

COAL AGE

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Coal, of Late Years, Has Been Too Costly

MUCH of the present difficulty in the coal industry has arisen because coal is too expensive. If anthracite had been a little cheaper and a little cleaner, oil would not have displaced it so freely, if it had displaced it at all. If bituminous coal had been less costly, locomotives would not have burned oil so extensively, nor would it have been consumed by industry at such long distances from the oil fields. If coal had been cheaper the use of water power would have been less general. The balances always wavered dubiously between one source of power and heat and another. A trifle in either pan of the scale would have thrown the pointer over with violence.

That oil has everywhere a strong rival in bituminous coal is shown by the fact that its use on railroads has not recently gained. Bituminous coal is a successful competitor with water power as is clearly evidenced around Niagara Falls, where water power and coal power are marketed side by side. An engineer recently engaged by a Western public-utility firm was asked to provide for it a new water-power system. His reply was that he did not know whether he would give his approval to the establishment of any such system, as he believed that with coal he could manufacture electricity for the firm at a lower price per kilowatt-hour when interest on construction costs was considered.

* * *

If coal had been cheaper the wonderful economies in its use would have been made more slowly. What "put the crimp" in the coal industry was the high price during the war. This, of course, was due not so much to the high cost of production of coal as to artificial valuations due to shortages and panics resulting from strikes and to the inadequacy of the railroads to handle the large quantities of coal demanded at peak periods.

* * *

Looking back, it is easy to see that production would not have been so seriously curtailed had the cost of coal been at all times lower. Consequently, it would seem that it is true in the coal business as in all others that a cheaper product makes it possible for an industry to hold its own against competition. New machinery will lower prices. It should increase profits, not only because the public will not be able to capture all the reductions of cost due to cheaper production, but also because what cost reduction is attained will enable the industry to demonstrate more clearly than ever that coal is a cheaper means of producing power than oil or water. The difference usually lies with coal, and,

at a lower price, both rival agencies will have increased difficulty in competing. Barring a public interest in curbing rivers, in developing irrigation and canals, few water-power systems should be constructed in the near future. Power will, henceforth, be only a byproduct of reservoir construction and not the main object.

Cheaper coal will also aid in the progress of the refrigeration of buildings by artificial means. The high cost of current for this purpose holds back such projects. But the costs of generating electricity can be reduced by diminishing the cost of coal which is one of the principal items of power production. Cheaper coal will also aid in promoting central heating which, however profitable in urban centers, can never spread widely into less closely settled areas unless the cost of coal is lowered.

* * *

Coal is not as near the pre-war price as are other products. It still remains too high for a steadily growing market, even though too low in most cases for profit. Something must be done to get coal back nearer its 1913 cost, and machinery and management show the way at least in part.

Meanwhile, the demand for coal will enlarge greatly. The use of steel, concrete, brick and tile will increase as the price of coal is lowered. More steel will be used for houses. Floors and roofs in domestic construction are almost never fireproof and need steel and concrete if safety is to be assured. For this reason steel will enter the house as it has the office building, the apartment and the school and coal will be the gainer.

Thus the industry will be best served by those who find new ways of cheapening coal, for it is a product having no fixed market. Evidence shows that the consumption of coal is increasing, and cheaper coal will hasten that result, which has been so long delayed that some have begun to doubt whether the future will align itself with the present or with the more remote past. There is assurance that the curve of output that has been halted temporarily will once more begin to mount.

* * *

That is why the yearly exposition and convention at Cincinnati, backed by the Manufacturers' Division of the American Mining Congress, is big with possibilities. The industry is laying strong hands on the items of cost that for years have been stationary. If it can lower these—and it can—the price of coal must decline and the demand for it increase with profit to everyone and with a better public attitude toward the industry.

Speakers and Subjects at Cincinnati Convention

TUESDAY, May 17, 10 a.m. to 12 noon
CHAIRMAN—HOWARD N. EAVENSON

SUBJECT: COAL PREPARATION

1. "Coal Preparation, Its Necessity and Progress."
E. A. Holbrook, Dean, School of Mines, Pennsylvania State College, State College, Pa.
2. "Effects of Coal Cleaning on Marketability."
F. R. Wadleigh, Consulting Mining Engineer, New York City.
3. "Economic Methods of Cleaning Anthracite."
F. G. Wilcox, President, West End Coal Co., Scranton, Pa.
4. "Economic Methods of Cleaning Bituminous Coal."
Humphrey D. Smith, Assistant to President, Majestic Collieries Co., Bluefield, W. Va.
5. "Preparing Bituminous Coal by Sand Flotation."
J. William Wetter, General Manager, Madeira, Hill & Co., Philipsburg, Pa.
6. "Cleaning Coal, Phelps Dodge Corporation Mines."
J. B. Morrow, General Outside Supt., Stag Canon Branch, Phelps Dodge Corporation, Dawson, N. M.

TUESDAY AFTERNOON, 1.30 to 3.30

CHAIRMAN—HARRY S. GAY

SUBJECT: COAL PREPARATION

1. "Cleaning Coal at the Colonial Breaker."
W. H. Lesser, Mechanical Superintendent, Madeira, Hill & Company's Anthracite Interests, Frackville, Pa.
2. "Anthracite Preparation by Sand Flotation."
Charles Dorrance, Mining Engineer, Scranton, Pa.
3. "Cleaning Small Size Coal."
Louis W. Huber, Asst. Prof. of Mining, Carnegie Institute of Tech., Pittsburgh, Pa.
4. "Cleaning Coal by Launder System."
Shelby D. Dimmick, Vice-Pres. and Gen. Mgr., Glen Alden Coal Co., Scranton, Pa.
5. "Air Cleaning at Montour No. 10 Mine."
H. W. Morgan, Director of Research, Pittsburgh Coal Co., Pittsburgh, Pa.

WEDNESDAY, May 18, 10 a.m. to 12 noon

CHAIRMAN—J. D. ZOOK

SUBJECT: COAL PREPARATION

1. "Dry-Cleaning Coal, Berwind White Mine."
Charles Enzian, Mining Engineer, The Berwind White Coal Mining Co., Windber, Pa.
2. "Cleaning West Virginia Coal."
Milo W. Summers, Engineer, Turkey Gap Coal & Coke Co., Dott, W. Va.
3. "Results Obtained in Cleaning Coal at Algoma."
William Beury, General Superintendent, Algoma Coal and Coke Co., Algoma, W. Va.
4. "Preparing Coal on Tables."
Robert E. Hobart, Mechanical Superintendent, Lehigh Coal & Navigation Co., Lansford, Pa.
5. "Preparing and Marketing Off-Grade Coals."
W. C. Shank, President, Carbon Coal Co., Pittsburgh, Kans.
6. "Cleaning Coal by the Wet Jig Process."
E. E. Flinn, Director of Research, Lehigh Coal & Navigation Co., Lansford, Pa.

WEDNESDAY AFTERNOON, 1.30 to 3.30

CHAIRMAN—DR. L. E. YOUNG

SUBJECT: MECHANICAL LOADING OF COAL

1. "Recent Developments in Mechanical Loading."
G. B. Southward, Mechanization Engineer, American Mining Congress, Washington, D. C.
2. "Four Related Major Factors in Mechanical Mining."
H. F. McCullough, Mechanical Engineer, Consolidation Coal Company, Fairmont, W. Va.
3. "Developments in Cutting, Shearing, and Snubbing."
R. J. Smith, President, Princeton Mining Co., Terre Haute, Ind.
4. "How Roof Control Affects Mechanical Loading."
Wm. G. Fletcher, General Supt., Inland Collieries Co., Indianola, Pa.
5. "Does Mechanical Mining Depend on Roof Control?"
Thomas W. Dawson, Chief Engineer, H. C. Frick Coke Co., Scottsdale, Pa.
6. "How Preparation Aids Loading in Dirty Seams."
Dr. E. E. Fyke, President, Marion County Coal Co., Centralia, Ill.

THURSDAY, May 19, 10 a.m. to 12 noon

CHAIRMAN—A. W. DICKINSON

SUBJECT: MECHANICAL LOADING OF COAL

1. "Application of Conveyors to Longwall Mining."
D. A. Thomas, President, Montevallo Coal Mining Co., Birmingham, Ala.

2. "Conveyors Applied to Room and Pillar Mining."
F. H. Coleman, Assistant Engineer, Graff Brothers, Blairsville, Pa.
3. "Scraper Loaders Applied to Modified Longwall."
S. W. Blakslee, Mine Supt., Pennsylvania Coal & Coke Co., Ehrenfeld, Pa.
4. "Complete Recovery by Mechanical Mining."
L. C. Skeen, Gen. Supt., Fordson Coal Co., Stone, Ky.
5. "Mining by Mechanical Loading Exclusively."
Edward Bottomley, General Superintendent, Sheridan-Wyoming Coal Co., Sheridan, Wyo.
6. "Loading by Mechanical Methods Exclusively."
David Ingle, President, Ayrshire Coal Co., Oakland City, Ind.

THURSDAY AFTERNOON, 1.30 to 3.30

CHAIRMAN—T. E. JENKINS

SUBJECT: MECHANICAL LOADING OF COAL

1. "Entry Driving with Mechanical Loaders."
O. S. Newton, General Manager, Sunday Creek Coal Co., Columbus, Ohio.
2. "Mechanical Loading in Utah Coal."
G. A. Schultz, Gen. Supt., Liberty Fuel Co., Latuda, Utah
3. "Maintenance of Mechanical Equipment."
I. N. Bayless, Gen. Supt., Union Colliery Co., Dowell, Ill.
4. "Retreating Panel Methods with Machine Loaders."
Jay I. Snoderly, Chief Engineer, Bethlehem Coal Co., Fairmont, W. Va.
5. "Machine Loading Under Draw Slate and Bad Roof."
E. J. Christy, Wheeling Township Coal Mining Co., Adena, Ohio.
6. "Shaking Conveyors on Pillar Recovery."
George F. Osler, Vice-Pres. and Gen. Mgr., Pittsburgh Terminal Coal Corporation, Pittsburgh, Pa.

FRIDAY, May 20, 10 a.m. to 12 noon

CHAIRMAN—W. L. ROBISON

SUBJECT: SAFETY IN COAL PRODUCTION

1. "Shall a National Safety Code Be Developed?"
Dean E. A. Holbrook, State College, Pa.
2. "Safety Features in Mechanical Mining."
W. D. Brennan, General Manager, Stag Canon Fuel Co., Dawson, N. M.
3. "How to Keep Accident Prevention Before Men."
Clyde A. McDowell, Asst. to Gen. Mgr. of Mines, Pittsburgh Coal Co., Pittsburgh, Pa.
Edward Graff, Mining Engineer, The New River Co., Macdonald, W. Va.
4. "Improving Mine Safety Through Conferences."
J. D. Rogers, Chief Engineer, Stonegate Coke & Coal Co., Big Stone Gap, Va.
5. "When and How to Unseal Mine Fires":
(a) Organization Procedure and Factors Governing Time of Unsealing—J. J. Forbes, Supervising Engineer, U. S. Bureau of Mines, Pittsburgh, Pa.
(b) Relationship Between Sealing and Unsealing Mine Fires—J. T. Ryan, Vice-Pres. & Gen. Mgr., Mine Safety Appliances Co., Pittsburgh, Pa.
(c) Safety Appliances and Accessories Used in Mine Fire Fighting and Recovery Operations—Prof. Edw. Steidle, Carnegie Institute, Pittsburgh, Pa.
6. "Discussion from Operator's Viewpoint."
Frank Dunbar, General Supt., Hillman Coal & Coke Co., Pittsburgh, Pa.
7. "Discussion from State Inspector's Viewpoint."
R. M. Lambie, State Mine Inspector, Charleston, W. Va.
8. "Handling Gases Through Proper Ventilation."
Daniel Harrington, Safety Engineer, United States Bureau of Mines, Washington, D. C.
Robert McAlister, Chief Inspector Coal Mines, Fuel Dept., Colorado Fuel & Iron Co., Trinidad, Colo.

FRIDAY AFTERNOON, 1.30 to 3.30

CHAIRMAN—ERSKINE RAMSAY

SUBJECT: CUTTING AND BLASTING

1. Moving Picture, "Duties of the Explosive Engineer."
Courtesy U. S. Bureau of Mines.
2. "When Should Top and Bottom Cutters Be Used?"
T. W. Guy, General Superintendent, Boone County Coal Corporation, Sharples, W. Va.
W. Z. Price, Assistant to President, Warner Collieries Co., Washington, Pa.
3. "Reducing Blasting Costs Through Supervision."
C. E. Carden, Superintendent, Gauley Mountain Coal Co., Jodie, W. Va.
4. "Blasting and Preparation for Mechanical Loaders."
Roy T. Lyons, Engineer, Consolidated Coal Co., Saginaw, Mich.
5. "How Blasting Efficiency Increases Production."
H. G. Mundy, Superintendent, Century Coal Co., Century, W. Va.

Alive at Top or Merely Sprouts at Roots?

By Eugene McAuliffe

President, Union Pacific Coal Co.
Omaha, Neb.

MUCH is being said and written at the present time relative to the growing measure of engineering technique manifested in the operation of our coal mines. There is likewise in evidence a definite improvement in the character of the supervisory service accorded coal-mining properties. Doubtless the extension of the use of machinery, including undercutting machines, electric locomotives, electric pumping and hoisting apparatus, with the attendant train of motor-generator sets, rotary convertors and transformers, together with related control apparatus, have all contributed toward the creation of betterment in the character of the personnel engaged in coal-mine supervision. A further and markedly beneficial influence is that supplied by the trained engineers who are employed by many manufacturers of mining machinery, who in a sense serve to establish a contact between the too frequently isolated mine official and the widely spread industry of which he is a part. Again the benefits to be derived from the careful reading of one or more technical mining papers, plus the occasional opportunity to attend a meeting where mining matters are discussed, constitute factors which contribute to progress. So it may be said that the resident mine force is astir.

Back of the force which "live, breathe and have their being" around and in the mines, there is, however, another and controlling power, the general manager, president or other executive, which brings us to the question—*Is the property alive at the top or is it merely developing sprouts at the roots?* Whether the coal industry as a whole is or is not developing "sprouts" at the roots, the fact remains that there is room for further achievement at the top. The industry's pains and aches cannot be cured by the application of local alleviations; it cannot be restored to health by economies of operation, however desirable. The difficulties that confront the industry are fundamental—they lie deep, the elements of management, methods, sales policy and labor relations entering therein.

No matter how often interested individuals or associations may attempt to deny the fact, the industry is overdeveloped and overmanned. Empirical comparisons by whomsoever made regarding the relative overdevelopment of other industries take us nowhere. We are given to wonder what John W. Lieb of the New

How Labor Productivity Has Increased Since 1914

	Percentage
Iron and steel.....	59
Meat packing	27
Petroleum refining	83
Cement manufacturing	61
Automobiles	172
Rubber tires	211
Flour milling	40
Unweighted average	92

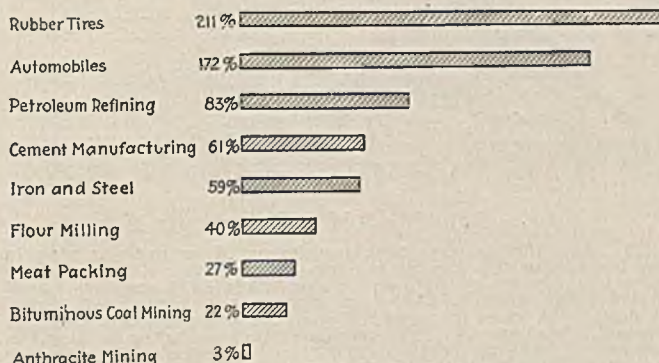


Fig. 1—Output per Man Increases More Rapidly in Manufacturing than in Mining Industry

Though increasing transportation distances, mine depth and better preparation of coal explain in part why the coal industry has not progressed in output per man as rapidly as in other industries, and although the relative standardization and efficiency of the coal industry at the beginning of the comparative period was greater than in more newly organized industrial undertakings, in which greater progress was therefore possible, nevertheless the difference in growth of output per man is striking and worthy of careful consideration.

York Edison Co., Daniel Willard of the Baltimore & Ohio R.R. Co., or a thousand other large users of fuel would say if they were asked to let their properties stand idle (over and above legal holidays) 78 per cent of the time. Those who make comparisons between the short working time of our mines and that suffered by certain other industries ignore the extraordinary losses sustained in the maintenance of an idle or part-time worked mine, losses that are not equalled in any

other industry during a non-productive period. Space precludes listing the elements that go to make up these charges, they are but too well known to mining men. Given a work year of 200 days of 8 hr. each, which is above the average time worked by our bituminous mines, we have but 1,600 producing hours out of the total of 7,392 that go to make up the 308 work days in the year. If we are to depend on comparisons let us at least compare ourselves with reasonably similar lines of industry. If the coal-

using public-service industries such as water, gas, electricity, street and steam railways seem too remote for purposes of comparison, we can turn to our sister mining industries, copper, iron, etc. With the acceptance of the above mentioned theory of an adequate ratio of working to idle time, we are free to consider possible changes in methods that will not only improve our management, but which will likewise contribute to the elimination of surplus mines.

Regardless, again, of what may be said relative to the progress made for efficiency within the coal industry, those who make a close study of affairs know that up to and until the past ten years little real advance has actually been made. Such improvements as undercutting machines, power haulage and general electrification were received slowly; the makers of mine equipment, backed by a flair for business-getting, have gone much more than half way in the work of modernizing our mining methods. Stress is laid on the increased output per man day, but the shift of tonnage to newer and virgin fields, the growth of strip-pit mining, and the loading of coal within the mines on non-hoisting days are potent factors in the increases shown by the uncertain statistics available. It would, however, be

less than natural for the industry to fail to gather some modicum of acceleration in this speeding age.

When comparison, however, is made between the growth of productivity per man hour by the men employed in coal mining and those employed in other industries, there comes the uncomfortable feeling that the world is rushing by us. The increase in the productivity of labor in various industries, as determined by a recent survey made by the United States Department of Labor, which is shown at the head of the article, will prove informative. The automobile and rubber-tire industries are, relatively speaking, new industries, but those of iron and steel, cement manufacturing and flour milling were well established in 1914. Petroleum refining has made extraordinary progress, wholly the result of scientific research. The productivity of railroad labor in the United States, measured by the number of traffic units per employee, has increased about 40 per cent since 1915 and about 150 per cent since 1890, moreover these increases have been almost uninterrupted, no new theory of transportation evolved, merely additional and heavier facilities, plus an intensive system of employees' education. Perhaps the new railroad situation can be classed as one-half capital additions and one-half

new attitude of mind—the translation by the railroads themselves of a feeling of hostility on the part of the public and their employees into one of co-operation and approval. A study of the relative number of coal-mine fatalities suffered today as compared with a decade ago, or a comparison with the record of present-day European mines, should suffice to allay our pride of accomplishment.

What is the task that confronts our coal-mine executives today? The assembling of and consolidated recurring publication of the salient facts governing the industry are almost indispensable. That portion of the industry to whom fact finding is today an abomination will laugh at themselves and their prejudices in ten years from now.

An enlightened policy of coal storage at the points of consumption to which a system of coal freight rates, seasonally descending with the decrease in demand and ascending when consumption is at the maximum, would serve to fix the theory of summer coal storage in the public mind. Last, but not least, the time-worn theories of operation and labor relationship should be eliminated and more modern methods applied.

Perhaps the greatest curse which afflicts mine operation today lies in the fact that as a substitute for good management, both on the part of the executive and the local mine force, the theory of paying tonnage rates was substituted for a day wage in so far as it was possible to do so. In principle the tonnage or task basis of payment is sound in that it provides for payment

for the actual amount of service that is rendered.

If we stopped there all would be well, but immediately upon its inception the employer undertook to shift all the weaknesses of an incompetent mine management over on the task-paid workman, until, in many instances, less than one-half of the workers' time was productive time, the remainder spent waiting for cars in which to load the coal he had prepared, or otherwise waiting for timber, track material or other supplies, which it was the employer's duty to supply promptly but which he instead undertook to deliver at the convenience of the foreman or that of the driver entering the particular place. Defects in managerial service

likewise extended in other directions; the carrying forward of ventilation, including brattices and overcasts; failure to maintain drainage or pumping facilities, etc. There are few men engaged in the operation of mines who are not familiar with the measure of the delays occasioned by poor track, defective electric line circuits, defective track bonding, low voltage and like deficiencies. As a result of this system, or lack of system, the workmen sought additional compensation to cover the time they were compelled to waste, and it was but a step further to the acceptance of the principle that eight hours, whether

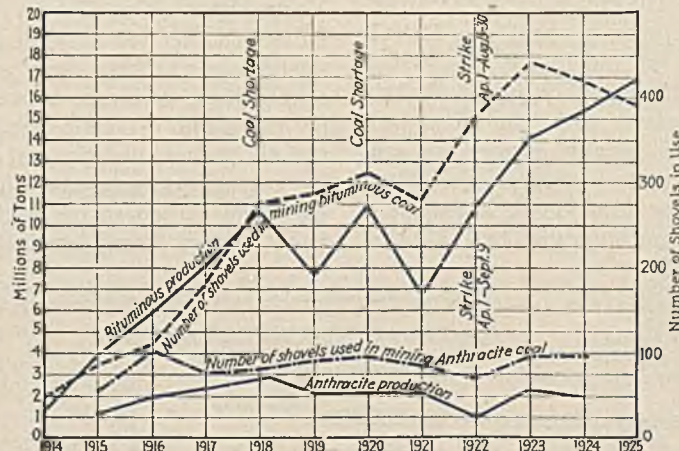


Fig. 2—Strip Pits Add to Outputs per Man

Mr. McAuliffe declares that our improved output per man is due in part to the growth of strip-pit operation. Graphs show statistical history of strip-pit mining since 1914 and are based on statistics of U. S. Geological Survey and Bureau of Mines. At first, only when there was a shortage of coal could the strip pits sell a big tonnage. Recently care has been taken to keep the coal clean in the pit and to pick out refuse at the tippie, and now the strip pits work more steadily than before, owing to the greater ease with which the coal is sold.

working at full or fractional productive capacity, was an undue time to remain in the working place and so again the natural thing for the workers to do was: first, to acknowledge the theory of a reduced production by the acceptance of the mismanagement thrust upon them; second, to learn to think that half productive time might as well (except in so far as their necessities required them to produce) be spent without the mine; and third, to capitalize each and every unfavorable condition experienced as a means of increasing the rate per ton so as to absorb not only the inefficiencies of the employer but the time voluntarily lost by the workman himself. That these changes are the result of what might be referred to as the unconscious working of a class or occupational psychology makes them none the less real.

To those who are not afraid of a new idea there is one thing that a producer of coal can do to improve his costs, providing he has two or more mines—that is to close down not less than one-half his production, thereafter double-shifting the remainder. There is nothing revolutionary in this suggestion. It is being done in metal mines everywhere, in coal mines in many parts of the world, and to a limited extent in the United States and Canada.

Assuming that the capital investment cannot at once be decreased, certainly the cost of ventilation, drainage, retimbering and general maintenance can be materially reduced. Whether the electric power is purchased or made, the "demand" or "ready to serve" charge can

be reduced one-half. The cleaning up of falls, replacement of structures, rock dusting, sprinkling, and numerous other similar items of operation and maintenance expense, all of which bear a time relation to cost, can be cut down. This does not mean greater production, but instead a more concentrated output. Double or even triple shifting does not call for additional capital investment, a situation that should, in the present state of the industry, go far to recommend the practice.

Much has been said relative to the substitution of machinery for hand loading, and a real measure of progress is being made in this direction. It is true that mechanical coal loading is being retarded by lack of capital, which is in many quarters a real issue, by an honest lack of belief in the adaptability of mechanical loading to the certain existing conditions, and, in many cases, by a lack of desire to make any change in the methods of mining which have served for generations.

SAYS MECHANICAL LOADERS DO CUT COSTS

The installation of mechanical loaders wherever thoroughly tried out has resulted in lessened costs, which in turn include a reduction in the number of men required. The lessened area which it is found necessary to police, ventilate, and otherwise maintain represents savings that will not appear in old mines, immediately following the transition, but will come later. Certain properties have found, for example, that despite the addition of a large additional rated motor load, the actual kilowatt-hours per ton of coal produced has been decreased by the adoption of mechanical loaders, this saving wholly attributable to concentration.

One of the advantages that flow from the adoption of a mechanical loading program is that of getting away from the tonnage rate as a basis of payment applied to from 45 to 60 per cent of mine labor, substituting therefor a day rate. The industry must gradually establish a better working year and a better annual wage than a very large per cent of mine workers now enjoy. At the risk of being misunderstood, even misrepresented, we will even say that the rate of wages paid is an entirely secondary matter, providing the basis be not too low. An unduly depressed wage is not conducive to economy of operation.

PROBLEM IS TO REPLACE MEN WITH MACHINES

The real problem is that of eliminating manual labor so far as it is possible to do so, substituting therefor mechanical equivalents. The experience of the United States Steel Corporation, which a few years ago demanded and defended the 12-hr. day, should be sufficient. This great and successful company later reversed its theories of management, reducing the work day to 8 hr., installing power driven machinery to do, at a marked decrease in cost, what cheap labor, working 12 hr., had done before.

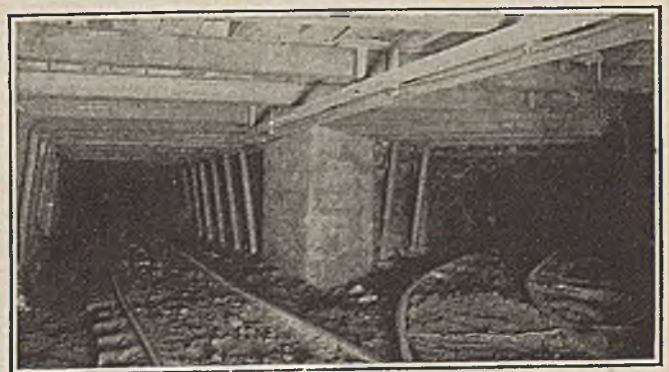
With the substitution of mechanical loaders for hand labor in our mines, serious thought should be given to a composite basis of wage payments, a combination day and task or tonnage rate. The ideal wage would be a combination of a living day wage rate (not an adequate wage, but one upon which a man could get along), upon which should be superimposed a tonnage rate. The real wage should represent a combination of a fixed daily rate, which would govern when the man entered the mine, and a tonnage rate for every ton in the production of which he participated, which would serve as a secondary or additional earning. To illustrate: Assume

a loading crew of six men, the living or base wage \$4, or some other proper sum. If the mine management were guilty of inefficiency the base wage paid would represent a direct tax on the company, insuring a proper manifestation of interest on the part of the employing force. On the other hand, defects in individual service rendered would be reflected in the reduced earning capacity, not alone of the person responsible for it, but of the whole crew, with the result that every man on the crew would automatically become an active proponent of productive service; in substance, both sides would be equally rewarded or penalized as the case might be. By organizing men into productive units, a gang esprit de corps would be established, and with the dollar interest shifted from the shoulders of the employer, where it now rests, to the joint backs of men and employer, the common incentive for productivity would work wonders in the daily cost sheet.

To repeat what has been so well said so many times relative to the collateral advantages that flow from mechanical loading, largely the result of concentration, would be superfluous. The industry in no sense suffers from lack of ideas, it has only to make up its mind to surrender for once and all its worn-out salesmanship psychology, ceasing to think of profit-making as something to be attained through speculative agencies, strikes, suspensions, sudden export demand or a lack of transportation. All these are agencies that have served in a doubtful way in the past—their day is now, however, gone. The acceptance of the theories of giving publicity to definitely measurable results, a new theory of labor relationship, the adoption of production methods accepted and made workable in other industries, will prove far more profitable than will the persistent clinging to worn-out traditions. What the industry needs is a wider sense of vision, a better understanding of the great place it must continue to occupy in world affairs.

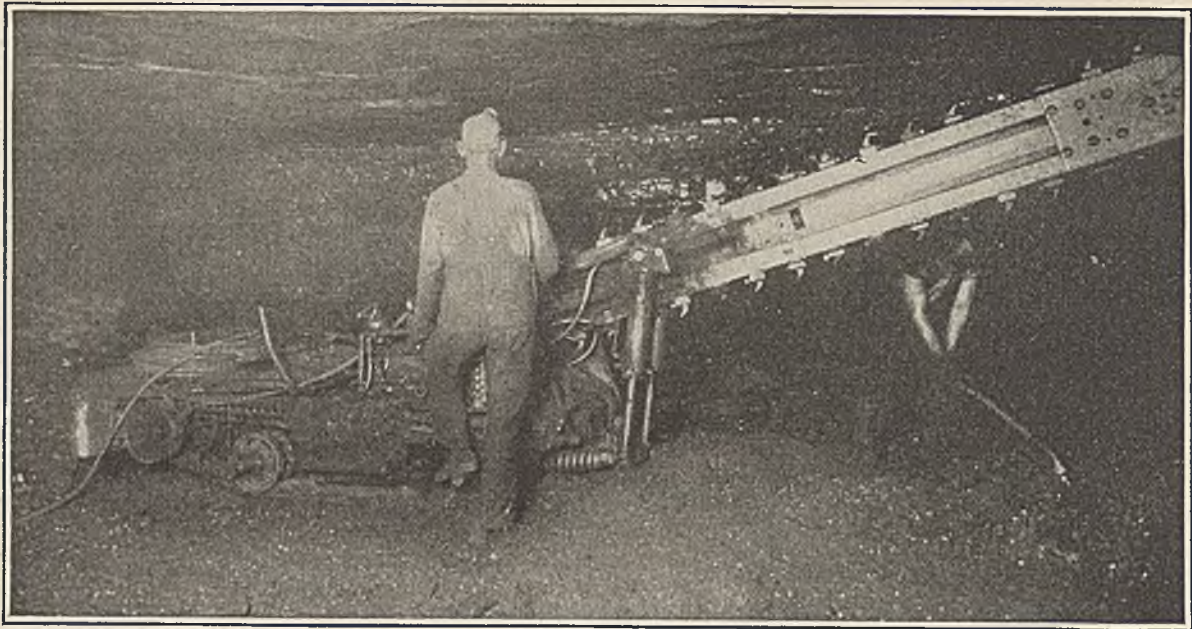
THE TEMPERATURES, and consequently the service, to which the refractories are subjected in various parts of a powdered-coal furnace will vary with different burners depending upon the position of the burner, the velocity of entrance of the flame, and the methods of air admission.

RALPH A. SHERMAN,
Assistant Physicist, U. S. Bureau of Mines,
Pittsburgh, Pa.



Concrete Corner Eliminates Dislodgeable Posts

At partings cars tend to leave the track and pile up, and just there, because the roof has least support from the pillars, a little forest of props supporting cross beams is frequently found. So in this well constructed parting of the Consolidation Coal Co. the nosing of the pillar is of concrete, as J. J. Forbes pointed out in his address at the National Safety Congress. Note the steel posts and cross bars, the lagging of the roof and the protection for the trolley wire.



Shearing Machine Preparing Face for Shooting

Better Management Needed

To Make Loading Machines Successful

"It Can Be Done" Must Be Slogan for Complete Mechanization—Every Operation Must Be Scheduled and Adjusted Skillfully to Eliminate Delays

By L. E. Young

Vice-President, Pittsburgh Coal Co.,
Pittsburgh, Pa.

