COAL AGE

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *President*
E. J. MEHREN, *Vice-President*

Devoted to the Operating, Technical and Business Problems of the Coal Mining Industry

JOHN M. CARMODY
Editor

Volume 32 NEW YORK, NOVEMBER, 1927 *Number 5*

VIGOROUS MANAGEMENT

WITH 150,000 acres of coal in western Pennsylvania and 20,000 acres in Ohio and eastern Kentucky, and a sales organization operating from New York and Boston to Minneapolis and Winnipeg, and lighters and fueling stations on the Lakes from Ashtabula to Duluth, Pittsburgh Coal Company is prepared to render real service.

CHANGES in management have brought a new examination of properties, methods and possibilities and a definite program of reconstruction and reorganization. In brief, what we are doing is to apply the well-tried principles and methods of successful modern manufacturing and merchandising to the production and sale of coal. This implies the collection of the essential facts on which plans can be formulated with confidence. In our view, the controlling facts are those which relate to the sale of our product. So we began through research the scientific study of the coal from every mine, to discover what we can and cannot make of it. At the same time we studied our customers, present and potential, to learn what we should know about their use of coal.

WITH these facts we intelligently plan our operations to produce the tonnage of the different kinds of coal needed and provide preparation to give each customer a better product for his purpose than he ever had before.

Concurrently, we had a careful engineering survey made of our physical properties and equipment. With equal care we have studied our methods, personnel, houses, and the sanitary and social conditions of our employees. These facts we also regard as essential. In sales, we believe in standard products, each of uniformly and dependably superior quality, sold under established trademarks. We rely on well-planned advertising and sales promotion; on thorough training of the salesmen and the service engineers who are a part of the sales force; on effective direction and management of sales; and on the customer's willingness to pay a higher price for a quality product.

IN PRODUCTION, we look to large operations wherever possible, with able and capably staffed executives at their head, working according to detailed production plans and schedules. Certain new plants are projected for practically continuous operation, handling large tonnages every 24 hours. We place our faith in mechanical production, cleaning and preparation—not merely for economy of operation, but to secure a product of unvarying quality superior to that possible with hand preparation and cleaning. In the management of personnel; we are as anxious to "sell" the Pittsburgh Coal Company, its purposes, policy and methods to our employees as we are to our customers, whose good will we value as highly.

WITH WORK every day, and with mechanical means of increasing productivity per man, we expect our employees to earn good wages. Every effort is being made to prevent accidents and to make mines and preparation plants safe. Improvements in streets, houses, sanitary and social conditions are intended to make our mining towns attractive places for employees and their families.

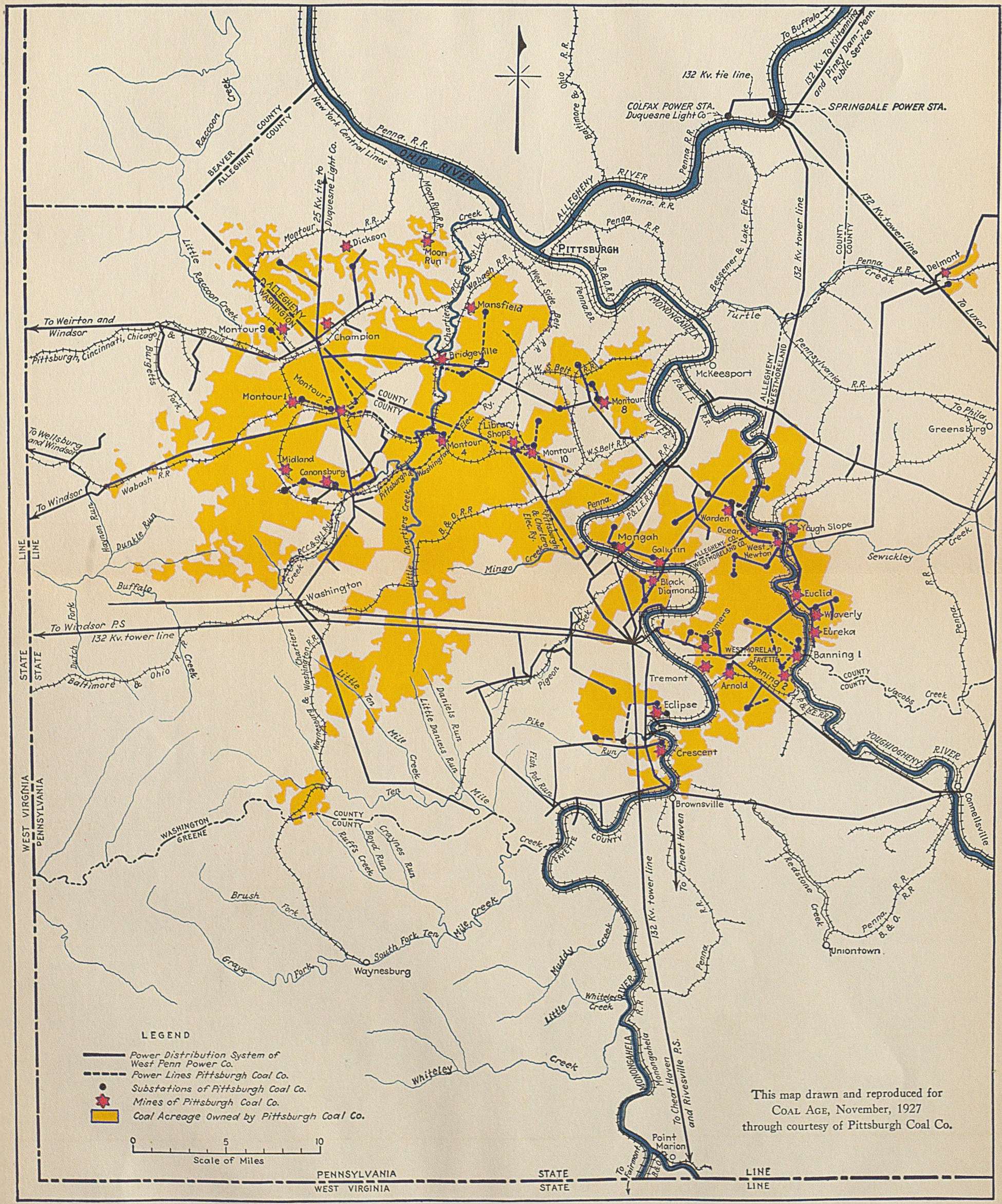
With a property so extensive, these improvements cannot all be made over night. We feel that we are only well started, not merely on the physical changes contemplated, but on the development within our organization of the men to carry out these plans in detail. Time is needed for further research and experiment and for the slower processes of necessary growth.

J. D. A. Morrow

J. D. A. Morrow

President, Pittsburgh Coal Company

The Pennsylvania Properties of Pittsburgh Coal Co.



This map drawn and reproduced for
Coal Age, November, 1927
through courtesy of Pittsburgh Coal Co.

Taking the *Guess* Out of MERCHANDISING

By Sydney A. Hale

Associate Editor, Coal Age
New York City

PLANNED SALESMANSHIP is the keynote of the merchandising program of Pittsburgh Coal Company. The hit-or-miss methods of selling and distribution which have been accepted as inherent to the business by many producers of coal find little place in the Pittsburgh marketing set-up. The sales executives of the company know where their markets lie, they have a clear idea of what their share of business in a given territory should be and are building their organization to reach that quota.

The foundation of the marketing program of the company is a costly and comprehensive analysis of its sales territory. Officials of Pittsburgh Coal Company have not been content with a casual mapping out of sales areas on the basis of prices, quality and relative transportation costs. By a canvass made by their own men and checked against data from other sources the company has compiled records showing the total consumption of coal in the districts in which it is interested, consumption by individual consumers and classes, the kinds of coal purchased and the sources of supply.

With these data available the company knows not only the sales potentialities in any given area, but also the sales resistance to be overcome. It can gage accurately whether a specific consuming district is worth intensive cultivation and how its product will fit in with the consumers' requirements in that territory. As a result if it is decided to open a branch office at Utica or Marion that decision is based upon an accurate knowledge of just how much tonnage is consumed in the territory to be served by the new branch office.

This knowledge in turn enables the sales executives to interpret the detailed cost records on the distribution of the tonnage mined. It is the policy of Pittsburgh Coal Company to sell its entire output through its own organization and elaborate statistics are currently compiled to show just what the cost of selling is per ton of coal. These figures are broken down to show costs for the organization as a whole, for each branch office and for the individual salesman.

In allocating costs each branch office is charged with the salaries and office administrative expenses of that branch. Advertising, unless purely local in character, is charged against sales as a whole. Research laboratory costs also are treated as a sales, rather than an operating department, expense. A number of the salesmen cover a large part of their territories in automobiles. Careful records are kept of these costs, which run between 10 and 12c. per mile. The higher cost per mile as compared with railroad transportation is, of course, offset by the ability to make more towns in a given time.

THE SALES quota toward which the company is working is 20,000,000 tons per annum, with mines running 300 days each year. To reach this goal the sales executives realize that the selling force must know the territory intimately and also must have a real knowledge of the coals sold and their application to specific consumer requirements. For the highly technical service a combustion corps has been organized. But each individual salesman, regardless of his length of service or past experience, is required to go to school at Pittsburgh.

The "curriculum" begins with inspection at the mines and familiarity with conditions at the face and on top. The salesman must know how coal is mined, cleaned and sized. Then he is required to spend some time in one of the research laboratories and study the broad principles of combustion. When he returns to his territory his sales equipment, it is felt, consists of something more than a quick tongue and a personal acquaintance with the buyers in his field.

What might be termed the post-graduate course is being built up through the interchange of reports made by the combustion engineers on specific cases where they have been called upon for inspection service and advice. These reports are made available to all branch offices and to all salesmen so that, if a combustion-sales problem which has been solved in Buffalo territory crops up in Detroit, the Detroit office is in a position to meet the issue promptly.

In common with other companies operating a large number of mines, Pittsburgh Coal Company is endeavoring to break away, as far as possible, from consumer demands for shipments from a specific mine. Pittsburgh officials believe that their output is varied enough to cover any demand for gas, steam or domestic coal and to meet special requirements on B.t.u., sizing, hardness, ash and sulphur content and ash fusion point. They believe that, with the mining and preparation methods described in other articles in this issue of *Coal Age*, they are in a position to furnish a product tailor-made to the consumer's requirements and that they can do this more readily and more profitably if they are not tied down by orders specifying shipments from individual mines.

AS THE FIRST step in this program, the production of the company has been classified into three trademarked groups. Coal for domestic consumption is sold under the trade name, "Champion Domestic

Coal." Gas coal is marketed as "Standard Youghiogheny Gas" and steam grades as "Champion Steam Coal." Kentucky production is sold as "Pike Floyd" and Ohio tonnage as "Peacock Pomeroy."

IN MERCHANDISING domestic sizes the company has launched an extended campaign of dealer helps. The backbone of this particular campaign is "An Advertising Manual for the Coal Retailer" illustrating various sizes of newspaper advertisements, blotters, mailing cards and folders. Mats or electros of the newspaper advertisements, mortised for the insertion of the individual retail distributor's name, are furnished free. Every piece of copy, of course, features "Champion Domestic Coal," and the trademark itself carries the name of Pittsburgh Coal.

Folders, blotters and mailing cards ready for imprinting with the dealer's name also are furnished upon request. This literature is all two-color work, attractively illustrated and written in a style designed to catch the eye of the average household consumer. Emphasis is placed upon cleanliness, quick-firing and slow-burning characteristics of the coal. Comfort, ease of handling and economy also are featured.

IN SELLING Pittsburgh Coal Company coal to the dealer, limited space is used in publications such as the *Retail Coalman, Black Diamond* and *Seward's Journal*. Most of the effort to reach the retail merchant, however, is made through direct mail appeal. For example, in arousing interest in the last edition of the Manual a series of six mailing cards went out. Each card in the series told briefly about the coal and the advertising campaign and enclosed a return post-card which the dealer could mail back for a copy of the Manual and further details. The mailing list circularized approximated 5,000 names; about 2,800 wrote in for the Manual.

Some attempt has been made to actually trademark the coal itself, but experiments along that line have not as yet been wholly successful. Pasting labels on lumps has been found difficult because the adhesives used have failed to do their work. Labels also have been scattered through the coal. Some apprehension has been expressed lest labeling coal make sales difficult to competing dealers in the same community. It is believed, however, that the trademark idea will make such a strong appeal to the consumer that retailers will be compelled to handle trademarked coal if they want to retain their share of the community business.

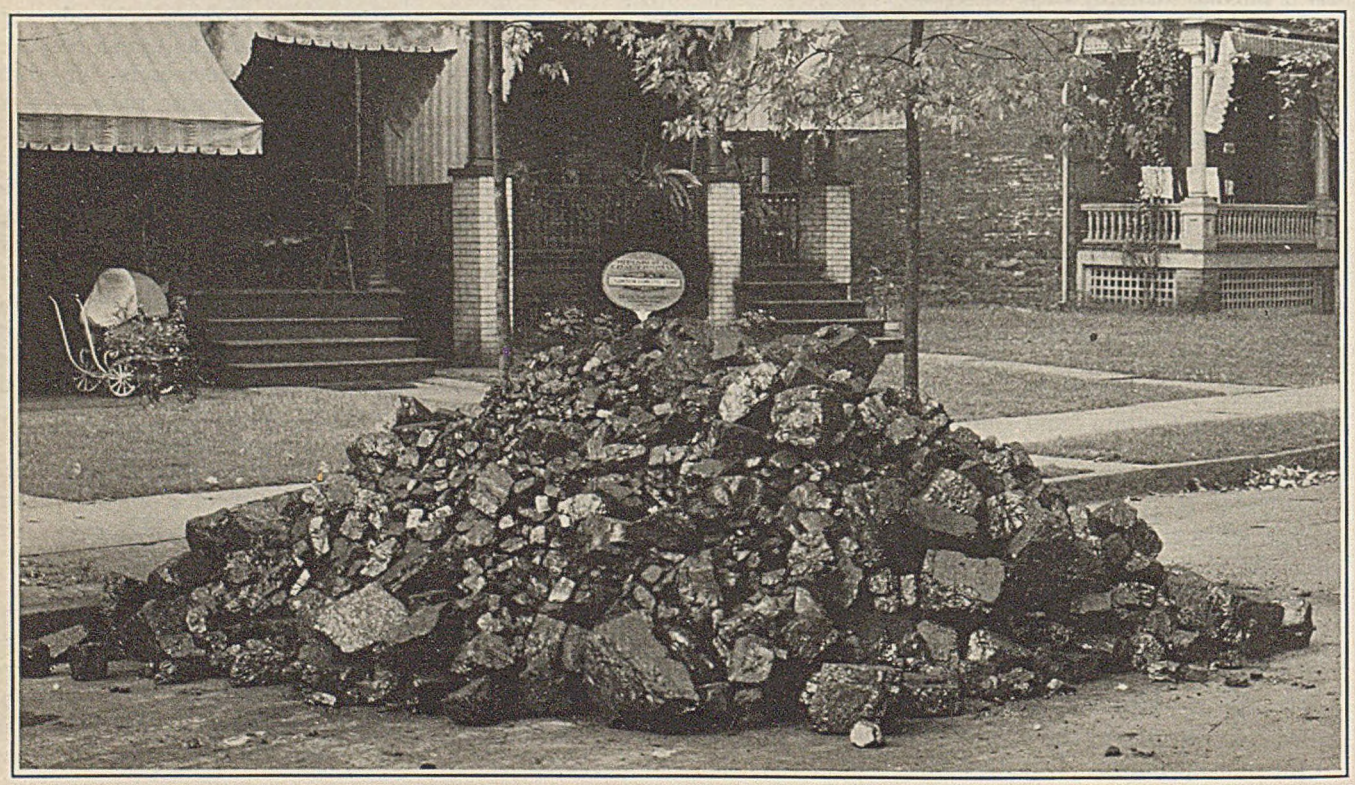
In the case of coal sold through the company's own retail department in Pittsburgh, stickers have been put on the coal. When a load is dumped at the curb a fan-pennant is stuck into the pile so that all who pass may know paterfamilias has purchased a load of Pittsburgh Coal Company fuel. Trucks painted white are employed for local deliveries. A separate retail office with display windows is maintained in the heart of the city.

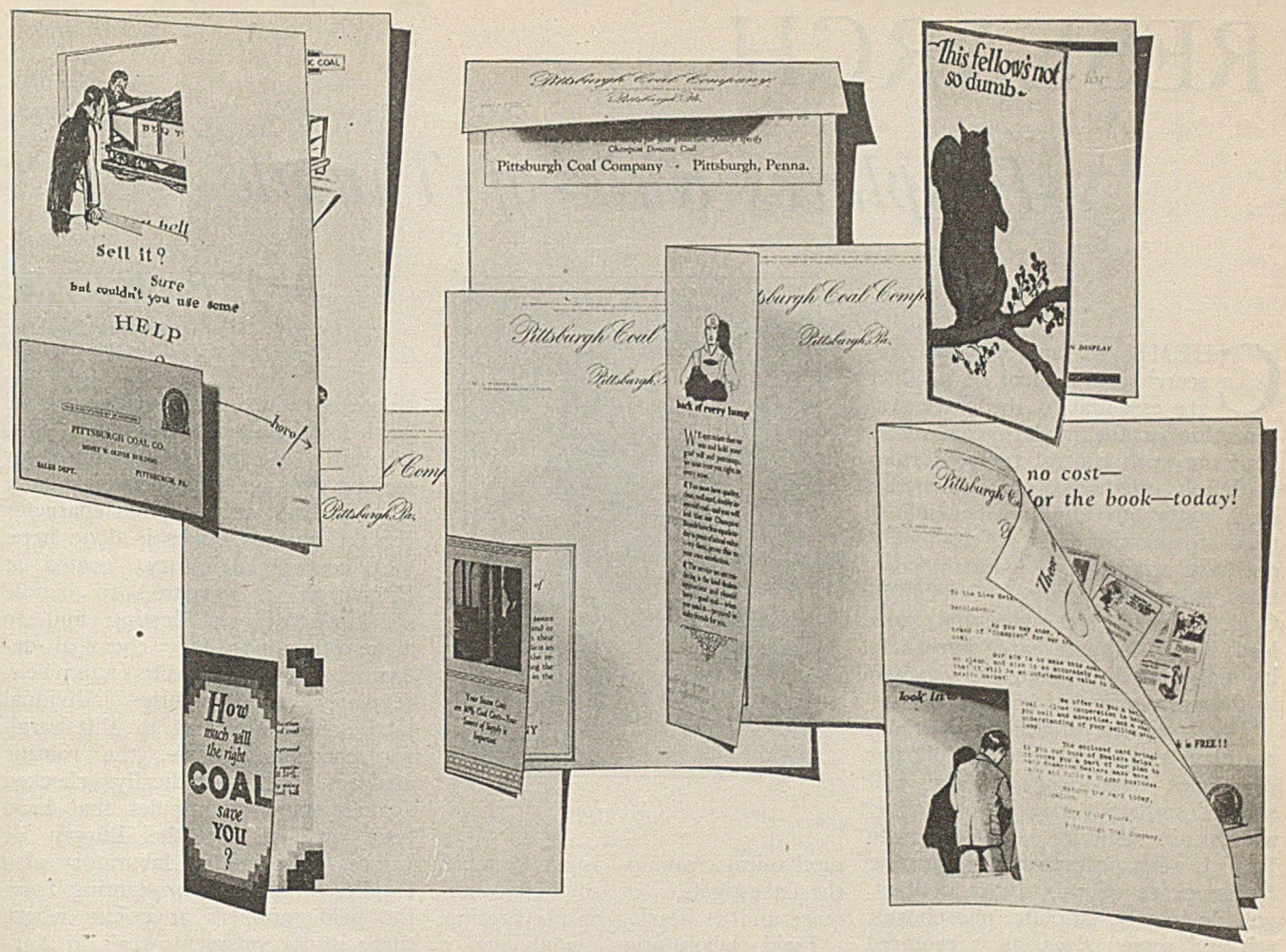
ONE OF THE innovations in Pittsburgh retailing was the application of the market analysis idea to the local retail trade. Several months ago a crew was put on to make a house-to-house canvass of the city, find out what fuel was burned, how much and from whom purchased and the type of heating equipment used. This information is made the basis of subsequent sales solicitation. So much interest was aroused by the canvass that some other retailers in the city attempted a duplicate survey.

In the advertising campaign for industrial business, copy is used in media such as *Power* and *The Purchasing Agent* for general appeal and in *The Ceramic Industry* and *Brick and Clay Record,* for example, when an appeal is directed towards a particular industry. In pushing gas coal only one publication—*Gas Age Record*—has been used. As in the case of retail business, however, much of the promotional work is concentrated on direct-mail copy.

For this work the company has found that an illustrated sales-letter is the most effective. The letter-

Telling the World that "Champion Domestic Lump" Is Used Here





Some of the Literature Which Drives Home the Story of Pittsburgh Coal

forms, some with special cut-outs, tell in an entertaining way some fact which the company wants to impress upon the prospect. One to gas-coal consumers, for example, stresses the fact that the company still has tremendous reserves of Youghiogheny gas. Another, addressed to general industrial users, emphasizes specific savings in consumption made in certain plants as the result of recommendations of the combustion engineers of the company. In some cases the letter form is a four-page folder with the inside pages devoted to a two-color printed sales talk upon some feature of the company's service. Illustrated sales-letters also are employed in reaching retail prospects.

In the letter proper, of course, a multigraphed appeal based on arguments covering conditions ruling at the particular time the letter is mailed is made. In this way the opportunity is afforded to make a multiple appeal in an attractive form with dispatch and at a reasonable cost. With the printed forms carried in stock it is possible to circularize any particular group within a few hours after the decision to make an appeal.

Speed is further served by the manner in which the record lists of prospects are kept. The information as to consumption, size of coal used and buying habits of each prospect which was the groundwork for the general sales analysis has been transferred to addressograph stencils so grouped and tabbed that the sales department can select any group in any territory. For example, if a temporary surplus of three-quarter lump should threaten, the cards are so classified that a girl in the sales department can readily pick out a list of every consumer of three-quarter lump in the territory chosen for the immediate drive.

THE PRINCIPLES of successful merchandising are not difficult. The same rules which govern successful marketing in other lines are equally applicable to the coal industry. First must come a good product. Then a thorough knowledge of markets so that waste in selling effort may be reduced to a minimum. To these two fundamentals must be added a trained selling organization which understands the real meaning of service and a steady advertising campaign.

But the application of those principles to any specific business—whether it be coal, sealing wax or cabbages—means unremitting work and persistent effort. Like the colored preacher who explained that he was able to hold his audience because "fust I tells 'em what I'se goin' to tell 'em, then I tells it to 'em and finally I tells 'em what I'se told 'em"; the secret of a successful advertising campaign is largely one of repetition. In the case of Pittsburgh Coal Company, the sales executives know the industries and retail coal merchants they want to sell, they have trained their men to render effective merchandising service and now are keeping everlastingly at the prospect list.

Not so many years ago it was a common impression that this particular company confined its sales efforts to a few large consumers. Pittsburgh Coal Company is not neglecting the large consumer—nobody does. But it is adding steadily to its list of customers from its prospect records. It is not dropping any eggs—if it can help it—from the old basket, but it is adding to its stock of baskets.

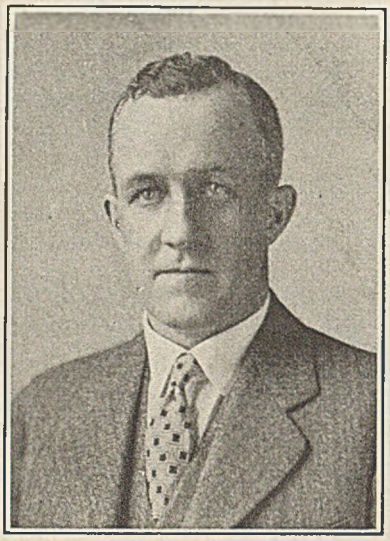
RESEARCH

Displaces Rule-of-Thumb

By J. B. Morrow
Consulting Engineer
Pittsburgh Coal Co.

CHEMICAL and physical research and control of product are essential to the successful operation of the modern coal mine. Had not such control replaced rule-of-thumb methods, the electrical, steel, automotive and rubber industries—to mention only a few—could not have attained the dominant positions they now occupy. Pittsburgh Coal Company, following the same lead, has added a research bureau to its many other departments devoted to the preparation of quality coal.

The functions of the research department may be classed as follows: To check the quality of the coal shipped so that it may be maintained at certain definite standards; to furnish such information regarding fusion point of ash, B.t.u. content, volatile matter, sulphur, phosphorus, ash and screen sizes, as is required by the sales department to determine the grade and class of coal that is best adapted to the customer's need; by systematic sampling of the face, to furnish a check on the operation of the mine, so that any variation in the quality of the coal in the seam may be detected; by visual inspection, analyses and specific gravity tests to determine the quantity of impurities in the prepared sizes, as a further check on the quality of the coal shipped; to study the characteristics of the coals from various mines and to determine the possibility of improving them by mechanical cleaning—as an example, the investigation of sulphur occurrence and its bearing on preparation.



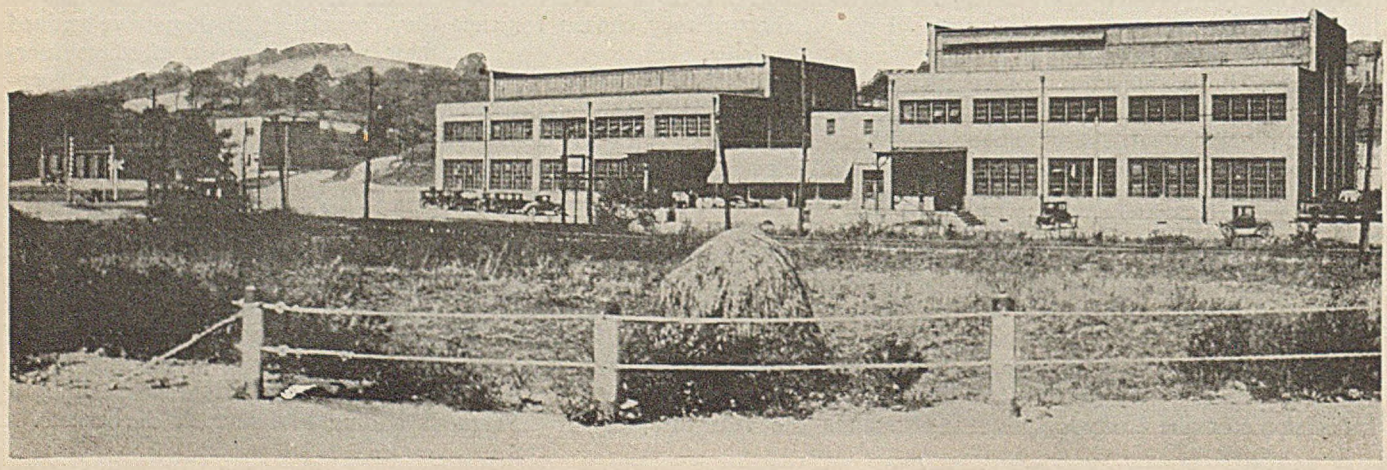
J. B. Morrow

Field laboratories, employing a chemist and a sampler, are maintained at five mines where samples are taken of every car loaded for shipment. Those are analyzed only for ash and sulphur. As the samples are burned in electrically-heated muffles with a circulation of oxygen, and as it takes only from seven to ten minutes to make an ash determination under these conditions, it is readily possible to advise the shipping clerk of the quality of any particular car soon after it has been loaded. The laboratory at Montour No. 10 mine, in addition to analyzing samples of the shipped product, performs the control work for the air cleaning plant. This laboratory is especially equipped for making sink-and-float tests on a large scale and all work of this character for the various mines is done here.

A central laboratory, located at Pittsburgh, is prepared to handle all kinds of coal testing and to make other necessary chemical determinations. Composite samples, regularly made at the individual laboratories, are sent to Pittsburgh for checking. Here, the routine analyses are periodically checked against standard samples that have been analyzed by the Bureau of Mines. The central laboratory also handles all samples originating from the field samplers at points where there is not sufficient work to warrant a separate laboratory. These field samplers, three in number, visit all mines at regular intervals, inspect for extraneous impurities the coal shipped and take average and car samples for analysis. A new central laboratory and office is being constructed at Library. This brick-and-concrete building will contain equipment for all types of coal testing and other analytical work.

For over two years an intensive study of the characteristics of the coals of this company, with reference to mechanical cleaning, has been in

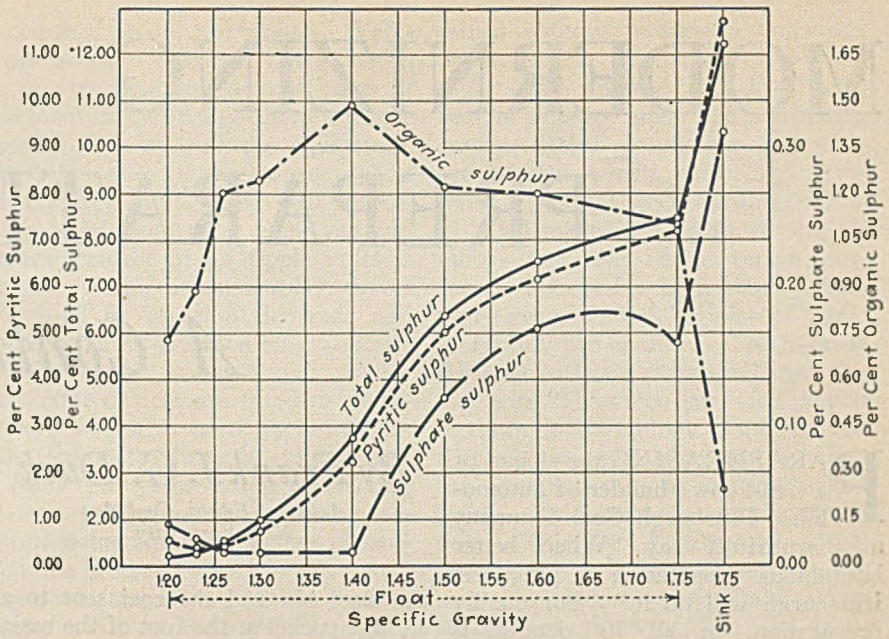
Site of the New Central Laboratory at Library—



progress. The regular procedure, developed after much experimentation, is to take large samples fully representative of the output from each section of a mine. From a mine having a daily production of 2,000 tons, a 20-ton sample is selected. This is screened into five sizes: +4 in., —2½ x 4 in., —1 x 2½ in., ⅜ x 1 in. and —⅜ in. These products are quartered and sent to the laboratory at Montour No. 10 mine for separation tests. The standard sample for this work consists of 500 lb. of 2½ x 4 in., 250 lb. of 1 x 2½ in., 125 lb. of ⅜ x 1 in. and 50 lb. of —⅜ in. coal. These samples are separated at specific gravities of 1.30 and 1.60, the —⅜ in. material being screened on 20 mesh before treatment; the —20-mesh coal is also separated at gravities of 1.30 and 1.60.

As a further check on the results obtained, samples of slack are taken at each mine for a period of 10 days and separations made on the daily samples as well as on a composite made from them. These results are again checked by a second series of tests performed in a similar manner. The composite sample is separated at six gravities—1.30, 1.40, 1.50, 1.60. 1.70 and 1.80—and at three sizes, ⅜ x 1 in., —20 mesh x ⅜ in. and —20 mesh. Screen tests are also made at 5/16 in., —4, —8, —16, —28, —48 and 100 mesh. Fusion points, proximate analyses and organic sulphur as determined on the samples from the various specific gravities. Crushing tests are made on all of the separated products and reseparations made on these samples at the various gravities. This is to determine the lowest percentage of refuse that it will be possible to obtain in a mechanical cleaning plant.

The accuracy of this method of sampling and separating is indicated by the following tests, both a complete series, made on the coal from a group of seven mines: The average of the first series of tests indicated the possibility of recovering 93.2 per cent of the coal at 1.60 specific gravity, the coal containing 7 per cent ash; the second test showed a recovery of 92.5 per cent of the coal at the same gravity and having the same ash content.



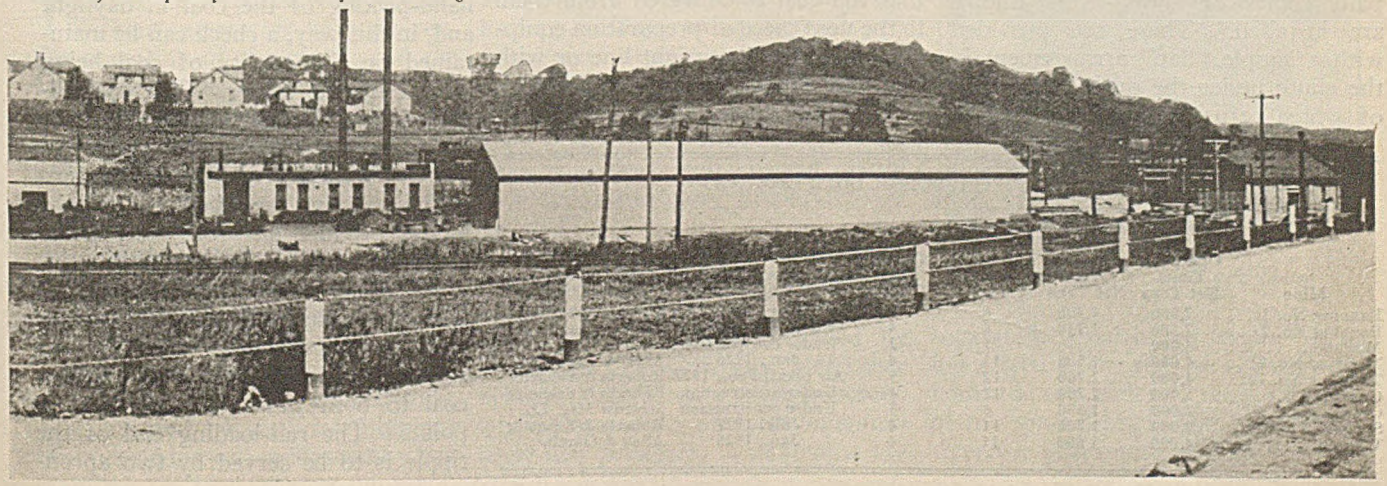
Shows Distribution of Sulphur Forms in Coal

The main laboratory is at present investigating the distribution of sulphur in the coal seam. This study has particular reference to the distribution of the various forms at different specific gravities. Sufficient work already has been done to indicate that, at certain mines at least, there is a separation of the organic sulphur at different specific gravities and that, contrary to the general belief, this form of sulphur can be reduced by washing. The results, plotted on the accompanying chart, have been carefully checked by a series of analyses made by different chemists and would seem to indicate that there is a concentration of organic sulphur at a gravity of 1.40.

Further research is being conducted in an endeavor to determine the sulphur forms—humus or resinic—at intermediate specific gravities, and the effect on the sulphur remaining in coke in this material compared with the sulphur content at other gravities. For this investigation, samples were taken from certain districts which are particularly high in sulphur. Results thus far obtained from some of the low-sulphur mines also have indicated that the same concentration of sulphur occurs at the intermediate gravities.

Many other problems are to be studied and numerous other investigations undertaken. As the research department and its several functions become more clearly understood, we have every reason to believe that its sphere of usefulness will be broadened.

Heart of Shop Operations of Pittsburgh Coal Co.



MODERNIZING PREPARATION

A Continuous Process

By Frank J. G. Duck
Assistant Editor, Coal Age
New York City

PARAPHRASING the slogan of a well-known builder of automobiles, Pittsburgh Coal Company may truthfully say "When better bituminous preparation is practiced, Pittsburgh will do it." For quality preparation, in all its details, is the major consideration of this company—all other improvements, both above- and under-ground, primarily are planned and made with the object of producing better and cleaner coal. The reconstruction and development program, already well under way, is sufficient evidence of a desire to give its customers the highest grade fuel that it is possible to prepare. That neither money nor time is any object is readily realized from a consideration of its methods presented elsewhere in this issue. The magnitude of the undertaking prohibits, except in a few instances, anything but a broad general treatment in this article.

Broadly speaking, surface treatment of bituminous coal may be divided into six stages: Dumping the run-of-mine; conveying; screening; picking and mechanical cleaning; sampling and analysis; and loading for shipment. Although their choice and arrangement naturally is dependent upon local topography and conditions, at all the reconstructed operations of the Pittsburgh Coal Company rotary or "cross-over" dumps are installed. These are provided with a simple "flap" arrangement in the chute under the dump, by means of which refuse may be diverted to the slate bin and the coal sent to a storage pocket at the foot of the main tipple conveyor. Automatic scales, equipped with quick-reading dials, weigh the coal. Push-button control of the trip feeders, as well as of the trip makers, is generally employed. The distance that the coal falls after dumping, as well as the chute angle, is such as to produce the minimum breakage consistent with steady, uninterrupted operation.

AS A FURTHER means of reducing degradation, conveyors and belts of several types are used to move the coal from the dump to the preparation equipment, to cross-convey it where necessary and to load it for shipment. Coal is delivered to the main carriers by horizontal reciprocating feeders, thus insuring a uniform flow of material to the screens. Anti-friction bearings and Hunt lubricators (*Coal Age*, Vol. 32, No. 2, August, 1927, p. 113) permit practically noiseless operation of the conveyors, eliminate "jamming" and break-downs, and decrease power consumption. The discharge ends of the conveyors generally are so arranged that the coal is delivered from them to the next piece of preparation equipment in either a straight line or with but little vertical or angular drop.

The new tipples built or building, together with their ultimate and present capacities, etc., are given in the accompanying table. With the exception of Midland mine, each of these tipples is equipped to deliver the following sizes or any combination thereof: 6-in. block; +4-in. block; 2½x4-in. furnace; 1⅛x2½-in. stove; —1⅛-in. slack. In addition to these, the air cleaning plant at Montour No. 10 mine also prepares powdered fuel, 0 — $\frac{5}{16}$ in., and stoker fuel, $\frac{5}{16}$x1⅛ in.

The surface plant now building at Midland mine is not a tipple but a loading station—run-of-mine coal is to be loaded directly into railroad cars which will deliver it to a centralized plant for preparation. Although having a rated capacity of 4,000 tons in six hours, the capacity of this plant can be raised to 8,000 tons in the same length of time merely by increasing the width of the conveyors. A rotary car dump, and a dividing chute of the type previously described, are provided. Because of topography, the refuse is elevated from the bottom of the slate chute to a large-capacity bin from which it is removed for disposal. The coal is carried to the railroad cars by conveyors and loading booms. A small off-take conveyor is installed to which, at will, it is possible to divert the contents of a mine car. This conveyor permits hand-picking of the coal in daylight and, in this way, a check can be maintained on the quality of coal being loaded by the miner. The coal diverted to the small picking conveyor is returned by it to the main conveyor.

The installation of new and modern equipment in the Crescent tipple, whose product has for many years enjoyed an enviable reputation, involves many noteworthy features. It will be a combination rail and river plant equipped with one shaking screen, 10 ft. wide, which will deliver coal to both rail- and river-loading points. The rail-loading end of the tipple is to be served by two apron-

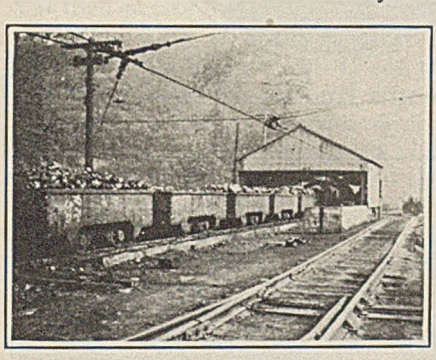
NEW TIPPLES OF PITTSBURGH COAL COMPANY

Mine	Capacity per Day (6 Hrs. Operating Time) Net Tons	Present Daily Output Net Tone	Number of Sizes Loaded or Provided for	Number of Tracks	Date Placed in Operation	Designed and Erected by
Banning No. 1....	2,000	1,300	6	3	Aug., 1927	Morrow Mfg. Co.
Banning No. 2....	2,500	1,750	6	4	Under construction	Allen & Garcia
Midland.....	4,000	.....	1	2	Under construction	Allen & Garcia
Montour No. 9....	4,000	1,500	11	4	Jan., 1926	Allen & Garcia
Montour No. 10....	4,000	2,700	12	5	Air plant, Feb., 1927	Roberts & Schaefer
Crescent.....	5,000	2,200	12	4	Under construction	Roberts & Schaefer
Ocean.....	2,000	1,500	6	3	Under construction	Morrow Mfg. Co.
Somers.....	2,000	1,700	11	4	July, 1927	Roberts & Schaefer
Warden.....	4,000	3,600	11	4	Jan., 1926	Allen & Garcia

type loading booms, each five feet wide, and by a chute for loading slack. Coal will also be delivered to the river end by two loading booms and these will be six feet wide.

This will be one of the few river tipples with provisions for the simultaneous loading of three separate sizes into barges in three loading channels. It will be the only tipple on the Monongahela River with two booms, loading parallel to stream flow. There are now but two other tipples on this river with similar equipment, each of which has one loading boom arranged to load either bar-screened lump or run-of-mine.

The rock gate in the dump chute at Banning No. 2 tipple is electrically operated. This enables the operator to maintain the same rate of dumping when the cars in a trip contain alternate loads of coal and rock as when all loads contain coal. Probably the



Rotary Dump at Warden

most unusual feature of this tipple is the shaking picking tables—three in number, five feet wide and flat in section. These tables, as do the screens at Somers tipple, enable the pickers to remove any lumps, regardless of their size, without lifting. Extremely large lumps occasionally contain binders. These are pulled from the table, the binder removed and the coal returned for further treatment.

THESE PLANTS were erected without interfering with the regular operation of the mines, and the changes from the old to the new tipples were accomplished without loss of production. All tipples are similar in design, construction and operation, local conditions and equipment of various manufacture necessitating the principal differences. Built of structural steel, with reinforced-concrete floors and steel sashing, the structures are remarkably free from vibration. "Armco" iron or zinc siding and roofing is used, and ample natural light (supplemented by artificial illumination is provided—as evidenced by the accompanying photographs. Walkways and stairs are of liberal width to provide easy access to all parts of the plant and, although there is ample room to get around the equipment, there is little if any waste space. Heavy-duty mill type, dust proof, slow speed motors are employed and central control of all tipple units is provided. Rope, gear and belt drives are used as occasion demands and speed reducers are used on practically all conveyors. Guards and similar protective devices are fitted to all revolving and other parts likely to occasion accidents through carelessness.

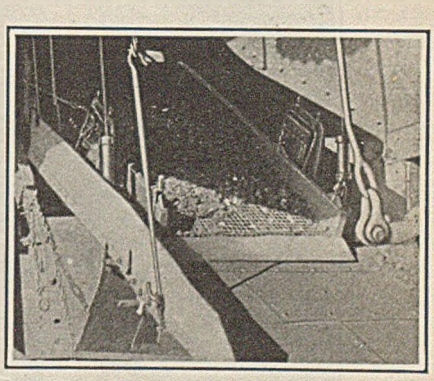
Sufficient reciprocating or shaking screens are provided to insure accurate sizing and, as a further precaution, the prepared sizes are rescreened just prior to delivery to the loading booms. All screen plates are interchangeable and are so designed that they may be easily and quickly changed or renewed. There are ample facilities for picking the larger sizes, each on separate tables of liberal width and length or, as in the case of the Marcus screens, on solid plates built directly into the screens themselves. The refuse removed on these tables is thrown either into chutes or onto troughs mounted directly above or below the reciprocating screens and attached thereto—the movement of the screens causing the slate and rock to move in the same direction as the coal. This waste material is delivered directly to refuse bins and from there removed, by various means, to the rock dump. The mixed coal and rock is either broken up and thrown into chutes which return it to the main tipple conveyor for retreatment, or else is placed to one side where the pickers separate it when, for any reason, the tipple is not in operation.

As previously indicated, great flexibility in the sizes that can be loaded characterizes these plants. Simple mixing arrangements of various types are provided which make possible the loading of any combination of prepared sizes after picking and with a minimum of handling after leaving the screens. In fact, in all tipples manual labor has been reduced as far as is consistent with efficient operation and satisfactory preparation of the coal.

At least one item of new equipment, that should appeal to those interested in better and more efficient preparation has been recently installed by Pittsburgh Coal Company. Reference is made to the Traylor vibrating screen which successfully operates on an entirely new principle. Vibration is obtained without motors or solenoids, hence there is no machinery to wear.

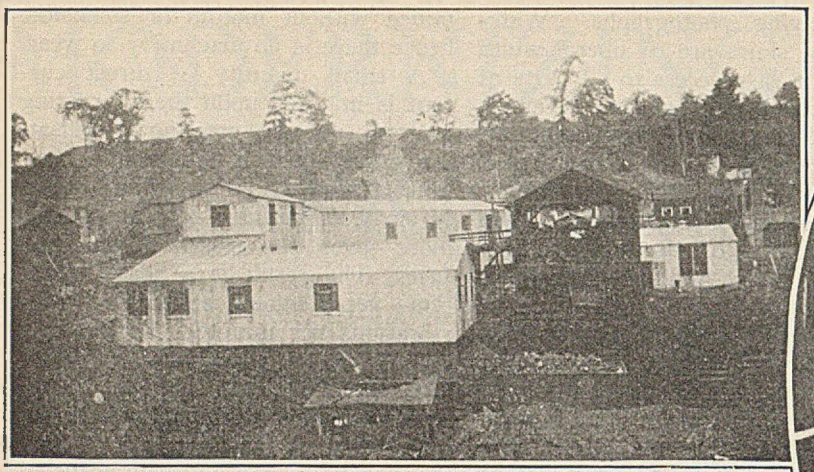
A small quantity of direct current is imposed upon the alternating current, thereby creating a pulsating current which uniformly transmits a vertical reciprocating action of small magnitude—$\frac{1}{8}$ in. or slightly more—over the entire screen surface. The result is a sharp vibration—yet a smooth action—of 3,600 vibrations per minute. These cause the coal to be in constant loose contact with the screen surface. When screening material high in moisture or that containing large amounts of clay, the vibrations may be easily adjusted by rheostat control to meet the conditions. Thirty-six hundred vibrations per minute, of $\frac{1}{8}$ in. each, are equivalent to a shaker screen making 120 strokes per minute of 3 to 4 in. each. Another unusual feature of this screen is the fact that, because of its construction and operation, 100 per cent of the power applied to it is transmitted to the vibrating member.

