives, hoists, etc. In such cases, a synchronous motor for power factor correction can be used to advantage by installing a 440-volt synchronous motor to drive the direct-current generator. An automatic controller can be installed on a low-voltage equipment of this nature.

Men and Women of the Mines I—Standardization

By H. S. Geismer
Birmingham, Ala.

A mine superintendent had just returned from a meeting in the general superintendent's office at which the subject of standardization had been discussed. All of the superintendents present had been instructed to standardize in future on single models of locomotives, mining machines, car wheels, and the like, so that the spare parts in stores accounts could be reduced to a minimum. Statements furnished by the accounting department had been read showing that the company had almost unbelievable sums tied up in spare parts inventories at the different operations. These could not be reduced safely unless the numbers of models were likewise reduced.

Just outside of the superintendent's office was the parking space allotted to employees' cars and as he looked out of the window he became impressed with the different models and makes there represented. His thoughts also traveled back to the talk on standardization at the general superintendent's office. What a fine thing it would be if all of those cars could be of one model and make. If this were the case a few spare parts in the commissary would insure immediate relief in any emergency whereas now repair parts were kept in stores all over the country and even then occasionally cars had to be put out of service for weeks awaiting the arrival of parts from the factory. Think of the money invested by dealers in those spare parts inventories!

Just then an automobile salesman came along to remind him that he had had his car nearly two years and that he ought to trade it in. He was assured by the

salesman that unless he acted promptly he could not expect to get much for his old car in a trade because a model more than two years old must be either sold to a blacksmith or man of kindred type or find its way into "jitney" service.

This started a train of thought. Who would want a car that was considered perfect ten years ago? Who would even want one that had its bearing housings designed to use bearings that were in vogue ten years before? If all of the dealers in the county had stocked up on such bearings ten years before and had been assured that they were standardized bearings think of the sales resistance that would have developed when improved bearings were offered. The same would be true of tires; starting equipment and what not.

So it would not be advisable to let the company officials build up hopes of finding machines of a single model that could be used indefinitely. It might not even be expedient to keep on using some of the machines now in service until all of the spare parts for them now reposing in the supply houses had been requisitioned. Perhaps, after all, it might even be economical to get the very latest design each time an additional machine was required.

The superintendent recalled the close call to bankruptcy that one company had experienced when it finally was compelled to scrap all of the "long wall" mining machines of a single model that it had acquired over a period of years. As a matter of fact half of these machines had been purchased after the type was already antiquated because the officials could not get up courage enough to scrap those previously bought.

The auto salesman got an order.

Research Widens Market

The California Fruit Growers' Exchange has demonstrated that it isn't necessary for an association to engage in prohibited practices in order to accomplish worth-while results. The Exchange has shown that not only the safest but the most profitable activity for an association is the development of its market, the finding of new uses for its products, the utilization and sale of byproducts, and entrenching the industry represented by the association so solidly that it is made impervious to competition.—From an address by Charles F. Abbott, executive director, American Institute of Steel Construction, Inc.



Looking Down Toward the New Tippel

This picture was taken while a conveyor was being installed, at a monitor plant in Kentucky. Monitors are being supplanted by other means of transportation in many places because of their high labor expense, the danger from runaways that their use entails and the breakage to which the coal is unavoidably subjected.

The Mechanics Involved in Coal Carbonization*

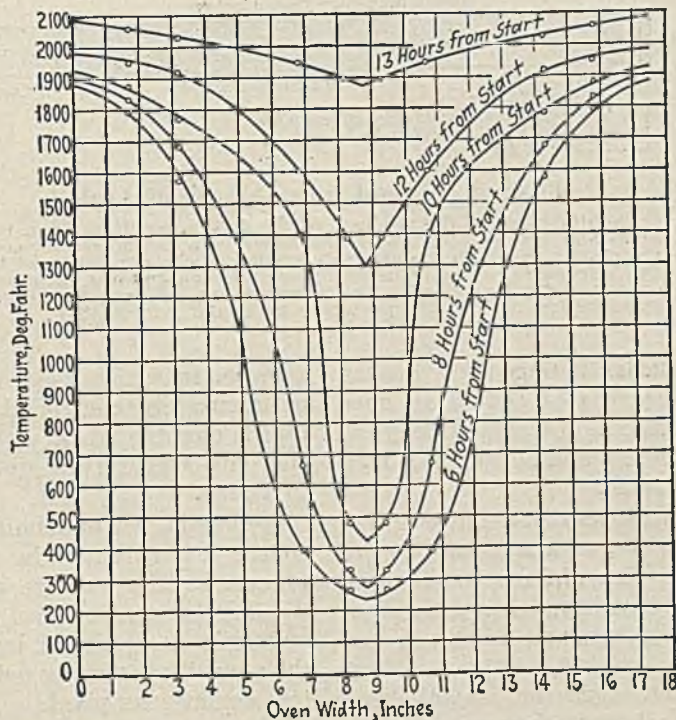
Principles of the High- and Low-Temperature Processes of Coal Carbonization Are Discussed, Difference in the Products Obtained Are Described, and Fields for Each Process Are Clearly Defined

By William H. Blauvelt
Consulting Engineer, New York City

IT IS CAUSE for wonder that coal, one of the most widely used materials in all industry, is employed almost entirely in its original form. In the production of power from this fuel, practically all research and invention has been directed toward its more efficient use in the raw state rather than to improving the form value of the coal itself. It certainly would be an important economic step if, by processing in an efficient manner, the form value of coal could be enhanced. If, in this process, products can be extracted that are of sufficient value to cover the cost of processing, at the same time leaving a residual fuel that is better than the original coal, such a step would be doubly justified. This result has been secured with notable success in practically only one branch of the coal industry. Reference is made to the manufacture of coke, which industry employs many millions of capital and some of the best engineering and administrative talent that can be obtained. During the past twenty years, however, another process for treating coal, generally called "low-temperature distillation," has been frequently mentioned. Much time and money has been spent on many different projects for treating coal in this manner. It is the purpose of this article to present the principles involved in the high- and low-temperature carbonization of coal, the difference in the products obtained, and the application of each process.

Both operations must first be defined. This is difficult since much is unknown about the composition of coal and its decomposition when heated. Yet it may suffice to define high-temperature distillation in terms of its chief application—coke manufacture—since in practice only coking coals are so used. The substances in coal governing its coking are not well understood but are called resins or binders. They appear in all bituminous coals, but to make satisfactory coke they must be present in adequate quantity. A satisfactory coking coal put into an oven encounters walls heated

to at least 1,800 deg. F. The heat at once begins to penetrate through the charge toward the center of the oven, and the coal in immediate contact with the hot walls quickly reaches a viscous state due to the melting of the resins. As the temperature of the charge is raised, the fusion zone travels toward the center of the mass and the first layers solidify into coke. The typical cellular structure of coke is produced as the mass solidifies, and results from the gases and vapors forcing their way through the solidifying coke. The walls of these cells are hardened as the temperature rises. The structure of the finished coke is determined by the size and arrangement of the cells and the hardness and thickness of their walls. These latter qualities depend upon the rate and degree of heating and the composition of the coal. The viscous zone that is produced by the progressive fusion of the coal, at temperatures between 1,200 and 1,400 deg. F., is practically impervious to the gases and vapors as they are produced. On that account, a pound or even greater pressure is often developed in the center of the charge. As a result, all the gas and vapor liberated in that portion of the coal between the wall and the zone of fusion is forced to travel toward the walls through the hottest part of the coke, and thence along



Temperature Gradients Across Byproduct Oven

This chart, taken from Haslam and Russell's "Fuels and Their Combustion," shows the temperature changes that occur in a coke oven at different intervals during the coking period. For example, 8 hr. after charging the particular oven illustrated, the temperature at the center was only 300 deg. F. although that of the oven walls was 1,900 deg. F. This supports the general belief that the fusion zone is an unusually poor conductor of heat.

these hot walls to the gas space above the charge. All of these vapors are raised to the maximum temperature of the oven and subjected to a strong secondary reaction producing gas rich in hydrogen. Benzols and viscous tar rich in aromatic compounds, typical high-temperature distillation products, are also produced. Some of the gases and vapors, evolved before the fusion zone is reached, escape through the relatively cool center of the charge and are hence but little subjected to secondary reactions.

Low-temperature carbonization is done in a much different manner than high-temperature distillation. The destructive characterization of this process is such that the hydrocarbons and other volatile constituents of the coal are not subjected, either during or after distillation, to temperatures that will cause secondary reactions.

*Abstract of a paper, entitled "The Distillation of Coal," presented at the Annual Meeting of the American Society of Mechanical Engineers, New York City, Dec. 6-9, 1926.

The maximum seems to be approximately 1,400 deg. F., although some authorities fix the temperature at from 950 to 1,100 deg. F. Opinions differ as to whether all coals react similarly at any given temperature. Yet, commercial low-temperature operations may be carried on at higher temperatures than those given. However, when the products of distillation are heated above the critical temperature, where secondary reactions occur, the yields are no longer true low-temperature products. This suggests one reason why the various low-temperature processes have not made more rapid progress. The heat conductivity of coal is low. Therefore, it is difficult to design an apparatus of high capacity which, at the same time, can maintain the low temperature gradient that is necessary if secondary reactions are to be avoided.

Low-temperature carbonization naturally precludes the formation of a true coke, as the conditions that permit of the development of the cell structure in the by-product oven are here absent. The name "char" has been applied to the solid residue resulting from low-temperature distillation. Depending on the process and apparatus employed, this char may have the shape of the original pieces of coal, it may be produced as balls of irregular size and shape, or it may be obtained in a pulverulent form.

The gas produced in the two processes is much different, both in quantity and quality, as a reference to the table will show. The tars are also different and should have separate, rather than competitive, places in industry. The typical high-temperature tar is viscous at ordinary temperatures, yields from 50 to 60 per cent of pitch, and its oil is rich in anthracene, naphthalene, the benzols and other saturated hydrocarbons. On the other hand, low-temperature tars are more limpid and contain less pitch. As their chief constituents they carry paraffines, naphthenes, and unsaturated hydrocarbons. The oils resemble crude petroleum after the tar acids, principally cresols, are removed. Upon distillation and further cracking, they yield a fairly high percentage of light oil similar to gasoline which is suitable for motor fuel. The large quantities of tar acids in the oil give it unusual value as a wood preservative, disinfectant, or insecticide.

As might be expected from a study of the operations, the yields of tar and oil from the two processes are quite different. In the high-temperature process, the conditions are favorable to the "cracking" of a large percentage of the vapors. This results in a high yield of gas with a corresponding decrease in the quantity of tar and oil produced. The amount of tar and oil obtained per ton of coal treated is usually between 10 and 13 gal. Low-temperature carbonization, on the other hand, does not subject the vapors to temperatures which are sufficient to cause secondary reactions. Conse-

quently, the quantity of tar and oil is increased. Because the gas that is formed is not diluted with the products of "cracked" vapors, its volume is sometimes only 60 per cent of that produced in high-temperature processes. Therefore, its calorific value per unit volume is higher.

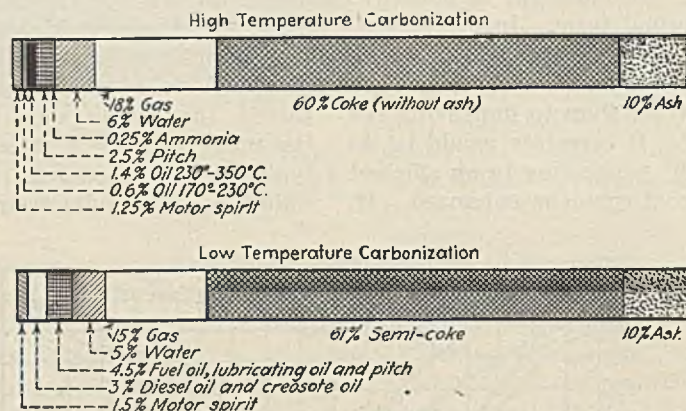
It is difficult to give definite data regarding the yields of tar and oil that may be expected when any particular coal is subjected to low-temperature carbonization. Theoretically, any process employing a definite temperature and a given coal should yield the same quantity

of tar and oil. Actually, varying conditions, which have an appreciable effect on the final results, are often unconsciously introduced. Since the yields of gas and tar are interdependent, a comparison of the volume of gas obtained in the two processes leads to the conclusion that a yield of between 20 and 30 gallons of tar and oil per ton of coal carbonized at low temperature is a reasonable estimate. It is to be hoped that the large amount of development work now in progress will soon perfect apparatus

in which the conditions of carbonization can be accurately controlled. In this way, definite data on the quantity of tar and oil that can be expected from the low-temperature distillation of coal will become available.

Ammonia, as ammonium sulphate, is an additional source of revenue in high-temperature distillation processes. The average quantity so obtained is about 25 lb. per ton of coal carbonized. Although some ammonia is produced by low-temperature distillation, the quantity is usually not sufficient to warrant recovery in a commercial plant.

In the preceding comparison of the products obtained from the high- and low-temperature processes, only one of the two general divisions of low-temperature carbonization has been considered. Discussion has been confined to processes in which the heat required for distillation is applied externally and passes to the coal through the walls of the containing vessels. However, several processes have been developed in which the heat is applied directly to the coal within the containing vessel. This is accomplished either by a current of preheated inert gas or by the introduction of a controlled supply of air that produces partial combustion. Such processes usually yield a smaller quantity of coke or char than those in which the heat is applied externally. The quantity of gas is naturally much larger from the internally-heated carbonizers and may vary from 60,000 cu.ft. of 150-B.t.u. gas to 25,000 cu.ft. of 240-B.t.u. gas per ton of coal processed. The quantity of tar and oil is usually less and the composition of these products is somewhat different. Wellington and Cooper state that "the crude oil is, in fact, more like the heavy-oil distillate from blast-furnace tar." The yield of



Products Obtained from Carbonizing Coal

The difference in the products of distillation resulting from the high- and low-temperature carbonization of a typical coking coal are clearly shown in the above diagrams which were prepared by Dr. Friedrich Bergius. The yields are average and are not based on any particular process. The increased quantity of oil resulting from the low-temperature process is particularly interesting.

ammonia is said to be nearly as high as from byproduct ovens. Certain of the processes employing internal heating have the advantage of simple design and operation.

As determined by a satisfactory return on the capital invested, what are the fields in which the two processes may find practical application? The field of the high-temperature process, as exemplified by the byproduct coke industry, has been clearly demonstrated. All of the products—coke, gas, tar, benzol, and ammonia—have well-established markets. Coke is recognized as the standard fuel in many metallurgical processes and is growing in favor with domestic users. Byproduct plants are delivering all the gas not required for heating the ovens either to gas companies for domestic consumers or to industrial plants for use in metallurgical furnaces. The supply of this gas is as reliable, and the quality as good, as that from any plant where manufactured gas is the principal product. In fact, several coke plants are run primarily as gas plants. Byproduct tar is the principal source of that material in this country; coke-oven benzol is an excellent motor fuel and has a ready market in the dye industry and elsewhere. Ammonium sulphate has a potential world market as a fertilizer.

A different situation exists in the field of low-temperature carbonization. The usual products are semi-coke or char (either in lump or pulverulent form), gas which is much higher in calorific value than standard city gas, and tar and oil, the quality and composition of which has been previously discussed. At present there is no established demand, either here or abroad, for any of these products. However, many new industries have met and overcome similar situations and each of the products previously mentioned undoubtedly has potential value. Perhaps the creation of a demand for these products, and the adaption of each to its particular demand, is a problem of even greater importance than the development of a specific apparatus or process for treating the coal.

Both here and abroad, many low-temperature processes have been brought to varying degrees of perfection. However, as previously indicated, it is difficult to choose among them until there is a clear understanding of what market conditions must be met by each of the several products. At present, there is greater interest in Great Britain in the coke or char since it appears to offer a possible smokeless fuel for use in the domestic grate fires so common in that country. In Germany, the chief interest appears to be centered in the oils as it is hoped that these will make that country less dependent on foreign petroleum. The variety of coals in America, and the extent of our territory, offers a diversified field having many possibilities. For example, in one locality the hot char may find a market when delivered from the carbonizing plant directly to the grates of a boiler plant. This is an application which appears to offer certain economies. In another region, it may serve to create a market for the fines from a lignite mine where now only the screened lump is salable. In fact, under certain conditions the char

from these fines, if properly briquetted, may find a better market than the screened lump. Low-temperature char has already attracted much attention, in the pulverized state, as a boiler fuel. At least one process is designed with this use in view. The ultimate success of a low-temperature char in any field is naturally determined by the extent to which its changed form value increase its sales value in relation to the cost of processing.

Low-temperature oils have some of the characteristics of petroleum and some that are similar to those of coal tar. Without fractionation or other treatment these oils are, of course, marketable as fuel oil. Whether their high content of tar acids, their appreciable yields of motor fuel when cracked for that purpose, the value of certain fractions as Diesel-engine

fuel, or other characteristics, will obtain for these oils a profitable and ready market can be determined only when a steady and reliable supply is available for experiment and investigation on a commercial scale. Many believe that these low-temperature oils offer the best possibility of furnishing a satisfactory substitute for petroleum when an increase of demand over supply has occasioned a sufficient advance in the price of the latter.

Because of its high calorific value, the gas resulting from low-temperature carbonization is naturally an excellent fuel. As its quality is so much above the usual standards of city gas, it is not directly usable for that purpose. But it can easily be diluted to the established standards by mixing with a leaner product such as blue water gas.

There is yet much work to be done to establish low-temperature distillation on the same firm basis as the byproduct coke industry. As there is no immediate prospect of large profits per unit of the various products the successful apparatus must be simple to operate and of moderate cost. It must permit of good heat control and, despite the low temperature gradients, it must have a fairly high output. Only a small number of the processes that have been patented in this country or abroad meet all these specifications.

LOW-TEMPERATURE DISTILLATION DESIRABLE

There is reason to believe that there is a place in the industrial life of America for the low-temperature distillation of coal. Apparatus is being perfected and simplified and there are many coals which, although now of little value, might be processed to yield a satisfactory profit if the proper market conditions obtained.

Although the order is frequently reversed, a successful application of low-temperature carbonization can be made only after a careful and intelligent study of all the conditions surrounding any proposed location. When these are clearly understood, a process can be selected which will best meet the situation and an intelligent conclusion can be reached as to the probable success of the venture. In many instances the desire of the inventor or promoter to "push" his particular apparatus has been the leading influence. Where such has been the case, the results have usually been unsatisfactory. Low-temperature distillation may appear to be

Quantity and Quality of Distillation Gases		
	High-Temperature	Low-Temperature
Cu.ft. per net ton of coal.....	11,000—13,000	4,000—5,500
B.t.u. per cu.ft.	525—600	675—800
Gas Analyses:	Per Cent	
Hydrogen	50.0	27.5
Methane	33.0	48.0
Illuminants	3.0	10.0
Unsaturated hydrocarbons	0.0	3.1
Carbon monoxide.....	5.5	7.3
Carbon dioxide	1.5	2.5
Nitrogen and oxygen.....	7.0	1.6
	100.0	100.0

progressing but slowly toward its proper place in the commercial life of this country. However, the history of the successful development of the byproduct industry may easily be duplicated by the newer processes and perhaps in a much shorter time.