MECCHANICAL LOADING has made substantial progress in the last twelve months and, in general, the outlook is encouraging, as a number of the companies that have been doing pioneering work have overcome some of the principal difficulties that confronted them a year ago. In several fields the indications are that additional companies will undertake mechanical loading on a large scale if wage contracts can be negotiated.

Practically everywhere there has been in evidence a sincere desire on the part of operators to co-operate with each other in working out problems that have a general application, and the manufacturing companies have approached the problems in a broad way. For several years the American Mining Congress has held an annual convention with an exposition of machinery, and has succeeded in bringing together for several days of conferences, the men who have been interested in the real operating problems of bituminous mining. The American Institute of Mining and Metallurgical Engineers and the National Coal Association have also put forth efforts to secure the heartiest co-operation of mining engineers, operators and manufacturers of mining machinery. Other educational agencies, such as the technical press, have presented from time to time, the latest information available as to machinery, methods and results accomplished.

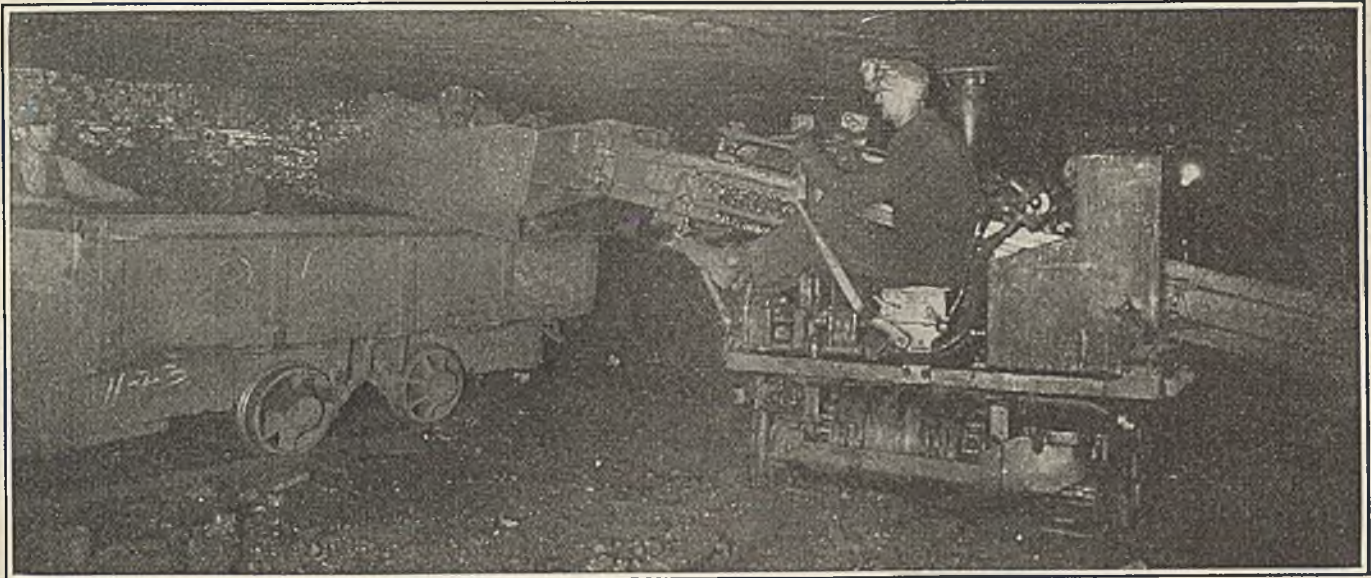
However, the introduction of mechanical loading devices, including scrapers and conveyors, has resulted in

many new problems in the management of bituminous coal mines. It will be possible, in a brief paper, to discuss only a few that have general application; no attempt will be made to discuss specifically the problems arising in certain districts as a result of state laws, district regulations, and labor contracts and conditions.

Much has been written regarding the important mechanical features of loading devices, the mine lay-out necessary to permit the use of machines, and the general conditions that are prerequisite to the equipping of a mine for the loading of coal entirely by such mechanical devices. When a mining company "goes mechanical" there are a number of personnel or human problems that are even more important than the machines themselves. To make a successful 100 per cent mechanical loading mine it is necessary to have on the job some one who is willing to live with the machines for many days and nights—some one who has the faculty of "selling the mechanical idea" in the course of time to every man in the mine.

UNTIRING EFFORT IS PRICE OF SUCCESS

Every mechanical loading operation that may be called successful that has come to my attention is the result of the inspiring and indefatigable efforts of one or more men who have in fact "lived on the job." To venture into mechanical loading with a mine superintendent or mine foreman who says or thinks "but you probably could not do that with our men in our mine"



Shovel Which Despite Its Size Handles Coal with Minimum Breakage

Coal, when it was loaded by hand, had to be broken down to small size so that it could be readily handled. It had, when large, to be rolled on the floor to the car, and when small, to be thrown from a long distance with a shovel. It was often projected against the roof to carom down into the car. Rolling, throwing and caroming are far less gentle operations than those of this shovel, that has both the reach and the power to deal gently with the coal. Breakage is thus decreased.

is unwise. Mechanical loading must be sold to the organization; the machines will work, and it is largely a matter of education of men and of bosses, organization, management, and perseverance.

The changing over from a hand-loading tonnage basis to a day-wage basis brings to the foreground a number of details of mining that have been slighted in many mines. The delivery of mine supplies to the face must become systematic; the laying of track in working places must be scheduled; the day work must be planned in order to expedite coal production; idle places must be reduced to a minimum; and mine cars must be kept moving steadily. The specialization and subdivision of work has eliminated the flexibility that could be presumed under the old system, for the hand loader was theoretically supposed to be doing some of his other work whenever there was delay in the delivery of an "empty." With mechanical loading most of the men are on a day basis, and delays on the bottom or elsewhere cause relatively much more damage to a cost sheet than at a hand-loading mine. Likewise the upkeep of locomotives and mine cars, the constant supply of power, and the uninterrupted operation of the tippie have more importance than ever.

SPECIALIZATION FOLLOWS MECHANICAL LOADING

The introduction of mechanical loading devices means specialization of tasks. For example, the drilling of holes was once in many fields an incidental task of the coal loader. Now it has become an important step in the preparation of coal, frequently bringing with it for the operator the long-desired opportunity to drill and shoot the coal. Snubbing of coal by the loader was required under many local contracts; special crews of day men are now organized to do this work. The laying of track in working places must be done more carefully and more systematically to permit heavy loading machines to be taken to the face.

Successful mechanical loading results in concentration of working places, and where shooting is permitted during the working shift much more rapid extraction of blocks of coal is possible. With the many advantages resulting comes also real scheduling, in the proper se-

quence, of undercutting, drilling, tracklaying, shooting, timbering, and loading. Delay in one operation interferes seriously with the schedules of other crews. The real objective must be considered to be the steady, uninterrupted movement of loaded trips to the shaft bottom or pit mouth—and every other operation must be studied and planned to make this possible.

All equipment must be ready for operating a full shift and necessary supplies and emergency repair parts must be close at hand. Partings must be kept up to the producing zone, and power feed-line must be adequate to furnish good voltage under peak-load conditions. It is false economy to permit this vital factor in mechanical loading to suffer; good electrical engineering must lead the way, and planning of electrical power facilities is more important now than ever in coal mining.

MINE TELEPHONES INDISPENSABLE

Concentration requires that scheduling and dispatching methods be applied to all operations at the face, including the gathering of coal. Mine telephones are practically indispensable.

Several new types of labor are required in machine mines. In many fields previously the most energetic men wanted jobs loading and they exercised their privilege of working more or less intermittently. As a hand loader a man developed little skill, and the talents that might have been developed were practically wasted.

The men who became "machine runners" were in many instances not skillful mechanics and knew very little about the construction and maintenance of the undercutting machine. The motorman has also seldom been a mechanic. To the mine electrician or the machine boss was delegated the task, frequently not rigidly supervised, of keeping the cutting machines and other equipment in operating condition. How well this has been accomplished under difficult physical and labor conditions is well-known.

In mines using mechanical loaders it has been necessary to train and maintain crews of men to operate, to keep in repair, and to overhaul these machines, which usually are more complicated and not as ruggedly built



Gathers Coal as One Would Sweep Grain with One's Arms Into an Apron

However, with these arms of stout steel, large lumps can be gathered and once they are swept together they are carried by one conveyor to another, the function of which is to deliver the coal to a mine car. The machine moves from place to place at its work, but the second conveyor can be swung so that it will nevertheless drop the coal unerringly in the car with minimum spillage. To get a big tonnage in

mechanical loading at the working face the cars must be delivered and removed with mechanical regularity. The man operating the machine undertakes that sole function. He cannot leave it to perform a dozen other tasks that the hand miner has to perform, consequently, to keep him busy, he must have cars, cars, and more cars, all set one by one or at best by twos or threes, on the stub end of a single track. That

takes co-ordination and management, foresight also, extending from the railroad to the working face. The mine, the dump, the preparation plant, the railroad sidings are all parts of one big machine that must be tuned up to work in unison. Yet as they are dependent on many men's concurrent efforts, management is needed, scheduling, planning and co-ordination. Without this management success is impossible.

as the mine locomotive or the undercutting machine. The operation of these machines calls for several new types of men. First, the operator, second the mine repairman, and third, the shop repairman.

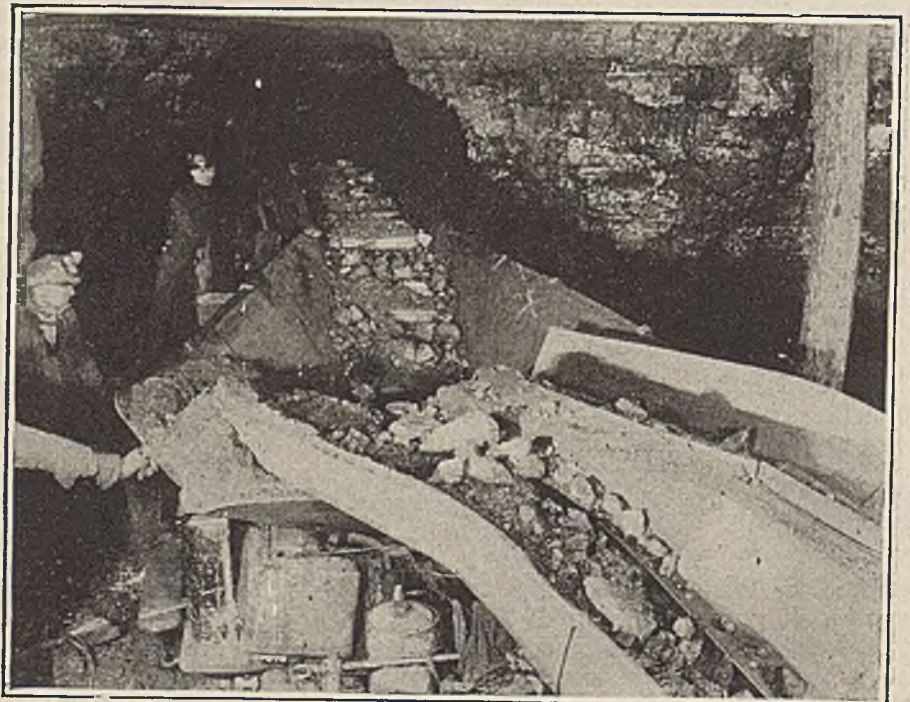
The operator of a loading machine in a large mine should not be expected to repair the machine any more than the locomotive engineer is expected to maintain the locomotive he runs from one terminal or division point to another. His is an operating job, and the best results will be obtained by organizing the work so that when the shift begins, the loading machine is ready in every sense for the shift's run. At the end of the shift skilled mechanics should inspect the machine and make any necessary repairs and adjustments.

The organization from top to bottom should understand that the loading machines must run the full eight-hour shift, the same as a hoisting engine. Likewise the operator of the loading machine should be as to his ability, training and reliability as dependable as the locomotive engineer. The railroad company knows that without fail a crew of men will be on hand to run a locomotive on a schedule—this is now so well established that we cannot conceive of a more dependable class of skilled men than locomotive engineers.

Hoisting engineers at mines are almost without exception a high class of men, with real personal pride in their records for skill, sobriety and careful operation of their hoists. At mines that are 100-per cent mechanical many of the operators of loading machines have established for themselves a reputation for skill, sobriety and

dependability that is comparable with that enjoyed by locomotive and hoisting engineers. The success of mechanical loading depends largely on the development in the working force of a real "pride in the job."

Similarly, the man making repairs in the mine and in the shop must be a high type of man. It is remarkable how quickly a new class of mechanics has been educated to the work, and there is no reason why the man of the mining community who is handy in repairing automobiles should not be able to learn the maintenance



From One Conveyor to Another and Thence to the Mine Car

A stream flows along the conveyor that would aggregate an unbelievable quantity of coal were it not for the exigencies of frequent car replacement. The restricting elements in mechanical loading are not in the machine but in the methods of mining and in the delivery of small cars one by one to the conveyor. If the machine could be kept traversing an endless well-prepared face and the cars could be made to pass in a never-ceasing flow past the loading conveyor, what a record tonnage could be loaded! This is the aim of management.

problem that loading machines bring to the mine.

Though, at first, no men may seem to be available for these new classes of work, serious consideration of ways and means to train men right at home will be given to this problem by the superintendent who thinks, plans, and leads.

The use and maintenance of a large number of loading machines underground introduces more complicated problems in the mechanics of maintenance than have



Do Machines Break Coal? Here is the Answer

Machine-loaded coal being picked on a moving apron in the tippie. The huge lumps shown in the picture that two men could not possibly lift on to a car have been loaded by machine. Where proper blasting methods are used which prepare the coal for loading but do not shatter it, this is the result.

existed previously. In some mines it has been found economical to install a repair shop as near as possible to the center of activities. Of course, in 100-per cent mechanical loading mines, if the work is concentrated, the "center of activities" moves at a surprising rate, and a permanent center cannot be selected.

If the loading machines cannot be moved quickly, there will have to be points at which certain repairs are made, and other stations or shops where machines may be overhauled thoroughly. The systematic inspection and overhauling of loading machines is absolutely essential and a more or less half-hearted approach to the problem is fatal. The system of expecting an operator to keep a loading machine continuously in first-class running condition by making occasional adjustments and repairs at the end of the shift is no more adequate to the task of getting out a large tonnage daily than it is to expect a locomotive engineer to maintain a locomotive which sees hard service.

Much has been written in regard to the preparation of the working face, the layout of the mine, shifting cars, and the cleaning of the coal. It is desirable to have as much of this work as possible under the personal supervision of one foreman—that is, there should be no opportunity for a foreman to shift responsibility. With the intense concentration possible, if all the work is done on one shift, one foreman should be held responsible for the tonnage, daily and monthly, from his section. If part of the work is done on a second shift,

there should similarly be a definite division of responsibility.

It should be noted that in most mines the use of mechanical loading devices is still in the experimental stage, and though to some observers it may appear that a definite system and practice has been arrived at, it does not seem presumptive to predict that there will be important improvements in loading machines, cutting, shearing, drilling, blasting, transportation, and underground practice in certain fields.

Many of the improvements that have been developed in the last few years are the result of the investment of large sums of money in plant and equipment. There has been a tremendous change in the mine cost sheet; the cost of gathering has gone up in many mines because of the necessity for having one or more locomotives at each loading machine; the cost of tracklaying in rooms is changed; the problem of mine supplies is transformed; the burden of cleaning coal in the tippie is much heavier; the idle-day cost is much different.

CAUTIONS REGARDING SAVINGS EFFECTED

The savings apparently possible with one loading machine cannot be taken as a basis for final estimates on equipping a large mine with machines, due to the fact that generally when the first machine is purchased it is installed under better than average conditions, with the best labor available, with the most favorable power conditions and given the best supervision. When a number of machines are installed only average conditions will prevail and men of average ability will have to be trained.

In this paper a number of the difficulties that should be anticipated and avoided have been pointed out, solely in the spirit of helpfulness. There are so many different local problems in bituminous mining that generalizations are almost futile, but in every instance of successful application of loading machines there has been on the job a staff of men who believed "it could be done." This spirit, coupled with good mining practice, and good management in the general sense, will meet with success in most fields.

Standards Measure Rope by Big Diameter Bearing Out Coal Age Report

From the report of the National Standardization Division, covering Wire Rope for Mines, of the American Mining Congress, adopted as a tentative American standard by the American Engineering Standards Committee and embodied in the "Handbook of Standard and Approved American Coal Mining Methods, Practice and Equipment," the way to measure a rope is to take the largest diameter for measurement. An imaginary circle is described around the rope touching the exterior strands, and the diameter of this circle is taken as the true rope diameter. A smaller measurement could be taken by putting a machinist's caliper square so two strands would be touching one arm of the square and two the other. This is designated in the standard as the wrong way to measure wire rope. This decision of the committee is in accord with the note on the measuring of wire rope published in *Coal Age*, Feb. 17, p. 265, regarding which a note of protest was recently received from a field engineer.

Coal-Washing Research Will Save and Better Coal While Increasing Capacity

Exemplified by Table Operation—Correct Heights and Spacing of Riffles and Suitable Distribution Increase Yield

By Byron M. Bird

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NEVER BEFORE in the history of the country has there been such manifest activity in coal preparation. This is evinced both by the numerous articles in the technical press on coal-cleaning methods and by the large number of new plants and of changes in existing plants during the past year.* Probably in some instances the additional coal-cleaning facilities are necessitated by depletion of low-ash reserves, but in most instances they are the result of the more general adoption of mechanical loading underground. Whatever the cause, everyone is seemingly concerned with some phase of the new movement. Operators who have not cleaned their coal hitherto are perplexed to discover how to choose correctly between the numerous processes now available; those also who are already cleaning their coal are anxious to obtain better results. On the whole, the progressive attitude of the industry presages a new day for coal preparation. And yet, if one visits the coal-cleaning plants throughout the country, as I, during this past year, have had opportunity to do, he cannot but be convinced that most operators have thus far lost their greatest opportunity for better coal cleaning by not studying the means by which their practice may be improved. Such work would have for its object obtaining the best possible results at every stage of the coal-cleaning process. Few operators realize how greatly both the capacity and efficiency of their washing units can be increased by adjusting them with a full understanding of what each variable is intended to do.

Take the commonest type of washer, the jig, about which much has been written by different investigators.† How many jig men have studied the principles underlying the control even of its two most important

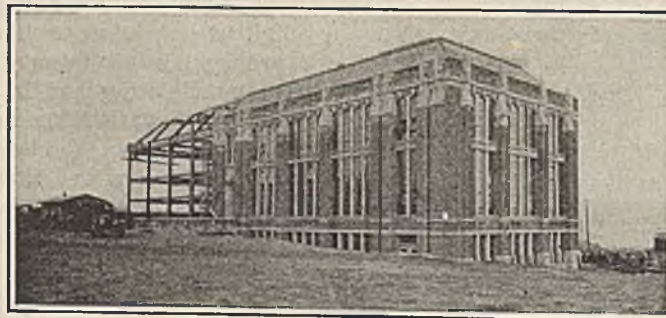
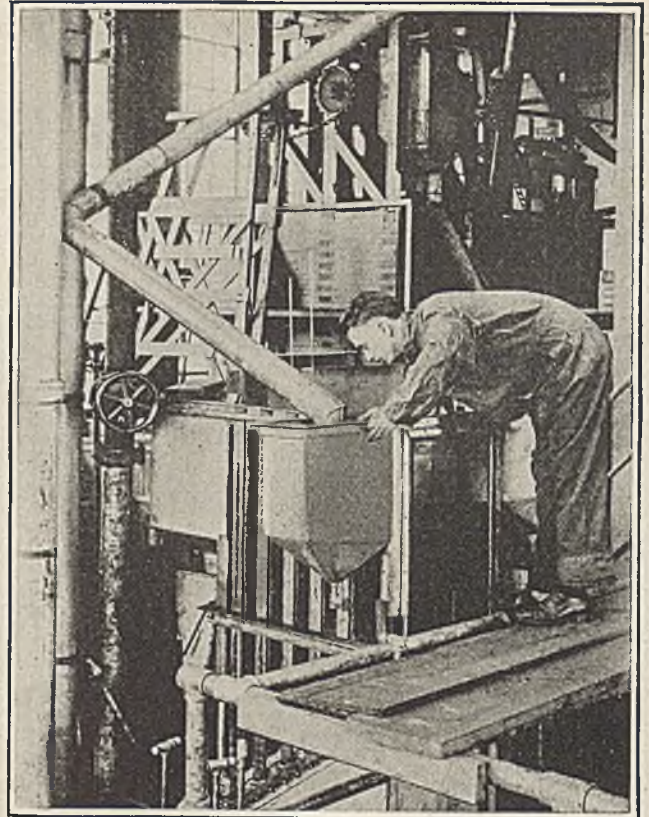


Fig. 1—Mines Laboratory, University of Washington

Coal-washing and coal-utilization experiments are conducted in the three sections to the right. The non-metallurgical and ceramic work occupy the two center sections. The future metallurgy and mining laboratory and the office of the College of Mines and the U. S. Bureau of Mines will be housed in the next section under construction.

variables, plunger stroke and water supply? In several instances a few simple adjustments of these variables alone have increased the capacity of a jig by half and improved the separation; in another instance the proper use of these variables to obtain a gentle suction stroke resulted in reducing the ash content of the fine sizes of the washed coal by 3 per cent. These examples from this widely used type of washer serve only to emphasize the possibilities that most operators are overlooking in not mastering every detail of the operation of their particular type of washer. In some instances, where the problems are peculiarly difficult, the results, even after the most careful work, may fall far short of those obtained by a float-and-sink test. When this occurs, the operator may need to conduct investigations to improve the process itself; or, if the problem is of sufficiently general interest, it may merit study by some governmental agency. This paper gives some results of an investigation of this character on one of the standard devices for the cleaning of fine sizes of coal, the coal-washing table.

BASE DATA ON INTENSIVE STUDY

The data upon which the discussion is based have been obtained during an extended study of the cleaning of the fine sizes of bony coals of the Pacific Northwest, conducted by the U. S. Bureau of Mines in co-operation with the University of Washington. This work includes experiments both with commercial tables which form part of the equipment of the College of Mines and also with smaller apparatus specially designed for studying

*Published by permission of Director, U. S. Bureau of Mines.

†Illustration in headpiece shows hindered-settling classifier mentioned in the text with commercial-sized Elmore jig in the background. Classifier is used as adjunct to tables either to prepare the feed or rewash a middling when treating an unsized feed.

*Fraser, Thomas, Mechanical cleaning makes rapid strides in 1926, *Coal Age*, Vol. 31, No. 4, page 129, Jan. 27, 1927.

†Richards, R. H., and Locke, C. E., A text-book of ore dressing, and many others.

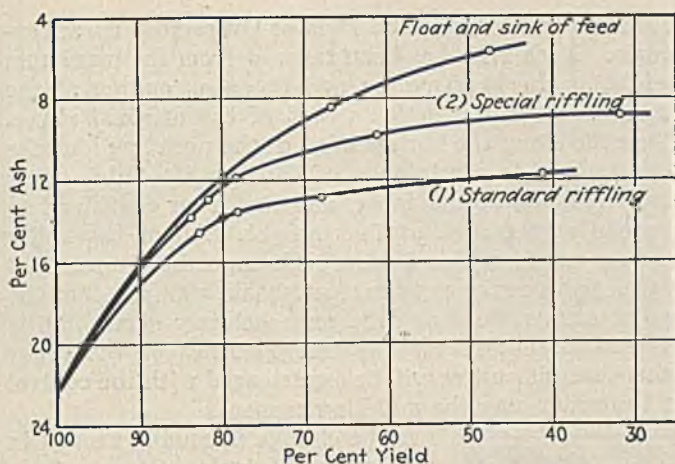


Fig. 2—Graph Showing How Tables Are Improved By Ruffling-System Changes

Yield-ash curves showing relative efficiencies of treating the same coal using standard and special ruffling.

fundamental principles. In this work the regular station staff is assisted by graduate students holding fellowships offered each year by the university.

The particular part of this tabling investigation that has proved of most general interest concerns some comparatively simple changes that may be made in the ruffling of almost any table used in washing unsized coal for increasing its efficiency in general, particularly by reducing losses of fine coal in the middlings and refuse. These changes are designed to enable the table to wash more efficiently either a coal of medium difficulty to a low-ash-content, or one of considerable difficulty to a medium ash-content. As few coals present such difficult washing problems as those of the State of Washington, the methods outlined in this paper of improving the table separation, combined possibly with suitable re-treatment of a middling product, may prove of application to other than Washington coals.†

DIFFICULT COAL TO WASH

At the time of the change from the standard to the special style of ruffling many tests were made to determine the degree to which table separation could be improved. The coal used, which comes from Pierce County, Washington, presents a difficult washing problem, 32.3 per cent of the feed being bone between 1.38 and 1.70 specific gravity; hence an improvement in the performance of the table shows large differences in the results between the two tests selected for discussion.

However, the improvement shown in the tests recorded in Table I and in Fig. 2 is only relative, because both tests, which are now several years old, could be improved in the light of subsequent experience. But if we balance the slight gain in efficiency possible in test No. 1, by cutting the tonnage to that of test No. 2 and by altering the distribution somewhat, against the gain possible in test No. 2 through subsequent improvements in the ruffling, we feel reasonably sure that the tests are sufficiently comparative to give a good qualitative idea of the improvement due to changes in the ruffles.

A comparison of the tests may be made most readily by referring to Fig. 2. The float-and-sink curve shows the yield of recoverable coal of each ash content in the

feed; the other two give corresponding yields of coal obtained in each instance with the table. The nearness of approach of the curve of each table to the feed curve is the measure of the table efficiency. For example, in test No. 2, 63.8 per cent of 10 per cent ash coal was recovered from the 73.8 per cent shown by the feed curve; expressed in terms of efficiency this represents

$$100 \times 63.8 \div 73.8 = 86.4 \text{ per cent.}$$

In contrast with this result, no coal containing 10-per cent ash was recovered in test No. 1. True, some coal of this quality might have been separated with an ideal adjustment of the table, but the efficiency would obviously have been much lower than in No. 2. The comparison shown in Fig. 2 is on a basis of quality of washed coal, keeping tonnage handled per hour a constant. Obviously if a washed product of 14-per cent ash only is desired, the special ruffling will permit of a distinct increase in the quantity washed per hour without reducing the efficiency of the standard ruffling. Thus, the special ruffling serves to improve either the efficiency or capacity of the table. The degree to which either will be shown depends, of course, upon the difficulty that the coal presents to any effort to subject it to effective washing.

In spite of the improvement due to special ruffling, there is still evident between the float-and-sink curve of the feed and that of table test No. 2 a distinct spread, which starts at 12-per cent ash and increases with washed coals of lower ash-contents; this represents an incompletely separated mixture of free particles of coal and impurities. If a coal below 12-per cent ash, is to be washed, therefore, a middling will require re-treatment; to do this intelligently one should know the peculiarities of this product. As the zonal products of test No. 2 were not separated by float-and-sink, the data in

Table I—Typical Tests Comparing Results with Standard and Special Ruffling

FLOAT-AND-SINK TESTS					
	Specific Gravity	Weight Per Cent	Ash Per Cent*	Cumulative Weight Per Cent	Cumulative Ash Per Cent*
Float-and-sink test of feed through 407 Ton - Cap screen.	Under 1.38	47.8	5.7	47.8	5.7
	1.38-1.50	19.1	15.2	66.9	8.4
	1.50-1.70	13.2	29.8	80.1	11.9
	Over 1.70	19.9	65.6	100.0	22.6

TABLING TESTS					
	Zones**	Weight Per Cent	Ash Per Cent*	Cumulative Weight Per Cent	Cumulative Ash Per Cent*
Test No. 1	1-5	41.2	11.7	41.2	11.7
	6-10	27.0	14.5	68.2	12.8
	11-14	10.1	18.3	78.3	13.5
	15-17	1.8	25.8	80.1	13.8
Standard ruffling	18-19	2.7	34.8	82.8	14.5
	20-22	17.2	61.8	100.0	22.6
Test No. 2	1-5	31.9	8.8	31.9	8.8
	6-10	29.6	10.9	61.5	9.8
	11-14	16.9	19.7	78.4	11.9
	15-17	3.4	34.1	81.8	12.9
Special ruffling	18-19	2.1	48.5	83.9	13.8
	20-21	16.1	68.6	100.0	22.6

* Moisture free basis.
** One-foot zones.

ADJUSTMENTS			
	Test 1	Test 2	
Tonnage washed per hour	5.36	4.71	
Length of stroke (inches)	1	1	
No. of strokes per minute	310	258	
Cross-slope (inches per foot)	1.000	1.083	
Elevation of refuse end of supporting channels above other end (inches)	0.9	4 1/2	
Average pulp ratio	Weight of water Weight of coal	1.34	2.05
Height high ruffles (inches)	1 1/2	1 1/2	
Spacing high ruffles (inches cc)	10	5	
Height low ruffles (inches)	1 1/2	1 1/2	
Spacing low ruffles (inches cc)	1 1/2	1 1/2	

Method of making tests described in Bureau of Mines Reports of Investigations Nos. 2570 and 2586.

†Bird, Byron M., Theory of stratification and its application in Serial No. 2755, U. S. Bureau of Mines, June, 1926.

Table 2, taken from a more complete test under similar conditions, are presented to show the general character of a middling for a separation at 10-per cent ash, which is probably as clean a product as it would be practicable to make from coal such as this by a system of tabling unsized feed followed by re-treatment of a middling.

These data appear normal, except the size of the portion over 1.70 specific gravity. Material of this specific gravity would ordinarily be the coarsest particles present; hence its inclusion is probably accidental. The remainder of the product is typical, it shows that the free particles of coal in the middlings, even with the special riffling, are still in the fine sizes. Logically, in order to complete the separation of a product such as this, one should not use the table a second time, but should rather use an apparatus depending upon a different principle for its separation, such as a hindered-settling classifier.* A classifier that has been used for this purpose is shown in the headpiece. In a sorting column 24x30 in., an excellent separation of table middlings has been made at the rate of 5 tons per hour.

The special riffling differs from the standard riffling used on most tables either in the height or in the spacing of the high riffles, or in both, and in the absence of low riffles between the high riffles. As the maximum size of particles in the feed and the tonnage handled per hour are determining factors in the height and in the spacing of riffles, the special riffling must be a matter for experiment in each individual plant and any details here given are to indicate only its general character.

The maximum size of coal treated thus far in experiments with special riffling has been the undersize of a 407 Ton-Cap screen, showing about 25 per cent on a 4-mesh sieve. In the tests with this size of feed, the height of the riffles has been gradually built up to a maximum of 1½ in. With each increase in height, higher efficiencies have been obtained. Results with material passing a 6-mesh sieve also have been good. But riffles 1½-in. high gave some difficulty in distributing the water and the coal on the table; hence no attempt was made to increase the height further. Probably the average person who experiments with this system of riffling will do well to start with a height of 1 in.

Likewise progressive improvement has resulted from increasing the number of high riffles. At present the table in the laboratory has a net 2-in. space between riffles. However, our stratification experiments carried on in conjunction with the table tests indicate that for 4-mesh material a better spacing would be 1 in. This change in the table is contemplated at an early date. With finer coal the riffle spaces could be reduced.