IT IS TO BE noted, in the photograph showing the Traylor screen in use at Arnold mine, that although the upper end is completely covered with coal, the lower end is empty—thus indicating that all undersize has been removed. No shaker screens are installed at this plant, and gravity feed is employed throughout. The Traylor screen is installed, at an angle of approximately 30 deg., under a bar screen having 3 in. openings. The +3-in. coal passes directly to the lump-coal cars. The —3-in. material passes to another bar screen having $\frac{3}{4}$-in. openings—this removes a portion of the slack. The remainder of the coal goes directly to the Traylor screen where it is finally sized and

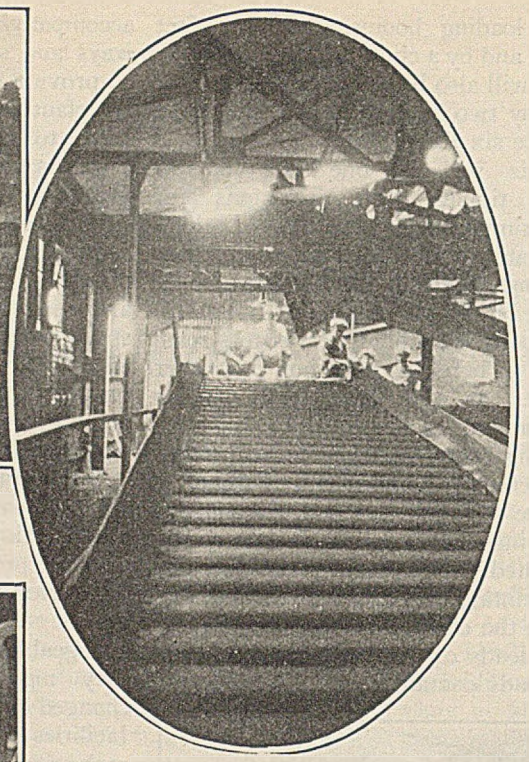


Handling 125 Tons per Hour

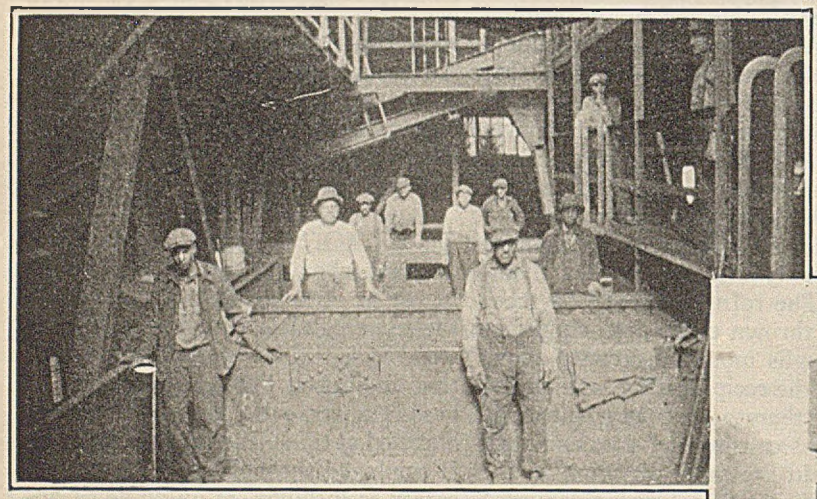
separated. Coal is fed to the vibrating screen at the rate of 125 tons per hour, the remainder of the production of this mine being handled by the bar screens. Approximately 30 per cent



New and Old Tipples at Banning No. 1

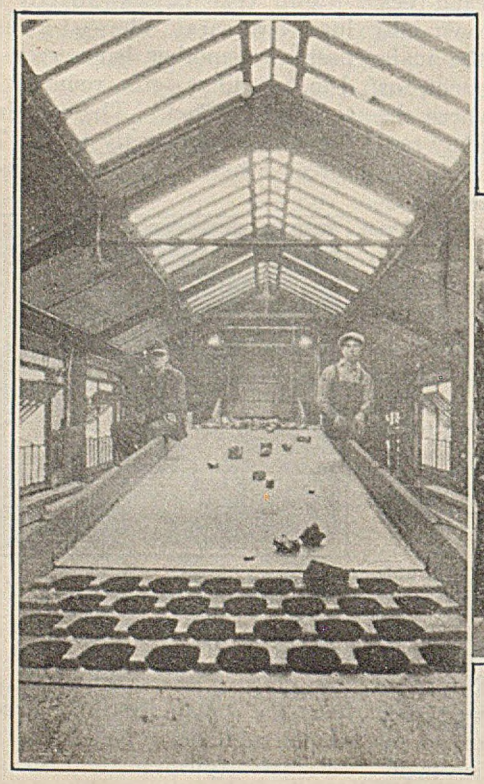


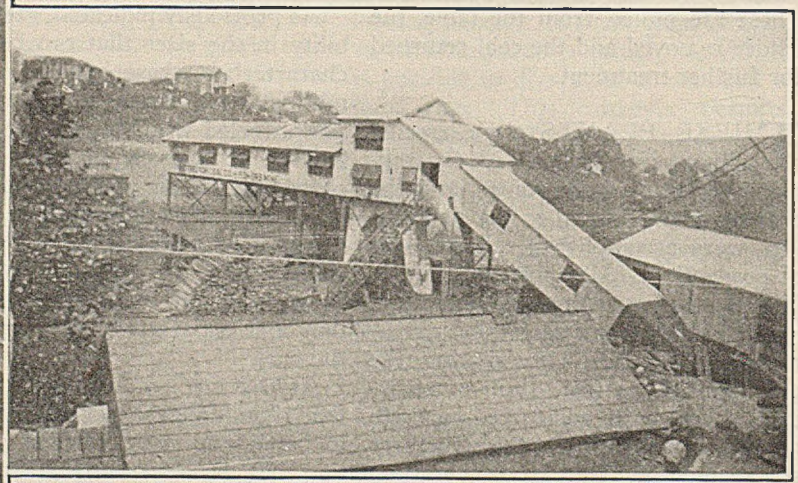
Booms Reduce Breakage



Tipple Crew at Warden

Clean Coal from Clean Plants





Abundant Sunlight Aids Good Preparation
at Somers and All Other Mines

of the coal that goes to the Traylor screen passes through it.

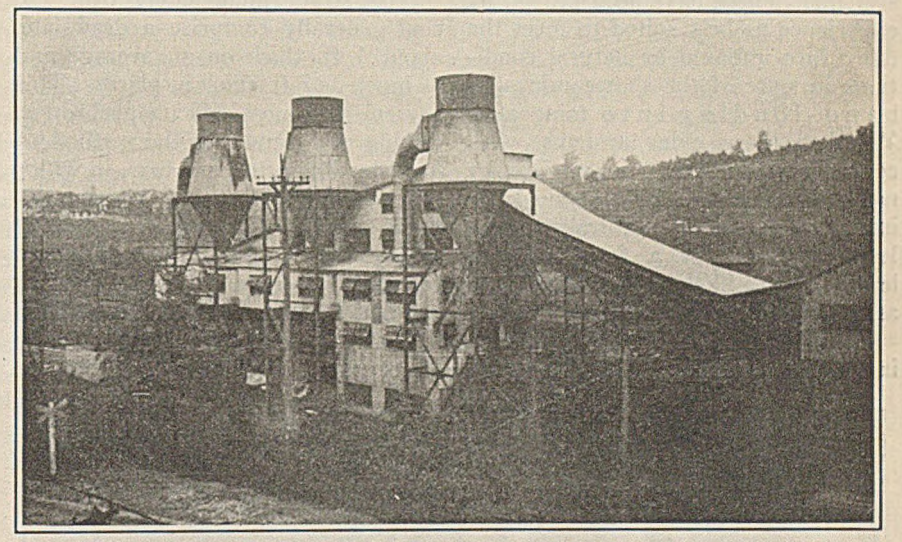
As the dry cleaning plant at Montour No. 10 mine has been described in detail in the technical press, only brief mention of its more salient features will be made here. The plant consists of duplicate units, each having a capacity of 160 tons per hour, thus giving a total output of 320 tons per hour. Plus 2½-in. coal is sized and prepared on Marcus screens in the adjoining tipple. The undersize is raised to storage bins. Bone and refuse from the picking tables in the tipple are crushed to 2 in. and conveyed to the raw coal bins for the air plant. From these bins, the coal is delivered by reciprocating feeders to belts which carry it to six double-decked Arms screens (three in each unit) located in the cleaning plant. These size the coal into seven products from 2½ in. to dust. The screened coal then passes to 16 Arms air concentrators, eight in a unit. Each of the sizes from 2½ to $\frac{3}{16}$ in. is fed to two tables—the $-\frac{3}{16}$-in. coal is prepared on four tables. Bonson decks, consisting of fine screens covered with woolen cloth, are used on the six tables treating the $-\frac{5}{16}$-in. coal. The middlings from all tables are returned to the raw coal bins for retreatment. The refuse is conveyed back to the tipple and then to the rock dump.

FOUR products, or combinations thereof, can be shipped from the dry cleaning plant at Montour No. 10 —nut, stoker fuel, pulverized fuel and cleaned slack. From a raw-coal feed of irregular analysis, varying between 9 and 14 per cent ash, this plant supplies a uniform product containing 7 per cent ash. The building is of structural steel and reinforced concrete construction, with corrugated zinc roofing and siding, and vibration is practically eliminated. Gravity flow is utilized as far as possible, the entire screening operation being performed on the top floor, the air cleaning on the floor immediately below, while all fans and motors for supplying air to the tables are located on the ground floor. Central control of the 66 motors, totaling about 900 hp., required to run this plant is provided. Three cyclone dust separators remove all but the finest dust from the air that leaves the tables. Four men, in addition to the foreman, comprise the operating force.

One of the greatest advances in the bituminous coal industry will be the first of a series of central preparation plants now being designed. In a general way, tentative plans call for a plant to treat 1,000 tons per hour of run-of-mine coal from six or more mines. As far as conditions permit, the plant is being designed and built in two separate units each having a capacity of 500 tons per hour. Operation will be on a basis of one or two 10-hour shifts per day, six days per week. Coal will be delivered to the central plant in railroad cars. These will be emptied in a rotary dump to belts which will carry the coal to the main screens. The +4-in. coal will be screened and hand-picked there, and separation may be made of this material into 4x6 and +6-in. lump. From intermediate storage, the —4-in. coal will be conveyed to the mechanical cleaning plant where provision will be made to load six sizes or any combination thereof.

The reject from the picking tables in the tipple will be repicked—the large rock sent directly to railroad cars for disposal and the remainder crushed to —2½ in. and mixed with the —4-in. raw coal going to the cleaning plant. One of the most important features of this plant is to be the uniformity of the finished product —the ash content of the +1-in. coal is not to exceed 7 per cent and that of the —1-in. material shall be between 8 and 9 per cent. Automatic samplers are to be installed on the raw coal, cleaned coal and refuse conveyors. All transporting and loading equipment in the tipple and cleaning plant is to be of such design and construction as to reduce handling and degradation to a minimum. Exact data as to the location of the plant and the type of mechanical cleaning equipment to be installed are not available now but soon will be announced.

Routine sampling and analysis of coal for size and ash content is performed at all mines. In addition, composite samples of the daily production from each operation are sent to a central laboratory at Pittsburgh for sulphur and B.t.u. determinations. Thus, the consumer is enabled to purchase coal not only having a guaranteed content of these impurities but also a material that will meet any particular requirement. Samples of the cleaned coal and refuse are also taken at Montour No. 10 at intervals during the day so that a check is at all times maintained on the operation of the plant. Further details regarding the chemical and physical control of the coal prepared by this company are given in an article describing its research activities.



Dry Cleans 320 Tons per Hour at Montour No. 10

The prepared coal at all mines is loaded for shipment with booms which can be lowered to the bottom of the car, thereby minimizing breakage. These loading booms are operated by small electric hoists which are controlled from platforms located above the cars. Hauls and retarders of various types permit accurate "spotting" of the cars being loaded, thus reducing degradation through spillage due to overloading.

That modernization of preparation equipment is a continuous process is borne out by what was going on all around the writer at the various plants as he collected data for this article. Construction and reconstruction on all sides, plans for new plants and designing engineers searching for improvement in method and detail! One could only feel that a few months hence another story of the progress of preparation at the mines of Pittsburgh Coal Company must be told.

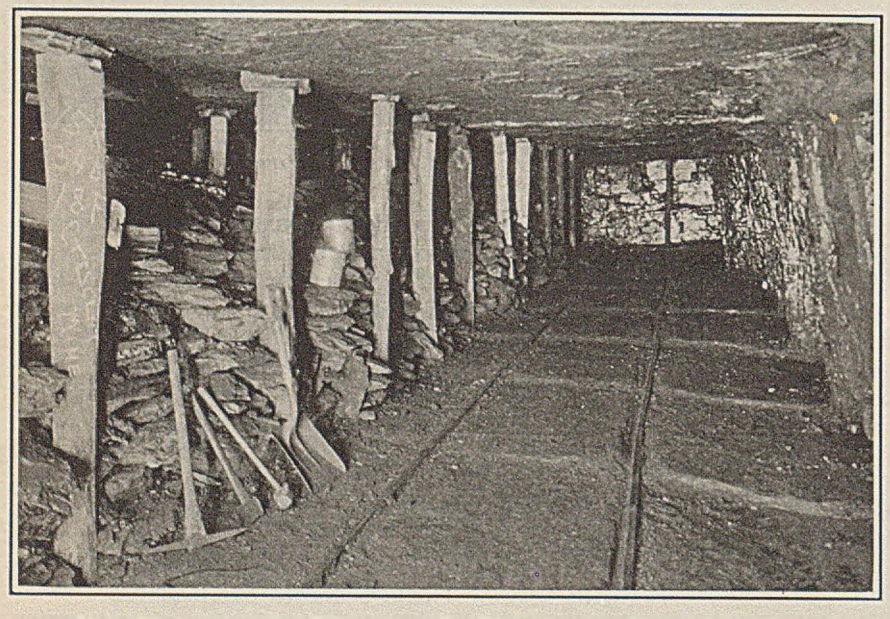
Room and Pillar System Dominates

By A. F. Brosky
Associate Editor, Coal Age
Pittsburgh, Pa.

WHILE searching for better and cheaper methods of mining, the Pittsburgh Coal Company adheres, for the production of most of its tonnage, to several tried systems. These have been proven by experience as best suited to meet the difficulties imposed by natural conditions in spite of the shortcomings of hand-loading into mine cars. Whether these older systems, with certain modifications required by mechanization, will be continued far into the future is naturally problematical, but for a few years at least they are likely to be relied upon as the main sources of production.

All of the mines of this company in Pennsylvania are in the Pittsburgh seam. The majority of them are drifts, the others are opened by shallow shafts or slopes. The cover ranges from 15 to 800 ft. The characteristics of the seam proper are everywhere about the same, except for a variation in thickness, the average being about 6 ft. This seam is marked by two distinct planes of cleavage—the 'face' and the 'butt'—the face being the more pronounced. Rooms are generally worked "on the face," that is, perpendicular to the most pronounced cleats of the coal.

The strata immediately over the coal generally comprise a drawslate, about 1 ft. thick on an average and as much as 7 ft. thick in places. This presents the most difficult problem in mining the seam. In the method of hand-loading into mine cars, in which progress of extraction is comparatively slow, the drawslate if held at all is supported by timbers only during the time required to load out a cut and is then taken down. Often it is necessary to take down much or all of the drawslate before the cut is loaded out. Experiments toward finding a way of avoiding the handling of this slate by leaving about 8 in. of coal in the roof are now in progress in connection with the conveyor and machine-loading operations.



This Illustrates the Drawslate Problem in the Pittsburgh Seam

Shortwall cutting machines are in predominant use, but recently shearing and topcutting, also truck-mounted undercutting, machines have been put to use as tools for the general plan of increasing efficiency and bettering the quality of the coal produced. In the older workings drilling is done by hand, using the twisted auger, but here again the practice is being changed by the introduction of mechanical drills. Types driven by electricity or by air, truck-mounted or portable, are on trial in conveyor and loading-machine sections.

IN ALL OF the mines mechanical haulage is the practice, exclusively so in some and for primary transportation only in others. The mule has given a good account of himself in gathering work in a number of the older mines where relatively small mine cars are used and his services will in all probability be continued for the remaining life of the workings in which he is now employed. Where large mine cars have been introduced locomotives have replaced the mule for gathering.

So far as possible, isolated pumping units are being eliminated. Ditches are dug to drain relatively large areas to central dams or sumps, from which the water will be conducted to the outside by fewer units of greater capacity and lower maintenance and operating cost.

Surveys are made quarterly; retreat lines are posted and once a year the recovery is checked. All places are turned and driven to sights. These are marked with white paint and extended at 100-ft. intervals. Track turnouts and switches are located by instrument.

In going over the old maps of the Pittsburgh Coal Company one may trace progress in the establishing of present mining systems. Experiments in practically every known system of mining, or modification thereof, have been made and the results are plainly indicated by symbols and the distinctive colors covering quarterly

surveys. Evolving from these experiments are three distinct mine layouts best suited to as many sets of conditions. All are based on room-and-pillar mining in a panel layout. These are: (1) Full-retreating in a panel, with rooms driven on only one side of the butt entry. (2) Full-retreating in a panel, with rooms driven on both sides of the butt entry (but rarely used). (3) Half-advancing and half-retreating in a panel.

THE CHOICE of a particular system for use in any one mine has been determined by conditions, such as grade or cover, and by local experience. Under comparatively light cover the half-advancing and half-retreating layout is used. A block of solid coal is split into two parts by a butt entry. As the entry is driven up, rooms in one of the blocks are worked and pillars recovered in consecutive or progressive order—on the advance. When the butt entry has reached its limit, rooms are turned and pillars recovered in the same manner—on the retreat. All exceptions voiced to the contrary, notwithstanding, the company has found this system quite satisfactory under light cover. It provides quick tonnage results at the start and uniform and high production thereafter. This system is not at all suited to mining under heavy cover.

WHERE the cover is heavy, say 500 ft., the full-retreating system, with rooms driven from one side only, is used exclusively. From the standpoint of recovery this system is best. A layout of this method of working is shown herewith. The width of the panel or the length of the butt entries driven through it is 1,500 ft. The length of the panel is such as will provide a working section of convenient size. The main or flanking entries are driven in fours and a generous protecting or barrier pillar, from 100 to 150 ft. wide, is left on all sides. Within this panel butt entries are driven at intervals of 300 or 350 ft., depending upon the length of room desired. Entries are driven 10 ft. wide on 50-ft. centers

In this system successive butt entries and the rooms on them are driven up only as needed, the progress of the rooms being so timed that each is barely completed at the time that the retreating break or pillar line reaches the inby extremity of the room, when drawing of the pillar mated to the completed room is immediately commenced.

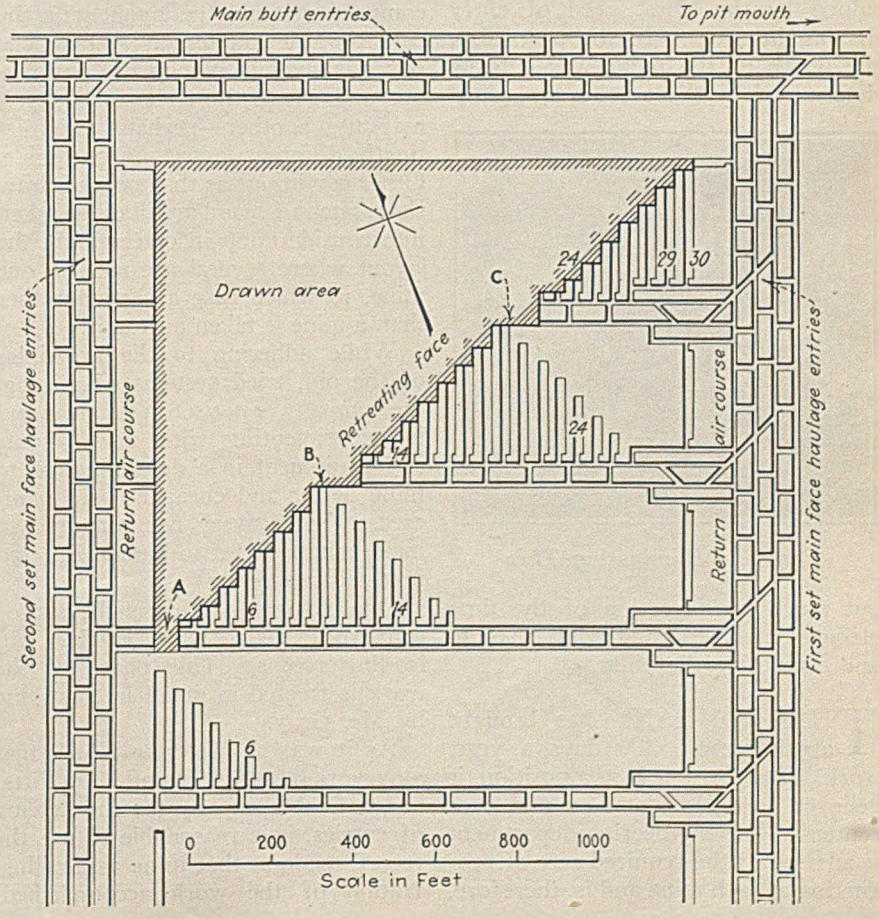
The pillar line is maintained at an angle of 45 deg. and within a panel attains a maximum length of about 1,700 ft. As indicated by *A*, *B* and *C* below, at the point where the butt entries intersect the pillar line a step is maintained, which in length is equivalent to the combined width of three pillars and the two rooms between them. This provision is made so as to avoid disturbing ventilation, the rooms always being cut into the gob and not into the entries at their inby extremity.

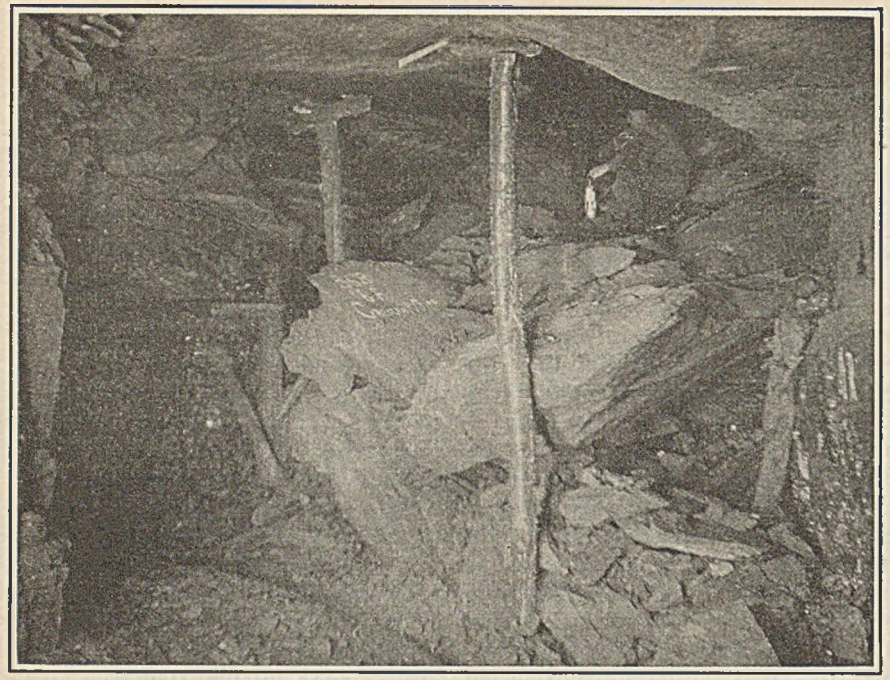
The standard room widths are 20 and 21 ft. and the room centers are 33, 39 and 45 ft., depending upon the thickness of cover. Rooms are generally driven to a length of 300 ft. in the full retreating systems; in the half-advancing and half-retreating system the rooms driven advancing are 280 ft. in length and those retreating are 220 ft. Pillars are extracted by driving butt-off places, 15 ft. wide, leaving a protecting wing pillar, 6 ft. wide, which is recovered from within the butt-off place. In mining this wing pillar a cutting machine is generally used, but a protecting stump is left at each end, which if recovered is extracted by pick. When the last butt-off place is driven through and the recovery of the wing pillar between it and the gob is started, another butt-off place is begun. Where conditions are normal, yet another butt-off place may be started after the second one is "holed" half-way through, providing three working places in one pillar.

THE ADVANTAGES of the mining layout last described are many. The rooms need not be opened up any faster than is necessary to keep the pillar lines straight, so that in the event of an interruption to work, fewer rooms are left standing and fewer falls occur. Also, the pillar ends are less likely to take weight. Since the places are concentrated and worked methodically, a more positive control of supervision and ventilation is obtained. Less timbering is required and safety in general is promoted since the miners always work in solid coal.

Objections have been raised, in consideration of this system, to the necessity of driving the butt entries to their limit before a single room is turned. This feature is not always necessary and in many cases a few rooms may be driven to a length of, say, 100 to 150 ft., as a means of providing more coal during the time that entries are being driven.

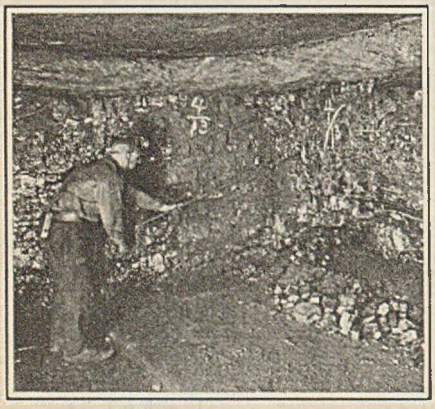
Full Retreat Method of Mining Pittsburgh Seam





Pillars Are Drawn on the Full Retreat in These Mines

The thickness of pillars, the width of rooms and their length have always been controversial. The room length now favored by this company, from the standpoint of operating cost, is in the neighborhood of 250 ft. A room of this length was virtually out of the question before the advent of loading machines and conveyors since adequate development could not be obtained by the slow speed of entry driving by hand. In the past, also, the width of the pillar was entirely determined by the overburden, without much consideration of the time element involved in driving a room and extracting the pillar.



Power is Eliminating This

THIS COMPANY has brought about steady, 300 days a year, work. Therefore, it is in a position, it believes, to drive rooms on narrower centers. The engineering department is advised of the required rate of production at each mine and is, therefore, in position to authorize and direct the opening up of new areas as the areas already opened are exhausted. This has been a big factor in planning development work and is effecting a greater concentration of workings.

To adhere strictly to one standard system of mining in any one mine, when a wide variation of conditions prevails, is considered illogical. The company matches the layout with the conditions encountered. Where the cover is shallow it may use one layout and where the cover is heavy it may use another—perhaps two distinctly different layouts in one mine. Other conditions as thickness of draw slate, pitch of seam, are likewise taken into consideration in determining the layout where several are used in one mine, in which case a section rather than a mine is taken as a unit.

While adhering to the principles of the old, tried systems of mining, the company is not set in its ideas and is experimenting with new layouts and equipment in a determination to mine better and cheaper coal, to increase the recovery per acre and to make mining safer to human life and invested capital.

One example of this is the use of conveyors for driving entries and loading rooms. This phase of the work is treated in detail in this issue by Mr. Gray.

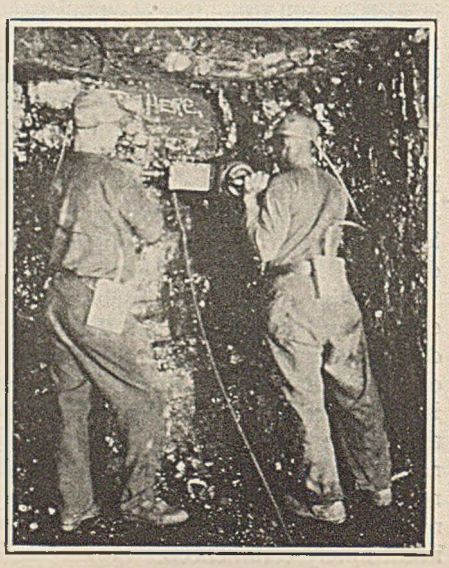
As it was at Montour No. 9 that conveyors were first installed by Pittsburgh Coal Company for the driving of entries, it is reasonable to use the record made at that mine as an illustration of the work accomplished. Since about Sept. 1, 1926, when conveyors were introduced, each entry, despite all delays, has been advanced approximately 2,000 ft. as compared with about 400 ft. per year, which was the greatest speed recorded at this mine with hand loading.

IN THE first half of September, 1927, the following results were obtained: 55 yd. of entry were driven by the two units in twelve days, an average of 13.7 per day. In addition, one conveyor loaded out 45 lin.ft. of 36-in. slate and 54 lin.ft. of roof coal and drove one yard through a 3-ft. clay vein. The other conveyor loaded out 36 lin.ft. of drawslate, 5 ft. thick, and 24 lin.ft. of roof coal. This conveyor drove through one spar and four angle clay veins. During the development 255 tons of coal were loaded in the entries. Of the twelve days, five were reported as unproductive, being used for moving the drive and laying track.

For comparison, the following figures indicate the speed possible with hand loading. In March, 1927, the average advance of the eight best entry men was 2.54 ft. per shift. In 1922, when entries for a manway were being driven and an effort was being made to advance them as speedily as possible, an average of only 50 ft. per month was attained, though the conditions were normal. The results at other mines with hand loading were no better.

The Pittsburgh Coal Company must not be considered, however, as permanently wedded to room methods. If longwall should be found not only feasible but preferable the company will introduce it. The fragile roof and thick coal constitute difficulties that will have to be met.

Portable Electric Drill at Work



Engineers Plan Operations to Cut Production Waste

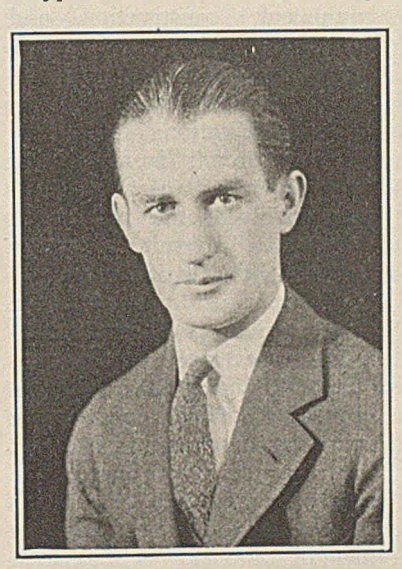
By Jerome C. White

Production Engineer
Pittsburgh Coal Co.

THE CORPORATE set-up of Pittsburgh Coal Company follows the three main economic divisions of administration, sales, and production. Active control of all mining operations centers in the production vice-president, L. E. Young. The set-up of his organization is of the line-and-staff character and is broken into three divisions, engineering, operations, and safety and welfare. It can be seen in this intimate grouping of work, engineering is recognized as an important function in production.

The line division heading up under H. R. Miller, production manager, is the operating department and is responsible for production, and its quantity, quality and cost. It is responsible for building up and maintaining an efficient producing organization. It is solely responsible for the operation of the mines under the technical standards maintained by the engineering department and the safety standards set up by the safety and welfare organization. Included in the safety and welfare department are mine inspectors, for the safety of the worker is not forgotten in the urge for production. C. A. McDowell, safety and personnel director, is in charge of safety work and kindred social problems incidental to housing thousands of employees and their families. The upkeep of equipment and power requirements, a huge task, is under the direction of A. B. Kiser, superintendent of mechanical equipment, reporting to the production manager. W. A. Lauder is general superintendent of mines and H. M. White is division manager.

When the daily problems of business were simple the tasks of management were simple. Increased demands for quality, more intense competitive conditions, both from within and outside the coal industry, have thrown constantly increasing burdens upon those charged with managerial responsibilities. These conditions in other industries gradually forced the abandonment of the straight-line organization, one-man control, in favor of the wider and more flexible type of line-and-staff management. The line exists for production and the staff to support the line. Both are responsible for results. In the organization of the production department these principles are recognized in the breaking of production into two closely-related functions, engineering and operations.



Jerome C. White

THE CHIEF engineer, E. S. Taylor, is responsible to the production vice-president. Within the engineering department is a planning division in charge of a production engineer. This division of the engineering department may be said to be the coordinating link between engineering and operations, and takes on more of the nature of management engineering. It forms the beginning of scientific management in coal mining. The whole production organization set-up makes for direct action.

What the functions of the planning division are may be seen from the executive order which created it: "In order to plan and supervise certain important mining operations the position of production engineer has been created. The production engineer and his assistants will plan in detail the methods of mining, haulage layouts, dispatching systems, drainage, pumping and ventilation; they will standardize equipment, construction and practices."

THE RELATION of this group to the rest of the organization is shown in the following quotation from the same executive order: "In arriving at the practices, plans and standards involved in the foregoing, the production engineer will consult the various operating officials of the production department. After the said practices, plans and standards, as developed by the production engineer, have been approved by the chief engineer the operating department shall put them in effect at once. The hearty cooperation of all officials will facilitate greatly the inauguration of this important step in the development of the planning of mining operations." The essential purpose of this work is to relieve the operating executives from details by giving them the assistance of a staff of specialists.

It may be said, too, that this department exists for service. While it initiates plans and standards in its production and cost work, its services are available to any official who needs them.

Only the high spots of interest—those that illustrate the principles of scientific management and orderly planned production methods—are discussed here. The functions of the transportation engineer illustrate the principles of management that are being put into effect. His work is to make underground haulage good railroading. The program calls for the re-conditioning of main haulageways

and future work to be done under engineering control. Haulage facilities, adequate to handle the expected load, are essential. For instance, in planning for mechanical loading, transportation plans are so made that production will not be retarded on account of the haulage being inadequate.

There is under way a scientific study of transportation and dispatching. At present dispatching is limited to haulage systems. Plans are being worked out to dispatch other work such as that of cutting crews and trackmen. Mechanical loading offers a wide field for scheduling and dispatching. Operations dispatching is essential, not only to eliminate the wasted time of day men (not always their fault) but to eliminate delays and unsatisfactory service to the miners at the face. In this work production standards will play an important part.

FOR INSTANCE, if a standard production or a standard time for a job has been set at a certain figure then efforts must be directed toward reaching that figure, no matter how much higher it may be than present performance. When these standards have been correctly set with due regard to existing conditions, any substandard performance will have to be improved. To set a certain standard of attainment, when higher than present performance, is a challenge to both engineering and operating departments to reach it. The engineering department is to plan *how*, and the operating department to *do it*.

The mining engineer is in charge of mine development, projections, ventilation and drainage. The production quota for a mine or a division having been determined, it is necessary that a production plan covering the areas within the mine be secured. Also, as the production schedule is known for three months in advance, the development of the mine is planned for the attainment of this schedule. Within these plans must go equipment and material requirements. The necessity for planning ahead is apparent. Then, also in view of the pressure upon production management for increased output and low costs, it is essential to exercise centralized control to insure the following-out of the production program determined upon.

Mine development is being planned to effect concentration and a track layout whose object is to utilize haulage equipment effectively. In fact, this applies to all equipment. Concentration of working places is the goal whether it be for conveyors, loading machines or hand loaders; or with regular room-and-pillar or concentrated block systems.

This control is exercised through the division engineers. In some of the mines map tacks are used. These furnish very quickly much of the data that it is essential to know about a mine. The degree of concentration and the proportion of retreat work to advance work can be seen quickly.

Why a Planning Engineer?

In order to plan and supervise certain important mining operations, the position of production engineer has been created. The production engineer and his assistant will plan in detail the methods of mining, haulage, layouts, dispatching systems, drainage, pumping and ventilation; they will standardize equipment, construction and practices. The relation of this division to the rest of the organization is shown in the following quotation from the executive order: "In arriving at the practices, plans and standards involved, the production engineer will consult the various operating officials of the production department. After the said practices, plans, and standards, as developed by the production engineer, have been approved by the chief engineer the operating department shall put them in effect at once. The hearty co-operation of all officials will facilitate greatly the inauguration of this important step in the development of the planning of mining operations."

AS PREVIOUSLY mentioned, this division of the engineering department exists as an aid to management and is, in fact, a part of it. An illustration may clear this point. In case it is intended to mechanize a mine, the superintendent is furnished a complete and detailed plan of procedure. The superintendent of mechanical loading (a member of the operating department) assists him in the initial organization incident to installing the machines. When a change of mining method is being made, a carefully-prepared schedule is made out, and kept up as to progress by the division engineer. In one case it was necessary to make two retreat lines coincide; one by hand mining, and the other mechanical loading, with both of them moving at different rates. The overburden exceeded 500 feet and the whole situation presented many difficult problems. The progress of each was checked and recorded by the division engineer for the guidance of those in charge of the mine. These major problems of management, wherein several functions are concerned, are handled by conferences; the daily routine by schedules and instructions.

Quantity production through concentration of operations and the handling of coal from several mines over one large tipple, while it has many advantages, has increased the complexity of management problems. Multiple shifting is a phase of management that needs no argument but does require time to develop on a practical basis, especially with the advent of loading machines. This is one of the responsibilities of the planning department.

AFTER specialization of executive function, we arrive at specialization of labor. Mechanical loading is introducing the need for co-ordinated functional jobs done the right way at the right time. Places cut and sheared, drilled and shot, track laid not for small cars and mules but for five-ton cars and heavy locomotives, timbering done, places examined and made safe for a loading machine that will clean a room out in twenty minutes. These are problems for operations scheduling, dispatching and organization. Just as the problems and requirements change, so do management methods have to change to meet them. Formerly, if the hand loader produced 20 tons per day he was a good man; now, that 20 tons can be loaded in as many minutes from the same place, the whole problem is more complex, the structure more intricate. To get that much coal to the machine and away from it continuously is the big problem.

The purpose of scientific management is "greater prosperity for the employer coupled with greater prosperity for the employee." It is the purpose to make the work so that the employee becomes thrifty and happy in doing it. Nowhere in the effort for increased production and management efficiency has the welfare and health of the worker been forgotten.

Clean Coal!

Start Preparation at the Face

By B. L. Lubelsky

Explosive Engineer
Pittsburgh Coal Co.

SINCE profits in coal mining are dependent upon the difference between the cost of production and the sales realization, any factor at the mine which affects the sales realization of the coal must be considered as important as any that influences the cost of production. The most potent factor in this connection is *quality,* in terms of percentages of lump and ash.

The great difference in ash content between lump and slack in Pittsburgh seam coal is shown quite clearly in typical analyses taken at certain mines in the Pittsburgh district.

Mine	Ash Percentage Slack	Lump	Run of Mine
A	10.00	7.50	8.30
B	9.50	7.25	8.00
C	9.50	7.75	9.00
D	9.80	6.50	7.80
E	10.00	5.50	7.90
Average	9.75	6.90	8.20

The ash content of the lump is but slightly higher than the inherent ash in the coal. The average difference in ash content between the lump and slack, about three per cent, represents the extraneous ash. In connection with these ash percentages, one important factor for consideration is the variation that must be expected from these typical analyses. With the lump coal an almost constant ash percentage can be assured. In the slack, however, a variation of almost five per cent may be found in one day's run.

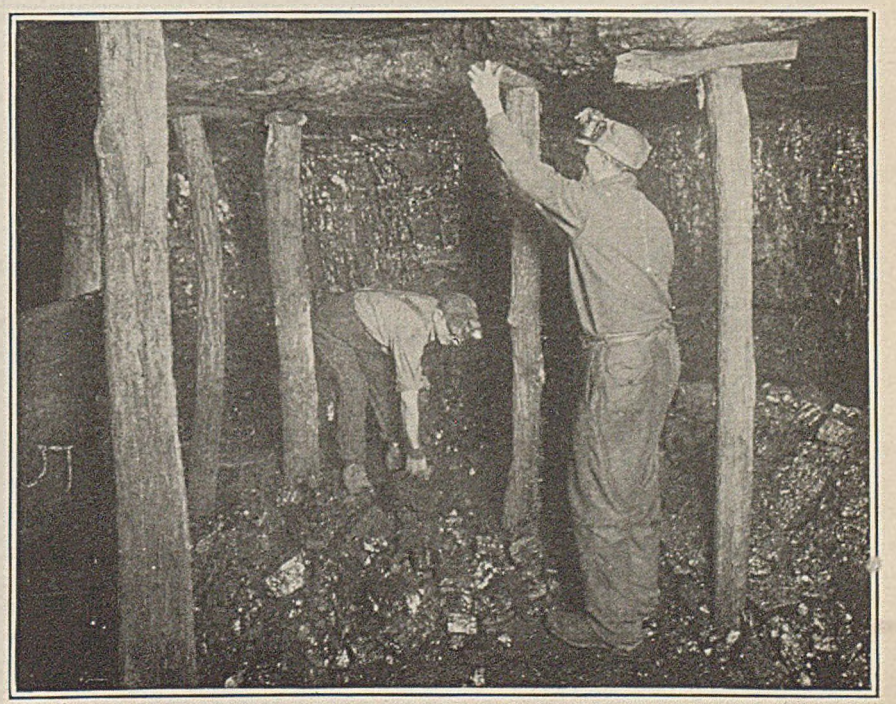
IT IS apparent from these figures that matters bearing respectively on lump coal and clean coal are inseparable from a sales as well as a production standpoint. Since the general tendency is for the impurities in coal of hard structure, such as from the Pittsburgh seam, to find their way into the slack, the mine producing most lump ships a product lowest in ash. For this reason, the Pittsburgh Coal Company has spent considerable money in supervising shooting, in order to secure a maximum of lump coal at all mines, with a minimum of extraneous substances.

In 1924, in co-operation with the Bureau of Mines and Carnegie Institute of Technology, a research program was carried through at the Banning No. 2 mine to determine quantitatively the factors affecting the production of lump coal. During this period, explosives of different physical characteristics were studied under different conditions of working places, as regards width and direction, using various types of stemming materials and varied placement of drill holes. The information obtained, although not positive in determining any one best practice, indicated the lines along which future supervision must follow and the principles were then carried into the mines when they resumed operations.

Although the conditions in the various mines are different in many respects, the general characteristics of the Pittsburgh bed remain the same. A standard section in Banning No. 2 mine is shown on the following page. With the exception of the height the bed is practically the same in all mines. Rooms are driven from 15 to 24 ft. wide, depending upon the roof conditions; but in all cases the rooms are driven "on the face"; that is, perpendicular to the most pronounced cleat of the coal, since this direction of working gives the best shooting as well as mining results. The places are undercut to a depth of 6 ft. by shortwall cutting machines and the miner carefully removes all machine cuttings before the coal is drilled and shot.

THE drilling of holes also varies as between mines, although the general system in all cases is the same. Two holes are drilled in rooms and entries, being started about 12 in. from the rib and from 12 to 24 in. from the top, depending upon the ease with which the coal parts from the drawslate. The holes are drilled parallel to the rib and slightly up-

Posting Drawslate in the Cut



ward so that at the back the hole is about 6 in. shorter than the cut and about 4 in. below the top of the coal.

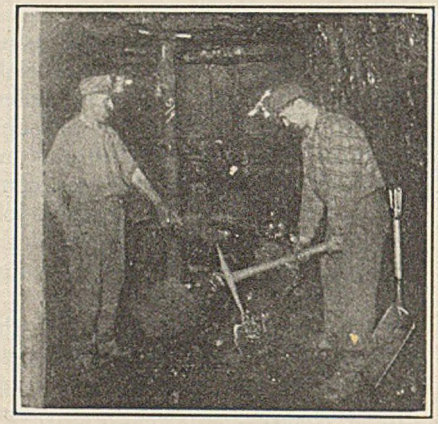
The first hole fired, the "tight shot," is lightly charged and is intended merely to open the coal along the bedding planes without throwing any of it out, as shown below. The miner is required to shear to the back of the cut and load out all the coal that is brought down by this first shot before firing the second or "butt shot."

THE explosives used in the mines depend upon the physical characteristics of the coal although an attempt is being made to standardize as far as possible. The $1\frac{1}{4}$-in. diameter permissible is used most in high coal. The explosive used here is of a medium rate of detonation, approximately 2,800, and a U.D.C. of approximately 216. In the lower coal, especially in the western part of the field, where the coal is very close-cleated and difficult to mine in large lumps, a $1\frac{1}{8}$-in. diameter cartridge is used with desirable results from the standpoint of lump coal, as well as blasting efficiency, and experiments are now being conducted in the use of a 1-in. diameter cartridge. In considering this change, the shooting effect has already been studied and found satisfactory, and the storage qualities of the small-diameter cartridge are now being considered. In connection with the use of explosives, the experimental work indicated that the low rate of detonation was not always the most desirable, and with this in mind the explosives used are generally of medium rather than extremely low rates.

In the open light (non-gaseous) mines, each man fires his own shots and the supervision is entirely in the hands of the regular mine officials, assistant bosses and fire bosses, instead of in the hands of shotfirers. In order to facilitate the proper judging of shots, and to insure greater safety in handling, the use of compressed black blasting powder in cartridge form has been resorted to. The same general system of shooting is employed at these mines, although it is difficult to give as close supervision to the individual shots as is possible where a shotfirer is employed.

Cleaning Out the Kerf

In the closed light (gaseous) mines, the explosive is taken into the mine by the miner who buys his day's supply (not to exceed seven cartridges) at the mine every morning. The electric blasting caps are taken underground by the shotfirer who carries them and charges the miner for each one used. The duties of the shotfirer are clearly laid down, although no attempt has been made to complicate his work with unnecessary rules and regulations. His equipment consists of a flame-safety lamp—no electric light—a permissible

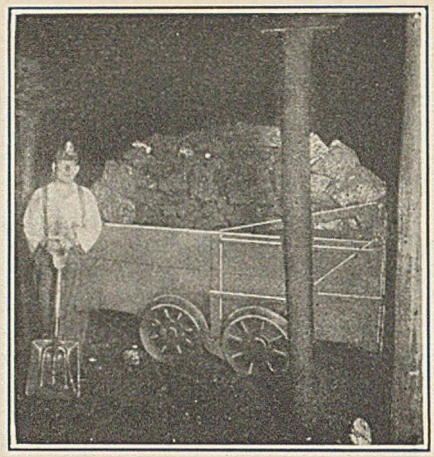


Results of a Tight Face-Shot

generator-type blasting machine and a tamping stick long enough to measure the cut and the length of the hole.

He is directly responsible for measuring the hole and the cut in order to determine whether the hole is properly placed and drilled and has authority to pass any hole which he considers improper. He judges the amount of explosive to be used and tamps the hole with the aid of the miner. Clay dummies are used and the holes are tamped to the collar. In addition to his duties pertaining directly to the shooting, the shotfirer is employed in checking the posting, to make sure that the posts are properly set before the shots are fired.

ALTHOUGH not strictly a part of face preparation, the posting system merits a brief description since it is instrumental in keeping drawslate from the coal. The plan view of a room illustrated shows the location of the track as well as the regular room timbers. The right-hand rail is 3 ft. from the rib, in order to give sufficient clearance on that side, and $2\frac{1}{2}$ ft. from the left-hand rail a row of double posts is set on 4-ft. centers as the room advances. Four feet from the row of double posts on the gob side a row of single posts is set on 4-ft. centers. The chief advantages of this system lie in the even distribution of the weight. In a 20-ft. room, which is about the average width, the row of double posts comes at about the center of the unsupported roof span, where the greatest weight is naturally to be expected. The row of single posts gives additional support and is not so close to the rib as to be useless for taking weight. Another great advantage of this system is that in the retreat work it is possible to recover the double row even though the single row is lost, giving a much higher post recovery than would be possible with other systems of posting. In order to prevent as far as possible the intrusion of drawslate into the coal, it is desired to keep the drawslate in place until the coal has been loaded out.



Lump Coal Requires Fewer Cars

SOME have made a practice of loading out the tight shot and then if possible taking that section of the drawslate down before shooting the butt shot. The disadvantage of this system lies in the difficulty, if not impossibility, of preventing small pieces of slate from mixing with the coal.

A standard system is used to hold the drawslate safely while the man is loading coal. As soon as the miner gets his tight shot sheared in far enough, a post is set to catch the front of the slate about 3 ft. from the rib, or even closer if possible. As he loads out his tight-shot coal, another post is set about 2 ft. from the back of the cut and about 5 ft. from the

rib. · As the clean-up progresses, additional posts on 4-ft. centers are set on a line with the two initially set, in the event it is not necessary to take down slate during the coal-loading cycle.

TO INSURE a uniformly low-ash slack, coal inspectors have been added to the mine force, who are responsible for checking the work of the miners to insure the loading of clean coal. In addition to determining for each mine the source of impurities, they instruct the new men that are hired and keep in touch with them until such time as they know definitely that these men are loading clean coal. No uniform system of docking or laying men off is followed, each mine using a system of its own. In addition to watching the miner, who is, of course, responsible for the actual loading of coal, the inspectors enforce the following rules pertaining to cutting:

(1) Before commencing to cut, clean up the bottom thoroughly in the area adjacent to the proposed cut. This applies to rib places as well as rooms and entries.

(2) Be careful not to cut through a rib shell and into the gob, thus avoiding the certainty otherwise of dragging out particles of waste material.

(3) Avoid cutting low. The general practice in the region is to leave 6 to 8 in. of bottom coal, characterized by the miner as "brick bottom," because it is relatively high in sulphur and ash. When the cutter bar enters into this high-sulphur and high-ash coal, or into the fireclay below it, the cuttings are gobbed.

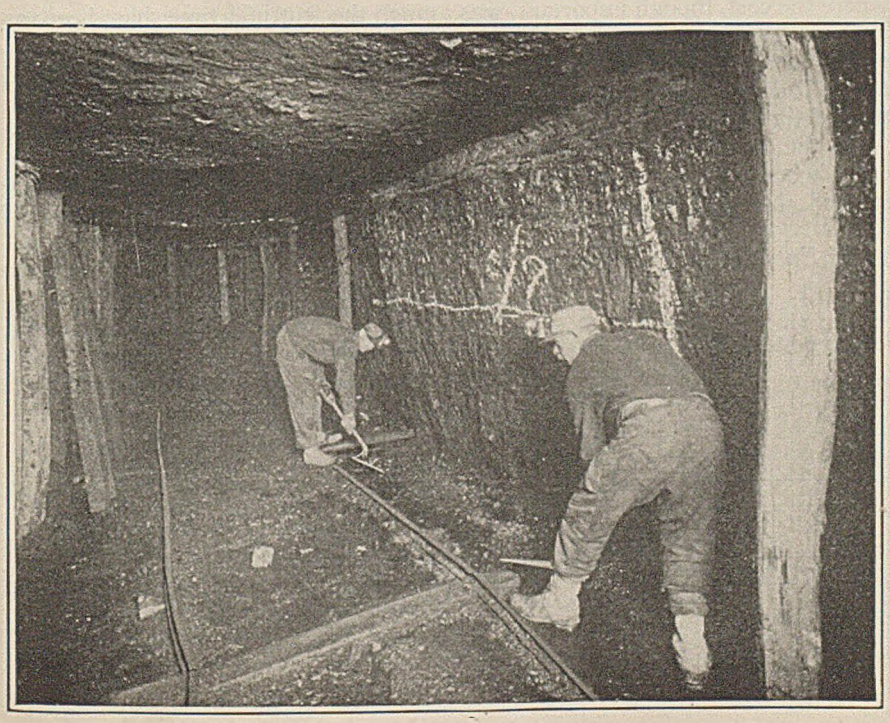
(4) Make a careful separation of refuse in places cut through a roll or clay vein. In this case, the miner is instructed to gob all refuse and some coal adjacent to the disturbing formation, thus insuring the loading here of coal as clean as that got under ordinary conditions.