Tractor Proves Useful in Strip Pit

Open-cut or strip mining is one of the most interesting processes of coal production. In many cases also it is the cheapest and safest. Unfortunately by no means all coal-bearing areas are amenable to this method of operation. Southern Illinois is usually considered to be the region of shaft mines yet even here stripping is practiced to some extent. Thus in Williamson County the Pyramid Coal Co., is stripping 20 to 30 ft. of overburden to uncover a 6-ft. coal bed.

This stripping differs somewhat from most others in the method employed in "sweeping" the top of the coal after the overburden has been removed. For this purpose a 5-ton caterpillar tractor with a LaPlante-Choate "bulldozer" attached is employed. This outfit literally scrapes the top of the coal pushing all dirt and rock left by the shovel back against the bank where it can be picked up by this machine.

But the usefulness of the tractor does not end with coal sweeping. Within the strip pit standard-gage railroad tracks must be shifted frequently and heavy materials such as rails and ties must be supplied for their extension. The tractor does both of these jobs quickly and easily. Again, when the switching locomotive is away the tractor can be used for moving or spotting empties, so that the coal-loading shovel may be kept continuously in operation. The tractor may also be used in moving heavy machinery, in moving and spotting churn drills and in doing a multitude of odd jobs about the plant.

Production and Utilization of Power At Groups of British Collieries

In the course of a paper recently read before the Institution of Civil Engineers, of England, Prof. Douglas Hay gave some interesting data on the effect that grouping of mines has had on the economies attained in power production and utilization at British collieries. At an early stage in the development of electric power, advantage was taken by a number of collieries of the possibilities presented by this form of energy transmission. From its very inception, colliery engineering practice has always been closely associated with the steady progress of electrical engineering.

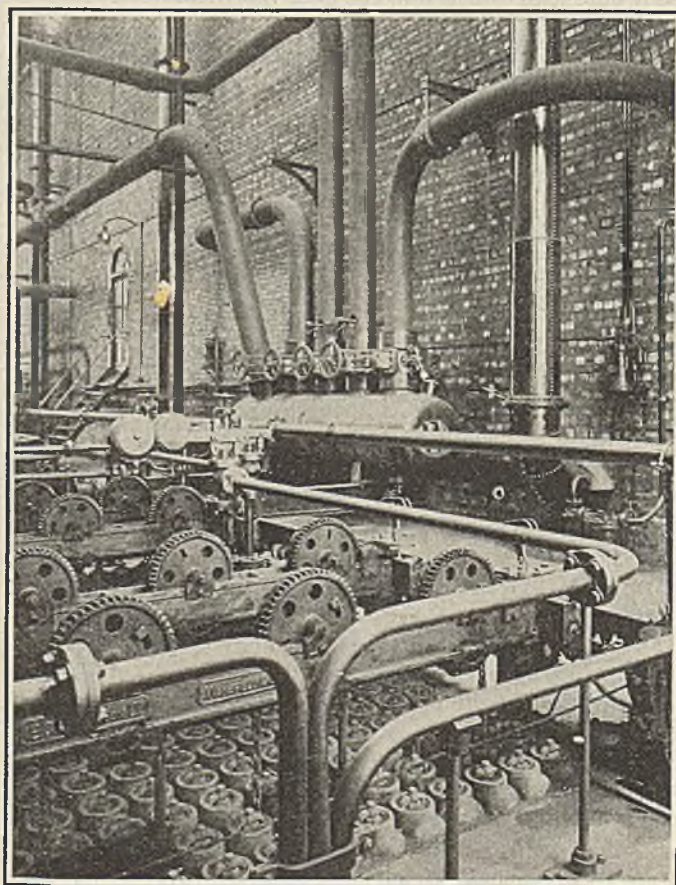
In 1924, a total of nearly 1,250,000 hp. of motors had been installed in British collieries, the bulk of these being supplied with power from colliery generating stations. The advantages of co-operative working of the small colliery plants were realized as early as 1900, so that today, in a large number of cases, the small stations owned by a group of collieries have been interconnected. On the other hand, the advantages of improved load factor and greater diversity of demand have been gained by the installation of single large power stations serving a colliery group. In other cases a combination of both schemes has been adopted. Such schemes are common even in areas served by public service companies which, however, are unable to compete in price with the colliery stations. Altogether a total generating capacity of not much less than 750,000

kw. has been installed in such stations, and the general experience is that energy can be produced at a cost not exceeding 0.6c. per kilowatt hour.

In the case of colliery groups working coking coals the tendency is toward the installation of large central coke oven and byproduct plants in conjunction with which a power station would be operated in order to utilize available inferior coals, surplus gas, and waste heat, together with coke breeze and dust. All these fuels will be available whether the plant be operated on a high- or on a low-temperature process.

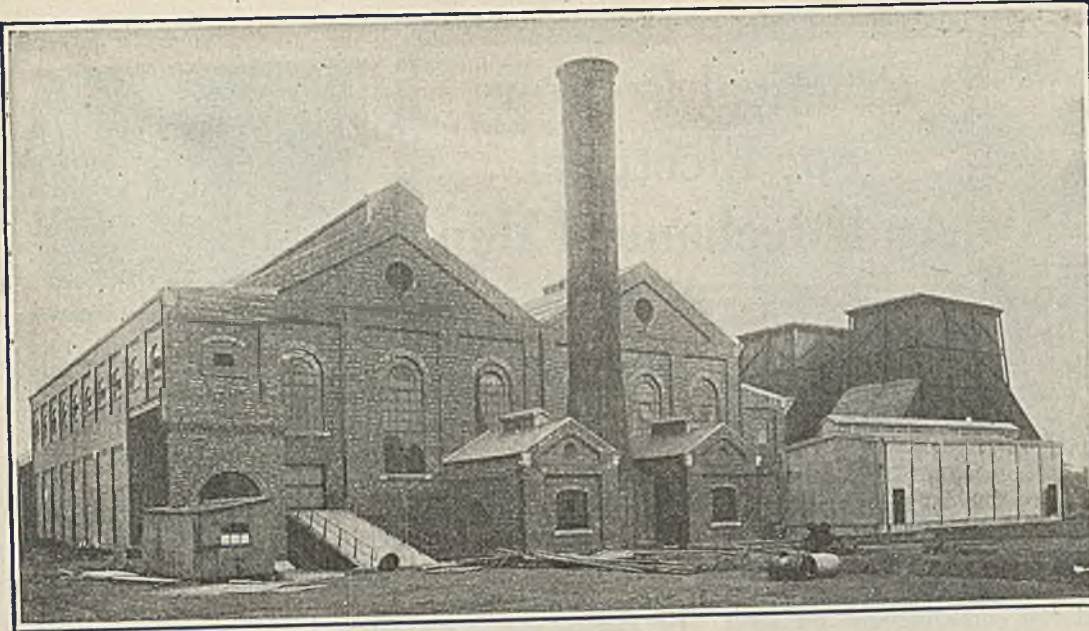
As an illustration of a large mine power plant serving several collieries as well as mine villages in the neighborhood, the new Frickley station of the Carlton Main Colliery Co., Ltd., may be cited. In many respects this plant is considered as a model of what a generating station should be. Its equipment includes the latest types of generating and distributing apparatus constructed in Britain. Steam is generated in four B. & W. triple-drum watertube boilers, each having an evaporation of 40,000 lb. per hour. The final temperature of the steam is 650 deg. F. including 250 deg. of superheat. This steam is used in Curtis turbo-alternators, of 6,000 kw., 7,500 kva. capacity each and running at 3,000 r.p.m. The power factor averages 8.0 per cent.

Control is centralized through the use of meters. A central panel carries various instruments of this kind which indicate, record and integrate every operation of the plant. The engineer is thus in a position to know from day to day exactly what the generating costs are and how efficiently the plant is operating. In fact, the



View Above the Economizers

In this picture the piping is particularly noticeable as it contrasts strongly with American practice. Thus, note the total absence of cast elbows and the prevalence of flanged joints. Long sweeping pipe bends reduce the internal friction. Despite its advantages, however, this kind of piping looks peculiar to the average American mechanic.



Frickley Plant

In many respects this plant is considered as a model of what generating stations at coal mines ought to be. It is equipped throughout with the most modern generating and current-control machinery available and is so provided with meters and other recording devices that it operates under what might be termed continuous test conditions.

plant runs under what amounts to continuous test conditions.

Distribution is by overhead lines at 22,000 volts. These lead to the collieries in the neighborhood, where the flow is transformed to the pressure required. The loop principle has been adopted for the transmission lines.

COMPANY WIRED HOUSES FREE OF CHARGE

In four neighboring mining villages the coal company has wired all houses free of charge and supplies current at a flat rate of 30c. per week in the summer and 36c. per week in the winter, the amount of current supplied at any one time to any house being limited to 180 watts. If the tenant exceeds this maximum a limiter comes into operation and flickers his lights until the excess is removed by switching out one of them. Most of the houses are seven-roomed, for which a lighting current of 180 watts is considered ample for all ordinary requirements. An alternative arrangement available to the consumer is a charge of 24c. per week for the meter and 2½c. per kilowatt hour for all current used.

Institutions in the villages, such as churches, clubs and the like are supplied at 8c. per kilowatt hour up to a maximum of 600 units per annum and 6c. per unit beyond this amount up to 900 units while above this consumption the charge is 4c. per kilowatt hour.

This system has proved highly successful. The rates named permit the colliery generating station to meet the expense incurred, no profit being desired.

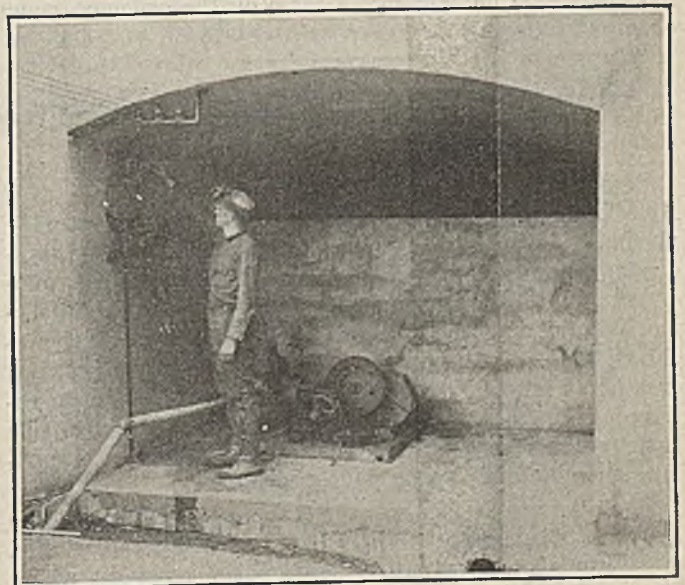
Phases of the Lignite Problem Set Forth

Several methods of approach to the problem of the successful utilization of lignite are possible, states the Bureau of Mines. Any process whereby lignite can be profitably converted into more valuable and salable products will help to develop this latent source of energy. Accordingly an investigator might well study any of the following phases of the lignite problem:

(1) A cheap means for completely gasifying lignite, including an improved method of making producer gas and a suitable method for making water gas. (2) A means for producing a solid fuel other than by briquetting the carbonized lignite. (3) The possibility of de-

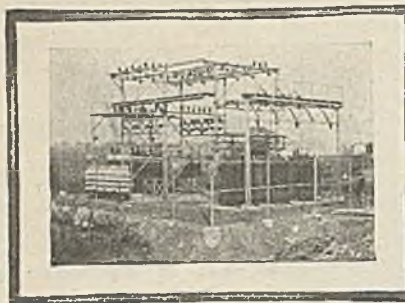
veloping a means of coking lignite. (4) The commercial applicability of the carbonizing and briquetting process and its relation to byproducts and methods for plant control. (5) A method for producing valuable crude liquid products by the distillation of lignite, with attention to the influence of changes in conditions, such as pressure, temperature, and rate of heating on the character, quantity, and quality of the resulting products. (6) The possibility of hydrogenating or otherwise preparing liquid or soluble products direct from lignite.

Each of these studies offers a promising field, but only the carbonizing and briquetting process holds positive assurance that the experiments will end with a satisfactory solid domestic fuel. Some of these problems when solved would be more or less of local interest and not generally applicable to the large lignite deposits in different parts of the United States.



Mine Water Impounded at Drift Mouth for Bath-House Purposes

At the Exeter mine of the Stonega Coke & Coal Co., in Virginia, water drained from underground is used in the bath house. Natural drainage is outby with reference to the main entries, and therefore the scheme shown in the above illustration was easily and conveniently arranged by driving a short spur entry which joins with the main-entry system. The dam has a capacity of about 13,500 gal.



Practical Pointers For Electrical And Mechanical Men



Conservative Comparison Shows Meters Cut House Energy to One-Third

At the flat-rate charge of 25c. per lamp per month for electrical energy supplied by a mining company to its tenants, the company almost invariably loses considerable money. In many cases where house meters have been installed the company has saved the cost of the meters in the first year. At a rate of 5c. per kw.-hr. the tenant will pay about the same amount for light but will not waste any large amount of the energy by letting lamps burn when not actually needed.

A few years ago when but 20 of the houses of the Gatliff Coal Co., Gatliff, Ky., were served by electricity, and when house meters were installed, the total energy taken by these houses—as recorded by a main line meter—dropped to about one-third the former amount. The average per house per month for August, September, and October, the three months preceding the installation of meters, was 252 kw.-hr.; and the average for the three months following meter installation was 88 kw.-hr.

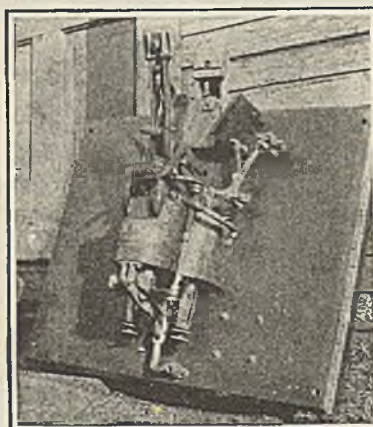
This is a big reduction but at that it is too conservative for an average. Had the same three months, August, September, and October of the year before meter installation, and of the year following meter installation been compared, there would probably have been a much greater difference. It is probable that a comparison on the basis of these summer and fall months would have shown a ratio on the order of seven or eight to one.

Automatic Reclosing Circuit Breaker Obviates Overload Difficulty

Some time ago, an editorial was published in *Coal Age* commenting on the common difficulty in restoring normal service after the breaker at a mine sub-station opens. This difficulty arises from the fact that, in spite of warnings and orders to the contrary, the mine locomotive and machine runners all try to start their machines the instant power is restored. This, of course, creates an enormous overload which often results in re-tripping the breaker. A solution of this problem has been found, I believe, in the automatic reclosing circuit-breaker which is now so widely used.

The average feeder loss in haulage circuits should be less than 20 per cent and the voltage drop is, of course, proportional to this loss. Automatic breakers which have separately-variable drop-out and closing values of voltage are now on the market. These instruments may be set so as to drop out at 50 per cent or even less voltage but not to reclose until the voltage rises to 75 per cent of normal. Judicious use of these breakers will prevent, in great measure, the "pumping" of main breakers by heavy starting currents. Since these "volt-

age" breakers can be placed in a small space, it might be advisable, in large mines, to put a breaker on each of the main haulage locomotives, or, in other cases, a separate breaker might be used for each section of the mine. In addition to the voltage settings, the breaker could easily be equipped with a variable time-delay reclosing feature and so adjusted that no two locomotives could start at once. Ordinarily, however, this



Breaker Ready for Installation

As conditions change these breakers are removed to new locations. Interconnection of mine feeder circuits effects a direct saving if the circuits are protected and sectionalized by automatic reclosing circuit breakers.

would hardly be necessary, for the runners would soon learn to slow up a little in their endeavor to start. Only the quickest would get on the line and the others would have to wait until the first motor had accelerated enough to permit the voltage to rise to the proper value. Some provision would have to be made against tampering with the breakers, especially if placed directly on the locomotive.

In sub-stations, where space is not the factor that it is on portable equipment, the standard type of reclosing circuit-breaker is well worth the investment. When this type of breaker trips on overload, a load-measuring relay is cut in delaying reclosure until sufficient controllers have been cut off to reduce the load to a reasonable value. On new installations, I have seen these hold open for several minutes at a time, but after a few such delays the men learn to cut off the controllers at once and allow service to be restored promptly.

Another important feature of automatic breakers is utilized where two or more circuits are fed by a single station, each feeder having its own breaker and all energized through the main station bus. In order to take advantage of the diversity factor of these feeders, the sum of their various capacities should be considerably greater than that of the main or machine breaker, but it is not desirable to have the main breaker trip every time the total load becomes excessive. In such a case, arrangements are made to have the main breaker overload relay cut off sufficient of the less important feeders so that the sum of the overload settings of those remaining is less than that of the main breaker. These feeders will not reclose until the load on the main breaker drops

off to a pre-determined value. This arrangement is valuable because, in every case where it can be done at a reasonable cost, inter-connection of feeders is just as economical in the mine as it is to the large power companies of whose super-power plans we hear so much these days.

F. FRASER MACWILLIAMS.

Pennsylvania Coal & Coke Corp., Cresson, Pa.

Double Motor Drive of Fan Arranged To Go in Small Space

Originally the fan at the No. 2 mine of the Newcastle Coal Co., Newcastle, Ala., was driven by a direct connected steam engine located in a small, but well constructed building. When the mine was electrified, it was considered advisable to apply two motors so one of the two would always be in readiness as a spare.