Thus far in our experiments the riffles have been tapered to the same point as the high riffles of the

manufacturer. Take the Deister-Overstrom as an example. Each riffle has been tapered from the maximum height at the head-motion and to ¼-in., ending at the same point on the deck as that of the original riffles. The riffle along the bottom edge of the deck has likewise been tapered to a minimum of ¼-in. on the "high spot" at the corner of the table, and has been continued to the end of the deck at that height. All of the riffles leading out from this bottom riffle taper in like manner.

One point requires special emphasis, namely, that the top of each riffle should be an absolutely straight line and should not follow any irregularities of the deck; otherwise difficulties will be experienced with the control of the water over the middling corner.

One change is usually needed in the water controls. Often a "dry spot" appears on the deck in front of the head-motion. This deficiency of water may be remedied by use of the extra water distributor and the moveable spray shown with the table in Fig. 5.

Perhaps it is in order also to remind the reader of the great importance to good tabling of such factors as, solid foundation for the table, uniform rate of feed (an excellent type of feeder is shown in Fig. 3), uniform water pressure, and uniform quality of feed. Though all of these are recognized as of fundamental importance, in actual plant design, they are too often ignored. No system of improving the table and neglecting these external factors will accomplish the best results.

Although the use of the special riffling involves no new principles, some discussion of the best means of obtaining good results may be

helpful in throwing some light upon the subject.

The one variable of the table principally affected by the special riffling, is the combined effect of lateral slope, longitudinal slope, and water, which, for want of a better term, we call "distribution." As this variable, if all others are kept constant, largely determines where the products of the table are discharged, its proper control is of great importance.

When either the upward slope of the deck toward the refuse end or the lateral slope is increased, everything on the table—shale, bone, and coal—moves back toward the washed-coal end of the deck; but the refuse and the bone, particularly with high riffles, move back less than the coal. It is logical, therefore, in order to get the maximum spread between coal and refuse, to obtain such "distribution" that a small quantity of the feed will come over the deck close to the head-motion.

However, because the tendency is to discharge too much of the feed at this point, owing to the difficulty

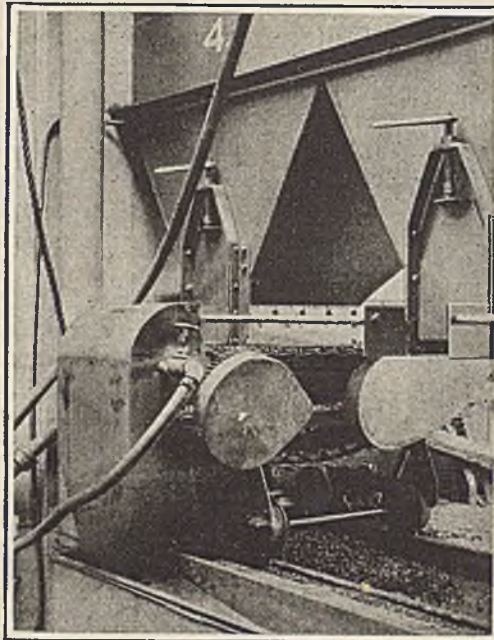


Fig. 3—Apron Feeder in Mines Laboratory

This feeder is adapted to the uniform delivery of fine, wet coal to tables.

*Bird, Byron M. Theory of stratification and its application in ore dressing. A discussion of a paper on the same subject by A. W. Fahrenwald. *Mining & Metallurgy*, Vol. 8, No. 243, pp. 144-145, March, 1927.

Table II—Relative Sizes of Particles in Typical Table Middling

Specific Gravity	Weight, Per Cent	Average Diameter, mm.
Under 1.38	34.1	0.83
1.38-1.50	36.1	1.49
1.50-1.70	26.1	1.89
Over 1.70	3.7	1.26

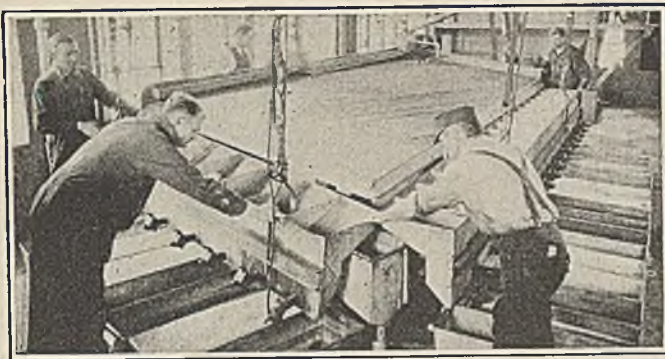


Fig. 4—Taking Zonal Samples on Table

One of the commercial-sized tables at University laboratory. After the table is "tuned up" by recirculating the same coal, fresh coal is fed and a 2-min. sample caught in the manner shown. Jig in background.

of telling during a test just what proportion of the feed is coming over, the rule in our tests is to discharge no coal in the first 6 or 8 in. Along the remainder of the deck the distribution should be made as uniform as possible; the middling corner should be watched especially to make sure that it is covered. The key points in good table distribution are the first few feet near the head-motion and the middlings corner.

The upward slope of the deck toward the refuse end, required by the special riffing, is out of all proportion to the change in the height of the riffles. As an example, in test No. 2, Table I, with 1½-in. riffles, the channels were 4½ in. higher under the refuse end than under the head-motion. Three inches is a common difference with 1-in. riffles when treating 8 tons per hour. As this steep slope, up which fine coal cannot climb to advantage, is of great importance, it is probable that the height of riffles should be increased for higher tonnages, to maintain this upward slope nearly constant.

SIMILAR FEATURES FOUND IN MANY TABLES

As the expedients of steepening the slope up which fine coal lost in the middlings must climb and of obtaining greater mobility by use of closely spaced riffles should logically occur to any one studying the table, one is not surprised to find some modifications of these features on each of the different standard makes of tables, or to find still other variations in commercial practice. No plant has come to my notice that is using the close spacing of riffles shown desirable by this work, but one plant washing a bony coal has been found that

uses riffles 1½ in. high, spaced 2 in. apart. A check on its efficiency by the method illustrated in Fig. 2 showed the separation of an extremely difficult feed to be excellent.

This paper is a progress report of an investigation now being conducted in the Pacific Northwest to devise better means of preparing fine sizes of coal. It suggests methods which have been found to increase the efficiency of the table when treating an unsized feed, methods which are especially efficacious when the differences in specific gravity between coal and impurities are small. The large relative increase in efficiency resulting from this work only serve to emphasize the need of investigative work in all branches of coal preparation.

Even Short Inclines Should Not Lack Landing Signals Entirely

Many of the hoists used on inclines for handling men and materials at drift mines are not fitted with indicators. Such cases are common where the inclines are only a few hundred feet long and where both upper and lower landings can be seen by the hoist operative. Being without an indicator the hoistman sometimes makes a poor guess at the landing.

At the Virgie (Ky.) mine of the Rogers Elkhorn Coal Co. where the hoist serving the incline is at the bottom landing, a signal light located beside the hoist



Car Approaching Contacts at Upper Landing

A steel plate on the bottom of the car but insulated from it will short circuit the contactors and illuminate a signal lamp located at the hoist at the bottom of the hill. The hoistman stops the car at the right point even though the "top" may be obscured by fog, snow, or rain.

indicates when the car reaches the upper landing. The contactors energizing this light are shown in the accompanying photograph.

These are mounted on a "4x6" which is spiked to the ties near the center of the track. Both contactors are held by coil springs and carry rollers at their upper ends. On the bottom of the car and insulated therefrom is a steel plate 8 in. wide and 6 ft. long which is turned up at each end. When the car reaches the landing this plate slides over the contactors depressing them, and at the same time completing the circuit between them. At the point where the contactors are located the track is several feet above the ground and therefore free of dirt and water.

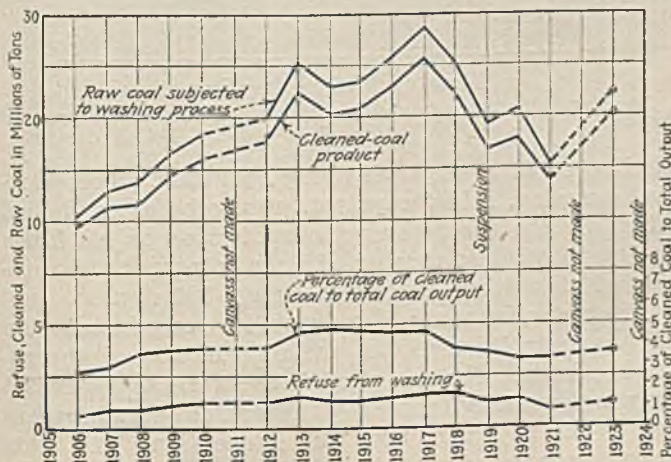
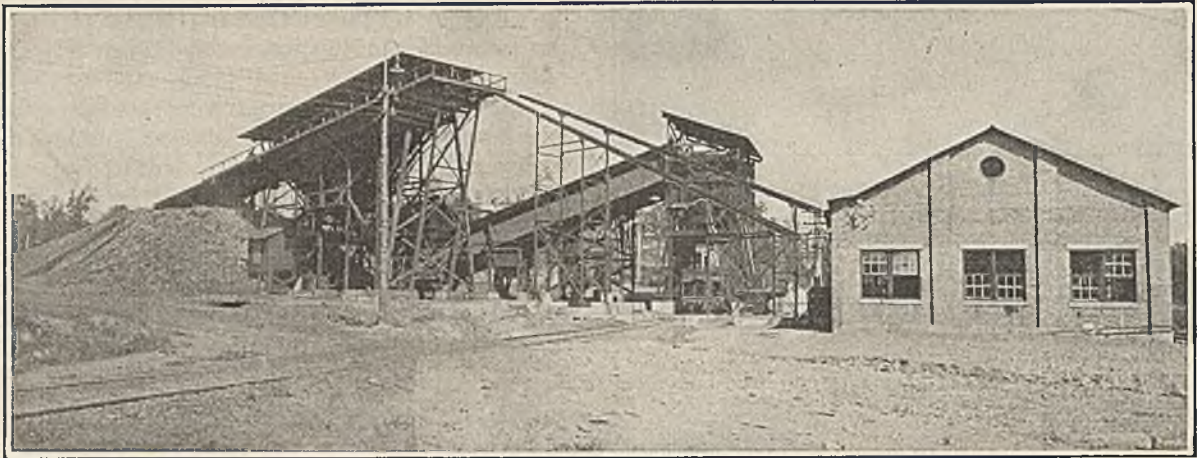


Fig. 5—Graph Shows Progress in Washing

No washed-coal statistics were gathered by U. S. Bureau of Mines for 1922, 1924 or 1925, but those of 1923 are suggestive of the fact that washing practice exhibits increased activity.

HORSE SENSE vanished with the horse, but mulishness did not vanish with the mule.—Wall Street Journal.



Trip Dumping Accelerates Mine Operation And Lessens Production Costs

Alabama, the Birthplace of the Revolving Dump—Today a Whole Trip of Cars May Be Discharged by One Man Who Also Acts as Weighman—This Greatly Reduces the Cost

By Erskine Ramsay

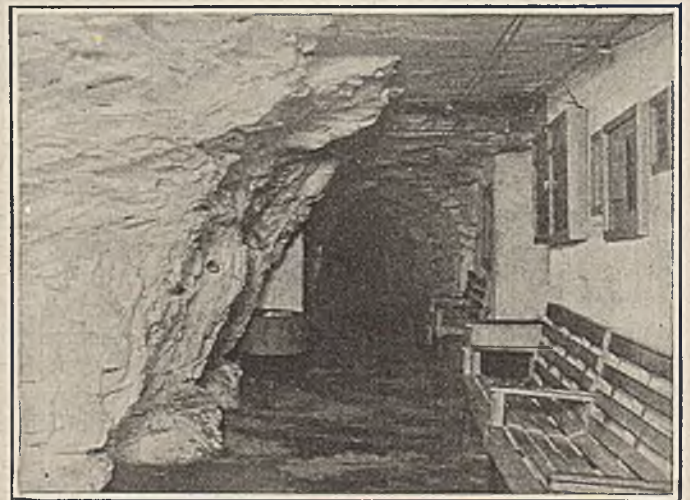
Chairman of Board, Alabama Byproducts Corporation,
Birmingham, Ala.

ALABAMA probably has had more to do with the development of the rotary dump than any other region in the world. In fact, it was in the Birmingham district that the first multiple-car or trip dumper ever built anywhere was designed and erected. This equipment is shown in one of the accompanying illustrations which clearly indicates its construction and ruggedness. This dump, built to my designs as chief engineer and assistant general manager of all departments of the Tennessee Coal, Iron & Railroad Co., was constructed at the company's Birmingham shops and installed at the Smythe Red Ore Slope on Red Mountain.

Since then many dumps of a somewhat similar type have been introduced into many mining regions throughout the United States and other countries. One of the most noteworthy installations of equipment of this kind is that operated by the H. C. Frick Coke Co., at its Colonial Mines. At this plant there are two dumps each of which is capable of discharging a 42-car trip at one operation. Other installations of a similar nature are said to be planned for some of its other mines in the Connellsville coke region.

The installation at the Smythe plant discharged 5-car trips without uncoupling them from the hoisting rope, or disconnecting the cars from each other. The machine was operated by gravity. Though the letters patent included the use of swivel couplings for dumping one or more cars at a time without uncoupling them from the other cars of the trip, swivel couplings were never used at the Smythe plant, for the entire trip was

The headpiece accompanying this article shows the upperworks at the Parrish mine of the Railway Fuel Co. The brick hoist house appears at the right, the loading bin near the center and the dump house or tippie at the left. Hoist house, tippie and slope all lie in the same straight line, or, more strictly speaking, in the same vertical plane.



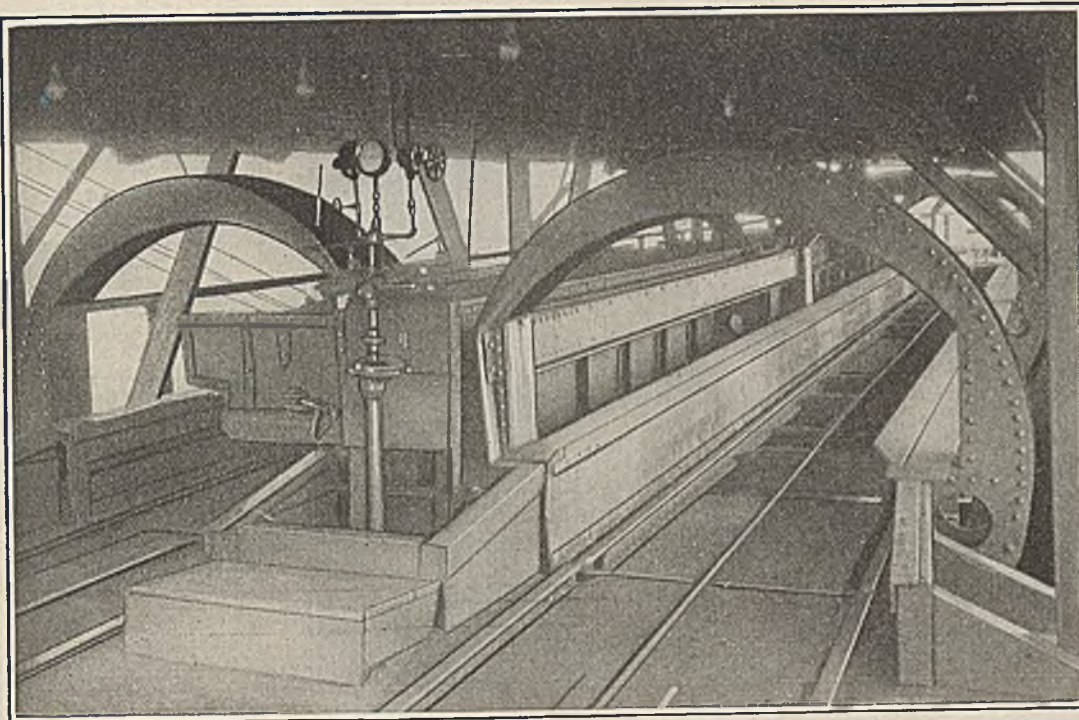
Manway Within the Mine

The first aid station is at the right as is also the underground foreman's office. The tool room is at the right rear.

discharged at a single dumping operation. The selective dumping, said the patent, was to be accomplished either by the use of swivel couplings or by hitchings having a sufficient number of links to permit the rotation of a car through approximately 180 deg.

The swivel was not incorporated in any installation anywhere until long after the introduction of the revolving dump. The first plant in the world to use swivel couplings was the Keokee drift coal mine operated years ago by C. P. Perin, near Big Stone Gap, Va. This operation is now included among the many active mines of the extensive Wentz interests.

In practically all lines of business new devices, especially if they partake of the nature of innovations, are



Twin Dumps

This shows the lower ends of the two dumpers serving the Parrish slope. The trip of cars in the farther dump has been discharged and is now ready to be lowered back into the mine. From the time a trip is coupled onto the hoisting rope on the bottom landing until it is returned to the same point it is handled as a unit.

accepted cautiously. This was true of rotary dumping in Alabama, yet this state now has among other examples of this kind of equipment, one outstanding installation. The Woodward Iron Co. discharges, by means of rotary dumps, every ton of its output of both coal and iron ore. Its output amounts to about 5,000 tons daily.

In this day of mine mechanization attention may well be directed to the marked improvement in speed and cost of handling the output of a coal mine through the introduction of rotary dumps. An example is found at the Parrish mine of the Railway Fuel Co., located at Parrish, Ala. This mine operates in the Mary Lee bed of the Warrior coal field and the entire output is consumed by the parent company, the Southern Ry. The bed worked lies practically level, but there are many local swags and hills in several parts of the mine. The panel room-and-pillar system is employed. The main roads are carefully graded so that the trips may be handled with ease and regularity by 8-ton electric locomotives. The 700-ft. double-track slope is driven

through rock overlying the coal and is on a pitch of $26\frac{1}{2}$ deg. or practically 50 per cent. The length of the hoist from bottom landing to tippie is approximately 1,000 ft.

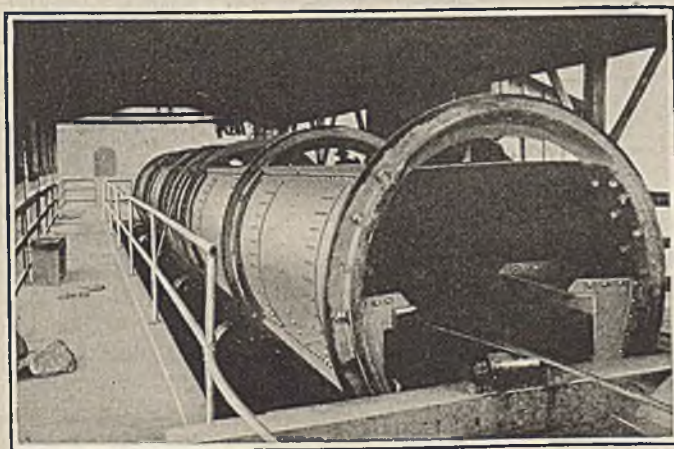
An electric hoisting engine serves the slope. This machine has an actual hoisting capacity of 5,000 tons in 8 hr. The capacity of the new tippie, however, much exceeds this, but the quantity of coal hoisted and handled is, of course, limited by the hoisting equipment on the one hand and the developed capacity of the mine itself on the other.

The first day that the tippie was in operation the output exceeded 1,500 tons which was handled through only one of the two dumps installed. An even greater output could have been produced on this first day, except for the fact that the full quota of miners was not at work. With both dumps working, the tippie, so far as the dumps are concerned could easily handle 1,000 tons per hour.

At present the time required for a hoisting cycle or that necessary for raising and discharging a 6-car trip containing 12 tons of coal is approximately as follows: Time, hoisting from bottom landing to dump, 1 min. 20 sec.; time, necessary to dump trip, 5 sec.; time of dropping trip out of dump back to bottom landing, 1 min. 20 sec.; total time of cycle, 2 min. 45 sec.

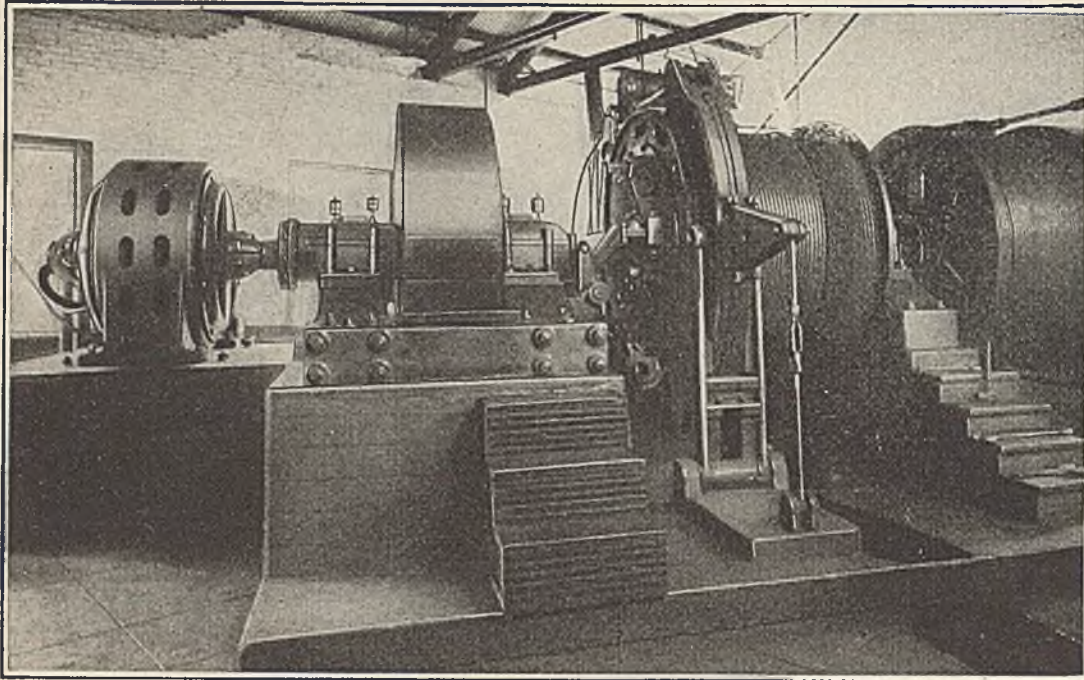
As the Southern Ry. needed coal for its daily operation the mine could not be shut down for any great length of time in order to change over from the old to the new tippie. To meet this situation, therefore, the new tippie was completely erected beside the old wooden structure and when everything was in readiness to make the change, the wooden structure was torn down and the steel tippie quickly skidded over into place. By this means the output ceased for only eight working days. It had been estimated by company officials and engineers that from ten days to two weeks would be required for this changeover.

The new tippie is much shorter than the old one and is built on a 12-per cent track grade and erected in line with the slope. The coal is hoisted in balance and in trips of six 2-ton cars which are dumped in two large



First Multi-Car or Trip Dumper

This piece of equipment was erected at an iron mine near Birmingham in 1900, and is still in use. Both its appearance and age bespeak its ruggedness of design. The success attained with this machine warranted the erection of many others of the same general type.



Slope Hoist

Hoisting in balance from a slope is not an overly common practice, although it has many advantages. This machine is electrically driven and has two drums; one for each side of the slope, which is double tracked. As may be seen the slope is so long that the cable winds onto the drum in at least two layers in order to bring the trip to dump.

gravity-pneumatic-power dumpers fitted with differential supporting rollers. These latter are extremely simple and efficient and require neither lubrication nor attention. They are, in a sense, large roller bearings.

These dumps were the first to be equipped with the new, simple and efficient, frictionless holding-back chains. This means of retaining the dump does away entirely with the use of friction-producing rollers or other arrangements usually employed to prevent longitudinal movement and consequent binding of the dumpers. The cars are not uncoupled from each other during the dumping operation, and the trip is not detached from the hoisting rope from the time it leaves the inside landing at the foot of the slope until it returns to the same point. As the entire 6-car trip is discharged at one operation, swivel couplings are unnecessary.

LOADING BINS SOME DISTANCE UP-TRACK

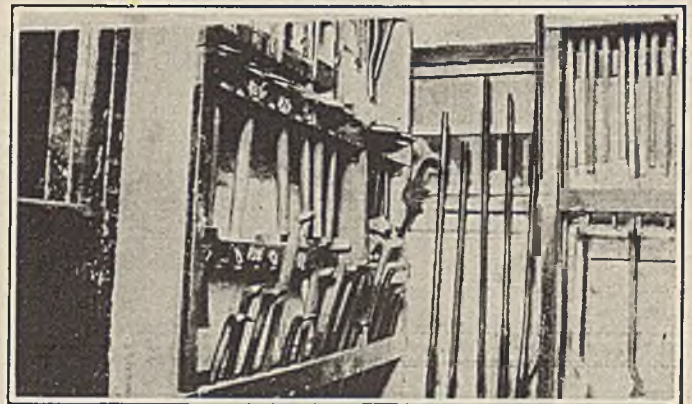
Because the hoist house, built several years ago, is in close proximity to the loading track, which lies between it and the tippie, the loading bins had to be placed some distance up-track in order to prevent having too steep a pitch for the conveyors. From the bin under the dump the coal is fed by a continuous reciprocating-plate feeder onto duplex balanced single-deck shaking screens.

The feeder which is of an improved type, gives a uniform coal feed to the screens instead of the more or less intermittent feed usually afforded by machines of this kind. The screens employed in this tippie are equipped with 2-in. perforations. The coal going through the screen is bypassed around the crusher and mixed on the apron conveyor with that which passes over the screen which is generally crushed to 6-in. and smaller.

When the market requires a 2-in. undersize, which amounts to only a small percentage of the output, the material passing through the screens is deflected by a butterfly gate to a chute which passes it to a 30-in. belt conveyor that carries it to a separate compartment in the railroad coal bin. When this product is not being made all the coal goes to the 60-in. apron conveyor on one section of which it is picked, the refuse being

thrown into a refuse bin underneath. The Parrish plant was designed, built and installed by Andrew C. Ramsay and myself.

Some new and unusual features are embodied in another plant which we are building for Moss & McCormack near Carbon Hill, Ala. A double-track tippie is being erected to serve a single-track slope. Each track is equipped with a new type of gravity-power dump. The electric hoist is fitted with two rope drums,



View in the Underground Tool Room

This shows about one-fifth of the tool room interior. Here are kept four times as many tools as are ordinarily required in the day's work. These are in the charge of a tool man and are maintained in excellent condition at all times. This does away with all excuses and alibis on the part of the men that they have no adequate equipment with which to work.

one for each tippie track. The trips will not be detached from the hoisting rope, and the cars will not be uncoupled from each other. Swivel couplings permit the cars of each trip to be discharged one at a time in the single-car dumpers. The weighman in addition to weighing the coal will control the intermittent movement of the cars through the dump. It is the intention that when this plant has been put in operation a full description of it will be published in *Coal Age*.

Special attention might well be called to the Parrish mine itself, the tippie of which has been already described, because of the neat and business-like arrangement of the toolroom underground. The management,

realizing that there was much room for improvement in the method of handling company tools; particularly in keeping record of them and maintaining them in proper working condition, thereby increasing the efficiency of the mine force, fitted up an unusual underground tool supply house. This installation was made in the following manner:

Across the walkway from the first-aid station and underground office, a room 10x12 ft. in ground area and 8 ft. high was constructed with 8-in. concrete walls. Neat racks and receptacles of symmetrical design were provided to accommodate 375 tools of various kinds.

TOOLS ARE CHARGED AS ISSUED

All articles in the toolroom as they are issued are charged to the employee receiving them. Inasmuch as each man is known by his check number, this is marked immediately over the small brass check hung on the tool receptacle and corresponding to the number stamped on the tool itself. Four times as many tools are stored in this room as are ordinarily needed. They include: Track-, carpenter-, pipe- and rock-men's tools, each of which are kept separately.

Every morning at 9 a.m. before the sand cars are returned to the surface, all broken and dull pieces of equipment are placed in them. At 3 p.m., the tools having been repaired are returned to the toolhouse by the same cars. In this way each man who checks out tools finds them always in first-class condition. He cannot, therefore, excuse himself by declaring that his equipment was inadequate for the performance of his work.

This is, of course, merely a detail suggestive of the general efficiency at the mine, where real economies in labor are being effected. For instance, the dump, once the point where many men could be seen at strenuous labor is now operated with ease by one man with an assistant for odd jobs. The operating officials of this mine to whom thanks are due for their kindness and assistance in preparing this article are W. E. Leake, vice-president; Dan MacDonald, superintendent and O. L. Lockwood, engineer.

Men and Women of the Mines VII—A Matter of Inspiration

By H. S. Geisner
Birmingham, Ala.

One of the directors of the company owning the C-C coal mines happened upon an article in a magazine that had much to say about the evils of absentee ownership especially in the coal industry. Curious to know how much foundation existed for the statements made in the article the director decided to pay a visit to the C-C mine without revealing his identity or the object of his mission. Several years before while on an inspection trip to all of the company's properties, with a large party of directors and officers traveling in a private car, he had visited C-C and met the superintendent, but the superintendent did not recognize him when he entered his office. He introduced himself as a political observer making a study of industrial relations in the various industries. After a few preliminaries approximately the following conversation took place:

Superintendent—Our employees seem to have forgotten that there is such a thing as loyalty to the company employing them. If our miners can load slate for coal without being caught they are happy. If our day

men can loaf on the job without being reprimanded they brag about it to their buddies. If our bosses can increase their incomes by selling jobs they close their eyes to the fitness of the candidates and fill their pockets.

Director—Surely you do not mean to say that all or even most of your employees are guilty of such conduct.

Supt.—Probably not. Possibly I should have said some of our employees, some of our day men and some of our bosses.

Dir.—Assuming that some of your employees are inclined to conduct themselves as you have suggested and assuming further that their conduct is dictated largely by natural impulses such as that to look out for one's self, has your company ever done anything to inspire loyalty from these men whose inclinations you describe as selfish?

Supt.—If I work for you and my heart is in the right place I will certainly look out for your interests without having to be reminded of duty in the matter.

INSPIRATION IS SOURCE OF LOYALTY

Dir.—It is my observation that loyalty is almost entirely a matter of inspiration rather than inclination.

Supt.—Where should I get my inspiration?

Dir.—From the officers and directors of your company of course.

Supt.—Looks reasonable, but if true the officers and directors of my company would be put to shame if they heard your line of talk.

Dir.—Qualify your statement with "some directors" and I will agree with you.

Supt.—Can't do it. Several years ago a bunch of our directors paid us a visit and I have just been recalling their reactions although I did not analyze them at the time. They had a little conference in their private car after they had completed their inspection of our mines and while waiting for their train crew to get the right of way; the burden of their talk was what results have we obtained from this appropriation and that appropriation and what have been the reactions to this policy and that policy. Results for them and reactions toward them mind you and—

Dir.—Wait a minute! I just thought of something that has a bearing on all this. They should get their inspiration from their higher ups, the Dear Public. If you have cause for complaint think about the treatment being handed them.