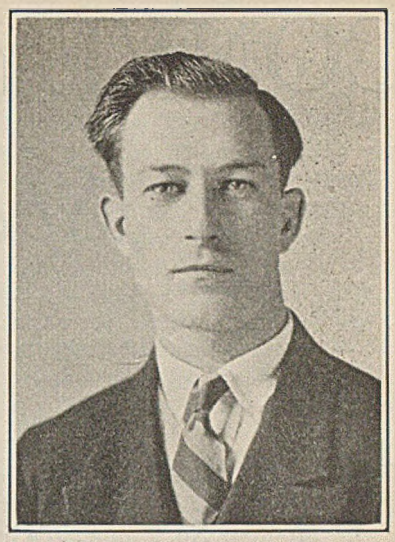
From all these sources, the impurities are apt to be of small size and find their way into the slack.

To check the work of the coal inspectors, and to allow the shipper to have a partial control of the shipments according to ash content, small mine laboratories have been fitted up at some of the mines for running ash determination on the various grades of coal. Samples are taken regularly, from which a careful ash determination is made for every car of slack loaded, it being completed before the car is billed. This serves as a means of constantly checking the product of the mine and prevents the shipment to customers of coal higher than standard in ash.

IT PROVIDES a means of checking, in the event of complaint, of mine cars yielding dirty coal and therefore the section of the mine in which they were loaded. In this way assistant foremen are advised when coal of a quality below standard is being loaded in their respective sections.

The Bottom Clean-Up Before Cutting





B. L. Lubelsky

Marked improvement in the purity of coal carried to the tipple, by this exercising of meticulous care in avoiding contamination by roof, bottom and gob material in actual mining, is an accomplishment of the company. The results obtained at the Delmont mine are one example of genuine achievement in this respect. In the last two years, following the enforcement of the above-mentioned rules governing mining practices at the face, the ash content of slack has been reduced 3.8 per cent at this mine and improvement in larger coal has been made in proportionate degree.

MECHANICAL loading of coal has introduced some new factors both in shooting and cleaning, but as yet little definite has been determined concerning shooting to the best advantage. The lump coal is clean coal, but lump coal may be hard to get. If, then, clean coal can be furnished without the large lump, it is true that the real demand of the consumer will be met in almost all cases. Certain steps are being taken to insure clean coal to provide this result with mechanical loading by eliminating the sources of impurities. With the new track-type of cutting machine, it is possible and feasible to cut above, and subsequently to shoot, rolls after the coal has been loaded, guaranteeing a cleaner product.

The mining system that we have laid out for mechanical loading allows the leaving of fenders of coal in the rib work to prevent the gob impurities from mixing with the clean coal. All these precautions are being taken to give the consumer a clean product, instead of furnishing a product more difficult to procure—*lump coal*—when all he need desire is *clean coal.*

CONVEYORS

Speed Development

By T. W. Gray
Assistant General Superintendent
Mechanical Equipment, Pittsburgh Coal Co.

WHEN Pittsburgh Coal Company proposed to open the Montour No. 9 mine, in a hill containing sixteen million tons of virgin coal, it was faced with the problem of obtaining sufficiently rapid development. To provide for so large a capacity as was planned, under difficulties such as existed, some better means had to be devised than had hitherto been used. This was the reason for installing conveyors, which up to that time had not been placed on an operating basis in any of the mines of the company.

At Montour No. 9 the cover over the coal is about 50 ft. thick and, in driving the entries, it was necessary for the men to work under a slow but steady downfall of water which seeped through the light overburden. In wet weather this downfall increased and became even a more serious handicap. In places where the coal was less than its average thickness, 5 ft. 4 in., the drawslate was even thicker than the coal itself and, where it was impossible to obtain clearance without leaving top coal, all this drawslate had to be removed. These conditions made imperative the use of conveyors, without which loading inevitably would have been far too slow.

Following this installation where the conditions were most unfavorable, one of a similar character was made at the Warden mine for the development of a pair of main face entries opening up a new block of coal. The entries in this section are dry, and the work is done under a 12-in. drawslate of unusual regularity. The only difference between this equipment and that at Montour No. 9 is the use of permissible instead of ordinary motors.

Following these installations, another was recently made at Montour No. 10 mine. There, not only are a pair of butt entires being developed by conveyors, but the rooms are being mined in the same manner. The working places are all dry, but the drawslate is abnormally thick and, in the entries, is being loaded out. In the rooms, top coal is left in place to support the drawslate.

In general these installations present two distinct problems. The conveyors in the entries were installed primarily to aid in rapid development where the cost, though important, was a secondary consideration. In the rooms, cost is the primary interest, for on it depends the profitable operation of the mine.

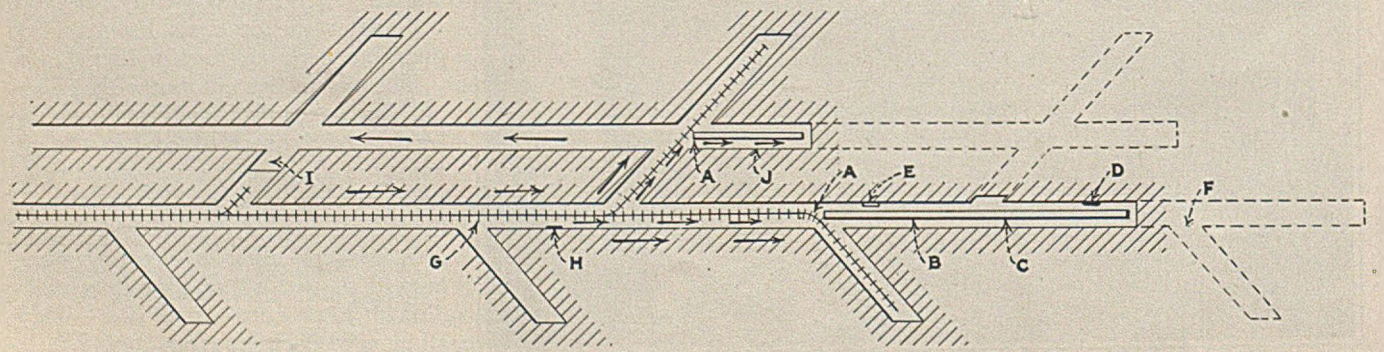
As the conditions under which the entry work is done are quite similar, it will be well to consider both installations together. In both instances, the coal averages about 5½ ft. At Montour No. 9 the thickness of the drawslate runs from 12 in. to over 5 ft. In places the coal is only 2 ft. thick. The entries, in every instance, are driven 10 ft. wide on 50-ft. centers. Each entry is worked by an individual unit consisting of conveyor, duckbill, loading chute, cutting machine, drill, electric car hoist and auxiliary blower.

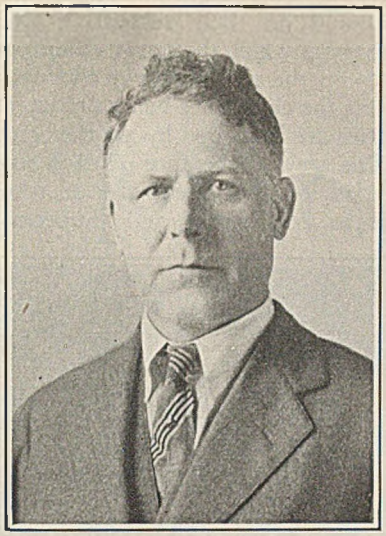
THE working cycle for a 6-ft. undercut at the Montour No. 9 mine was established as follows: Cutting, 35 min.; drilling coal and slate, 20 min.; shooting coal, 10 min.; loading coal, 45 min.; shooting slate, 10 min.; loading slate, 20 min. This cycle, which is an average obtained from work extending over a long period, allows for about three cuts per 8-hr. shift, barring unusual delays. At Montour No. 9, because the water and soft bottom made it difficult to get a good hold for the jack pipe, the cutting time has been as long as 80 min.

A shortwall machine making a 6-ft. cut with a 6-in. kerf is kept in each entry. When not in use the machine is kept alongside the rib, about 20 ft. back from the face, thus allowing clearance for the conveyor. The ma-

Sketch of Entries Being Driven by Conveyors

(A) Loading point; (B) Position of drive head; (C) Conveyor; (D) Position of cutting machine; (E) Position of hoist; (F) Future loading point; (G) Past loading point; (H) Position of air blower; (I) Stopping; (J) Small arrows indicate ventilation tubing to the face. The conditions in both entries are identical as regards the placement of the equipment.





T. W. Gray

chine can be moved to and from the face without difficulty.

The crew for each conveyor consists, at the face, of two men, who cut the kerf, drill the holes, shoot the coal and slate, load the conveyor, feed the duckbill and do all the other work needed at that point, including the extension of the conveyor and of the air tubing. At the loading point, one man is located to operate the hoist by which the cars are controlled, to load the cars to capacity and, during periods when no coal is being loaded, to oil and inspect the conveyor. One driver serves two conveyor units. A mechanic or face boss completes the crew.

AFTER the place is cut, two holes are drilled in the slate with an electric rotary drill. These holes are placed about 12 in. from the rib and about 10 in. below the drawslate, slanting slightly upwards and parallel to the rib. At Montour No. 10 and at Warden, a third hole, for a snubbing shot, is drilled to a depth of 3 ft. in about the center of face directly above the binder, for the coal at these mines is much harder to shoot than at Montour No. 9.

At both Montour No. 10 and at Warden, permissible explosives are used. As Montour No. 9 is an open-light mine, compressed black powder is used for shooting. The holes are fired electrically, electric squibs being used with the black powder. The holes are tamped solidly with cartridges of rock dust which are made by loading the powdered material into 1½x8-in. tamping bags. Rock dust has been found to be more economically procured and handled than clay.

After the coal is shot it is loaded by means of a duckbill and conveyor. The former is of special construction. It was designed and built in the Pittsburgh Coal Company's shops. It is about 4 ft. wide and tapers to the width of the conveyor in about 6 ft. of length. The feeder pan, which moves back and forth, was also designed and constructed at the shops. It is about 19 ft. long and allows the duckbill to extend that distance ahead of the conveyor, about two cuts of coal being taken out before adding a pan.

Before the coal is shot, the duckbill is backed away from the face. After the shot, it is fed into the loose coal. The coal along the ribs is usually loaded on the duckbill or directly on the conveyor by the men at the face, who trim the ribs and the back of the cut while the duckbill is loading the loose coal directly in front of it. Most of the cut is loaded by the duckbill itself, for it is so pliable that it can be moved across the face. In handling the slate the procedure is the same, the duckbill in this case also loading the greater part of the material.

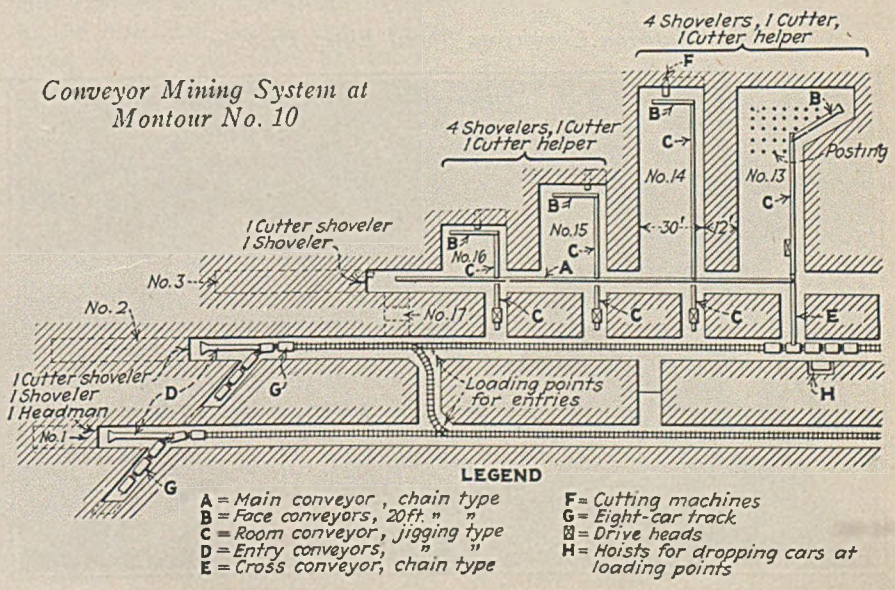
EICKHOFF jigging conveyors are used in entry and room work, those on the entry being heavier than those in the rooms. The entry pans are 13 ft. long, about 24 in. wide, and 6 in. deep. The sections are connected rigidly at the joint by a bolt on each side, and each joint is supported by a small removable cradle. A 6-ft. pan is provided, so that the conveyor can be extended, where necessary, a half-pan length. Ordinarily, the pans are added only after two cuts have been made, this operation requiring 10 to 15 min.

After the conveyor has been extended so as to be 23 pans long, the loading point is advanced. When the conveyor is disconnected, the pans are laid along the rib ready for use later when the conveyor is extended. The drive head is brought within four pan lengths of the face of the coal for its new position, being moved forward by means of the electric hoist. A 30-hp. motor can efficiently actuate about 250 ft. of conveyor. At the loading end of the conveyor line the pans are suspended from rail beams by chains, so as to provide a grade of about 7 per cent to the loading point.

IN ALL entry work the face is ventilated in the regular way by coursing the mine air. The blower is used only to remove the powder smoke after the shots, thus speeding the cycle of operations. Should there be any indication or accumulation of gas at the face of the working place, it is removed by erecting a line brattice in the usual manner. The fan is kept well back of the last open crosscut in order to prevent the possiblity of a recirculation of air. The fan is kept running almost all the time. In consequence the air at the face is very good. Even after a shot of black powder, which produces a large volume of smoke, the face will be cleared in a few minutes to such a degree that the men can return to work.

The sketch on the preceding page shows the system used at Montour No. 9 and at Warden for the handling and storage of cars; the system at Montour No. 10 is somewhat different. Chutes, or oblique roadways, are driven into the solid coal on 350-ft. centers at about 45 deg. to the main entries and of a length sufficient to permit of the storage of

Conveyor Mining System at Montour No. 10



twelve cars, which are dropped past the loading point under the control of an electric hoist. These chutes are driven by a swivel conveyor.

THE MAN at the loading end runs the engine, spreads the coal so as to obtain a maximum load, and removes as many impurities as he can. When coal is being loaded in the chutes, it is advisable to stop the entries. The face crew then loads in the chute without the use of the duckbill. Before the chute is utilized as the new loading point, the entry is driven far enough to allow for the accommodation of the drivehead and four pans.

After every advance of the loading point, the permanent track is extended to the last chute. It consists of 80-lb. rail supported by 6x9-in. treated ties. The side track is of 25-lb. rail and is laid at the same time as the main road.

The cars at the different mines vary in capacity, those at Montour No. 9 holding an average of 3,200 lb., those at Montour No. 10 being slightly larger and those at Warden having a capacity of about 4 tons. However, with conveyors, this is not so important a consideration as with machines which load one car at a time. The conveyors load the cars in a train. Where, however, large cars are provided, trip changes are less frequent, and some time is saved.

THE GENERAL layout of the work at Montour No. 10 is shown in the sketch on page 259. Two main butt entries are driven by two separate units of Eickhoff conveyors. The first cuts of the room necks, which are 10 ft. wide and spaced at 42-ft. centers, are turned off No. 2 butt entry. Originally, it was purposed to drive only two entries, but lack of clearance made it necessary for the accommodation of the conveyor, *A*, to drive No. 3 entry which is on 30-ft. centers with No. 2 entry, thus leaving a 20-ft. room stump. The rooms are started off No. 3 entry and are driven 30 ft. wide.

Each room has its own equipment which consists of a 20-ft. Jeffrey face conveyor of drag-chain type, *B*, 6 ft. back from the face in order to allow the cutting machine to pass between the conveyor and the face; a room conveyor of the jigging type having pans 20 in. wide and of a smaller profile otherwise than those in the headings; and also a smaller driving unit, a shortwall cutting machine, *F*, and a hand-held electric rotary drill. In addition to the room equipment there is a Jeffrey drag-chain conveyor, designated *A* on the sketch, which delivers coal from each group of four rooms to a small Jeffrey drag-chain conveyor, *E*, which loads the cars.

The room-conveyor drive head is set up in the room neck wherever that passageway is not in use, so that the wide room can be worked direct by means of the jigging conveyor, which is split at the point where it crosses the conveyor *A* and is connected by long extension bolts. This allows the jigging conveyors to empty into conveyor *A*.

Storage chutes for the entry conveyors are driven by means of small chain conveyors. A "chute" or oblique roadway at 45 deg. to the butt is driven from No. 2 to No. 1. This chute is used to store the empties for the loading point in No. 2 entry. Off No. 1, a similar chute is driven into the solid coal to provide car storage for the loading point in No. 1. Both chutes are loaded out by hand on their respective chain conveyors which discharges their contents on the main jigging conveyors. While the chutes are being driven, the entries are extended by another crew.

The crew at the face of each room consists of four men, one of whom acts as coal cutter and timberman.

Butt Working a Long Face

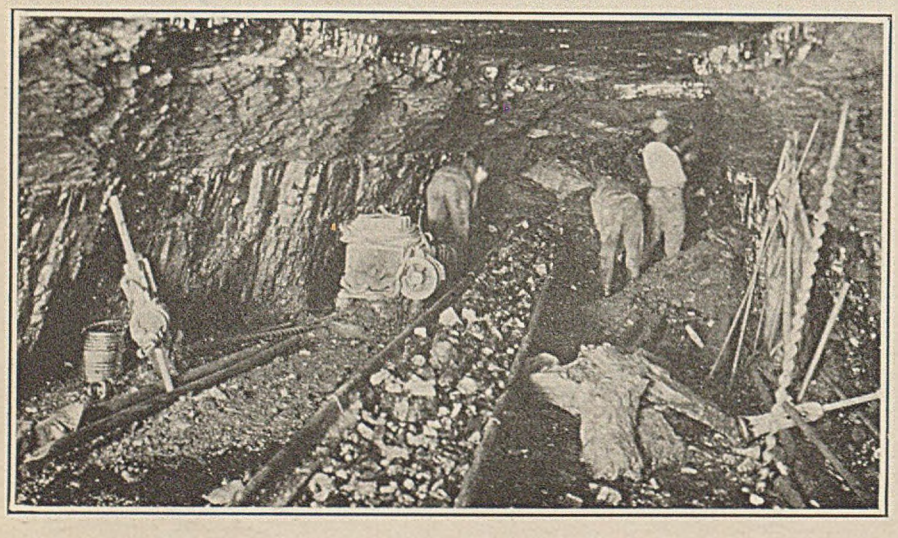
The other three men load the face conveyor and do all other necessary work. In addition to these, a man at the point of discharge of the jigging conveyor trims the cars and controls the conveyors *A* and *E*—the conveyor at the face, *B*, and the jigging conveyor, *C*, being started by the room crew.

NO DEFINITE cycle of operations has been developed for the work, because it has been started only recently. The place is undercut and shot, after which the loading of the coal is started from the right rib of the room. As soon as the loose coal is removed from the right corner, the machine man sumps into the coal and starts a cut across the face, so that by the time the coal from the earlier cut is loaded, the place is again cut and ready to be drilled.

Probably the most important feature of this work is the fact that it is performed under approximately 40 in. of drawslate which is supported by leaving about 8 in. of top coal. Timbering plays an important part in this work. In general, five posts are set for every cut forward. These are spaced at equal distances across the width of the room with one post set close to the right-hand side of the conveyor. It is often necessary, because of the apparent weakness of the top, to set a crib in addition to the regular posting.

Pittsburgh Coal Company officials, as a result of the comparisons made between loading by hand and by conveyor, are so much encouraged with the success of the latter that they purpose to center additional development around conveyor loading as rapidly as may be found possible.

Shaking Conveyors Speed Entry Driving



Achieving the Impossible—

MACHINE LOADING

in Pittsburgh Seam

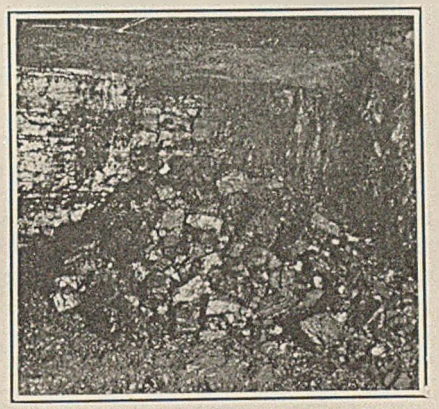
By J. T. Clark

Superintendent of Mechanical Loading, Pittsburgh Coal Co.

MOST of the companies that have attempted to apply machines to the loading of coal from the Pittsburgh seam, and they are only a few, have discontinued their efforts after a period of experimentation. In contradistinction, Pittsburgh Coal Company in recent months has installed twelve machines and has been satisfied with the results obtained though it has had the equipment in service only a short time. The average daily tonnages per machine have not been high, but they have sufficed to show some saving in cost over hand-loading methods, even though the work has not, as yet, been fully organized.

Because conditions in these mines are extremely unfavorable, primarily by reason of the heavy drawslate, the company does not expect to obtain any phenomenally large output per machine such as is being attained at a few mines in districts where conditions are unusually good. It is "plugging" steadily along, is making improvement gradually and expects in a comparatively few years to have its mines fully mechanized along these and similar lines.

In the performance of its appointed task, the loading machine has functioned satisfactorily. It will load coal at a rate which, were there no delays in other phases of operation, would establish a high daily tonnage. In this



Results of Correct Mining

the loading machine is at least as successful as other mining devices that already have been widely accepted and used. Realizing this, the management is planning a number of improvements centering around the machine loader.

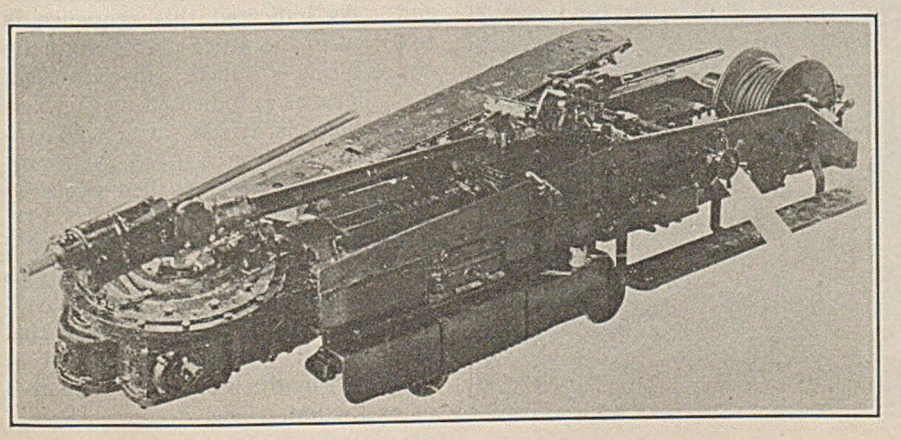
PERHAPS THE REASON why Pittsburgh Coal Company has made more progress with mechanical loading than many of the others that have tried it under similar conditions is that it has established a separate department for the control and general supervision of the work. The mechanization section is a separate division in the operating department. Mine areas are being developed exclusively for mechanical loading, and the foremen in charge of these areas have nothing at all to do with the old-method operations upon which the bulk of the output still depends. Men engaged in the work are being trained; and as a means of acquainting them intimately with the mechanism a number of them were sent to the shops where the machines they were to operate are being manufactured.

The twelve loading machines in use are distributed among five mines, where they are: (1) Driving rooms and pulling pillars; (2) driving entries; and (3) loading rock in the grading of roadways. Ten Joy machines are being used for loading coal and two Myers-Whaleys for loading rock. Only one of these machines, a Myers-Whaley, which is used in rock work under light cover at Banning No. 2, is not permissible; all the others are of the government-approved type.

The two Myers-Whaley machines used for the loading of rock leave little to be desired in the accomplishment of this work. By hand-loading methods, when a man has filled three, or at most four, 2-ton cars with slate in a shift he may be credited with having performed a fair task. But when the work is properly arranged each of these machines will load regularly in a single shift at least 60 cars of this capacity.

Thus the machine performs a task equivalent to that of a crew of 15 to 20 men, assuming that all of them could work simultaneously in the loading of the rock from a single entry, which obviously is impossible. If more than six men are thus employed, interference and confusion results. In this heavy work, therefore, the machine not only effects a substantial saving in labor but also usually loads the rock out of the entry at a rate which is three to four times

Combined Shearing and Cutting Machine Is Economical



faster than the maximum rate by hand loading.

One of these machines is employed in Banning No. 2 mine in grading and widening entries and the other in Midland mine in the taking of top. At Midland, an average thickness of 4 ft. of rock is being taken in entry stretches which aggregate about 2,000 ft. To all appearances the savings on this one job alone will pay the initial cost of the machine. Experience indicates that no mine that has much rock to be loaded into cars can be developed and maintained in the most economical manner without the services of a mechanical loader.

The company believes that both machines and conveyors may be used economically in the loading of its coal. In determining which of these agencies is best adapted to the work, various physical conditions must be considered, the more important among these being the thickness of the seam and the condition of the roof.

WHERE conditions are normal, the loading machine is usually given preference. It is more portable and has a higher "load factor," for its portability enables the operating force to shift it around among many places. The loading machine is favored because with it, for any given tonnage, less capital has to be invested in accessory equipment. The value of conveyors for the handling of coal and rock is treated elsewhere in this issue.

The general plan is to install the coal-loading machines in batteries of two. One foreman and one mechanic are detailed to each battery. By this close supervision, inadequate face preparation, faulty track and defective mechanical equipment are discovered before they retard operation. Track materials also are being standardized. Thus 40-lb. rail, steel ties, No. 2 switches with a radius of 22 ft., and No. 2 portable switches for use in the cut-throughs between rooms and between entries are uniformly adopted. By laying track in the last cut-through between adjacent places, the maximum distance traversed in the changing of cars is kept below 125 ft. All the coal-loading machines are mounted on caterpillars and travel from place to place by this means. Concentration of places permits of this practice. At each mine where loading machines are installed, except Banning No. 2, a standard method of working is provided.

J. T. Clark

The initial installation of loading machines was made at Banning No. 2 mine. Here two batteries, or four machines, are employed in a block system of mining which provides the advantages of short rooms, great concentration and such security as is obtained only in working narrow places in solid coal.

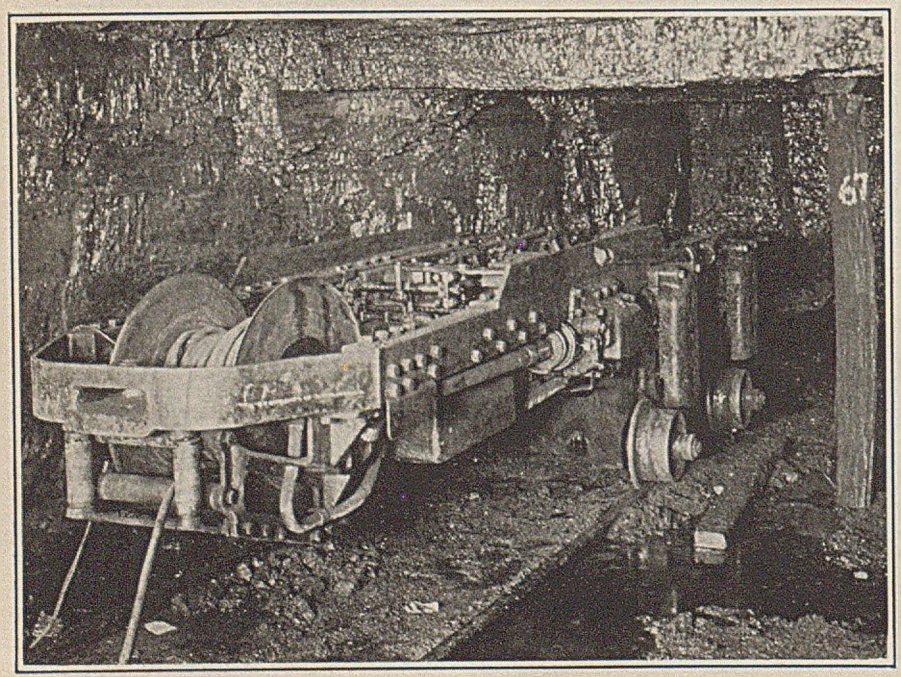
Over the section now being mined mechanically, the cover is about 500 ft. and varies elsewhere from 200 to 550 ft. The seam, which is from 6½ to 8 ft. thick, is of a friable nature and tends to spall. It is overlaid with drawslate which cannot be held in place by ordinary methods of support. Above the drawslate is a fairly good roof. The bottom is of moderately hard fireclay.

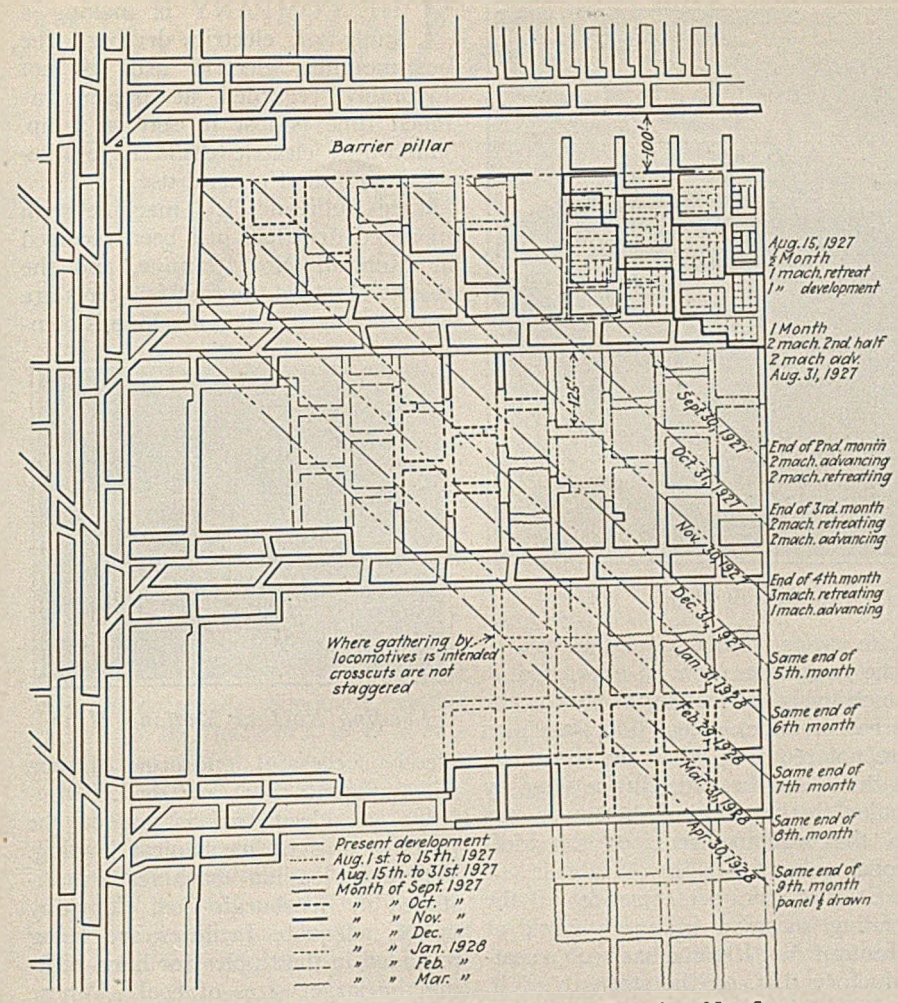
A layout of the system appears on page 263. All places are 12 ft. wide. Butt entries are being driven to the boundary and, from them, rooms spaced on 90-ft. centers and driven 340 ft. are being turned retreating. Crosscuts are made at intervals of 100 ft. As quickly as a room has been driven to its full length the extraction of the blocks mated to it is started in orderly sequence along a break-line intersecting the line of the entries at an angle of 45 deg. Two batteries, each of two loading machines, will work as a unit in this section.

THE METHOD of working individual blocks is also shown on page 263. The butt split *A* is first driven through the block leaving a pillar 13 ft. wide which is indicatel in this sketch as pillar No. 1. When this place has been advanced approxmately four cuts, face split *A-1* is started, the driving being so timed that this second place is cut through only after pillar No. 1 has been drawn sufficiently far to establish a 45-deg. break-line across the pillar end. As indicated this sequence is followed in the other places until the entire block is mined. In extracting the pillars, as is indicated in Fig. 2, a 14-ft. place is driven through in two 6-ft. cuts, leaving a 4- to 5-ft. protecting stump, which is then mined by pick and loaded by hand.

Though loading machines and conveyors are being applied mainly as a means of reducing the cost of loading coal, the company believes that the problem of roof control will be simplified by the increase in the speed of extraction.

It Shears and It Undercuts the Face



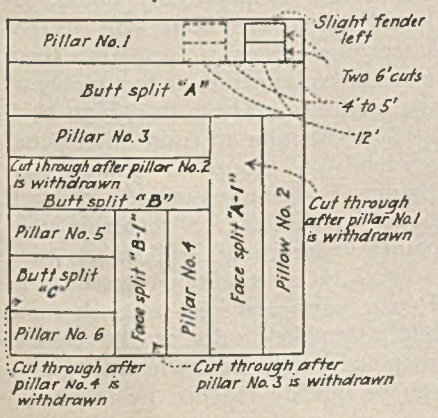


Sketch of Block System of Mining at Banning No. 2

All rooms and crosscuts on the advance (first mining) are topcut and sheared to a depth of 9 ft. All coal in the retreating ribs (second mining) is undercut to a depth of 6 ft. In entries, where top must be taken down the coal is undercut and sheared, with a kerf 9 ft. deep. These two operations are performed by one machine, the Sullivan CLU combination undercutting and shearing unit. Two of these are now in operation in the Banning No. 2 mine.

The motive for shearing, aside from getting lumpier coal by avoiding the need for a center shot, is to avoid shattering of the roof at the middle of the face. This applies whether the drawslate is held by roof coal or is taken down after the loading of each cut. Topcutting is primarily intended to facilitate the leaving of top coal and to preserve, by protecting the roof against shattering blows, whatever self-sustaining powers it may have. Two Goodman slabbing machines with 9-ft. cutter bars are being used in this mine.

Details of Individual Blocks



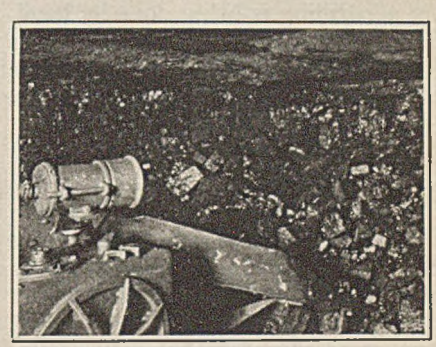
In shooting, an attempt is being made "to lay down" the coal so as to produce a maximum of lump and yet, at the same time, to leave it in such condition that it can be handled by the loading machine with a minimum of digging. In advancing places, rows of props on 9-ft. centers, one row for each cut are set on each side of the track. Safety props are set at the face as needed. The company does not expect that mechanical loading will save timber.

IN BANNING NO. 2 mine the machines load into 1.7-ton mine cars. These are pushed by hand, one at a time, to the face over a short length of straight track. As the track laid in the foremost crosscut of each room is retained till the next crosscut has been driven, every working place serves as a sidetrack for the storage of empties, the loads being pulled through the crosscut. Two mules serve each loading machine, one taking the cars from it and the other taking them to the sidetrack proper.

The company has ordered 4-ton steel cars for use in mechanical-loading operations at Banning No. 2 and, when these cars are placed in service, the mules will be replaced by 8-ton locomotives.

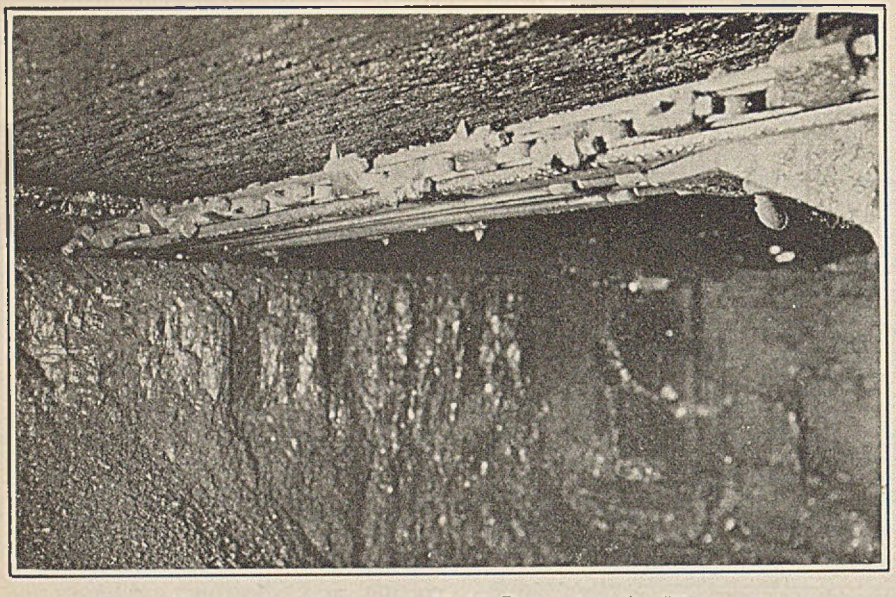
THE EQUIPMENT allocated to each battery consists of two loading machines, one combination undercutting and shearing machine, one topcutting machine, and one electric post drill.

The operating crew in a battery consists of 2 loading-machine operatives, 2 loading-machine helpers, 4 drivers, 4 car pushers, 2 cutters, 2 drillers, 1 shotfirer, 1 bugdust cleanup man, 2 tracklayers, 2 tracklayer's helpers, 2 timbermen, 2 coal cleanup men, 1 mechanic and 1 foreman—a total of 28 men. All operations incident to loading-machine mining are performed by this crew, including the placing of loads on the side track.



Mechanically Loading Lump Coal

Two loading machines are in operation in the Crescent mine. Here the seam is 6 ft. thick and is overlaid with about 10 in. of drawslate, which is taken down and gobbed. The roof in general is good, so only three posts are used for each cut. The seam is fairly level, and the cover is from 100 to 250 ft. thick. The coal is hard and makes large lump and is, therefore, in demand for domestic use. The system of mining is room-and-pillar, half advancing and half retreating. Rooms are 21 ft. wide and 280 ft. long on the advance side, and 220 ft. wide on the retreat side. They are driven on 39-ft. centers. Each loading machine is assigned to



Topcutting Serves to Hold Drawslate in Place

a separate panel where it loads out from seven to nine places.

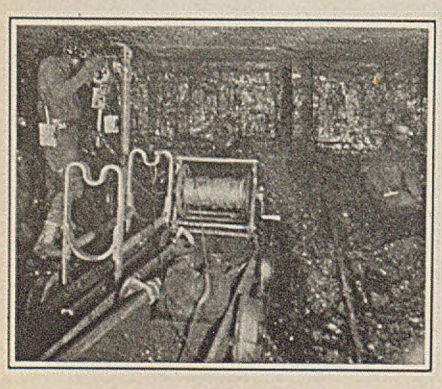
With the exception of that which is contained in the protecting stumps, all pillar coal is loaded mechanically. One Sullivan CLU cutting machine has just been installed, and the places have been narrowed to 17 ft. The room centers will probably be reduced accordingly in the near future. As yet all drilling is being done by hand, but electric drills will be installed as soon as they can be provided. The mine cars when mechanically loaded each hold 2.7 tons and are placed by a cable-reel locomotive.

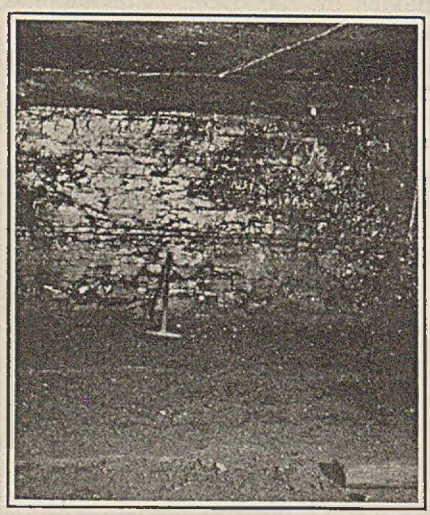
THE CREW with each machine consists of 1 loading-machine runner, 1 runner's helper, 1 motorman, 1 trip-rider, 2 men drilling and shooting, 2 cutters, 1 tracklayer, 1 timberman, 3 slate gobbers, the half-time service of a mechanic and also of a foreman.

Two Joy machines are working in Montour No. 10 mine, one in rooms and the other in the development of entries. The seam is from 5 to 5½ ft. thick. The roof is comparatively good, and the thickness of the drawslate varies from a few inches to 2 ft. The operating crew is organized in much the same manner as that at the Crescent mine, except that slate men are not required when the drawslate is thin. As the gathering is done by mules, the handling of the empty cars to the machine requires an additional man.

So far, the performance of the loading machine in entry work at Montour No. 10 mine has been so satisfactory that, on the strength of it, two additional machines have been ordered for a similar purpose. This one machine has driven as much as 51.75 lin.ft. of entry in one 8-hour shift and during the first half of September advanced 498 ft. or an average of 41.5 ft. per shift.

Drill Truck at the Face



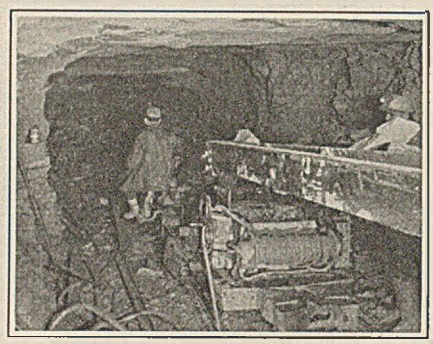


A Machine Clean-Up

Conditions similar to those in the Crescent mine are found in the Somers mine where two Joys are installed, one in rooms and pillars and the other in entry work.

THE COMPANY is making a study of electric drilling; the post-mounted electric drill is not favorably regarded at present as much time is lost in setting it up. Hand-held electric drills have likewise not found general use.

One Sullivan CLU machine with mounted drill has just been received at Montour No. 10 mine, and the results obtained the first few days are encouraging. If this machine is completely successful, one crew of men will undercut, shear and drill.



Loading Rock at Midland Mine

To get clean coal is one of the problems of mechanical loading. Wherever loading machines are installed in Pittsburgh Coal Company mines, adequate facilities are being provided in the tipples for hand-picking the larger sizes of coal. Where the drawslate is kept in place, the coal should be cleaner when loaded by hand than when loaded by machine. Where the slate is taken down, the outlook is that cleaner coal can be produced by loading machine with preliminary shearing than with hand mining without that assistance. For with shearing machines the coal can be shot down without shattering the roof as badly as is inevitable when the coal is not sheared. Furthermore, the working places advance so rapidly that the coal can usually be loaded before the drawslate falls.

THE MAINTENANCE of loading machines is receiving careful attention. As previously noted, selected men have been sent to the factory in order to acquaint them with the construction and assembly of the machines. These men have been used at the mine to train others, and gradually a group of skilled mechanics is being assembled at each mine. Facilities for repairing machines underground will be provided as rapidly as conditions warrant it. Repair parts are kept at each mine and assembled units at the central shop at Library from which all plants can be quickly reached by truck.

Why *Automatic Signals* on Underground Haulage?

By H. T. Griffin
Transportation Engineer,
Pittsburgh Coal Co.

GOOD TRANSPORTATION facilities and methods are equally as important in coal mining as they are in railroading. As it is the primary business of the railroads to haul materials, it is a safe assumption that they know the best practices and use them. Their transportation principles are, therefore, worthy of emulation. Good roadbeds well maintained, adequate motive power to do the work with a safe emergency reserve, well-designed terminals and good rolling stock, so that trips once assembled may be moved rapidly over the road, scheduled train movements conforming to the volume of traffic to be handled, and a constant effort to attain the largest number of car miles at the lowest possible ton-mile cost, are the criteria of railroad operations.

The transportation problem of Pittsburgh Coal Company is by no means a small one. Every day approximately 23,000 cars are moved over 250 miles of track by 105 haulage locomotives. This does not include the gathering by animals.

Details of the haulage methods at Warden and at Banning No. 1 mines illustrate present and proposed practices at all other operations. At Warden, haulage control is secured by means of dispatching, while at Banning No. 1 automatic signals are used to control trips on the main line. This is supplemented by dispatching to regulate the distribution of cars. Dispatching is practiced at practically all of this company's mines, but the elaborate block signal system as used at Banning No. 1 was adopted to meet a particularly difficult haulage problem.

At Banning No. 2 where, upon completion of a new and larger tipple it will be necessary to handle one trip every eleven minutes as part of an increased tonnage program, automatic block signals have been decided upon. At this mine a rope haulage in the slope is being eliminated. In its place a 25- and a 20-ton locomotive will haul the coal up a 2.37 per cent grade to the tipple. This is the ruling grade for three miles of haulage road. Four-ton all-steel cars and 80-lb. rails are being installed.

THE AUTOMATIC signals at this mine will be supplemented by a dispatching system. This will partake largely of the nature of a real production-control system because this mine will be a 100 per cent mechanical loading operation. One loading machine will require 50 four-ton cars per day whereas a miner requires only three or four. Then, too, there will be trackmen, timbermen, drillers cutters and shotfirers whose work must be routed and scheduled.

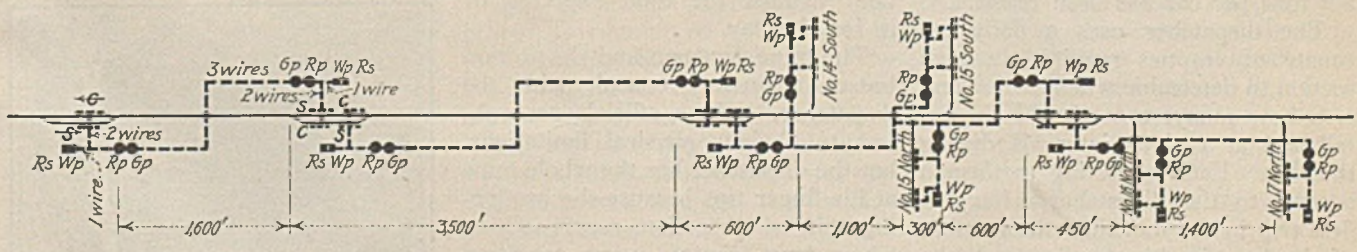
At Warden the dispatcher controls all the mine haulage, both gathering and main line. Telephones are located at all gathering side tracks and at stragetic points along the main line. In all, 27 telephones are installed inside the mine. This communication system is divided into four sections, all connected with a switchboard in the dispatcher's office.

MAIN-LINE HAULAGE is by two 20-ton and one 13-ton locomotive, with a 13-ton machine in reserve. Gathering is performed by 13 storage-battery, and five cable-reel locomotives. Five additional cable-reel machines of the latest flame-proof type are on order to provide for increased production with maximum safety.

There are over 10 miles of track in this mine. Of this, 5.1 miles is main-line and 5.2 miles is in butt headings. The total main-line haul of 5.1 miles is divided between three main-line locomotives, as follows: One traverses 2.2 miles, another 1.6 miles, and the third hauls 1.3 miles. The fourth locomotive, when used, helps the others in accordance with the dispatcher's orders.