The accompanying sketch shows how this was done without increasing the size of the building. The motors

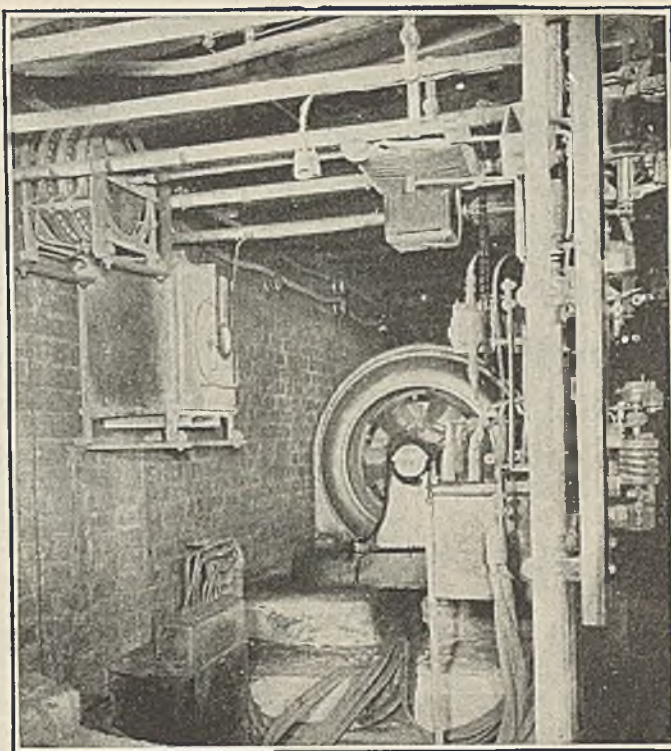
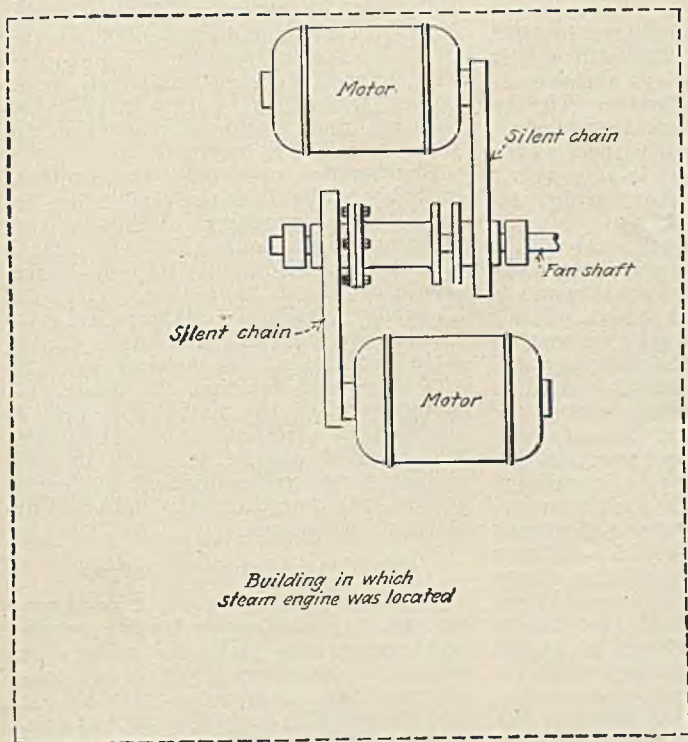


Fig. 1—Behind the Switchboard

The distance from the switchboard to the wall is 5 ft., providing accessibility which has been further enhanced by putting the field rheostats on the wall. These instruments are controlled from the front of the board in the ordinary manner.

substations at the Valier mine of the Valier Coal Co. in Illinois, the rheostats controlling the respective fields of the motor and generator of a converting unit are suspended from the wall and located about 5 ft. behind the switchboard.

As shown in Fig. 1, both are controlled from the front of the switchboard. The rheostat in the foreground, which regulates the fields of the generator, is direct controlled through a pipe shaft. The second rheostat, which regulates the fields of the motor, is controlled through two sprockets and two sprocket chains, which are joined together in a single loop by two wires passing through four pulleys. This arrangement is illustrated by a line sketch, Fig. 2, which is shown below.



Motors and Drive in Building

The arrangement for shifting from one motor to the other by changing the bolts of the double-flanged sleeve from one end to the other is economical of space. Even with this arrangement there was little space to spare at one end of the building.

are 50-hp. 2,200-volt, and of the squirrel-cage type. The drives are by silent chain to sprockets which are mounted on flanged sleeves which in turn are loose on the shaft. Between the sprocket sleeves is a double-flanged sleeve which is keyed to the shaft. A change from one motor to the other can be made by removing the bolts from one pair of flanges and inserting these in the other pair.

Making a Switchboard Accessible

In order to lend accessibility to wires and other electrical portions at the rear of a switchboard, it is always well to locate the latter several feet from the wall. Another wise provision is to place the rheostats in a position where they do not block access to the rear side of the switchboard proper. In one of the underground

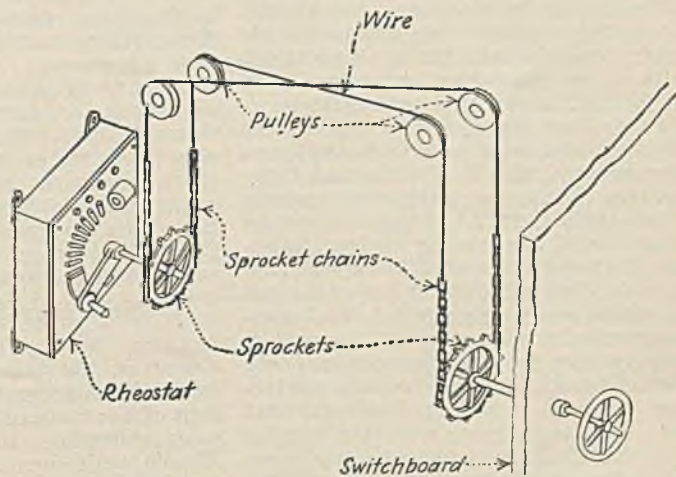


Fig. 2—Indirect Control of Rheostat

As the rheostat controlling the fields of the motor was too large to be so located that its shaft would be in direct line with the control knob on the switchboard for a direct connection, a system of sprockets, chains and wires in a continuous loop, passing through pulleys, was devised. The operation of this contrivance is made clear by the sketch.



News Of the Industry



Union Puts Strike Onus Up to Owners; Central Field Mines Allowed to Work At Old Scale Pending New Agreement

By Sydney A. Hale
Associate Editor, *Coal Age*
(By Wire from Indianapolis)

Indianapolis, Ind., March 29.—Whether there shall be a suspension of mining in any organized bituminous coal field of the country after April 1 has been put squarely up to the operators as the result of the action taken by the policy committee of the United Mine Workers at a meeting in union headquarters here yesterday afternoon.

This committee authorized district organizations of the international union to permit any Central Competitive Field producer to continue at work after Thursday at the Jacksonville scale pending the negotiation of a new agreement. Operators in the outlying districts had already been granted this option following the first meeting of the committee at Miami, Fla., Feb. 23.

The committee at yesterday's session also opened the way for the negotiation of district agreements within the Central Competitive Field. In addition, the usual provisions for keeping maintenance and safety men at mines which elected to shut down were adopted.

Committee Acts in Resolution

The action of the committee was embodied in the following resolution:

"(1) That the officers of the respective districts comprising the Central Competitive Field be authorized to enter into district wage negotiations with their respective operators upon the basis of existing agreements;

"(2) That the district organizations be given authority to permit any operator or any mine in the Central Competitive Field to work continuously from April 1, 1927, by agreeing to an extension of the existing contract pending the negotiation of a basic scale;

"(3) That all district organizations be authorized to permit any coal company or mine to employ all the men it may require for maintenance, repairs, development, construction or production of coal, providing, however, that such company agrees with the district organization to pay the existing wage schedules and carry out the existing agreement temporarily until a basic agreement is negotiated."

The provision to permit work pending the negotiation of a new agreement represents a direct reversal of the position taken by the union in its dealings

with the anthracite operators in 1922, in 1923 and again in 1925, although in some of the earlier parleys such an arrangement had been effective. The decision, of course, is a logical supplement to the action taken with respect to the outlying districts and is in line with a hint carried in a news story in the preceding issue of *Coal Age*.

To what extent this proposal will be accepted by operators in Illinois, Indiana, Ohio and western Pennsylvania is a question upon which union officials declined to venture any public conjecture. In so far as the outlying districts are concerned, the United Mine Workers has succeeded in having the plan accepted in all but two of these fields. To date the Southwestern Interstate Coal Operators' Association has declined to agree to such a proposal, but a subscale committee of miners and operators in that field has been considering the question of a new contract for several days. This committee, which adjourned last week in order to allow union representatives to attend the meeting here yesterday, will reconvene again on Thursday.

Iowa operators, acting through the Iowa Coal Operators' Association, also have refused to continue work under the expiring contract rates pending a new agreement. A number of independent producers in that state, however, have accepted the suggestion. Although many of the operations affected are local mines and country banks there are some commercial shipping mines among them. It is estimated that this independent group, about thirty in number, is mining about 20 per cent of the production of the state.

Miller Blames Stand-Pat Policy

As to the probable effect of the action of the union policy committee on the Illinois mines, Rice Miller, president of the state operators' association, said: "Pending the meeting of the Illinois scale committee scheduled for tomorrow there is little I can say beyond pointing out that Illinois' position is well known and not changed by yesterday's union announcement. We believe some constructive change from the terms of the Jacksonville agreement is vitally necessary to prevent

complete prostration of unionized fields and ultimate disintegration of the United Mine Workers. The abandonment of interstate negotiations and the demise of the Central Competitive Field is just one of many signs of the pathetic failure of unionism under a stand-pat policy which totally disregards economic and competitive fundamentals. If the new policy permits constructive negotiations by states I believe the operators will discuss problems with a fair and open mind. Meanwhile I know of no Illinois companies who expect to sign individual temporary extensions of the Jacksonville contract and complete suspension in Illinois April 1 is inevitable."

Shaft-mine operators in Indiana probably will follow the lead taken by the Illinois producers although the Indiana Bituminous Coal Operators' Association, at a meeting in Terre Haute on March 23, took no action on an earlier suggestion of the recent convention of district 11 miners for a state conference. In neither state is any hope held out that the latest announcement of the union will halt a suspension. Notices of a shutdown were posted at the majority of the Illinois mines yesterday and the same course was pursued at a number of Indiana operations.

Shutdown Certain in Indiana

The decision of the policy committee, according to spokesmen for the operators, comes too late to affect the immediate situation. Notices of suspension, they say, were withheld as long as possible; regardless of any subsequent action which may be taken it would be impracticable, if not impossible, to countermand the orders to the miners to clean up their places and remove their tools in time to halt a shutdown on Friday.

The strip-pit mines of Indiana, on the other hand, are said to be favorably inclined to any proposition which will allow them to continue at work. In some quarters it is even stated that the producers in this group, who are not members of the Indiana Bituminous Coal Operators' Association, would not be adverse to a flat renewal of the Jacksonville scale. Last year the strip-pit mines produced approximately 15 per cent of the state's production and their competition is and has been a thorn in the side of the older operators.

Up to the present time Ohio operators have given no indication that they are willing to accept or consider anything less than "the continuously competitive wage scale" rejected by the miners at the Miami conference. As in Illinois and Indiana, Ohio mines have been making preparations for a long

shutdown. The only exception is in the Pomeroy Bend section, where mines which have been running open-shop since 1925 on the 1917 wage scale, are planning to increase their output after the first of next month.

In the Pittsburgh field much will depend upon the policy adopted by the Pittsburgh Terminal Coal Corporation. Although there have been many conflicting rumors as to what that policy will be, union officials here profess to have no definite knowledge on the subject. In a recent statement to *Coal Age*, denying that the company had served notice on the union that it would run open-shop after March 31, F. E. Taplin, chairman of the board of directors of the Pittsburgh Terminal Coal Corporation, said:

"We have not served any notice on the union, we have told the union that we have no objection to running under union domination if they will give us a scale of wages at which we can compete with the open-shop mines around us. We are not trying to run non-union or open shop, or any other particular way, so long as we can get a scale of wages under which our mines can sell coal in a competitive market."

Accord Hangs on a Phrase

In a large measure the reaction of the Central Competitive Field operators to the latest proposals of the union will revolve around the interpretation to be placed upon the phrase "upon the basis of existing agreements" incorporated in the first part of the resolution adopted by the union policy committee yesterday. If that is to be interpreted as meaning an inflexible demand on the part of the United Mine Workers that the Jacksonville scale be accepted as the minimum which the union will consider, then operators hold out little hope that anything can come out of the plan.

At first blush coal operators are inclined to put that construction on this phrase. This, for example, was the opinion expressed by William Hamilton of Linton, the newly-elected president of the Indiana Bituminous Coal Operators' Association. Men high in the counsels of the Illinois mine owners also were disposed to take the same view.

On the other hand, interests friendly to the United Mine Workers decline to commit themselves to such an interpretation. No concealment, of course, is made of the fact that the union would like to preserve the Jacksonville basis. At the same time it is insisted that the spirit of the policy committee's resolution is broad enough to permit of a full and free discussion of any and every suggestion relating to wages and working conditions.

"The policy committee could, if it saw fit," explained one spokesman for the union, "recommend a rate of \$1 per day. It can, however, only recommend. No agreement which it might suggest would be binding until ratified by the mine workers themselves. The report of the scale committee adopted at the recent convention is the expression of the wishes of the membership, but negotiation is not limited to a consideration of the particular bases therein outlined. We are ready to listen



Rice Miller

President of the Illinois Operators' Association and chairman of the joint scale committee which met in Miami, Fla., last month, says suspension in Illinois fields is inevitable.

to anything and everything the operators may have to offer."

While, on the face of it, the first section of the resolution might be interpreted as contemplating four separate and unrelated agreements, such it is understood, is not the union's interpretation. If the proposal for district negotiations be accepted by the operators, it is intimated that the first agreement to pass the approval of the policy committee would be used as the basic agreement upon which contracts for other states and districts would be based, subject to such differentials and other modifications as conditions peculiar to the other states and districts might justify.

While the policy committee report makes no specific mention of the union proposal to make the joint conference a continuing body it is believed that the language of the report is broad enough to make possible a revival of this plan, put forward by John L. Lewis, president of the United Mine Workers, at Miami.

Explaining the general purpose of the committee's program, Mr. Lewis said:

"We are going as far as is humanly possible to avoid a suspension. We say that while we talk this thing over we shall not fight. That is ordinarily considered a reasonable thing to do.

"At Miami we offered to continue work in the outlying districts where operators said they would continue to confer with us. Now we are giving the Central Competitive Field the same opportunity. The attitude of the operators is that they do not want any more interstate conferences. Well, here is a chance to make district agreements. They say that conditions in each state are different. Very well; let them make district agreements.

"In the past the operators have complained that we were not willing to remain at work pending wage negotiations. This resolution shows we are willing to accommodate them."

In his talk with the newspaper men after the meeting, Mr. Lewis declined

to be drawn into any discussion of the union's plans for action in the non-union districts of the South. As far as can be learned, however, the organization's efforts to revive joint negotiations in the formerly organized districts of western Kentucky and northern West Virginia have failed. In both sections operators have declined to meet with union scale committees.

Despite the latest action of the policy committee it seems reasonably certain that practically all of the Central Competitive Field mines will suspend operations on March 31. Apparently no formal notices of suspension will go out from union headquarters, but district officials will handle the situation. Unless there should be a last-minute change a suspension also will take place in the Southwest and at the association mines in Iowa.

Barring some surprise move in the unorganized fields of the South it seems most likely that the focal point of the union attack will be in western Pennsylvania, with the Pittsburgh Coal Co. the immediate objective. The first gun in that campaign was fired last week when Ellis Searles, editor of the *United Mine Workers' Journal*, filed charges with the executive board of the Council of Churches of Christ assailing conditions at the operations of the Pittsburgh Coal Co. C. E. Leshar, executive vice-president of the company, immediately countered with a reply, stating that his organization would be pleased to have the Council of Churches examine and investigate the towns and villages in which its employees live.

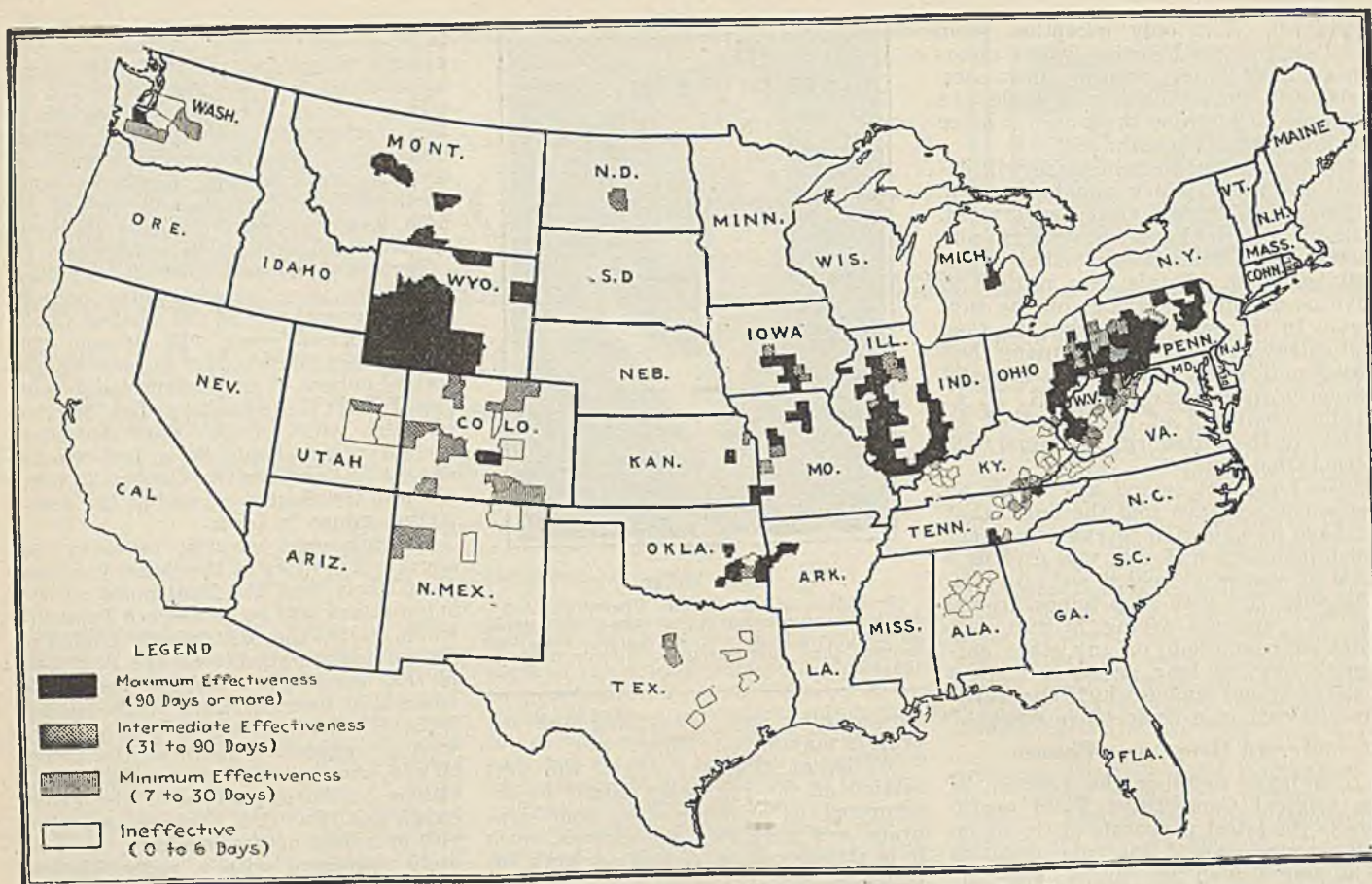
"The Pittsburgh Coal Co.," said Mr. Leshar, "believes that both with respect to living and working condition, as well as earnings, conditions are now better than when our mines were operated under contract with the United Mine Workers."

Suspension Area Limited

With the area of suspension limited to the Central Competitive Field, the organized mines of the Southwest and part of Iowa, the situation is in striking contrast to conditions encountered in 1919 and in 1922. In the former year, which marked the beginning of Mr. Lewis' leadership of the union, at one time or another 71.6 per cent of the bituminous miners of the United States were on strike.