"Pestle-Tail's" Successor



Gasoline Mule in a Mine Supply Yard

This mechanical "mule" was built in the shops at the Harmar mine of the Consumers Mining Co. and is being used in the supply yard at this plant for hauling supplies to the mouth of a slope. It is propelled by an old Ford engine connected by means of sprockets and chains to a set of standard mine-car wheels and axles.

Specialized Supervision Insured In Every Department Of Coal Mining By New Type of Organization

Main Cleavage Between Production Management and Engineering Control—Production Department Standards Set Up by Engineers—Co-ordination Arranged for as Charts Show

By R. L. Melendy

General Manager, Consolidation Coal Co.,
Fairmont, W. Va.



R. L. Melendy

THERE IS a very noticeable change in the attitude of the leaders in the bituminous coal industry toward the industry. There is less of the tendency to bewail the frequently unjust attitude of the public toward "the greatest of the fundamental American industries," and to wind up a discussion by joining wearily in the plaintive chorus "You gotta quit kickin' my houn' aroun'." It is only occasionally that one breaks forth with the recital, usually a true recital, of the tremendous difficulties in the way of adapting to the coal industry the methods of business management that obtain in other industries. Whenever a group of coal men get together today they are usually intensely in earnest in their inquiries into the details and degree of success the other fellow is meeting in his efforts in this direction.

Knowing something of the genuineness and intensity of this spirit of inquiry, I accepted the editor's invitation to state what we are planning to do. This article is merely a statement of a program, not the report of an accomplishment; it presents an outline of a form of organization adapted to the present stage of progress under this program and is not a statement of an ideal or final form of organization for a coal mining corporation.

We are introducing no new features but are extending somewhat further in the management of our mines certain basic features in the management of American industries which are common to a greater or less degree in the bituminous coal industry. Among these are—Specialization of executive functions and responsibility; specialization of labor; standardization of methods, processes, equipment and tasks; quantity production through concentration of operations; production planning and the use of production, labor and supply budgets or quotas; operations dispatching; multiple shifting; supply control system; and cost control system.

The further extension of specialization of executive functions and responsibility is necessitated by the number, variety and geographical distribution of our mines. The main line of demarcation, as may be noted in the accompanying organization chart, is between production management and engineering control; i.e., between line and staff.

The production organization is headed by a produc-

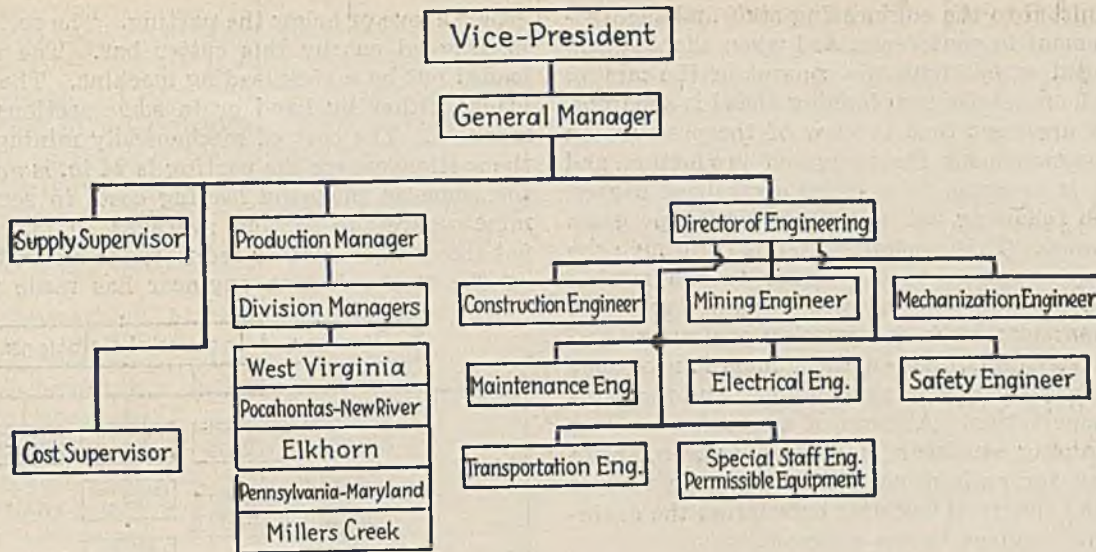
tion manager. He is, in effect, manager of mines. The production manager, division managers, district superintendents, mine foremen, and section and functional foremen constitute the production executive organization. They are responsible for the production, at a standard cost, of a designated quantity or quota of coal, cleaned to a degree specified by the general management. They are responsible for building up and maintaining an efficient producing organization. They are solely responsible for the operation of the mines under the standards set up and maintained by the engineering staff.

In my judgment no industry places a heavier burden on production management or calls for a higher degree of executive ability than is required in the management of coal mines. Constantly varying conditions demand an unusual degree of resourcefulness. The widely scattered force of laborers under ground, a considerable portion of whom are working on a day basis of wage payment, requires an alertness in supervision and a quality of leadership greater than is demanded in most other industries. It is for this reason principally that we are endeavoring to free the production management from other phases of management and to assist rather than limit them by the services of a staff of engineering specialists.

DIRECTOR CO-ORDINATES ENGINEERING

The engineering or staff organization is headed by a director of engineering whose function is to co-ordinate and direct the activities of a group of engineering specialists. A considerable number of problems are handled by two or more members in conference with the director of engineering. The staff at present has the following members: Mining engineer; mechanization engineer; construction engineer; maintenance engineer; electrical engineer; engineer of transportation; engineer of safety; and a special staff engineer—assigned to permissible equipment.

Neither space nor interest permit a complete statement of their functions. I will guess at the high spots of interest and discuss those that illustrate staff procedure rather than attempt to follow a logical order based on the relative importance of their several functions.



The Two Main Divisions Are Production and Engineering

The functions and organization of the engineer of transportation illustrate the principles of management that are being put into effect. Our program calls for "railroading underground"; for the relaying or reconditioning of main haulageways; it also calls for completing the motorization of the mines, and the installation of a dispatching system.

The engineer of transportation and his staff have prepared an unusually complete set of transportation standards which have been adopted, printed and sent to the several mine executives down to and including road construction foremen. These standards cover road construction, including drainage, grading, road-bed, alignment, weight of steel rail, quality and size of ties, the use of tie plates, lock washers, specifications for frogs, switches, track tools, track crews, method and procedure in laying track, etc.

TRANSPORTATION ENGINEER IMPORTANT

The organization consists of transportation inspectors and a cost control clerk. While the track foremen in the mine are directly under the mine foreman, and are part of the mine organization, their selection must be approved by the engineer of transportation or his representative—the transportation inspector. This is also true of the appointment of motormen. He prepares estimates for approval before the expenditure is incurred and controls the expenditure through daily and monthly reports of work completed and costs to date. His inspectors insure the construction of the road in accordance with the standards and assist in instructing and training track foremen. The engineer of transportation sets the tasks for track maintenance crews over each stretch of haulageway. He considers mine projections proposed by the mining engineer from the standpoint of an economical haulage system. The concentration of working places to afford balanced motor haulage is jointly determined upon. The engineer of transportation maintains records which enable him to supervise haulage costs. Under his direction mine telephones and signal systems are being installed. His staff work up the data upon which the dispatching system is based. This data includes length and grade of haulage routes, number of working places, size of trips, etc. In determining the size of trips he works

in conference with the electrical and maintenance engineers. He is responsible for the design of mine cars and haulage locomotives. In the latter he collaborates with the electrical and maintenance engineers.

The engineer of transportation through designs, standards, and an inspection force is responsible for the construction and maintenance of a thoroughly high grade railroad system underground, operated on schedule and maintained according to standards.

MAINTENANCE CHIEF'S DUTIES ARE MANY

The maintenance engineer presents an almost parallel case. He is responsible for the continuous, uninterrupted operation of equipment and for the inspection and maintenance of the equipment at low cost. Definite standards of inspection and maintenance have been prepared and issued. They cover the time and nature of daily and periodic inspections and specify the points to be covered in these inspections. The maintenance engineer has on his staff a division maintenance engineer for each division and district. The division maintenance engineer works through his own central repair and inspection crew and through the mine maintenance foremen. Each mine maintenance foreman is appointed by the mine superintendent. The appointment must be approved by the division maintenance engineer. The mine maintenance foreman is in charge of all repair work inside and outside at the mine and is in charge of the electrical and mechanical repair shops, car repair shop, blacksmith shop and motor barn. The mine maintenance foreman is responsible to the superintendent for the inspection and maintenance of all equipment according to the standards set by the maintenance engineer. The mine maintenance foreman shares with the superintendent in the appointment of operators of locomotives and cutting machines, and maintains records of the repair costs of the equipment by class of equipment and by operators.

The mining engineer is in charge of mine development, projections, ventilation and drainage. The production quota having been determined for a division or for a mine, the mining engineer submits a production plan covering the areas within the division and within mines from which the designated production is to be secured for a definite period. This production schedule

is then submitted to the engineering staff and the division management in conference, and when adopted cannot be changed except with the consent of the mining engineer. The necessity for planning ahead is apparent. It is equally apparent that in view of the pressure on production management for increased production and low costs, it is essential to exercise centralized control to insure the following out of the production program determined upon. This control is exercised through the division engineers who report direct to the mining engineer and through their several corps of engineers. It is also apparent that in determining projections and mining methods the mining engineer finds it necessary to confer with the mechanization engineer and the engineer of transportation. A corps of engineers working under the mining engineer is developing a complete drainage plan for each mine. As a drainage plan is worked out the electrical engineer determines the drainage equipment required by the program.

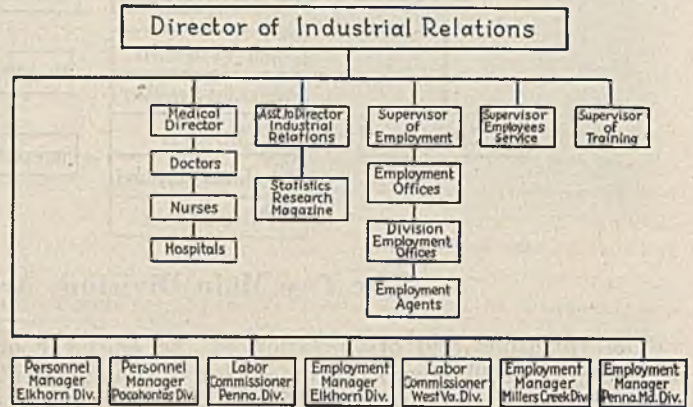
The mechanization engineer is responsible for the development and introduction of new types of equipment, particularly equipment that will reduce the amount of labor required or will permit the economical employment of labor of a higher degree of skill or will effect a further specialization of labor. With the numerous and difficult problems involved in the introduction of loading machines and conveyors the industry is familiar. These problems require co-operation with other staff engineers and with the production management in bringing about the adaptation of mining methods and mine organization to permit the economical use of such types of mining equipment as prove practicable. Perhaps the most valuable phase of this service is that it reveals the weaknesses of and leads to the correction of traditional methods and organization.

STAFF ENGINEER IS OF HIGH VALUE

One or two illustrations will indicate the value of this staff engineer's services in other directions. For some time we have realized the need of self propelled mounted drills in order to control drilling as it affects the proportion of lump coal, the roof, and the amount of top coal that may be recovered. It was also desired, as a part of the program to bring about a further specialization of labor. No such drill was on the market. Manufacturers were loathe to undertake the design and manufacture of this equipment with its uncertain commercial possibilities. Through the efforts of the mechanization engineer, in co-operation with the engineers of these large manufacturers of mining equipment, designs were prepared and submitted and several types are now being built. In addition, a design has been submitted and a drill is being built for attachment to a combination undercutting and shearing machine.

Another illustration is in the efforts to solve a local operating problem. In a large section of two mines there is a local parting varying in thickness from 10 to 40 in. Where the parting exceeds 10 to 12 in. the loading cost, while not entirely prohibitive, is exceedingly high. Efforts to work out this situation were under way at the time the mechanization engineer was added to the staff. He gave to it concentration of effort and attention and special training and experience. In co-operation with the engineer of one of the manufacturers of mining equipment, he secured certain changes in an unusually strong and substantial type of mining machine, equipped with a 13 ft. cutter bar. The coal is cut

either above or below the parting. The rock is shot and is dragged out by this cutter bar. The rock is then loaded out by a rock loading machine. The coal is then loaded either by hand or in some sections by loading machine. The cost of mechanically mining the coal in the sections where the parting is 24 in. is approximately the same as the hand loading costs in sections of the mine where the parting averages 10 in. Whether or not this cost is further reduced, the method worked out by the mechanization engineer has made possible the



All Labor Relations Centered in New Department

mining of a considerable acreage that cannot be mined economically by hand. Further changes that are being made in the design of this cutting machine give promise of materially reducing the cost of mining the coal in the thick parting sections of these two mines.

The construction engineer has direct charge of the extensive tipple construction and tipple revamping program. The functions of the electrical engineer and his staff are those common to this position. The engineer of safety has developed a fairly complete set of standards and is responsible, through his inspectors in the several divisions, for their enforcement. He is also engaged in making changes in and about the mines to conform with the standards recently adopted. Aside from his staff of safety inspectors he directs the work of a corps of men engaged in giving instruction in mine rescue and first-aid work.

ENGINEER STUDIES PERMISSIBLE EQUIPMENT

A special staff engineer assigned to permissible equipment is responsible for developing, in co-operation with the manufacturers and the Bureau of Mines, many of the types of permissible equipment now in use in our mines. A recent instance of the nature of his services is illustrative. Mine telephones and signals are essential to a dispatching system. No permissible telephones had been developed for use in gaseous mines. Because of the important place dispatching is given in our program, this special staff engineer was instructed to make the development of this type of equipment his primary task until it was accomplished. He did. Present indications are that these approved telephones will be received within the next sixty days.

I have taken up the space assigned to this article in outlining only one of the phases of management incorporated in our program, namely, further degree of specialization in executive function and responsibility, and have discussed somewhat sketchily the organization through which this is being effected. Most of the other features of our program have been or are becoming a

part of the program of many mining companies and are familiar. Specialization of labor is still being extended in many directions and its further extension is recognized as desirable. I have referred in passing to the standardization of equipment, methods, processes and tasks. Based on the progress we have made, we believe that there are large possibilities in this direction and that while variations in mining conditions are limiting factors, a much larger measure of the value inherent in standardization can be obtained.

CONCENTRATION AUGMENTS PRODUCTION

Quantity production through concentration of operations and the handling of coal over one large tippie and by one mine management is being effected throughout the industry. Our program and budget includes the construction of several tipples designed to handle easily an average daily production of from 4,000 to 8,000 tons. Among the recognized advantages of large quantity production under one mine management and through one mining system is the type and character of the mine organization, operating system, and mine equipment that are possible under these conditions.

Multiple shifting is a phase of management which needs no argument but does require time to develop on a practical basis. In our judgment it will be as common in the coal industry as in other industries within the next few years. Its possibilities, however, depend upon the prior accomplishment of other features of the program. In some instances we have been able to effect double shifting with a fair degree of success. We are planning definitely to bring about multiple shifting as our program advances in a much larger measure than is possible at present.

DISPATCHING IS OF PARAMOUNT IMPORTANCE

Next to the specialization of executive functions the management feature of our program that we consider of first importance is operations dispatching. Our program in this direction starts with certain physical changes. We are developing what we believe to be a thoroughly practicable railroad system with well built haulage roads and modern types of heavy rolling stock. We are planning in mine development and in mine projections to effect concentration and a track layout for the purpose of utilizing haulage equipment economically. The staff of the engineer of transportation together with the general engineering staff are gathering data and are making what we believe to be a fairly scientific study of transportation and dispatching.

At the outset dispatching is being limited to the transportation system. Plans are being worked out, however, to include at as early a date as possible the operation of mining machines, loading machines, drilling machines, etc. and to follow this by including the work of the several crews of day labor.

It is impossible to determine the degree of success this plan for operations dispatching will meet. The utmost effort of our organization will be given to this phase of the program. We consider it essential in order to effect the co-ordination of mine activities. The lack of this co-ordination appears to us to be the weakest phase of mine management. A far greater degree of co-ordination of activities is essential in order to decrease cost directly through the elimination of the innumerable delays and idle time that is characteristic of the mining industry. While these delays are usually

small in units of time, they total large in man-hours at the close of the day.

Operations dispatching is essential not only to eliminating the waste time of day men, for which we pay directly, but to eliminate the delays and unsatisfactory service to the men at the face, for which we and the industry have always paid heavily, even if indirectly.

A controlling purpose running through our program and affecting decisions as to equipment, methods and type of organization is our determination to enable both tonnage men and day workers to deliver a larger measure of service with the efforts they are putting forth and for the number of hours they are under ground, thereby effecting both a lower unit labor cost and increased earnings per man.

Can Produce Much Gasoline from Lignite By New Process, Frenchmen Say

It is claimed that two French chemists, Albert Prudhomme and Eugene Houdry, after long investigation and research have perfected a process for producing large quantities of gasoline from lignite. According to the information available synthetic gasoline can be made on a commercial scale at approximately two-thirds of the present cost of the petroleum product.

A report on the researches of these two chemists was recently read by Chief Mines Engineer Lafon to the Commission on Mines of the Chamber of Deputies. This body gave instructions for the work to be continued and, if need be, supported by special appropriation. Although the process of distillation is for the moment being kept secret, it is stated that a small plant is actually extracting five gallons of gasoline, four of fuel oil and valuable sulphur, from a ton of lignite. Using this process, it is said that within ten years it will be possible to produce at least 265,000,000 gallons of gasoline and 160,000,000 gallons of crude oil per year, using 10,000,000 tons of lignite. This production will meet at least half the liquid fuel requirements of France.

It is estimated that there is sufficient lignite in France to provide oil and fuel by this method for at least 150 years.

It has recently been announced from Ottawa, Canada, that an application will shortly be made to Parliament for a federal charter for a three million dollar corporation that will attempt to carbonize Canadian slack coal. This is seen as a definite step toward the solution of Canada's fuel problem as the carbonized coal produced from the slack is expected to equal the best anthracite in quality. The product will retail to the consumer for not more than \$13 a ton and the output is expected to be about 1,000 tons a day. The by-products will be recovered.

Major coal research in Germany tends toward low-temperature distillation of both coal and lignite. This produces richer gas, more oil and somewhat less coke, than high-temperature processes. In 1926 two successes in low-temperature distillation were recorded—one at the Matthias Stinnes pits near Karnat and the other at the lignite mine at Edderitz near Coethen. Great possibilities are believed to exist in combining already known processes of dust milling, briquetting, coking, low-temperature distillation and hydrogenation, either together or with other processes such as power development or long-distance heating.

Operation of Retarding Conveyors and Hoists Calls For Understanding of Regenerative Braking

Conveyor Runaways Confined Principally to Cases Where Motor Was Depended Upon for Braking—Overspeed Governor in Connection with Automatically-Set Gravity Brake Usually Affords Full Protection

By J. H. Edwards

Associate Editor *Coal Age*, Huntington, W. Va.

INVESTIGATION of a number of runaways of retarding conveyors, and of instances of hoist overspeeding when operating on inclines and planes, indicates that few operating men thoroughly understand the characteristics of the various types of electric motors. This is particularly true when they are used on loads that become overhauling and thus drive the motor as a generator and return power to the line. Many of the conveyor runaways and cases involving overspeeding of hoists, which badly damaged or totally destroyed the motors, would have been averted had the characteristics of the driving motor been more generally understood.

Some conveyor runaways have arisen from broken shafts or gears but most of them have been caused by a condition, or combination of conditions, that affected the motor during the time that it was regenerating power to the line. In many instances, to the men at the mine at least, the primary cause of these troubles remain a mystery.

Rope-and-button as well as apron conveyors, the types chiefly used for retarding duty, are those that have figured in the majority of runaways. Because the rope-and-button conveyor is now the more widely used, and also because there are more uncertainties in calculating the driving or retarding power required by this type, all further references in this article will be confined to them.

The manufacturers of conveyors do not agree as to what is the best method of controlling an overhauling load. One of the leading companies advises the installation of an automatic mechanical brake which precludes regeneration with the motor. Another prominent firm recommends that the motor, equipped with a solenoid brake, be utilized as a regenerative retarder. In addition, it states that a mechanical brake should be installed which, in an emergency, can be set by the man in the headhouse.

The first manufacturer asserts that regenerative braking is highly unreliable and that the value of the energy returned to the line is usually negligible. The second concern does not stress the importance of the power regenerated but claims that, because there is no wear on the brake bands or drums, regeneration is an ideal method of energy dissipation. However, the unreliability of regenerative braking is admitted and therefore the hand-set emergency brake is advised.

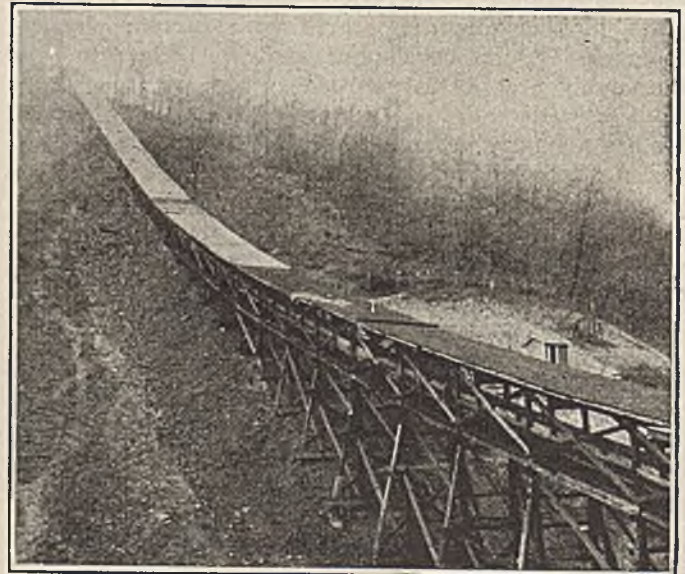
An electrical engineer of a large coal company, who has had wide experience with regenerative braking, claims that this method of retardation should be used wherever loads are overhauled. He further states that there should be a gravity-set mechanical brake on the main drum or head sheave which should be automatically tripped by an overspeed governor driven from the main

shaft. For regular stopping duty the motor should be equipped with a solenoid brake.

Many operating men have asked this question: "If we were equipped to utilize the power resulting from lowering our coal down this mountain, how much could we expect to save?" Theoretically, this is dependent upon the tonnage handled and the vertical distance through which it moves. Practically it depends upon many other factors, among them the angle of inclination, method of lowering and ability of the mine load to absorb the peaks. Generally speaking, the possible saving is much less than expected.

To convey an approximate idea of the saving in power that may result, the following instance is assumed: Production, 2,000 tons per day; difference in elevation between headhouse-feeder and dump at tippie, 500 ft. If the tonnage is lowered at a uniform rate throughout 8 hr. of actual operating time, the theoretical regeneration will be 126 hp. or 94 kw. If lowered in 5 hr. of actual operation, the power recovered will amount to 202 hp. or 150 kw. In either case, a total of 752 kw.-hr. of energy will theoretically be regenerated. At every mine, the energy returned to the system will vary with existing conditions.

In actual practice, the results will be much different.

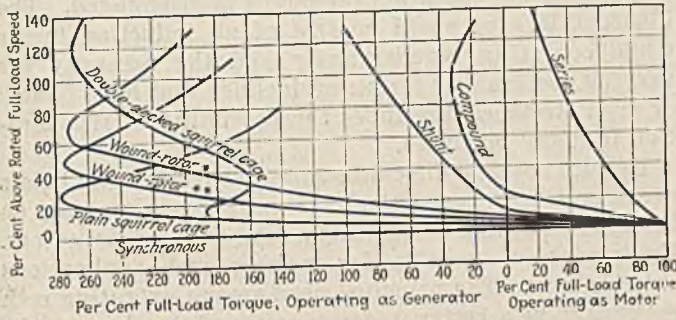


Rope-and-Button Conveyor of Sycamore Coal Co.

This conveyor, at Cinderella, near Williamson, Va., was installed in 1911. Normally it handles an overhauling load and the speed is held in check by regeneration of power to the line by the 30-hp. direct-current shunt-wound motor. Not long after installation this conveyor was damaged by a runaway and as a result a mechanical brake was installed on the high-speed shaft of the gear reduction. The brake is set by pulling a rope which extends to the dumper's position. The motor is not equipped with solenoid brake. The conveyor itself is 1,100 ft. long. The upper 500 ft. is on an 18-deg. pitch, the next 250 ft. on a 32-deg. pitch and the remainder is a curve having an 800-ft. radius.

The conveyor is the only type of coal-lowering machine that can deliver energy to the driving motor at a fairly uniform rate. Lowering in monitors or cars would deliver it at rates varying from zero to a maximum. Using this latter method, which involves relatively small friction losses, 50 per cent of the energy might be saved. Although dependent on the grade, 5 per cent recovery would be a fair estimate with a rope-and-button conveyor.

Recovering 50 per cent of the theoretical power, with a daily production of 2,000 tons, if electrical energy were valued at 2c. per kilowatt-hour, would result in a



Approximate Speed-Torque Curves of Typical Motors

The curve marked "Plain Squirrel-Cage" applies also to wound-rotor motors with all external resistance cut out. Curve "****" is the characteristic for a motor with external resistance equaling the rotor resistance, and curve "*****" for one with external resistance double the rotor resistance. The characteristic of the synchronous motor is a straight line because this type of motor must hold at synchronous speed. Up to about 175 per cent full-load torque the double-decked squirrel cage motor has the same characteristic as the plain type, but beyond that point it changes to a characteristic resembling a wound-rotor motor with high external resistance. This set of curves was approximated from curves and information supplied by the Westinghouse Electric & Mfg. Co.

saving of \$1,690 per year. If only 5 per cent of the theoretical power were recovered, the saving would amount to \$164 per year. This data would indicate that, as a rule, an investment made with the sole object of recovering power is worthy of consideration only where the coal is lowered in monitors or cars.

There is no doubt but that braking by regeneration, that is by allowing the motor to be driven slightly above no-load speed so that it becomes a generator and delivers power to the line, is a method which involves little if any wear on the equipment. Consequently, renewals of friction surfaces are reduced to a minimum and some useful energy is furnished to the power system. It would seem reasonable, therefore, to use this method wherever possible. However, a better understanding of the characteristics of motors when operating as generators is needed as is also a knowledge of the practical limitations of such applications.

MOST METHODS ARE REGENERATIVE

Any standard type of motor except one that is series-wound will regenerate power if the load becomes overhauling and drives it slightly above normal speed. A shunt- or compound-wound direct-current motor will regenerate energy even if it becomes disconnected from the source of power. On the other hand, an induction motor will not act in this manner because it must receive its excitation from the line if it is to become an induction generator. As previously stated, lack of knowledge of these facts has probably caused a number of run-aways.

A combination of direct-current motor and shunt solenoid brake may prove disastrous on a load that is likely

to become overhauling. If the motor should become disconnected from the line while being driven as a generator, it will continue to generate and thus hold the brake in the release position. At the same time, the motor cannot exert a braking effect because it carries no electrical load.

In some cases, induction motors apparently have been connected to the line without circuit breakers or fuses. The object of such procedure is to assure that, if the power fails because of trouble at the generating station or with the transmission lines, the motor will continue to carry any small loads (such as lighting, and the like) that may remain connected to the line. Such a load, however, would be of no service because the motor, unless operating in parallel with a synchronous machine, would have no source of excitation and therefore would generate no voltage.

D. C. MOTORS' REGENERATING TRAITS

Inasmuch as direct-current motors continue to be used to some extent on conveyors and hoists, their regenerating characteristics will be briefly discussed. A shunt-wound motor must be driven by the load at approximately twice its normal speed if it is to absorb even 75 per cent of the full-load torque. This precludes the use of such a machine to absorb a torque more than 5 to 10 per cent greater than the full-load rating.

The more common type of direct-current motor, the compound wound, is a poorer regenerator than the shunt-wound machine. Under the conditions previously mentioned, the compound fields become differential and the maximum torque that can be absorbed is approximately 30 per cent of that at full load. To attain this torque, the speed will have to be nearly 100 per cent greater than normal.

The question that naturally arises is how much overspeeding can a motor safely withstand? The only answer that can be here given is that manufacturers design their standard machines to operate at an overspeed of 50 per cent. Practical men frequently fail to consider that the force tending to throw the coils out of a rotor increases as the square of the speed. Thus, at twice the rated speed the centrifugal force is four times as great as that developed from normal rotation.

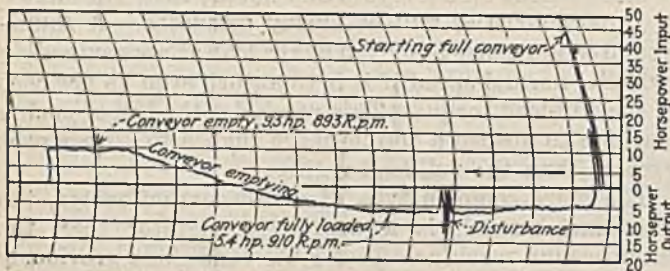
Synchronous and induction alternating-current motors are the most satisfactory for regenerative braking. The synchronous motor permits minimum overspeeding. However, because of its higher cost and lower starting torque, this type is not ordinarily applied to hoists and conveyors.

Wound-rotor induction motors, the type commonly used on conveyors and hoists, fortunately are well suited to regenerative braking. When the motor has no external resistance in the rotor circuit it will absorb full-load torque at an overspeed of from 3 to 7 per cent. Furthermore, it will handle a torque approximately 250 per cent of full-load before it reaches "pull out" and loses its braking ability. Insertion of resistance in the rotor circuit increases the overspeed required to absorb the torque. In many instances this fact has caused the abandonment of regenerative braking, especially where the motors are equipped with hand-operated drum controllers. When the hoistman makes his first trial under these conditions, he is more than likely to think that the load is gaining too much speed and naturally will attempt to reduce it by moving the controller handle toward the "off" position. This action inserts resist-

ance in the rotor circuit and permits a further increase in speed. To hold an overhauling load at the lowest speed, with a wound-rotor induction motor, the controller handle should be in the "full-on" position.

A plain squirrel-cage motor acts in the same manner as the wound-rotor type with all resistance cut out of the secondary circuit. However, the double-decked or high-starting-torque type has a different characteristic after the absorbed torque has increased to about 175 per cent of its full-load value. At this point the characteristic changes to that of a wound-rotor motor with high external resistance and the speed consequently increases abruptly from about 7 per cent greater than normal to approximately 50 per cent above full-load speed.

Some of the runaways of conveyors driven by induction motors may possibly be explained by single-phasing and low voltage. If the power line goes single-phase, the ability of the motor to retard the load is materially reduced—at the same time, the solenoid brake will remain released regardless of its respective phase connection.



From Graphic Wattmeter Test
on Rope-and-Button Conveyor

This test was made after reconstruction following a runaway which destroyed the motor and badly damaged the headhouse equipment. The conveyor is 400 ft. long and has an average pitch of 28 deg. The new motor is a 3-phase, squirrel-cage, equipped with solenoid brake and rated at 25 hp, 860 r.p.m. At full load the conveyor handles 225 tons per hour at a rope speed of 90 ft. per min. Unexplained disturbances occurring during full-load regeneration showed peaks of 15 hp. and 930 r.p.m. The test was made by P. H. Zipp of the Zipp-Beckmeyer Const. Co., Huntington, W. Va.