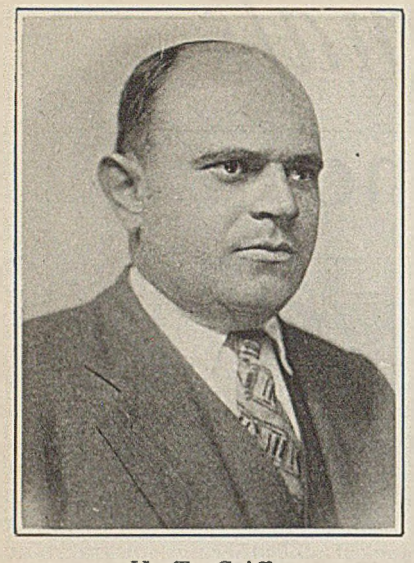
At present 700 four-ton, all-steel cars are in use. All of these are fitted

Diagram Showing Nachod "Sud" Type Signals for Banning No. 1 Mine



Legend
Solid lines = Track
Dotted lines = Trolley contactors and signal circuits
—C— = Clearing contactors
—S— = Setting contactors
Rp 6p = Two light single faced signals, red and green
Rs Wp = Single light double faced signals, red and white
Direction of operation { Both directions on single track / Right hand only through sidings

Signals normally show dark for clear block.
Green indicates permissive or proceed.
Red indicates danger, stop, trip approaching from opposite direction.
Trip about to enter a single track section with signals showing dark, will obtain green or proceed. Both signals at opposite ends will be set red, and rear signal at entering end will also show red for rear protection.
Signals limit trip movements to one (1) per block.
No following movements on same signal indication permitted



H. T. Griffin

with anti-friction bearings of various kinds.

All main-line track, including panel or section mains, is laid with 60-lb. rails. Forty-pound rails are used in all butt headings and in the rooms. No. 2 switches with 22-ft. radius curves are installed. These switches are built according to American Mining Congress standards. Good maintenance of track is insisted upon. The results of poor track, in the shape of derailments and lost production, stand out so conspicuously on the dispatcher's sheet that the management has a constant check, by sections, on the mine's entire track system.

THE SAME idea applies to locomotive and mine-car repairs. The effective car turnover is based upon the total number of cars at the mine. In figuring this no allowance is made for shop cars so that the local management will see that the number of bad-order cars is kept at a minimum, and that supply cars will be loaded, unloaded and returned to service as promptly as possible. Maximum loading is important. An average of 3.9 tons per car has been reached.

The dispatcher uses a daily estimate of empties required in each section to determine when and where, also how many, cars should be distributed at various intervals during the day. Each gathering motorman reports to the dispatcher, after his first trip in the morning, the number of loaders in his section and the number of loads and empties he has on hand. At the close of each day the dispatcher has a balance of cars for each locomotive but the morning report shows what the night shift did —whether they pulled the standing loads and placed any empties. The motormen then report to the dispatcher after every trip throughout the day. In this way the dispatcher is in constant touch with all the haulage units within the mine, and governs his trip movements according to the demand of the several sections.

The main-line motorman reports his arrival and departure together with the number of loads and empties from and to every sidetrack that he serves. As the dispatcher's office is at the pit mouth, he can see all outside movements. The main-haulage men report when they clear the main line, and ask for it when they want to use it. One mile of main line is double tracked. At the junction of the single and double track, one of the main haulage sections begins. Thus the section of main line over which traffic is the heaviest is double tracked. There are, therefore, no "bottle necks."

THERE ARE two approaches to the loaded tipple tracks. All three locomotives can be accommodated without congestion. When the fourth machine is being used it is necessary that the dispatcher shall keep it out of this area. However, it is a part of the dispatcher's business to schedule his trips so as to avoid piling them up at the tipple. He is enabled to do this because he knows the running and dumping times of each trip. The air-operated rotary dump here installed will handle regularly three cars per minute, and four per minute when required.

To get maximum service from each car is one of the dispatcher's chief duties. His car balances aid him in doing this. For instance, he can see at a glance whether any section at any time during the day is getting more empties than it can use, or whether it is getting less. This is shown by comparing any gathering locomotive's cumulative total at any hour against the total expected of it for the day.

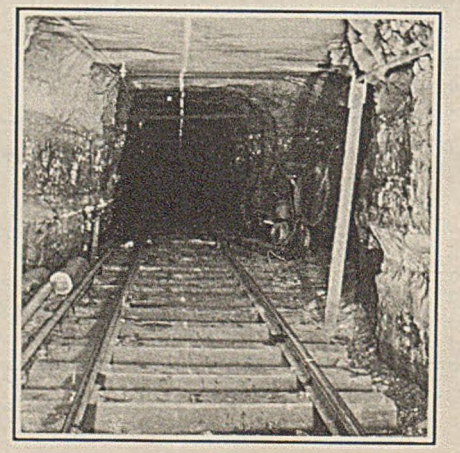
The mine foreman and the section bosses frequently consult with the dispatcher. These officials are subject to obvious physical limitations, but the dispatcher has the whole mine at his finger tips because the producing units of all sections report to him. They must report every condition that interferes with production, or anything that hinders their reaching the quota of cars assigned to them in the morning.

All running times between terminals are known to the dispatcher. By 8 a. m. he has received all his gathering motormen's reports and has estimated the total number of cars to be moved that day. It is upon these data that his motive power requirements are based. He knows early in the morning whether or not to use the extra locomotive and where to send it.

AS MAY BE seen in the illustration showing the dispatcher's office, a quota sheet is used. This sheet covers a half month or pay period, and serves as a graphic record of the tonnage produced. The mine is divided into nine sections, each in charge of an assistant mine foreman. The quota for each section is based upon its capacity to load, and takes into account the available working places, locomotive running times, and haulage equipment assigned to it. In checking over the sections that reach their quotas and those that fail, the dispatcher knows exactly why any section fell short and can so advise the assistant in charge of it. His sheet shows the number of cars offered, how long they were kept before being loaded, and the number and amount of all locomotive delays. He can thus promptly analyze conditions in any section. This is the part that the dispatcher plays in management.

Dispatching is not a management panacea. However, experience has shown that it has an important function to perform and can be made a valuable instrument of production control. When based upon known facts, such as locomotive running times, it enables the trips to be scheduled; when based upon the capacity of a miner or a group of miners, it shows when loads should be pulled and empties placed, thus giving an effective distribution of cars. The time of four-ton cars cannot be wasted. When the tipple capacity is

Tracks for Underground Railroading



known, trips can be scheduled to keep it busy evenly throughout the day rather than in spurts.

In other words, dispatching can be used toward synchronizing the many operations composing the day's work. It furnishes, day by day, an analytical chart that provides the management much timely material for its guidance. What is the car turnover? What is the load per car? How many cars are furnished each loader and each locomotive? All these and other questions the dispatcher can answer promptly and without thumbing through sheaves of individual reports that are more apt to be historical than a means of control.

THE reports received during the day indicate where the loading density is the heaviest. It is a phenomenon, but nevertheless true, that during the day there seem to be "loading surges or waves." Thus, one section may be loading to capacity, or in some cases above its apparent normal capacity, while another may be loading light with a low demand for cars so that a surplus is liable to accumulate to the detriment of the rest of the mine. During the same day or the next, this situation may be reversed as to sections.

Some of these surges are probably due to miners handling slate. In instances like this and in cases of delay the dispatcher promptly makes the necessary haulage adjustments concentrating, as it were, all his facilities upon the section demanding them and lightening up on the slow ones. Getting reports frequently and knowing conditions throughout the entire mine, he anticipates any changes that may occur and thus stabilizes production.

Time studies and graphs of the haulage system are made at intervals. These show the flow of coal to the tipple during the hours of the greatest and least traffic density. The problem is then given the dispatcher of filling in these "valleys" or periods of light loads. This service he performs in conjunction with the rest of the mine management.

At Banning No. 1 dispatching is used for distributing cars. Trips, once they reach the main line, are spaced and travel under full automatic block signals.

A hoisting engine hauls the coal from an inside yard up a slope 3,800 ft. long to the tipple. Main haulage service is by four 13-ton locomotives over a single track 9,550 ft. long. The signal system here employed is shown in detail in the accompanying diagram.

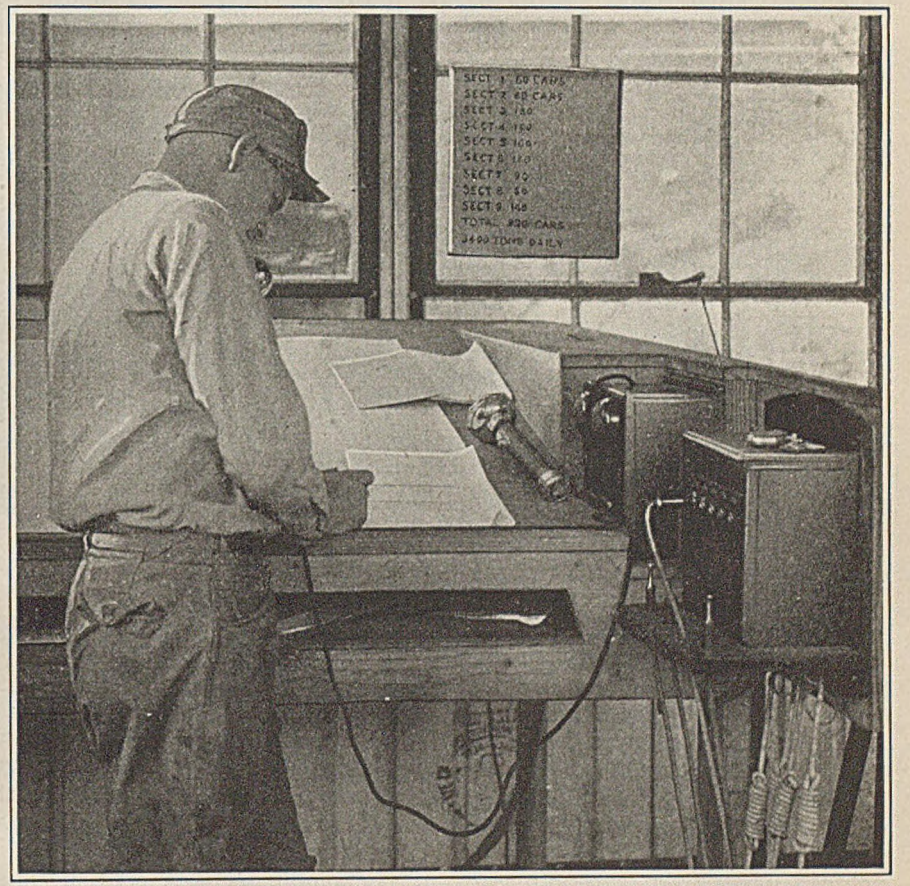
Each locomotive has positive front and rear protection. Passing sidings enable the maximum use of track and motors. It is possible to have all four locomotives using a single track simultaneously and without confusion or congestion. The bottom sidetracks will accommodate three locomotive trips. Adequate storage is provided at the foot of the slope to act as a "surge tank" for the transportation system. Delays to either the hoist or tipple do not, as a general rule, affect the haulage. Nor do reasonable delays to the locomotives affect the tipple and hoist.

By telephone dispatching the proper distribution of cars is made to the individual butt headings, and by the signal system the locomotives are moved rapidly over the main line. When the new tipple for this mine was completed, thus greatly increasing the mine's tonnage, the haulage problem presented many difficulties.

ONE OF THESE was that of moving more locomotives faster, over this single track than had ever been done before—and their movement had previously been a real problem. When general superintendent, W. G. Lauder, asked for a signal system, he stipulated that it should be as nearly fool-proof as possible. This meant the entire elimination of all hand operation and verbal understandings. The Nachod Signal Co. built the equipment according to specifications, and it was installed by the telephone department of the Pittsburgh Coal Company.

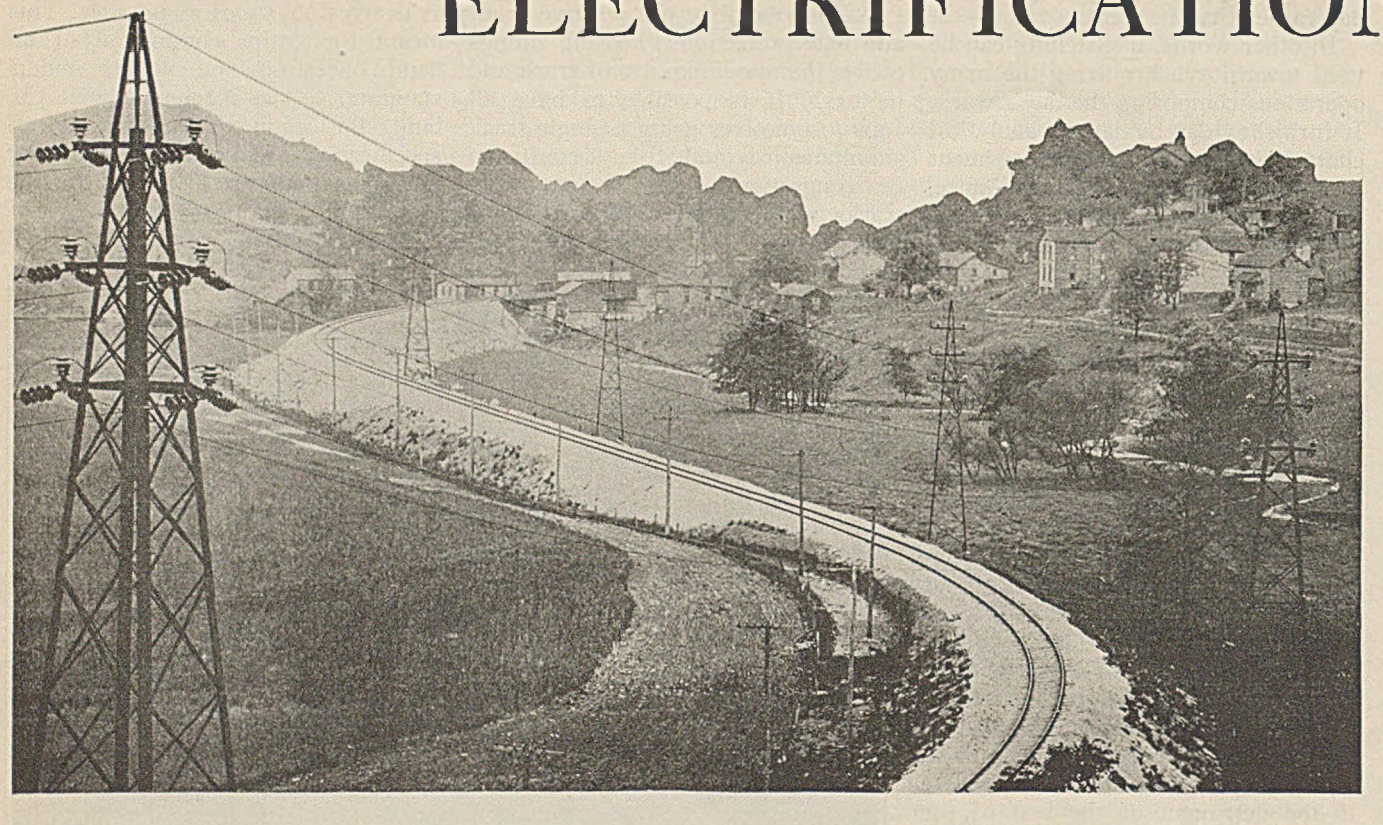
The normal indication of a signal is dark. Any locomotive when entering a block receives a green light; when it enters a protected section it sets the red light ahead as a safeguard from opposing trips and one red light behind to keep another trip from following too closely. As the trip advances it keeps clearing one block behind the nearest red signal in its rear. When a trip pulls out of a butt heading it sets two red lights far enough ahead to prevent any chance of a collision. As a trip approaches the signal within a butt heading it gets the indication as to the condition of the main line.

All signals are provided with reserve lamp relays. When one lamp burns out the reserve lamp lights up. Possibility of signal failures due to this cause is thus lessened. Of course, falls occur but when they take place the haulage naturally stops.



Dispatcher's Office at Warden Handles More Than 3,400 Tons Daily

ELECTRIFICATION



By F. H. Kneeland

Associate Editor, Coal Age
New York City

WHEN OFFICIALS of Pittsburgh Coal Company signed a contract in 1912 covering the purchase of central station power for twelve mines they were pioneering, for at that time but few mines of the country were purchasing power. Before the completion of the twelve installations it was decided to add six more, making the initial move cover eighteen mines. An expenditure of $422,169 for changing from individual plant to purchased power showed a yearly saving of $189,550, or 45 per cent on the investment.

Now all of the company's Pennsylvania operations are supplied by the West Penn Power Co. There are 35 metering points and the total power purchased in one year has exceeded 38,300,000 kw.-hr. The highest monthly consumption through one metering point was 569,000 kw.-hr. in February, 1927, at Banning No. 1 substation. From the two important standpoints of cost and continuity of power, officials of the coal company are well pleased with the service. Two hundred and twenty-five boilers were put out of commission. The average saving of purchased power applications has been 5c. per ton.

The rates are governed by the famous schedule "J" which to the uninformed may appear to be a highly complicated instrument. To the electrical engineer, however, it is a clear and condensed rate schedule that takes into consideration—in a manner fair to both parties—only the important points.

The minimum charge is $1.50 gross per month per kva. of established 15-minute maximum demand. The latter is calculated from connected load using a percentage table or, at the option of the power company, is determined by actual measurement each month. The energy charge is a sliding scale from 5½c. to ¾c. gross per kilowatt-hour. The steps or blocks depend upon the established demand.

A DISCOUNT of 5 per cent of the kilowatt-hours delivered is allowed when the purchaser takes the power at 1,000 to 15,000 volts, and 10 per cent above 15,000 volts. Another discount of 5 per cent of the total energy is allowed if the customer maintains a capacitive power factor of 90 per cent or better at the service connection. Further discounts depending upon the power bill are allowed in case the customer has two connections to one operation; several connections that could be served economically from a single point by a customer owned line; or a demand of 15,000 kva. or more.

As a secondary consideration to service, all substation equipment has been purchased and installed keeping in mind the economic necessity of power-factor correction. For this reason, motor-generator sets are used practically to the exclusion of synchronous converters. Only two of the latter are used, and these because they were available from a mine in another district that was shut down. All of the motor-generators are equipped with "TA" regulators.

The direct-current voltage at all substations is kept at about 580. The generating units vary in size from 150 to 750 kw. and the majority are equipped with manual control. Several, however, were recently converted to semi-automatic, that is fitted with reclosing direct-current panels, in order to save the wages of attendants. Two stations, those at the Warden and Crescent mines, are full-automatic, being equipped with motor-driven rheostats controlled by load-balance relays that automatically divide the load between paralleled units. All substations used by the company are located outside of the mines.

Earns 45%

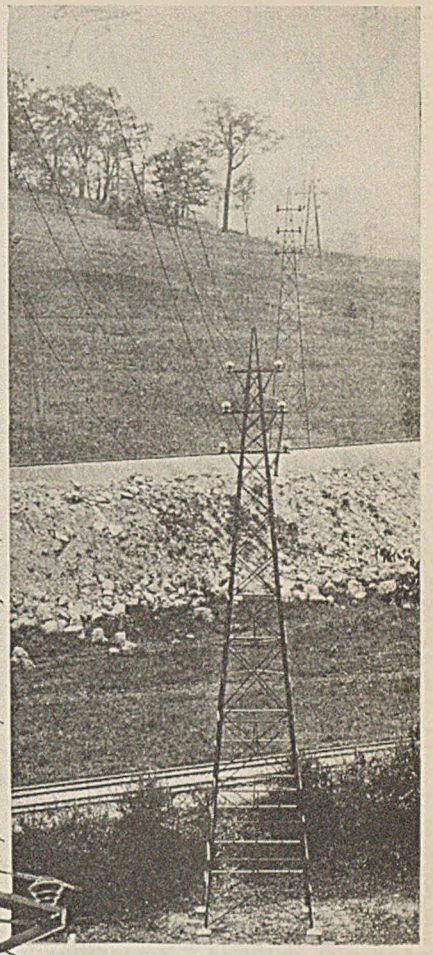
At present the power company delivers an average of 2,400 and a maximum of 2,500 volts at the 2,200-volt nominal loads. Serious interruptions have been so infrequent that the coal company has not found it necessary to install any auxiliary power units; not even for fans at closed-light mines.

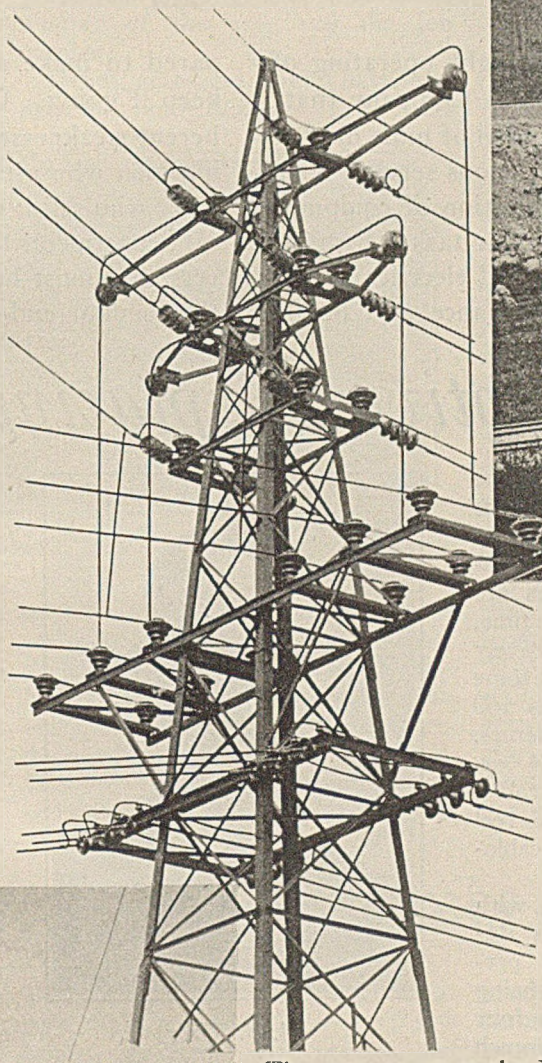
Loop circuits and sectionalizing switches are the principle insurance against long power interruptions. However another feature of importance is a special trunk telephone line between the exchanges of the private telephone systems of the power and coal companies. This facilitates prompt reporting, locating, and isolating or repairing of line trouble.

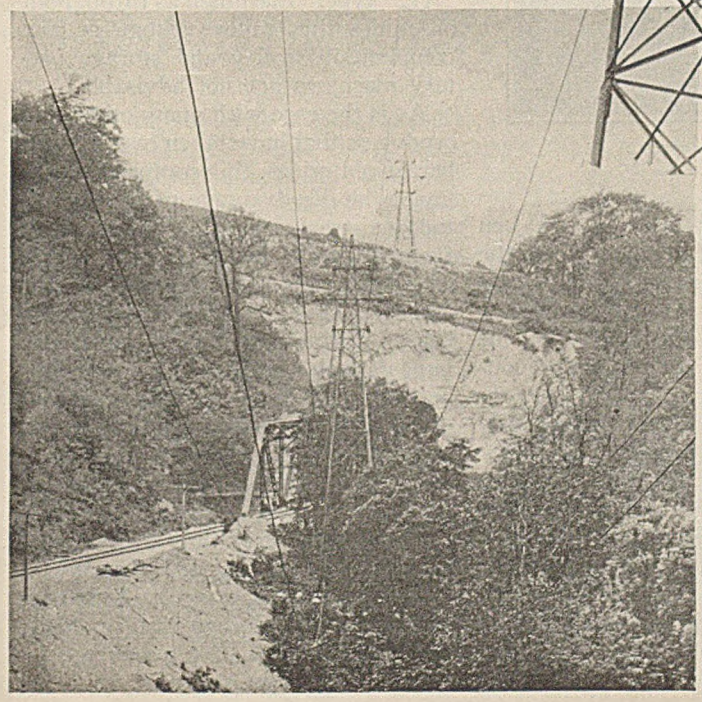
AN INTERESTING system of handling house and street lighting in coal company towns has been put into effect. The power company now handles the domestic electric service as if the houses were privately owned. It maintains the low-voltage distribution lines, reads the meters, and bills the tenants. The coal company acts as agent for the power company in handling applications for service and receiving the $5 meter deposit from new tenants and receives payment of power bills from those tenants who, for convenience, wish to pay through the coal company office.

In six of the company towns the street lighting, including installation, maintenance and electrical energy, is contracted with the power company at so much per light per year. This system will probably be extended to the other company towns.

In certain instances the change from steam to purchased power has added to the usual power saving by reason of the reduced maintenance on the equipment utilizing the power. An example is the pumping station at the bottom of the shaft at one mine.







During a 22-month period the repair cost to the original steam pumps was $4,103. During a period of the same length after the electric pumps were installed the repair cost to these was but $557.

Several other specific instances of saving are available. At the Delmont mine during a 6-month period, when 258,711 tons were mined, the saving by purchased power totaled $8,657, equaling 3.03c. per ton. The power cost at the Moon Run mine when idle and supplied by an individual plant was $1,987 per month. The average per month with purchased power and when producing coal at normal rate has been but $1,747.

THE AVERAGE monthly operating cost of a steam fan was $2,538. To operate the same fan after electrification, cost $1,616 per month. At the Euclid mine the installation of motor-generator sets and electrification of the fan with purchased power saved $873 per month. Savings of the same general magnitude were affected at several other mines.

Remarkably close co-operation between buyer and seller through the whole period of service seems to be an outstanding feature of the history of Pittsburgh Coal's purchased power. This has resulted in larger revenue to the power company and in decreased power cost and better service to the coal company.

Servicing the Mine for Mechanization

By A. B. Kiser

General Superintendent, Mechanical Equipment
Pittsburgh Coal Co.

EXPERIENCE HAS taught operating officials of Pittsburgh Coal Company that it is useless to project a plan of mine mechanization without providing continuous service. Careful study must precede the selection of equipment. It must be suited to its particular task. From the day it arrives the mechanical and electrical departments must follow its performance and be prepared to make adjustments and repairs that will keep it going. Constant study will reveal any inherent weaknesses. Co-operation with the operating men who use the equipment and the manufacturer who sell it enables the mechanical and electrical departments to add their bit to the general progress that must be made day by day to accomplish the common end—better quality and reduced costs.

Locomotive Displacing Mule

MECHANICAL loading and the adoption of larger mine cars are putting the mule at a disadvantage in many mines of Pittsburgh Coal Company and gathering locomotives are taking his place. At the present time, these machines are used exclusively in two mines and partially in some others. The company now has 160 haulage locomotives and 61 gatherers. These latter machines include 24 battery locomotives and 37 of the cable- and crab-reel type. The crab-reel variety are being converted to cable-reel machines.

Twelve cable-reel locomotives, with electrical parts complying with Bureau of Mines' specifications for "permissible equipment," are now being constructed for this company by four different manufacturers. Inasmuch as company officials believe that locomotives of this type can be used to advantage, the outcome of tests made on these different makes will be carefully watched. No doubt standardization will be effected later. All of these machines are being designed in accordance with specifications prepared by the company and embody features that are distinctively new in locomotives of this type.

These machines are limited to a speed of 4½ miles per hour when operating from the trolley and to half this speed when working from the cable. The control is of the semi-magnetic contactor series-parallel type and the reels will spool 450 ft. of two-conductor cable. When energy is drawn from the cable, the motors can be operated only in series and at reduced speed. Power is transferred from the trolley to the reel by a switch cylinder in the controller. This interlocks with the control cylinder and can be operated only when this latter cylinder is in the "off" position. This switch also opens the rail circuit and provides a return through the cable.

A. B. Kiser

The reel motor is always energized when power is flowing through the cable. This cable will be handled over the operator's end of the locomotive, because it is believed that visibility of the cable will reduce the possibility of its being run over by the machine.

All of the storage battery locomotives are equipped with Edison cells. The six-ton "permissible" machines are fitted with 80 "A12" cells having a capacity of 450 amp.hr. The smaller units are supplied with 80 "A8" cells having 300-amp.hr. capacity. On these smaller machines, where the length and breadth of the chassis will permit, in order to secure greater capacity the "A8" cells are being replaced with those of the "A12" type. Inasmuch as throughout all mines the trolley voltage is 550, combination trolley and storage battery machines are not advisable.

As is the case with many other coal producers that have taken over a number of old mines, this company works under the disadvantage of having numerous track gages. These range from 37½ to 44 in. The latter width, or 44 in., has been selected as the standard and all locomotives purchased during recent years have been built with this width of chassis. This permits changing the gage without disturbing the frame. Other equipment, also, is bought with wheels and axles that can be readily converted from one gage to another.

Experience, extending over several years, has demonstrated the advantage of contactor control. It is now in use alike on storage battery, cable-reel and 13- and 25-ton haulage locomotives. It is regarded as being

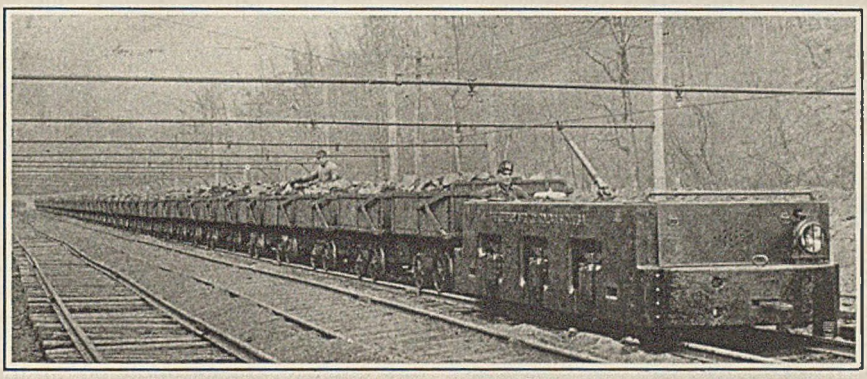
safer in operation and more economical both as regards maintenance of machines and use of power. It is considered necessary where automatic substations are operated.

All haulage locomotives heavier than 13 tons are equipped with six wheels. The largest units employed in this company's mines weigh 25 tons each. There are four of these machines. The next size is 20 tons, of which there are 14 in use. The 13-ton unit is the one most commonly employed. Four machines of this size were recently purchased from the General Electric Co., fitted with 90-hp. motors equipped with roller bearings. A leaf spring is located on either side between journal boxes and contactor control is employed.

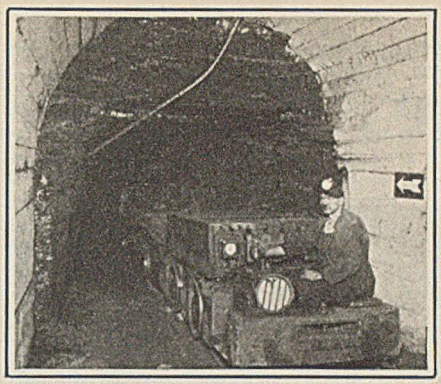
Outside-frame locomotives are in general use. These are fitted with drivers having cast centers and ordinary shrunk tires. All wheel repairs are at the Library shops. This applies to armature work also.

Forged high-carbon steel is employed for axles and Nuttall heat-treated solid gears are used exclusively. Both gears and wheel centers are purchased rough-bored and are finished to suit the individual axle to which they are applied. No keys are used in either gears or wheels. Each axle is given a serial number and the pressures required to force the wheel centers and gears to place are recorded by a graphic gage mounted on the wheel press. These charts are preserved together with the serial number of the axle and the job number.

Helical gears and pinions have been used to a limited extent. The results so far secured from them are not such as to warrant any immediate change from the standard spur gear. Steel-filled brake shoes are in general use, their variety having been reduced to less than a dozen standards. Grooved tires are not built up by welding. This practice was tried but proved unprofitable. When tires require repairs, therefore, they are either turned up or removed.



Mass Production Places Haulage on a Railroad Basis



On the Way Out at Montour No. 2

No. 3 single- and double-conductor rubber-clad cable is used on the cable-reel locomotives. Considering the fact that the voltage is 550 this cable is perhops slightly larger than is usual. The single-conductor type is being replaced by the two-conductor variety. This latter is of concentric design, this construction having been generally used for the past 12 years. All new locomotives are fitted with safety chains as a precaution against accident.

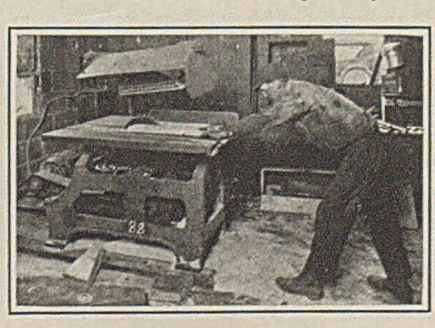
"Mechanical mules" are employed insteady of locomotives for drawing the rock dusting machines. These have been built at the Library shops from old breast machines and Jeffrey "21A" inclosed motors. They are equipped with trolley poles and automatic cable reels. A gear-shift clutch gives two widely different speeds—40 and 300 ft. per minute—for dusting and traveling, respectively.

Standardization and Progress Compromise

LACK of complete standardization is one difficulty that many mining companies are called upon to face today. Comparatively speaking, when all conditions are considered, the equipment of Pittsburgh Coal Company shows appreciable progress in this direction. For years the purchase of equipment similar to that already in use has been encouraged, except in those cases where machines have been superceded by others of superior design. The keeping of complete and up-to-date records has been a great aid to standardization.

In outside equipment transition toward standardization is most noticeable in the shops, the substations and at the fans. As an example the various shops contain: 31 Blount 14-in. wet-and-dry grinders; 20 Crescent 16-in. rip-and-crosscut saw tables; 26 Hoefer drill presses, and 25 United States $\frac{5}{8}$-in. heavy-duty electric drills used chiefly in car repairs. In the list of substation generating equipment, fans and fan motors, occur the following significant items: 33 General Electric 150-kw. synchronous motor-generator sets; 8 type BTS, 250-hp. 600/420-r.p.m. fan motors; and 11 Jeffrey 6x3-ft. fans. For tipple drives, the standard unit is a totally-inclosed, type HI, 440-volt slip-ring motor.

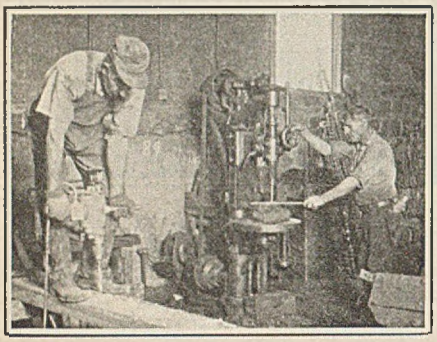
Power Saw at Library Shops



In the case of inside equipment such as pumps, mining machines and locomotives, standardization must in large measure be subordinated to specific requirements. Thus, the mine-pump inventory contains a number of types, yet four varieties stand out as being used wherever one of them will meet the conditions. These four types and the number of machines of each at present in use are as follows: 20 DeLaval, G-5, 1,600-r.p.m., 700-g.p.m., 40-ft. head cen-

trifugal machines; 148 Deming, Fig. 70, 5x6-in. machines; 81 Deming, Fig. 50, 5½x8-in.; and 80 Austin, 5x6-in. "anti-acid" pumps.

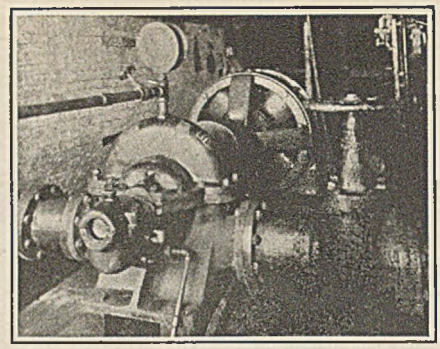
Considering the fact that a wide



Economizing in Time and Labor

range of sizes is required, the direct-current motors employed for driving mine pumps and for miscellaneous applications show a considerable degree of standardization. Thus, 245 types S and SA, Westinghouse, 10 hp. 1,150 r.p.m. motors are employed as well as 52 type SK, 15-hp., 1,700-r.p.m. Westinghouse and 103 type MC, 5-hp., 1,250-r.p.m. General Electric machines. Other types and sizes are in use but not so many of any one kind. For mine pump and other direct-current duty up to 50 hp. both inside and outside the mines, the company has standardized upon Allen-Bradley carbon-pile starting rheostats.

Of the 247 mining machines owned all but seven come under two classifications. Ninety-two are No. 28-A Jeffrey shortwall machines and 147 are No. 35-B shortwalls of the same make. Among the list of locomotives are the following items: 8 General



Keeping Things Dry Underground

Electric 8-ton cable-reel machines; 10 General Electric 10-ton haulage units; 35 Westinghouse and 45 Jeffrey 13-ton and 28 Jeffrey 10-ton haulage locomotives. Post-Glover rolled-steel resistance has been adopted as the standard replacement resistance for all locomotives.

Maintenance and Inspection Centralized

LIBRARY, Pa., which is centrally located geographically and lies only 13 miles from Pittsburgh, is the headquarters of the equipment installation and maintenance department. Here the central shop of the company, probably the largest shop in the United States devoted exclusively to the repair of mining equipment, is located.

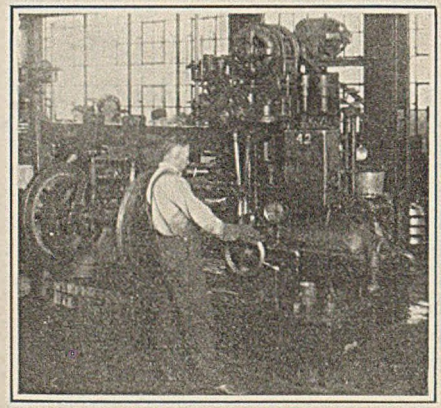
Except for two new steel buildings used as storehouses, the shop unit is housed in one large brick and steel building. In all, this structure houses not only the machine and electric shops, shop drafting room and office but the warehouse for mine supplies and spare equipment.

The amount of work handled by these shops is indicated by the fact that the force normally employed consists of 35 mechanics and 15 electrical repairmen. In addition to these there is a chief clerk, draftsman, storekeeper, shipper, saddler, carpenter foreman, garage foreman and some miscellaneous help.

The outside work of this department is divided among eight officials. Thus, a mechanical engineer is charged with transportation, an electrical engineer devotes his time to problems of power utilization and a superintendent has charge of electrical construction and maintenance. In addition to these, there are five inspectors, one each for locomotives, mining machines, pumps, electric cap lamps and the commutation of electrical equipment.

The duties of this latter official include the selection, standardization and distribution of carbon brushes; also the inspection and checking of electrical connections that may affect commutation. Each type and size of brush is designated by a number which constitutes a key to its grade and use. Identification number tags are attached to all brushes that are sent out from the shop warehouse on mine requisitions.

Although in general the repair methods adopted at Library are



Making Up Locomotive Drivers

typical of the best practices followed at the central shops of large coal companies, they embody certain specific features that are somewhat unusual. One of these is the practice of repairing Edison lamp batteries. This requires special tools.

Both electric welding and oxy-acetylene welding and cutting are extensively used. By these processes worn parts of many descriptions may be built up, or plates or bushings may be securely affixed. Exceptions to this practice are encountered in the case of locomotive tires and axles. Tires are not filled in by electric welding but when worn are turned up once or twice and then scrapped. Filling in was tried but abandoned. Worn axles are replaced by new ones, the old steel being used for machine shop stock.

The practice of the winding department is to buy factory-made coils excepting that an occasional set is made to meet some special emergency. Little work is done on commutators. Probably one reason for this is because proper attention to brushes has, in most cases, eliminated trouble and excessive wear. Another is because special and, in most instances, expensive equipment is required in order to do a first-class job of commutator rebuilding. Repair is made of such commutators as have only a few defective insulating segments; those in need of complete reinsulation are replaced with factory-assembled fillers.

Scrap materials are handled in somewhat the same manner as they are by railroad companies. Instead of selling mixed copper and brass in small quantities from individual mines, all such material is shipped to the Library shops. Here it is carefully sorted and finally sold in large quantities. This results in the realization of a higher price which compensates for the expense of handling.

EQUIPMENT *Can't Hide*

Good Records Act as Spotlight

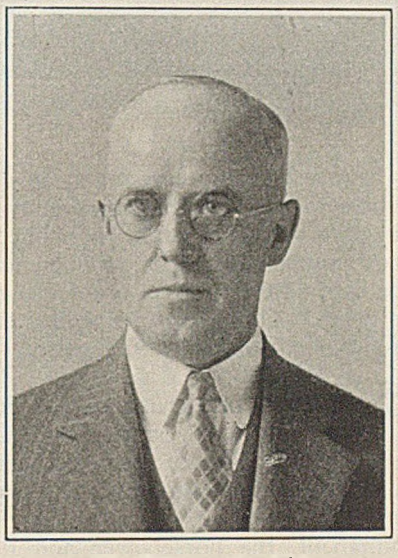
By M. M. Kelso

Pittsburgh Coal Co.

ONE OF the most difficult tasks confronting the management of a coal-mining property is that of keeping an accurate yet concise record of the various pieces of equipment owned. This is difficult because equipment occasionally needs repairs and in many cases may be transferred from plant to plant. Any record adopted should keep track of all of these various changes.

Naturally the card index system is the most efficient and elastic means of keeping these records. Many such schemes have been tried with all degrees of success but the system adopted by Pittsburgh Coal Company after some years of use, has well demonstrated its utility for this purpose.

When a requisition for any particular piece of equipment is made, four index cards, each 5x8 in. in size, are made out and assigned a record number. Two of these are white in color and two are blue. One white and one blue card are for the shops at Library, Pa., whereas the other two are kept in the files of the main office. A name plate bearing manufacturers' number and the card record number is placed on equipment. The record number is likewise stamped into metal under the name plate.



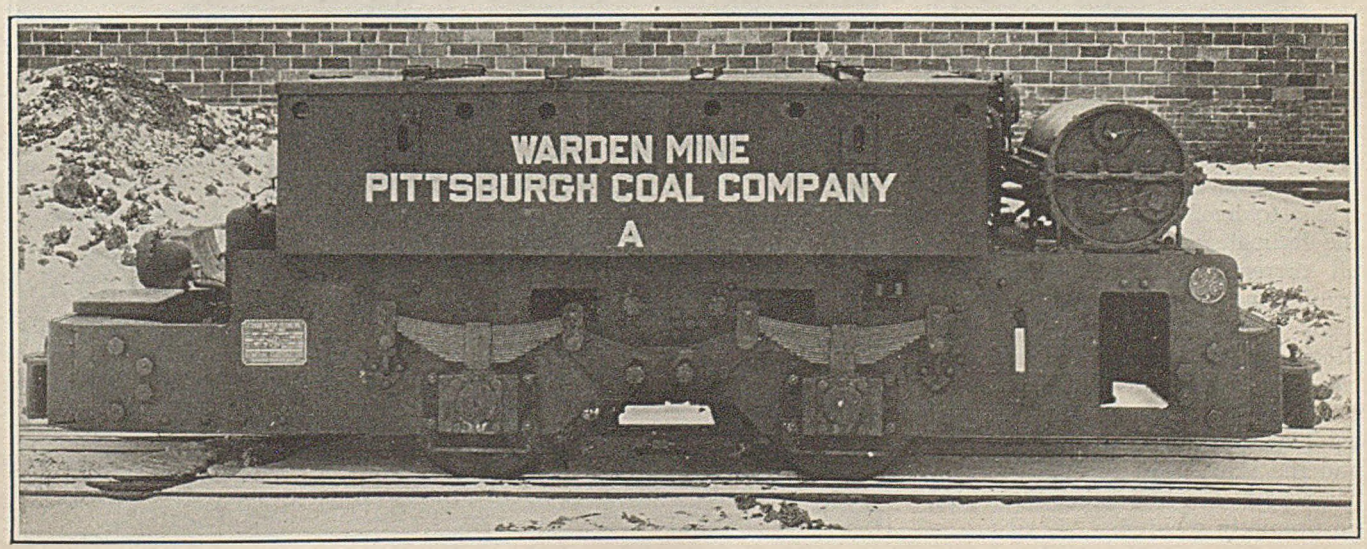
He Sits on the Lid

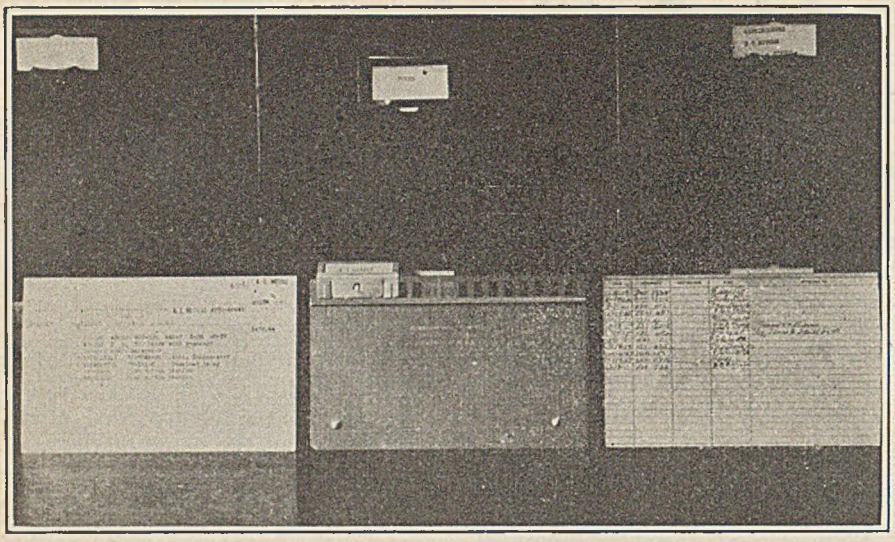
When first made out—that is, at the time of requisition—these cards carry only enough data to identify the equipment. Take the case of an electric motor as an illustration. The card would carry the type, horsepower, make, order number and date of requisition. When invoices are received all four of the cards are filled out completely, after which one pair of cards is sent to the shops as has been already stated, and the other retained in the Pittsburgh office.

The white cards are filed alphabetically under the name of the mine to which the equipment is sent; the blue ones are classified according to the make and type of the equipment. In case of a transfer from mine to mine or from mine to shops, a record of this transfer is entered on the backs of all cards. Thus a complete record of all shifts and changes in equipment location is kept. Cards also indicate location and purpose of equipment. Record cards on motors show to what piece of equipment they are attached. Periodic checks are made at the mines by a competent man who makes any necessary corrections.

After these entries have been made, the white cards are transferred to the files (at Pittsburgh and Library) covering the mine or plant at which the piece of equipment is located. The blue cards are returned to the files covering that type of equipment.

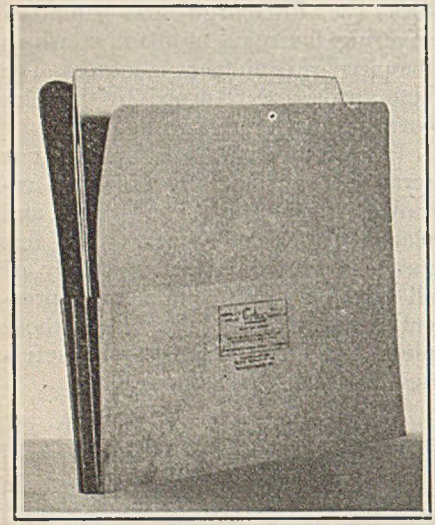
In case any piece of equipment is scrapped or sold, all cards are removed from the "live" files and placed in "dead" ones. By this means a record is kept not only of all machinery and equipment at present in use or in storage, but of those pieces that have outlived their usefulness and have been discarded.





Card Index System Really Works

At the end of each year a typewritten record is made in the city office showing all transfers of old, and purchases of new, equipment that have been made during the twelve-month period just ended. This is sent to the Library shops and is checked with the card index kept there. In this way all errors are promptly discovered and corrected. Approximately 6,000 separate pieces of equipment are covered by these card indexes.



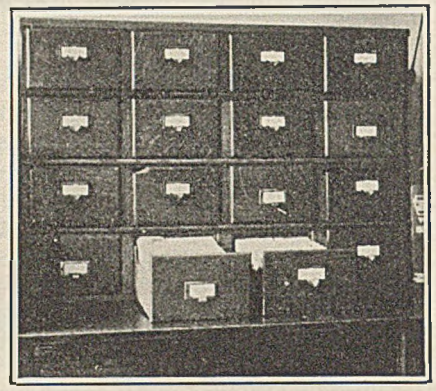
Handy File Pocket Used

In conjunction with this index system, a folder file is kept, numbered on the decimal system, in which is placed all correspondence, bills and blueprints concerning each piece of equipment. The cards show the number of the folder wherein this information may be found. By this means a complete history of any piece of equipment from its date of purchase and the price paid, together with all correspondence and other data, may be promptly secured.