Barring country banks and local stripping operations, the tie-up was complete in Illinois, Indiana, Ohio, western and northwestern Pennsylvania, Tennessee, a large part of eastern Kentucky, Michigan, Iowa, Arkansas, Oklahoma and Washington. Kansas and Missouri production was hard hit and there was little tonnage mined in Montana and Wyoming. Northern West Virginia was down and the majority of the miners in the New River, Kanawha and Panhandle districts were on strike. Alabama also was affected.

When the long suspension of 1922 started an unexpired contract kept most of the miners in western Kentucky at work. There were minor defections in Indiana and Ohio and some losses in union effectiveness in West Virginia, Tennessee, southeastern Kentucky and the Southwest. Alabama miners re-



How the 1922 Suspension Affected Bituminous Production

This map, based upon statistics collected by the United States Geological Survey, shows the maximum effectiveness of the general strike in 1922 in the coal producing states of the country. The number of days each field was down was determined by

taking the average number of days lost through strikes per man employed. The map also shows the anthracite districts. It makes an interesting companion piece to the map appearing on p. 146 of *Coal Age* for Jan. 27, 1927.

remained at work; northeastern Kentucky and Harlan County were little affected. On the other hand, gains were made by the union in central Pennsylvania, Connellsville, Somerset and Westmoreland counties.

All told, the 1922 suspension affected 73.3 per cent of the mine workers. As appears from the map on this page, however, these men were not all involved at the same time nor were they out for the same length of time. The Central Competitive Field, the Southwest, Montana, Wyoming and parts of central Pennsylvania were the areas in which the United Mine Workers was then the strongest. Effectiveness also was high in the Cumberland-Piedmont, Fairmont and Kanawha sections.

At the present time not even the Central Competitive Field is solidly union. There is some tonnage not mined under contract in Illinois, but this does not enter the ordinary channels of trade and may be disregarded. Southern Indiana produces some commercial tonnage which is not mined under union contract. At the end of 1925 it was reported that there were over 100 mines which did not recognize the union and these operations produced nearly 700,000 tons.

For the past two years there have been non-union operations in the Pomeroy Bend section of southern Ohio. In western Pennsylvania the Pittsburgh Coal Co. and the Bethlehem Mines Corporation have been targets of attack because they have broken away from the union. In the Southwest

the union has lost ground in both Arkansas and Oklahoma. Western Kentucky has been non-union since 1924. The Cumberland-Piedmont section has passed from union control and apparently only a shadowy organization remains in West Virginia, Tennessee and eastern Kentucky.

Not only, therefore, is the public at large made more secure by increasing non-union capacity and the narrowing of the actual theater of conflict in the union bituminous districts but consumers also are better fortified in the matter of stocks of coal on hand than ever before in history. On Armistice Day, 1918, it was estimated that consumers had approximately 63,000,000 tons in storage. No figures are available for Nov. 1, 1919, when the strike that led up to the arbitration award which is the basis of the Jacksonville scale of wages started. On April 1, 1922, it was estimated that stocks in the hands of consumers again totaled at least 63,000,000 tons.

The figures for Jan. 1, 1927, placed the total then in the stockpiles of the consumers at 55,000,000 tons. This total was exclusive of several million tons in transit and 5,567,000 tons on the docks at the upper lake ports. Production the first quarter of the year probably will be close to 170,000,000 tons. Taking the high consumption estimate for the last quarter of 1926, plus current exports, and this output would exceed immediate requirements by approximately 20,000,000 tons.

As a matter of fact, it is doubtful if

the estimate of 11,200,000 tons weekly consumption during the last quarter of 1926 would hold good for the first quarter of 1927. But even if it did, the total storage reserve, including dock and transit coal, would be considerably in excess of 85,000,000 tons. The non-union mines and the union operations outside the zone of suspension can easily produce 8,500,000 to 9,000,000 tons a week. With stockpiles to be drawn upon to bridge the gap between this production and actual weekly consumption, it would be months before the public felt any real pinch. Where the rub may come is in uneven distribution of stocks or in an unlooked-for spread of the strike zone.

Bethlehem Coal Output Gains

Coal production by the mines of the Bethlehem Mines Corporation in 1926, according to the annual report of the Bethlehem Steel Corporation, the parent company, totaled 7,295,356 gross tons, an increase of 964,110 tons over the output for the preceding year.

The company has developed coal properties in the vicinity of Ellsworth, Heilwood, Johnstown, Marianna, Slickville and Wehrum, in Pennsylvania, and near Fairmont and Morgantown, W. Va. These properties are estimated to contain 834,323,000 tons of coal and are equipped to produce 10,000,000 tons per year. The equipment includes 2,198 70-ton and 1,690 50-ton standard-gage cars for transporting coal from the mines to the steel plants.

Inroads of Coal from Southern Fields In Northern Markets Strikingly Shown By Figures on Traffic to New England

By Paul Wooton

Washington Correspondent of *Coal Age*

The familiar story of the displacement of Northern by Southern coal is told strikingly by the figures showing the movement into New England. Of the 20,000,000 odd tons of bituminous coal that New England ordinarily consumes per year, about one-half came in all-rail in the years immediately following the war. This profitable business fell largely to Pennsylvania and the bulk of it to the unionized mines of central Pennsylvania. Far different was the showing in 1926. In this latter year the receipts of all-rail coal were 8,000,000 tons. The coastwise receipts ran close to 13,000,000 tons, the largest in any year since the war except 1923 and 1925.

The 1926 receipts of New England ports by tidewater comprised 62 per cent of the total; thus receipts by rail dropped to 38 per cent. This in itself shows heavy displacement of Northern by Southern coal, as the bulk of the shipments by tide come from non-union districts; but this does not tell the whole story. A great shift has occurred in the source of the coastwise receipts themselves.

New York Shipments Drop

The tidewater piers at New York furnished New England 2,500,000 tons in 1918 and 2,700,000 tons in 1920. In 1924 shipments from New York dropped to 1,016,000 tons and in 1926 they fell even lower to 973,000 tons. Thus the Pennsylvania fields and especially the union fields in Pennsylvania have been losing in the movement both by tide and by rail, as the following table shows:

PER CENT OF COASTWISE SHIPMENTS TO NEW ENGLAND ORIGINATING AT FOUR PORTS

	Hampton Roads	Baltimore	Philadelphia	New York
1919.....	62.6	1.5	5.9	30.0
1920.....	58.7	7.5	7.7	26.1
1923.....	71.3	9.0	6.7	12.0
1925.....	83.2	5.7	3.5	7.6
1926.....	81.2	7.5	3.8	7.5

It will be noted that the two ports south of the Mason and Dixon line have increased their share of the New England trade. This is true of Hampton Roads in particular. Its percentage has risen from 62.6 in 1919 to over 80 in 1925 and 1926. Philadelphia contributed about one-half as large a fraction as before. The great shrinkage, however, has occurred at New York. In 1919 30 per cent of the coastwise tonnage for New England was dumped over the piers of New York harbor. In 1925 and 1926 this fell to 7½ per cent.

All of this is pointed out in the representations which have been made to the Interstate Commerce Commission by the Northern operators in the Eastern coal rates investigation (I.C.C. Docket 15006). It is shown clearly that the forces bringing about this change arise primarily from differences in cost of production, due chiefly to the

differences of labor cost. In one brief the story is told graphically. A map shows the territory in New England which was competitive between central Pennsylvania all-rail and Hampton Roads in 1900, and again in 1926. In 1900 the competitive area was about twenty-five miles from the coast. Within that boundary all-rail coal from Pennsylvania dominated the market. Now the whole of southern New England, it is shown, is competitive territory, in which central Pennsylvania meets severe pressure from Hampton Roads coastwise shipments. Of course the Pennsylvania operators present this as an argument for readjustment of freight rates, but it also is startling evidence of the shift of business which has come about through the great difference between union and non-union labor costs.

Another striking point in this connection is that Pennsylvania has lost to Hampton Roads no less than 3,000,000 tons of the local New York harbor business.

South's Industrial Growth And Future Appraised

The Southern Industrial Conference, under the auspices of the Southern division of the American Mining Congress, held its session at the Tutwiler Hotel, Birmingham, Ala., March 21 and 22. There was a large attendance of industrial and civic notables and prominent industrial and mining engineers and geologists, and many interesting addresses were made and papers read touching on the industrial progress of the South and its potential industrial possibilities.

The opening session was presided over by C. J. Griffith, of Arkansas, chairman of the board of governors, and the visitors were welcomed by Governor Bibb Graves. J. F. Callbreath, secretary, American Mining Congress, responded. An address on "Transportation and Industry" was delivered by W. L. Stanley, vice-president, Seaboard Air Line Ry., and J. A. Emery, of the National Association of Manufacturers, spoke on "Industry and Community Development."

At the afternoon session, March 21, presided over by Howard J. Young, Tennessee member of the board of governors, there were addresses by McKinley W. Kriegh, chief of tax division, American Mining Congress, on "Simplification of Federal and State Taxation Problems"; M. O. Leighton, consulting engineer, Washington, "The Partnership of Coal and Water Power," and by E. F. Burchard, geologist, U. S. Geological Survey, whose subject was "The Iron Ore Situation in the South."

At an informal dinner in the evening of March 21 Dr. Henry Mace Payne, consulting engineer of the

Principles of Overhead Costs Explained

Fundamental principles to be taken into account by industries in the proper treatment of overhead costs are set forth in a pamphlet, "The Evolution of Overhead Accounting," just issued by the Chamber of Commerce of the United States.

The foreword of the pamphlet states that "It is now generally recognized that overhead is the most important factor in cost accounting. Yet, until comparatively recently, even with improved methods in accountancy, the overhead content in the cost of a commodity has been roughly estimated or guessed at. Increasing competition, refinements in machinery and production methods and intelligence used in management have brought to the front the problem of more accurately measuring overhead."

The Chamber's Department of Manufacture, aware of the confusion among manufacturers over treatment of overhead, has just completed a special study of the best methods of accounting procedure. The material developed is used as a basis for the pamphlet.

The pamphlet is intended to be useful to all lines of industry. It is divided into two parts. The first is devoted to the history of overhauling accounting, showing various stages in the development of modern practice in such manner as to make clear the fundamentals in the accounting that are today recognized as important. The second part offers some suggestions to the manufacturer who wishes to improve his accounting procedure.

E. W. McCullough, manager of the Chamber's Department of Manufacture, announces that a copy of the pamphlet will be sent to any executive requesting it.

American Mining Congress, occupied the chair and a number of interesting papers were read, among which was one by J. H. Hand of the department of geology and mines, Arkansas, on "The Wonder State." James L. Davidson, secretary of the Alabama Mining Institute, spoke on "Advances in Safety Work." The evening session was presided over by Lee Long, Clinchfield Coal Corporation, and after the reading of several papers, committee reports were made, officers elected for the ensuing year and the business sessions adjourned. R. G. Brown, Louisville, Miss., was elected chairman of the board of governors.

The visitors and delegates to the convention visited the steel plant, rail mill and ore mines of the Tennessee Coal, Iron & Railroad Co. on a special train provided by the corporation, the Louisville & Nashville Ry. and the Alabama Mining Institute.

Accidents in Coal Mines Killed 162 in February; Rate Lower Than in 1926

Accidents in the coal-mining industry of the United States in February, 1927, caused a loss of 162 lives among the employees, according to information received from state mine inspectors by the U. S. Bureau of Mines. One hundred and twenty-nine of this number were killed in the bituminous mines in various states and the remaining 33 occurred in the anthracite mines of Pennsylvania.

The output of bituminous coal for the month was 52,904,000 tons, showing a fatality rate of 2.44 per million tons of coal produced. The fatality rate for anthracite mines was 5.64, based on a production of 5,852,000 tons. The combined rate for bituminous and anthracite mines was 2.76, based on 162 fatalities and a production of 58,756,000 tons of coal. The February rates a year ago were 3.71 for bituminous, 4.32 for anthracite, and 3.74 for both classes of mines.

During the first two months of 1927 the production of bituminous coal amounted to 109,786,000 tons while the anthracite output was 12,413,000 tons. The combined fatality rate per million tons for these two months was 2.66 for bituminous mines as compared with 4.94 for the same period last year, and 6.04 for anthracite mines as compared with 5.32. For both classes of mines the two-months rate was 3 for 1927 and 4.95 for 1926.

Comparative rates for the two-months periods of 1926 and 1927 follow:

Our Industrial Philosophy Praised by Benn

A notable luncheon gathering in London on March 23, which included Gordon Selfridge, says the *New York Times*, heard Sir Ernest Benn, the English writer and publisher, define in a manner flattering to American ears the difference between the American and British industrial philosophies.

"John Bull says to his sons: 'You are good fellows. Do the best you can, but don't kill yourself at it. We were not made for work. A happy life is what you came here for. If you find things too hard, there is the insurance fund or the dole and the old-age pension at your service.'

"Uncle Sam says to his sons: 'You are a man. You are as good as any other man and anything which any other man can do you can do, if you will try. Life is not a bed of roses, so get up, get out and be quick about it. Above all, remember that America is destined to lead mankind and you are an American citizen.'"

	Year 1926	Jan.-Feb. 1926	Jan.-Feb. 1927
All causes.....	3.739	4.547	3.003
Falls of roof and coal.....	1.829	1.912	1.448
Haulage.....	.650	.673	.622
Gas or dust explosions.....	.636	1.766	.164
Explosives.....	.143	.098	.155
Electricity.....	.143	.146	.131

Steel Corporation Mines Increase Coal Output

Output of the coal mines of the United States Steel Corporation during 1926 totaled 34,294,657 tons as compared with 31,475,568 tons in the previous year, an increase of 2,819,089 tons, or 9 per cent, according to the annual report. During the same period the coke manufactured amounted to 17,336,334 tons, a gain of 1,035,110 tons, or 6.3 per cent, over that of 1925. Of the coal mined 25,659,335 tons was used in the manufacture of coke and the balance for steam, gas and all other purposes.

The corporation owns 99 coal mines of which 19 produce coal exclusively for use in beehive coke ovens located near the mines, 15 other mines serve in a similar capacity but in addition are large shippers of coal, while all the remaining mines are coal shippers exclusively.

There are 16,118 beehive ovens and 3,284 byproduct ovens. Of the former 2,905 are inactive.

On its coal and coke properties the Corporation during 1926 had 25,985 employees, a gain of 65 over the previous year.

It is not likely that the subject of coal will appear on the program of the Institute of Politics, Williamstown, Mass., this year. W. W. McLaren, executive secretary of the Institute, is the authority for this statement, and in the event the plan is changed the National Coal Association will be consulted respecting any coal program that might be arranged.

Coal-Mine Fatalities During February, 1927, by Causes and States

(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground										Shaft				Surface				Total by States							
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Explosions of gas or coal dust.	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1927	1926
Alabama.....	5	1									1	7													7	2
Alaska.....												2													0	1
Arkansas.....												5													5	3
Colorado.....	1	1			3							5												11	16	
Illinois.....	3		3		1							10												6	5	
Indiana.....	6		1				1					5			1									1	3	
Iowa.....	2											2												2	1	
Kansas.....	2											1												10	15	
Kentucky.....	6		4									10												0	15	
Maryland.....																								0	1	
Michigan.....																								0	1	
Missouri.....																								0	0	
Montana.....			1									1												1	1	
New Mexico.....	1											1												1	0	
North Dakota.....						1						2												2	9	
Ohio.....	7		2									9												2	10	
Oklahoma.....			1									2												2	2	
Pennsylvania (bituminous).....	17	2	5					2				26										1	1	27	52	
South Dakota.....																								0	0	
Tennessee.....																								0	3	
Texas.....																								0	0	
Utah.....	1		1									2											3	5	1	
Virginia.....	2											3												3	8	
Washington.....		1										2												2	1	
West Virginia.....	11		13		1		3					28		1				1	3	1			4	33	48	
Wyoming.....																								0	0	
Total (bituminous).....	64	5	31	2	6		6	2		2		118		1	1		2	3	1			2	3	129	173	
Pennsylvania (anthracite).....	6	6	4	4	2					7		29												33	9	
Total February, 1927.....	70	11	35	6	8		6	2		9		147		1	1		2	3	2			4	4	162		
Total February, 1926.....	79	10	29	29	7		8	5		3		171		2	1		3					3	5	182		

C. & O. Gets 2 Short Lines; May Obtain Third

Conditional approval of the application of the Chesapeake & Ohio Ry. to acquire control of the Greenbrier & Eastern Ry. by purchase of its capital stock and by lease was recommended March 28 in a tentative report by Examiner Thomas F. Sullivan to the Interstate Commerce Commission. The road extends from Marfrance, W. Va., to a junction with the Sewell Valley Ry., a distance of eleven miles.

While the unification was held to be in the public interest, the I. C. C. was advised to order the C. & O. not to pay more than \$125 per share for the 10,000 shares of the Greenbrier stock outstanding, instead of a price in excess of \$140 a share.

The Commerce Commission has authorized the C. & O. to acquire control by purchase of capital stock and by lease of the Sewell Valley R.R., a 21-mile line in West Virginia, and the Loop & Lookout R.R., a 19-mile line, also in West Virginia. The C. & O. will pay \$1,000,000 for the stock of the Sewell Valley and Lookout roads and assume obligation on \$300,000 of Sewell Valley bonds.

Plans Maturing To Connect L. & N. with C. C. & O.

According to word from Richmond, the Louisville & Nashville R.R. is going ahead with plans for road construction in Virginia to connect its Harlan division with the Carolina, Clinchfield & Ohio R.R. in Virginia, as its outlet to the Carolinas and South Atlantic seaboard.

The road will construct a branch line from a point near Hagan, Va., northward to a point two miles from the Kentucky boundary which is to connect with the company's Martin Fork branch in Harlan County, Kentucky. Another offshoot will be built which will start from a point near Hagan and connect with the Carolina, Clinchfield & Ohio at or near Speers Ferry, in Scott County, Virginia.

Frick Orders Mine Cars

The H. C. Frick Coke Co., Pittsburgh, Pa., a subsidiary of the United States Steel Corporation, has ordered 1,254 mine cars as follows: 854 cars from the Lorain Steel Co., 200 from the Phillips Mine & Mill Co., and 200 from the Watt Car & Manufacturing Co.

The New York Central is in the market for 1,000 hoppers of 70 tons capacity, 1,000 gondolas of 70 tons and 500 of 55 tons.

The Southern Pacific Ry. has ordered 1,000 gondolas from the Standard Steel Car Co.

The chief coal-shipping ports on Lake Ontario—Oswego, Sodus Point and Fair Haven—will be opened on April 1 and lights will be displayed. Ice conditions on this lake are unusually favorable this year and vessels with coal will probably start out early.

World Coal Output Declined Slightly In 1926 Due to British Strike

The world's production of coal and lignite in 1926 was approximately 1,355,000,000 metric tons, practically the same as in 1924 and 1925, according to the U. S. Bureau of Mines. The decline in the output of the United Kingdom caused by the great strike was largely offset by increases in the other principal producing countries, particularly in Germany and the United States. The output of Great

Britain dropped from 247,000,000 to about 127,000,000 tons, while in Germany the output of bituminous coal rose from 132,729,000 to 145,362,000 tons.

The following table presents the information for 1926 thus far received by the Bureau of Mines. The figures are taken from such official sources as are available, supplemented by trade information, and are subject to revision.