Although a brake is available that is held in release by a polyphase motor or rotating magnet, its use will not protect against the single-phase condition. A phase-failure relay, in combination with a magnetic switch, should be installed to insure setting of the motor brake in the event of single-phasing. Greater certainty of release because of the absence of a magnetic seal is the principal advantage claimed for the rotating magnet brake as compared to one of the solenoid type.

Inasmuch as the torque of an induction motor decreases as the square of the voltage, and the ordinary solenoid brake does not release until after the potential has fallen to about 80 per cent of its normal value, it is possible that low voltage has caused some conveyor runaways. A sensitive low-voltage relay could be used to counteract this possibility.

Everything considered, the use of an overspeed governor (such as is applied to large hoists) is the safest procedure. The electric circuit from this governor can be arranged to open the motor circuit, set the solenoid brake and likewise the main gravity brake if such a device is used.

Some mining men have the idea that regenerating power to the line would be advantageous only until such time as the power company discovered the practice and installed a ratchet on the meter. Generally speaking, this conclusion is erroneous because the ratchet would be effective only if the power developed

exceeded the demand of the mine. Instances of this kind have occurred but they are unusual. Such a condition obtained for a time at Bonny Blue, Va., where the supply hoist was used for lowering coal from the mountain during the time that the monitor plane and its equipment was under construction. At that time the power demand of the operation was small because little of the electrical equipment had been installed.

At this mine the new incline machine serving the monitor plane is equipped with an induction motor but this is not used for regenerative braking but only for spotting in event of a bad landing or other emergency. During normal operation the motor is disengaged. The inherent lack of speed control of an induction motor while operating regeneratively and the necessity for varying the braking torque on inclines that have "flats" or level stretches, precludes the possibility of regeneration in many instances.

Despite possible difficulties, many conveyors and hoists are operating regeneratively, thereby lessening wear on brakes, reclaiming energy and acting as speed limitators. Equipment is available for making such applications entirely safe. The principal need among operating men appears to be a better understanding of the characteristics and possibilities of trouble when using motors for regenerative braking.

An instance is known where a rope-and-button conveyor ran away because the return trough was oiled to diminish the squeaking. In their design calculations the manufacturers take cognizance of the retarding friction of the un-oiled upper strand. Perhaps the time will come when the upper strand of such conveyors will be regularly oiled and its retarding torque as evidenced by the annoying and characteristic squeak will be replaced by the resistance of a motor delivering useful energy.

Combustion Economies, Not Competition, Check Use of Coal, Says Gandy

Frequently I have heard surprise expressed by business men that coal consumption has not, in more recent years, kept pace with the industrial progress of the nation. For the period 1869 to 1923, the production of bituminous coal increased from 20,303,000 tons to 507,803,000 tons, or 2,400 per cent, as against an increase in the value added to manufactured products, over the same period, of from \$1,395,000,000 to \$25,850,000,000, or an increase of 11,760 per cent. Following the war the increase in the use of bituminous coal was checked. This was due not principally to oil and hydro-electric competition, as is commonly thought, but rather to improved combustion methods and devices, which made it possible to get increased fuel value from every pound of coal. Whereas seven years ago it required 3 lb. of coal to generate 1 hp. of electrical energy, today some of our public utility plants are generating that amount of energy from 1 lb. of coal. There you have a concrete evidence of the trend in combustion economies which, it is believed, have about reached a maximum. These economies largely explain the so-called excess capacity of bituminous mines. Some of the mines were developed by reason of war demand and there would have been a continuing and an increasing demand for their product had not these economies figured in the equation. —Harry L. Gandy, at meeting of Cincinnati Chamber of Commerce.

Systematic Development Is Chief Requisite To Success in Concentrated Mining

Workings in an Area of 110 Acres in 4-ft. Coal Can Be Made To Yield 2,000 Tons per Day—Mechanical Devices Must Be Used in Development—Objection to Single Entry Is Merest Quibbling

By Louis F. Gerdetz

Consulting Engineer, Georges Creek Coal Mining Co.,
Lonaconing, Md.

THE COAL INDUSTRY is rapidly recognizing the fact that the introduction of concentrated mining systems based on principles of complete extraction has become one of the most important factors in its activities. It is beginning to realize that coal wasted by old systems of mining is worth more than a few cents a ton. Concentrated mining based on principles of complete extraction, in order to conform to the American standards of mass production, requires, in addition to proper mechanical devices, mine layouts which necessarily must differ in many respects from those employed under the old system. Maximum concentration of production in a coal mine demands, in addition to full knowledge of the subject, an intense supervision and perfect functioning of all correlated branches that form the new system. If properly regulated, concentrated mining will closely approach the factory efficiency in other industries; otherwise its correct functioning is impaired if not destroyed. In this paper I have selected for my subject a branch of this system of mining which, in my opinion, is one of the most important, namely, the preliminary development of a layout, or, in other words, the development of entries in advance of main mining operations. This particular phase of the work, being a preliminary to proper ventilation, haulage, drainage and distribution of power, is the keystone to the efficiency of the entire system. With the foregoing in mind, I present three plans, each of which is supposed to represent a mine in full development, showing the position of preliminary work relative to that of main mining operations based upon a certain rate of progress.

In highly concentrated mining, where large tonnages are derived from comparatively small territories, it is of utmost importance that these two operations so far as possible be carried independently of each other so as to eliminate such unavoidable interferences as would exist if the case were otherwise. Layout No. 3 is probably the best example of this contention. It bears in addition the distinction of occupying the least area necessary for its development for a specific production. It is the development of this layout that

I choose to discuss as my subject in this article.

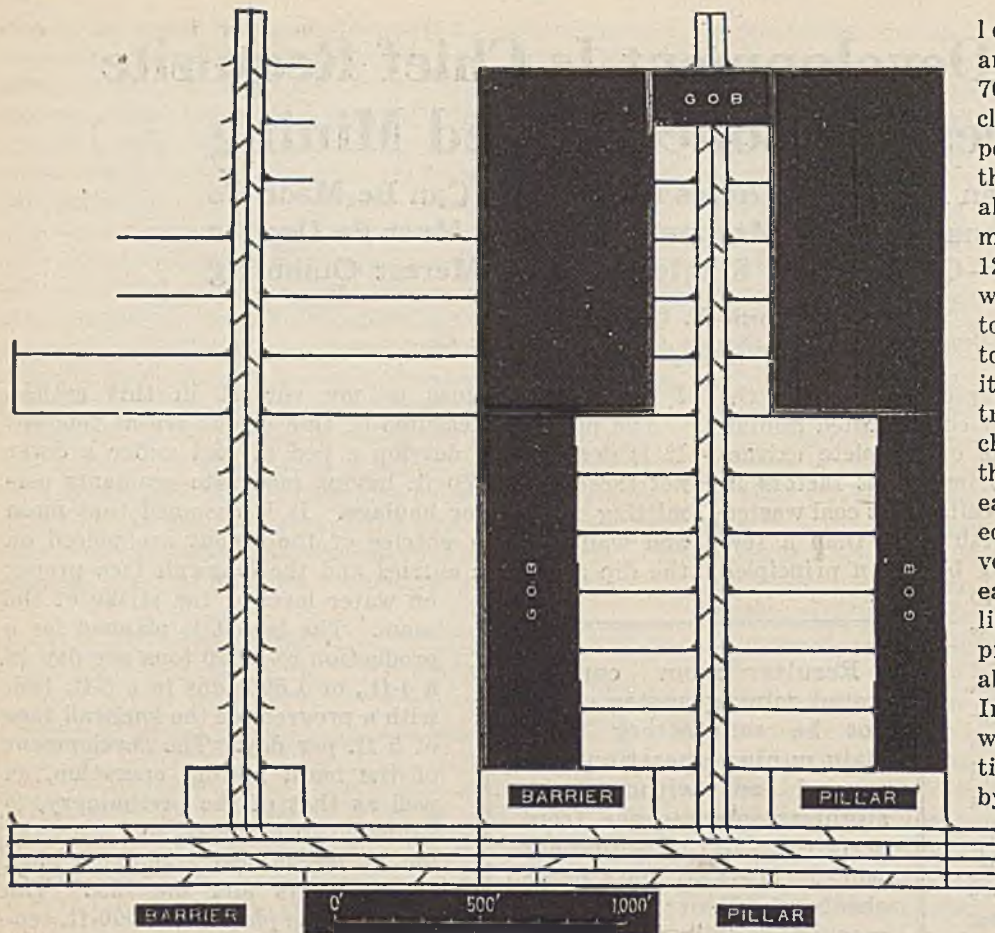
The principal features of this layout are as follows: It is designed to develop a bed of coal under a cover not exceeding 1,250 ft. having moderate gradients permitting free motor haulage. It is assumed that main and wall (single) entries of the layout are placed on the dip and cross entries and the longwall face proper

on water level or the strike of the seam. The layout is planned for a production of 2,000 tons per day in a 4-ft., or 1,500 tons in a 3-ft. bed, with a progress of the longwall face of 5 ft. per day. The development of the main mining operation, as well as that of the preliminary, is supposed to be performed with the aid of mechanical appliances such as conveyors and the like. The main entries placed on 3,000-ft. centers consist of three intake and two return air courses. The return airways adjoin the 200-ft. barrier pillars protecting the main entries. Double system cross entries on 800-ft. centers connect the two main entries. Thirteen single wall entries divide the longwall face into twelve independent 200-ft. walls. The air is supplied to the face in two equal parts by the two main-entry air courses, through the double system cross entries and the centrally located wall entry. The other twelve wall entries are provided with doors, ten of which are equipped with regulators so that if necessary a separate current of air in addition to the main current is supplied to each face. The return air is split into two currents which travel along the face in opposite

Results from concentrated mining systems will not be satisfactory until main mining operations are carried on without the slightest interference from activities in development work. The two must be so absolutely divorced that the men engaged in the one do not know what those in the other are doing. Furthermore, progress of the two must be synchronized if the main mining operation is not to crowd development or if development is not required to stretch so far ahead of the main operation that the purposes of concentrated mining are defeated. Driving of entries by the method of hand loading into mine cars is not only inadequate but antiquated, considering the fact that highly developed mining devices are now available for this work.

directions. It reaches the main return air courses through the two end wall entries. It should be understood that passing the return air through the two end wall entries can be avoided by the addition of one or two return air crosscuts through the barrier pillar. This would necessitate maintaining, for a short distance, an air course in the gob along the barrier pillar. In this case no part of any haulage entry need be in return air. Ventilation of the single wall entries when in stages of development is provided by blower fans which are placed on intake air, each entry having its own split.

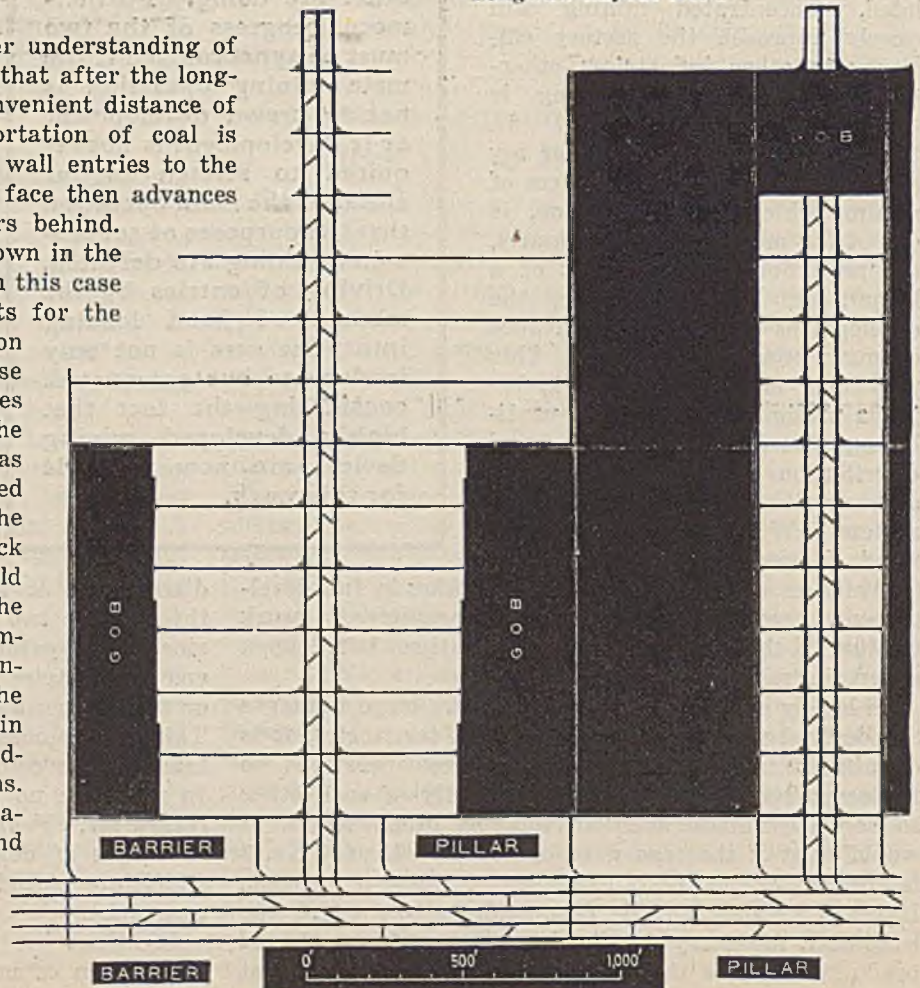
It is not the intention to enter here on a detailed description of methods or equipment employed in the



Longwall Layout No. 1

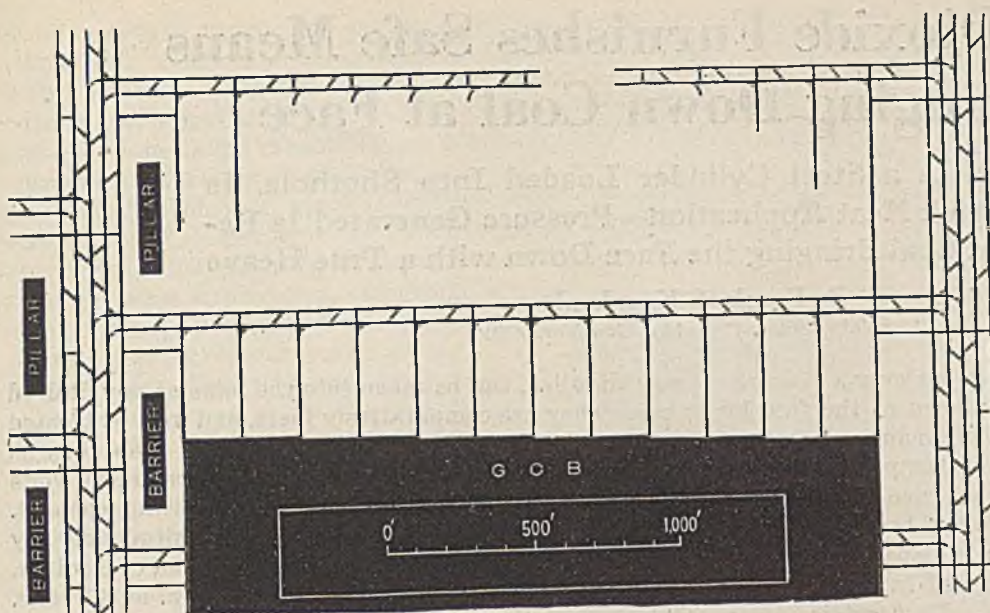
length of entries per panel amounts to 19,350 lin.ft. or 21,700 lin.ft. when crosscuts are included. To maintain the relative positions of the preliminary and the main operations as outlined above, the entries of the layout must advance in the aggregate 121 lin.ft. per day. Crosscuts would raise this rate of advance to 130 lin.ft. per day. In order to take care of this advancement, it is proposed to develop the entries with the assistance of mechanical devices, employing for this purpose eight complete plants, each embracing the necessary equipment for cutting, conveying, ventilating, etc. Theoretically, each plant is taxed with only 15 lin.ft. of progress per day. In practice this progress can probably be improved 100 per cent. In this connection, however, it is well to remember that, in addition to the progress as measured by the advance in coal other highly important duties must be performed before an entry can be finally accepted as answering the

Longwall Layout No. 2



main mining operation, but, for clearer understanding of the subject, it is necessary to mention that after the longwall face has advanced to within a convenient distance of the nearest cross entry, the transportation of coal is diverted through the newly developed wall entries to the cross entry that is next in line. The face then advances without interruption leaving no pillars behind.

The single system wall entries as shown in the plan, are being developed backwards, in this case on the raise. This procedure accounts for the possible elimination of a third entry on the main cross entry which otherwise would be necessary were the wall entries to be driven in the same direction as the longwall face. The cross entries, as already stated, are, in this layout, placed on 800-ft. centers. Advancing at the rate of 5 ft. per day, the life of the block of coal lying between these entries would be roughly 6 months. Theoretically the extraction of this block would be accomplished in 160 working days. In planning this layout I have assumed that the preliminary development shall maintain itself at a distance of one panel in advance of the main mining operations. Consequently, by maintaining the relative progress of the preliminary and main mining operations at the rate indicated in this demonstration, the layout would at no time exceed in extent two panels or cover an area of more than 110 acres. The total



Longwall Layout No. 3

purposes for which it is intended. This is particularly the case if entries are driven in low seams of coal. It must be remembered that these important functions and unforeseen occurrences tend to delay the progress of an operation and that therefore a conservative factor of safety, particularly for such an important branch of the system as the development of entries, is in proper place.

AREA TWICE AS LARGE IS REQUISITE

The arrangement here indicated infers that in the preliminary development of the layout only eight working places on the principal entries would be required at any one time. If, on the other hand, the entries of this layout were to be developed by the old "cut-per-day" method, assuming that the progress expected thereby could be faithfully maintained day after day, it would then follow:

First, in order to adhere strictly to the basic principle of the layout, demanding a separation of the two operations, or at least not to disturb the facilities and efficiency pertaining to main mining operations, the preliminary development would have to be spread over an area at least twice as large as that shown on the plan.

Second, as an alternative, abandoning this principle and permitting a detraction from the efficiency of the whole layout, an additional entry would have to be added to the double system cross entry and from it wall entries could be driven in the direction of the advance of the face. This alternative would add approximately 4,000 lin.ft. of entries and crosscuts to the layout.

With an average progress of 5 ft. per day, 28 working places on the principal entries would have to be steadily occupied in order to maintain the advance development in proper relation to main mining operations. Since there are not as many places in this layout available, it stands to reason that either the progress of entry driving per day would have to be increased or the development spread over a larger area. In both cases the cost of this work would be far in excess of that in the original plan and the efficiency of the system would be greatly impaired. Layouts Nos. 1 and 2, which are units in a series of seven alternate plans are in general

of the same design as Layout No. 3 with the difference that preliminary and main mining operations in the former are not executed in exactly the same manner as in the latter. The amount of entries per acre is practically the same in all three layouts. Based on a given production Layout No. 1 will occupy the largest and Layout No. 3 the smallest area. In conclusion I desire to place myself on record concerning the single system of entries employed in these concentrated layouts. It is difficult to imagine that in this era of progress, with devices developed to a high stage of efficiency and safety, serious criticism unfavorable to the

employment of single entries in concentrated layouts is being made.

From the standpoint of economy, any criticism adverse to single entries is of course untenable. It is sufficient to point out that if single wall entries were to be replaced by double entries with regulation crosscuts, such a change would add to each panel of the layout 13,650 lin.ft. of entry or an increase of 62 per cent for the entire layout. No advantage of any kind can be pointed out with the remotest chance of proof where a double entry could in any way facilitate the operation of the face in this case.

Concerning the safety feature relative to outlets or escapes from the face, it is enough to say that the face of Layout No. 3 is provided with 13 outlets and that each and every individual 200-ft. wall has 13 outlets to the right or left of it. Question of the single entry system from the standpoint of safety, concerning for instance falls of roof or ventilation under gaseous conditions, is an evasion of the responsibility of management for functioning efficiently. Arguments from this angle of view do not justify condemning the single entry system when it is properly developed and subsequently employed in layouts such as are here presented.

Improved Carbonization System Extracts Quintupled Energy, Inventor Says

H. R. Freeman of London, England, recently announced after years of experimentation, that he had perfected a new system of coal carbonization by which it is possible to obtain five times the electrical energy that is now obtainable from coal. According to the inventor of the process, the secret lies in an accurate electrical device for determining the temperature of powdered coal in the retort.

Mr. Freeman states that each pound of coal used under present methods gives 0.545 hp.hr. but claims that, under the new process, it will give 3.313 hp.hr. He predicts that London will be supplied with power from the Kent coal fields at 1c. per kilowatt hour.

Applied to oil shale, the process yields a better motor spirit than benzol at a cost of 12c. per gallon. A syndicate is taking up the process in Australia and negotiations are going on for the building of plants in three British coal fields.

Carbon Dioxide Furnishes Safe Means Of Bringing Down Coal at Face

Liquefied Gas, in a Steel Cylinder Loaded Into Shothole, Is Gasified by Quick Heat Application—Pressure Generated Is Released Against Coal Bringing the Face Down with a True Heave

By Frank H. Kneeland

Associate Editor, *Coal Age*, New York City

SINCE the announcement somewhat over a year ago that coal was being brought down at the face by means of an inert gas the whole industry has been curious to learn more of this somewhat peculiar shooting process. In the months that have elapsed this method of bringing down the face has been tried in at least six different mines of both Indiana and Illinois, on three different types of faces and in coal varying from 39 in. to 8½ ft. in thickness. Thus entries 10 to 12 ft. wide, rooms from 28 to 45 ft. in width, and long-faces varying from 60 up to 120 ft. in length have been driven by means of this material.

The inventors of this process, who were recently interviewed, state that carbon dioxide exerts a true heave on the coal. Its detonation is not an explosion in any sense of the word. It is not even a chemical process. On the contrary the action of this gas is entirely physical and its disrupting effect is obtained by transforming its state from liquid to gas in a comparatively extremely brief interval. For successful results this transition of state should take place in approximately 2½ sec. Any slower period of gasification will either give inefficient results or fail to bring the coal down at all.

In practice the liquid carbon dioxide is compressed within a steel cylinder or bomb 4 in. in diameter and approximately 37 in. long. In this bomb also and in direct contact with the liquid gas is a heating element or priming charge. This is composed of certain chemicals which under the action of a powerful electric current will evolve heat quickly. The rear of the cartridge carries a cap which is screwed into place binding a steel disk which, under the action of the force from within, when suddenly applied, will shear off around its entire circumference, thus permitting the gas to escape into the cap. This cap is provided with four holes or vents near its end which permit the gas to be liberated against the coal at four points, its direction of flow through all vents being transverse to the major axis of the bomb.

In actual use the bombs or cartridges are loaded at a filling station. Here they are fully charged, the amount of liquid carbon dioxide placed within them ranging from 2 to 5 lb. in weight. The heating element is, of course, of such size as to completely gasify the gas charge almost instantly. As previously explained a deficient heat supply would do much to vitiate the efficiency of the shot. Ideal conditions would demand a heating element that would supply exactly enough heat to gasify the liquid charge but no more. This amount can be calculated within close limits. The best source of the liquid carbon dioxide so far found is that of purchase. This gas is accordingly bought in the 50-lb. cylinders normally supplied to soda water fountains.

Each day's supply of bombs or cartridges, as they

may be called, can be taken into the mine at any desired time. They are comparatively inert, and may be treated accordingly. Stray currents are entirely innocuous as it requires from 150 to 250 amp. of current at 80 volts or more to start the reaction in the heating element. This is naturally well beyond the magnitude of any stray current so far discovered in American coal mines, the maximum being approximately 15 amp. at 30 volts. This is entirely too small to start the reaction in this heating element.

Holes to receive these bombs may be drilled in the face in any desired manner, a power-driven steel core drill having been found most adaptable to the coal of beds Nos. 5 and 6 in the Illinois field. This type of drill has the advantage, furthermore, of making less cuttings or dust than either the auger or the percussive type. Loading is done in much the same manner as with ordinary explosive. The bomb is slipped into the hole, the cartridge wires connected to the binding posts on its forward end, the bomb shoved back to the bottom of the hole and tamping rammed in tight upon it. It makes little difference whether the hole is drilled entirely to the back of the undercut, is in front of it, or 6 in. to a foot behind it. The effect is approximately the same in either case.

BOMB DISCHARGED BY CLOSING SWITCH

When all is ready connection to the lead wires is made and the bomb is discharged by the momentary closing of a switch. It is unnecessary to hold the switch closed for any length of time, for, as already stated, the reaction in the heating element, and consequently in the bomb itself, takes place in approximately 1/20th of a second. It is not even necessary for the workmen to retire any great distance from the proximity of the shot. It is, however, desirable that they shall not stand in line with the bore hole. With this as with every other device used for bringing down the coal, mishaps occasionally occur. Thus, upon rare occasions, the tamping may be blown out like the wad from a pop gun, or still rarer, the bomb may follow the tamping out of the hole and be hurled several feet.

The practice with this new material has, however, been brought to such a stage of development that it is now at least 98 per cent reliable, and misfires or "duds" are few and far between. When such a mishap occurs, however, there is no danger in approaching the hole immediately, for if the shot fails to go when the current is turned on the carbon dioxide will gasify so slowly that the metal diaphragm or shear plate will be deformed gradually (allowing the gas to escape slowly) rather than being sheared, allowing an almost instantaneous escape. Even if this deformation and gas leakage does not occur there is no danger in drilling another hole nearby and shooting out the missed bomb.

The bombs themselves are of decidedly sturdy construction, their walls being approximately $\frac{1}{2}$ in. thick. The pressure generated in the gasifying of the liquid usually averages about 25,000 lb. per square inch, while the steel is easily capable of withstanding an internal pressure amounting to 65,000 lb. per square inch. There is thus provided an ample factor of safety inasmuch as the steel diaphragm will either bulge or shear off, permitting the gas to be liberated long before a dangerous pressure is produced. In short, this bomb is a boiler in which one weak plate (the shearing diaphragm) has been incorporated. This will give way long before a dangerous pressure can be developed in the balance of the shell.

Those who have watched a face come down under the action of one of these bombs state that it resembles the dumping of a carload of coal. The action is thus comparatively slow, resulting in a minimum of degradation and a comparatively large percentage of lump sizes. Repeated tests, made by competent authorities, have demonstrated that the vitiation of the atmosphere is practically negligible, seldom amounting to an increase in carbon dioxide content exceeding $\frac{1}{2}$ per cent. During some of the early experiments in practical operation with this material the face of a 14-ft. entry which was well ahead of the last crosscut after being fired could be approached by the hand loaders as quickly as they could walk from the crosscut to the coal brought down. Thus only a matter of from 10 to 20 sec. was involved from the time the switch on the entry was closed until the loaders could be shoveling the coal into the car. This compares favorably, as all mining men know, with the period that must elapse from the firing of an ordinary shot until the fumes clear away.

One of the peculiarities encountered in the use of this material is that increasing the charge does not increase the pressure developed. Thus 10 lb. of carbon dioxide gasified in a single hole would create a pressure no more intense than would 1 lb. of the same material treated in a similar manner. Naturally the volume of gas evolved would be ten times as much in the one case as in the other and the work done by the larger charge would not only be greater in volume but would extend over a greater area. Carbon dioxide may safely be used in places that would normally be considered extremely gassy. This is for the reason that the maximum gas temperature developed is only about 350 deg. F. which is less than one-half the temperature necessary to ignite the most explosive mixture of air and methane.

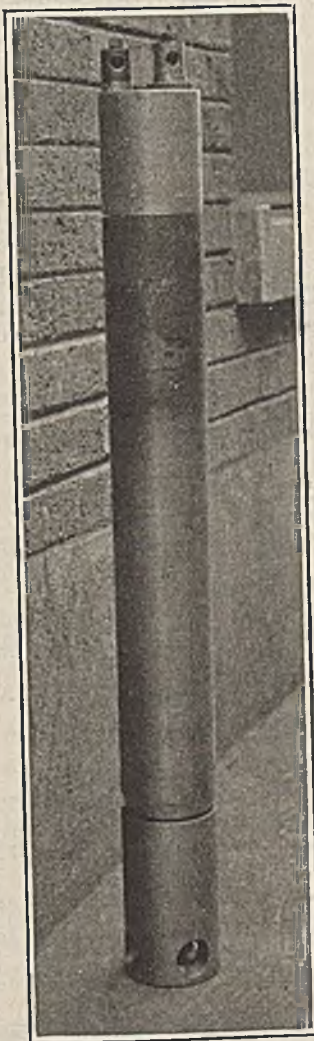
As illustrating the safety of this method of shooting so far as gas is concerned, the following experiment has been repeatedly tried. When a hole in the face strikes a bleeder of gas this may be ignited purposely and permitted to burn at the mouth of the hole. Through the flame the bomb and tamping are introduced into the hole and rammed home in the usual manner. When the bomb is fired the gas flame is

instantly extinguished probably not because of the concussion but because of a momentary blanket of the inert carbon dioxide. The same action takes place when the gas is encountered and is ignited at the edge of the undercut.

As has been stated these bombs are of unusually rugged construction. When loaded they have been dropped off of coal cars, been run over by locomotives and have even been short circuited with electric current sufficiently powerful to cause an appreciable arc, but in no case have they been fired, nor has any material damage been inflicted upon them. While they are fairly expensive is the first instance, the depreciation is apparently negligible and they last indefinitely. The actual inertness of these bombs is sometimes demonstrated by pure accident. Thus on several occasions fully loaded bombs have been dumped with the mine car load of coal on which they were sent out of the mine, passed through the weigh basket, over the shaking screens to be finally removed from the coal on the picking table. Again when sent out of the mine with a car of rock they have been dumped with this material and were only separated from it after having passed through the rock chute and bin.

The outstanding advantages inherent to this method of bringing down the coal face are first, its safety, and second, its comparatively mild action on both roof and coal. Experience has shown that the average amount of coal brought down per shot in entries and ordinary rooms 6 ft. high is about 13 tons. In wide rooms and on long faces with coal 8 ft. thick an average of 25 tons per hole has been secured. The first two shells ever discharged in a coal mine were placed in a bed 8 ft. thick and netted 21 tons of coal each, or a total of 42 tons for the two shots. No definite figures are available at the present time on the exact quality of the coal produced, but there is no question but that this has been materially bettered by the adoption of this method of blasting as compared with either black powder or permissible explosives.

The actual expense involved in using this material so far has been slightly greater than when explosives are used. It is believed, however, that as time goes on and further experience is gained this expense can be appreciably decreased. Those who have used carbon dioxide—and one mine in Illinois is now securing at least 85 per cent of its output from its use—state emphatically that the advantages secured, such as greater safety and a better quality of output, far more than offset the comparatively slight increase in expense.



The Gas Bomb

Two binding posts for the electrical connections may be seen at the top and two of the four vents for the escaping gas are visible near the bottom of the cylinder.

INFORMATION circular No. 6020, recently issued by the U. S. Bureau of Mines, describes the method by which the Bureau's first aid training was given to all of the approximately 1,400 employees of mines Nos. 9 and 12 of the Madison Coal Corporation, Dewmaine, Ill.