In case it becomes necessary or desirable to order duplicate equipment or spare or repair parts, the maker's shop number, his order number, and the date of the original order can all be given. This greatly expedites the procurement of the desired parts.

FOR CARBON brushes, of which thousands are purchased each year, a separate card index is maintained. This is similar to the other index, but shows the location of the equipment, the horsepower and the type of the machine on which the brush is used, its serial number, voltage, amperage, speed in r.p.m., number of brushes, their type (leading, trailing or radial), and the grade and size of the brush. Each grade and size is given a number and requisitions are made out by this number only. This avoids all mistakes in measurements by the various foremen.

Division cards in all of these files are of aluminum, made by the Aluminum Company of America. The accompanying illustrations show

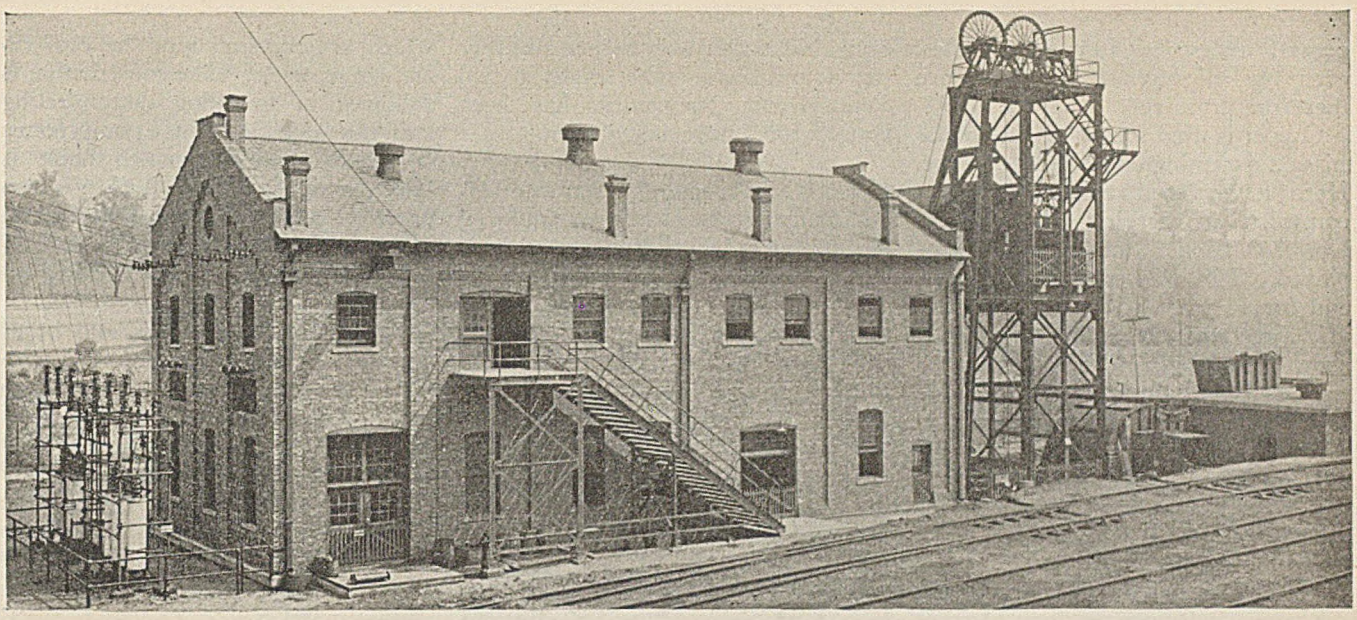


Compact Records Save Time

not only these cards and the case in which the city records are kept, but a view of the file in the Library shop.

Keeping card index files to show a record of the various pieces of equipment owned by a company is not a new system. Few firms, however, have carried this plan to the degree of perfection reached in this direction by Pittsburgh Coal Company. Its records are such that any machine or piece of equipment owned by this firm can be almost instantly traced and all information and data relating to it made immediately available.

Equipment Records in the Making at Library



Knowing *Cost of Power* Effects Substantial Savings

By J. H. Edwards
Associate Editor, Coal Age
Huntington, W. Va.

THE purchase of electric current inevitably brings problems of its own. When energy is generated by the mining company its cost is frequently lumped in with other operating expenses and details of its use are often obscured in the total. This paves the way for numerous petty extravagances in power utilization which, taken collectively, may readily mount to decidedly appreciable proportions.

Purchased power, on the other hand, must needs be metered else it could not equitably be paid for. This, in turn, paves the way for measuring and evaluating the amount of current consumed in various individual operations and processes. Comparison between the consumptions of individual machines and distinct types become easy. Possession of, and familiarity with, a definite yardstick leads to its use. The result is that power soon becomes something real, something tangible that must be saved wherever possible and by all available means.

Some of the equipment and practices employed by Pittsburgh Coal Company with this in view are here described. No pretense is made that these machines and practices represent the "last word" in power economy. With this company, as with many others, economy in power utilization is a continuous growth or evolution, the end or ultimate of which is never attained.

Transmission—Permanent, Safe, Sure

BROADLY speaking, electric transmission includes outside lines, wiring in buildings and other structures, trolleys, feeders and telephone lines underground. The problem confronting any mining company, therefore, is that of selecting a type of transmission construction that will strike a balance between ultimate cost, an economical and reasonable degree of permanency, safety, and protection against fire. Years of experience with all phases of the problem, including high-voltage lines, have enabled Pittsburgh Coal Company to set certain standards. Changed conditions, however, have left some details still in doubt.

This company's outside alternating-current transmission from metering points to substations embraces: Three 25,000-volt, one 4,400-volt and several 2,500-volt lines. The total length of all of these various lines amounts to 31.7 miles, while that of the outside 550-volt lines is 18.7 miles. Wood-pole construction is used for all except one 25,000-volt line, for which steel is employed. Painting of the ungalvanized steel has

proved expensive and wood poles, even for the highest potentials, are therefore preferred.

Copper is used for all outside transmission excepting one 25,000-volt line. Here a stranded aluminum cable, equivalent in carrying capacity to a No. 4/0 copper conductor, is employed. This was purchased in 1911 and for 13 years was used as a 550-volt direct-current circuit. So far it shows no signs of deterioration.

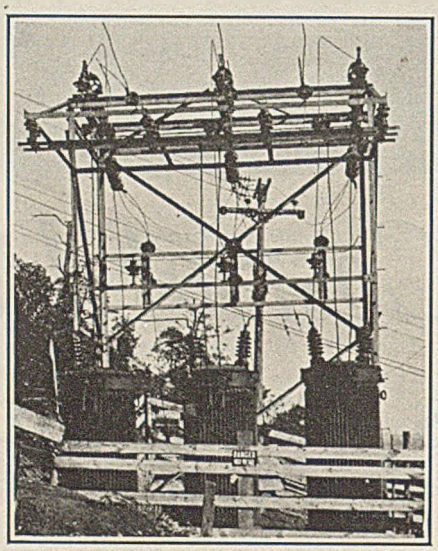
Power and light wiring in all buildings and structures is placed in metallic conduit. All switches, regardless of the motor or light circuit controlled, are of the square-D inclosed safety type, having quick make-and-break contacts.

All substations are located outside the mines and generate direct current at 580 volts. Feeders do not enter the mine by way of the main shaft or portal but are taken down boreholes. At drift operations these are usually located about 200 ft. from the collar.

On single-track outside tramways, Hubbard adjustable brackets have been adopted as the standard means for supporting the trolley wire from wooden posts. It is thus possible to slide the hanger to any desired position and clamp it in place.

In boreholes, which for the most part are quite shallow, special rubber-covered wires are used. The outer insulation is a heavy braid resembling circular loom. Standard No. 4/0 round bare copper is used as feeders inside the mine. Grooved wire of the same capacity serves for trolleys. A little No. 2/0 wire of this type is still in use but none of this size has been purchased for over 15 years. Some No. 6/0 trolley wire, a size that has found favor with at least two Pennsylvania companies, has been bought for future installation.

UP UNTIL recently, separate machine circuits have been employed but mining machine feeders and trolleys are now being tied together. This permits a more economical use of copper and cheapens construction, as both conductors can be supported from a common hanger. It also decreases the cost of equipping the mine with sectionalizing automatic circuit breakers, which improvement is under way.



Substation at Banning No. 1

Particular attention is paid to minimizing the fire hazard and decreasing the liability of personal contact with the 550-volt lines. Trolley and feeder disconnecting switches are placed in open pre-cast concrete vaults which are recessed into the coal rib and set in brick. Like construction is followed in installing disconnecting switches outside mine pumprooms. A wooden-handled switch hook is hung beside each box. A hasp is also provided which can be padlocked in such position as to prevent closure of the switch while men are working on the line.

Mining machine cables and other portable equipment are provided with Ohio Brass fused nips. These have copper contacts backed by steel springs. The use of soldered joints in 2/0 and 4/0 conductors in gassy mines has been eliminated through the adoption of a bronze clamp similar in construction to those used on guy wires. These were developed by the Ohio Brass Co.

As is the case with many other coal producers, bonding has not yet been standardized. During recent years several different types of bonds have been tried. Much of the newer track is fitted with bonds of the electrically-welded type and, in general, this is the variety most preferred. For various reasons, however, pin-expanded bonds are still favorably considered. A double setscrew-bond has proven satisfactory for temporary work but difficulty has been experienced in preventing its use on permanent installations.

Telephone lines are strung with bare galvanized steel wire. At crossings the circuit is taken under the track by means of duplex cord having a heavy rubber sheath. Although this has proven fairly satisfactory it is possible that, in the future, conduit may be added.

Alternating Current is Preferred

PRACTICES relating to stationary motors and their mechanical connections to the machinery driven are not entirely uniform. Improved types of drives have been installed in a number of cases. Wherever possible, outside motors operate on alternating current at 440 volts. The exceptions to this rule embrace the machines larger than 50 to 75 hp. employed for driving fans and hoists. Fan motors, together with their drives, will be described later.

Most tipple motors are of the slip-ring type. In all sizes wherein it is readily available, the "HI" totally-inclosed construction is employed. No double-deck squirrel-cage motors are installed on tipples. The chief reason for this is that this type allows no opportunity to apply speed control in starting or operation.

Long belts, idler belts, inclosed spur- and worm-gear reducers, Texrope and Reeves variable-speed drives, may all be seen in the tipples and dry cleaning plants. Their locations and applications depend upon the age of the installation and the duty to be performed. For service not requiring a change in speed ratio, totally-inclosed gear reducers are favored.

The supply of belting is handled in a somewhat unusual manner. What is termed "an idle-belt account" was established some ten years ago with the Edward R. Ladew Co. of Pittsburgh. All used, badly worn or discarded belts, as well as those from dismantled or abandoned mines and miscellaneous sources, are shipped to this company's warehouse. Here they are given a serial number and held in stock until orders are received from the mines for endless belts that can be made from them. The belt company then cuts, trims and remakes the old belt and, after shipment, bills the coal company for the labor.

When motors are direct-connected to speed reducers, pumps, booster fans or other equipment, a special flexible coupling is used. This consists of two steel sleeves which are fastened to the two shafts that are to be connected. Each sleeve, at its extremity, carries three symmetrically

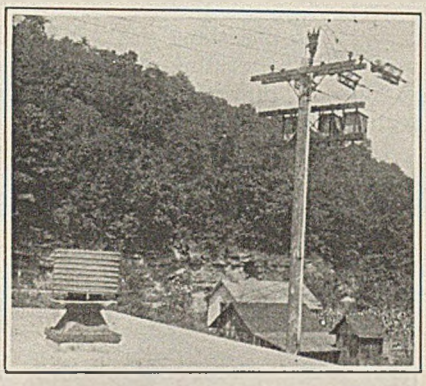
disposed arms. These are bolted alternately to a flexible disk of rubber and canvas made by the Thermoid Rubber Co. The coupling thus formed resembles that used in the drive shaft of some automobiles. Such couplings are standard for all direct-connected motor applications except hoists. For this latter duty, Bartlett-Hayward flexible couplings of the internal and external gear type are used.

THE six hoist motors employed by this company range in size from 75 to 300 hp. All are of the 2,200-volt, slip-ring type, equipped with full-magnetic control. The shaft hoist at Euclid mine is a 300-hp. machine having cylindro-conical drums and is equipped with governor controller affording all practical protective features.

The ends of rotor shafts are tapered slightly where they receive pulleys, gears or couplings. This is done in order to facilitate ready removal of whatever is applied to them.

Vigilance Extends to Fan-Drive Motors

WITH 44 fan motors totaling 5,185 hp., the ventilation load of Pittsburgh Coal Company represents the single item of greatest magnitude so far as the possibility of making savings through the adoption of suitable equipment is concerned. The distinction of having



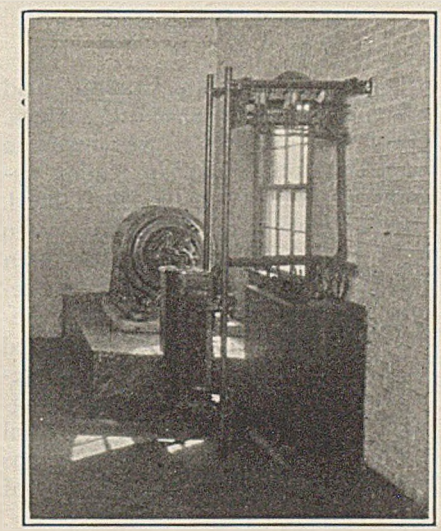
Feeder to New Fan at Warden Mine

more variable-speed motors driving its mine fans, more of the "BTS" type, and more Sherbius sets than any other coal producer, goes to this firm.

All but two of this company's fan motors are of the variable-speed type, the two exceptions being squirrel-cage induction machines that total only 30 hp. The variable-speed list includes 15 type "BTS" alternating-current, brush-shifting motors ranging in size from 75 to 250 hp. and totaling 2,900 hp.; 7 slip-ring induction motors with rotor-resistance speed control, ranging from 50 to 300 hp. and totaling 850 hp.; 16 direct-current machines with field-resistance speed control, varying from 20 to 125 hp. each and totaling 605 hp.; and 4 slip-ring induction motors with Sherbius control, ranging from 150 to 250 hp. each and totaling 800 hp.

IN FIRST cost the brush-shifting motor and control is more than twice the cost of a slip-ring motor of the same size together with its control. The chief advantage of the higher-priced machine lies in its greater efficiency and higher power factor, as compared with a slip-ring motor, when operating on rotor resistance at reduced load. The 150 and 250 hp. sizes of these machines have 135 brushes arranged with five on each of 27 studs. Renewal of these brushes has represented the only maintenance expense above that incurred with ordinary slip-ring machines. So far, the average life of a brush has been about eleven months.

With the Sherbius system of speed control, the main unit is a simple induction motor with wound rotor and slip rings. The auxiliary unit is a small motor-generator set consisting



Speed Regulator on 250 Hp. Motor

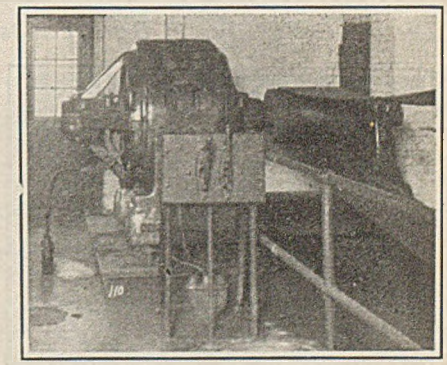
of a polyphase commutator motor and an induction generator. At reduced speeds of the main unit, the commutator motor takes energy from the rotor circuit thus driving the induction generator which, in turn, delivers current back to the line. The speed of the main motor is governed by the position of the taps in a transformer connected in the rotor circuit.

The Sherbius installations were made some years ago before the "BTS" brush-shifting motor was available. That this latter type has proven the more desirable is indicated by the fact that it is now being purchased for new installations.

Why does Pittsburgh Coal Company employ so many variable-speed fan motors? So that: (1) The quantity of air can be adjusted to meet the actual needs of the mine when working; (2) speed can be reduced at night, on idle days or during intermittent mine operation; (3) the quantity of air can readily be increased above normal needs if required; (4) circulation of air can be greatly reduced in case of a mine fire; and, (5) the speed of the fan can be changed to meet the requirements of any alternation in, or revision of, the ventilating system.

Variable-speed fan motors have effected large savings for this company. Records show that one such machine saved $642.42 per month during a shutdown when the speed was reduced so as to cut the load from 157 down to 40 kw.

Mechanical connections between motor and fan are of three types—long endless belt, silent chain and rope. Idler-belts and gear reducers have not been tried for fan service. None of these fan installations include provision for auxiliary power. Purchased energy is depended upon



Slip-Ring Motor at Montour No. 1

entirely as it has an excellent record for continuity of service, no serious interruptions having been experienced. At the Crescent mine, motor failure is forestalled by the provision of two slip-ring motors connected to the fan through rope drives and

clutches. Only one of these machines is used at a time. The drive pulleys are of different diameters so that reduced fan speed can be secured by shifting to the smaller of the two. This small pulley was applied several years ago to effect economy in power consumption, and paid for itself in a few months.

One of the best fan installations this company possesses is a new one at the Warden mine. It consists of a "BTS" motor equipped with full automatic control. The motor rating is 150 hp. at 600 r.p.m. and 24 hp. at 300 r.p.m. Change of speed is effected by push-button control from the starting panel.

Look Out Pumps!—Drainage Engineer Coming

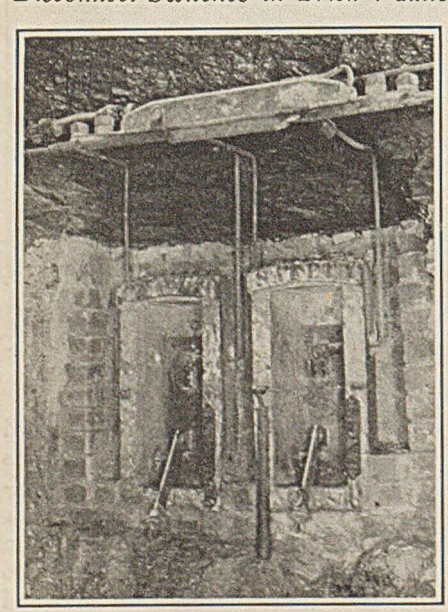
TO RID its mines of water Pittsburgh Coal Company uses 575 pumps. No wonder that it employs a mine drainage engineer and a pump inspector! W. R. Cuthber, the engineer, spends much of his time in planning ways and means for ditching, eliminating pumps and centralizing pumping. R. B. Goddard, of the operating department, specializes in pump and heavy pipe line installations, and pump inspection.

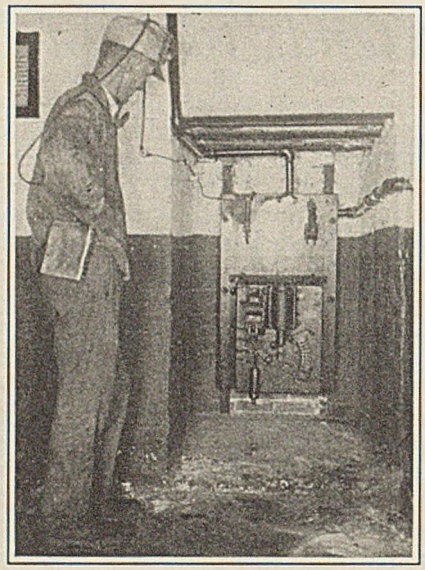
Of the three general types of pumps used, 431 are centrifugal, 138 reciprocating and 10 rotary. The centrifugal type is favored where it is possible to provide a sump sufficiently large to hold enough water for several hours of continuous pumping. In the reciprocating class, the plunger type is favored, the single piston variety being used only in sizes up to 6 x 8 in.

Centrifugal pumps range in size from 300 to 1,000 gal. per minute. The size finding widest use is the 700 gal., single stage. Two- and three-stage machines are also widely used, however. In reciprocating pumps, the 5½ x 8 and 8 x 10-in., vertical, triplex, plunger machines and the 5 x 6-in. triplex, plunger trench pumps are standard.

"Kosmos" porcelain plungers, as furnished by the Aldrich Pump Co., and used on machines handling acid water, are effecting excellent savings. The initial installation was made in May, 1923, on a 5½ x 8-in. triplex machine operating against a 239-ft. head. Monthly upkeep on this pump, when fitted with brass plungers, had been $45.02. Barring breakage, the porcelain plungers promise to last indefinitely. The longer they are used the smoother they become, thus decreasing the wear on, and prolonging the life of, the packing. Total saving on the first pump, to date, has been $2,400. Approximately 250 of these plungers are now in use.

Disconnect-Switches in Brick Vaults





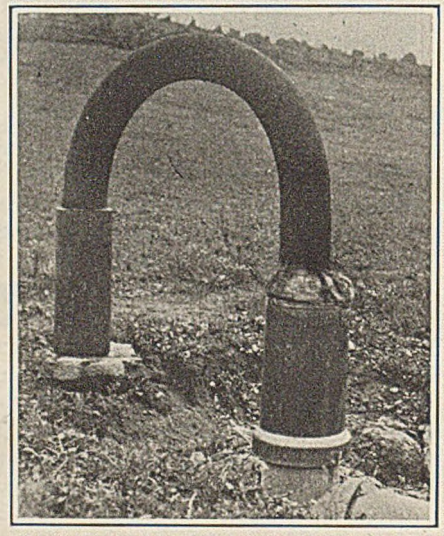
Automatic Pump Starter

None of the pumping stations are as yet arranged for full-automatic operation, but several centrifugal machines are now being fitted with motor-driven vacuum pumps for priming. Direct current is used almost exclusively for underground pumping. Many of the motors are equipped with field rheostat controllers for 25 per cent speed change. This renders it possible to operate the machines at low speed during times of scant water, thus decreasing maintenance expense, and at high speed and correspondingly higher capacity during rainy spells.

Pumprooms are built with an offset extending about 3 ft. into the wall for the controller mounting. This space does not have the same height as the main pumproom, being considerably lower. Control mounting of this kind prevents a man from accidentally brushing against live parts carrying 550 volts.

Another precaution taken is that of placing the disconnect switches in open-fronted brick or concrete vaults outside of the pumprooms with a switch hook hung near by. Thus, in case of fire in the pumproom or overspeeding of the motor, current can be cut off without risk. It is also possible to determine whether power is "on" or "off" without entering the pumproom.

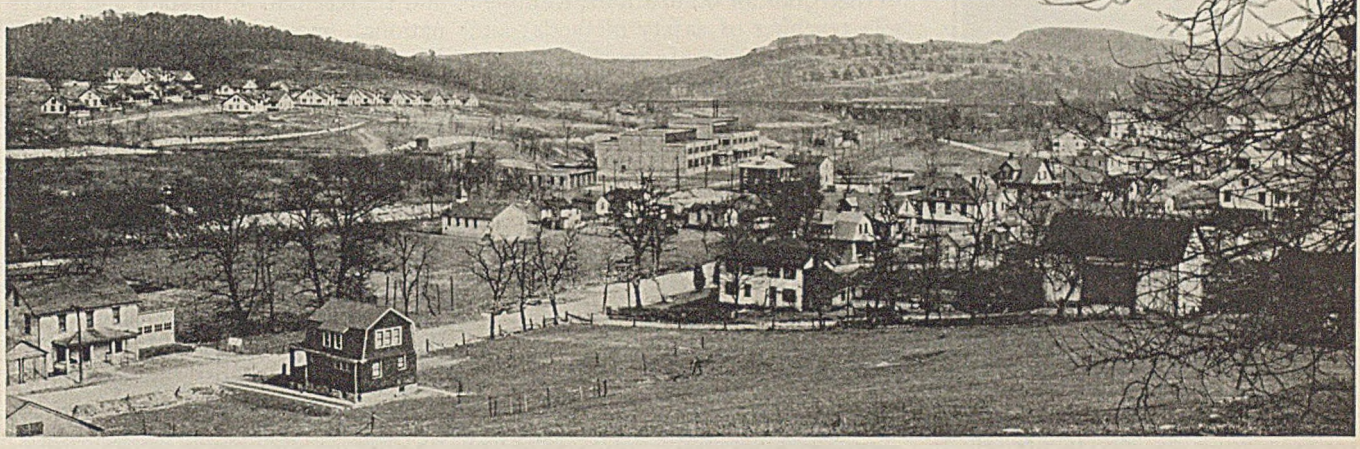
It is desirable to provide at the top of all boreholes some arrangement rendering it difficult or impossible for anyone to drop objects into the hole with either mischievous or malicious intent. This is accomplished by fitting the upper end of the casing with a return bend having a 4-ft. rise. The joint between the bend and the casing is a leaded sleeve.



"Goose-Neck" on Borehole Discharge

All centrifugal pumps, as well as those of the piston variety, are equipped with full acid-resisting bronze. Standard triplex machines are fitted with 3-section bronze valve chambers designed and built at the Library shops. The valve seats are made of Duraloy and other non-corrosive metals.

SAFETY *and* HOUSING



By C. A. McDowell
Safety and Personnel Manager
Pittsburgh Coal Co.

WHILE ENGAGED in the reconstruction of its plants, the Pittsburgh Coal Company has not neglected those matters upon which the well-being and contentment of its people depend. The company recognizes the needs of its employees at work, at play, in the home, in the community circle and is meeting them by providing opportunities for general and vocational education; by establishing safety at the high level of its importance; by furnishing desirable facilities for recreation; by improving living conditions in the homes and in the towns.

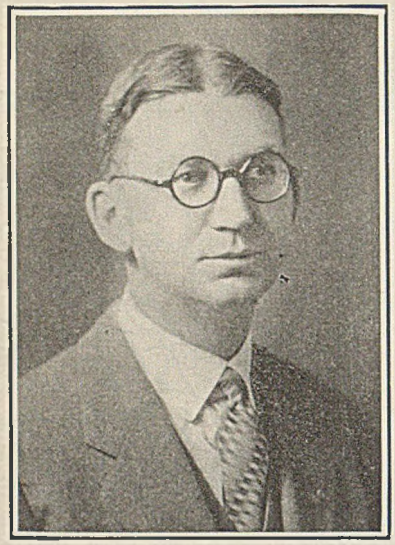
The scope of this undertaking is best explained by the fact that the company owns and maintains 3,580 houses in 21 communities at or adjacent to its mines. In several instances a community consists of two or more town sections. These housing facilities take care of approximately 5,000 workers and shelter a population of treble that number. By the end of this year the company will have spent nearly a million dollars in a three-year program for construction and repairs toward the improvement of living conditions. The division of expenditure is to be as follows: Streets and roads, $212,000; water supply, $137,000; garages, $90,000; sewage disposal, $146,000; house and street lighting, $144,000; painting of houses, $52,000 and new buildings, $135,000.

Improvements that are providing greater comfort, convenience and sanitation, also more pleasant surroundings, have been made within the houses. More than 2,500 workers of the 7,500 on the company's payroll live in their own homes or homes at points distant from the mine. They travel to and from work in their own automobiles. Thousands of dollars are being spent monthly for the repair and maintenance of houses, many of which until recently had been untenanted for a considerable period of time. All houses are wired for the use of electricity, as dealt with in greater detail elsewhere in this issue. Pure water is supplied to all villages. Several of the towns are served water direct from the lines of a commercial water company. The water used at Banning No. 1 is taken from the Youghiogheny River and treated in a company-owned filtration plant. At the remaining towns water is taken from wells and before being used is filtered and chlorinated where necessary. Sewage is being handled by septic tanks or by vaults without the septic-tank feature. Each house is provided with a substantial container for garbage which, together with rubbish and ashes, is collected regularly by the company. Sanitation inspections are made periodically. Problems pertaining to sanitation are handled by a sanitary engineer who is in the continuous employ of the company.

Steps have been taken to better the appearance of the towns. Box-car red is no longer used as a color in the painting of houses. Instead, houses are painted in combinations of three or four colors and all are trimmed. A few of the houses are single but the majority are double, of the semi-detached type, for each half consisting of four to five rooms. An average monthly rental of $2.33 per room is charged. The minimum ground allotment for a house or house section is 50x100 ft. Weeds are kept down, the mowing of lawns and the making of gardens are encouraged.

MANY garages have been erected recently, of sheet-iron construction, in groups of 5 to 20. These rent for $2.50 a month. The miners own good cars, quite a few of them fine ones, and demand garages. A Standard lead-clad wire fence has been adopted to set off the house lots.

Not many years ago few mining



C. A. McDowell

towns were readily accessible from the outside during the wet months because the roads leading to them were almost impassible. The Pittsburgh Coal Company is engaged in a road-improvement program which will enable the population of its towns to travel at any time of the year. The roads serving as streets are 16 ft. wide and those serving as alleys are 10 to 12 ft. wide. In three of the towns, streets are made of "red dog" or burnt clay, the product of a burnt-out gob pile. In the other towns the roads are built up of steel-mill slag and limestone. In either case the thickness of the roadbed is 12 in. From bottom to top the roadbed, when of rock and slag, consists of a layer of crushed slag, a layer of fine slag and a surface of crushed limestone. All roads are graded to sights and rolled. The cost of building roads of "red dog" in the one case and of rock and slag in the other has averaged 80c. and $1.35 per sq.yd., respectively. These costs are exclusive of any great amount of grading. All streets are sufficiently lighted for safe passage at night.

WASH OR "change houses," though not required by law in Pennsylvania, are being built. One at Crescent mine is nearing completion and appropriation has been made for another at Montour No. 10.

Administration of each town is in charge of the superintendent of the mine of which it is a part. Details of town-administration are handled by the outside superintendent. General office matters pertaining to town management come under the jurisdiction of the safety and personnel manager who also directs the following activities: Safety and safety investigations; mine inspection; employment and personnel; statistics covering accidents and employment records; vocational education; recreation; medical attention and health education.

The Pittsburgh Coal Company is devoting a great deal of attention to safety and is practicing it not perfunctorily as a benevolent measure, but in a decidedly practical sort of way. Its approach to safety follows three distinct channels: (1) Training of men in their jobs, or occupational training; (2) teaching of safety methods; and (3) establishing safe working conditions. The safety program is being carried out on the basis that a careful man is exposed to danger if man-made physical conditions do not redound to safety; also that safety training contributes to efficiency and occupational training to safety.

OCCUPATIONAL training, naturally, is delegated for the most part to plant officials. As conditions and procedures are somewhat varied as between mines, and as practices are gradually being changed by the introduction of new methods and equipment, the training of men for their jobs must be adjusted accordingly. In general, the best place for this training is "on the job" and the best teachers are the bosses. But for those who seek higher training a vocational course has been established. It is in charge of men experienced in this field.

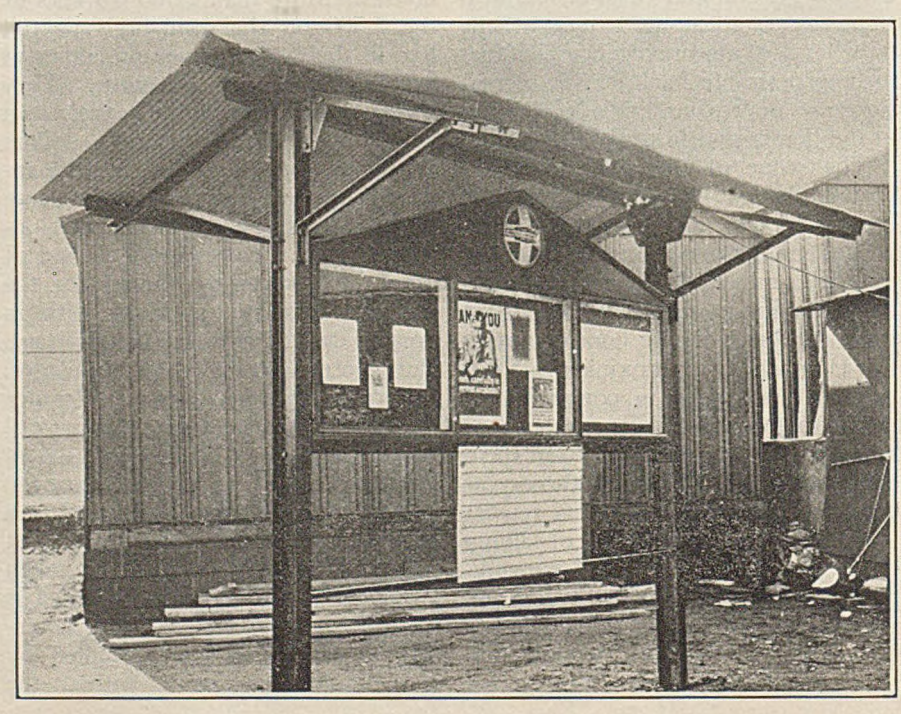
It is the aim of the company to train every employee in first-aid methods and at least ten per cent of them in the use of mine-rescue apparatus. First-aid is also being taught in the schools. Teams are being organized and trained in recovery operations. Two fully-equipped rescue stations are maintained at strategic points. A schedule has been developed covering procedure and use of equipment in the event of a mine fire or explosion. Mine-rescue and first-aid contests will be held each year and representation in state and international meets will be continued. First-aid and mine-rescue classes are being conducted with the co-operation of the U. S. Bureau of Mines. The work is in charge of R. D. Currie, formerly of this government bureau.

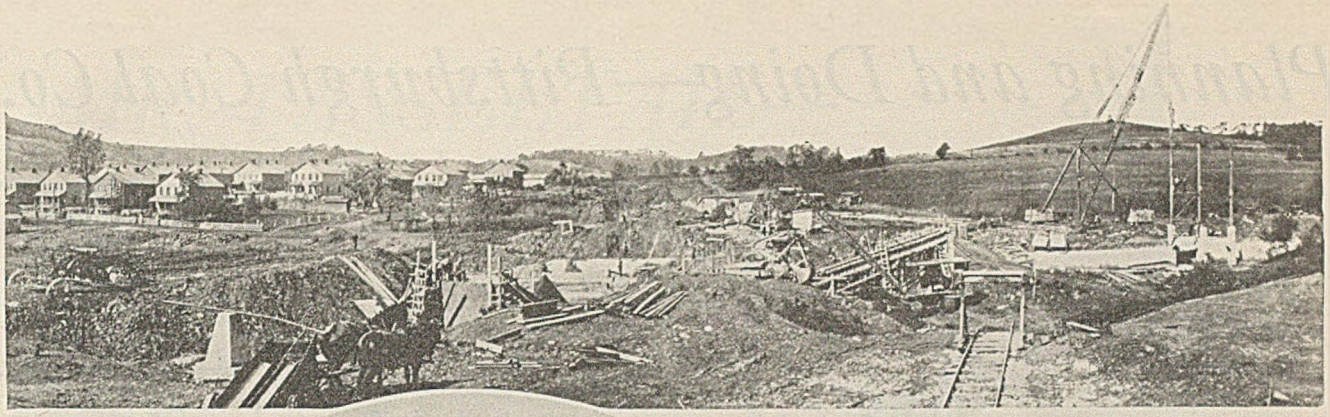
Upon completing the course in first-aid the employee is given a certificate and is presented with a pocket first-aid packet on which the company's insignia is lithographed. In this packet is an accident report card that is to be filled out as a record of the accident in which the packet was used. These records are filed with the company for compilation and future reference. Packet refills are kept at each mine office and are handed out in exchange for the filled-out report cards. The company is encouraging the use of these packets at the plant, in the home and on the street.

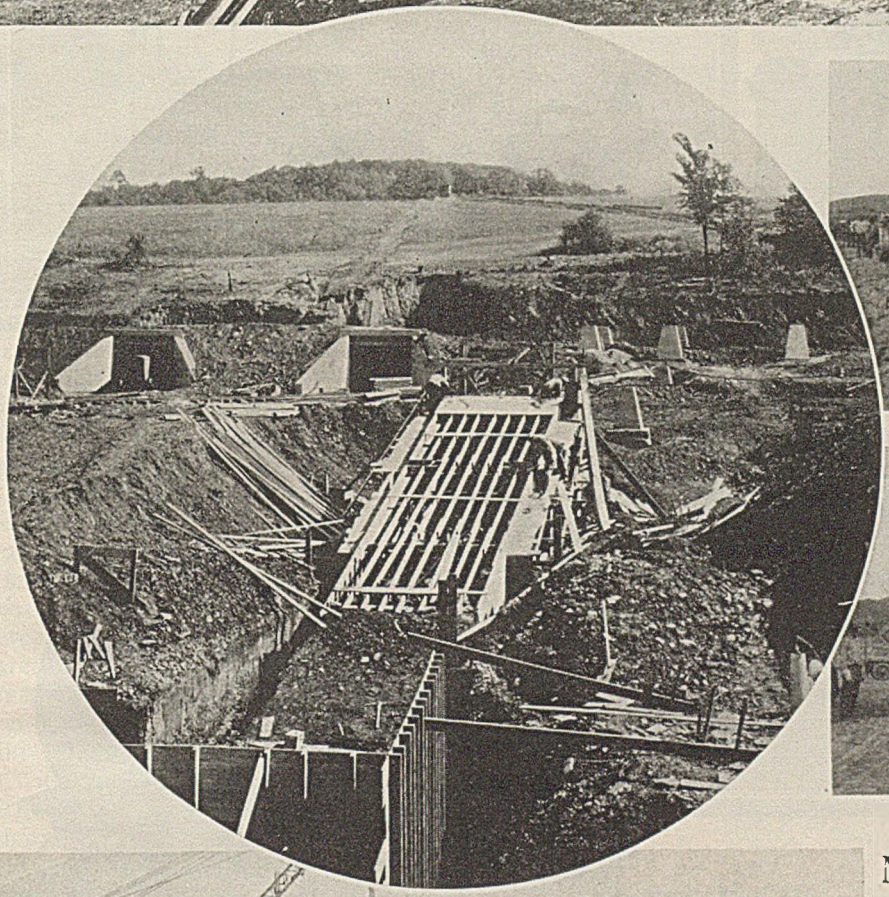
Mine safety meetings are held

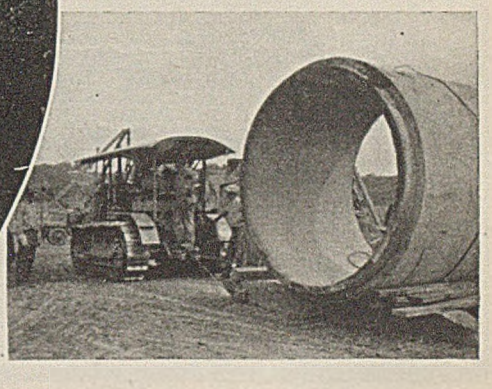
(Continued on page 286)

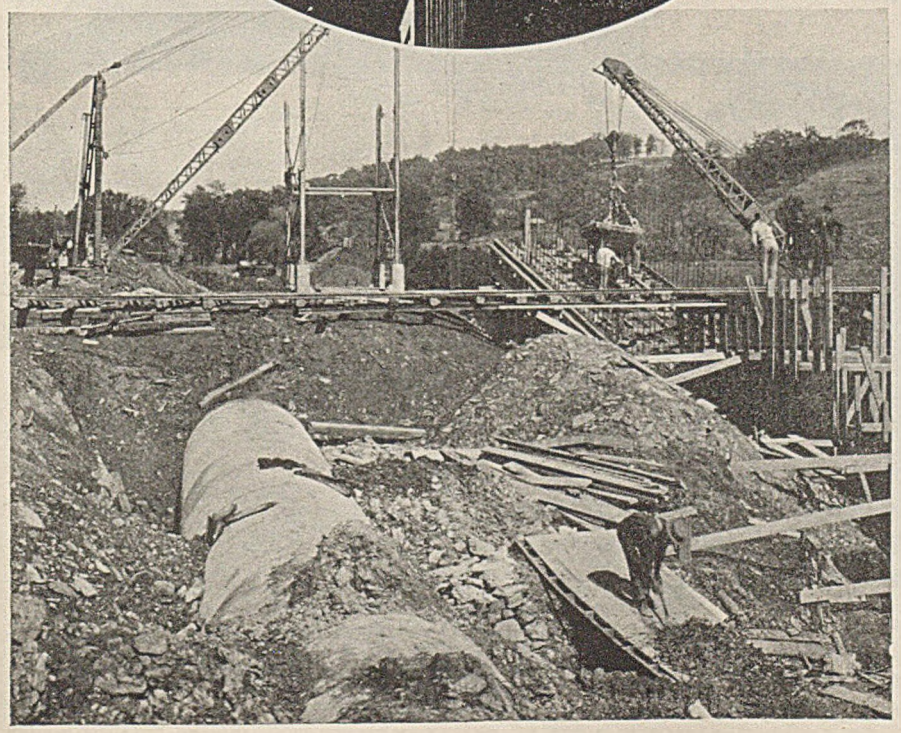
Sheltered Bulletins Encourage Reading in Inclement Weather









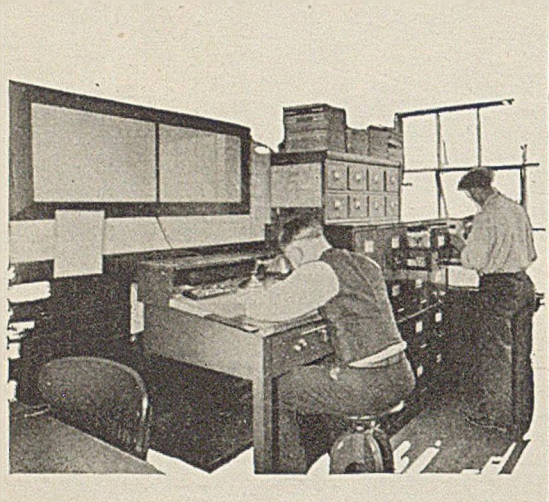


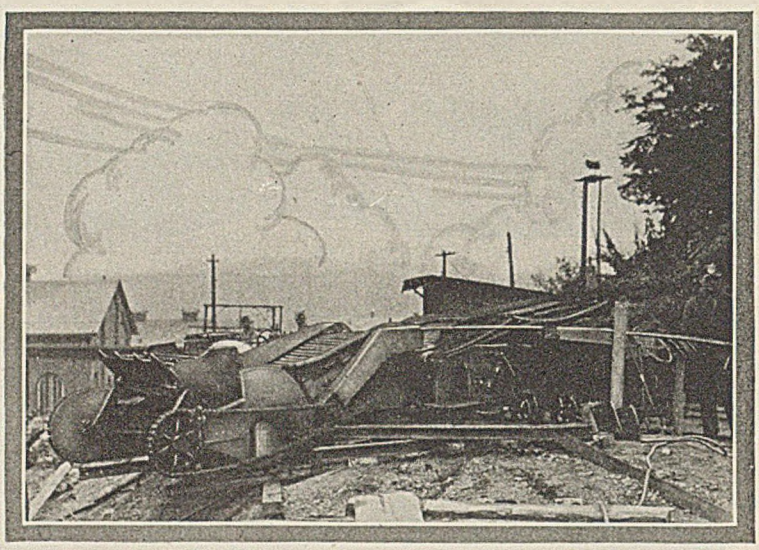
Midland No. 1 Modernized Under New Program

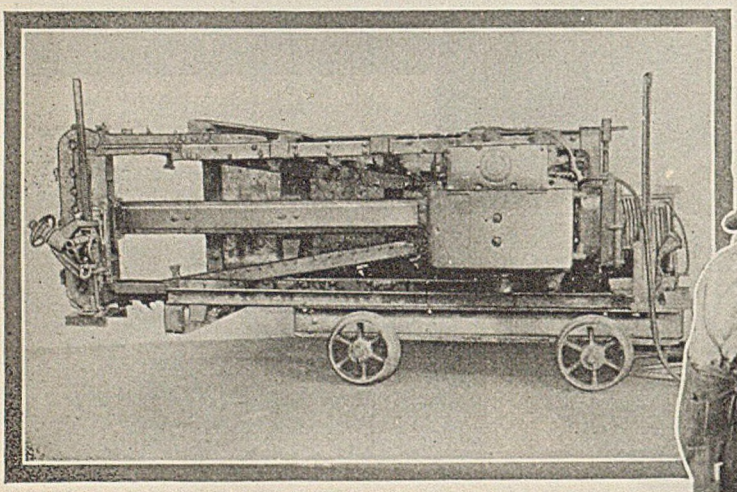
Typical of the nature and scope of the modernization program of the Pittsburgh Coal Company is the plant reconstruction work at Midland No. 1 mine. The coal-handling facilities under construction transfer coal from the mine cars to railroad cars for preparation in a central cleaning plant elsewhere. Coal and rock will be emptied from mine cars by one rotary dump unit.

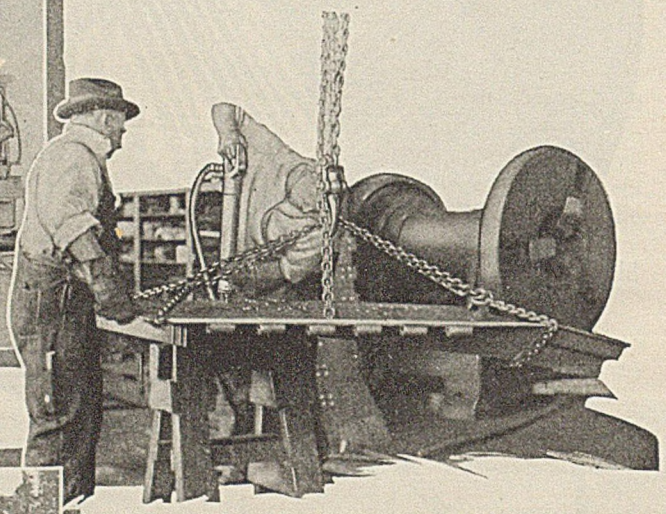
Another feature of the new plan is the provision for widening conveyors so that the capacity of the plant may be increased from 4,000 tons to 8,000 tons per day. A small conveyor is installed for the inspection of coal in individual mine cars for docking purposes. This small conveyor is fed from the rotary dump and carries the coal to daylight for inspection.

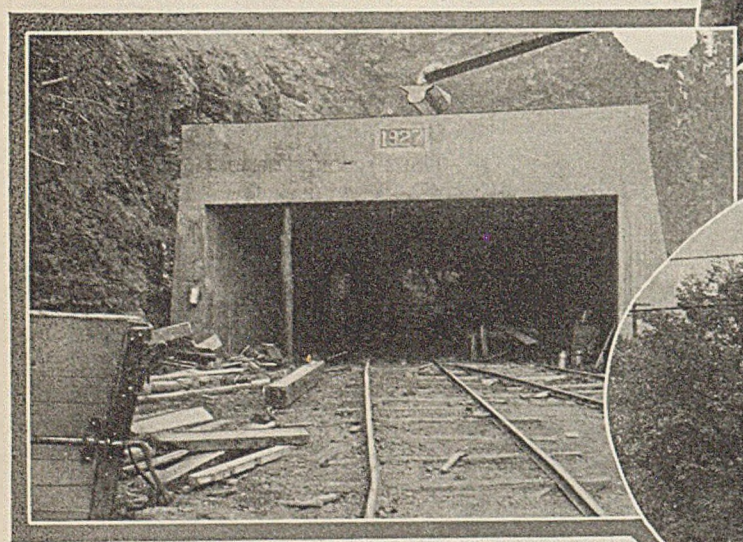
Planning and Doing—Pittsburgh Coal Co.

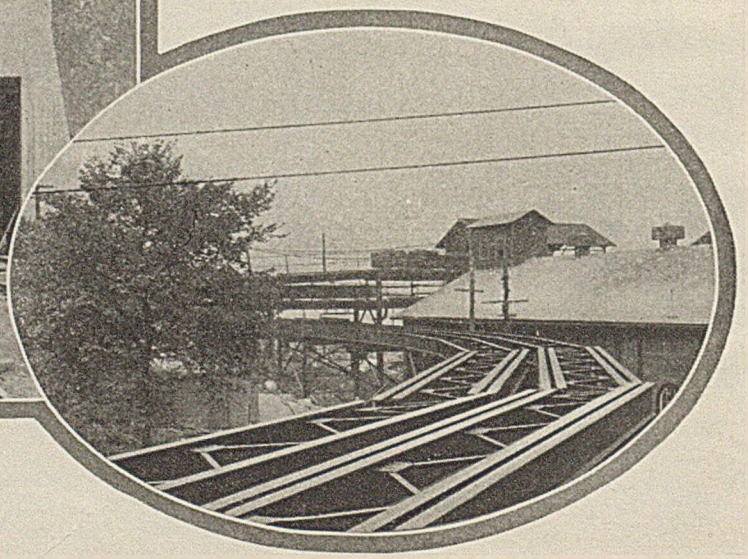












MR. TASSELTAIL—

Well Fed—Ready for Work

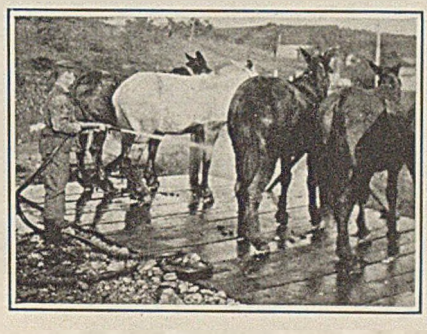
By C. G. Ailes

Livestock Agent,
Pittsburgh Coal Co.