Coal Produced in Principal Countries of the World In Calendar Years 1924, 1925 and 1926¹

(In metric tons of 2,204.6 lb.)

Country	1924	1925	1926
NORTH AMERICA:			
Canada { Coal.....	9,138,841	13,134,968	{ 11,675,633 3,254,267
{ Lignite.....	3,233,459		
United States:			
Anthracite.....	79,765,491	56,079,281	77,000,000
Bituminous and lignite.....	438,790,754	471,781,446	524,613,000
Other countries.....	(2) 2,098,000	(2) 2,013,000	(2)
SOUTH AMERICA:			
EUROPE:			
Belgium.....	23,361,910	23,097,040	25,319,570
Czechoslovakia:			
Coal.....	15,178,942	12,754,456	14,408,172
Lignite.....	20,459,690	18,789,098	18,613,900
France:			
Coal.....	44,011,240	47,047,630	52,477,972
Lignite.....	944,180	1,007,270	
Germany:			
Coal.....	118,768,748	132,729,095	145,362,900
Lignite.....	124,637,201	139,804,258	139,877,407
Saar (2).....	14,032,120	12,989,850	(4)13,581,000
Hungary:			
Coal.....	744,394	805,019	826,906
Lignite.....	6,333,286	5,520,760	5,822,299
Netherlands:			
Coal.....	6,180,182	7,116,970	8,651,000
Lignite.....	191,202	207,623	
Poland:			
Coal.....	32,224,680	29,080,499	35,356,134
Lignite.....	88,038	65,576	(4)73,000
Russia.....	(5)13,918,000	(5)14,334,970	(5)(6)25,300,000
Spain:			
Coal.....	6,127,586	6,117,342	(4)6,310,000
Lignite.....	411,773	402,690	(4)354,000
United Kingdom:			
Great Britain.....	271,405,414	247,079,210	127,589,000
Ireland.....	(2)	(2)	(2)
Other countries.....	(2)	(2)	(2)
ASIA:			
China.....	20,969,000	13,800,000	(2)
India, British.....	21,514,131	21,239,892	(4)21,000,000
Japan (inc. Taiwan and Karafuto):			
Coal.....	31,816,662	(2)	(2)
Lignite.....	176,764	(2)	(2)
Other countries.....	(2)	(2)	(2)
AFRICA:			
Rhodesia, Southern.....	591,526	689,201	874,140
Union of South Africa.....	11,819,988	12,321,728	12,850,000
Other countries.....	(2)	(2)	(2)
OCEANIA:			
Australia:			
New South Wales.....	11,804,688	11,579,108	10,700,000
Other States.....	2,303,156	3,156,914	(2)
New Zealand:			
Coal.....	1,102,418	1,044,726	(2)
Lignite.....	1,014,224	1,070,269	(2)
Total.....	1,357,000,000	1,361,000,000	1,355,000,000

(1) Prepared by U. S. Bureau of Mines. (2) Estimate included in total. (3) Territory under French control. (4) Estimated from monthly figures as follows: The Saar, Poland (lignite), Spain, 11 months; India, 10 months. (5) Data for year ended Sept. 30. (6) Russia in Asia included under Russia in Europe.

Anthracite Circular Prices for April at New York

(Per Gross Ton, F.O.B. Mines)

	Broken	Egg	Stove	Nut	Pea	No. 1 Buckwheat	Rice	Barley
Lehigh Coal & Navigation Co.....	\$8.35	\$8.35	\$8.85	\$8.35	\$6.00	\$2.50	\$2.25	\$1.50
Lehigh Valley Coal Sales Co.....	8.25	8.25	8.85	8.25	6.50	3.00	2.00	1.50
Lehigh & Wilkes-Barre Coal Co.....	8.25	8.25	8.75	8.25	6.50	2.50	2.00	1.50
Hudson Coal Co.....	8.25	8.25	8.85	8.25	6.00	2.50	2.00	1.50
Philadelphia & Reading Coal & Iron Co.....	8.25	8.25	8.85	8.25	6.50	3.00	2.25	1.75
Delaware, Lackawanna & Western Coal Co.....	8.25	8.25	8.75	8.25	6.50	2.75*	2.00	1.50
M. A. Hanna & Co.....	8.25	8.25	8.85	8.25	6.00	2.75	2.00	1.50
* Domestic buckwheat, \$3.50. ♡								

Engineers Meet at Wilkes-Barre.—Attendance at the monthly meeting of the Engineers Society of Northeastern Pennsylvania, held at Wilkes-Barre, March 26, was unusually large. William A. Skinner, general counsel, consolidated Workmen's Compensation

Bureau of Scranton, Pa., spoke on the development and trend of changes in workmen's compensation laws. F. C. Hohn, consulting engineer, gave an illustrated talk on the details of construction and maintenance of mine tracks.



News Items From Field and Trade



COLORADO

Output Ahead of Last Year.—Coal mines in Colorado produced 940,286 tons of coal in February, an increase of 190,780 tons over the total for the corresponding month a year ago, when 749,506 tons was produced. Total output in January and February was 274,944 tons greater than in the first two months of 1926.

William Young of Pueblo has been named by Governor-elect Adams as a member of the Industrial Commission, which handles labor problems. Mr. Young will succeed R. T. Bell, whose term expires May 1.

Clinton L. Oliver, connected with the McCleary interests at Excelsior Springs, Mo., will go to Colorado in June and take up the promotion of his coal properties.

ILLINOIS

A suit for \$100,000 damages against the Donk Brothers Coal & Coke Company was authorized by the Madison County Board of Supervisors at Edwardsville on March 22. It is claimed by the Madison County authorities that the building of the Madison County Tuberculosis Sanitarium south of Edwardsville was damaged through settling because of a mine owned by the Donk Brothers company. The mines were operated before the building was erected. The company has denied responsibility, contending that faulty construction was responsible for the settling of the building.

INDIANA

The Enos Coal Co., which operates the large strip mine in Pike County just east of Princeton, one day recently loaded 83 car loads of coal, which was the record up to that time, has since loaded 88 cars in a day with a total of about 4,300 tons.

The Knox Consolidated Coal Co. has started rock-dusting its mines in Knox County, as required by House bill 132, recently signed by Governor Jackson. American No. 2 mine is the first mine to start the work and is one of the four mines owned by this coal company.

Would Boycott Company Stores.—The United Mine Workers of Indiana at their recent state convention in Terre Haute, went on record as favoring the insertion of a clause in the district constitution which would penalize its members for patronizing commissaries or company stores except for supplies actually used in the mining of coal, but action under this provision is withheld until the state and national

legal departments of the organization have passed on its legality. At present many of these company stores handle almost everything in the way of clothing, dry goods, shoes and similar merchandise and the action, if it is declared legal, would put many of them entirely out of business.

KENTUCKY

Union Man Fired, 300 Walk Out.—The Beech Creek Coal Co., at Beech Creek, in the western fields of the state, had a walkout of 300 men on March 21, as a result of the company discharging Ray Mellory, who attended a district union convention, and was named a member of the wage scale committee of District 23, United Mine Workers. When he returned the company discharged him for being absent without leave. The men struck, contending that they would not work until he was put back.

Coal Field Deal Pending.—Reports from Morehead and Mt. Sterling on March 21 were to the effect that work had started in placing values on property of the Northfork R.R., the Lennox R.R. and Rush Fork cannel coal fields, involving about 50,000 acres of land containing timber, coal and fireclay. It was stated that Chicago capitalists were interested in purchasing and developing the properties, and that the pending purchase would involve around \$2,000,000. The Northfork line is 20 miles long, from Morehead to Wrigley, in Morgan County, and taps rich cannel coal property, while the Lennox R.R. runs to Redwine, in the same field.

Clifford Off, president, and George S. Ford, vice-president of the Groveland Coal Mining Co., Chicago, along with R. W. Hunter, of Louisville, another vice-president in charge at Louisville, have returned from the Harlan fields, where they have contracted for the entire output of a mine with a capacity of 35 to 40 cars a day.

OHIO

Expect Passage of Amended Code.—The amendments to the Ohio mining code contained in House Bill No. 206, by Representative Roberts of Belmont County, was passed by the Ohio House of Representatives March 22 as a special order. The bill now goes to the Senate with excellent chances for passage. The bill is a compromise measure with practically every operator in the state agreeing to its provisions and also having the support of the Ohio miners' union. The bill amends the present code in a number of ways, chiefly by providing for the

use of rock dust, restraining the drilling and filling up of wells in mines, limiting the number of people on mine cages, providing for regulation of electrical installations in mines and along other lines.

PENNSYLVANIA

Umpire Neill of the anthracite conciliation board has just handed down a decision hitting at trouble makers within the ranks of the miners' union. The umpire sustains a coal company which refused to employ a man who had caused an illegal strike at one of its collieries. The coal company said this strike was in violation of an agreement with the miners' union and that the management was justified in its stand. The union contended that the company was discriminating against the employee but the umpire finds that under the existing circumstances the operating concern had a right to deem the employee an undesirable and to refuse him a position on that account.

The Lehigh Valley Coal Co. has turned down the request of the miners' union in regard to the rate of pay to five men who were entombed for eight days in a mine at Tomhicken, near Hazleton. In paying the men the company gave them credit for two extra shifts but the union felt as though the workers deserved credit for three shifts for each day they were held in the mine. The coal company management bases its refusal to pay for 24 shifts on the ground that the men were held in the mine "through an act of God" and that there is no such contingency provided for in the agreement which exists between the companies and the union. One man who was trapped in the Tomhicken mine was never found. The other five resumed their jobs about a week following their rescue.

Reckless Mining Charged.—Two warrants for the arrest of Robert Barron, head of the Barron Coal Co., operating in South Scranton, were issued March 23 at the instance of District Attorney Harold A. Scragg. The warrants charge Barron with wilfully and unlawfully wrecking two city streets in the Twentieth Ward, South Scranton, as a result of mining by the Barron company under the surface. The District Attorney's move for prosecution follows receipts of a petition a week ago from fifty property owners and taxpayers who reside over workings of the Barron company.

Stock Offered at Record Prices.—A block of 250 shares of Mahoning Coal Railroad Co. stock, having a par value of \$50, was offered at \$1,000 a share last week by a New York investment



Rope Centering Sheaves at Bonny Blue Coal Co., Bonny Blue, Va.

The horizontal distance between the 1½-in. ropes is approximately 12 in. at the incline machine and is 66 in. at the track. The monitors are of the drop-bottom type and have a capacity of 20 tons each. The incline is 3,400 ft. long, and the vertical drop 1,000 ft. The rope is "doped" once a month but gets dry and bright on the outside five days after treatment. After eight months' use the present rope shows many broken wires. The former rope lasted thirteen months.

house. This is the highest price at which this stock has ever sold. A year ago the same firm offered 1,000 shares between \$850 and \$900 a share. The company pays 100 per cent in cash on its stock, and its balance sheet shows a surplus of 600 per cent. The Mahoning Valley is a link in the only route the New York Central has to Pittsburgh and Youngstown.

Would Gradually Abolish Tax.—A new plan for abolishing the anthracite tax is provided for in a bill introduced in the House at Harrisburg March 22. This bill, which was introduced by Representative Jones, Luzerne County, provides that during 1927 and 1928 the coal tax be imposed at 1½ per cent, as it has been. In 1929 and 1930 it is proposed that the tax be reduced to 1 per cent, and after 1930 that no tax be collected.

UTAH

The Fleming Coal & Coke Co. has been organized at Salt Lake City with a capital of \$1,000,000 in 2,500,000 shares. The new company has a government lease in Emery County which, it is stated, is valued at about \$200,000 and which represents stock in that amount fully paid up. It is planned to spend approximately \$300,000 in building a spur track from Woodside, four miles distant on the Denver & Rio Grande R.R., and a tippel at the mine, according to Wallace B. Kelly, County Attorney for Salt Lake County, who is secretary and a director of the new company. The property includes 1,800 acres of land, which, it is stated, contains rich coking coal deposits.

WASHINGTON

Pacific Coast Earnings Drop.—Pacific Coast Co. and subsidiaries report for the year ended Dec. 31, 1926, net income of \$161,809 after taxes, interest, etc., compared with \$285,338 in 1925. The decline in earnings was due to smaller tonnage of coal sold. In re-

viewing the year, Walter Barnum, president, said the flow of California oil made difficult the position of the coal industry in the State of Washington. The situation has been further complicated, he said, by the fact that 1926 was and part of 1927 will be a period of transition, with the company changing from older and deeper to new and shallower mines, easier and less costly to operate. Low market prices for coal hastened this change and made necessary abandonment of some older mines which otherwise might have operated a few years longer.

WEST VIRGINIA

At a meeting of the directors of the Hatfield Reliance Coal Co., which owns extensive mining property and mines in West Virginia, held March 16, in Cincinnati, Ohio, J. T. Hatfield was re-elected chairman of the board of directors and Irvin Davis, president. Other officers are: Vice-presidents, Julius Fleischmann, J. T. Hatfield, Jr.; secretary, F. J. S. Bramlege; treasurer, William M. Miller; assistant secretary-treasurer, August Helm.

A jury investigating the responsibility for the death of four men at the mine of the Central Pocahontas Coal Co. at Shannon Branch on Jan. 19 found that the explosion was caused "by negligence of the machine crew in not making proper examination before entering the working place" and probably by the dangerous practice of what they call "nipping on the trolley wire from cable hook."

WYOMING

Shields Claims Settled.—Settlement of miners' and other claims against the Mark Shields estate is believed to presage stripping development near Gillette. The case was settled out of court. Four years ago Mr. Shields, who was president of the Bank of Gillette, was instrumental in opening the Peerless mine. When difficulties arose

he killed himself, and since that time the mine has been shut down except for a short period when it was operated by the Kirby Coal Co. The property contains a seam of coal 80 ft. thick, which is close enough to the surface to permit strip mining. One strip mine is now in operation a short distance east of the Peerless mine. This is owned and operated by the Homestake Mining Co. of Lead, S. D.

McAuliffe Closes Two Mines.—The Union Pacific Coal Co. has closed down its No. 2 mine, at Rock Springs, and the D mine at Superior, for an indefinite period. George B. Pryde, general manager, states that all the employees of the two mines will be absorbed by other mines belonging to the company, those with families being placed in Rock Springs mines and at Superior and the single men being cared for in Winton and Reliance mines. The closing of these mines means no reduction of output in the district, which is up to normal for this season of the year.

CANADA

Besco Reorganization Planned.—Formal notice has been issued to shareholders of the British Empire Steel Corporation calling a special general meeting on April 14 to consider what action should be taken with respect to the application which has been made to the Supreme Court of Nova Scotia looking to the appointment of a liquidator of the corporation and possibly of one or more of its constituent and subsidiary companies. Special meetings of each class of shareholders have also been called. In a letter accompanying the notices of meetings, President Roy M. Wolvin states, in part: "Your directors have realized the importance of the earliest possible reorganization of the corporation and its subsidiaries, but so many different classes of senior and junior securities are involved that it was considered unwise to submit any plans for your consideration until the assistance to be given by the government to the steel industry was known."

The Crow's Nest Pass Coal Co., Fernie, B. C., has let a contract for a 750 ft. tunnel to open up the A seam at its Michel Colliery. The tunnel will be a main-haulage tunnel, 12 ft. wide by 7½ ft. high, driven on a 7 per cent grade. The contract calls for the completion of the work in three months. The company's Michel and Coal Creek collieries are being operated on full time, and the district is experiencing a period of prosperity, the like of which has not been known for many years.

The British Colonial Co. of Toronto is preparing to expend \$100,000 in testing and proving its coal properties in the Larchwood area in the Sudbudy district of Ontario. The properties of the company comprise 12,500 acres of prospective coal lands, under option. A working force has been engaged during the past year sinking a shaft which has reached a depth of 300 feet. This will be continued to reach a wide coal seam occurring at a depth of 400 feet which has been disclosed by diamond drilling.

Among the Coal Men

Hiram Blauvelt, vice-president of the Comfort Coal-Lumber Co., Hackensack, N. J., has just returned from two months' trip through the Mediterranean and Europe, having visited Madeira, Gibraltar, Algiers, Naples, Sicily, Malta, Tripoli, northern Africa, Rome, the French Riviera and Paris. Mr. Blauvelt was principally engaged in gathering material for his first book, "In No Sense Abroad," which probably will be completed during the course of the coming year.

Charles Magill, for several years senior geologist with the Southern Pacific R.R., has been given a leave of absence for a period of about ninety days, so he can enter actively upon the coal fields of the Mt. Shasta Coal Co., near Redding, Cal. The coal company has just completed a diamond drillhole on section 17, coal land bought from the Southern Pacific Company. The hole was driven vertically to a depth of 901 ft. The coal company will at once start drilling another hole on section 18. These two drillings are on what is known as Bullsken Hill.

C. W. Nelson, formerly safety engineer for the Hillman Coal & Coke Co., has been appointed Kentucky representative for the Mine Safety Appliances Co. of Pittsburgh, Pa., with headquarters in Cincinnati, Ohio. Edward H. Kellogg has been promoted from assistant general sales manager to general sales manager. Ray H. Magee has been named as southern West Virginia representative with headquarters at Mt. Hope. Beach M. Chenoweth and Thomas Brown will be in charge of Tennessee and Alabama territories, respectively, with offices in Birmingham, Ala.

J. E. Graham, of the Cosgrove-Meehan Coal Co., Johnstown, Pa., is one of a number of business men of the Central West and East who have been active in organization, consolidation, etc., in connection with the formation of the new U. S. Rock Asphalt Co., Louisville, with plants in western Kentucky and Alabama having a total daily capacity of 3,000 tons of road-building material.

Roy C. Davidson has been appointed general freight agent of the Chicago, Rock Island & Pacific Ry., with headquarters in Chicago. He succeeds Frederick K. Crosby, deceased. Mr. Davidson will have charge of rate adjustments in Rock Island territory east of the Missouri River. E. A. Groves has been promoted to succeed Mr. Davidson as assistant general freight agent.

George F. Goetz, chairman of the board of the Consumers' Coal Co., Chicago, and a director of the United States Distributing Corp., New York, contemplates an extensive hunting expedition in southeastern Africa with friends next summer. His purpose is to capture beasts of the jungle alive to add to the collection in his large private zoo.

F. O. Sandstrom, appointed assistant secretary of the Rocky Mountain Coal Mining Institute at its recent annual meeting in Denver, has had extensive experience in coal and traffic affairs. From 1904 to 1919 he was



F. O. Sandstrom

general agent of the traffic department of the Colorado & Southern R.R., for the following two years was traffic manager for the Denver Union Stockyards Co. and since that time has been secretary, treasurer and traffic manager of the Colorado & New Mexico Coal Operators' Association.

Joe T. O'Neal, Louisville coal man and attorney, who was barely beaten for Mayor of Louisville last fall, when he was named a candidate forty-eight hours before the election, may yet serve, as the election is being contested and may be thrown out. The case is now before the Court of Appeals. Mr. O'Neal's father had a similar experience in 1905, which resulted in a new election.