Mine Inspectors' Institute Views Auxiliary Ventilation, Cap Lamps and Gas-Recording Devices from All Angles

What Retreating Longwall Will Achieve and Why Its Introduction Should Be Encouraged—Chief State Mine Inspector Hay of Kansas Gives Reasons for Advocating Use of Electric Cap Lamps

Staff Correspondence

SIXTY MEN representing eleven coal mining states gathered at Charleston, W. Va., on May 3 to attend the three-day meeting of the Mine Inspectors' Institute of America.

"Automatic Recording Devices for Mine Gases," the first subject, was presented by George H. Deike, president of the Mine Safety Appliances Co., Pittsburgh. He reviewed the dangerous percentage limits of methane and carbon monoxide, the methods of detection, and the limitations of these methods. The following paragraphs are quoted from his preliminary remarks:

"The Bureau of Mines states that the length of the gas cap formed over a non-luminous flame of a Wolf round-wick lamp when one per cent of gas is present is about 0.3 in., and many men claim that they can easily and accurately detect this percentage. This is doubtful because it is easy to be misled unless one is extremely careful to differentiate between the "fuel" cap that is constantly formed and the gas cap. It is doubtful, considering all the variables whether less than 2 per cent of methane can be detected effectively. This percentage gives a cap about 0.4 in. high.

METHANE PERCENTAGE CLASSIFICATION

"The Bureau of Mines has recently offered a new classification for coal mines depending upon the percentages of methane generated, and has termed a mine virtually non-gassy in which inflammable gas in excess of 0.05 per cent cannot be found by systematic search. A definitely defined classification will no doubt meet with general approval and is likely to be standardized and accepted by the various mining states."

Mr. Deike submitted a table of gas-detecting methods and appliances now used or available which will be found on this page.

The continuous methane recorder was described in detail. This is the instrument which was first exhibited at Cincinnati in May, 1926. The continuous carbon-monoxide recorder, which was placed on the market in 1925, was likewise treated.

Referring to the latter, Mr. Deike said, "With the advent of vehicular tunnels, such as the Liberty Tunnel in Pittsburgh and the Holland Tunnels under the Hudson River, connecting New York with Jersey City, it was realized that adequate ventilation would have to be provided to take care of the carbon monoxide from the exhaust gases of automobiles. The U. S. Bureau of Mines co-operated in making the ventilation studies. In this work they required an instrument which would continuously and accurately record small percentages of carbon monoxide. The development of such a recorder was begun during the year 1923.

"The Bureau of Mines accordingly started with the visible indicator as the basis, substituting, in place of the thermometer, a unit of thermocouples and wiring these to a Leeds and Northrup Recording potentiometer. The recorder was perfected by the Bureau of Mines to a point where it will show carbon monoxide in concentrations as low as two parts in a million.

It is described in the U. S. Bureau of Mines Technical Paper No. 355 and is now commercially available. The instrument has special application to war needs also. During the war, as a carbon-monoxide indicator was needed, Doctors Lamb and Larson, of the Chemical Warfare Service, worked on the problem, developing and later patenting what is substantially in principle the present commercial recorder, except that other catalysts were used, as "Hopcalite" was not then available."

Richard Maize, of Uniontown, Pa., asked Mr. Deike how, if continuous recorders were connected only in the main return, could the concentrations in the various splits be determined. He also suggested the possibility that the concentration in one split might decrease and

Appliances for Gas Detection, Their Accuracy and Field of Use			
METHANE			
Appliance	Lowest Percentage Detectable	Field of Use	Remarks
Flame safety lamp	1.0-2.0	General inspection fire boss, etc.	Roughly quantitative depending on lamp fuel and operator.
Burrell indicator	0.1	Foreman, asst. foreman, development entries, return air of split, etc.	
Gas analysis apparatus	0.02	Gas inspector, chemist, return air of splits, etc.	Accuracy depends on laboratory technique of operator.
Continuous recorder	0.01	Fan house, etc.	Accurate—automatic.
CARBON MONOXIDE			
Appliance	Lowest Percentage Detectable	Field of Use	Remarks
Canary bird	0.1-0.15	General recovery work, etc.	Roughly quantitative depending on bird and length of exposure.
Carbon monoxide	0.7	General recovery work, fire fighting.	Fairly accurate depending on ability to read color scale.
Pyrotannic detector	0.01	Safety engineer, fire-fighting, etc.	Accurate in trained hands
Gas analysis apparatus	0.01	Safety engineer or chemist, fire fighting, etc.	Accuracy depends on laboratory technique of operator.
Continuous recorder	0.0004	Fan house, spontaneous oxidation, etc.	Accurate—automatic.

Early session will be found recorded in last week's *Coal Age*, on page 646, and the business sessions, banquet and excursion are reported in the "News of the Industry" section of this issue.

in another simultaneously increase beyond a safe limit, and yet the main return remain practically unchanged.

Mr. Deike admitted this possibility and cautioned that continuous recorders do not take the place of any other safety precautions, but instead serve as a check and warning. He suggested the possibility of installing continuous recorders in each split but hinted that, based on present safety standards and cost of instruments, this was more than could be expected.

He also stated that the recorder could readily be moved around from split to split wherever its services were needed. It could be placed to one side of the airway and need not be located in the fan house when drawing its sample from the airway near the fan because, having a suction fan of its own, it could readily suck the mine air through a pipe 200 or more feet in length.

"Mine Safety Rules Supplementing the Statute Laws," was the final paper of the Tuesday session. This was prepared by A. H. Findeisin, mine inspector, Industrial Commission, Madison, Wis., but was read by L. M. Brown of Wheeling, W. Va.

GOVERNMENT BY LAWS OR RULINGS?

The paper described the Wisconsin safety statute which gives authority to an industrial commission to formulate and promulgate safety codes. These are defined as, "directions explaining how some of the general provisions of the labor laws are to be applied in particular industries or operations."

The original mining code was developed in 1920 by a committee consisting of two professors of mining engineering, a representative of the U. S. Bureau of Mines, a representative of the Wisconsin Federation of Labor, five representatives of mining companies, and the author of the paper.

The final draft of rules was not made until after public hearings, at which comments and criticisms were invited. After adoption by the commission, the rules were published in the official state paper and thirty days later became effective and have since had the full force of statutory law.

Commenting on the paper, J. W. Smith, Kansas City, Mo., said that the Wisconsin method is somewhat similar to that recently inaugurated in Utah, the mine regula-

tions of which he understands are being enforced without difficulty.

Ed. Flynn, Pratt City, Ala., mentioned the difficulties which might arise from trying to enforce rules not definitely in the statute. The laws of Alabama instructed coal companies to provide regulations for the safe operation of their mines, which when promulgated must be printed and distributed to every employee. However, when complying with the law in every detail, the companies found it difficult to take action against employees who violated the rules thus provided.

HAVE TRIED IT IN MARYLAND

J. J. Rutledge of Baltimore, Md., who was one of the Wisconsin committee, said that he thinks an "enabling act" giving authority to a commission to make and amend specific rules is the best way to handle mine safety laws. He called attention to the fact that in three states, Utah, Wisconsin, and Maryland, specific rules which are not on the statute books, are being enforced.

R. Dawson Hall remarked that a coal company could only prevent undesirable legislation being enacted by appealing individually to the legislators, a process known unfavorably as "lobbying." Where there is a commission it can appear before it by representative who can argue its case in an open and honorable manner. Commissions were gradually taking over the more difficult, technical and detailed work of the governmental bodies, both here and in Great Britain. In fact some had said that the country was more and more assuming a commission form of government. Those who make this assertion point to the Federal Trade, Interstate Commerce and Tariff commissions. In Great Britain there are, or were, not only the regulations of statutory boards, but by-laws made by operating companies. Mr. Hall evidenced the condition in Kansas where a good law to keep out smoky mineral oils had been passed prohibiting the use of any but animal oils. This had successively made it difficult to introduce petroleum wax (known as "sunshine"), carbide and the electric cap lamp.

Supporting a statement by Mr. Hall that statute laws are not changed with sufficient frequency to keep up with progress in the industries, William Boncer, of Vir-



Mine Inspectors' Institute of America After Its First Session

Inspectors are strong on discipline, so when the president gave the word they all came out to be photographed, which, as every one knows, is too often the signal for prompt dispersal. This then shows the whole group, or at least eight out of nine of them.

ginia, acting president of the institute, offered the comment that the Virginia labor laws as yet have not been amended to make any mention of electricity.

At the close of the afternoon meeting, James T. Beard, Danbury, Conn., formerly associate editor of *Coal Age*, who is a charter member of the institute, recalled for the benefit of the members why and how the institute was formed in 1908 and what were the aims of the founders.

Applications of about 40 new members were approved by the institute at this session and in those that followed.

SMALL ACCIDENTS LESS NUMEROUS

At the morning session of the following day, J. V. Sullivan for W. H. Cunningham, secretary of the West Virginia Coal Association, presented an address in which it was shown that though the number of fatalities had been greater the number of "non-fatal accidents in the coal mines of West Virginia had been lower in proportion to the number of men employed than in the other industries of the state." Said Mr. Sullivan, "The report of the state compensation commissioner for the fiscal year, 1925, the last year for which figures are available, shows that of 191,144 protected by state compensation, 87,483 or 45 per cent were employed in the mines. In that same fiscal year the total number of non-fatal accidents reported was 29,934, of which 13,401, or 44 per cent, occurred in the coal mines, whereas 16,533, or 56 per cent, occurred in other industries.

"The report of the compensation department for the preceding year of 1924 shows an even stronger presentation of these facts. In that year, there were 164,864 men on the compensation fund, of which 78,672, or 47 per cent, were engaged in mining, whereas of the non-fatal accidents reported to the department, only 12,152, or barely 41 per cent, were attributable to coal mining."

Mr. Cunningham's paper stated that the mining companies' associations had co-operated with the department of mines in many ways, notably in the observance of State Safety Day, Aug. 21, 1926, and also in the department's successful effort to have its powers extended. The operators had supported the enactment of, at least two measures, enlarging the supervision of the department in the interest of mine safety.

IS PRESENT VENTILATION DANGERPROOF?

That the use of fans and tubing has its dangers was admitted by R. Dawson Hall in his address on "The Use of Auxiliary Ventilation." He stated, however, that the present systems of ventilating working faces in which line brattices, curtains and doors on the entry and bratticed crosscuts are used also were dangerous. It was necessary to balance dangers, and if it was found that auxiliary ventilation, properly installed, was safer to adopt than older methods, which had been proved inadequate, then such ventilation should supersede the old.

Mr. Hall declared that the new system was peculiarly well adapted to longwall-retreating operations. In fact, the progress of longwall would be greatly hampered if auxiliary ventilation were not permitted. He showed how longwall would conserve the coal resources of the country and of the coal operator. The latter, finding it possible to continue the operation of a mine for a longer period than with less permanent construction will be greatly disposed to build more permanent plants at the mine and to erect better houses, having greater facilities, for the families of his employees.

Furthermore, the complete extraction and complete caving of the roof will serve to eliminate the storage of gas in abandoned mine workings, and to prevent the entry of water. The loading machine, which needs longwall for its effective operation, will remove all coal, large and small, good and bad; in consequence, no pyritiferous material will be left for any water entering the mine to leach. Where such leaching occurs the water becomes highly acid. Thus the introduction of longwall in its chain of causes affects the problem of water "pollution" vitally, and is connected in other directions with the problem of ventilation.

Mr. Hall described the mine room as being constructed like a cannon. It is true it has side openings or crosscuts that furnish a relief to explosive violence, but nevertheless the confinement of an explosion in a room is so like that in a cannon that it is important to reduce the number of men working in such narrow operations to the lowest practicable limit. In the single-entry method of opening longwall retreating, the number of such places is reduced to a minimum, thus reducing the possibilities of accident. These places can be rockdusted, especially seeing that being few in number the coal represents only a small proportion of the whole coal obtained from the panel.

EXPLOSION FINDS ROOM FOR EXPANSION

The longwall face when completed furnishes such room for expansion that the risks of explosion are greatly reduced. As shooting a longwall face requires only light shots, the dangers of a blownout shot are decreased. As ventilation conditions are favorable when the face is established, the methane should be swept out. As the caving is complete in the rear of the excavation, no reservoir of gas is available to be blown out in the mine by a sudden cave, by a change in the course of the ventilating current through the excavation or by a change in ventilating pressure.

Mr. Hall stated that the hazard in the mine from explosions increases, other things being equal, with the square of the number of men in the mine, for each man furnishes a hazard to all the other men and therefore a mine with 100 men has a hazard equivalent of 10,000 units, where a mine with one man has a hazard of one unit. But the dangers of certain types of operation, such as room-and-pillar workings, are greater than those of other types.

Furthermore, said Mr. Hall, with longwall the men are grouped together and can readily be supervised, putting the placing of shots and of props, the control of gas and ventilation, and the observation of roof conditions under competent and sometimes continuous control."

EDDIES MAKE FAN ACTION UNCERTAIN

Discussing the location of the auxiliary fan and the importance of taking into consideration the eddying of the air current, Mr. Hall said, "Wherever there is a good normal current, the auxiliary fan should be placed where it will not suck in its own return, so long as the main current is flowing. The fan must be in the normal current and so far back from the nearest auxiliary return that it will draw on the fresh air and not on the vitiated current coming back from the working face. In theory, perhaps, we might put the fan just outby the last crosscut or just outby the nearest room being ventilated by the auxiliary fan, because the return air could not travel back against the incoming current, which latter would rush in and intercept it.

"However, there is always turbulence in the air current, and in that case the return air would have an opportunity to travel back. Some have advocated that the fan be set 10 ft. outby the nearest auxiliary return. For safety it should be surely set further back. How much is a matter for consideration, and, until more is known, it would be best to put the fan back at least 25



Officers on Brink of New Official Year and of Lover's Leap, West Virginia

From left to right, William Boncer, president; W. H. Jones, first vice-president; Charles W. Stewart, third vice-president; C. A. McDowell, secretary; J. T. Beard, editor-in-chief; J. J. Rutledge, treasurer; J. W. Smith, assistant secretary and J. H. Edwards, publicity editor. The rock projects from the side of the valley making a precipice some hundred feet high.

or perhaps 50 ft. Experiment has shown that there is no pressure on the top of a flat aeroplane wing, but rather what is relatively a vacuum. It is possible that a similar relative vacuum might occur in a mine; that is, the pressure at some points near the auxiliary fan might be less than at some points further in.

"Anyone who has seen water, in an eddy, traveling up-stream will realize what is meant. Probably a light fluid like air is more subject to such currents than a heavy fluid like water. In consequence, it is well to have the fan well back of the nearest auxiliary return. It is easy to see how a fan might start an eddy which, once created, would tend to perpetuate itself. The Whirlpool Rapids in the Niagara River are an example.

"In the auxiliary fan, we have a new appliance. It is necessary to go cautiously until all the possibilities are fully apprehended. Consequently, the fan should be set well back from any tubing return, wherever methane may be found. It must be remembered that a fan will recirculate not only methane and carbon dioxide, but dust also, if wrongly placed."

USES SUCTION FAN AT FAULTS

Ed. Flynn, inspector, said that the Tennessee Coal, Iron & R.R. Co. used a suction fan connected with steel spiral tubing which acted as a return for driving through faults. It has given excellent results. Richard Maize, Pennsylvania state mine inspector, Uniontown, Pa., said that such a fan would discharge the return air near the fan motor. Consequently, the gas and dust might be ignited. Mr. Flynn stated in reply that the fan was driven by a belt actuated by a motor some feet away from the discharge and so located that the return air would travel down the entry away from the motor. Mr. Hall said that it was better not to use a suction fan because if the return should be dusty or gassy it might be ignited by sparks from the fan should the blades

strike the casing. He added that by placing a tube of some length on the fan discharge the return air could be carried 50 or more feet from the fan motor.

Mr. Maize advocated the force fan for the further reason that it drove the air well beyond the end of the tubing, and created a turbulence at the face of the working that mixed the discharge air with the gas in the airway whereas the tubing if drawing air instead of discharging it would bring it in without turbulence and might fail to remove the gas. He had noted that line brattice gave its best results when the air approached the face by the narrow side and not by the wide side. The blast obtained by passing the air by the narrow side was more effective than the more gentle current resulting from passing the air up the wide side and removing it by the narrow passageway.

OPPOSED USE OF BATTERY

Carl Scholz, receiver for the Indian Run Collieries Co., said that he took strong exception to Mr. Hall's remark to the effect that, "a portable battery to be replaced and replenished every day would furnish continuous power that would not fail even in case of a roof fall or a failure of electric current. The battery should be made to operate a permissible motor." He said that a battery was a great source of potential energy and that he was opposed to the use of storage-battery equipment because if the roof were to fall and short-circuit the battery the latter would continue to deliver energy and might cause the most dangerous kind of mine fire. It would not only ignite the coal but supply a continuous heat which would maintain and intensify the fire. With this conclusion he had not induced the U. S. Bureau of Mines to concur.

Mr. Hall said that a battery used for the purpose of driving a mine fan was a stationary unit and as such could be adequately protected by posting. If the possibility of a fire from lubricating oil might be feared, the support to the roof might be afforded by an incombustible post or posts. Thus a steel pipe could be used.

AS WITH A MAIN VENTILATING FAN

Mr. Scholz favored an independent power line for such fans. It was customary for the main fan to be connected independently so that its operation would not be affected by the operation of circuit breakers which would cut off the power should a locomotive or a cutting machine or both draw too heavily on the power circuit. Mr. Hall said that a power line hung from the roof might be broken by a roof fall. This might cause a heavy ground or short-circuit. The feed line could, of course, be armored and buried in the bottom as a means of circumventing that possibility.

Mr. Maize said that not only should the motor be permissible, but the connections also. Mr. Scholz declared that the Bureau of Mines insisted that every permissible motor should have the connections incorporated in the equipment. The Bureau would not approve a motor unless the connections were as permissible as the motor itself. Mr. Maize insisted that some permissible equipment had been fitted by mining staffs with non-permissible connections.

Oscar Carlidge, consulting engineer, Charleston, W. Va., who had been associated as manager with Mr. Scholz in the Raleigh-Wyoming Coal Co., said that he had found better results were obtained with tubing and an auxiliary fan than with line brattice. Since his

association with the company there had been an explosion, and he had been informed that line brattice was then being used in the place where the explosion occurred.

David J. Roderick, state mine inspector of Hazelton, Pa., said that in the anthracite region the method of approaching a thick bed was by rockholes driven from a roadway in the Buck Mountain seam. These rock holes were 1,000 ft. apart and inclined at 45 deg. As soon as they reach the upper bed, roadways were driven in the coal parallel with the roadway below. These upper gangways were driven east and west 500 ft. to connect with roadways from adjacent rockholes. The air was carried up each rockhole in a tube which had a tee connection where the tube reached the seam to be worked.

Here the air was split and carried by tubes connected to the tee east and west. Ventilation was provided in this manner till connections were made between rockholes. The air returned by the roadways in the coal to the rockhole and descended by these holes to the Buck Mountain entry. There was not much gas, or exception might be taken to the system. Many acres had thus been recovered. The anthracite region had hundreds of such fans.

PROS AND CONS OF LIGHTING

The paper of Miller D. Hay, chief inspector, department of mines, Oklahoma City, Okla., on the "Advantages of the Electric Cap Lamp," was presented by Richard Maize in the absence of the author, at the morning meeting, May 4. Mr. Hay declared that no coal mine in existence could be classed as one that would never generate methane. He discussed the dispute between the Rock Island Coal Co., operating mines at Hartshorne, Okla., with its men and the State Mining Department. "The miners objected to the use of electric lamps," said Mr. Hay, "primarily because they had been taught through their district officers to oppose not only closed lights but generally any other changes proposed by the company. They claimed, however, that the weight of the battery was excessive and that the illumination was poor.

"The State Mining Department supported them with the added objection that the mere fact of having a safety lamp would make them careless and instead of being a safety measure the contemplated carelessness of the miner would increase the hazard. The department also contended that all motors and mining machines should be made gasproof." The result was a series of strikes and court litigation that has terminated thus far in favor of the company, though the State Supreme Court has yet to be heard from.

The advantages of the electric cap lamp, as Mr. Hay enunciated them, are (1) It furnishes a liberal amount of properly distributed light for a definite period; (2) It eliminates the known hazards of the open light because gas, coal dust, blasting powder and combustible material in general cannot be ignited by it; (3) It provides a uniform amount of illumination thus reducing the injuries from falls; (4) It affords an illumination that is not affected by quick movements or strong currents of air; (5) It will burn for a period of 2½ hr. completely submerged in water; (6) It effects a saving in labor of approximately 20 min. per day over the use of the carbide light."

Mr. Hay in his paper instanced a near disaster in a mine near Henryetta, Okla., April 14, 1927. A break of

the roof under a greatly swollen stream suddenly flooded the mine, and nineteen men were caught like rats in a trap. Though the mine was connected with another shaft mine operating two slopes, the water cut off this means of escape, for it rose in both hoisting shafts above the ring timbers and in one of the slopes the water was high enough to entirely close the opening.

After the men were rescued it developed that the water in a cross entry leading to the other slope was within 12 in. of the roof. The rescued men said that they had tried to escape through this entry, but that the air current was so strong that it was impossible to hold the flame in the carbide lamp. Had they been equipped with an electric lamp they could have effected their escape five hours sooner.

Mr. Hay's paper stated that he had kept a modern type of electric cap lamp with accessories, including battery cable and head piece under water for a period of 2½ hr. and that the lamp continued to burn with its usual brilliancy throughout the test.

In the discussion J. J. Rutledge commended Mr. Hay's courage in his advocacy of the electric cap lamp. C. E. Krebs, geologist, Charleston, W. Va., said that electric lamps were more economical in use than those that had an open flame.

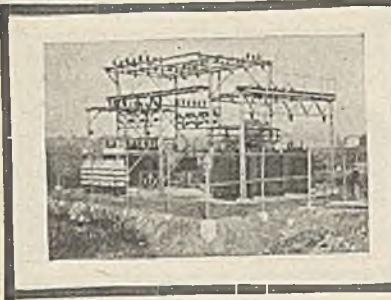
W. L. McGinnis said that in Raleigh country shaft mines, 247 ft. below the surface, it was anticipated that gas would be encountered in quantity, and the companies were induced to put in electric cap lamps. Later it was found that the mines were practically free of gas. As the electric lights were troublesome to drivers, the operators urged that the mines be put back on an open-light basis and as a result they are being operated in that manner today.

Charles Krist said he had lost three men by the use of electric cap lamps. The coal seam pitched heavily, and it was necessary to send the coal down to the entry by chutes. Men would fall down these and sustain injury. In consequence, the men were given electric lights. On one occasion two men were found to be missing, and they were ultimately found at the working face asphyxiated by methane, of the presence of which apparently they had not become aware. They had been provided with a flame safety lamp, but had left it down on the entry.

OPEN LIGHT IGNITES FUSE

Archie Forbes, of Lundale, W. Va., described the ignition of a shot by an open light. A man in raising his head ignited a fuse, causing the powder to explode prematurely. Mr. Maize said that, because of the use of electric cap lamps, men had lost their lives by asphyxiation, but more men had lost them by the action of open lights and defective safety lamps. He declared that fire hazards were decreased by closed lights. True, electricity is a hazard, but it must be conceded that it goes where we put it. An open light on the head of a miner goes wherever that man pleases to take it. He advocated the proper use of flame safety lamps when needed.

C. E. Krebs, mining engineer and geologist, Charleston, W. Va., submitted the last paper which was on the "Fossil Flora and Fauna of the Coal Measures of the Pottsville Series," but which contained much interesting material relative to the coal measures in general and the stratigraphy and fossiligraphy of the Carboniferous era.

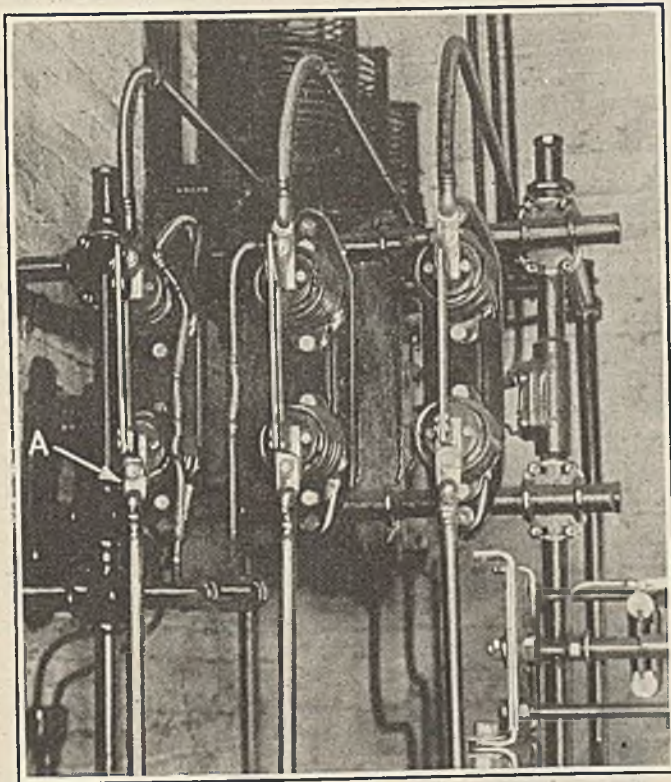


Practical Pointers For Electrical And Mechanical Men



Connection Change Simplifies Testing

For testing purposes it has been found desirable to connect the operating transformer of a full-automatic substation so that it can be energized at times without causing the power-converting equipment to operate. Evidence of a change in this connection from the usual arrangement is to be seen in a number of automatic substations. One such instance, shown in the accom-



Where the Change Was Made

The two wires carried in the conduit A, which runs to the primary of the control transformer, have been "spliced out" and connected to the tops, instead of the bottoms, of the switches.

panying illustration, is that at the Wolfpit mine of the McKinney Steel Co., at Wolfpit, Ky.

This substation contains one 200-kw. full-automatic synchronous motor-generator set. As originally installed, the two wires carried in conduit A and feeding the operating or control transformer, were connected to the bottom or load side of the disconnect switches. These wires were later "spliced out" and connected to the top or line side of the switches.

The object of the change was to provide for testing the a.-c. control relays and switches without starting the machine and without disconnecting the motor leads. With the present revised wiring the condition for testing is created by opening the main disconnect switches.

It will be observed that now, these last mentioned switches are not what the name implies, in other words opening them does not kill all of the equipment. To

secure the advantages of having main disconnects would now necessitate the installation of another set on the line side of those shown in the illustration.

A Simple Circuit Breaker Signal

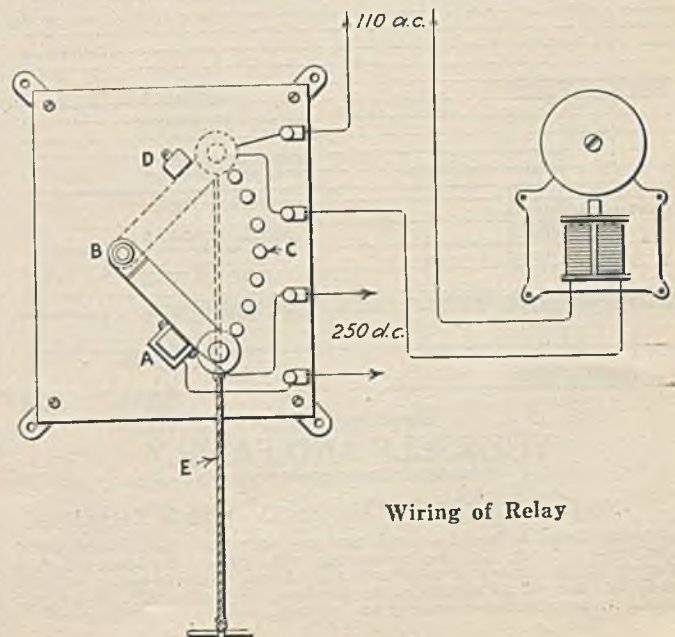
At one of our mines the direct current is furnished by an unattended non-automatic substation. At irregular intervals the circuit breaker had a way of tripping out and frequently considerable time would elapse before anyone would notice it. I obtained an 8-in. gong made to operate on 110 volts, alternating current, and decided to mount this near the repair shop, within easy hearing distance. The problem was to get a relay to close the bell circuit upon failure of the direct current. A burned-out starting rheostat from a 5-hp. direct-current motor solved the difficulty. The starting rheostat was stripped, leaving only the 250-volt holding coil, "A," the rheostat arm, "B," contact buttons, "C," and rubber stop, "D."

Owing to the fact that this particular coil was grounded to the core, it was necessary to wire the relay as shown. Thus, when the arm is in contact with the holding coil, it is insulated from the bell circuit. An extra contact outside the regular circle completes circuit with no danger of the alternating and direct currents getting crossed.

The bell and relay are mounted near the ceiling and a piece of heavy cord, "E" enables anyone to pull down the rheostat arm after the circuit breaker is closed. This has proved to be a convenient and time-saving device.

Byrne Gas Coal Co.,
Scottdale, W. Va.

PHILIP N. EMIGH,
Chief Electrician.



Wiring of Relay



Consumers' Stocks of Bituminous Coal Total 75,000,000 Tons on April 1; Largest Storage Pile in History

Consumers' stocks of bituminous coal on April 1, according to the latest survey of the U. S. Bureau of Mines, amounted to 75,000,000 net tons. This was the largest stock in the history of the country. The previous maximum was 63,000,000 tons, which had been reached at the close of the war on Nov. 11, 1918, and again on April 1, 1922, just before the suspension of that year.

In addition to the 75,000,000 tons in the hands of consumers on April 1, there were 2,085,000 tons on the Upper Lake docks, 431,000 tons in storage at the mines, 1,809,000 tons standing in cars unbilled, and an unknown quantity amounting to many millions of tons moving in cars en route to destination.

In the first three months of 1927 the average rate of consumption in the United States, exclusive of additions to stocks, was about 11,430,000 net tons a week. The exports averaged 387,000 tons a week and the total consumption plus exports was 11,817,000 tons. The exports had dropped close to normal, reflecting the settlement of the British strike.

The rate of home consumption, on the other hand, was high. Business in general was active, and the railroads, public utilities, and coke plants were consuming coal in large volume. In March the steel industry set a new record of production. The sales of retail dealers also were unusually large.

Special interest attaches to the rate

of consumption and exports since April 1, 1927. There is reason to believe it is less than in the first quarter of the year. Exports overseas have continued to decrease. Now that the heating season is closing the average rate of consumption may be expected to fall sharply. The tonnage handled by retailers, for example, fluctuates with the season and may fall from 2,500,000 tons a week in winter to less than 1,000,000 tons in summer. The consumption of the public utilities, the railroads and many industrials also tends to decline in summer. Thus the total weekly consumption of the country in the months of May and June, 1926, averaged only 8,030,000 tons a week, and in the months of August and September, 1926, only 9,440,000 tons.