SO FAR AS known, man has always kept and used domestic animals. The horse, the donkey, and their hybrid, the mule, have been his companions and servants from ages so remote as to be lost in the mists of antiquity. Yet, although man's association with these trusty servants long antedates the dawn of civilization, there are people today who apparently know next to nothing about caring for, handling and working these animals.

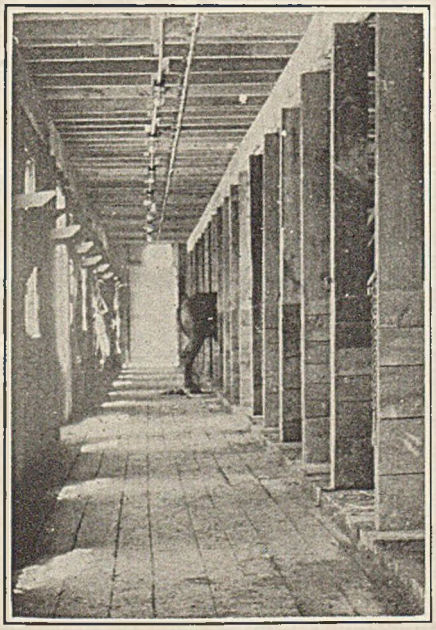
It is an old adage among mining men that in order to be a successful mule driver a man "must use more brains than the mule." Logical as this dictum obviously is, there are nevertheless many men who apparently do not, cannot or will not grasp its force. One other element that always crops up in any organization that owns and works horses or mules, and which must be reckoned with, is plain, ordinary ignorance on the part of employees.

Although this is admittedly an age of mechanization, an age wherein mechanical energy including electricity, is surely and steadily supplanting muscular exertion, the coal mines of the country are not yet fully mechanized. In many places today the mule or the horse is a more economical means for moving loaded cars within the mine than is the locomotive. This condition will doubtless continue to exist for many years to come and it is, in fact, somewhat doubtful if the mule can ever be totally eliminated. The mule and the horse will thus find a logical place in coal production for a long time.



A Cooling Shower After Work

Stables Are Light and Airy



In its various mines throughout western Pennsylvania, Pittsburgh Coal Company employs approximately 500 mules and horses. So far as possible these animals are of the low, short chunky type, better adapted to pulling heavy loads than to speed. The mules usually range from 12 to 15½ hands high at the withers and weigh from 800 to 1,200 lb. each. The horses are from 15 to 16½ hands in height and weigh from 1,300 to 1,500 lb.

That the mule has not passed out of the mine-haulage picture is evidenced by the experience of this company. Under certain conditions this animal furnishes a more economical means for gathering than does the locomotive. This is particularly true in retreat operations. As an instance of this kind, the Delmont mine in which mules are extensively employed, might be cited. This operation produces over 3,000 tons per day more than half of which comes from areas worked on the retreat. In the section of largest production, 21 drivers are employed. Here the average output per driver during the first eight working days of September was 116 tons exclusive of slate. The best driver averaged 215 tons of coal per shift and the poorest about 108. The car used at this mine is of only about 1.9 tons capacity.

A great military leader once made the statement than an army "fought on its stomach." By this he meant that troops that were properly fed could be depended upon to give a good account of themselves on the battlefield. Their morale, ability and endurance are all superior to those of poorly fed or half-starved, half-clothed men. Discipline, training and experience can only partially make up for deficiency in food, clothing or equipment.

What is true of men, in this respect, is equally true of mules. The animal that is well fed, well cared for and properly handled will do vastly more work than one that is poorly fed and abused. All of this is well known to the officials of most mining companies yet many such firms are inclined to slight the attention paid to the care of company livestock.

With Pittsburgh Coal Company, care of its animals is almost a department by itself, or as nearly so as are the mechanical and electrical departments with many companies. This department is headed by Mr. C. G. Ailes, a man whose official title is that of livestock buyer. As a matter of fact, however, the duties are far

more extensive than the title would indicate, for he not only buys all horses and mules for the company but he oversees their care and feeding as well. This is by no means an easy task, for although stable bosses can usually be secured who are experienced in the care of animals this cannot be said of the drivers. At best, many of these men are ignorant of mules and their ways, and inexperienced in their handling and care. In other words, they are men who are liable to unbuckle the checkpiece instead of the throat latch if they wish to remove the bridle or who may, in harnessing, get either collar or hames —or both—upside down.

Provisions taken by this company for the care of its live stock are well typified by the facilities previded at Campbell's Run. Here a new barn capable of holding a total of 51 head of stock was recently built. This stable is approximately 40x140 ft. in ground area. The stalls are single and about 5 ft. wide with one exception. This is a box stall in the southeast corner of the building.

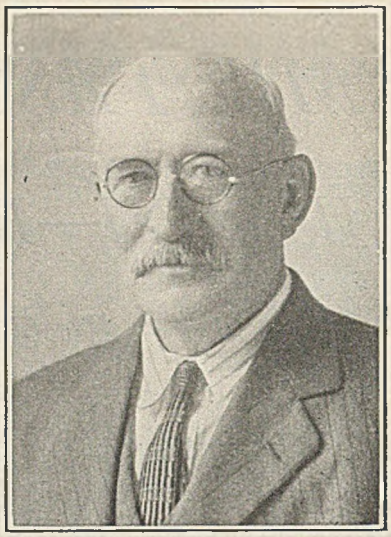
Taken as a unit this barn is of excellent construction and almost model plan. There are two rows of stalls, one upon either side facing a feeding alley in the center. This central alleyway is amply wide as are also the alleys behind the stalls. The barn is electrically lighted, all wiring being carried in conduit and a light is placed behind every second stall. In the rear of each stall is a wooden harness peg, bracket or hanger. This is amply strong and securely spiked to the studding. Each stall is labeled with the name of the animal that occupies it together with the number branded on his hoof. To the partition post of every fourth or fifth stall a collar scraper is chained. Manure and other refuse is removed by means of a trolley carrier running on an overhead track. This dumps at a point well outside the barn or where this material may be readily loaded up and hauled away.

The front of the mangers, the floor of the feeding alley and that of the hay loft are all made of matched yellow pine flooring. Baled hay is raised and swung into this loft by means of a rope and pulleys. Bins are provided in the loft for grain or "patent" feed. In addition to a generous hay ration, each animal receives daily—one feeding in the morning and one in the evening—about 12 lb. of prepared feed. This consists of cracked corn, oats, ground alfalfa, oil meal, molasses and salt. This makes a nearly balanced ration and one that goes a long way toward keeping all the stock well and healthy.

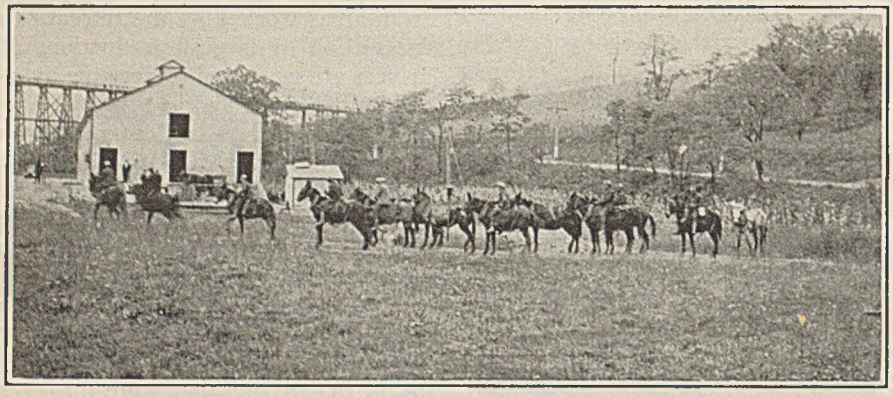
Hay-holes are provided in the loft floor at suitable points over the feeding alley. These are of course railed to prevent anyone from falling through. A stairway in the feed alley near the eastern end of the barn gives ready access to the loft. This is hinged at its upper end and counterweighted so that it may be easily raised or lowered.

A short distance in front of the barn is a large reinforced concrete watering trough, just beyond which is the "mule bath house." This latter is a platform upon which the mules are led and where mud, dirt, sweat and the like are washed off of them by means of a hose and nozzle. A man, after a hard day's work always feels better for a good bath. Why not a horse or mule?

In all of its dealings with its livestock Pittsburgh Coal Company tries to keep two things in mind. The first of these is the fact that if properly fed, cared for and handled, any mule is good for eight hours of honest, steady, hard work each day. The second is the far more obvious yet often forgotten fact that the neglect and abuse, or the savings resulting therefrom, that will kill one mule will not buy another. From any standpoint whatever, therefore, even one that is purely selfish and coldbloodedly commercial, it pays handsomely to take good care of the mine mule. In this company's operations a mule's average life is about four to five years as against two or three years in many mines.

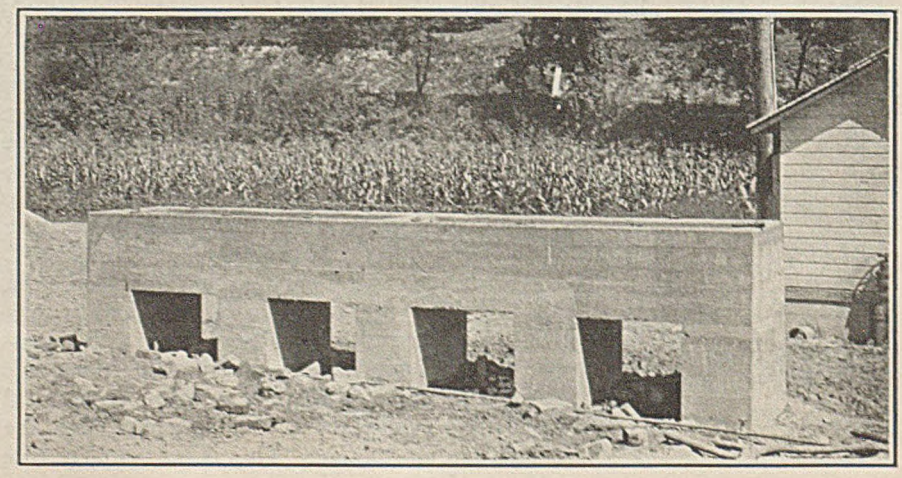


C. G. Ailes



A Rural Setting for a Highly-Organized Industry

Concrete Troughs Insure Clean Drinking Water



What Price

DRAWSLATE DISPOSAL?

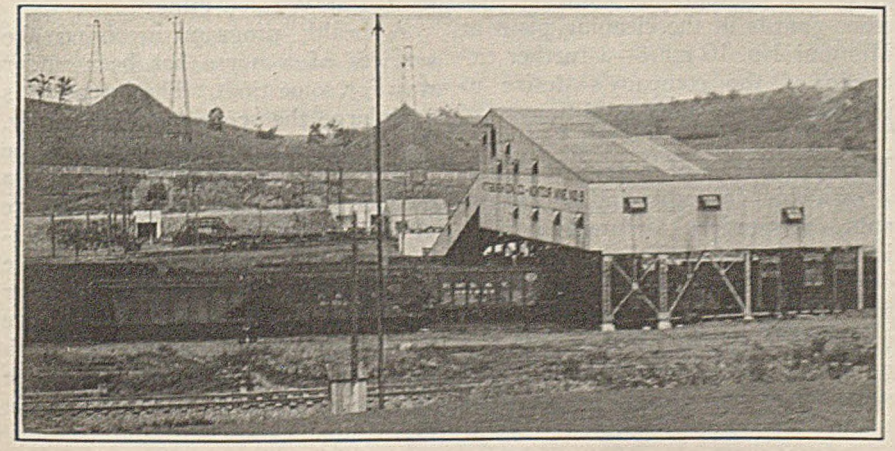
DISPOSAL of the drawslate, occurring over the coal in the mines of Pittsburgh Coal Company, entails a problem of appreciable magnitude. In rooms much of this material can, of course, be gobbed. In entries, however, inasmuch as the entire width of the passage must be left open, drawslate has to be disposed of in some other manner. The average thickness of this drawslate is about 12 in. and the entries represent from 10 to 30 per cent of the total area worked. As a result, a mine that produces a million tons of coal per year may be compelled to handle anywhere from 100,000 to 300,000 tons of rock. This must be hauled to the outside in mine cars and there disposed of in any one of numerous ways.

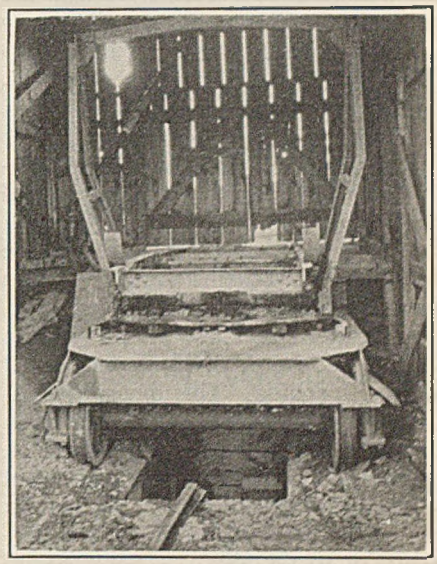
Several methods of slate disposal—each fitting a particular set of conditions—are now in use. Topographical features of the surface at the plant site and the quantity of material to be wasted are the primary considerations influencing the final choice of a disposal method. In the past excellent results have been secured by hauling the slate to the dump in mine cars which are there emptied by mechanical dumping devices. Generally, but not always, the use of a hoist is involved in schemes of this kind. Pittsburgh Coal Company leans strongly, however, toward slate disposal by means of aerial tramways. This is not because other methods have proved unsatisfactory within their intended scope but rather because they are inadequate for handling the large tonnages of refuse taken daily from the remodeled and enlarged mines. Wherever the distance and difference in elevation between the loading and discharge points are relatively great the aerial tramway has been chosen unhesitatingly even though its first cost was high.

Installations of this kind have been made at the Warden and Montour No. 9 mines, and work will soon be commenced on a similar tramway furnished by A. Leschen & Sons Rope Co., of St. Louis, Mo., at Montour No. 10. Except for a connection by track, this system will be entirely independent of the tipple and will not interfere in any way with the dumping of coal. Inasmuch as no human hand will be necessary to the operation of this tramway it might logically be termed "full automatic," even though stopping, starting and lubrication naturally will require human attention.

Upon entering the loading station of this tramway, the buckets will be unlatched automatically. They will then coast to an automatic stop or brake by which they will be released singly to one of four loading chutes, the doors of which will function mechanically allowing only a bucketfull of material to pass. By means of a relay circuit, each bucket will be released upon being filled and will gravitate to a latching device that will clamp it to the traction rope at a predetermined distance from the next preceding bucket.

Tipple and Aerial Refuse Tramway at Montour No. 9



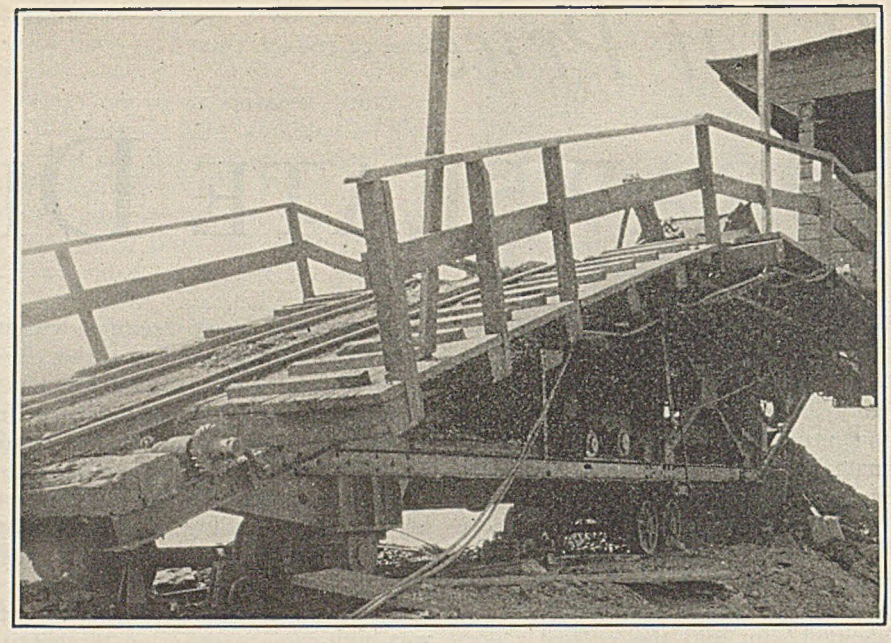


"Locotippler" at Champion Mine

WITH 26 buckets, of 21 cu.ft. capacity each, the system will be capable of handling 80 tons of slate per hour. As the needs of the mine increase this capacity can be raised to 125 tons by merely adding more buckets. The tramway will be 3,000 ft. long and suspended from seven towers. It will cross a highway and a railroad and the difference in elevation between the surface level at the loading point and the highest ground along the path of travel will be 197 ft. The traction rope will be actuated by a 50-hp. motor having a speed variation of 50 per cent. The cost of this installation, which was designed by Fred C. Carstarphen, consulting tramway engineer of Denver, Colo., will be about $40,000.

The Saxon dump, built by the Dempey-Degener Co. shown in one of the accompanying illustrations, is performing excellent service at several of this company's mines. A typical installation is that at Delmont. Trips of slate cars are hauled by locomotive from the slope mouth to the foot of the rock bank, a distance

of about 1,500 ft. The track extending up this bank is about 250 ft. long and the cars are pulled up it one at a time on a slope of about 25 deg. to the dump unit located at its upper extremity. Here the car is up-ended and the endgate raised by a motor-driven mechanism, thus allowing the slate to slide out and over the end of the dump. Two men and the part-time services of a locomotive crew are employed in this operation. As many as 184 cars of slate have been handled with this equipment in one 8-hr. shift.



Has Mechanically Dumped 184 Cars of Slate in One Shift

FOR WASTING moderate tonnages of refuse over a flat-crested bank, the Locotippler, manufactured by the Bloomsburg Locomotive Works, of Bloomsburg, Pa., has proved efficient at the Champion mine. Here cars of rock are pulled one at a time to the top of the bank and placed on this machine. This device is electrically propelled and consists of a balanced dump platform mounted on a turntable, which, in turn, rests upon a truck. By this means the car, in discharge, is tilted on end either forward or to the side.

The company has had occasion to use a 5-ton motor truck for transporting refuse from Banning No. 2 mine to a road fill. At the Arnold operation, also, a similar machine is employed for hauling slate to a ravine about ½ mile from the tipple. The success attained at both of these places indicates that the truck can be advantageously employed for wasting limited quantities of mine refuse. The fact that between times it possesses high utility for other purposes also renders its employment attractive and frequently necessary.

Safety and Housing at Pittsburgh

(Continued from page 280)

monthly at each plant for the discussion of accidents and their prevention. At these meetings, also, safety suggestions are acted upon. The company is a member of the National Safety Council and circulates the literature of this organization among its employees. Safety-slogan inserts are placed in each pay envelope. At each plant is hung a white flag, measuring 4 by 6 ft., on which appears in green letters the words "No Accident Today."

First-aid stations are being established in the several sections of each mine and will be re-located as necessary so that no working place will ever be more than 1,500 ft. away from one of them. The station is an opening in coal and is furnished with a wooden platform; electric lights; a cannister containing a stretcher, two blankets and a complete set of splints; also a first-aid cabinet. An up-to-date first-aid station is being installed outside, adjoining the mine foreman's office, at each plant.

A genuine desire on the part of this company to better physical conditions is demonstrated by its early adoption of rock-dusting on a large scale. A separate division, headed by an engineer, has been set up for rock-dusting. Entries are treated with rock-dust to the last breakthrough as they advance and two men are engaged for sampling and analyzing the dust. Reports and charts are made from their findings for reference and study. In mechanical mining, blowers and tubing are used, not as a primary agent of ventilation but merely for quickly removing smoke after shooting. Elsewhere in this issue is displayed a group of photographs showing machine-guards in the cleaning plant at Montour No. 10 mine—a further example of the company's desire to provide safe working conditions.

INSPECTION of mines is in charge of a chief inspector and two assistants. Inspections are made periodically and the findings recorded on designated forms, these being supplemented by reports. These provide a means of comparing conditions in one mine with those in another, all inspections being reported on the basis of predetermined standards.

The employment division is under the direction of an employment manager. Each applicant for employment is given an oral examination at the mine or in the employment office, when a card recording detailed information concerning him is made out. Turn-over charts are made up and analyzed.

A DIVISION has been created for the guiding of recreation activities covering sports and community functions. Two ball leagues have been established and winning teams receive appropriate trophies. A number of Boy Scout troops have been organized and a band has been started at Warden mine.

A health program involving the services of a nurse has been under way for some time. The intention is to enlarge the scope of this activity. The company reserves facilities in the Mercy Hospital, ably staffed by its own surgeons and nurses, for the care of injured men in its employ. A follow-up of injured employees is made by frequent visits to the hospital or home. Injured men on recovering are re-employed at occupations for which they are best fitted. This practice encourages loyalty and results in lower labor turnover.

Facts About the PITTSBURGH COAL COMPANY

By C. E. Lesher
Executive Vice-President
Pittsburgh Coal Co.

ORGANIZED IN 1899, the Pittsburgh Coal Company began operations in 1900, with a production of 17,825,660 tons. Making up the company were nearly all of the then active coal properties in the Pittsburgh District, other than those on the Monongahela River. Operations on the River were controlled by the Monongahela River Consolidated Coal and Coke Company, the River Company for short, which was consolidated with the old Pittsburgh Coal Company on January 1, 1916, to form the present company. The combined tonnage of both companies reached a record total of 24,707,204 tons in 1913.

Ten years later the grand total had shrunk to 13,915,588, with 12,521,575 tons of Pennsylvania output. In 1924 but 8,447,193 tons were mined, and by the spring of 1925 all its mines except one in Kentucky and one in Pennsylvania had ceased to operate. These two mines were working open shop.

Two factors accounted for this loss of markets and business, viz., war-time changes in freight rates on coal which gave competing fields decisive advantages in great market areas, and the enforced continuance of an uneconomic war-time wage scale in the mines which were operated under the domination of the miners' union.

In August, 1925, at the urgent request of former employees, the company began operating its Pennsylvania mines at a reduced wage scale under non-union conditions of operation. This movement has steadily gathered headway, until in the first week of October, 1927, the output of the Pennsylvania properties was 186,000 tons, or an average of 31,000 tons per day, and the production of all mines, including those in Ohio and Kentucky, totaled 209,602 tons for that week, or at a rate in excess of 10,000,000 tons per year.

With other coal producers of Western Pennsylvania this company has engaged in aggressive action to obtain more equitable rates on coal from this field. The Interstate Commerce Commission has recognized the justice of these complaints and has recently ordered changes in certain rates, which we hope marks the beginning of a proper readjustment of coal freight rates from the Western Pennsylvania District.

In the early days a large coal business was done down the Ohio and Mississippi Rivers as far south as New Orleans. In 1913 more than 3,000,000 tons were sent from the mines to these southern markets. Because of changes in rail freight rates, giving the lower river markets to Alabama and Southern West Virginia, the Pittsburgh district as a whole practically had withdrawn from this trade by 1916. Extensive river trade is now enjoyed as far down the Ohio as Wheeling and vicinity.

Between 1913 and 1918, after the extension of the Montour Railroad from Imperial, Pa., to connect with the Union Railroad at Mifflin Junction, the "Montour" mines were opened up; six mines in all. Since the war and until the present large reconstruction program was entered upon early in 1925, no new large properties were developed, except the Pike-Floyd mine in Kentucky.

THE CONSTRUCTION and reorganization program outlined in this issue of *Coal Age* covers those projects already completed or under construction. Plans are being actively prepared for other new large projects, such as will put this company definitely in the forefront as a large-scale producer of bituminous coal with the latest in preparation, mechanical cleaning and sales organization.

Some idea of the progress already attained toward this goal is indicated by the statistics that follow covering production, man power, and expenditures for new plants and equipment:

Present (October, 1927) daily output—Pennsylvania, 31,000 tons.

Present (October, 1927) daily output—Ohio and Kentucky, 4,000 tons.

Production January 1, to October 31, 1927—7,084,000 tons as compared with 7,585,000 tons in the same period of 1924, the last year of union operation.

Capital expenditures, 1925-1927 to date:

Outside mine plants	$3,295,000
Inside mine plants	1,872,000
Machinery and Equipment	1,607,000
Towns	934,000
Total	$7,708,000

The number of mines in operation are: 19 in Pennsylvania, 3 in Ohio and 1 in Kentucky. There are 10 idle mines in Pennsylvania and 4 in Ohio.

All operations in Pennsylvania are in the Pittsburgh bed; in Ohio in bed 8-A in the Pomeroy field; the No. 8 bed in eastern Ohio; and Elkhorn No. 3 in eastern Kentucky. All the coal produced is a high-volatile bituminous coal; used for gas, byproduct, and metallurgical purposes, for burning ceramics, for railroad, domestic and steam fuel.

The company has gross assets, as of January 1, 1927, of $156,518,240; it has 171,000 acres of unmined coal, mainly in the Pittsburgh district; its total production from 1900 to date has been 469,610,000 tons.

To house its mine workers the company has 3,580 houses in Pennsylvania, 491 in Ohio and 222 in Kentucky. It has now on its payrolls in the Pittsburgh district 8,900 men, as compared with 11,000 at the end of 1924.

The average power consumption at its mines is 4,245,000 kw.-hr. per month. Since 1913, when electrification of its mines was begun on a large scale, the power consumed has been nearly 400 million kw.-hr.

To reach its customers and market its product the company, through subsidiary companies, the Pittsburgh Coal Company of Wisconsin, the Milwaukee-Western Fuel Company, and others, has 29 coal docks on Lake Superior and Lake Michigan with a combined storage capacity of 4,320,000 tons of bituminous coal and 718,000 tons of anthracite; has two vessel fueling docks on the Lakes with a capacity of 37,000 tons, and operates three fueling lighters on Lake Erie. On the upper Ohio River the company operates a fleet of 4 steam tow boats and 70 steel barges.

IN THE EAST, sales agencies are maintained in Detroit, Cleveland, Columbus, Youngstown, Erie, Buffalo, Utica, New York City, Toronto, Ont., with the headquarters of the company and sales department in Pittsburgh. In the Northwest and on the Lakes, the Wisconsin Company has sales offices in Duluth, Minneapolis, St. Paul and Superior. Sales offices are also maintained at Sandwich, Ont., and Saulte Ste. Marie, Mich. The Milwaukee-Western Fuel Company has its headquarters at Milwaukee.

In the mines of this company in Pennsylvania are found the following major items of equipment: 215 locomotives; 246 mining machines; 520 pumps; 16,000 electric cap lamps; 75 fans; 14,000 mine cars; 40 substations; and 250 miles of main haulage track.

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

JOHN M. CARMODY, *Editor*

NEW YORK, NOVEMBER, 1927

Has the Rockefeller Plan Failed in Colorado?

Operators interested in labor relations, particularly those working non-union, will do well to keep a weather eye on Colorado. In its issue of September 8 *Coal Age News* predicted the strike that has now been called by the I. W. W. The U. M. W. of A., with only a skeleton organization in Colorado, has had no part in this action. In concert with state officers of the Colorado Federation of Labor it has consistently opposed this strike. Operators and state officials have labored during the past two months to prevent it.

All to no avail. Neither their efforts, nor the Rockefeller plan, nor wage increases granted since strike agitation started, acted as a barrier. The movement lies deep in the hearts of thousands of workers and has spread rapidly. It may not succeed. Nevertheless repercussions may be felt in far away fields. It appears to be another case where union strength has been broken only to be succeeded by mass organization enlisting the loyalty of men and women alike.

Pittsburgh Coal Company's Reorganization Plans

Reorganization on a scale hitherto unknown in the coal mining industry has put the Pittsburgh Coal Company in the spotlight. With extensive properties and a production that reached 24 million tons in 1913, the company mined only 8½ million tons in 1924. Large losses that year were succeeded by a net operating loss of $1,226,940 in 1925. Many organizations would have been discouraged. Not so the Pittsburgh Coal Company. The situation acted as a challenge for the future. An intensive survey of their properties and their marketing possibilities led to plans for modernization described in the preceding pages of this issue.

Capital expenditures of $7,700,000 during 1925-1927 for mine development, preparation plants, machinery, equipment and town improvement tells a dramatic story of performance against plans. It has taken vision, courage and intelligent application on the part of executives and faith and patience on the part of stockholders. Not the least of the problems has been the change from union to non-union operation. Labor turnover, incident to this new policy, made it necessary that this gigantic program be carried out without the usual quota of miners accustomed to the peculiarities of the Pittsburgh seam.

Much yet remains to be done. Plans, based upon thoroughgoing engineering studies, call for additional expenditures. The trend is toward effective mechanization. The aim is larger units both in underground operations and cleaning plants. Scientific management, already well established in many other industries, is getting its first real trial in the coal mining industry. Research has found a home here. Throughout the organization there is a spirit of enterprise that presages ultimate success.

Research, Not Rhetoric, Hope of Anthracite

When the mists of oratory have cleared away in the anthracite region, it will be discovered that the microscope is more powerful than the megaphone. Football games are won or lost not by colorful cheer leaders but on the training field where, under the relentless drive of the coach, fundamentals are learned or not as the case may be. So in business the hard-boiled approach of the future will be through the laboratory. Science, research and applied engineering, rather than eloquence, will exhaust the latent possibilities of basic products and develop effective market penetration.

Friends of anthracite are encouraged to believe that the time is ripe for something more than gracious words about the banquet table, however well meant. The rock-bottom problem is one of quality and price and convenience. It is well to understand that in this matter-of-fact world no head of a family, in Detroit for instance, thinking of his winter fuel gives a sentimental rap whether his money goes to support a coal miner, an oil driller, or a coke puller. He doesn't think of them any more than they think of him when they trade in their old auto for a new one. All of them—consumers here, there and elsewhere over this broad land—think of themselves first. They want comfort and freedom from drudgery of all sorts. And this must not cost too much.

Research in anthracite—serious research—will find ways to improve quality, reduce price and devise and market firing appliances that will meet the consumers' idea of what he should get for his dollar. When this is done, sentimental appeals for business will be quite as unnecessary as they are undesirable in our modern economic life.

A Prize Editorial

SERVICE to business is the corner-stone of industrial publishing. In this busy age when the genius of mankind, at work over wide areas, produces ideas and methods so rapidly, the executive can no longer depend entirely on his own resources, the printed page must serve him. New developments are quickly and accurately brought to him in his trade paper. Thought is stimulated into action.

With this in mind the Associated Business Papers, Inc., embracing leading trade journals in many fields, last October offered a prize of $500 for the best editorial appearing between June 30, 1926, and June 30, 1927, judged for clearness of style, sound reasoning and power to influence.

Eighty-three editorials were entered. By unanimous decision the judges awarded the prize to Sydney A. Hale, associate editor of Coal Age, and managing editor of Coal Age News, for his editorial "No More Panaceas," wich appeared in Coal Age, July 15, 1926.

Coal Age takes pleasure in reprinting Mr. Hale's editorial, which we feel reflects the thought and judgment of the bituminous coal industry.

No More Panaceas

NO "SICK" industry has had more practitioners eager to prescribe for its ills than the bituminous coal business in the past decade. Some of the remedies proposed have had real merit; a few were lethal. For the most part, however, the virtues of the beneficial have been argued with more zeal than discretion. Apparently fearful that they might not win attention by claiming too little for their prescriptions, enthusiasts have dulled interest and sharpened opposition by claiming too much. Simple tonics have been presented in the wrappings of panaceas to an industry fed up on cure-alls.

Although the coal trade has shown no disposition to swallow any of the remedies offered, the psychological effect of the constant clamor for a strong and speedy cure has been bad. Too many operators and too many critics of the industry still are waiting for the catholicon which will relieve coal mining of all its ailments over night. The obvious, the prosaic things which must be done if there is to be a permanent rehabilitation are ignored because they are so simple of statement—and so difficult of accomplishment.

The fundamental problem of the bituminous coal industry today is the distribution of its product at a price which will be fair to the consumer and which will yield a reasonable profit to the producer. Strip that problem of all its complexities and the ultimate solution rests with the individual operator. He can solve that problem to his own satisfaction and to his own financial well-being if he knows accurately his costs of operation and refuses to be inveigled or stampeded into selling his coal at a price which will not cover those costs and yield a reasonable profit.

Of course, the stock objection to so simple an answer is: "I must meet my competitor's price or lose the business. I know my competitor is selling below cost, but I've got to meet his price." But must you? Is it necessary to keep mining at a loss for no other reason than the fear that, if you don't, the other fellow will? Is capacity production at a net loss more desirable than sixty or eighty per cent output at a profit? If one operator wastes his capital assets, must every other producer match him in folly?

There is only one way to make money in business. That way is to sell the product produced at a profit. The fact that there are bituminous operators today who are making a profit proves that knowledge and self-restraint are not without their rewards. It takes courage to resist the temptation to shade a nickel or a dime on the order that is slipping away. Nevertheless there are companies in highly competitive soft-coal districts that have displayed that courage year in and year out. True they have not flooded the market with coal—and they have not been drowned in red ink.

When the industry as a whole gives greater heed to the obvious way out of its difficulties, it will be in a better position to appraise at their real value the various plans put forth to improve the bituminous coal trade.

When the industry holds fast to the fundamental law of profitable operation, it can accept and utilize the good features of every scheme which incorporates any beneficial germ and reject the impractical phases of such plans.

But there is no substitute for individual responsibility and no hope of effective cooperation without it.

The BOSSES *Talk it Over*

Can a Standardized Mine Layout Be Adhered To?

"SAY, Jim, reading in last month's issue about modifying the layout of workings to meet changing conditions in a mine, reminds me that we have a little problem of our own along the same lines. Down in the Swamps we're getting under heavier cover and I'm beginning to see signs of trouble. It's not serious yet, but it will be later if we don't do something. Down there, I noticed that cuts are beginning to set down on the bottom before they are shot, the timbers take weight early and we are handling more gob than is customary. I consider these things advance indications of increasing weight. Looks as though our rooms are too wide and the pillars too lean to carry the weight that comes on them."

"You mean, Mac, that you favor modification of the width, length and centers of rooms to match changing conditions?"

"Exactly, Jim. I instructed Dave, who bosses that section, to stop work in alternate rooms and to narrow down the rooms still working. I want permission to change the projection in the solid coal."

"I'm glad you brought the matter up now, Jim, as I am going to the city office this afternoon. I'll try to have the Old Gent and the chief engineer come out in the morning to make an inspection. Offhand, they will start some tall kicking. They like to stick close to standards in everything. I do myself."

"But look here, Jim—you can't hold mine layout to exact standards unless you work throughout the mine a system that is suitable for the worst conditions. We're just beginning to get under heavy cover and our present system was planned for light cover. I see no objection to a modification if it is adhered to throughout a section. The boss of the section won't have any trouble in enforcing the rules. If we don't change, our timber cost will go way up and we'll probably have to squeeze, too."

Is standardization of mine layout advisable?

If modifications are made, should they be gradual or abrupt?

Operating men get a kick out of these problems.
Replies come from all mining states.
Letters accepted will be paid for.

Mining Men Answer Jim and Charley

Extra Compensation for Hard Workings

I AGREE with Mac on his policy of handling the situation where dirty coal is concerned. I do not favor the bon· system. The varying conditions found throughout the mine, which will not permit its being adapted with fairness to all, will result in dissension among the men.

The best policy to prevent the loading of dirty coal is to find out who is responsible for the loading and then let the assistant foreman and loader know that you know it. If it is then a case of wilful neglect on their part they can only be given a reasonable chance to make good. Another suggestion is extra compensation for loading work where the loading of clean coal is particularly hard. The rate of compensation for loading could be arranged so that the total earnings of a miner working in a hard place would about equal the earnings of those working in locations where clean-coal-loading is easy—even though the amount of coal loaded be less for the man working in the difficult locality.

The penalty system is far better than the bonus system for several reasons. First of all, every man has to be careful at all times if he is to escape a penalty. On the other hand, if he doesn't see a chance of making the bonus he is a little more careless than he would be on the penalty system.

A face preparation inspector is sometimes really helpful. Most of the time, however, it would be better to put on an extra assistant boss, if the assistants and foreman have more than they can do. Such an extra assistant should be held responsible for various detailed duties just as if he were in charge of a small mine and were the only foreman on the job.

A foreman or an executive working for a small salary is not always a "cheap" man. Usually the low-salaried man has been found to be the costliest in the long run.

H. T. WALTON

Wolfpit, Ky.

Clean Coal Depends on Face Preparation Methods

IN MY opinion preparation of coal should start at the face. Up to the present time the majority of screening plants on the surface merely size the coal, and the extraction of the impurities is left entirely up to the human element.

Some operating men think that the cleaning of coal starts with the loader, but I think differently inasmuch as there are several important operations to perform before the loader can load the coal. The cutting and blasting of the coal being the important preliminary operations.

There has never been any one feature of mining so much abused as blasting. I would venture to say that a man can enter 75 per cent of the mines operating in the United States today, ask the mine foreman or face bosses such questions as these: "How much powder do you use per hole in room work or entry work? How far from the roof and rib do you have the holes drilled? How much stemming do you use per hole? Is your stemming of non-combustible material? In your machine mines are the machine cuttings absolutely all cleaned out of the kerf before blasting is permitted? What quantity of coal are you getting per pound of explosive used? What are the diameters of the drill holes? Are they drilled to back of cut?" It is doubtful that they could answer these questions intelligently. Yet a miner cannot be expected to load clean coal if it is blasted wrong.

For instance, a loader cannot be made to clean the sulphur or dirty band out of his coal if the coal is blasted so hard that the dirt or sulphur will go through a 2-in. screen. Nor can a perfectly blasted coal be secured in blasting after a cutting machine that has a 7½-ft. cutter bar for a seam of 4-ft. thickness.

It just isn't being done, but still, some superintendents buy a cutting machine with the longest cutter bar that they can get. "Maximum tonnage per machine" is their rule and then when the percentage of lump coal from such machines is low or the coal is coming out dirty they will call the mine foreman into the office and tell him to get cleaner coal and more lump coal. Lump coal is clean coal. Therefore, if the percentage of lump coal is high so will the percentage of clean coal be high.

I AGREE with Mac's views for getting clean coal loaded in some instances. But as for penalizing the loaders I am of the opinion that you may fine a loader 50c., 75c. or even a $1, tell him you have done so, put it on his statement and deduct it from his pay check, and the majority of them will not even pay any attention to it, never miss it or never complain.

I think discharging is the most effective course of action of any. In union fields, naturally, it is hard to apply. I have had the experience of having coal coming over the screen in a deplorable condition, full of sulphur and other impurities. By discharging one or two loaders the next day the coal would come out much cleaner. Cars should be searched separately, say every twenty-fifth car, and on the first two offenses talk to the man about it. Then, if he persists in loading dirty coal, discharge him.

The face preparation inspector is all right. In this discussion, a mine foreman or a face boss resembles an old hen raising a bunch of chickens. You can give an old hen double the amount of chickens to care for that she should have and she will go right ahead and scratch for all of them, but if you are not careful when she goes to cover the chickens at night there will be some of them left out. So it is with mine foremen and face bosses. If you put too much on them, some of the items are going to be slighted. But in an organization that has adopted the method of specializing in such items as preparation, haulage, drainage, etc., it should be well managed to keep out that old evil of "passing the buck."

THERE ARE several means of determining whether a loader is endeavoring to load clean coal while you are in his working place, but in my opinion there are but two sure means of knowing. First, notice the impurities he throws back in his working place as all he takes out of the coal is there. Second, enter his place unexpectedly while he is loading, and inspect what coal he has in the car.

In some mines occur what are known to the miner as "horse backs"; to the engineer, "faults" or "erosions." Approaching and leaving the faults, the coal directly adjacent as a rule is contaminated with sulphur or dirt. Also, where there are falls of roof slate occurring on a freshly-shot room of coal, the loader or company man beats it up into small enough pieces to readily handle it, but in breaking it up the fine pieces sift down through the coal. In such cases as these, the face boss or face inspector should have some off-quality checks, to give to the loader. When the loader checks a car of O. Q. it should be pulled to some side track and kept until there is enough of it accumulated, and then dump it to your own power plant in a run-of-mine condition.

In closing I wish to state that I think the greatest movement to be made to better the preparation of the coal by some of the operators is for the operator to assume the responsibility of blasting the coal, taking it out of the individual loaders hand. It calls for closer supervision but it pays dividends inasmuch as it makes a better grade of coal, is safer to the miner and operator's plant and saves explosives.

VAN B. STITH

Mogg, Ky.

Good Working Conditions Best Way to Get Clean Coal

MAC seems to have trouble with his men in loading dirty coal. Many others have the same difficulty. One way to overcome this is to provide the miners with proper ventilation so that when a miner shoots his coal down he will have to wait a half day before the smoke clears away so that he can see what he is loading. If the mine is a wet one, provisions should be made to have the water pumped out. Otherwise if the men have to be made to

Topic for December

Can—
EQUIPMENT BREAKDOWNS
be prevented by
Inspection?

Will the saving pay cost of inspection?

What is the best plan for keeping equipment in first class running order?

load in water that is sometimes up to 8 in. deep they cannot be blamed for loading dirty coal. There are sections in every mine, where the coal is cleaner than in others. By paying bonuses for loading clean coal, the man in the clean section would get the credit, besides not having to watch so closely for dirt. They are able to load more per shift than a man working in the dirty section. It would be far better to pay the men extra in the dirty section for cleaning the coal, than to pay a bonus. The next thing is proper supervision. When a company gives the assistant foreman a section so large that it takes him from six to seven hours to visit each working place once a day, he cannot keep close watch over his men. He has duties to perform to comply with the law besides visiting working places. Each assistant should have a section only large enough to enable him to visit at least two-thirds of his places twice a day. In that case a coal inspector would not be necessary, as it is very seldom that the coal inspector and assistants work together. It is better to have one boss on the section than two. You often hear miners say there are too many bosses, and moreover say it not unjustly. When a man is marked for dirty coal two days in succession, the foreman should go to that man's place and explain to him why it is better for him and the company that he load clean coal. The result is frequently very surprising, provided the mine foreman comes in like a lamb rather than like a lion.

What a mine foreman or assistant mine foreman should do is to get the good will of the men. The men will do more for a foreman they like than for one they don't like, even in the matter of loading coal.

JOHN BOHN

Hooversville, Pa.

Firing and Hiring Costly; Educate Your Men

MAC SUGGESTS an easy way to get rid of a dirty coal loader but in a union field a man can't be fired. Nor would it be fair to do so in many cases. Where men work double in wide rooms or entries, both loading in the same car, it would be an easy matter for one to load a dock on the other and by Mac's system get him fined.

As to a face preparation inspector we may be getting the red tape idea. Find a man to do a job, and one to watch him do it and one to see that he watches him do it. I do not think any man ought to receive a bonus for doing what he is paid for doing.

We have a penalty system for the first dock of fifty cents. For the second dock, seventy-five cents, and for each subsequent dock in the same pay, two days lay-off. This is not a bad system, although it does not always work out satisfactorily but union officials have given co-operation on dispute-questions arising over docking of dirty coal loading.

If you have a twenty foot picking table and two men picking, don't put in a forty foot picking table unless you are going to use at least two more men. It is better to leave the twenty foot table in and use four men for you will get better results.

Create a habit of loading clean coal and you can get clean coal. The men are not entirely to blame for loading dirty coal. A good market, high price and a shortage of coal, in the past have caused the management to slacken its vigilance. In a few days the men are wise and they in turn ease up, until one day when the demand slackens off. Clean coal loading must be made an every day habit and not put off and on like an old shoe.

Squaring the turn is another thing that causes the loading of dirty coal. This is a fair clause of contract but is absurd to both parties. The men set a limit on the number of cars they will load, until a section of the mine which is behind them catches up. This makes the management give the low turn section cars faster than they can load them, and in the scramble, lots of dirty coal is loaded. I think that in case of a man being docked when he can show the management that he is working under unusual conditions, that he should be given special consideration and refunded the dock. If you fire a man, you have to hire another, so why not educate the one you already have? It may be cheaper in the long run.

THOMAS JAMES

Vincennes, Ind.

Face Preparation Inspector Will Insure Clean Coal

A FACE preparation inspector is a great help in getting the coal cleaned, as he can go to the miner's working at any time when he is loading and inspect the coal that has already been loaded in the car. His inspection trips should never be regular, but should be very irregular. He and the foreman could aid materially in getting the men to clean the coal by favoring those that load clean coal and pointing them out to others as good examples.

If the face inspector is an experienced man—as he should be—he can tell which men are cleaning the coal as they load it by the amount of impurities he finds.

The dumper should be instructed to look for impurities as the coal runs out of the car and if he finds it containing an appreciable amount he should order it docked for picking. This should then be put aside and when the man responsible for the loading comes from work he may see the result of his carelessness. The miner could be shown how dirty coal causes loss of orders and consequently shutdowns and lack of work.

I am in favor of the bonus system and believe in penalizing those that load dirty coal. Moreover, anyone getting as many as three "docks" during a pay period of fifteen days should be discharged.

C. E. LIVELY

Vivian, W. Va.

Penalty System Effective Against Dirty Coal Loaders

IN ORDER to secure the best results in producing clean coal for the market, the management of the mine in question must function in harmony.

The contract between the miners and operators clearly states that merchantable coal free from impurities must be loaded from the mine. It is then necessary for the management of the mine to enforce the contract in the most feasible manner.

While in the penalty system a miner is scarcely ever discharged until after the dirty coal is inspected in the tipple or on the surface, yet the section boss can wield a constructive influence in the loading of clean coal by his daily inspection of the working places in the mine together with the percentage of goaf not loaded.

The system used in a large producing center of the United States to secure the loading of clean coal is: First, mines that hoist one car in a hoisting period, allot a certain per cent of the working time for docking and during this period the coal is inspected by a dock boss who either imposes a fine specified in the contract or in an aggravated case recommends discharge of the person loading such coal; second, mines using the skip hoist where more than one car is hoisted at a time either use the skip for hoisting single cars at one hoist for a certain period of docking, or other means is provided, such as hoisting single mine cars at the air shaft for the purpose of docking, which is a very good arrangement as it does not interfere with the maximum output of the mine, and a large per cent of the daily tonnage can be handled in this manner by using a mechanical dumping and conveying system.

The coal cars used for inspection and docking are selected in such manner so that an average representation of coal will be secured of each working place in the mine.

This penalty system has proven very successful in the work of loading of clean coal. In large operations where the section bosses have large sections to visit they would be greatly assisted by the use of a face coal inspector who should be a practical miner. One who is able to instruct the miners in the proper handling and use of explosives so that the coal would be blasted down with a minimum amount of fine coal. This condition should secure the largest per cent possible of lump and graded coal which generally demands a higher price in the market, and the gain in the merchantable price of the coal should naturally pay a margin over the wages of a good face coal inspector.

F. F. GREEN

Christopher, Ill.

Pay Docks and Picking Tables Guarantee Clean Coal

THE conversation on coal preparation between Jim and the superintendent, Charley the tipple boss, and Mac the mine foreman, recalls an experience of some years ago in a mine in northern West Virginia. The cross-section of seam operated showed 9 in. of bottom coal, 2 in. of slate binder, 4 ft. of coal, 12 in. bone coal binder and 9 in. of roof coal, making a total thickness of 5 ft. 10 in. The tipple at this time was not equipped with shaker screens but had the old type bar screen.

The sales department was trying to market this coal with seams free from impurities and of equal analysis. The writer being responsible for the preparation, experienced considerable difficulty in getting this coal into railroad cars in order to meet the consumers specifications. Different systems were tried out before the right one was finally adopted. The foremen were instructed to visit every working place twice each day and explain to the miners in detail the necessity of clean coal. This method met with little success, as the miner could knap a little bone coal and mix it with the marketable coal and still leave his place in good shape for the foreman's inspection. This is made easy by the fact that the formation of bone resembles the structure of the good coal so close when broken that it would slip by the car trimmer's inspection and get into the railroad cars where, at its destination, an analysis would show a high ash and sulphur content. The next method tried was a fuel inspector working in the mine with an additional man in the railroad cars while the coal was being dumped. A dock system was also established. Some better

results were obtained with these improvements but since the miners could still load the good coal in the rear of the car and the knap in the front where it would be covered up on dumping, really marketable coal was not yet obtained.