Frank D. Rash, president of the Kentucky Mine Owners' Association, former official of the St. Bernard Mining Co. and president of the Inland Waterways Co., Louisville, Ky., is one of the organizers of the new Central Commercial Bank, which is planning to open at once in the Starks Building Annex, Louisville.

The condition of B. M. Clark, president of the Rochester & Pittsburgh Coal & Iron Co., who has been ill in the Roosevelt Hospital, New York City, was reported last week to be unimproved.

Herbert H. Shaver has been appointed assistant general sales agent of the Hudson Coal Co. with offices in Scranton, Pa.

S. S. Bridgers has been appointed chairman of the Coal, Coke and Iron Ore Committee of the Central Freight Association, with headquarters in the Chamber of Commerce Building, Pittsburgh, Pa.

S. B. Jeffries of Thomas, W. Va., has been appointed general manager of the Davis Coal & Coke Co., the main office of which is in Baltimore and having operations in West Virginia. Through a typographical error Mr. Jeffries' name appeared as "Jesse" Jeffries in the issue of Feb. 24.

Capt. W. E. Chilson, managing agent of Pickands, Mather & Co. at Buffalo, N. Y., has been chosen as one of the board of transportation of the Buffalo Chamber of Commerce.

Obituary

Frank Nelson, mine operator, realtor, capitalist and prominent in the civic life of Birmingham, Ala., died there March 25, following an illness of two weeks. He was born in Columbiana, Ala., in 1862, received his early education in the local schools and later attended Oxford College, Oxford, Ala., and the University of Alabama. After several years in the lumber business at Columbiana Mr. Nelson moved to Anniston, where he was engaged in the banking business until he went to Birmingham to devote his attention to extensive interests there. At the time of his death he was president of the Nelson Coal Co., a large distributing organization, and was in control of large coal properties. He also was president of the Alabama Mining Institute and had extensive realty interests.

William H. Warren, aged 64 years, widely known coal operator, died at his home in Richmond, Va., March 21. Mr. Warren was born in Fayette County, West Virginia, spent his early life on a farm and later taught in the public schools. In 1894 he embarked in the coal business and was elected secretary and treasurer of the New River Smokeless Coal Co., which concern operated mines in Fayette and Raleigh counties, West Virginia. He located in Richmond in 1907, engaging in the wholesale and retail coal business, and he continued in this line until 1926, when, owing to ill-health, he retired from active commercial life.

Harvey Cameron Stineman, for many years a prominent coal operator at South Fork, Cambria County, Pa., and a son of the late State Senator Jacob C. Stineman, died at his home at Radnor, near Philadelphia, where he had been residing for three years, on March 19. He also was a brother of State Senator W. I. Stineman. He was president of the South Fork Lumber Co. and operated three mines there. The body was placed in a receiving vault in Grandview Cemetery in Johnstown.

Newell Beeman, widely known in connection with the coal and iron industry of the mountain states for many years and for 31 years superintendent of the Rocky Mountain Coal & Iron Co. and operated three coal mines. is dead at his home in Salt Lake City. Mr. Beeman, who was born in 1844 in New York State, had been actively engaged in the industrial and commercial life of Salt Lake City and the intermountain country since he first came to Salt Lake City in March, 1890.



Production And the Market



Apathy in Soft-Coal Trade Unrelieved by Shadow Of Strike; Anthracite Marks Time

Developments in the bituminous coal markets of the country continue to contradict precedent as the day set for the suspension of mining in the Central Competitive Field approaches. There is scant evidence of apprehension on the part of consumers, and the sentiment of producers is significantly reflected in the fact that during the third week in March production fell below the 13,000,000-ton mark for the first time during a full-time week since the last week in October.

In general an apathetic attitude prevails in the trade both for steam and domestic grades. Here and there, it is true, there has been a slight spurt due to a touch of cold weather, but in practically every instance the effects were only transitory. It is a fact also that there has been sufficient bidding at times on steam tonnage to cause a moderate advance in prevailing spot quotations, but for the most part this has been counterbalanced by recessions elsewhere. Accumulations of "no bills" in some sections have assumed such proportions that price concessions have almost placed circulars in the "scrap of paper" category, particularly on domestic grades.

Storage Buying Spurts

Belated storage buying by purchasing agents in the Middle West last week was about the only bright spot in the dead level of industrial consumer indifference in that section. Even this,

however, was not of sufficient volume to affect prices. The flurry caused an advance in West Virginia smokeless mine-run, but this soon collapsed. Railroad buying is helping the stripping operations move their output. No. 8 Ohio slack and nut-and-slack receded 10c. to 15c. and top prices on southern Ohio mine-run dropped 15c. Western Pennsylvania prices advanced quite generally, based on uneasiness over the labor situation.

Low-Volatile Mine Run Softens

Whatever the next few weeks may bring forth for the non-union producers, the going was not easy for them last week, as further softness marked the course of spot quotations on smokeless mine-run in the Middle West as well as in New England. Movement of 2-in. lump and slack from eastern Kentucky to the lower lake ports was instrumental in maintaining stability in quotations in that field and at the same time lightened the burden of operators who have been plagued with unbilled tonnage. Industrial demand at the Head of the Lakes has been active and spot tonnage has been moving freely; domestic demand, however, has been hampered by mild weather.

The tidewater markets were almost uniformly quiet last week. Apathy was especially marked in New England, where large reserves in the bins of consumers caused lack of interest in the spot market, with a softening ten-

dency in prices. Prices are unchanged at Philadelphia and Baltimore with demand easing. There was little new spot business in the New York market, though contract customers took full quotas and in some instances additional tonnage when inducements were offered. In the central Pennsylvania mining field prices were uneven, pools 1 and 71 advancing 5c. to 15c. and other pools declining 5c. to 25c.

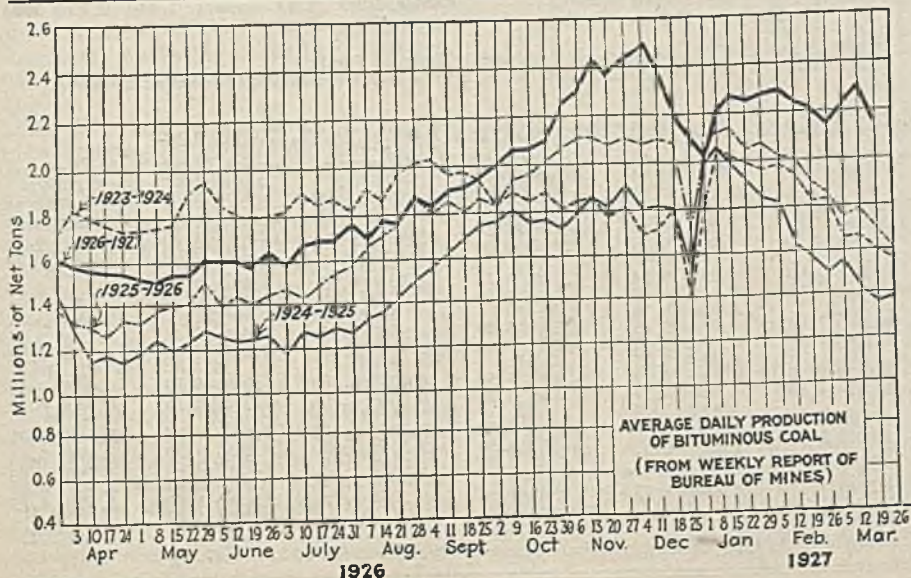
Production of bituminous coal during the week ended March 19 is estimated by the U. S. Bureau of Mines at 12,958,000 net tons, a falling off of 820,000 tons from the preceding week. Preliminary reports for last week indicate a moderate gain.

Coal Age Index of spot bituminous prices halted at least temporarily in its downward course. On March 28 the index number was 171 and the corresponding weighted average price was \$2.07. Compared with the figures for March 21 this was an advance of 2 points and 2c.

Anthracite Market Quiet

Unaffected by the reductions in circular prices, the hard-coal trade is almost uniformly sluggish. Consumer interest for the most part is limited to purchases of small lots to tide over immediate requirements. The steam end of the business also has shrunk perceptibly in importance. Loading for the lakes at Buffalo continues apace.

In the Connellsville coke market last



Estimates of Production

(Net Tons)

BITUMINOUS

	1926	1927
March 5.....	10,460,000	13,262,000
March 12 (a).....	10,690,000	13,778,000
March 19 (b).....	10,263,000	12,958,000
Daily average.....	1,711,000	2,160,000
Coal yr. to date (c).....	522,519,000	579,410,000
Daily av. to date.....	1,758,000	1,947,000

ANTHRACITE

March 5.....	1,789,000	1,211,000
March 12.....	1,966,000	1,488,000
March 19.....	1,963,000	1,432,000
Coal yr. to date (c).....	48,370,000	90,313,000

BEEHIVE COKE

March 5.....	265,000	187,000
March 12 (a).....	262,000	196,000
March 19 (b).....	263,000	204,000
Cal. yr. to date (c).....	3,524,000	2,097,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.

week there was a sharp break in the asking price on second-quarter furnace contracts. Approximately half the tonnage open was signed up at \$3.50@ \$3.65, though some producers were talking \$4@ \$4.25. Both furnace and foundry spot are easier, but quotations are unchanged.

Middle West Quiet

Middle Western industrial consumers continued their apathetic way last week. There was some last-minute buying in the Chicago market by purchasing agents who wanted to make assurance doubly sure in the matter of stockpiles, but such orders did not lift price levels. The best that can be said of the price structure on Illinois and Indiana coals is that it was maintained in theory if not always in fact. The greatest temptation to make concessions, however, was in the domestic side of the market.

Reports from the southern Illinois mining fields emphasize the accumula-

tion of unbilled loads which threaten to halt operations before the suspension brought on by the expiration of the Jacksonville agreement actually becomes effective. Stripping operations, with prices 25 to 50c. under the quotations of the shaft mines, seem to be more successful in moving their output. Railroads are still liberal buyers from the steam-shovel pits.

Conditions in the Jackson and Duquoin sections are no more satisfactory than in southern Illinois proper. Steady railroad buying and a slight increase in general industrial orders have helped the Mt. Olive district, but there, as elsewhere, the desire to run every day has led to a piling up of "no bills" and uneven prices on steam sizes. Four days a week is the maximum for most mines in the Standard field. Screenings alone retain a semblance of strength. Circular prices, however, are unchanged.

A touch of cold weather helped Eastern coals in the Chicago market for a

few days last week, but the effects were short-lived. During the spurt smokeless mine-run rose from \$1.60@ \$1.75 to \$1.85@ \$2 and prepared sizes went up 25 to 50c. By midweek, however, prices had again relaxed. There is a flood of cheap-priced high-volatile coal. Some 4-in. block is offered for shipment at \$1.75, with egg \$1.50, and distress tonnage is to be had at still lower prices. Retailers report little storage buying by householders.

St. Louis Domestic Trade Dull

The St. Louis domestic market also is quiet. Retail stocks are fairly large and dealers are ordering forward sparingly. Most of the retailers who are adding to their stockpiles are on a still hunt for bargains in higher grade Illinois coals. Actual movement of anthracite, smokeless and coke is light. Current orders from the country run largely to the lower priced fuels. Steam business is seasonably active, but does not begin to absorb the tonnage avail-

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

Table with columns for Market Quoted, Mar. 29 1926, Mar. 14 1927, Mar. 21 1927, Mar. 28 1927, and various coal types (Low-Volatile, Eastern; High-Volatile, Eastern; Midwest; South and Southwest).

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

Table with columns for Market Quoted, Freight Rates, and various anthracite grades (Broken, Egg, Stove, Chestnut, Pea, Buckwheat, Rice, Barley, Birdseye).

*Net tons, f.o.b. mines. †Advances over previous week shown in heavy type; declines in italics. ‡Domestic buckwheat (D. L. & W.), \$3.50

able. Iowa retail trade is leaning toward eastern Kentucky and southern West Virginia coals.

Movement of 2-in. lump and slack from eastern Kentucky to the lower lake ports is now under way. This movement has been a welcome relief to producers who have been struggling with unbilled loads. The extent of this latter evil, however, has been over-estimated, according to the statements of some shippers. A week ago the number of "no bills" at Louisville & Nashville mines in eastern Kentucky was 1,315 and 1,500 cars was said to be a generous estimate for Chesapeake & Ohio mines. "No bills" in the western part of the state do not exceed 500 cars, say late reports.

Discount High-Price Propaganda

The possibilities of any sudden jump in prices in the non-union fields after April 1 are generally discounted sharply by observers in the Louisville market. Current demand is light, particularly for domestic sizes. Quotations, however, are well maintained as operators are convinced that reductions would not increase sales. Slack and other small steam sizes of Kentucky coal find a ready market at the price levels which have prevailed for several weeks.

Continued mild weather has taken the edge off the domestic market at the Head of the Lakes. Most of the retail buying is for current consumption and immediate requirements are light. Hydro-electric public utilities also have curtailed their purchases. On the other hand, general industrial buying is active throughout the greater part of the territory served by the docks. There is a substantial market for spot tonnage and, with an early opening of navigation in sight, dock operators are more ready to take on this business.

Screenings Market Expands

The bituminous price situation is strongest in screenings. The market for this coal has shown a marked expansion and some of the docks are planning to bring up more cargo lots of slack this season. In line with changes in mine prices, dock quotations on anthracite have been reduced 50c. Under the new schedule egg is \$12.70; stove, \$13.15; nut, \$12.70; pea, \$11.05; domestic buckwheat, \$7.15. Current demand for domestic anthracite is brisk.

At Milwaukee the demand remains slow because of the continuance of mild weather. It may be stimulated somewhat, however, by the regular spring reduction in prices, which was announced March 24. The price of West Virginia smokeless was cut \$1.10 and retailers quote anthracite as follows: stove, \$16.15; egg and nut, \$15.70; pea, \$13.90; buckwheat, \$10.50. The Twin Cities trade shows little sign of life either in steam or domestic.

Domestic grades of Southwestern coals still move slowly, but railroad and industrial orders for steam sizes have kept Kansas production at fairly high levels. There has been little storage buying of Arkansas and Oklahoma domestic sizes and no announcements have been made as to summer prices.

Aside from the recent drop of 25c. on prepared coal, Kansas quotations are nominally unchanged.

Weather Aids Colorado Market

A weather spurt early last week afforded temporary relief to Colorado operators burdened with accumulations of "no bills" of lump and nut. Effective March 21, prices on Walsenburg, Canon City and Crested Butte lump were cut to \$4.25; washed nut, \$4; washed chestnut, \$3. This was a reduction of \$1.75 on lump and \$1 on the nut sizes. Trinidad coking coals are down to \$3. Steam coals are bringing \$1.40 @ \$1.50. Kemmerer-Rock Springs lump is quoted at \$4.25; nut, \$4; screenings, \$1 @ \$1.40.

The Utah domestic market is spotty. A short weather flurry has been followed by a slump and the number of unbilled loads shows no diminution. Nevertheless there has been a somewhat wider distribution of tonnage over the territory served by the Utah mines. Working time averages three days a week. Industrial buying is easy. Screenings sell at \$1.25, as against a circular price of \$1.50. Quotations on prepared coal are firm.

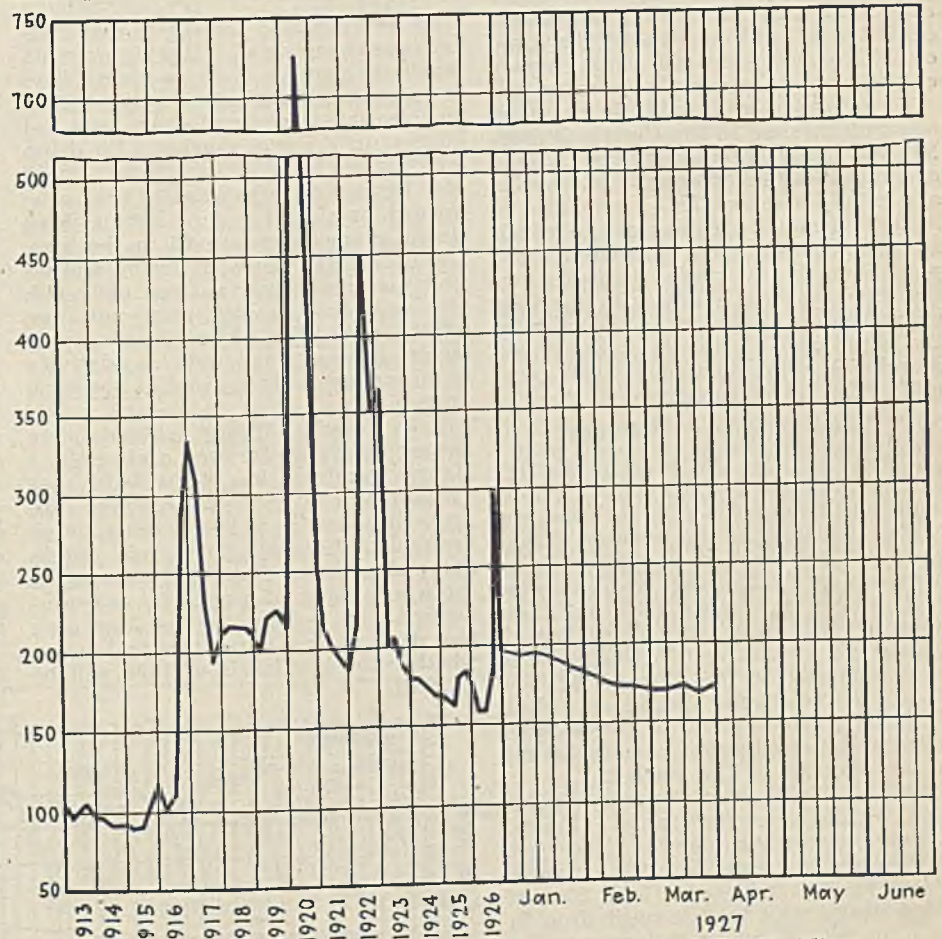
Cincinnati finds 1927-28 contract prices a more interesting topic than strike probabilities. Quotations made

public show an advance of 15 to 25c. over last year's figures on bituminous, bringing nut and slack to \$1.60 and mine-run to \$1.75. In the lake trade, heavy shipments to the lower ports have given the buyers an advantage over the producers which the former are not slow to seize.

Current spot trade in domestic grades is lackadaisical and prices on high-volatile are off about 25c. On the steam side of the market, slack held its position without difficulty and mine-run was stronger. Smokeless is still in a state of flux. Standard shippers probably will make no change in their April circulars, but some spot lump is selling 75c. under the \$3 base and mine-run has sold down to \$1.75. Retail prices at Cincinnati are slipping.