In general, localities remote from the mines and subject to interruptions in supply carry the heaviest reserves. Fig. 3 shows how the stocks of industrial plants—the largest and most representative group of consumers—varied from state to state on April 1. On the average over the country as a whole, this group had a supply sufficient for 62 days. As usual, the industrial Northeast was heavily stocked. New England had enough for 70 days; New York, 85 days; New Jersey, 67 days; Pennsylvania, 63 days. The manufacturing states of the Middle West also were protected with very large reserves. Ohio had coal to last 69 days;

Average Weekly Soft-Coal Exports and U. S. Consumption*

(In Thousands of Net Tons)

Period	Net U.S. Consumption†	Exports	Total
1921—Jan. 1 to Mar. 31	8,740	405	9,145
1921—April 1 to July 31	6,260	637	6,897
1922—Jan. 1 to Feb. 28	8,730	194	8,924
1922—Mar. 1 to Aug. 31	7,480	155	7,635
1923—January.....	11,370	276	11,646
1923—February.....	11,550	226	11,776
1923—Mar. 1 to May 31	9,850	414	10,264
1925—Mar. 1 to May 31	8,300	269	8,569
1926—January.....	12,700	251	12,951
1926—Feb. 1 to Mar. 31	11,960	287	12,247
1926—May 1 to June 30	8,030	470	8,500
1926—Aug. 1 to Sept. 30	9,440	936	10,376
1926—Oct. 1 to Dec. 31	11,200	1,116	12,316
1927—Jan. 1 to Mar. 31‡	11,430	387	11,817

* Allowing for changes in stocks.
† Production plus imports and minus exports plus or minus changes in stocks. Allowance is made for stocks at the mines; coal in transit, including unbilled loads, coal in cars en route to destination, and coal on the Lake docks; and stocks of commercial consumers.
‡ Bituminous coal required to meet shortage of anthracite.
§ Subject to revision.

lower Michigan, 60 days; Indiana, 74 days; Illinois, 57 days; Missouri, 78 days. These heavy reserves are the more marked because the Middle West ordinarily stores less coal than the average for the country.

How the present reserves of industrial plants compare with what they held on March 1, five years ago, one month before the great suspension of 1922, are shown in Fig. 4. Aside from the Northwest and New England, present stocks show an increase in almost every locality. The increase is especially marked in the Middle West. Illinois had 81 per cent more coal on April 1, 1927, than on March 1, 1922; Indiana had 61 per cent more; Ohio, 90 per cent more; Missouri, 81 per cent more, and Iowa, 183 per cent more. For

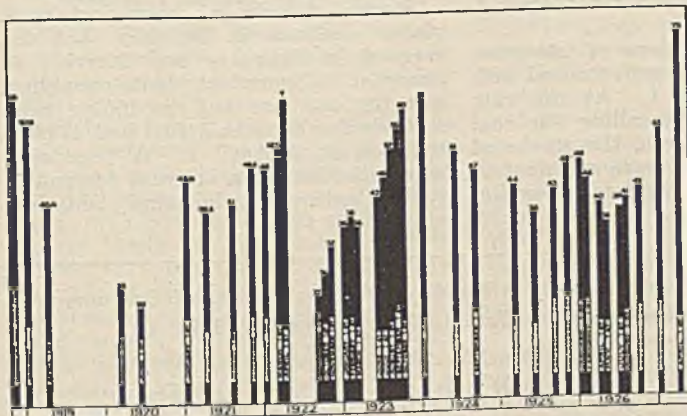


Fig. 1—Total Commercial Stocks of Bituminous Coal Nov. 11, 1918 to April 1, 1927

Figures represent million net tons and include coal in the hands of railroads, industrial consumers, public utilities, and retail dealers. Coal for steamship fuel, on Lake docks, in transit, and in the bins of householders is not included. In the first quarter of 1927 consumers increased their stocks by 20,000,000 tons. Stocks April 1 were about 75,000,000 tons, the largest in history.

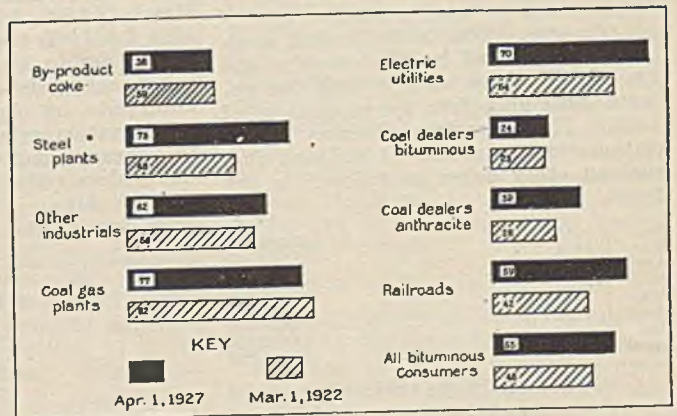


Fig. 2—Days' Supply Held by Different Classes of Consumers on April 1, 1927, Compared with March 1, 1922

Even estimating a possible though improbable depletion in the immediate future at the high rate of consumption prevailing in February and March, 1927, the stocks that were on hand on April 1 were sufficient to last 53 days, if evenly divided. This was the largest reserve in terms of days' supply on record in the annals of the Department of Commerce.

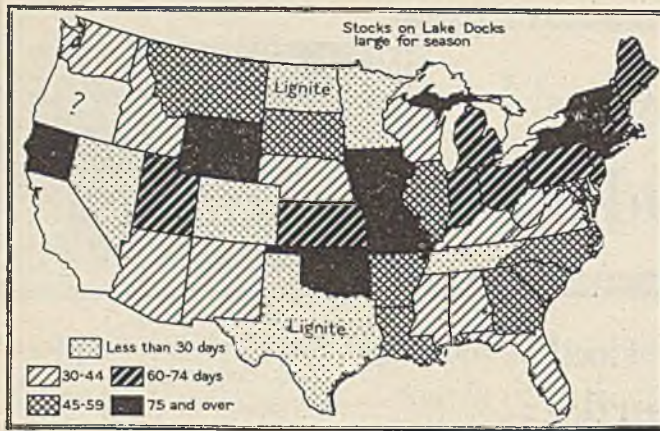


Fig. 3—Days' Supply of Soft Coal on Hand at Industrial Plants Other Than Steel and Coke Works, April 1, 1927

This diagram shows state by state the days' supply of soft coal held at industrial plants other than steel and byproduct coke works. The average supply for all such consumers was 62 days, but in particular states the supply varied widely.

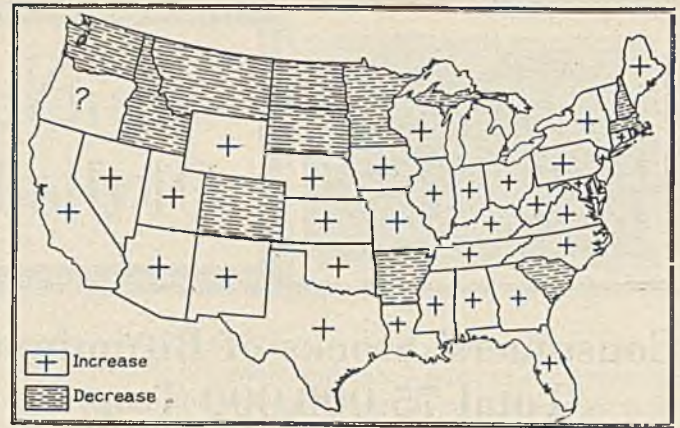


Fig. 4—Stocks of Industries Other Than Steel and Coke Works on April 1, 1927, Compared with March 1, 1927

A group of 1,801 identical industrial plants had 37.3 per cent more coal on hand on April 1, 1927, than on March 1, before the great suspension of 1922. Outside of the Northwestern States the increase was found to be nearly universal.

the country as a whole the increase was 37 per cent.

The public utilities were heavily stocked on April 1. Coal-gas works had an average supply of 77 days. The electric utilities had an average of 70 days.

Complete returns from the byproduct coke plants show a total of 6,443,690 tons of coking coal in stock on April 1, of which 1,631,603 was low-volatile and 4,812,087 high-volatile. The 201 steel works reporting had 1,596,511 tons of gas coal and 3,738,784 tons of steam coal. For both groups of plants these are the largest stocks on record.

Byproduct Coke Plants

	Days' Supply—	
	Feb. 1	April 1
Low-volatile.....	29	36
High-volatile.....	31	38
Average.....	31	38

Steel Works

	Days' Supply—	
	Feb. 1	April 1
Gas coal.....	54	70
Steam coal.....	55	75
Average.....	55	73

Between Jan. 1 and April 1 the railroads added more than nine million tons to their stocks of coal and on April 1 had on hand a reserve of 22,806,000 tons. This is the largest stock ever accumulated by the carriers and exceeds by three million tons the reserve built up before the suspension of 1922. The American Railway Association reports stocks of railroad fuel coal on other dates as follows, in net tons:

Jan. 1, 1919.....	13,626,000
Mar. 1, 1920.....	4,649,000
April 1, 1922.....	19,844,000
Mar. 1, 1923.....	7,111,000
Mar. 1, 1925.....	11,337,000
April 1, 1926.....	9,089,000
Jan. 1, 1927.....	13,499,000
April 1, 1927.....	22,806,000

Coal brought to the surface, prepared for the market, but not yet delivered to a consumer, may be considered "in transit." The largest element in the quantity in transit is of course the coal moving in railroad cars, which has never been accurately measured but runs into many million tons. From the current reports of coal loadings it

is evident that the quantity on wheels en route to destination on April 1 was unusually great.

A few producers of soft coal follow the practice of storing coal at the mines. From a list of 43 companies who have at some time in the past stored in quantity at the mines or at some intermediate point, the Bureau has received reports of 431,000 tons in storage on April 1, as against 144,000 tons on Jan. 1.

A significant element in the reserve in transit is the coal in cars unbilled at the mines or in classification yards, which tends to increase just before a suspension. According to the American Railway Association, this unbilled coal increased from 553,000 tons (11,059 cars) on Jan. 1 to 1,809,000 tons (36,189 cars) on April 1. The peak accumulation of "no bills" when the 1922 suspension began was 1,530,000 tons.

On April 1 there were 2,085,000 tons of bituminous coal on the Upper Lake docks, of which 1,507,000 tons were on Lake Superior and 578,000 tons on Lake Michigan. The total on Feb. 1 was 4,203,468 tons and on Jan. 1, 5,567,250 tons. On other dates in recent years the figures were: April 1, 1920, 861,000 tons; April 1, 1921, 2,253,000 tons; March 1, 1922, 5,160,000 tons; March 1, 1923, 1,700,000 tons; April 1, 1926 2,892,000 tons.

Considering the season of the year, retail coal yards were well stocked with anthracite on April 1. At the rate their customers were calling for coal in February and March, the stocks of the dealers reporting were sufficient to last 39 days. The dealers reporting from New England had a supply equiv-

alent to 59 days' deliveries. Retail stocks of anthracite, which naturally tend to decline toward the close of the coal year, decreased 33 per cent from Jan. 1 to April 1. The quantity remaining on April 1, however, was close to normal for the season.

Retail dealers' stocks of bituminous coal on April 1, on the other hand, were larger than at the corresponding season of other years. They were, for example, 14 per cent larger than on March 1, 1922, one month before the suspension of that year. Deliveries of bituminous coal by retailers in February and March were heavy and the stocks on hand April 1 were sufficient to last only 24 days.

Stocks of anthracite on the Upper Lake docks compare favorably with the corresponding dates of other years. On Feb. 1, there were 406,822 tons on the Lake Michigan docks and 412,323 tons on the Lake Superior docks, a total of 819,145 tons. On April 1 the stocks on Lake Michigan were 339,929 tons, on Lake Superior 350,160, and the total, 690,089. The total stocks on other recent dates have been as follows, in net tons: April 1, 1921, 83,833; March 1, 1922, 821,448; March 1, 1923, 10,000; Jan. 1, 1924, 513,297; April 1, 1926, 16,689.

Stocks of coke at byproduct coke plants declined in January, but increased in February and March. A group of 21 byproduct plants supplying gas for city use and producing coke suitable for household fuel had 470,000 tons on hand April 1. A year ago, when coke had been in great demand to replace anthracite, the same plants had only 53,000 tons.

Days' Supply of Bituminous Coal in Hands of Various Classes of Consumers in the United States, Jan. 1, 1919, to April 1, 1927

	Jan. 1, 1919	Apr. 1, 1919	Mar. 1, 1920	Apr. 1, 1921	Mar. 1, 1922	Mar. 1, 1923	June 1, 1924	Mar. 1, 1925	Apr. 1, 1926	Jan. 1, 1927	Apr. 1, 1927 (a)
Byproduct coke plants.....	32	23	15	28	39	19	34	25	21	34	38
Steel plants.....	42	35	9	38	48	26	56	30	24	50	73
Other industrials.....	65	47	27	47	56	34	53	40	32	41	62
Coal-gas plants.....	81	58	31	66	82	58	88	78	60	69	77
Electric utilities.....	49	48	21	48	54	34	63	51	46	47	70
Coal dealers (bituminous).....	39	25	13	26	23	11	40	33	14	23	24
Railroads.....	32	(b)	11	24	42	16	50	35	23	33	59
Total bituminous.....	42	31	18	36	43	22	49	37	26	37	53

(a) Calculated at average rate of consumption during February and March, 1927.
(b) No data.

Deadlock of Miners and Operators Tightens in Indiana and Illinois; Ohio and Pennsylvania Mark Time

By Sydney A. Hale

Associate Editor, *Coal Age*

St. Louis, Mo., May 10.—Developments in the labor situation in the Illinois-Indiana sectors of the old Central Competitive Field the past week have strengthened the deadlock which bars the way to an early negotiation of statewide agreements between the operators in those two states and the district officials of the United Mine Workers.

The probability that the negotiation of an agreement between the Indiana shaft-mine producers and district 11 would compel Illinois producers and district 12 to take action was destroyed by the collapse of the joint conference between the scale committees of the Indiana Bituminous Coal Operators' Association and district 11 at Terre Haute, Ind., on May 4. As forecast in the preceding issue of *Coal Age*, pushing the question of the renewal of the Jacksonville rates to the forefront of discussion wrecked the conference and resulted in an adjournment sine die.

Unless and until Harry Fishwick, president of district 12, recedes from the position that the union will insist upon the acceptance of the Jacksonville rates as practically a condition precedent to the negotiation of a state contract in Illinois the majority of the producers in that state believe that it would be time wasted to meet with the Illinois miners. Privately they do not look for any change for several weeks to come.

In line with their policy of keeping in frequent touch with one another, members of the Coal Operators' Association of Illinois are meeting here today at the Missouri Athletic Club. St. Louis was selected because of the interest displayed in the meeting held here a month ago and because it is the most convenient location for operators in the Fifth and Ninth districts.

Leaders Confident of Support

At the meeting today the various operators will give their views of the situation, seek to compose any internal differences which may crop up and scotch the rumors always current during a protracted wage struggle that this mine or that is secretly dickering with the union organization. The producers who have taken the lead in the present battle are confident that their policies have the support of the large majority of the operators in the state.

Although there have been some minor disagreements on details, spokesmen for the dominant groups in the association express great satisfaction over the solidarity of feeling on the main issues. Nothing like the sharp division of opinion reported in Indiana exists in Illinois operating circles, they insist. While a few companies have made peace with the union and accepted the proposal for an interim agreement permitting them to continue at work, the ton-

nage affected is admittedly an insignificant fraction of the total capacity of the state.

Moreover, those who have rejected the union's offer find considerable satisfaction in the fact that market conditions in and around Chicago at the present time are such that the minority working are not riding on the crest of any buying wave. As a matter of fact, many producers now shut down have not moved all the domestic tonnage loaded at the mines prior to the suspension. Further encouragement has been given to the majority by the report that the United States Fuel Co. already had closed down one mine in the Danville district and would close down completely.

Solidarity May Depend on Demand

This cheerful view of the situation, however, is not indorsed by all the operators. From another source it is reported that the Steel Corporation mines in the Danville district will continue to run as long as the corporation wants coal. There is also a minority less sanguine of the solidity of the commercial mines now down. This group declares that the development of any real demand for tonnage in Illinois would see a number of desertions from the association ranks. That there is any real danger of more operators making independent peace is denied by strong association members.

The end of the Terre Haute conference between Indiana shaft-mine operators and district 11 came a few hours after the resolution proposing a cut in pick-mining rates from \$1.08 to 85c. per ton had been forced to a vote. This resolution was offered by the operators at the first day's meeting. The union spokesmen promptly offered an amendment to restore the \$1.08 rate. Just before the noon adjournment on May 4 the resolution was put to a vote. Operators, as was expected, voted against the amendment of the miners and the latter voted down the original resolution.

At the afternoon session that day the union conferees came back with a proposal to continue the old day and tonnage rates and to take up the question of modifications in working conditions later. The majority of the operators, however, took the view that the proposal was too vague and indefinite to hold out such real promise of relief that they would be justified in giving it serious consideration. After some further discussion E. D. Logsdon, on behalf of the operators, moved the sine die adjournment.

The resolution of the miners read as follows:

"We propose that the basic scale for tonnage work, day work, etc., as provided by the Terre Haute agreement be accepted and that the various sec-

tions of the Terre Haute agreement be taken up separately and that all complaints and pertinent questions presented by either side be considered under the section of the Terre Haute agreement governing or covering the question or complaint."

In the earlier discussions spokesmen for the miners laid great stress upon American living standards, quoting the late President Wilson and the late Samuel Gompers, president of the American Federation of Labor, in support of their views. The claim was made that members of district 11 had been averaging \$118 per month, or little more than \$1,400 per year. Union officials insisted that the \$7.50 basis was not an extravagant sum for the daily maintenance of an American family and contrasted the miners' earnings with the income of operating officials.

What Wage Can Industry Afford?

Spokesmen for the operators retorted that, while they believed in the principle of high wages, the real question to be faced was how much the industry could afford to pay. Under the competitive conditions of the past four years, they said, the industry had been forced into an unsound financial condition. It could not hope to continue to meet competitive market prices for its coal and wages that burdened it with high production costs without escaping bankruptcy.

A demand that operators put up a bond to guarantee the payment of wages was answered by a demand that the next contract require the union to put up a bond to guarantee the observance of the terms of the agreement by its members. Union officials pegged their bond demand on the fact that one or two companies had failed with unpaid payrolls. Operators resented what they considered an attack upon their integrity and an insinuation that, in the case of financial difficulties, the claims of the workers would be subordinated to those of other creditors.

What the next move in the Indiana situation will be no one cares to predict. There were many operators who were opposed to meeting with the miners last week, feeling that "the time was not ripe." They now point to the results of the conference as proof that they were right. On the other hand, they admit that the acceptance of the miners' invitation for a joint conference was better strategy than a rejection because, unlike the invitation to the Illinois operators, the proposal from district 11 did not specifically bind the conference to a consideration of the Jacksonville scale.

Drive on Mechanized Mines?

The decision to meet was influenced largely by the attitude of the machine mines and by one or two large operators who are planning to go into mechanization on a broad scale. It is not unlikely, therefore, that union officials will make a drive to persuade these operators to follow the lead of the Pike County Coal Corporation in signing an independent contract with the union. Members strongly in favor of the association program, however,

discount the chances of union success in that direction.

Indiana shaft-mine operators naturally are not happy over the agreement between the union and the Indiana Coal Producers' Association, which represents the stripping interests. Strip-pit production has been developing rapidly in the past few years and these operations now contribute from 15 to 20 per cent of the output of Hoosierdom. These mines, it is claimed, can pay the same basic rates as the shaft operations and enjoy a decided advantage in production costs over the latter. In fact there are some who contend that the higher the day rate is the greater the advantage the strip pits have.

Reports that strip-pit tonnage is being purchased by one of the railroads serving the Indiana coal fields are the subject of bitter comment by shaft operators in and around Terre Haute. These critics feel that such purchases must give "aid and comfort to the enemy" in the fight of the producers to lower production costs. "If this road must have coal now," asked one operator, "why doesn't it go into western Kentucky and buy non-union fuel?"

For the most part, however, operators say that the railroads and large industrial consumers well fortified with reserve stocks are ignoring offers of tonnage from Middle Western mines paying the Jacksonville scale. For the time being this is considered one of the most hopeful factors in the whole situation from the producers' standpoint. It lessens the incentive some mines now down might otherwise have to make a separate peace on the union's terms.

But the operators are not unmindful of the fact that in days gone by pressure exerted by railroads, large industrial consumers and captive mines has whipped commercial producers into line just when the commercial producers were beginning to think their chances of winning a sane victory over the union were the brightest. So they are wondering, to paraphrase the classic verse of the peregrinating burghmaster of New Amsterdam, whether these consumers will love them in September as they do in May.

Depression Limits Operation

The situation in the Pittsburgh district remained virtually unchanged last week. The depressed state of the market has had a deterrent effect on the spread of the open-shop movement. During the week ended May 7 the Pittsburgh Coal Co. reports that its mines now in operation produced 116,928 tons of coal, with an average of 5,338 men at work, against 109,925 tons with 5,025 men in the preceding week.

Scenes of disorder were infrequent in the district last week. Four men said to be union miners on picket duty at the mine of the McClane Coal Co., at Treveskyn, were arrested, charged with violating Sheriff Braun's order against assembling within half a mile of a pit mouth.

W. S. Hensell, a coal and iron guard, accused of tossing a tear gas bomb into a group of children near the Pittsburgh Terminal Coal Corporation's Horning mine, was apprehended on charges of

Sees Capital and Labor More Harmonious

One of the most hopeful changes on the economic horizon, according to Haley Fiske, president of the Metropolitan Life Insurance Co., is the growing understanding between labor and employer, which he characterizes as a peculiarly American achievement.

"Anybody who has watched the recent trend of the pronouncements from labor organizations and the speeches of their enlightened leaders," said Mr. Fiske, speaking at the opening general session of the Chamber of Commerce of the United States, at Washington last week, "must have recognized an entirely new attitude which labor is taking toward the employers. There is every evidence that organized labor is recognizing the responsibilities of capital and the representatives of capital. As a matter of fact, the working people not only are becoming capitalists through savings, investments and life insurance, they are forming corporations with large capital; they are organizing banks, trust companies, building associations, housing apartments, and in this city they have formed a large life insurance company.

"Is there not visible a new state of mind and a new vision which might perhaps be briefly expressed as co-operation rather than competition in the relationship between employer and employee?"

impersonating an officer, inciting to riot and disorderly conduct. He was released on \$3,000 bail.

John Brophy, former president of the second district of Pennsylvania, renewed his feud with John L. Lewis at the district convention at Dubois, May 4. He charged Lewis with malfeasance in office in making contracts "over the heads of district No. 2 locals" last year at Nanty Glo and Revloc. He blamed Lewis for the loss of 20,200 members in district 2.

Brophy's opponents contested his right to a seat in the convention, claiming that as he is now a resident of Pittsburgh and has not been a member of the local for six months, he was not qualified as a delegate. After a heated argument the convention voted 58 to 53 not to seat Brophy.

Philip Murray, international vice-president of the miners' union, characterized the Brophy report as untrue and warmly praised Lewis. He explained that owing to Lewis' duties in the "trying days of the strike" he would not be able to answer Brophy's charges. Brophy was denied permission to take the floor in rebuttal.

The labor alignment in the Ohio coal fields continued without change last week. Union officials held two mass meetings and addressed the mem-

bership. Operators hear the report that in meetings of union locals the members are demanding to know what is to be done in lieu of strike benefits if the strike lasts until fall, as President John L. Lewis has forecast. The men are being told to find work on the highways and in the mills of the Ohio valley.

A few communist organizers have appeared in eastern Ohio urging the men to break away from the international and form a new union.

S. H. Robbins, president, Ohio Coal Operators' Association, issued a statement May 5 appraising the situation at the beginning of the fifth week of the suspension, in which he reiterated the unalterable opposition of the producers to a renewal of the terms of the Jacksonville agreement.

Small Ohio Mine Signs Up

The Chestnut mine, a small operation at Longtown, Columbiana County, resumed May 1 under a separate agreement with officials of the local union, after a month's shutdown. It is reported that agreements with other mines in the vicinity are pending, but they are all operations having small output.

Another of the occasional efforts at organization of southeastern Kentucky mines by the United Mine Workers was launched Sunday, May 1, at Harlan, Ky., when it was reported that about 1,000 miners were present at an open-air meeting, addressed by Gus Dwyer, international organizer; Thomas Kennedy, international secretary; William Turnblazer, president of District 19; H. F. Reed, Milt Darbin and Pola Ellis, miners of Harlan who are leaders among workers. Peter Campbell, a labor leader of Louisville, who has no connection with the miners' union, was another of the speakers. It was reported that a few miners joined the organization.

Rate of Fuel Consumption By Utilities Falls

Public utility power plants in the United States consumed 3,483,285 net tons of coal during March, according to a report by the U. S. Geological Survey. This compares with 3,336,397 tons used in the preceding month. Fuel-oil consumption by these plants in March totaled 639,347 barrels, against 670,253 barrels in February. The decline in average daily consumption was 6,800 tons of coal and 3,300 barrels of oil.

The average production of electricity by public utility power plants in March was 216,000,000 kw.-hr. per day, about half of 1 per cent less than the daily output for February.

More electricity was generated by the use of water power in March than in any previous month, the total amount being nearly 2.6 billion kilowatt-hours. The proportion of the total output produced by water power was about 38 per cent, which is not a record, as the output by the use of water power for some months has been over 40 per cent of the total. It would require more than 2,500,000 tons of coal to generate the kilowatt-hours produced by water power in March.

Record-Breaking Storage Stocks In Consumers' Hands Minimize Effect of Suspension on Market

By Paul Wooton

Washington Correspondent of *Coal Age*

The Bureau of Mines stock report raises the curtain on the stage which was set April 1. It confirms in full the impression that had been created by heavy production that stocks are enormously large. They are so large that, strike or no strike, they will dominate the market for months to come.

Stocks of bituminous coal in the hands of consumers totalled 75,000,000 tons. This is 12,000,000 tons in excess of the previous record, established on Armistice Day at the close of the Fuel Administration's campaign for emergency storage. It is 13,000,000 tons greater than the reserve built up at the beginning of 1924, when consumers foresaw the possibility of a strike which was avoided by the Jacksonville agreement. It is from 12,000,000 to 15,000,000 tons greater than the reserve at the beginning of the strike of 1922.

Besides the coal in the hands of consumers there was a very large reserve in transit. The Lake dock operators had 2,085,000 tons on their docks. There were 431,000 tons on the ground at mines—about three times the usual figure. There were 1,809,000 tons, in 36,189 cars, unbilled at mines or in classification yards, according to the American Railway Association. This is more than three times the normal number of "no bills." It is greater than the peak accumulation of "no bills" before the suspension of 1922, when at one time 1,530,000 tons was on hand in unbilled loads.

In addition to all this there was the coal on wheels and otherwise in transit to destination, which never has been measured accurately. It is estimated as being all the way from 15,000,000 tons to 30,000,000 tons.

Consumers Take No Chances

The record shows that consumers have refused to take chances, despite the practical certainty that production would continue at the rate of 8,000,000 tons or 9,000,000 tons a week, as against only 3,000,000 tons or 4,000,000 tons in 1922. They laid in a reserve 20 per cent greater than that which they built up in 1922. The railroads alone have 22,800,000 tons of coal on hand.

EDITOR'S NOTE—The foregoing Washington letter reflects certain views of official Washington. Due to the fact that policy as a rule prevents government officials from permitting their views being quoted directly, the authority for these reports is necessarily somewhat vaguely referred to. The views reflected are not those of any one group of officials, but of different men, in the legislative and executive departments. There is no necessary connection between their views and COAL AGE editorial policy; neither do they necessarily represent Mr. Wooton's personal views. It is felt that the opinions thus faithfully reflected will be of great interest to the industry. Where opinions are cited from sources outside of the government, the source will be specifically stated.

With this unusual amount of coal above ground it is regarded as a complete explanation of why the market has been so dull since the suspension began. At least 40,000,000 tons of the surplus will have to be absorbed before the market will be in a normal state of balance as between buyer and seller. Had there been no suspension it is doubtful if current production would have been any larger. A long period of low weekly tonnages appears inevitable.

Bureau's Report Significant

Special interest attaches to the Bureau's report of the current rate of consumption in the first quarter of the year when domestic consumption was at the rate of 11,430,000 tons a week and export at the rate of 387,000 tons a week. The net draft on supplies was 11,817,000 tons a week. Even if this rate of consumption were to continue, it would require many weeks before stocks could be absorbed. With the close of the heating season the rate of consumption is certain to fall sharply. It is not generally realized how large an element is represented by this seasonal buying of soft coal by the retail trade. In the winter weekly retail purchases of bituminous coal sometimes pass the 3,000,000-ton mark. In the summer they may drop as low as 1,100,000 tons. The weekly consumption in May and June, 1926, for instance, was 8,030,000 tons and in August and September, 1926, was a little over 9,000,000 tons. With a production of 8,000,000 tons as at present, the draft on stocks is small. If the mines now in operation were to produce this maximum they could easily cover the present rate of consumption.

Under these circumstances the suspension must last a long time before it can change the market and offer any hope of profit to the hard-pressed union operator. On the other hand, an immediate settlement still would leave the industry faced with the problem of absorbing an undigested surplus of 40,000,000 tons.

Ohio Shippers to Meet

Reports to Guy L. Cory, chairman Ohio Valley Shippers' Advisory Board, indicate a record breaking attendance at the meeting to be held at Indianapolis, Ind., on June 21. The committee on arrangements which has been formed, includes the traffic managers of a number of large shippers as well as prominent railroad men. In connection with the detailed arrangements for the meeting this committee, in connection with the officers and members of the board, has started an intensive campaign not only for a large attendance but for increased membership.

Short Coal-Mining Courses Announced by Colleges

The School of Mines and Metallurgy, State College, Pa., announces a five weeks' summer course in practical coal mining extending from June 20 to July 23, 1927. In making this announcement Dean Holbrook emphasizes the accessibility of State College to the anthracite as well as the bituminous coal fields. The first week is to be devoted to mine safety work for men who have not yet acquired Bureau of Mines certificates. The last four weeks will cover ground that will prepare students for the state examinations for fireboss and mine foreman papers. There also will be advanced work for those men who already have their papers but who wish to prepare for more responsible positions in mining.

Equipment consists of a 300 ft. tunnel to which is connected three steel mine fans of different type, a Clifford lamp-testing gallery, a complete set of safety lamps, smoke room, oxygen apparatus and gas detectors, mine and breaker models, an air compressor and a variety of drills.

West Virginia University School of Mines, Morgantown, W. Va., opens its fifteenth annual summer course, June 13 to July 23. Under the direction of C. E. Lawall and a group of competent instructors students are offered a well rounded out training in the fundamentals of mine management. State Mining Department examinations at the end of the course give students an opportunity to try for their mining papers before returning to their homes.

Tuition for both of these courses is free; board, lodging and text-book expense is kept low.

The School of Mines of the College of Engineering of the University of Alabama, offers five fellowships in mining and metallurgical research for work in co-operation with the Southern Experiment Station of the Bureau of Mines at Tuscaloosa, Ala. The fellowships, valued at \$540 per year, are open to graduates of universities and engineering schools who have proper qualifications to undertake research and investigation. Fellowship holders become candidates for the degree of Master of Science. For investigation during the year 1927-28 fellows will study the beneficiation of low-grade bauxite ores, the beneficiation of phosphate rock, and float-and-sink treatment of Alabama coals.

The College of Mines of the University of Washington, Seattle, Wash., offers five fellowships for research in coal and non-metallic minerals for work in co-operation with the Northwest Experiment Station of the Bureau of Mines. The fellowships are open to graduates of universities and technical colleges who are properly qualified to undertake research investigations. The value of each fellowship is \$720. Among the subjects selected for investigation are the following: Beneficiation and washing of coal, including the application of ore dressing principles to the cleaning of coal; briquetting of low-grade coals and other problems in the utilization of coals of the Pacific Northwest.