The final method employed was to install a combination horizontal screen and picking table which separated the coal into three sizes before being picked. A notice was posted to the loaders that in case an excess of impurities was loaded by any loader that he would be docked 50 per cent of the net weight of any such car. In aggravated cases the employee would be dismissed from the service of the company. This brought results as there was no way for a loader to "gip" his coal in order to dodge inspection. As it reached the screen it was spread out, separated, passed the observation of six pickers and the fuel inspector. Two years after the installation of this screen no loader was discharged for loading dirty coal and the marketable product had made a reputation for itself as a high-grade steam coal and was accepted in preference to coal mined from other seams of the same analysis and free from impurities.

The preparation of coal depends on the character of the seam mined. If it is free from binders face preparation may be successful. Otherwise, the only solution is the installation of picking tables as it is impossible for the miner to properly clean a dirty seam of coal at the working face as he labors under artificial light and poor ventilation. He should be given every consideration by the operating companies when his working is high in impurities. On the other hand, discipline must be maintained on preparation at the face regardless of the seam worked. Oft-times the operators as well as the miners are equally responsible for the dirt found in coal by the consumers at destination.

C. T. GRIMM

Adrian, W. Va.

A Word to Mine Foremen Relative to Accidents

OBSERVATION during 35 years of actual mining experience has convinced me that at least 80 per cent of all accidents result either from the carelessness of the individual worker, or from the carelessness and neglect in supervision by the foreman and superintendent. If mine foremen and assistant foremen will visit the working places daily, making a thorough inspection while in each place, and carry out the necessary steps in case dangerous conditions are found, accidents would be greatly reduced.

Every experienced mining man knows that the average miner will take unnecessary chances if permitted to do so. A large percentage of the accidents that arise from falling slate can and should be avoided. The miner is well aware of the dangerous loose slate, yet he will postpone the setting of timber until he loads his car. Also if the loaded car is pulled and an empty placed he will again promise himself to remedy the dangerous condition when it had in turn been loaded.

Another cause of accidents is the miner's aversion to taking down loose slate when he has coal ready to be loaded. Slate thus pulled becomes mixed with the coal making separation difficult. He therefore promises himself to take the slate down after he has loaded the loose coal below it.

Whether or not a mine foreman has time to remain in a working place until his orders are complied with, depends largely on his own ability. If he disciplines his men relative to safe working conditions he will not find many of them working under loose slate. In case the foreman finds a miner working under dangerous conditions he should penalize him; if that does not have the desired effect, he should discharge him. If this course is pursued the foreman will have ample time to remain in any place where it is necessary to see that dangerous conditions are made safe before passing to the next place.

As the men in his charge will work safely if the foreman demands and insists that they do so, it may seem harsh to discipline them to the extent mentioned. However, is it not better all around to discharge a man rather than to have him get crippled or killed through his own carelessness? If every foreman will discipline his men until they work safely, then and not before, will accidents be reduced to a minimum.

THOS. F. HOYE

Huntington, W. Va.

Does Safety Pay?

THE safety problem opens an interesting, if serious, subject. It seems at first glance as if Jim and Mac have been jogging along trusting to "Old Lady Luck" to pull them through. On the other hand, their seeming wretchedness over the unfortunate situation in which they are placed, proves a lack of safety initiative.

Let us briefly analyze the case. Two men killed in one week, through preventable accidents. Seven months have elapsed since the last Safety Conference among the mine officials. The Old Man is due to arrive, and raise h———. I don't blame him. Allow me to digress sufficiently to ask: How many of us about to enter the portal of a mine, have been temporarily halted by some glaring new sign such as "Safety, First and Always," or something similar? But the newness soon wears off, and the old sign loses its significance. This is one of the causes of a great many preventable accidents; i.e., lack of new signs, or, in other words, lack of diversity in presenting safety reminders.

The same applies to safety conferences; unless these are held at regular intervals we soon lose our enthusiasm for the movement, by allowing our minds to become centered in more material things. If the Old Man had been approached regarding a contribution towards a safety campaign, and had refused it, then he belongs to a class of operators who, like the dinosaur, should be extinct. On the other hand, the loose methods apparently recognized by Jim and Mac cannot be too severely condemned. Because, after all, a quite effective safety campaign can be carried on without any additional expense. But this demands absolute co-operation between the various officials of the mine, each and every one of whom must think and act safety, as well as preach it. Here is the keynote of this expenseless campaign: Discharge anyone, without fear or favor, who is found guilty of a careless act.

Shorty is wrong when he says that safety should work from the top down. In making this statement he is only trying to throw a cloak over his own shortcomings or inefficiency.

Safety should be co-operative. Suggestions of merit should be welcomed from all employees, no matter how lowly their position with the company. Give credit for the best, and you will soon reap a rich reward in the shape of a much reduced accident rate.

Safety must of necessity improve efficiency because anyone working for a company, with the knowledge that the best brains available are employed with the object of creating safety measures for his benefit, will feel a greater sense of security. He will, therefore, be in a much better frame of mind to give of his best.

The carrying out of a safety program must have absolute co-operation among the various officials. The chief executive must stress this point beyond quibble.

Safety cannot be budgeted because each successive day will bring its new problem which in turn will demand rapid readjustment and extension of existing safety measures.

No worth-while operation can afford to be without its safety engineer. This man must be allowed to travel throughout the workings as he may see fit, being responsible only to the superintendent, to whom he must present a daily report covering his findings and recommendations along safety lines. Such findings and recommendations should be laid before and discussed by the subordinate officials at the end of each shift.

Under no circumstances must the safety engineer be allowed to interfere with the ordinary duties of the mine officials. But the mine officials should work as a consulting committee in conjunction with the safety engineer.

JOHN BENNETT

Cassidy, B. C.

Someone Must Be Responsible

THERE'S no getting away from the fact that mining laws and inside conditions necessitate having some one person in charge of the inside. The management should place responsibility for electrical and mechanical maintenance in the hands of a specialist—an electrical engineer, perhaps an electrician or a master mechanic. Both the mine superintendent and the foreman should be quite willing to relinquish this responsibility to the electrical and mechanical departments and merely join in guiding the work involved.

ALABAM

Alabama *Mine Electrician*

Wise Spending Saves

SPENDING wisely on safety measures without a doubt saves not only money but a still greater thing—life.

At least one mining company employs an excellent plan of instilling safety into its men. This is by means of a monthly employees' magazine that is read and "digested" when the men are at home away from the hustle and noise of the mines. All through, as well as between the lines in this magazine, can be read the miner's greatest slogan *Be Careful.*

Fayette, W. Va.

V. S. VEASEY

Only One Boss

THE superintendent, the mine foreman and the electrician should always have a clear understanding between themselves. They should get together often and arrange a definite schedule for future work. The foreman should be the only one to give orders to underground employees, including the electrician. Then he will know where every man is and what he is to do.

F. J. ANDREWS

Fairmont, W. Va.

WORD *from the* FIELD

Plan Pittsburgh Rally To Aid Strikers

PLANS have been announced by the American Federation of Labor for a rally in Pittsburgh, Pa., Nov. 14 in aid of the striking miners in western and central Pennsylvania. Philip Murray, vice-president of the United Mine Workers, in a recent speech at the Monongahela City Speedway, told an audience of 10,000, including strikers and their families, that the Federation had pledged its full moral and financial strength to the miners' union and at the meeting in Pittsburgh its leaders would be prepared to make specific demands upon Governor John S. Fisher and other officials throughout the strike region for a square deal in this strike.

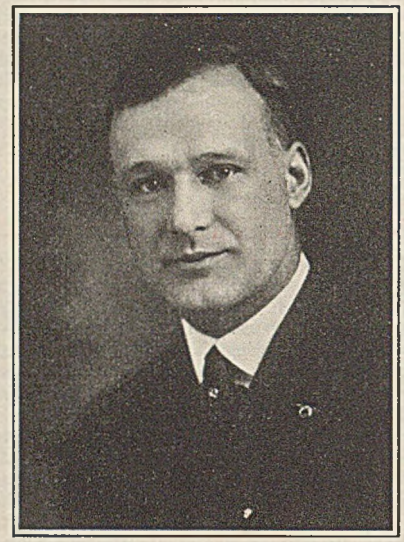
It was said that merchants and other business men of outlying coal towns, in some of which retail business has been greatly slowed up by the strike, had made tentative plans for a parade of 50,000 persons on Nov. 14, with a mass meeting to be held at Forbes Field or the Pitt Stadium. Governor Fisher, U. S. Senator David A. Reed, President John L. Lewis of the United Mine Workers and President William Green of the American Federation of Labor would be invited to address the assemblage on ways and means of ending the strike, it was said.

Reputed sponsors of this move declined to confirm the news but admitted that several associations of business men had discussed the strike situation and passed resolutions, some of which were sent to Governor Fisher, declaring the strike must be ended because of its deterrent effect on business.

Subsidiary to Publish Industrial Papers

Incorporation of a subsidiary to publish four long-established national circulation industrial publications just acquired was announced Oct. 27 by the McGraw-Hill Publishing Co. of New York City and the A. W. Shaw Co. of Chicago. The subsidiary is the McGraw-Shaw Co. and the papers affected are *Factory, Industrial Management, Industry Illustrated* and *Industrial Engineering.*

Under the announced publishing plan, the first two papers will be combined as *Factory and Industrial Management.* The third will be consolidated with *Industrial Engineering,* a McGraw-Hill publication founded in 1882. The consolidated papers will be issued monthly.



John V. Berry

As chief of mine safety, mine rescue and first aid for the Bethlehem Mines Corporation, Mr. Berry has long been a potent force for safety in coal mining. He is the author of the article, "Rescue Men Alert—Plans Ready; Men Trained," which appeared in "Coal Age" last month. Mr. Berry has his headquarters in Johnstown, Pa.

Coronado Case Settled; Union Pays $27,500

The Coronado coal case, which had been in the courts for thirteen years, was settled at Fort Smith, Ark., Oct. 13 with the payment of $27,500 to the company by the district 21 organization of the United Mine Workers. The Coronado Coal Co. had sued the union for $2,222,000 triple damage based on the allegation that the union conspired to restrain interstate commerce in coal from the mines of the Coronado and associated companies and that property destruction resulted from this conspiracy following labor troubles in 1914.

At the first trial, in 1917, the plaintiff company won judgment for $720,000, but this was reversed by the U. S. Supreme Court. On the second trial the case again went to the Supreme Court, which held that the verdict was in error as to the district locals and individuals but correct in so far as the international organization was concerned. The third trial, in 1925, and the fourth, in 1926, ended in mistrials.

Engineers at Pottsville Discuss Anthracite

BETWEEN 200 and 300 members and guests of the Engineers' Society of Northeastern Pennsylvania attended the meeting held at the Pottsville Country Club on Saturday evening, Oct. 29. Paul Sterling, mechanical engineer, Lehigh Valley Coal Company, Wilkes-Barre, Pa., delivered an interesting paper entitled "Modern Anthracite," which included a comprehensive review of the old and new methods of preparing this fuel. Particular reference was made to present-day methods of preparation and to the requirements of the anthracite dealer and consumer of today.

In discussing the higher yield of domestic sizes and the increased realization obtainable through the proper use of explosives and improved mining practices in anthracite mining, Charles W. Wagner, special engineer, Glen Alden Coal Company, Scranton, Pa., presented material contrasting the results obtained through correct and incorrect methods of shooting and mining.

James H. Pierce, consulting engineer, Stuart, James & Cooke, New York City, who recently returned from Russia after making a survey of the mining situation in that country, gave an informal talk on his experience and findings.

The meeting concluded with the showing of a motion picture illustrating the building of the Eighth Avenue subway.

West Virginia Injunction Against Union Upheld

The U. S. Supreme Court on Oct. 17 denied the United Mine Workers a review of federal court injunctions restraining the union from causing West Virginia non-union miners to stop work and join the union. The injunctions, obtained by the Red Jacket Consolidated Coal & Coke Co. and other non-union operators in 1922, held the union men were engaged in a conspiracy to interfere with interstate commerce in violation of the Sherman and Clayton acts.

Fritz Medal to Carty

The John Fritz gold medal for 1928 has been awarded to General John Carty, of New York, a vice-president of the American Telephone & Telegraph Co., for achievement in telephone engineering. The presentation will be made in February at the annual meeting of the American Institute of Electrical Engineers in New York City.

Truce Ends Strike in Illinois and Southwest; I. W. W. Walkout Gains in Colorado

REPRESENTATIVES of the United Mine Workers and operators of Illinois signed a truce in Chicago Oct. 1 which terminated the six months suspension of mining in that state. The warring factions in Iowa fell into line Oct. 5, followed the next day by Kansas, Missouri, Arkansas and Oklahoma, and on Oct. 7 by Indiana. In Colorado, on the other hand, the strike threat by the I.W.W. became an actuality on Oct. 18, though it had been quite generally supposed that the voluntary increase in wages granted by the operators beginning Oct. 1 would be effectual in heading off a walkout.

Under the terms of the new pact signed in Illinois, which was closely followed in Indiana, Iowa and the Southwest the producers will continue to pay the Jacksonville scale temporarily while a commission composed of two union representatives and two operators makes an investigation of the demands, claims and contentions of both sides for the purpose of providing the ground work for the ensuing agreement to become effective April 1, 1928. A report of this investigation will be made, with recommendations, to a joint wage-scale committee meeting to be held in Chicago Feb. 7, 1928.

An important feature of the truce is the provision that prompt attention be given by the commission to an early understanding covering the operation of loading machines. The joint commission is authorized to formulate a temporary basis for the operation of these machines, to be in effect until March 31, 1928.

RICE MILLER and Herman C. Perry, president and vice-president, respectively, of the Coal Operators' Association of Illinois, were appointed to represent the operators on the joint commission. The miners' representatives chosen were Harry Fishwick and State Senator William Sneed, president and vice-president, respectively of the Illinois miners' union. In the event of disagreement on disputed points it is provided that the commission may enlarge its number to five, when a majority vote will be binding. Mr. Fishwick has been chosen chairman and Mr. Perry, secretary, of the commission.

When the third joint conference of miners' and operators' representatives began its sessions the question of an agreement was turned over to a committee of eight, equally divided between the producers and union officials. The operator members were Herman C. Perry, general superintendent, Illinois & Indiana Coal Corporation; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co.; E. C. Searls, general manager, Crerar-Clinch Coal Co., and J. D. Zook, vice-president, O'Gara Coal Co. The spokesmen for the miners were Harry Fishwick and Walter Nesbit, president and secretary, respectively, of the Illinois union, and John Miller and Joseph Turner, chairman and secretary, respectively, of the scale committee. John L. Lewis, international president of the United Mine Workers, and Rice Miller, president of the Operators' Association of Illinois were ex-officio members.

THE complete text of the truce agreement between the Coal Operators' Association of Illinois and the United Mine Workers follows:

"(1) The question of making a wage contract effective April 1, 1928, and all matters relating thereto, is referred to a joint wage commission composed of the president and vice-president of the Coal Operators' Association of Illinois and the president and the vice-president of District 12, United Mine Workers of America.

"(2) Said joint wage commission shall with all diligence apply itself to such task and examine into, consider and report on the demands, claims and contentions of the operators and mine workers without prejudice or restriction. The commission shall report in writing its findings and recommendations to a joint scale meeting of the parties hereto to be held in Chicago, Feb. 7, 1928.

"(3) The commission will formulate its own rules and methods of procedure and will organize its work promptly and hold frequent meetings. To facilitate agreement upon disputed points the commission may enlarge its number to five, in which case a majority vote shall be binding.

"(4) Work shall be resumed at once, the wages, conditions and rules of employment existing March 31, 1927 being extended to April 1, 1928.

"(5) It is desirable to have an early arrangement covering the operation of machinery and devices for loading coal. The commission is requested to give this matter its prompt attention."

A STATEMENT on the settlement, issued by the Coal Operators' Association of Illinois, follows:

"The present truce agreement with the miners has been entered into for the following reasons:

"The Illinois operators are relying upon the sincerity of purpose frequently expressed by John L. Lewis, president of the mine workers national organization, and Harry Fishwick, president of the Illinois district, that the commission which has been provided for will throughout the next four months consider fairly, without prejudice or restriction, every aspect of the present Illinois mining conditions and wage scale, and will recommend such changes as are found necessary to establish the economic parity of Illinois mines with other coal producing districts with which Illinois mines must compete.

"The operators further realize the serious financial situation as well as threatened destitution and distress prevailing in various coal mining districts in Illinois and sincerely desire to prevent any further development along such lines.

"With so large a volume of coal now being produced by open-shop or non-union fields, so much coal still remaining in storage, and the prevalent coal prices offered by these competing coal fields in general so slightly increased over prices of last spring, and in no instance above normal prices for this season of the year, not all of the Illinois mines can or will probably undertake to work, and few or none of those that do open can expect to operate more than part time during the next six months. By or before then, however, a proper wage scale and conditions, it is believed, should be agreed upon.

"The period from October to February each year always develops maximum demand for coal as to number of users because of seasonal requirements for household and allied uses. In view of this fact and regardless of the demonstrated good transportation service so far provided by the railroads it seems wisdom to accept this truce arrangement and thereby guarantee an adequate supply of fuel to prevent any possible consumer anxiety, panicky buying or excessive price.

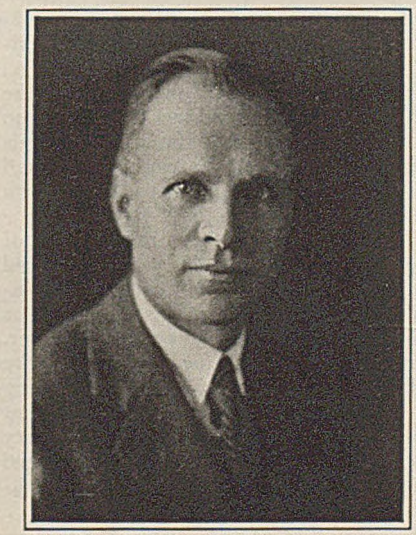
"For the ultimate adjustment of

Cosgrove New President West Virginia C. & C.

John C. Cosgrove, Johnstown, Pa., was elected president of the West Virginia Coal & Coke Co. at a directors' meeting in New York City early in October. He succeeds W. M. Wilshire. The company operates 30 mines in West Virginia having an annual capacity of about 5,000,000 tons.

Mr. Cosgrove has for several years been chairman of the board of the Cosgrove-Meehan Coal Corporation, operating in Pennsylvania, West Virginia and Illinois, and will retain this connection. He immediately assumed his new duties.

John C. Cosgrove



proper conditions and wage scale which shall govern future coal-mine operation in Illinois and that shall in reality be to the best interests not only of all participants in the industry but likewise to the general public of Illinois and the consumers of its coal operators are compelled, however, to rely upon the findings of this balanced commission and the propriety and intelligence of its general conduct and recommendations."

A regulation on car distribution under which unbilled cars loaded with coal at the mines are charged against allotment of cars to each mine has had a deterrent effect on operations since the signing of the truce in Illinois. The only sizable output is coming from the southern fields of the state, principally Franklin County, and even here production is far below normal. Much less is being produced in the central field and scarcely any tonnage is coming out of the northern district. With Arkansas and Oklahoma to all intents and purposes completely non-union and Missouri rapidly drifting in that direction the agreement covers little Southwestern territory outside the State of Kansas.

WHEN the Colorado strike was launched at 7 a.m. Oct. 18 about 3,000 men responded in the northern field, which completely disabled the mines there. In the southern field less than 30 per cent of the men went out, Huerfano County being the hardest hit, with 1,180 men on strike out of 2,594, normally employed.

Despite the belief in some quarters that the trouble would last only a few days because the miners lacked funds the walkout is spreading. Late last week mines in Routt and Fremont Counties were affected and seven mines were closed down in Las Animas County. Out of 38 mines in Huerfano County 23 were shut down.

Mine company officials admit that the situation is growing serious. Peace officers continue their drive against pickets and disorders have been narrowly averted at a number of operations. Many women are doing picket duty. The producers have appealed to Governor Adams to provide more deputies to guard properties and miners desiring to work. The Governor is making a personal inspection of the situation in Huerfano and Las Animas Counties.

The jails at Walsenburg and Trinidad are crowded with pickets arrested for violation of the law. Huerfano County commissioners have decided to ask the federal government to deport pickets who may be arrested if not citizens of this country.

G. O. Smith to Head A.I.M.E. in 1928

George Otis Smith, director of the U. S. Geological Survey since 1907, has been named by the nominating committee for president of the American Institute of Mining and Metallurgical Engineers during 1928. This is tantamount to election.

Hard Coal No More a Monopoly; Operators, Miners And Regional Public Must Draw Closer Together

EITHER wedded to or divorced from the coal industry must the anthracite region be, said George Wharton Pepper, former U. S. Senator from Pennsylvania, in addressing the Chamber of Commerce at Scranton, Pa., Oct. 19. Recent years, he said, had shown that the anthracite monopoly, though still held by Pennsylvania producers, no longer had the high-grade fuel market cornered. Other fuels had invaded ground that had seemed in the past unthreatened and securely held.

It was, he remarked, difficult to discuss the subject without raising latent antagonisms, but it was not necessary to argue whether it was the operators, the miners or the Scranton public who were at fault. All that was needed was to announce the fact that the industry was threatened and had been losing ground. Attempts to apportion responsibility would only divert attention from the important fact that hereafter the anthracite market would be held only if battle is made for it. The region must be wedded to the interest of anthracite or it would lose the business. It could not continue safely to quarrel with its bread and butter.

The Pennsylvania state tonnage taxes on anthracite, Mr. Pepper said, seemed to him to be wrong, and anyone who believed that because they were levied on the production of anthracite the sums collected might be, and would be, devoted to the exclusive benefit of the hard-coal region, was merely deceiving himself. Legislatures were always only too eager to spend, for the purpose of pleasing their constituents, any money obtained by the state or nation. They never have had, and never will have, much consideration for the source from which the money comes. Such moneys were never so well ear-marked that they could be expended only for the benefit of those that provided them.

HE PLEADED for wise counsels from operators, miners and citizens of Lackawanna County. It was easy to expect too much of co-operation, to demand what would be given one by those who saw that their true interest lay in joint action. In the projected Mt. Carmel meeting he hoped that emphasis would be laid not on a program but on the recognition of a fact and the creation of a sentiment. The League of Nations had aroused opposition because it was predicated on a sentiment not yet quite deep and profound enough to justify such great sacrifices as were demanded.

Samuel D. Warriner, president, Lehigh Coal & Navigation Co., remarked to the citizens present from the hard-coal fields that "the annual payrolls of the anthracite region are now in excess of $300,000,000. The value of the annual anthracite product is approximately $475,000,000. Of this amount from wages, taxes, etc., approximately $400,000,000 flows back into the field largely from outside sources and forms the basis of your business activity. Coal is your principal article of export and the revenues from it form your trade balance by which you draw from outside sources the goods you desire and require. In 1913 with practically the same tonnage as probably will be shipped this year the labor bill was approximately $113,000,000. The labor bill for the same production this year will be almost three times this amount. Taxes, exclusive of federal income taxes, have increased in round numbers from $5,660,000 to $28,000,000; of which over six millions constitute the Pennsylvania tonnage tax universally resented by consumers of anthracite."

Ralph E. Weeks, president, International Textbook Co., testified to the value of anthracite to Scranton, saying that it brought $30,000,000 annually to the city and $100,000,000 to Lackawanna County.

Andrew J. Maloney

Maloney Named to Head Reading Coal Co.

Andrew J. Maloney, formerly vice-president and sales manager of the Chicago, Wilmington & Franklin Coal Co., Chicago, was chosen president of the Philadelphia & Reading Coal & Iron Corporation on Oct. 10. He succeeds W. J. Richards, who resigned as head of the big anthracite producing firm nearly three months ago.

Mr. Maloney was born in the heart of the hard-coal fields 43 years ago and studied at Temple University, Philadelphia, where he also was employed as usher and stenographer in a theater. Later he became traffic manager of the Whitehall Portland Cement Co. going to Virden, Ill., in 1906 as vice-president and sales manager of the Royal Colliery Co., which concern was later merged with the Chicago, Wilmington & Franklin Coal Co.

Washington Letter

By Paul Wooton
Special Correspondent

IN VIEW of the approaching anthracite conference at Mount Carmel special interest attaches to the final statistics of anthracite operations in 1926 recently published by the Bureau of Mines. With the official figures for 1925 and 1926 based on complete returns from all producers, it is now possible to appraise the market results of the great strike.

The normal production of the anthracite mines for the period of the strike—which lasted from Sept. 1 to Feb. 12—is about 35,000,000 gross tons. At first thought it would appear that this total would have to be replaced, ton for ton, by substitutes. On second thought, however, it is clear that much of the consumption during that period was supplied out of stocks accumulated before the strike. The producers had some millions of tons in their storage yards which were cleaned out before the end of the strike.

In addition, there were large stocks in the yards of retail dealers which were drawn upon. The quantity in the hands of the retailers when the strike began may easily have amounted to 6,000,000 tons. By the end of the strike this had been reduced to a small quantity of the steam sizes and finally there were the stocks in the cellars of the householders. These stocks never have been measured, but the sum total probably was several million tons. With the further addition of anthracite on the lake docks, these reserves were thrown into the gap, acting to reduce the quantity of substitutes required.

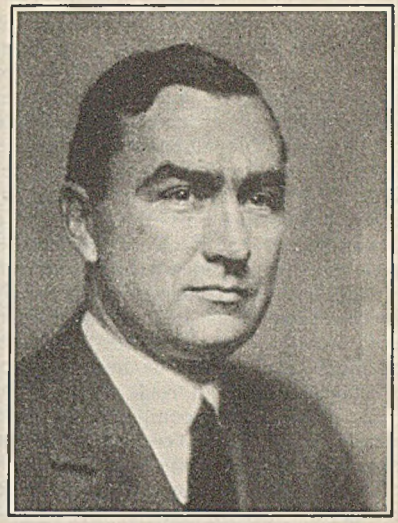
THUS it is when the production of the two years, 1925 and 1926, is considered as a whole and compared with the normal rate as indicated by 1924 the actual shortage in commercial production is cut to 23,000,000 gross tons. This is the difference in the actual shipments plus the local sales for 1925 and 1926, compared with what they would have been had the 1924 rate continued without interruption. This was the quantity that had to be replaced by substitutes.

Considering the substitutes available there was, first of all, an increase in the sales of fuel briquets—a small item but one which helped to fill the void. It may be put at 670,000 tons, which is the excess in the actual production of 1925 and 1926 when compared with the 1924 rate. Then there were imports of briquets from England and Germany, totaling 130,000 tons. Then there were imports of anthracite from Wales and Scotland, which brought a measure of relief to the coastal cities. These may be put down as 960,000 tons. Then there was a reduction in the quantity of anthracite sent to Canada. This may be set at 1,000,000 tons. It was made up in Canada largely by imports of British anthracite. These items were not great.

The foregoing are small items, but the increase in coke production was substantial. Sales of byproduct coke for domestic use in 1925 and 1926 were 3,500,000 tons above normal. Sales of beehive coke for domestic use were 500,000 tons above normal. Then there was fuel oil. The exact quantity used is unknown and because of that fact it doubtless was overrated. If 4,000,000 tons were put down as the amount of anthracite definitely replaced by fuel oil and gas over and above the 1924 consumption, it probably would be above the mark.

GREATER than all other substitutes combined were the increased sales of bituminous coal. From a study of deliveries of bituminous coal made by representative retailers to consumers during the period of the strike, as compared with the amounts the same retailers ordinarily sell, it appears that from 10,000,000 to 12,000,000 tons of raw bituminous coal was thrown in to meet the shortage of domestic fuel caused by the strike.

Totaling the several items the aggregate is 22,760,000 net tons of substitutes, compared to the computed deficiency of 23,000,000 gross tons of anthracite.



Robert W. Gillispie

Gillispie Moves Up

Robert W. Gillispie was elected vice-president and general manager of the Jeffrey Manufacturing Co., Columbus, Ohio, on Oct. 10. For many years connected with the Bethlehem Steel Co. in an executive capacity, Mr. Gillispie joined the organization July 1, 1926.

Pittsburgh's Coal Engineers Weigh Lessons Of Recent Mining Experiments

MINE OPERATORS of the Pittsburgh district are swinging toward complete mechanization. They have proved the "workability" of loading machines and conveyors and are now seeking methods and equipment that will make completely mechanized operation a day-to-day success.

These problems they discussed at an all-day conference held jointly by the mining section of the Engineers' Society of Western Pennsylvania and the Pittsburgh section of the American Institute of Mining and Metallurgical Engineers, in Pittsburgh, Oct. 20. About 150 men attended. C. E. Lesher, executive vice-president of the Pittsburgh Coal Company, was chairman.

L. E. Young, production vice-president, Pittsburgh Coal Company, described the loading-machine and conveyor operations of his company. He said that one of the big problems is to find ways of reducing the percentage of coal that must be handled manually with mechanical loading. Little is gained if only the loose coal is removed by machine and the tight, or hanging, coal by pick and shovel.

The drilling of coal is another problem. No permissible hand-held electric drill for 550-volt current has yet been found. A drill-rig pneumatically operated costs about $4,500, including the compressor; a storage-battery outfit costs between $6,000 and $7,000 and a portable motor-generator set costs about $2,000. None of these has as yet proved entirely satisfactory from the economic or practical standpoint.

Dr. Young said that his company has not gone far in the extraction of pillars by machine, but he believes that eventually most of the coal will be gotten mechanically. Where the coal face is sheared two instead of three shots are fired and a substantial saving in explosives has been made. A troublesome problem is to get "concentration without congestion." On one entry in the Montour No. 10 mine, where conveyors are being used, 33 electrical units are in operation. Only by a high degree of co-ordination will congestion be avoided.

THE PITTSBURGH Coal Company is seriously considering the driving of sets of six instead of four entries, chiefly as a means of providing additional places closely grouped. Dr. Young said it is easy to tie up $50,000 to $100,000 in equipment in a panel producing only a nominal tonnage. Additional expenditure is required for additions and improvements to outside preparation facilities. He has figured out that at one of the mines where coal is mined mechanically each working place represents an investment of $3,000. Analysis will show that in spite of the heavy investment, mechanical loading is justified where a reasonable tonnage from the equipment is forthcoming.

George Osler, vice-president, Pittsburgh Terminal Coal Corporation, said that his company has not gained satisfactory results with conveyors and loading machines, but yet is sold on mechanical mining. Prior to the strike five Joys, one Myers-Whaley (shovel-

ing coal) and two Eickhoff conveyors were being used. The company found that it cost as much to mine coal mechanically as by hand but that certain advantages accrued, such as greater speed in entry development.

W. L. Affelder, assistant to the president, Hillman Coal & Coke Company, declared that not only the presence of drawslate but the lack of permissible equipment has impeded progress in mining the Pittsburgh seam mechanically. Much already has been done in the development of permissible machines, but much had yet to be accomplished. A Myers-Whaley in rock work in one of the mines of his company has given entirely satisfactory results. He believes that the ultimate solution of the problem at many mines will be hand-loading into conveyors.

The Hillman Coal & Coke Company is using at one of its mines, located in the Johnstown district, nine conveyor units. Three more are on order. In this mine the coal is 4½ to 5 ft. thick. Both rooms and pillars are 37½ ft. wide. Mr. Affelder said: "We know absolutely that this work is effecting a great saving." The coal loaded onto conveyors cost only two-thirds as much as that loaded by hand in this mine. Many intangible savings also are effected. The average daily production from each of the four conveyor units, thus far this year, has been 70 tons. The crew numbers only four men, so that the output per man is 23 tons a shift as against 8 tons by hand-loading into cars. In September this mine produced 80,000 tons, of which 11,000 tons was mined by conveyors. The men make better wages on this work than in hand-loading, and labor turnover is reduced.

EDWIN JOHNSON, sales engineer, Coloder Company, described briefly a wireless mine in the Pittsburgh seam, where a Coloder is used for entry driving. Here the coal is undercut, sheared, drilled and hauled by storage-battery equipment. This arrangement has lowered the power demand and provided full voltage at the face at all times. The Coloder is working in three parallel entries, from each of which two and sometimes three cuts are loaded in a shift. In the eight months that it has been in service, it has effected a reduction in cost over hand-loading methods.

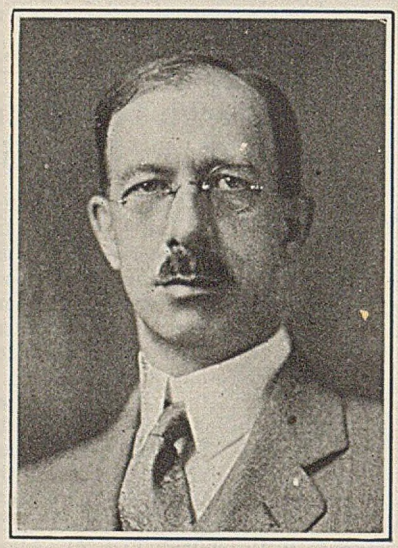
Frank Dunbar, general superintendent, Hillman Coal & Coke Company, voiced the need for a universal top-cutting and shearing machine. He questioned whether drawslate can be held in rooms wider than 15 ft. J. B. Mayor, vice-president, Mayor & Coulson, Glasgow, Scotland, said that the Pittsburgh seam had many conditions like those in British coal beds. But here as there the drawslate could be topcut, pried down and gobbed before shooting. At an operation in Scotland a 16-in. seam is being mined, above which occurs a 14-in. bed of dirt. The kerf is cut directly above the coal in the dirt bed and this dirt serves as packwall material.

Glenn Southward, mechanization investigator, American Mining Congress, said that small ribs of coal could be used to control the roof. In the rooms of a certain mine in the Pittsburgh seam, the center of the cut is loaded first, then posts are placed and the coal loaded out on both sides. Then the drawslate is removed. This system has been quite successful.

On April 12, 1924, the H. C. Frick Coke Company put into operation the underground belt conveyor system which carries the output of three mines 4.3 miles from a central dumping point to the Colonial Dock. E. C. Auld, assistant chief engineer of this company, presented a paper describing this conveyor system.

IT ALSO DESCRIBED a second system, now under construction, to carry daily 12,500 tons from six mines of the H. C. Frick Coke Company to a river loading plant to be known as Palmer Dock. This line will be 15,398 ft. long and will lift the coal 522 ft.

On Oct. 1, 1927, the Colonial Dock conveyor system had handled 9,390,619



Dr. L. E. Young

tons of coal. In March, 1927, it transported 284,047 tons in 27 working days and in September of this year 11,962 tons daily for 22 days. On Jan. 15, 1926, it handled 13,866 tons.

Thus far only three accidents, all minor, have occurred—two with the conveyor in operation and one while idle. The lost-time record is 9 man-days during operation and 19 man-days while idle, or a total of 28 man-days lost due to accidents.

Delays were practically neglible. Careful records have been kept of each delay of more than 15 min., those of shorter duration being of little consequence as the storage facilities under the dump compensate for any delay of less than 25 min. In all there were 50 delays equivalent to 48.42 hours during 3½ years of operation. On May 2, 1927, a delay of 2 hours and 50 minutes occurred; yet on that day the system handled 12,127 tons.

MAINTENANCE cost of the system has been low. Of the original belting 57 per cent still is in operation and of the 40,000 bearings less than 100 have been replaced. All carriers, pulleys and drives are in excellent condition. All intersection chutes have been replaced once and several of them twice.

Auxiliary conveyors must be light and easily handled and used in such a manner that a greater tonnage than is now obtained from individual working sections will be obtained. Otherwise the layout would be so cumbersome as to defeat its own ends.

Graham Bright, sales engineer, Mine Safety Appliances Company, presided over the afternoon session in which consideration was given to trends in locomotive design both for gathering and main-line haulage. Papers on this subject were presented by G. H. Shapter, commercial engineer, General Electric Company, and W. A. Clark, general engineer, Westinghouse Electric & Manufacturing Company. According to the former, about 19,000 mine locomotives are now in service, a saturation of 68 per cent in mine-transportation requirements.

Tests of slow-speed gathering locomotives under a wide range of conditions have proved that, without sacrificing tonnages hauled, they use 30 to 40 per cent less power than gathering locomotives of standard speed. About 2,600 storage-battery locomotives are now in service. When properly applied and maintained the storage-battery locomotive is quite as efficient as the cable-reel locomotive.

Difficulties in the use of storage-battery units have arisen from their application to scattered workings and to grades that are too stiff, coupled with failure to provide sufficient battery capacity. The practice now is to provide as much battery capacity as can be accommodated.

AS LOCOMOTIVE service has become more severe, motor capacity has been gradually increased. Horsepower per ton of locomotive has been raised from 6½ to 15 in the last 27 years. As the motors now represent 35 per cent of the locomotive weight, further increase in their size is impracticable.

Consequently, it has been necessary to introduce small blowers for the ventilation of the motors. By this means the continuous rating or capacity of the locomotive has been about doubled and armature windings no longer deteriorate from excessive heat.

Mr. Clark stated that the 8-ton locomotive is rapidly taking the place of 4- and 6-ton units for gathering purposes and that, because the modern mine car is so large, locomotives should be as heavy as tracks will stand.

A. B. Kiser, general superintendent, mechanical equipment, Pittsburgh Coal Company, spoke favorably of semi-magnetic control of locomotives. Sixteen locomotives (eight of the battery and eight of the cable-reel type) thus controlled have been working satisfac-

torily for some time in the Warden mine. Last year this company purchased 25 locomotives, large and small, embodying this control.

His company has gone to the 8-ton enclosed type of cable-reel locomotive to avoid the greater cost and sundry disadvantages of a storage-battery unit.

As the speed when the cable is being used is only half that attained when the locomotive is run direct from the trolley the possibility of a severed conductor is largely eliminated. He asserted that the vertical reel lengthened the life of the cable. He prefers roller bearings rather than ball bearings on the pinion end of the armature shaft as they are less subject to wear.

IN THIS he was opposed by R. I. Kingsland, superintendent, power and mechanical department, Consolidation Coal Company, who said that either type of bearing served the purpose when dust is excluded. His company is using a number of storage-battery locomotives of the permissible type and a few cable-reel locomotives in mines that are not particularly gassy. He thinks that even when locomotive motors are mechanically ventilated the horsepower per ton of locomotive should be kept as high as possible.

F. F. Jorgensen, also of the Consolidation Coal Company, said that his firm is increasing its use of 30-lb. rails in rooms and thus adding to the capacity of locomotives and live stock.

George Gramme, electrical engineer, H. C. Frick Coke Company, agreed with Mr. Kingsland that ball bearings on the pinion end of the armature shaft of a locomotive give satisfactory service. Much of the trouble at this end would disappear, he said, if the felts were kept in good condition.

W. D. Hockensmith, vice-president, Hockensmith Wheel & Mine Car Company, remarked that cars of 10-ton capacity are now being made, equipped with four-wheel Westinghouse air brakes. These cars, which are being used at two different plants, are 16 ft. long, and though they have only a 5-ft. wheelbase they "can't get off the track because they are so large." Each car weighs about 6,500 lb., and the ratio of dead weight to live load is 1 to 3 as against a ratio in the small car of about 1 to 1.

B. H. McCRACKEN, maintenance engineer, Consolidation Coal Company, said that manufacturers should provide more clearance under locomotives. The bottoms of their gear cases wear out, showing that the design is faulty. With more clearance the tires on locomotive wheels could be allowed to wear down further. Manufacturers should provide good axle bearings and thus eliminate the need for changing axles every year or so. Axles should last indefinitely.

Many present declared that the mule has not yet served his day. Mr. Shapter said that the locomotive should be adopted whenever it will displace three mules or horses if not before.

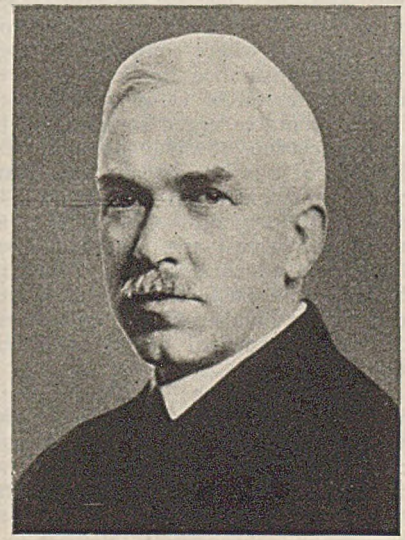
Combustion and Research Men Study Fuel Economy At First Annual Gathering in St. Louis

COMBUSTION experts, fuel research engineers and plain business men from all sections of the country gathered in St. Louis the week of Oct. 10 to discuss the efficient utilization of the fuel resources of the country. The gathering, known as the first National Fuels Meeting, was held under the auspices of the fuels division of the American Society of Mechanical Engineers. Professors, power plant engineers, government experts, industrial purchasing agents, manufacturers of heating equipment and coal operators contributed to the four-day symposium on modern fuel purchasing and fuel practices.

One of the most interesting papers, and one that evoked considerable discussion, was that presented by Morgan B. Smith, engineer, General Motors Corporation, Detroit, Mich. Explaining what factors should govern large industrial consumers in the purchase of fuel, Mr. Smith declared that proper selection of coal is the greatest single element involved in efficient steam-plant operation. He expressed the opinion that careful choice of fuel followed by comparatively inexpensive plant betterments and more intelligent plant operation would go a long way toward raising average boiler and furnace efficiency from 56 to 70 per cent. This would make possible an average reduction of 14 per cent in the amount of coal consumed.

"Steam-plant efficiency," said Mr. Smith, "can be raised only by co-ordinating coal selection, better plant operation, betterment and proper maintenance of plant, adequate records of plant performance and the installation of instruments for the guidance of plant operators and for obtaining comparative operating data. Real team work among men of widely different training, experience and knowledge, and points of view must be attained before maximum efficiency can be gotten."

Dr. O. P. Hood



Before an intelligent selection of coal is feasible the buyer must know his own boiler plant. He must be familiar with the type and size of boilers, volume and shape of combustion chamber, firing methods, type of grates and other auxiliary equipment, average and maximum and minimum boiler ratings, type of furnace construction, and type of refractories used in furnace construction. Special stress was laid upon the refractory material with respect to resistance to fluxing and erosion.

"Commerce doesn't follow the flag," declared S. W. Parr, professor of applied chemistry, University of Illinois, in discussing 'Fuels, Past and Prospective.' "It follows the molecule, provided only that there be enough of them and of the sort to 'make the wheels go 'round.'"

Tracing the development of fuel in the United States in the past one hundred years, Prof. Parr pointed out that in 1826 we produced 11,000,000 tons, or about one ton per capita. We now use five tons. Whereas in 1826 approximately 98 per cent of the fuel used was non-smoke producing, today over 80 per cent is smoke-producing.

TODAY we also have "the smoke evil." This is largely chargeable to the domestic chimney. So far as the steam-generating plant is concerned, the production of great volumes of smoke is an unnecessary extravagance, inefficient, wasteful, unsanitary and avoidable. The speaker saw less chance of reform in domestic heating because of firing methods and the type of equipment used.

"Now what about the future?" he asked. "Is there any relief in sight? Will all of the next one hundred years be required to undo some of the misfortunes which have befallen us along with the marvelous developments of the one hundred years just passed. Some hopeful features are the following:

"(1) Public intelligence is growing.

"(2) Scientific and investigational intelligence has made wonderful advance in this line in very recent years; one might almost say, in recent months.

"(3) Fuel research the world around is being promoted by both government and private agencies today as never before."

Answering an inquiry from the floor on complete gasification processes, Professor Parr said that these were still in the experimental stage. He was inclined to hold the same view on low-temperature carbonization. Complete gasification, he said, was a possibility in the near future.

O. P. Hood, chief mechanical engineer, U. S. Bureau of Mines, reviewed the fuel resources of America. Although our fuel resources are "superabundant," Mr. Hood emphasized that the supply of high-grade coal available at present economic levels is much less than is generally supposed.

Mr. Hood estimated lignite reserves

at 1,000 billion tons, bituminous at 1,400 billion and anthracite at 17 billion tons, exclusive of 1.4 billion tons of anthracite type coal outside of Pennsylvania. "Between bituminous and anthracite coals lie some 56 billion tons of semi-bituminous coals. This is mostly in West Virginia, Pennsylvania, and Maryland in the East, and Oklahoma and Arkansas in the Middle West."

"FUEL ENGINEERS," said a paper by A. C. Fieldner, chief engineer, division of experimental stations; W. A. Selvig, associate chemist, and P. Nicholls, supervising engineer, fuels section, U. S. Bureau of Mines, "have long been aware that the percentage of ash in coal is not the only factor involved in evaluating the effect of this constituent in the burning of coal. The tendency with which the coal clinkers and the nature of the clinkers formed often have more to do with maintaining the desired boiler capacity than has the amount of ash."

Determination of the fusion point of ash, however, is complicated by the composition of the ash and variations resulting from different methods of testing. Clinkering in the fuel bed also is affected by the size of the coal, the type of stoker and the thickness of the fuel bed. The urgent need of making a study of these factors and obtaining some reliable data on the value of fusibility of ash tests as an index of clinkering tendencies led to a co-operative investigation undertaken at the Pittsburgh station of the U. S. Bureau of Mines with the aid of two fellows of the Carnegie Institute of Technology supported by funds subscribed by the New York Edison Co. and the Consolidated Gas Co.

W. Trinks, professor of mechanical engineering Carnegie Institute of Technology, read a paper entitled "The High Cost of Fuel Savings," in which he declared that in many cases it was cheaper to waste fuel than to save it.

IN THE STEEL industry, for example, gas engines with higher heat conversion have been displaced by steam turbines because less space, fewer repairs and an easier available labor force are required for the steam engines. Low-pressure equipment is retained because it would cost too much to replace it with high-pressure machinery.

How to burn high-volatile coal smokelessly in a domestic heating plant was described by Victor J. Azbe. Mr. Azbe, who is chairman of the technical division of the Citizens' Smoke Abatement League, was in charge of a series of investigations made in St. Louis.

During the course of the investigations the conclusion was reached that even the best of the existing methods of firing were not wholly satisfactory because ordinary furnaces are not adapted to delivering the necessary air to the proper point and to create sufficiently high temperatures at such points to insure complete combustion. Mr. Azbe then developed a special baffle.

"Coal Mining and Coal Preparation from the Standpoint of Quality" was discussed by William Beury, general superintendent, Algoma Coal & Coke Co., Algoma, W. Va. He pointed out that the producer had no control over the natural quality of the coal itself, but must concentrate his efforts upon the cleaning and preparation of the fuel as mined. This means cleaning at the face as far as possible, and hand-picking of the larger sizes.

A. C. Fieldner

Recent developments in low-temperature carbonization were described by Colonel H. D. Savage, vice-president, Combustion Engineering Corporation, who illustrated his talk with lantern slides showing the low-temperature carbonization plant of the Mathias Stinnes interests at Essen, Germany. The system there used, he said, had been in commercial operation for three years and it has been accepted in England and in Spain. It was to have an American application in the plant to be erected at New Brunswick, N. J.

Colonel Savage predicted a rapid development for the low-temperature carbonization processes, particularly when the plant was an adjunct of a public utility. He foresaw an early union of gas and electric utilities with these companies supplying the householder with solid domestic fuel as well as with gas and electric energy. Anthracite-consuming territory, he thought, offered a fruitful field for the profitable sale of the solid fuel from low-temperature carbonization.

Williamson Mine Officials to Discuss Problems; Annual Safety Day Planned

ACTION empowering the officers to appoint committees to formulate plans for an annual Williamson Safety Day and to canvass all members and report on the advisability of organizing and fostering regular meetings of superintendents and foremen for the discussion of mining problems was taken Oct. 27 at the business session of the fifteenth annual meeting of the Operators' Association of the Williamson Field, held at Williamson, W. Va. Because of the illness of Thomas Devenny, president, George Patterson acted as chairman of the meeting.

The report of the executive committee, of which George Dunglinson, Jr., is chairman, stated that the labor situation has remained satisfactory during the year. Workmen's compensation, however, became a still more serious problem, though investigation indicated that where companies carried their own insurance the cost was reduced by reason of closer supervision.

The committee urged some action of the association toward stopping the shipping of unsold coal and called attention to a recent increase of "no bill" cars at Portsmouth, Ohio. It was moved to request the National Coal Association to consider action toward obtaining the publication of daily reports of the number of cars of distress coal at all principal points of distribution.