Car Interchange Slows Up

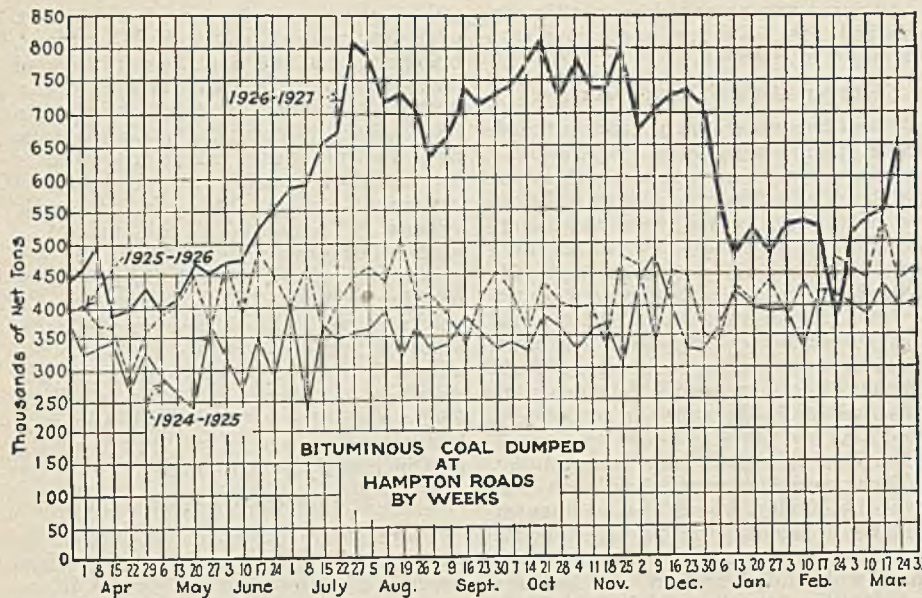
There was a falling off in coal traffic through the Cincinnati gateway last week. The number of loads interchanged decreased to 13,714, a decline of 785 from the preceding week but an increase of 1,973 over the corresponding week in 1926. Movement via the Louisville & Nashville R.R. decreased 154 cars; via the Chesapeake & Ohio, 570 cars. The number of empties en route to the mines increased from 12,798 to 13,700 cars.



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

	1927				1926	1925
	Mar. 28	Mar. 21	Mar. 14	Mar. 7	Mar. 29	Mar. 30
Index	171	169	171	170	163	161
Weighted average price.....	\$2.07	\$2.05	\$2.07	\$2.06	\$1.98	\$1.95

This diagram shows the relative, not the actual, price on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportion 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.



The Columbus market is colorless. Weather conditions work against the retail trade and only the larger dealers exhibit any interest in adding to their yard reserves. Industrial plants are not worrying. Most of the larger concerns are carrying heavy stocks and smaller consumers feel they are in a comfortable position. In view of the impending suspension, there is little inclination to talk contracts for Ohio coal. Production in the southern part of the state is gradually tapering off.

An overabundant supply in comparison with demand in the Cleveland market adversely affected prices. Slack and nut-and-slack dropped 10c. to 15c. and mine-run eased 5c. Lump also is in light demand. The extent to which non-union coals have displaced Ohio production is strikingly indicated by the unprecedented dullness in the face of impending suspension. Production in the No. 8 field during the week ended March 19 approximated 363,000 tons, or 52 per cent of capacity.

Pittsburgh Prices Advance

Prices in the Pittsburgh district again moved upward last week. Steam lump, slack, mine-run and gas mine-run all participated in the advance. District demand has been quickened by increases in quotations on Kanawha coal, which commanded \$2 on 14-in lump for lake shipment. Small lots of Pittsburgh district and Panhandle coal have been sold to the docks at \$2.25@ \$2.35. Three-quarter northern West Virginia is quoted at \$1.75. Uneasiness over the labor situation is contributing to the strength of the market.

Central Pennsylvania output fluctuates within a narrow range. Prices, however, are more uneven. The past week saw advances of 5 to 15c. on pools 1 and 71 and declines of 5 to 25c. on other pools, with the sharpest drop in pool 10. Week-end quotations were as follows: Pool 1, \$2.35@ \$2.55; pool 71, \$2.25@ \$2.35; pool 9, \$2@ \$2.10; pool 10, \$1.75@ \$1.85; pool 11, \$1.65@ \$1.70; pool 18, \$1.60@ \$1.65.

A not unusual quiet prevails in the Buffalo bituminous trade. Many consumers have 60 to 90 days' stock on hand and are not interested in adding to their supplies. Efforts to tempt

others to stock up at lower prices meet with little success. Three-quarter Youghiogheny gas is down to \$2.40@ \$2.60; mine-run, \$2.25@ \$2.35; slack, \$1.50@ \$1.60. Steam coals are around \$1.90@ \$2.10 for lump, \$1.75@ \$1.85 for mine-run and \$1.40@ \$1.50 for slack.

New England Trade Featureless

In New England the steam coal market is extremely dull. Having accumulated reserves for sixty to ninety days as insurance against possible labor trouble, buyers generally have now lost interest in the spot market. On delivered prices local factors have named low figures to take season contracts, several municipal orders having been closed at well down to \$6 in the bins. The open retail price in Boston and vicinity is now \$9 per net ton delivered, 75c. reduction having been put into effect on the 15th. The \$9 price is on paper, however, and only a relatively small tonnage is being sold at any such price.

F.o.b. vessel at Hampton Roads piers the present range for spot coal of No. 1 Navy Standard is \$4.35@ \$4.50 per gross ton, but occasionally sales are made at as low as \$4.20 for coals not so desirable. Accumulations are again the order of the day, and once more there are signs of persistent overproduction. In no direction is there any real demand, and it remains to be seen whether the low levels of 1926 will be reached.

On cars Providence and Boston for inland delivery West Virginia smokeless is freely offered at \$5.85@ \$6.10, the former being the ruling price at Providence and \$6 being about the level for conservative buying at Boston. There is less distress coal at the railroad wharves than was the case a few weeks ago, but all the factors owning their own facilities have ample reserves and are keen to move coal in order to relieve accumulations at the loading piers.

All-rail from central Pennsylvania there is no material change. Prices are on a minimum basis, the increased mining cost considered, and very little is heard from this market on the subject of Pennsylvania coal either all-rail or by water.

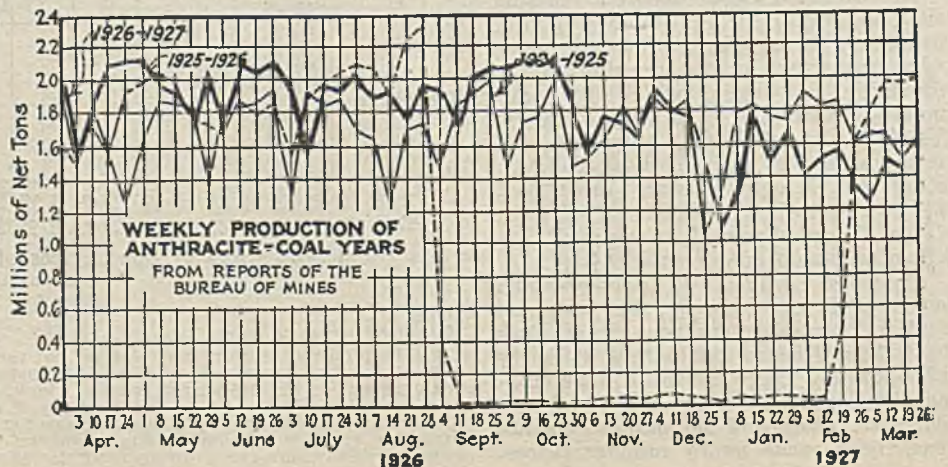
Bituminous buyers fought shy of the New York market last week and new spot orders were scarce. Contract customers, however, were ready to take their full quotas and, where attractive offers were made, were not averse to augmenting their supplies. There was more than enough tonnage standing at the local piers, but shippers experienced no great difficulty in keeping the movement fluid. Diversion of a substantial tonnage to the lakes was a great help.

Demand in the Philadelphia market has been easing off. A large percentage of the more important consumers are well fortified with reserve stocks and there is no threat of interference with operations at the mines supplying this market. Spot quotations are unchanged, but shippers are much less hopeful of the development of an early upward swing than they were a fortnight ago. Bunkering trade is quiet and the export market is temporarily non-existent.

Baltimore Cold to Strike Threat

Although a survey of local territory shows only moderate stockpiles, Baltimore is unmoved by the coming suspension of mining in the Central Competitive Field. Industrial purchasing agents seem convinced that a shutdown will in nowise affect the free flow of coal to their plants. Efforts to arouse an interest in contracting have developed little beyond a number of orders for deliveries over the next three months. A number of contract inquiries, however, are still pending. Spot prices show no change. Export movement is small.

Reaction to spring reductions on domestic sizes has been better than Birmingham district producers had ex-



Car Loadings and Supply

	Cars Loaded		Shortages
	All Cars	Coal Cars	
Week ended March 19, 1927.....	1,006,861	206,452	
Week ended March 12, 1927.....	1,005,715	220,179	
Week ended March 20, 1926.....	977,209	183,205	
Week ended March 13, 1926.....	967,411	188,834	

	Surplus Cars		Car Shortages	
	All Cars	Coal Cars	All Cars	Coal Cars
March 8, 1927.....	267,616	82,203		
Feb. 28, 1927.....	275,153	83,253		
March 8, 1926.....	202,432	72,949		

pected. A substantial tonnage already has been booked for April delivery at the new prices, which are practically the same as those of last year. Big Seam lump is \$1.75@2.25; Carbon Hill, \$2.50; Corona, \$2.75; Cahaba, \$3.50@4; Black Creek, \$3.75; Montevallo-Aldrich, \$4.75; Dogwood and Straven, \$4.20. Spot steam trade is slow and, in some cases, industries have cut down on contract shipments. Railroad and coke-oven demand, however, holds up.

Meager Orders for Hard Coal

There has been no improvement in demand in the New York anthracite market since the announcement of the new spring prices. Consumer buying is largely confined to small-lot orders for immediate consumption. Retail dealers are trying to clean up their old stocks. Except for the fact that retail prices were not reduced, conditions in the Philadelphia market last week practically duplicated those in New York. Steam trade also was quiet.

The Baltimore anthracite trade continues to mark time. Dullness rules in Buffalo, but hopes are expressed that spring fill-ups will be encouraged by the new prices. Loading for the lakes is still going on. One company has loaded 12 cargoes and another has started on its second boat. Toronto had nothing more cheering to report than the normal slackness of the fag-end of the coal-burning season. Yard supplies are ample. At both Toronto and Buffalo coke competition is a growing factor with which anthracite distributors must contend.

Coke Contract Price Breaks

A sharp break in the asking price on second-quarter furnace contracts featured the Connellsville coke market last week. While some ovens were

Plan Joint Consideration Of Labor Relations Bill

Joint consideration by the American Federation of Labor and the American Bar Association of an industrial relations bill to be introduced in Congress was made known at a meeting on March 23 of the committee on commerce of the American Bar Association in the Chamber of Commerce Building, New York City. Representatives of both bodies are to meet in New York April 25 and 26 in an effort to agree on a bill which probably will prescribe methods of settling industrial disputes.

Matthew Woll, vice-president of the American Federation of Labor, announced that William Green, president of the Federation, had appointed a committee to represent labor in considering the bill. Mr. Woll is chairman of the labor committee. On the Bar Association committee is Province M. Pogue of Cincinnati, who is also chairman of the committee on commerce. Julius Henry Cohen of New York is another member of the bar's committee.

In his outline of questions to be considered Mr. Woll said labor would try to avoid state interference in the form of compulsory arbitration.

talking \$4@4.25, it developed that contracts had been closed for approximately one-half the tonnage open at \$3.50@3.65. It now seems certain that the business remaining will be closed at that range. Spot furnace coke is easy at \$3.25@3.50, the higher figure ruling on small lots—principally single carload orders. Foundry coke, too, is easier, with prices unchanged.

Production of beehive coke in the Connellsville and Lower Connellsville region during the week ended March 19 was 139,840 net tons, according to the Connellsville Courier. Furnace-oven output—68,700 tons—showed an increase of 3,500 tons over the figures for the preceding week. Merchant-oven output was 71,140 tons, an increase of 1,090 tons.

February Exports Decrease

Compared with January, February exports of coal and coke from the United States showed decreases in all classes. Anthracite shipments to foreign countries dropped from 219,797 gross tons to 185,250 tons; bituminous coal, from 1,720,247 to 1,351,678; coke, from 59,471 to 59,004 gross tons. With the exception of coke, however, February shipments were ahead of those for February, 1926.

February, 1927, exports by countries were as follows, in gross tons:

To	Anthracite	Bituminous	Coke
France.....		24,639	1,500
Italy.....		17,742	
Great Britain and No. Ireland.....		57,293	
Canada.....	176,795	1,008,040	54,921
British Honduras.....		2	
Costa Rica.....		132	10
Guatemala.....		6	2
Honduras.....	15	42	
Nicaragua.....		49	
Panama and Canal Zone.....		51,181	1
Mexico.....	2,024	9,466	186
Newfoundland and Labrador.....	144		
Barbados.....		4,098	
Jamaica.....		2,195	
Other British West Indies.....		20	
Cuba.....	6,137	77,454	820
Dominican Republic.....		2,381	
Dutch West Indies.....		3	
French West Indies.....		7,503	
Argentina.....	100	25,478	
Brazil.....		42,774	
Chile.....			1,484
Colombia.....			2
British Guiana.....		1,618	
Dutch Guiana.....		1,947	
Ecuador.....		35	
Peru.....		2,903	48
Uruguay.....	20		
Venezuela.....	15		
Egypt.....		6,106	
British West Africa.....		8,561	
Total.....	183,250	1,351,678	59,004

May Modify Minnesota Rates

Decisions of federal courts against Minnesota freight tariffs, even in intrastate hauls, and in favor of the Interstate Commerce Commission have resulted in starting a move to effect a decided modification of the state law. The present law is a distance tariff, which is proving unworkable as against the interstate law. So it is proposed to revise it to permit an adjustment of rates for similar distances from different points. Under present conditions, some interstate rates from outside points, especially those on state lines, force intrastate rates to make discrimination against certain jobbing points.

Coal Produced in Virginia in 1925*

(Exclusive of product of wagon mines)

County	Net Tons		Value		Number of Employees				Average Number Days Worked	Average Tons per Man per Day			
	Loaded at Mines for Shipment	Sold to Local Trade and Used by Employees	Made Into Coke	Total Quantity	Total	Average per Ton	Underground	Surface					
Dickenson.....	1,011,395	7,079	4,113	1,022,587	\$1,694,000	\$1.66	390	168	113	172	843	290	4.18
Lee.....	1,500,736	11,971	1,297	1,514,004	2,691,000	1.78	978	211	187	296	1,672	201	4.51
Montgomery.....	78,969	1,130	498	80,597	285,000	3.54	108	28	11	69	216	226	1.65
Fulaski and Wythe	178,226	2,226	5,608	186,060	715,000	3.84	90	17	39	80	226	263	3.14
Russell.....	1,819,877	32,267	2,370	1,854,514	3,252,000	1.75	1,012	370	283	420	2,085	256	3.48
Tazewell.....	2,111,647	8,938	7,530	2,128,115	4,310,000	2.03	1,049	437	529	446	2,461	243	3.56
Wise.....	5,331,471	49,962	18,513	613,620	6,013,566	10,549,000	1.75	3,059	904	1,280	6,174	267	3.65
Total.....	12,032,321	113,573	39,929	613,620	12,799,443	\$23,496,000	\$1.84	6,686	2,135	2,442	13,677	254	3.69

*The figures relate only to active mines of commercial size that produced coal in 1925. The number of such mines in Virginia was 113 in 1925, 115 in 1924 and 168 in 1923. Methods of mining in 1925: The tonnage undercut by hand was 319,611; shot off the solid, 2,006,309; cut by machines, 10,472,410; not specified, 1,113. Size classes of commercial mines in 1925: There were 6 mines in Class 1A (500,000 tons and over), producing 31.6 per cent of the tonnage; 19 in Class 1B (200,000 to 500,000 tons), with 40.8 per cent; 12 in Class 2 (100,000 to 200,000 tons), with 11.2 per cent; 17 in Class 3 (50,000 to 100,000 tons), with 9.4 per cent; 26 in Class 4 (10,000 to 50,000 tons), with 6.1 per cent, and 33 in Class 5 (less than 10,000 tons), producing 0.9 per cent. Compiled by U. S. Bureau of Mines.

Foreign Market And Export News

South Wales Market Stronger; North Country Dull

London, England, March 14.—The South Wales coal market continues to register slight improvement. Inquiries from all sources are increasing, with European inquiries in the lead. Buyers are more inclined to place contracts ahead, and contract inquiries are numerous. Production is still going up, but supply and demand are better balanced.

The Compagnie Générale Transatlantique has bought 100,000 tons of the best Admiralty for delivery over the year at 22s. 6d., f.o.b. The Spanish Rys. have contracted for 30,000 tons of the same grade at 22s.

The North Country market is dull. Prices, however, hold steady. The Hamburg gas works has placed orders for 250,000 tons of ordinary Durham gas coal at prices ranging from 18s. 3d. to 18s. 6d., c.i.f.

Current quotations are: Best Admiralty large, 22s. 6d. @ 23s.; small steams, 15s. 6d.; best gas, 17s. 6d. @ 18s.; unscreened bunkers, 16s. 6d.

Output by British collieries registered a further slight decline in the week ended March 12, the total being 5,276,500 tons, against 5,318,600 in the preceding week. There was again a slight increase in the number of miners at work, the figure being now 1,019,300, against 1,000,015 the week before. Welsh coal exports for the week ended March 19 were the highest since the stoppage, at 547,550 tons, and they exceeded those of the corresponding week of 1926 by 1,320 tons. Scottish shipments were 11,000 tons higher on the week, but 23,500 tons below last year.

France Threatened by Strike Over Wage Cuts

A movement to reduce wages, initiated by French coal operators, has brought France face to face with a national mine strike, according to reports from Paris. The national council of the Federation of Underground Workers, at a special meeting held at the French capital last Wednesday, voted unanimously in favor of a walk-out on April 1 unless the coal-mine owners withdraw their notices of a downward revision of rates.

The employing interests, asserting that 65 per cent of the cost of working the mines is paid out in wages, declare that a reduction must take place in order to bring down the cost of coal to the consumer. The producers already have announced reductions in coal prices and claim that wages must be cut 8½ per cent to take care of this decrease in selling prices.

The present controversy marks the third attempt made by the operators to force a reduction. Twice before threats of a strike caused the em-

ployers to postpone action. It is generally believed, however, that this time they are determined to see the question settled as the competitive position of the French mines has been growing steadily worse since the collapse of the British general strike last winter.

French Coal Market Weaker

Paris, France, March 10.—The gradual softening of the French coal markets continued unchecked last week. In the North industrial coals are accumulating at the pitheads. Stocks of household coals also are growing rapidly. Recent reductions in prices on domestic grades have had no effect upon the market, first, because the weather is still mild and, second, because buyers expect further declines in quotations on April 1.

This increasing disability of the mines to move tonnage is forcing them to make an issue of the wage question. Operators in the Nord and Pas de Calais have advised their men that the lower prices at which foreign coals are being offered to French buyers and the decline in the cost of living compel them to terminate the wage agreement of Nov. 10, 1926, and announced that they soon would call a conference with their employees. Such a conference already has been held between operators and miners in the Loire basin, but the men declined to consider any downward change in the rates of pay.