Preceding action establishing a safety day R. M. Lambie, chief of the West Virginia Department of Mines, was invited to speak. He said that at the present rate of occurrence fatal accidents during the year would cost the Williamson operators $250,000. The field has had five fatal accidents in October, all preventable.

The by-laws of the association were amended, changing the date of the annual meeting from the third Thursday in October to the first Thursday in that month.

For the fifth consecutive term, Thomas Devenny was elected president of the association. The other officers are: L. E. Woods, vice-president; W. S. Leckie, treasurer, and George W. Coffey, George Dunglinson, Jr.; G. F. Downey, L. E. Woods and H. T. Wilson, executive committee.

At the annual dinner George Dunglinson, Jr., was toastmaster. Among the principal speakers were Harry L. Gandy, executive secretary, National Coal Association, B. W. Herrman and R. M. Lambie.

Films Schaeffer Method

A one-reel motion picture on the "Schaeffer Prone Pressure Method of Resuscitation" was recently completed by the Eastern Film Corporation, New York City. The film, which was made under the direction of A. J. Van Brunt, Public Service Corporation of New Jersey, visualizes the practical application of the method as recommended by interested national organizations as a result of the activities of the Public Health Service in Washington. Companies may obtain the film for instructing employees in the proper use of the method in electric shock, asphyxiation and drowning.

Mining Congress Program Makes Wide Appeal

"Mining, the Keystone of Industry," will be the keynote of the 30th annual convention of the American Mining Congress, to be held Dec. 1, 2 and 3 at the Mayflower Hotel, Washington, D. C. This will be the subject of the opening address, by William H. Lindsey, president, who also will advance a program of activity to be followed by the organization.

Herbert Hoover, Secretary of Commerce, will speak on "The Economic Importance of Mining to the Nation" and Sidney J. Jennings, president, United States Smelting, Refining & Mining Co., will make "A Plea for Unity in Natural Resource Industries." A "Bureau of Mine's Hour" will be conducted by Director Scott Turner of that Bureau, in which the work of that federal agency will be considered.

Legislation affecting natural resources will be considered at a session presided over by J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va. One of the speakers will be U. S. Senator Tasker L. Oddie of Nevada, chairman of the Senate Committee on Mines and Mining, who will outline the status of mining on the Congressional legislative calendar.

H. N. Taylor, president, U. S. Distributing Corporation, New York, will preside over a session to be devoted to considering the advisability of modifying the anti-trust law in the interest of promoting the commercial prosperity of the country. J. D. A. Morrow, president, Pittsburgh Coal Co., and S. D. Warriner, president, Lehigh Coal & Navigation Co., will make addresses.

Kanawha Operators Meet and Elect Officers

The twenty-third annual meeting and get-together of the Kanawha Coal Operators Association was held at the Kanawha County Club at Charleston, W. Va., on Oct. 20. Col. W. M. Wiley was toastmaster at the banquet.

C. A. Cabell, Carbon Fuel Co., is the newly elected president. Upon succeeding D. M. Morton to that position, Mr. Cabell breaks a twenty-three year association record by becoming president for the third time.

Everett Drennan and Lew Webb are the new directors. These two men together with C. A. Cabell, W. C. Mitchell, Deering Christian, John Laing, John S. McKeever, W. M. Wiley, and Frank O. Harris compose the present board. W. C. Mitchell was named vice-president, D. C. Kennedy, secretary, and John L. Dickinson, treasurer.

The secretary's report, read at the business session held in the morning, mentioned that the last year's tonnage from the 192 mines in the association was 19,000,000. The report of the auditing committee indicated a comfortable financial status.

Coming Meetings

Harlan County Coal Operators' Association. Annual meeting Nov. 10, Harlan, Ky. Secretary, E. R. Clayton, Harlan, Ky.

Southern Appalachian Coal Operators' Association will hold its annual meeting at Whittle Springs Hotel, Knoxville, Tenn., Nov. 11, Secretary, R. E. Howe, Box 687, Knoxville, Tenn.

American Institute of Mining and Metallurgical Engineers and National Coal Association. Joint conference on "Mechanization in Coal Mines," Nov. 12 at Knoxville, Tenn. Arrangements in charge of R. E. Howe, Box 687, Knoxville.

Illinois Mining Institute. Nov. 18 and 19, at Urbana, Ill. Secretary, Frank F. Tirre, St. Louis, Mo.

American Mining Congress, Thirtieth Annual Convention, Washington, D. C., Dec. 1, 2 and 3. Secretary J. F. Callbreath, Munsey Building, Washington, D. C.

American Society of Mechanical Engineers. Annual meeting, week of Dec. 5 at Engineering Societies Building, 29 West 39th St., New York City. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

Coal Mining Institute of America, 41st annual meeting, Dec. 7, 8 and 9 at Pittsburgh, Pa. Secretary, H. D. Mason, Jr., Box 334, Ebensburg, Pa.

Personnel Changes

WILLIAM CHANDLER has resigned as consulting engineer for the Hudson Coal Co., Scranton, Pa.

E. R. GLASS, Beaver, Pa., has been appointed assistant to D. H. Pape, executive secretary of the Monongahela Coal Operators' Association.

THOMAS MOORE has resigned as superintendent of the Vanderbilt works of the W. J. Rainey Co., near Uniontown, Pa., after ten years' service.

COLONEL S. A. SCOTT retired Oct. 1 as general manager of the New River Co. after sixteen years' service. Colonel Scott, whose headquarters were in Macdonald, has been succeeded by M. L. Garvey, formerly general manager of the Maryland New River Co. mines on Keeney's Creek. Dr. Gory Hogg, assistant general manager of the New River Co., also has retired. Colonel Scott will continue to serve as vice-president of the company and will be active in an executive capacity. His successor, who also has been president of the New River Coal Operators' Association for several years, will be succeeded in the management of the Maryland New River Co. by his brother, J. W. Garvey.

DAVID V. RANDALL, Shamokin, has been appointed, effective Nov. 1, to the newly created position of general superintendent of the Susquehanna Collieries Co., with headquarters in Wilkes-Barre, Pa. He will be succeeded by W. B. Geise.

Notables Will Attend Anthracite Parley

Ralph E. Weeks, president of the International Textbook Co., Scranton, Pa., has been chosen permanent chairman of the co-operative anthracite convention to be held at Mount Carmel, Pa., on Nov. 9, 10 and 11. Mr. Weeks has summarized the aims of this convention as, "to create an anthracite spirit, constant and uninterrupted supply of hard coal, bringing about humane and sympathetic understandings between miners and operators, permitting co-operation of the buying public and expansion of coal sales territory."

The program for the three days' meet will include addresses by Governor John S. Fisher, of Pennsylvania; Herbert Hoover, Secretary of Commerce; Mayor William Hale Thompson of Chicago; S. D. Warriner, president of the Lehigh Coal & Navigation Co. and chairman of the Anthracite Operators' Conference; John L. Lewis, president of the United Mine Workers; T. J. Varnish, Chicago; and Bishop Darlington of Harrisburg. Scientific research work will be discussed by Dr. Benjamin L. Miller, of Lehigh University; Dr. George Ashley, of the State Geological Survey; and F. G. Tryon, of the U. S. Bureau of Mines.

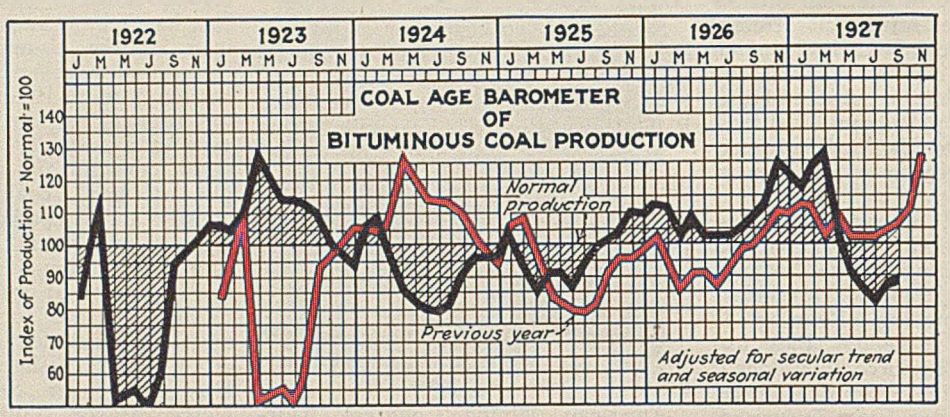
Frank H. Kneeland

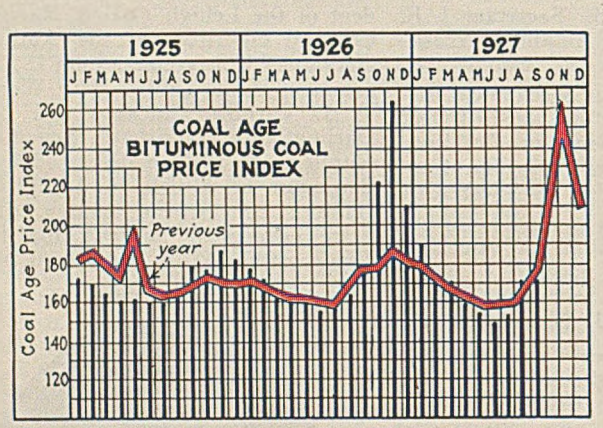
Kneeland Goes to Chicago

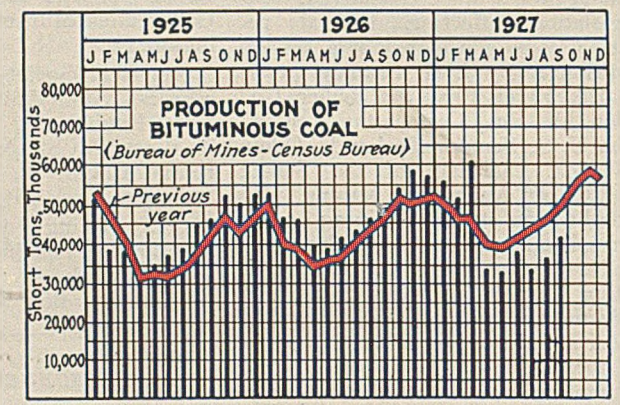
After rounding out fifteen years' service on the editorial staff of *Coal Age*, Frank H. Kneeland resigned effective Oct. 22 to become associated with the Safety Mining Co., Chicago. This company specializes in the Cardox method of shooting coal. He assumed his new duties as mechanical engineer with the latter company on Oct. 24.

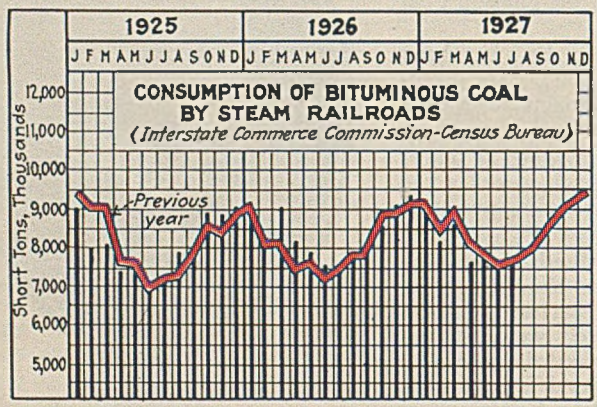
Mr. Kneeland, who is a graduate of the University of Illinois, has had a long and varied career in the coal mining industry, his experience including connections in Newfoundland and South America. For a time he also was in the employ of the United States Coal & Coke Co. in southern West Virginia.

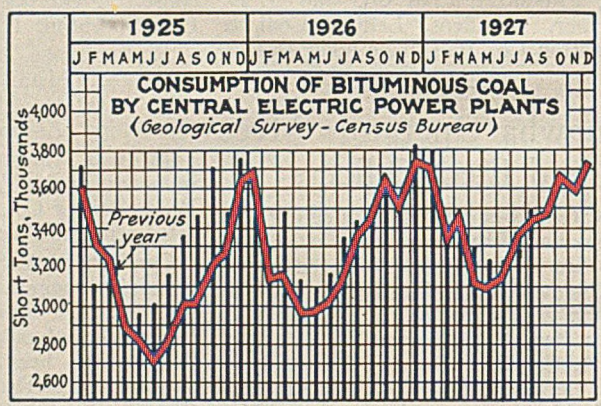
Indicators of Activities in the Coal Industry

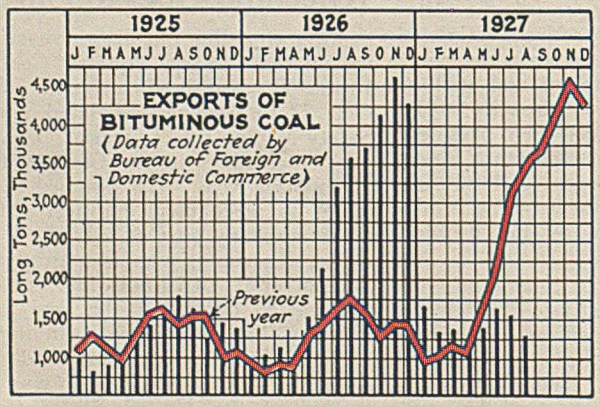


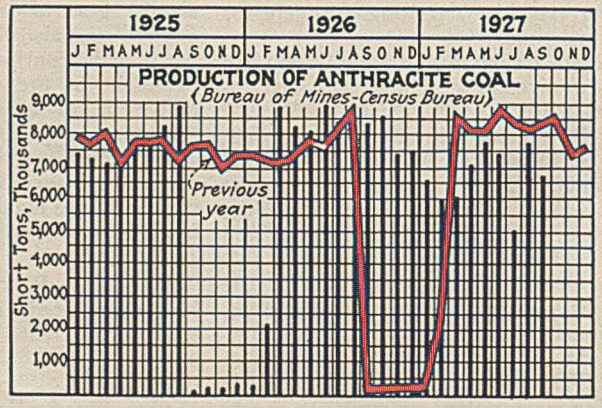












MARKETS *in Review*

PEACE in the labor controversy in Illinois, Indiana, Iowa and the Southwest early in October had a depressing effect upon the spot bituminous coal markets of the country last month. Kentucky and West Virginia were the first to feel the reaction, but the influence also spread into Ohio and Pennsylvania because the Southern tonnage forced out of the Middle West by the resumption of operations in Illinois and Indiana entered into more active competition with coal from Ohio and Pennsylvania.

The news of the settlement in Chicago was followed by a flood of cancellations of orders previously placed for Southern coal. Distress tonnage accumulated before operators could readjust their production programs to the new order of things and West Virginia and Kentucky slack sold down to prices reminiscent of sacrifice sales of pre-war days. Mine-run and prepared sizes also suffered in the decline.

WEIGHTED average spot prices declined 17c. and *Coal Age News* Index of spot bituminous prices dropped from 171 on Sept. 28 to 157 on Oct. 26. This decrease, however, does not begin to measure the actual losses since the averages for the country as a whole were bolstered up by the increased tonnage coming out of the Illinois fields after Oct. 1. Production in that state the first week after the settlement rose to 716,000 tons, as compared with 229,000 tons the week preceding. The larger figure, however, was less than half the output for the corresponding week last year.

Average spot prices on western Kentucky coal dropped 81c. between Sept. 28 and Oct. 26. Southeastern Kentucky averages declined 33c. The Pittsburgh district showed a loss of 35c. Southern Ohio quotations fell off 30c. High-volatile coals from southern West Virginia declined 22c. Low-volatile coal suffered the least, with mine-run dropping only 11c. Slack from the Pocahontas and New River fields, however, fared less happily.

THE path of the Illinois operators has not been easy the past month. The northern field is still down and few mines are working in the central part of the state. Most of the operating activity centers in southern Illinois, with Franklin County leading, but even there many mines have not reopened and others face broken running time. The chief drawback is the lack of any real market for screenings.

Indiana, where many mines had made peace with the United Mine Workers before the general settlement, has had harder sledding since the truce. Iowa has been unable to reach anything like full-time operation. In the Southwest non-union operations have been growing so rapidly in the past three years that Kansas alone is affected by the renewal of the agreement with the union.

DEVELOPMENT of a full-fledged labor war in Colorado has been precipitated by the Industrial Workers of the World, who declined to be satisfied with the wage increases granted effective Oct. 1 by the operators. This strike, which is unsupported by the United Mine Workers and has been denounced by the State Industrial Commission, is spreading. Prices on prepared sizes of Utah and Wyoming coal entering the Colorado market have been advanced 50c.; slack is up 75c. and mine-run $1. The local Utah market has been disappointing to the operators.

Until late in the month, the Northwest was the most active section of the country, but weather and the Illinois settlement have since slowed up business in that section. Milwaukee dock trade also has been lagging. Nevertheless the movement of coal from the lower ports has been well maintained. Up to Oct. 24 total cargo shipments for the season totaled 28,557,593 net tons as against 23,709,914 tons in 1926.

SOUTHEASTERN markets have been hard pressed as a result of the Illinois-Indiana truce. Western Kentucky has borne the brunt of the decline, but southeastern Kentucky coals also have been slipping. Louisville now pins its hopes for a revival on cold weather. West Virginia coals have been finding the spot market a sorry proposition. Apparently, however, the producers are readjusting their tonnage rates. The number of loads interchanged through the Cincinnati gateway dropped from 15,154 during the week ended Oct. 8 to 12,437 cars the week ended Oct. 22.

Ohio markets have been depressed both by unfavorable weather conditions and by the Illinois settlement. There is no indication, however, that Ohio operators will again deal with the union. This same unwillingness also is strong in Pennsylvania where the general complaint is not inability to get workers to man the mines but to find a market to absorb the tonnage which can be produced with the available working force.

TIDEWATER markets have been weak. New England in particular has shown no interest in the spot offers and purchasing agents seem determined to wait for still lower prices. Actual receipts of coal this year, however, have been ahead of the totals for the four preceding years. New York, too, has been marking time, with most of the business confined to contract customers. While Philadelphia has not been hurt directly by the Illinois settlement, the sentimental reaction to spot buying has been unfavorable.

In common with other seaboard markets, trade at Baltimore has contracted and prices have worked lower. Weather is charged with the chief responsibility for curtailing activities in the Birmingham district. While high temperatures have hit the domestic side of the trade the hardest, there also has been a slowing down in industrial and railroad buying; with few exceptions these consumers are taking only minimum allotments on contracts.

CONTRARY to fears expressed early in the month that the Illinois settlement would hurt the sales of anthracite chestnut, that size has been forging ahead. In the past ten days it has ousted stove from the position of favorite. Egg and pea, on the other hand, continue to move slowly. Steam sizes, which were inclined to be soft at the beginning of the month, also picked up. One favorable development was the increasing demand for domestic sizes in the Northwest. Lake shipments to Oct. 15, however, were only 1,202,040 net tons as compared with 1,905,138 tons the corresponding period last year.

In sympathy with the expanding market production of hard coal has been creeping up. Output to Oct. 15 was 63,895,000 net tons — a decrease of 2,257,000 tons when compared with 1926 figures. During the first six weeks of last year the anthracite mines were shut down by a strike. Despite the decrease the situation is not tightening.

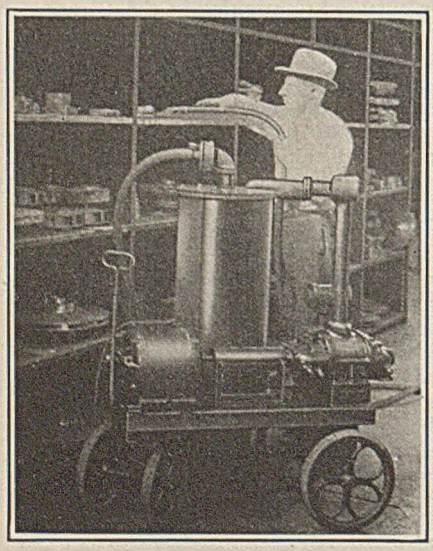
BEEHIVE coke in the Connellsville district has been slow. With the iron and steel industry backward there has been little demand for metallurgical coke and domestic buying has been below expectations. The byproduct side of the industry has been more successful in marketing its product.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

At PITTSBURGH COAL COMPANY

Vacuum Cleaners Help Keep Mine Bright

Probably many coal mining men have often wished that they could utilize their wives' vacuum cleaners to remove dirt from the mine office, power plant or warehouse. The illustration shows such



Housecleaning at the Mine

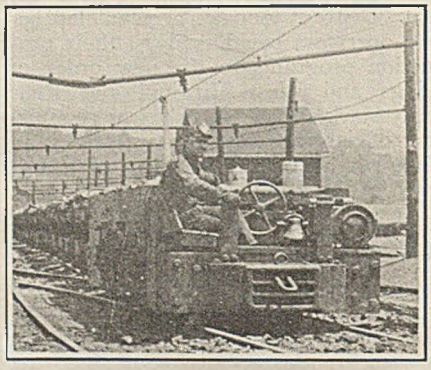
a machine employed in the warehouse at Library, Pa.

This equipment is readily portable and can be operated wherever electric current is available. Although shown sweeping out the shelving in the warehouse, it has been employed for many other purposes and in many other places. One of its chief advantages is that shared by practically all other machines of this type—it will successfully pick up dust and dirt without throwing it into suspension in the air. It is, of course, necessary to periodically remove this material from the dust chamber of the machine. Aside from this, and an occasional oiling, it requires very little attention.

Trolley Shoes Superior For Heavy Service

Heavy mine locomotives, when operating up to or near their capacity, naturally draw a heavy current from the trolley wire. The ordinary trolley wheel collects and transmits this heavy current with difficulty, and much arcing and burning or pitting of its surface as well as that of the trolley wire results. On several of its biggest machines, therefore, this company has adopted the use of a trolley shoe in place of the wheel.

Such a shoe gives a sliding surface-contact in place of a rolling line-contact which is all that is theoretically afforded by the wheel. Thus far, these shoes have given excellent satisfaction and far outlast the ordinary trolley wheels on heavy locomotives. They are open to the objection that they give some



Bringing Out the Coal

difficulty in backing and do not follow the trolley as readily when the machine is moving backward as does the ordinary trolley wheel. Another somewhat similar innovation now being adopted by this company is the use of a 6/0 trolley wire which will be installed on certain entries. This wire is approximately 344,825 circ.mils in section and weighs about 1 lb. per foot. It can be mounted in a standard 4/0 trolley hanger and should be little, if any, more difficult to install and maintain than the 4/0 size wire that has been used in many mines for years.

PROGRESS is made step by step through the exchange of ideas. Every man learns from others. Production men, electrical men and mechanical men are constantly trying out new methods for increasing efficiency and reducing costs. One idea suggests another.

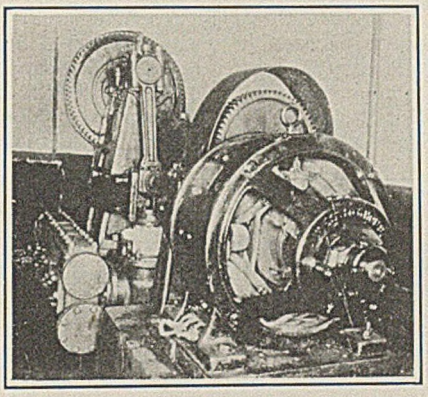
COAL AGE has been for years the medium through which operating men have traded ideas. Underground methods, shop kinks, haulage devices, tipple arrangements, electrical and mechanical pointers and safety methods all have a place in this picture.

IDEAS are worth money. *Coal Age* will pay from $5 up for those that are accepted and published in these columns. Here's your opportunity to win recognition for yourself and get paid for it. Can you use a few extra dollars? Practically everybody can.

LET'S GO! Short stories are best. We'll help you edit them. Simple sketches will do, too, or good snapshots. Our drafting room and illustration department will do the rest. Some of the most simple devices are the very things another fellow is looking for.

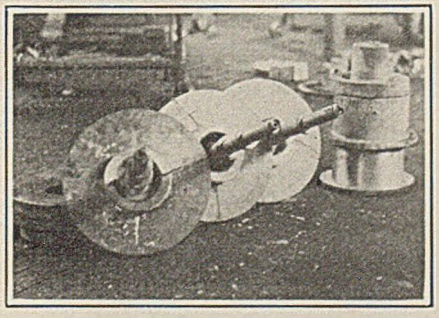
Acidproof Pump Parts Cut Replacement Charges

Practically all mines have more or less water which must be removed in some manner. In most instances, mine water is acidulous and attacks the pump and pipe lines with which it comes in contact. As a result, in order to withstand the ravages of this acidulous water, various acid-resisting materials have been adopted.



Porcelain Plungers at Work

To cope with the acidulous water in its mines, this company has been using acid-proof metals and other materials in its pumps for some time. One of the accompanying illustrations shows some acid-resisting metal parts that have been finished in the mine shop. Another shows a pump, installed underground, which has been provided with porcelain plungers. Porcelain seems to be entirely immune from the attack of acid water, and the longer it is used the smoother it gets and the easier it is to keep packed.



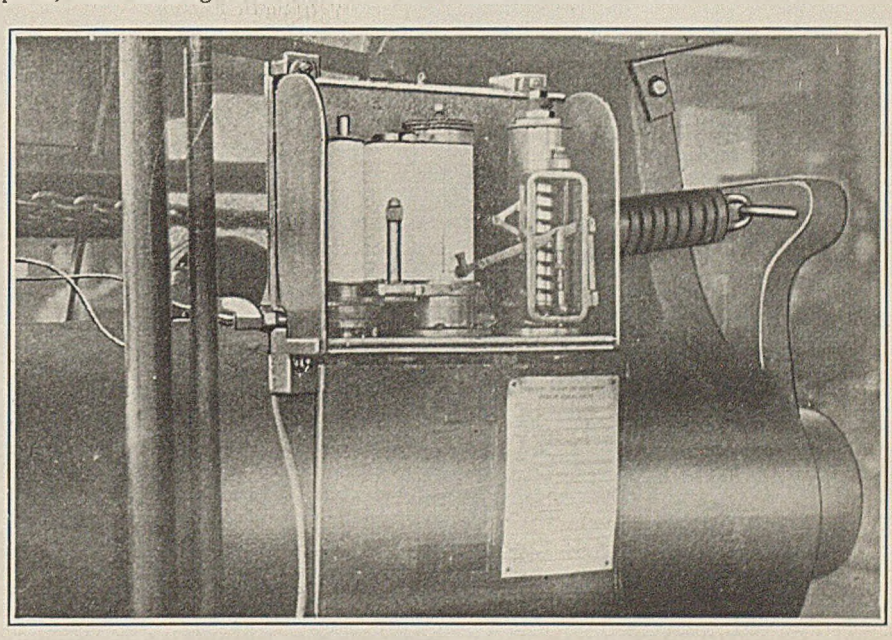
Finished in the Shop

For the various metal parts of pumps, Ascaloy, Duraloy and Cimet have all been used. However, the latter because of its hardness has been almost entirely superseded by the other two. The company buys the rough metal castings and finishes them up in its own shops. This method of coping with the extremely acidulous mine water encountered has proved entirely satisfactory. Such parts as impellers, valves and valve-seats which, if made of cast iron or bronze would last for only a short time, now last almost indefinitely.

Recording Pressure Gage on Wheel Press Places Responsibility for Poor Workmanship

In many shops, both at the mines and elsewhere, if two or more men work on the same job and it proves a failure, it appears to be a favorite "indoor sport" for each to blame the other; that is, "he passes the buck." Thus, it is difficult for the superintendent or person in charge of the operation to really determine which man is at fault.

At the Library shops, when it became necessary to make up a pair of drivers for an electric locomotive, three men performed the entire operation. One of them turned up the axle on a lathe, another bored the wheels and gear on a boring mill and the third pressed these parts onto the shaft in the wheel press. To obtain a proper fit of the various parts, close turning of the axle and accurate boring of the wheels were necessary. A variation in diameter or bore of 0.001 in. would make a decided difference in the pressure required to push the wheel into place on the axle. If one of the wheels became loose in operation, it was practically impossible to trace down and determine which one of the three men was at fault—even though the pressman kept a record of the pressures necessary to force the wheels onto the axle.



Prevents "Buck Passing" and Improves Product

To overcome this difficulty, the automatic recording gage shown in the photograph was installed upon the wheel press. This device somewhat resembles a steam engine indicator fitted with a continuous recording card. In other words, forward motion of the ram draws a ribbon of co-ordinate paper over a drum and the height of a pen on the paper indicates the pressure in tons exerted by the ram. Thus a permanent record of all pressing operations is obtained. It is the duty of the pressman to date this ribbon and mark the job number over each of the diagrams made on it. He also makes a record on his work slip showing the pressure at which each part went to place. This latter is read from the ordinary pressure gage mounted on the front of the machine.

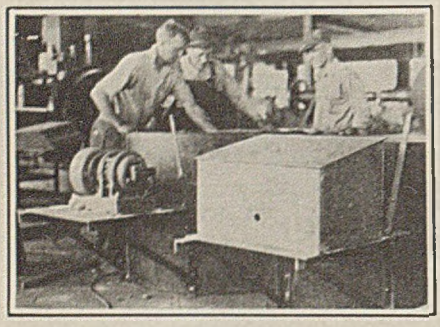
As has been stated, in pressing on wheels the operator observes the gage on the front of the machine, but the telltale on the back simultaneously draws a graphic record. Assume that an order comes from one of the mines for a complete pair of locomotive wheels. This job is given a number. The lathe hand who turns up the axle stencils the job number on its end. The boring-mill man, who bores the wheels and also the gear, stencils the same number on these parts. When the wheels are pressed on, the pressman, as stated, records the job number and press pressure for each part on his slip and also the job number and date on the automatic gage ribbon. In event any question arises with reference to this job, the recording gage record should tally closely with that of the pressman.

This recording equipment was built by the American Steam Gage & Valve Manufacturing Co. of Boston, and is known as the hydraulagraph. Forward movement of the ram moves the ribbon but reverse movement is taken up in a ratchet mechanism. The ribbon is ruled in 5-ton divisions which have been found amply close for all practical purposes. Since this device has been installed, it is difficult if not impossible for false records to be turned in.

Modern Blacksmith Forge Speeds Shop Work

Almost every mine nowadays is provided with its blacksmith shop. In fact, such a shop is almost as indispensable as are the miners themselves. The fact remains, however, that the blacksmith shop of the old type, regardless of how brightly the fire may glow or how musically the old bellows may wheeze, would hardly be considered efficient or adequate to present-day mine needs. The illustration shows two modern blacksmith forges under construction in the Library shops.

Each forge is built of ⅜-in. steel, has a diameter of 48 in. and is 36 in. high. A portion of this height, however, will be sunk into the blacksmith shop floor, so that the actual or working height will be from 28 to 30 in. The circular portion of the forge itself was purchased from the Smith Boiler Works, Monongahela City, Pa. It is provided with a suitable self-cleaning tuyere block fitted with a paddle ash-dump. The draft is furnished by a ½-hp. General Electric Co., type KF, motor operating at 3,470 r.p.m. on three-phase

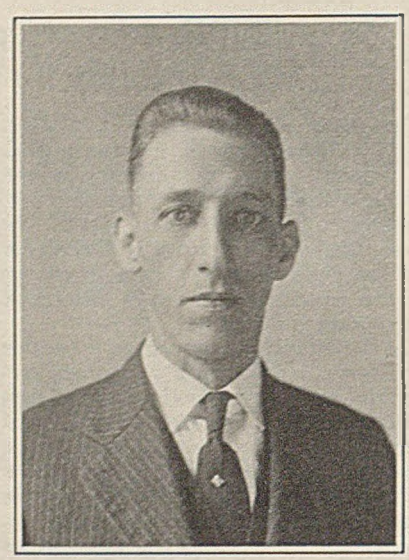


Clean, Compact and Convenient

alternating current. This is direct-connected to a No. 1 Sirocco blower, the complete unit being mounted on a bracket installed in the Library shop. The blower can be regulated by means of an ordinary paddle valve.

To protect the motor and fan from dust and dirt, as well as from accidental injury due to the handling of work in the forge, they are inclosed in a suitable sheet-iron case, the whole forming a compact and convenient unit. The plate work on these forges is either riveted or electric welded, depending upon which is the most convenient. Naturally, wherever these forges are installed they will be provided with the necessary uptakes and stacks. A suitable push-button switch also will be placed at some convenient point.

Modern shop practice demands efficiency, and this is seldom to be had without convenience to the workmen. There is no comparison between the convenience and efficiency of a forge of this kind and one such as was formerly installed in the "village smithy."



C. B. LeBon
Library Shops

Elevated Fire Siren Has Increased Range

With the electrification of coal mines has come the problem of providing some simple means of signalling or calling the men to work. At steam-operated installations the ordinary steam whistle admirably performs this function. At the electrified mine the siren is most generally used.

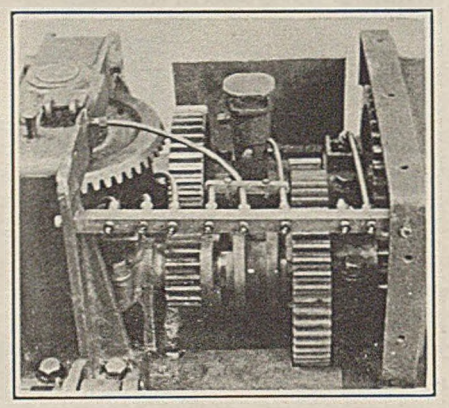
The photograph shows an extremely simple mounting for an electric siren installed at the Midland No. 1 mine. It is desirable to place such a signal in an elevated position so that the sound emitted by it will carry over long distances. In this instance it is simply mounted on a plank platform built on crossarms near the top of two cedar poles. This furnishes a cheap and fairly efficient mounting which, if properly constructed, should last for many years. More important, the sound of the siren can be heard throughout the camp.

Calls Them to Work

Bearing Lubrication Is Made Easy

Many machines employed in and about the mines are fairly complicated and their proper lubrication is not an easy task. Although many of the bearings are exposed and may be readily reached with an ordinary oil can, some of them are in places which are difficult to reach.

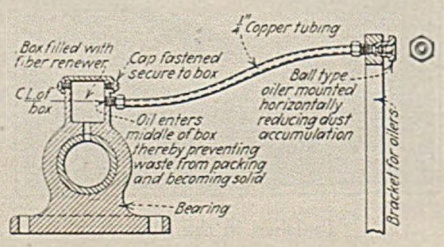
To assure that bearings in comparatively inaccessible positions shall be made easy of lubrication, this company has adopted the practice of bringing the points for oil lubrication to a convenient place on the mechanism. The photo-



No Need to Get Dirty Here

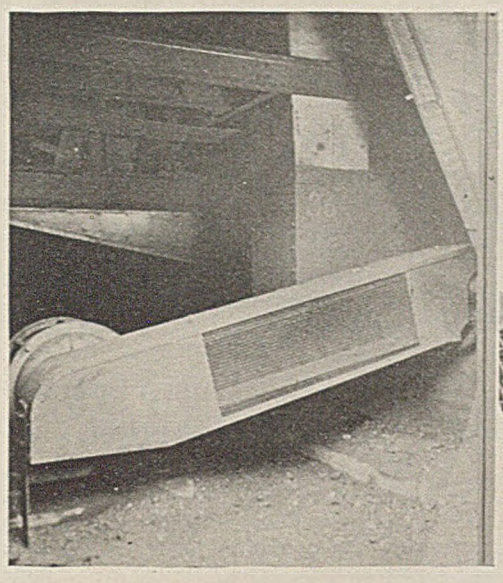
graph shows a top view of a mining machine and the piping that has been added. Brass or copper pipes are attached to the bearings to be oiled and are led to a suitable block at some point on the machine that can be readily reached by the machine runner. An oil gun is used to force lubrication.

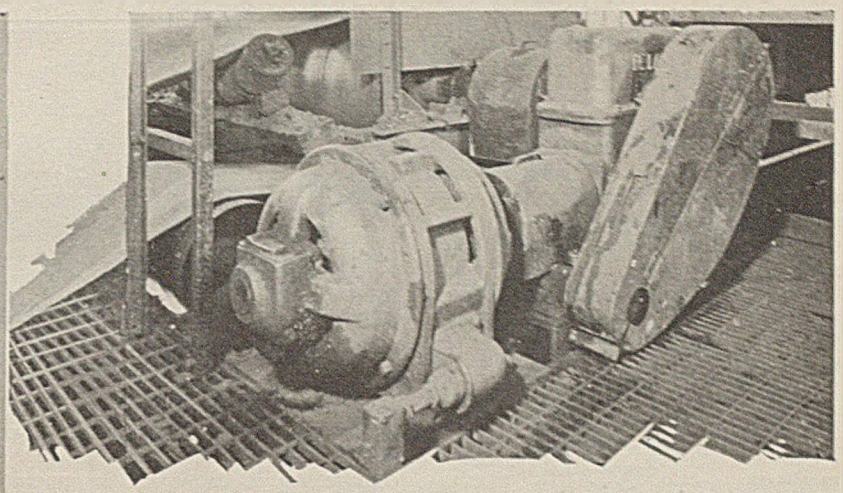
On waste-packed bearings the lubricant is discharged not on top of, but into the side of, the waste packing. As



Does the Job

is well known by all mining men, no matter how carefully such waste packing is protected from the dust which is invariably present in the mines, this material will collect on the surface of the waste. Introducing the lubricant into the packing at some point below its surface assures that the oil will reach the bearing without having to pass through a layer of this dust. It thus reaches the surfaces in a better condition than would otherwise be the case. Details of the construction of this oiling mechanism are given in the sketch above.



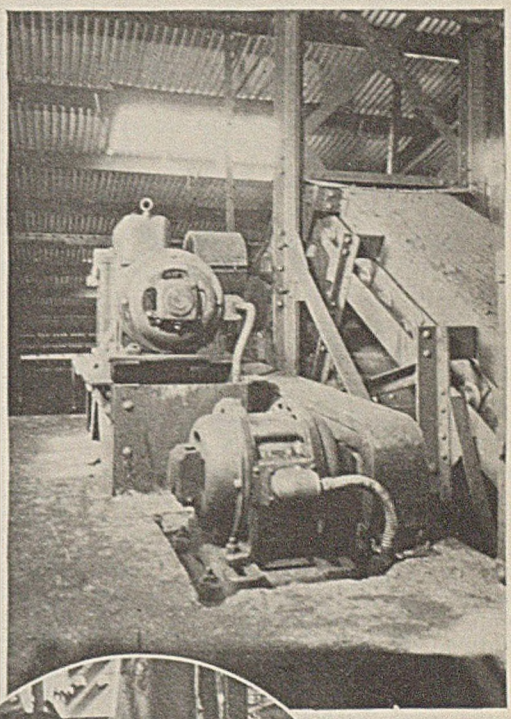


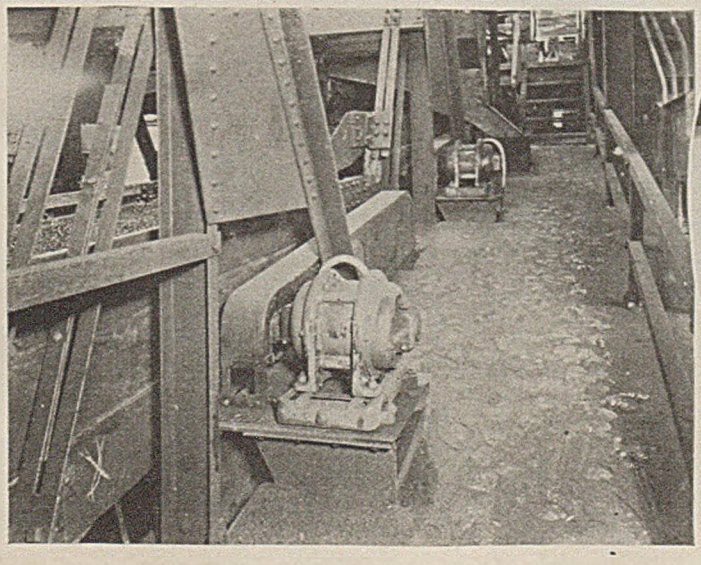
Effective Machine Guards Serve as Life and Equipment Insurance

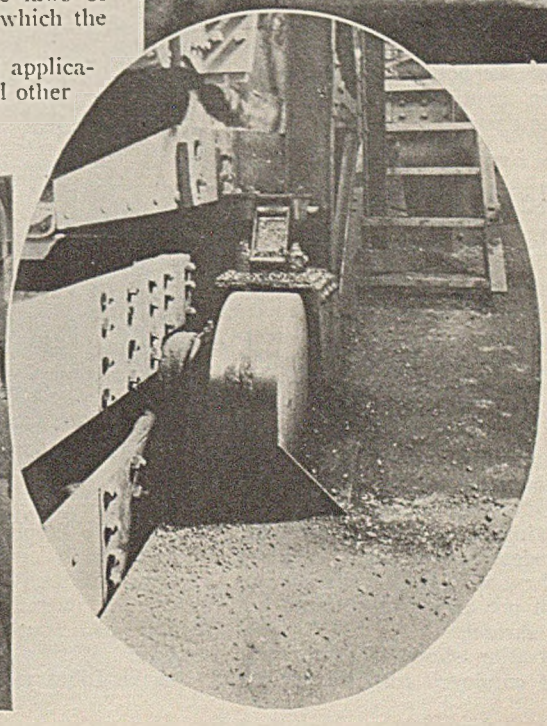
GUARDS undoubtedly receive the least attention of any part in machine construction and design, says C. B. LeBon, employed in the Library shops. However, when one realizes that protective appliances are used primarily to preserve human life, their proper application becomes of great importance. Therefore, an investment in properly constructed guards is comparable to purchasing fully paid-up life insurance. Since the inclosed parts are not exposed to dirt and other destructive materials, well-designed guards become a further asset by prolonging the lives of machines. Protective devices should be of durable construction, and the inclosed parts should be easily accessible for adjustment or repairs. Provision should also be made for inspecting or oiling the inclosed parts without entirely removing the guards or stopping the machinery.

When gears and chains are inclosed and run in a bath of oil, friction, wear and noise are reduced to a minimum. Quiet surroundings also tend to increase the efficiency of the men. Another advantage of proper inclosures is the lessening of the ever-present hazard of fire due to spillage of oil and grease. The safety laws of the various states are intended to protect the lives of the workingmen. The laws of nature should teach the preservation of the machinery upon which the livelihood of these men depends.

The photographs on this page illustrate some of the many applications of guards to couplings, flywheels, belts, chain drives and other mechanisms at the mines of the company.



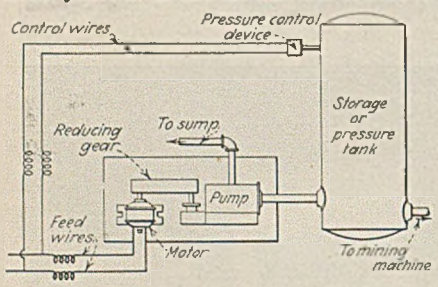




Automatic Water Supply Allays Cutter Dust

At Banning No. 2 mine, the cutter bars of the overcutting machines are continually supplied with water from an automatic pressure system. As shown, this is extremely simple in its construction, and consists of a tank set vertically on the main heading, into which water is forced until the air pressure reaches approximately 35 lb. per sq.in. When this pressure is attained, power to the pump is automatically cut off.

A pipe line leads from the bottom of the tank to the various working places, usually about as far as the last crosscut.



Simple, Cheap and Dependable

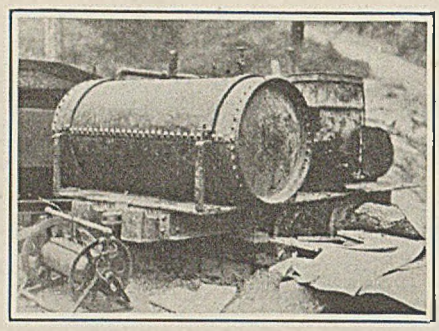
From here, hose reaches to the machines, where it is attached to a permanent pipe installed upon them. By this means, water is continuously squirted onto the cutterbars. When the tank pressure falls below a critical point, power is applied to the motor and the pump restarted. A 5-hp. motor is employed to drive this pump and, at the present time, runs only a small part of the time.

Dust from an overcutter is particularly bad, as it is automatically thrown into suspension by the action of the chain. This dust leaves the kerf near the roof, and much more of it finds its way into suspension in the air than is the case with an undercutter which discharges near the bottom. Keeping the cutter chain continuously wet allays much of this dust.

Movable Air Compressor Aids Construction

During recent years many coal mines throughout the United States have utilized portable or mine-car compressors for various operations underground. As a rule these are electrically driven and are fitted with an unloading device which either stops the compressor motor or unloads the compressor when the pressure in the receiver has built up to a certain amount. The machine again starts when the pressure falls to a predetermined point. In many instances, these machines serve a valuable purpose not only underground but also on the surface.

The illustration shows a compressor of this sort employed on construction

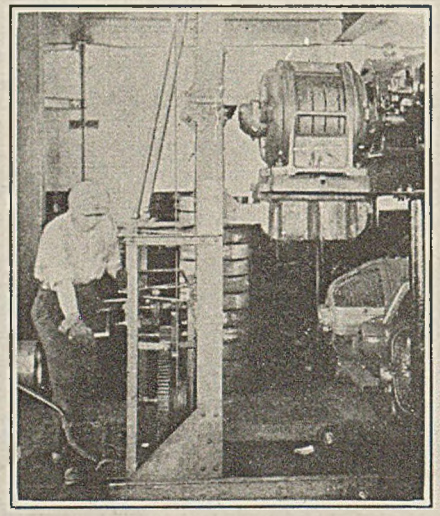


Reduces Labor and Saves Time

work at the Banning No. 2 mine. This particular mine is being redesigned, and a new entrance built to it. The compressor is employed for operating small rock drills in this construction work. It has been set off the track outside the new driftmouth, and power is brought to it by means of a vulcanized-rubber covered cable laid along the ground. Compressed air is led from the receiver to a convenient point within the new driftmouth and from there, by means of hose, to the point of application. This means of drilling is not only far easier than handwork, but is also much more rapid. It has greatly facilitated the work of building the new driftmouth.

Portable Elevator Is Warehouse Friend

With the increasing electrification and mechanization of mines comes the problem of properly storing spare equipment and repair parts. To effectively



Solving the Storage Problem

utilize warehouse space, it is frequently desirable to employ elevated platforms or racks so that material may be stored in tiers. It then becomes necessary to elevate or lower the equipment or parts that are to be put into, or taken out of, storage.

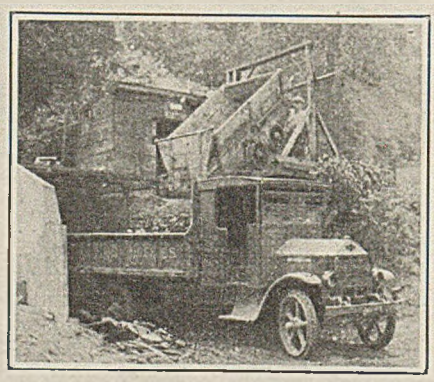
At the Library shops, the storage of spare motors and other equipment is greatly facilitated by a portable elevator. In the illustration, a spare motor is being raised to the level of the upper storage rack. By means of this apparatus, one man is able to raise or lower a motor to or from this height without difficulty and in a comparatively short time. Storing surplus equipment in this manner practically doubles the capacity of a given area of floor space. It also greatly lightens the work of the warehouse keeper.

Mine-Car Dump Speeds Refuse Disposal

At many mines the auto truck is playing a rôle of ever-increasing importance. This not only applies to every-day operation but to construction work as well. The Banning No. 2 mine is being redesigned and a new drift opened to give access to it. The refuse from this new opening is being disposed of by means of auto trucks which haul it away to a suitable dumping point. The photograph shows the means employed for discharging the mine cars.

As shown, the dump is an extremely simple hand-operated device, constructed on the job. It consists of a short countershaft carrying a pinion and a handcrank. The pinion meshes with the gear on a cross-shaft mounted in bearings on an upright wooden frame, to which a chain is attached. This chain carries a hook which may be slipped entirely through the coupling-pin hole of the drawbar of the car.

This dump is located on an elevated platform, the trucks backing up to a suitable point below its end. The position of the car on the track is such that, when it is up-ended by a rotation of the hand crank on the dump countershaft, the contents of the car will slide into the truck below. Two to three carloads are enough to load a truck and the track leading from the new driftmouth is long enough to hold sufficient cars to furnish a reserve to keep one or more trucks busy. After the car has been discharged, release of the lifting crank permits it to settle back upon the track in normal position.



Efficiency Plus