The Sarre domain collieries have posted notices calling for a reduction of approximately 10 per cent, effective next Tuesday. In this region, selling prices have dropped 13½ per cent since Feb. 1 and the cost of living, according to government figures, has gone down between 7 and 8 per cent. Rumors of a strike against the wage cuts are characterized as premature.

Selling prices of Lorraine coals have decreased 16 to 18 fr. per ton in sympathy with declines in the Sarre. Sarre, Lorraine, Nord and Pas de Calais coals are now selling at approximately the same figure f.o.b. Paris.

During February the O. H. S. received 136,700 metric tons of coal and 600 tons of coke on the reparations account.

In January the French mines produced 4,530,859 metric tons of coal and 98,632 tons of lignite, as against 4,543,310 and 94,309 tons, respectively, in December, 1926. The average number of men employed rose from 330,057 to 333,151.

Belgian Coal Demand Fading

Brussels, Belgium, March 9.—Coal demand grows weaker and weaker as winter merges into spring. Reductions in prices have failed to re-establish heavy buying, although there has been a slight improvement in the movement of some grades of industrial fuel.

Foreign competition also is increasing. Its effect, however, is marked only on contracts of minor importance.

Fine weather threatens to give the *coup de grâce* to the domestic trade. Orders are becoming scarcer and further declines in prices were registered today. Late reductions range from 30 to 40 fr. In the case of unscreened coal from the Borinage collieries, prices have dropped 50 fr. and the bottom has not yet been reached.

Naturally stocks are accumulating at some of the pitheads and at some of the wholesale and retail depots. But so far the accumulations have not been excessive—largely because of the fact that a number of collieries still are working on contracts entered into last year when the British strike was on and buyers were eager to make sure that there would be no interruption to the steady flow of coal to their plants.

Export Clearances of Coal, Week Ended March 24

FROM HAMPTON ROADS		Tons
For Cuba:		
Br. Str. Heath Park, for Havana....		3,185
For Argentina:		
Ital. Str. Maria Adele, for Buenos Aires		8,929
For Brazil:		
Jap. Str. Port Said Maru, for Rio Janeiro		6,802
Br. Str. Indian Prince, for Santos...		2,738
For Jamaica:		
Dan. Str. Josey, for Kingston.....		2,202
For Uruguay:		
Amer. Str. Commercial Pathfinder, for Montevideo		3,464
For Danish West Indies:		
Br. Str. Hillglade, for Curaçao.....		2,050
For Nova Scotia:		
Nor. Str. Karma, for Halifax.....		1,477
For Martinique:		
Br. Str. Glenaster, for Fort de France		4,755
FROM BALTIMORE		
For Canada:		
Am. Str. Pacific Spruce, for Vancouver		944
For Argentina:		
Br. Str. Elswick Park, for Buenos Aires		5,884
Br. Str. Ravenscar, for Buenos Aires.		5,756

Hampton Roads Coal Dumpings*

	(In Gross Tons)	
	Mar. 17	Mar. 24
N. & W. Piers, Lamberts Pt.:		
Tons dumped for week.....	195,687	270,377
Virginian Piers, Sewalls Pt.:		
Tons dumped for week.....	116,890	125,938
C. & O. Piers, Newport News:		
Tons dumped for week.....	177,872	188,137

* Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

Pier and Bunker Prices

	(Per Gross Ton)	
	PIERS	
	March 17	March 24†
Pool 1, New York....	\$5.75@ \$6.00	\$5.50@ \$6.00
Pool 9, New York....	5.20@ 5.45	6.10@ 5.45
Pool 10, New York....	4.80@ 5.10	4.75@ 5.10
Pool 11, New York....	4.25@ 4.75	4.25@ 4.65
Pool 9, Philadelphia....	5.15@ 5.30	5.15@ 5.30
Pool 10, Philadelphia....	4.85@ 5.05	4.85@ 5.05
Pool 11, Philadelphia....	4.45@ 4.55	4.45@ 4.55
Pool 1, Hamp. Roads....	4.85@ 5.00	4.50@ 4.60
Pool 2, Hamp. Roads....	4.50@ 4.65	4.25@ 4.35
Pool 3, Hamp. Roads....	4.00@ 4.10	3.90@ 4.00
Pools 5-6-7, Hamp. Rds.	4.20	4.00@ 4.10

BUNKERS

Pool 1, New York....	\$6.00@ \$6.25	\$5.75@ 6.25
Pool 9, New York....	5.45@ 5.70	5.35@ 5.70
Pool 10, New York....	5.05@ 5.35	5.00@ 5.35
Pool 11, New York....	4.50@ 5.00	4.50@ 4.90
Pool 9, Philadelphia....	5.40@ 5.55	5.40@ 5.55
Pool 10, Philadelphia....	5.10@ 5.35	5.10@ 5.35
Pool 11, Philadelphia....	4.70@ 4.80	4.70@ 4.80
Pool 1, Hamp. Roads....	5.00	4.60
Pool 2, Hamp. Roads....	4.65	4.35
Pools 5-6-7, Hamp. Rds.	4.35	4.10

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

Coming Meetings

Smoke Eaters' Association. Dinner, followed by meeting, at Cupp's Cafeteria, Johnstown, Pa., April 2, at 6 p.m. Secretary, C. O. Roberts, California, Pa.

American Society of Civil Engineers. Spring convention, Asheville, N. C., April 20-22. Secretary, George Seabury, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 27-29, at Engineering Societies Building, 29 West 39th St., New York City. Secretary, M. M. Kelly, 29 W. 39th St., New York City.

California Retail Fuel Dealers' Association. Fourteenth annual convention, Sacramento, Calif., May 5-7. Chairman of Convention Committee, George Burns, 19th St. between V and W, Sacramento, Calif.

International Railway Fuel Association. Nineteenth annual convention, Hotel Sherman, Chicago, Ill., May 10-13. Secretary, L. G. Plant, Railway Exchange Bldg., Chicago, Ill.

American Mining Congress. Annual convention May 16-20, Cincinnati, Ohio. Secretary, J. F. Callbreath, Munsey Bldg., Washington, D. C.

American Society of Mechanical Engineers. Spring meeting, May 23-26, at White Sulphur Springs, W. Va. Midwest regional meeting at Kansas City, Mo., April 4-6. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

Society of Industrial Engineers. Fourteenth national convention, Hotel Stevens, Chicago, Ill., May 25-27. Executive secretary, E. Van Neff, 17 E. 42d St., New York City.

American Wholesale Coal Association. Annual convention June 1-3, Toronto, Canada. Secretary-treasurer, R. B. Starek, Chicago Temple Bldg., Chicago, Ill.

National Retail Coal Merchants Association. Annual convention June 6-8, Detroit, Mich. Resident vice-president, Joseph E. O'Toole, Washington, D. C.

Association of Iron and Steel Electrical Engineers. Annual convention in conjunction with the Iron and Steel Exposition, at Pittsburgh, Pa., June 13-18. Secretary, John F. Kelly, Empire Bldg., Pittsburgh, Pa.

New England Coal Dealers' Association. Annual meeting June 14-16, Hotel Griswold, New London, Conn. Executive secretary, E. I. Clark, Boston, Mass.

Colorado and New Mexico Coal Operators Association. Meeting at Boston Building, Denver, Colo., June 15. Secretary, F. O. Sandstrom, Denver, Colo.

National Coal Association. Annual meeting June 15-17, at Edgewater Beach Hotel, Chicago. Assistant secretary, J. C. Crowe, Washington, D. C.

American Institute of Electrical Engineers. Summer convention, June 20-24, at Detroit, Mich. Regional meetings, April 21-23, Bethlehem, Pa., and May 25-27, Pittsfield, Mass. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

Michigan-Ohio-Indiana Coal Association. Annual convention at Cedar Point, Ohio, June 28-30. Secretary, B. F. Nigh, Columbus, Ohio.

New Equipment

Variable Speed Reducing Unit Attains High Efficiency

To meet the increasing demand for variable-speed drives for conveyors, cement mills, machine tools and other machinery requiring adjustment of speed, William E. Simpson, of 100 Morgan Building, Detroit, Mich., is putting on the market a new line of speed reducers which embody, in a single compact unit, a variable-speed drive.

Each unit comprises two reductions only, the first being a modified worm movement with variable ratio, and the second a train of heavy spur gearing adapted to take the high torque and shocks of the slow-speed end.

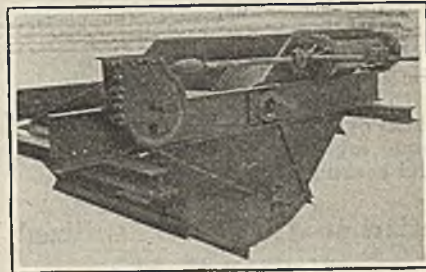
It is stated by the manufacturer that these reducers will operate silently and efficiently at motor speeds up to 3,600 r.p.m. and that the ratio can be readily adjusted from 10:1 to 1,000:1.

Weigh Baskets Eliminate Controversies

Tare weights of cars vary greatly according to the season of the year, to their use in wet or dry parts of the mines, to their repair with thin or thick lumber, to the sizes, and therefore, the weights of the iron or steel used in them and to the quantity of coal adhering to the bottom. The platform also on which the coal is weighed is repaired, changing its weight and, what is worse (because more uncertain in its effect on the weight of the platform), becomes littered with coal. Consequently, there is often much controversy as to the deduction to be made for the weight of the car.

For these reasons, it has been found advantageous to weigh the coal in a steel basket the weight of which is the same for all carloads and does not change with the season. The weight of the basket can be readily balanced on the scales so that net weights can be accurately determined.

In some cases two or more types of cars are used, and if weigh baskets are not provided the kind of car in



Basket Closed

One weigh basket being used for all coal weighed, the allowance is equal for all coal received whether loaded in light or heavy cars.

which the coal is contained must be considered in determining the net weight. Weigh baskets are not forbidden by the law of any state.

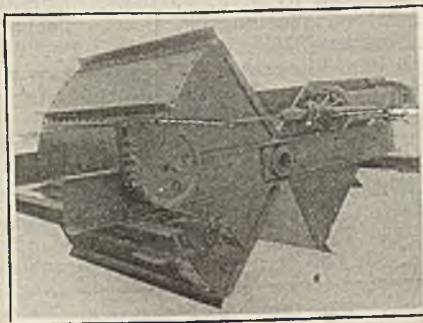
The weigh basket illustrated is manufactured and sold by the Roberts & Schaefer Co., of Chicago, Ill. It is stated that the old type of weigh basket could not be operated faster than four times per minute, but that the type described will dump six times and has been satisfactorily operated ten times per minute. It does not require space to lower or open, nor does it have any doors that drop down. Thus it saves at least 3 ft. of height. Ordinarily, it requires only 5 ft. of vertical space.

When used with a rotary car dump, the coal slides off the dumping shield and is brought to rest without striking either side or any obstruction. The basket opens near the receiving chute as it can be placed within only a few inches of the discharge point. Coal at the back flows out in a stream; that in the gate working out with it. Thus breakage is reduced. The gate is positively locked against opening. Mechanically the weigh basket is quite simple, and practically noiseless; no jars are felt because the basket closes on an air cushion. It can be operated either by compressed air or by an electric motor, the latter operation being controlled by limit switches having push-button control.

New Single Reduction Gear Units Are Developed

The R. D. Nuttall Co., Pittsburgh, Pa., has just developed and placed on the market a series of reduction gear units for heavy service. There are six units in the series covering a range from 150 to 2,000 hp. They are designed for services that require transmitting heavy loads at relatively high speeds, such as main and auxiliary drives in steel mills, the driving of crushers, hoists, pumps and other similar heavy equipment.

These units are equipped with either Nuttall 7½ deg. single helical or Nuttall herringbone gears, treated or untreated depending on application. They are furnished as desired with either sleeve or Timken tapered roller bear-



Basket Open

Bottom does not drop and the coal falls only a few inches to the receiving chute, thus reducing breakage. Compressed air or a motor with push-button control may be used as desired.

ings. It is possible to replace one type of bearings with the other because the bearing housings are identical in both types. However, in case of a change new shafts would have to be provided.

The gears are totally inclosed in a cast-iron case so fabricated as to lessen the weight. Thus, they are carefully protected from grit and dirt. The bottom of the case serves as a reservoir for lubricant and the gears run in a bath of oil while the bearings are lubricated by a positive splash system. The same lubricant is used for both gears and bearings.

Carbon Arc Process Utilized By Butt Welder

Among the many types of welding equipment that have been brought out during recent months, the "automatic" machines for electric arc welding are perhaps the most interesting. Only a few years ago everyone was agreed that electric arc welding would forever remain a manual process in which the skill of the operator would be the limiting factor. Yet in the last twelve months numerous new machines have appeared on the market for doing welding by machine which had formerly been done by hand.

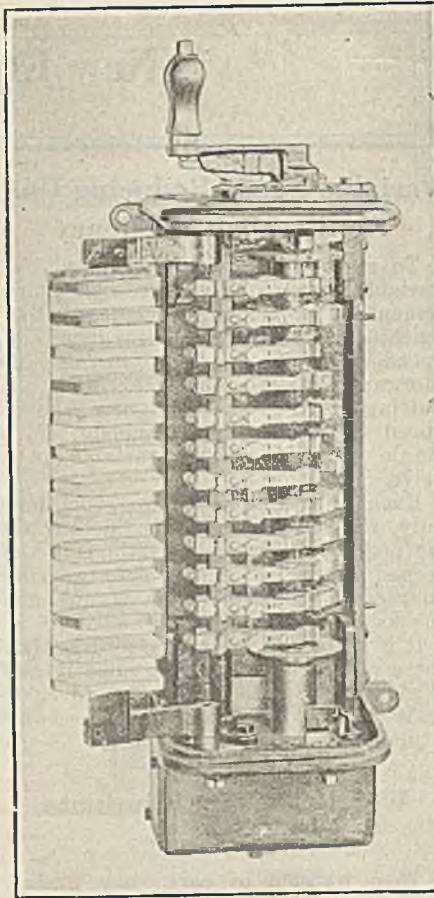
The Lincoln butt welding machine illustrated is a further adaptation of the machine-driven carbon arc to the problems of welding. One ordinarily thinks of butt welding in terms of the resistance welder. The arc butt welder is not an alternative method of doing butt welding but is claimed to be a solution to a class of butt welding problems which the resistance welder cannot solve. As an instance of this, a plug may be easily welded into the end of a tube with the arc butt welder although the job would be impossible with a resistance welder. The machine illustrated welds both ends of the tube at once by use of the two automatic heads. A similar instance of applicability of the arc butt welder is that of welding a small diameter round bar to a large diameter bar. With the arc butt welder, the welding heat is applied to the joint by the carbon arc and the bars revolved to distribute the heat uniformly. Pressure is applied to squeeze out the slag and to complete the fusion.

Use of the arc butt welder does not involve the difficulties with power supply encountered with resistance welding. The motor generator set furnishes direct current at 40 to 60 volts. This machine is built by the Lincoln Electric Co. of Cleveland, Ohio.



Lincoln Butt Welder

This machine, its makers assert, constitutes a solution for a class of problems which the resistance welder cannot solve.



Interchangeability Featured
In this Design

The above is one of a new line of drum switches for both alternating and direct-current motors which has been announced by the General Electric Co., Schenectady, N. Y. Standardization and interchangeability of parts has improved in this design. These instruments are provided with conduit connections and wood or other inflammable material has been eliminated from their construction. The contact fingers are self-aligning, and the mechanism is so arranged that the contact pressure is constant throughout the life of the tip.

Publications Received

Pit and Quarry Handbook, 1927 edition. Pp. 608; 5½x8½ in.; illustrated. Complete Service Publishing Co., Chicago, Ill. Contains useful and practical information on cement, lime, gypsum, sand and gravel, and crushed stone industries.

Effects of the Corona Discharge on Petroleum, by J. J. Jakosky. Bureau of Mines, Washington, D. C. Technical paper 375. Price, 10c. Pp. 21; 6x9 in.; illustrated. Discusses experiments made to determine the effects that high-voltage alternating-current electricity in the form of the corona discharge has on petroleum vapors.

The Bowie-Gavin Process, by A. P. Bowie. Bureau of Mines, Washington, D. C. Technical paper 370. Price, 15c. Pp. 42; 6x9 in.; illustrated. Discusses the application of this process to the cracking of tars and heavy oils, also to the recovery of oil from oil-soaked sands or shales, or from oil shales.

Smoke-Abatement Investigation at Salt Lake City, Utah, by Osborn Monnett, G. St. J. Perrott and H. W. Clark. Bureau of Mines, Washington, D. C. Bulletin 254. Price, 30c. Pp. 98; 6x9

in.; illustrated. This report gives in detail the results of an investigation instituted by the Salt Lake City Commission covering the heating system begun Sept. 1, 1919, and ended May 1, 1920. Recommendations for attacking the problem also are included.

Production of Explosives in the United States during the Calendar Year 1925, with notes on mine accidents due to explosives, by William W. Adams. Bureau of Mines, Washington, D. C. Technical paper 406. Price, 10c. Pp. 39; 6x9 in.

Dust Respirators: Their Construction and Filtering Efficiency, by S. H. Katz, G. W. Smith and E. G. Meiter. Bureau of Mines, Washington, D. C. Technical paper 394. Price, 15c. Pp. 52; 6x9 in.; illustrated. Describes some of the popular forms of dust respirators found on the market and gives the results of laboratory tests of the respirators and fabrics. A new dust respirator of higher dust-removing efficiency developed as a result of the tests also is described.

Descriptive Bibliography on Oil and Fluid Flow and Heat Transfer in Pipes, by Joe B. Butler. Technical series bulletin, School of Mines and Metallurgy, University of Missouri, Rolla, Mo. Pp. 62; 5½x8½ in.

Heavy Liquids for Mineralogical Analyses, by John D. Sullivan. Bureau of Mines, Washington, D. C. Technical paper 381. Price, 10c. Pp. 26; 6x9 in.; illustrated.

Report of New York State Tax Commission for the Year 1925. Pp. 526; 5½x8½ in.

Canada as a National Property. Natural Resources Intelligence Service, Ottawa, Ont., Canada. Pp. 75; 8x10 in.; illustrated. Reviews Canada's growth, agricultural pursuits, forest assets, mineral wealth, water power, etc.

Industrial Notes

Schonthal & Carroll, Inc., 224 S. Michigan Ave., Chicago, have been appointed district sales Agents for The Coloder and The Watt Car & Wheel Co.

A new company, recently formed, known as the Bailey Meter Co., has acquired the flow meter business and patents of the General Electric Co., and the fluid meter and combustion control business and patents of the old Bailey Meter Co. Payment for the flow meter business and patents has been made to the General Electric Co. in stock of the new company, of which the other principal holder is the Babcock & Wilcox Co. The engineering, manufacturing and sales organizations of the old Bailey Meter Co. has been retained by the new company, with the increase in personnel necessary from the General Electric Co. to properly handle the additional business. The new company has its factory and general offices in Cleveland, Ohio. E. G. Bailey, president of the old Bailey Meter Co., is president of the new company; R. S. Coffin, vice-president of the old company, is vice-president in charge of administration and finances, and R. E. Woolley, formerly connected with the General Electric Co., is vice-president in charge of engineering and sales.