Amended Mining Code Signed By Ohio Governor

The coal mining bill, passed by both houses of the Ohio General Assembly, providing for a number of changes in the mining code, has been signed by Governor Vic Donahey and will become effective July 27. The intervening time is allowed for a referendum petition to be signed, but none will be brought forth. The bill amends the law principally along the line of greater safety to the men, but another feature is that obsolete provisions are discarded. The bill provides that all mine foremen and mine bosses must have certificates issued by the Ohio Mine Department after an examination. This provision of the law becomes effective Dec. 31, which will permit all such foremen and fire bosses to appear before the deputy mine inspectors for examination. Heretofore anyone that the operator might designate could act as a mine boss or foreman. About 1,400 men are affected by the provision.

Another provision is the use of rock dust to keep down coal dust and thus prevent explosions, which have caused much loss of life and damage. The dusting is to be done under the supervision of the mine boss or mine inspector.

Carrying cages are regulated so that each man being hoisted or lowered in a shaft must have 400 sq.in. of space. The old law provided that not more than 10 men should be carried, regardless of the size of the cage. Formerly many small cages were overcrowded and large cages would be operated without sufficient men, causing needless expense to the operator.

Formerly only direct current was permitted in mines, but the amendment provides for the use of alternating current up to 220 volts on stationary motors.

Another provision makes it compulsory for the miner to erect certain props when the drawslate has not been removed. Formerly this matter was left largely to the judgment of the miner, but it now comes under the jurisdiction of the mine boss or the mine inspector.

A number of other changes of a minor character are contained in the new law.

Mine Drainage Code Goes to Correlating Committee

Ballots are being sent to the members of the Mining Standardization Correlating Committee that they may recommend to the American Engineering Standards Committee the code of coal-mine drainage just approved by all the members of the sectional committee on that subject but one who failed to vote. The committee is headed by J. A. Malady, and the sponsor is the American Mining Congress. On the committee were four men representing pump-producing companies, seven representing consuming interests and four general interests.

The action of the correlating committee is merely formal, as the adequacy of representation of the interests has already been passed on by the com-

Decries Business Cycles

That the business cycle theory is the worst bogey confronting American industry today was one of the important points stressed in a talk by Virgil Jordan, chief economist of the National Industrial Conference Board, New York, on "The Prospects, Problems and Puzzles of Business," delivered at the twenty-ninth annual convention of the National Metal Trades Association, in Detroit, on April 26.

"All cycles," Mr. Jordan said, "must be man-made. One reason for them is an excess of individualism; another is plain ignorance. We watch business very closely when it does not prosper, but pay no attention to it when it runs well. Consequently the reason for cycles"

"The constant development of new industries is the reason for American economic success. Business cannot stand still and be prosperous. Naturally it cannot move backward, and consequently the only way to maintain present conditions is to seek constantly to improve them."

mittee and the unanimity of the vote makes acceptance obligatory. The correlating committee is not a judge of the technical details of the standard.

New Orient Again Damaged By Tornado

Southern Illinois was struck by another tornado late in the afternoon of May 9. The top works of the New Orient mine, which were in the path of the storm of 1925, again suffered damage when roofing was torn away by the wind. The losses are understood to be fully covered by insurance. In Granite City, Ill., the wind made a hole 60 x 30 ft. in one of the walls of the new power plant of the St. Louis Coke & Iron Corporation.

Seven Air Locks Erected To Seal Everettville Fire

The official count of the men who lost their lives on April 30 in the explosion in the Federal No. 3 mine of the New England Fuel & Transportation Co., Everettville, W. Va., is 93. During the first week following this accident progress in recovery and restoration work proceeded with cautious slowness owing to the presence of a fire and the high oxygen and methane content of the mine atmosphere. It took exactly one week to seal the fire area, which lies between Nos. 1 and 4 South entries off the new main. This much of the work required the erection of seven air locks.

As determined by analyses, during this period of one week the highest oxygen and methane contents of the mine atmosphere were registered as 15.4 and 7 per cent, respectively. A sample taken from the sealed fire area on May 8 showed a carbon-monoxide content of 4.4 per cent. This last figure proves that those few who held that no fire existed in the mine following the explosion were in error. This minority asserted that the foggy atmosphere in by the air locks was due to mist.

Robert M. Lambie, Chief of the State Department of Mines; John T. Ryan, of the Mine Safety Appliances Co.; representatives of the U. S. Bureau of Mines and others who played an important part in conducting the restoration work, proceeded on the assumption that a fire existed. That they were correct in this assumption is proved by the high carbon-monoxide content of the mine atmosphere, which increased as the fire area was approached.

It is beginning to be generally believed that the seat of the explosion is located somewhere in the vicinity of the faces of the new main entries. This conjecture is borne out by the fact that evidence of the greatest violence is seen on those entries abreast of the fire area. Manifestation of violence recedes gradually in by and out by the fire region, where expansion of the explosive force most probably occurred.



Wrecked Tippie at Everettville Mine

A number of men were working on the structure when the explosion occurred, April 30, at the No. 3 mine of the New England Fuel & Transportation Co., Everettville, W. Va. Two of the men were killed and seven injured by the blast. One of the injured died later.

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Increased Output, Higher Buying and Consuming Power and Better Standard Of Living Urged to Cure Economic Ills

By E. J. Mehren

Vice President and Editorial Director, McGraw-Hill Publishing Co.

(By Cable from Geneva)

The International Economic Conference at Geneva opened on May 4 with 47 countries, including Soviet Russia, represented by delegates.

The first four days were devoted to a survey of the world's economic ills. There was general agreement that increased production was the indicated remedy, thereby increasing purchasing and consuming power and raising the standard of living. A striking note was the general solicitude for the well-being of workers, which probably was a new idea with European employers.

The keenest analysis of the situation was made by W. T. Layton, editor of the *Economist*. He contended that we could not return to pre-war conditions. In his opinion a new equilibrium must be established, due, first, to the great increase of industrialization; second, to the fact that the United States is now a creditor nation but apparently does not desire to buy from the countries she finances, contrary to the policies of former financing nations; third, to the decrease of European emigration; and fourth, to the alteration of trade relations resulting from the payment of reparations and international war debts.

The situation is more acute because Russian imports are small and Central Europe is divided by high tariff walls, resulting in duplication of industrial plants and preventing specialization, which is the essential feature of modern industrialism.

Mr. Layton's insistence that the tariff walls of Central Europe must be lowered was approved by numerous speakers. There also was general approval of tariff stabilization regardless of the level, thus encouraging long-time contracts, uniform tariff classification and nomenclature. Long-time commercial treaties were advocated. There was no reference to American tariff rates, but several indirect references to our limitation of immigration. Financing of backward countries was urged to stimulate production.

Government Intervention Decried

Dr. Carl F. von Siemens, of Germany, criticized government intervention in industry, which was particularly interesting as coming from the representative of a country where government assistance and compulsion are considered normal. Zimmerman, of Holland, cited increased government services and restrictive labor legislation as increasing the industrial burden by raising prices, restricting consumption and reducing trade. The remedies suggested were removal of government interference and reduction in number of non-productive public servants. Only Shidachi, of Japan, and Layton, of Great Britain, cited the wastefulness of armaments.

The speech of Henry M. Robinson, chairman of the American delegation, was well received. He sketched the development of our prosperous industrial situation, stressing the determination of American employers to effect needed economies by better management and machinery, but not by wage reduction. He affirmed the American belief that competition stimulates industrial progress and suggested that the American delegation probably would disapprove of international cartels if governments participated or if they were exploitive in character. Answering Sir Max Muspratt, of England, who thought that rubber restriction bore equally on every one, Mr. Robinson contended that there was discrimination against America, which uses 75 per cent of the output as against only 7 per cent by Great Britain.

Clearing Way for Understanding

It is not expected that the conference will have great or important immediate results but that it will contribute to a better understanding of international problems and will lay a basis for some definite action now and in the future. Three speakers advocated permanent organization for the study of international economic problems. The plenary sessions closed Saturday, May 7, and committee sessions on commerce, industry and agriculture began Monday, May 9.

Sokolnikoff, of Russia, painted an optimistic picture, declaring that industrial and agricultural production is now in excess of pre-war output, but the figures are doubted here. He made a strong plea for closer capital and trade relations, contending that the capitalist and socialist systems can work harmoniously together. He protested against the boycott of Russia.

Russian Censures Capitalism

Obolenski Ossinski, of Russia, criticized the capitalist system severely, declaring it to be the cause of the World War. He accused it of glaring inconsistencies such as longer working hours while unemployment continued on a large scale. He condemned cartels and repeated Sokolnikoff's plea for closer trade relations, emphasizing the importance of the Russian market. In conclusion he offered eleven suggestions for restoring world trade and prosperity:

- (1) Cancellation of war debts.
- (2) Increase of industrial wages.
- (3) Eight-hour day for all workers except miners, who should have six.
- (4) Fullest liberty for trade union organization and complete liberty for strikes.
- (5) Relief for the unemployed.
- (6) Raising of funds for the unemployed by taxation.

Says High Wages Depends On High Production

A warning that high wages are the result of high production was sounded by H. H. Rice, assistant to the president of the General Motors Co., at the manufacturing session of the Chamber of Commerce of the United States at its annual meeting in Washington last week.

"Though it may be admitted that high wages mean greater purchasing power," said Mr. Rice, "that merely is saying in another way that high wages indicates prosperity which can only exist with high production, for real wages must come in the long run out of production and cannot exceed production."

"We have been witnessing lately something which has puzzled the economic writers—a fall in prices with a rise in real wages and accompanied by a high level of profits. This has come about by lower cost, or, in other words, a higher average production."

(7) Decrease in unproductive expenditure, especially for armaments.

(8) Abolition of barriers against immigration.

(9) Cancellation of protectorates and mandates and permitting self-determination for all peoples.

(10) No intervention in China.

(11) Suspension of economic boycott on Russia and extension of credits to that country.

Unemployment Halts Mechanization

Henry M. Robinson, who is the American member of the industry committee, told the delegates that there was no excuse for America to discuss general conditions except objectively. This was in response to a question raised by Cav. di Gran Croce Alberto Pirelli, of Italy, and Sir Arthur Balfour, of England, who doubted that American methods were suited to European conditions. Both admitted that waste prevention and increased output were desirable and added that the interchange of methods and practice among industrial firms would be advantageous. The substitution of mechanical equipment for hand labor was considered not immediately possible due to extensive unemployment. Figures on the latter were considered uncertain inasmuch as 1923 American estimates from two sources varied three millions to five millions, with the cause of the discrepancy not yet discovered.

Peyerimhoff, of the French coal mines committee, spoke eulogistically of the social harmony prevailing in America and requested information as to how this was obtained. He recognized the fact that class conflict is non-existent in America and showed an excellent understanding of American conditions. He said that Europe is seeking a cure for its ills by first obtaining financial stability.

Boncer, of Virginia, Elected President of Inspectors' Institute

At the concluding business session of the annual meeting of the Mine Inspectors' Institute of America held at Charleston, W. Va., May 3-5, William Boncer, a Virginia state inspector, was elected president. At the meeting also were selected W. H. Jones, chief inspector of Kentucky; Nicholas Evans, a state inspector of Pennsylvania, and Charles W. Stewart, a state inspector of West Virginia, as vice-presidents. C. A. McDowell, Pittsburgh Coal Co., who filled the unexpired term of G. B. Butterfield, becomes secretary; J. W. Smith, an insurance inspector, Kansas City, Mo., assistant secretary; J. J. Rutledge, chief mining engineer State of Maryland, treasurer; J. T. Beard, of Danbury, Conn., editor-in-chief, and J. H. Edwards, associate editor, *Coal Age*, publicity editor. G. B. Butterfield of Hartford, Conn., was elected an honorary member, thus being the first to be so distinguished.

At the dinner held on the evening of May 4, V. E. Sullivan, state mine inspector of West Virginia, presided. The chief addresses of the evening were made by John Laing, former chief state mine inspector of West Virginia and now a coal operator, and ex-Governor E. F. Morgan, also of West Virginia.

John Laing said he had found himself confronted in the exercise of his duties by the insufficiency of the laws, but his Governor had told him to pay no attention to these defects in his authority. He told his aides to do likewise, arguing that the courts would always uphold any man who tried to keep the men safe in the mines under his supervision. He said moral courage as well as physical courage was demanded of mine inspectors now as then.

Began Foremen's Tests

He had started examinations for mine foremen without any legislative mandate. There were not wanting those who laughed at his temerity, but the examination was held, nevertheless, at Mt. Hope and was quite well attended. He had, he said, been quite recently in New York and had met a large operator in that city. The latter told him that his (Mr. Laing's) orders when he was inspector had caused him what he and his staff thought was an exorbitant expenditure of money. However, said this operator, the money all came back. He had figured that the "wasteful" expenditure saved him 13c. per ton. Mr. Laing counselled the inspectors not to hesitate to close any mine they deemed unsafe. "Come," said he, "to my mines, and if any are in unsafe condition, close them down."

Other speakers were William Boncer, the newly elected president; Josiah Keely, president, Cabin Creek Consolidated Coal Co.; C. F. Krebs, J. J. Rutledge, R. D. Hall and Ed. Flynn. Josiah Keely said that at mines where there were no unions the operators were afraid to discipline the men for fear of starting a union. When he ran a union mine he found the discipline a little

British Miners' Union Under Communist Control, Says Premier Baldwin

Debate in the British House of Commons last week over the government's bill to regulate trade unions was marked by unusual acrimony, the climax being reached when a Labor member called Stanley Baldwin, the Prime Minister, a liar. This outburst occurred when the Premier declared that the activities of the trade unions were shifting gradually from the industrial to the political sphere, in which some of them were controlled by the Communist Party.

When he was interrupted by a request to name the unions, the Premier refused, though he later named the Miners' Federation as one in control of Communist leaders.

On the eve of the debate the Cabinet decided to make the bill apply to employers as well as employees, so that a general lockout would be equally as illegal as a general strike.

Premier Baldwin, after the uproar which greeted his preliminary

statements had been calmed, said that in effect the bellicose massing of trade unions and employers' associations had produced a situation analogous to that of pre-war Europe. The government, however, had entered office with no thought of such a bill and had pursued peace.

In the case of the coal-mine subsidy, he said, the government had tried to buy peace. The mandate for the bill lay in the recent trade-union history of open extremism and impotent moderation.

Any bill passed immediately after the general strike, when the government had been urged to enact such a measure, might have been vindictive, he declared, but this bill was not. It came as near as phraseology could bring it to simple propositions—that a general strike was illegal, that intimidation was illegal, that involuntary political subscriptions were unjust, and that party politics in the civil service was improper.

better, but not much, for the union was continually thwarting efforts to put discipline in force.

R. D. Hall said that many improvements that were made solely for safety proved to be profitable because of their economic value altogether apart from the saving in workmen's compensation. In Kansas since rock-dusting had been introduced the mines did not blow up from overcharged or ill-tamped shots, and the operator saved rehabilitating his mine after each explosion. He could put in more permanent and tighter stoppings because once in they would last indefinitely. Thus his ventilation was more effective. Safety usually is good engineering with or without a compensation law.

On the morning of May 5 a hurried special meeting was called at which J. T. Beard was presented with a silver tea set by the members; the president and Ed. Flynn, of Alabama, making addresses. The members, almost to a man, then took cars to the Belle Alkali plant of E. I. du Pont de Nemours & Co., where salt from New York State, after being purified of everything but sodium chloride, is treated electrically to form caustic soda (sodium hydroxide), chlorine and hydrogen.

The first two products are shipped in tanks, the former being evaporated and crystallized. The hydrogen is piped to the synthetic ammonia plant of the same company nearby. As salt is being pumped from wells nearby and has been for years, a well is being sunk to obtain brine for use in the process. Returning to their cars, the members then drove about 50 miles to Hawk's Nest and Lover's Leap in Fayette County, where they viewed the winding valley of the New River up and down for many miles. The return to Charleston concluded the meeting.

Miners' Insurance Scarce; Remedy Sought

Insurance for coal miners, particularly affecting the Virginia and West Virginia fields, was one of the subjects taken up at the spring meeting of the National Association of Insurance Commissioners, in session at Richmond, Va., last week. Owing to the great hazards involved, companies have found it unprofitable to sell insurance to coal miners, and it was said that only one company, a New York concern, is now accepting risks in the Virginia fields, with the likelihood of cancellation at any time, leaving hundreds of miners without insurance protection. Efforts to remedy this situation will be made, it was stated by Commissioner Joseph Button, of Virginia.

Resolutions were adopted by the association to reduce the 700 classifications on coal mine risks to 28 classifications. This resolution, which refers to the classifications in the workmen's compensation insurance, will affect companies throughout the country.

Twenty-eight states were represented at the meeting with about 150 commissioners and insurance company executives in attendance, according to Commissioner Button, who is secretary of the body.

Albert S. Caldwell, of Tennessee, has been elected president of the National Association of Insurance Commissioners, succeeding Harry L. Cohn, of Ohio, who recently resigned as Ohio insurance commissioner to practice law at Columbus. The election, made by mail ballot, was officially confirmed at a session of the executive committee preparatory to the opening of the convention.



News Items From Field and Trade



ALABAMA

The ninth annual first-aid contest under the auspices of the Alabama Mining Institute and the U. S. Bureau of Mines will be held in the Birmingham municipal auditorium July 2. It is stated that the number of men who have received first-aid training during the past year is twice as large as in any previous year and the forthcoming meet is expected to be the largest and most interesting yet held.

To Enlarge Preparation Plant.—The Montevallo Coal Mining Co. will award a contract soon for a modern washery and preparation plant of large capacity at its Aldrich mine, Shelby County. This mine is now operating at maximum capacity. Practically the entire output of the mine is used in the domestic trade.

Builds Branch to Mary Lee.—The Central of Georgia Ry. is constructing a branch line from its spur track in East Birmingham to the Mary Lee mines of the Sloss-Sheffield Steel & Iron Co. This line will be about two and a half miles in length and will serve a large number of other industries in the territory through which it passes.

Improves Preparation.—The Franklin Coal Mining Co. has installed a concentrator table at its Powhatan Mines, at Powhatan, to increase the efficiency and capacity of its preparation equipment at this plant where a large production is being maintained.

Launch General Safety Movement.—With the object of promoting general safety work and keeping alive interest in accident prevention, the Birmingham Safety Council, Institute of Safety, will hold a series of sectional meetings beginning May 2, sessions to be held on each Monday night through June 6. Every line of industry will be represented on the programs, mining being cared for under the chairmanship of James L. Davidson, secretary of the Alabama Mining Institute, the coal division represented by James M. Cobb, safety inspector for the DeBardeleben Corporation. Inspiration talks will be made by prominent speakers.

ILLINOIS

Utilities Coal Calls Bonds.—The Commonwealth Power Corporation announces that its subsidiary, Utilities Coal Corporation, has called for redemption on July 1, 1927, at par and interest plus a premium of one-half per cent for each full year or fraction thereof of unexpired life, its outstand-

ing \$813,300 first mortgage 7 per cent serial gold bonds, due semi-annually to Oct. 1, 1938.

The Brewerton Coal Co., Chicago, has moved its offices from the Illinois Merchants Bank Building to 100 West Monroe St.

The West Virginia Southern Coal Co. of Huntington, W. Va., has opened an office in Chicago. C. W. Riker is in charge.

INDIANA

Strip Pits Preparing to Resume.—Crews of men have been engaged recently in preparing the big stripping shovels of the Gray coal mine near Oakland City for work. It is expected the mine will be in operation in a short time. Work also is being done on the Magnolia stripper, indicating that the strip mine industry in Pike and Gibson counties soon will be running as steadily as before the strike.

Addition to Ingle Property.—The Ingle Coal Co., which for many years has operated the Ayrshire coal mines near Winslow, Pike County, paid \$35,000 recently for 400 acres of coal lands in Patoka township, in which Winslow is located. The Ingle company sold a large tract of stripping land in southern Pike County to the Williams Coal Co. of Evansville.

Receiver for Dixie Vein Co.—Edward J. Bolmann was named receiver for the Dixie Vein Coal Co. in the South Bend division of the U. S. District Court recently. The petition was made by Edward T. Franklin, a stockholder of the company, which has its headquarters in Indianapolis and a stripping operation at Oakland City.

KENTUCKY

R. W. Hunter, vice-president in charge at Louisville, for the Groveland Coal Mining Co., Chicago, reports that his company had contracted a year's output of the mines of the Wheeler Coal Co. and the Harlan Knox Coal Co., controlled by Wheeler, including three in the Bell County field and two in the Harlan field, all having a total capacity of about 40 cars daily.

Turners Coal Co., Middlesboro, has filed amended articles increasing its capital stock from \$20,000 to \$30,000.

Hatcher Adds to Holdings.—The James Hatcher Coal Co., Big Shoal, has purchased the holdings of the Keyser Coal Co., including a store and forty-two houses at Keyser and thirteen houses at Mossy Bottom, with 589

acres of land. This gives the company control of all land in the leases of the Keyser and also of the Steele Coal Co., in connection with the Big Shoal plant, where coal seams had been exhausted. Col. Jim Hatcher now owns two miles of river front in Pike County, at Big Shoal.

It was recently reported that three coal mines on the O. & K. railroad, in Breathitt County, had been consolidated into the Wolverine Coal Co., controlling 1,000 acres of coal and timber land, near Jackson. It is planned to spend \$75,000 in additional trackage and improvements for larger operation.

MARYLAND

The Coromandel Coal Mining Co., with headquarters in Pittsburgh, has a force reopening the old Coromandel mine, on Big Vein Hill, at Lonaconing, and coal will be loaded within the next week or so.

MINNESOTA

The United States Steel Corporation has begun to move a good tonnage of steam coal to the St. Louis dock at Duluth for the use of its subsidiaries the Minnesota Steel Co., the Universal Portland Cement Co. and the Oliver Iron Mining Co.

The first cargo of coal was received at the Ford dock at Duluth during the last week, the Henry Ford II unloading a cargo of 12,000 tons there. A sister ship, the Benson Ford, is scheduled to arrive with another cargo within a week. Only two of the four Ford steamers are expected to operate this season between Duluth and Lake Erie ports.

OHIO

Plan Large River Plant.—Plans for the construction of a \$500,000 plant, fronting on the Ohio River in the East End, Cincinnati were disclosed last week by the Philadelphia & Cleveland Coal Co., which recently removed its headquarters from Cleveland to Cincinnati. The company proposes to build a coal tippie on the river front and a large wharf, it being the company's purpose to handle coal and steel and to engage in a general river transportation business. The Philadelphia & Cleveland Coal Co. is closely aligned with the West Virginia Coal & Coke Co., one of the largest of the Logan County (West Virginia) operations. It has a \$500,000 loading plant at Huntington, W. Va.,

and a large receiving plant equipped with latest type elevators at North Bend, to the west of Cincinnati.

The Alreese Coal Co., incorporated at Columbus, Ohio, May 2, opened for business at 523 Dixie Terminal, Cincinnati, the same day. The prominent members of the firm are H. C. Albright, formerly secretary and treasurer of the Eastern Coal & Export Co. of Richmond, Va., and Cincinnati, and Harold Reese, son of Roy Reese, president of the Buffalo-Thacker Coal Co., of Hunt-

for the purging of the stream are now under consideration. The idea has been put forth by Fred H. Decant, engineer, who is a member of the river pollution committee of the Chamber of Commerce in Reading. Under the plan outlined by the engineer the culm now being emptied into the river would be burned, turned into power, and made a source of revenue for coal operators.

Extend P. & R. Conversion Date.—The time limit for the conversion of interest certificates for stock of the

of Charles Bird, president; Norman Romesberg, vice-president; W. H. Kramer, secretary and general manager and C. A. Phillips, treasurer. There are about 1,100 acres in the tract.

Barron Case Dismissed.—The case of the Commonwealth against Robert Barron of Scranton, charged with causing widespread damage through caveins in connection with mining operations, was formally dismissed April 27. Mr. Barron agreed several weeks ago to stop mining, whereupon it was decided to drop legal action.

Borough to Survey Coal Lands.—Under the provisions of an ordinance recently passed, Archbald Borough Council will engage a mining engineer to make a survey of all coal lands in the borough. Members of the Council contend that the coal companies are not paying their just share of taxes. For this reason they decided to engage a competent engineer to ascertain the exact amount of coal in place within the borough limits. At the present time the various coal companies operating in Archbald pay taxes on a valuation of approximately \$2,000,000, or a little less than one-half of the total assessed valuation of the borough.

Markle to Build Clubhouse?—Some of the money John B. Markle, former anthracite operator, plans to set aside for civic betterment ideas may be spent close to the field wherein the Markle family gained riches in the mining industry. In Freeland a movement is already under way with a view of having the Markle Foundation help provide the town with a Y. M. C. A. or a club devoted to the interests of the young men.

The Vesta Coal Co., subsidiary of the Jones & Laughlin Steel Corporation, has given a contract for the erection of 200 miners' houses at Ritcheyville, near Centerville. Construction of the houses is to be completed within five months, by which time the company expects full operations of its mines on an open-shop basis.

TENNESSEE

The Grand View Coal & Lumber Co., of which W. A. Eudaly, Middletown, Ohio, is president, has increased its capital stock from \$300,000 to \$400,000. The company is a holding concern, and controls about 30,000 acres of coal land along Suck Creek Road on Signal Mountain and extending east to the Montalke property.

UTAH

New Castlegate Tipple.—The Utah Fuel Co. is replacing the old tipple for Castlegate mines Nos. 1 and 2. The new tipple will have a capacity of 600 tons of coal an hour, or from 4,000 to 5,000 tons a day. The cost of the new equipment will be about \$300,000.

Leases 800-Acre Tract.—Clarence Bamberger of Salt Lake City was granted a lease last week on a tract of 800 acres of coal land in the Clear Creek



General Hospital, Phelps Dodge Corporation, Dawson, N. M.

Located in a new country where no facilities were available, the Phelps Dodge Corporation of Dawson, N. M., had to build its own hospital, and right well did it perform the task. The company always has realized that it had a community to build and not merely a mine. For this reason Dawson is a town with mines rather than mines with a town added to it as the result of an afterthought.

ington, W. Va. The company starts as direct selling agent of the fuel from the mines of Mr. Reese, Sr.

The Columbus Board of Purchase announces that it probably will ask for bids on approximately 23,000 tons of coal for the various city departments some time in June. At present the board is buying its coal requirements on the open market as two attempts to obtain bids failed to produce an offer sufficiently low to warrant awarding a contract. The daily requirements of the municipal light plant, water works department and the garbage disposal plant amount to about 160 tons daily.

The Columbus Board of Education, opened bids May 4 for 15,000 tons of Hocking lump, to be delivered to the various school buildings. The Bell Coal Co., Columbus, was low, at \$4.24, and the Burns Coal Co. was next, at \$4.28. The coal is to come from Dones, a stripping operation in the Hocking Valley. For 2,000 tons of nut, pea and slack, the Burns Coal Co. was low, at \$3.74, and the Colonial Coal Co. second low at \$3.79. This coal is to come from Dry Branch, West Virginia.

PENNSYLVANIA

The Pittsburgh Terminal Coal Corporation and subsidiaries report for the quarter ended March 31, 1927, profit of \$70,675 after depreciation and depletion, but before federal taxes, against a profit of \$114,663 before federal taxes in the first quarter of 1926.

Plans by which the coal dirt in the Schuylkill river might be made to pay

Philadelphia & Reading Coal & Iron Corporation under the Reading dissolution plan of the Supreme Court has been extended from July 1, 1927, to Jan. 1, 1928, by the U. S. District Court at Philadelphia. The extension was granted at the request of the Reading Co., primarily to give the Baltimore & Ohio R.R., which holds 303,300 of the 571,238 certificates outstanding, further opportunity to dispose of its interests without financial loss as well as to protect other certificate holders.

End of Burning Mine Near.—One of the sights of the hard coal fields, the burning mines at Summitt Hill, will soon pass into history. For years tourists have come to this state to see the spot where a vein that caught fire in 1869 still burns, menacing the surface as well as spreading into one of the largest bodies of hard coal in the world. The Lehigh Coal & Navigation Co. has now decided to strip the burning area. It is thought that some coal will be recovered and that the cuts in the earth two miles wide and about 400 ft. deep will prevent the flames from spreading into undamaged sections of the company's holdings.

The Mercer Coal & Iron Co., which recently took over a mining tract between the Black Legion and Tomhicken mines, near Hazleton, will soon place a huge steam shovel at work.

Atlantic Fuel Co. Reorganized.—The Atlantic Fuel Co., with plants along the Baltimore & Ohio R.R. between Rockwood and Garrett, recently was reorganized with the election of William H. Kramer of Somerset as general manager. The board of directors consists

district of Carbon County by the local Government Land Office. The bidding was spirited and Mr. Bamberger will have to pay a bonus of \$5,000. The terms of the lease call for \$90,000 investment during the first three years, a minimum production of 50,000 tons beginning the fourth year and a royalty of 10c. a ton. Two years ago an assistant to the local United States Attorney filed on the land, but not being able to interest capital in its development, he had to relinquish it.

VIRGINIA

The Raleigh-Smokeless Fuel Co. was low bidder to supply the City of Norfolk with 9,000 tons of Navy Standard Pocohontas coal for the year beginning June 1. The bid was \$1.90 f.o.b. mines. Other bids ranged from \$2 to \$2.25, but no contract has been awarded.

"Minerals of Virginia, Their Occurrence and Uses," is the title of the first publication ever printed for popular distribution on the mineral resources of Virginia which will come from the press soon as a standard publication of the State Chamber of Commerce. Its editor is Dr. Wilbur A. Nelson, state geologist.

WEST VIRGINIA

Says Fires Were Incendiary.—R. M. Lambie, chief of the State Department of Mines, states that "the official report of State Inspectors Ringleman and Jarrett is that the recent fire at the mine of the Virginia & Pittsburgh Coal Co., at Kingmont, near Fairmont, was a deliberate act of some person or persons unknown. The fact that two fires were found about 100 ft. apart on main haulways where there are no electric wires or anything to cause a fire is in my [Mr. Lambie's] opinion sufficient evidence that someone executed a carefully worked-out plan to deliberately destroy this mine."

Trolley Regulation Passes.—Under the terms of House Bill 151, passed by both branches of the Legislature, section 36 of chapter 38 of the acts of 1925 is so amended as to prescribe that electric haulage by locomotives operated from trolley wire is not permissible in any mine worked by safety or approved electric lamps, except upon the intake airway, fresh from the outside, though if in the opinion of the Department of Mines, the danger to life and limb is increased by the intake being on the haulway, then special rulings covering the local conditions shall be made by the Chief of the Department of Mines. In mines where the methane content does not exceed one half of one per cent on the return of any air split special rulings on the use of electrical appliances may be made by the Chief of the Department of Mines.

Senate Amends Safety Bill.—Changed from its original form, which provided for the installation of mine-rescue and first-aid equipment at mines, House Bill No. 125, which has been passed by both branches of the Legislature, provides for the training of men in mine rescue work to be sub-

ject to call by the State Department of Mines in the event of an explosion or mine fire. The first section of the bill provides that the chief of the department shall be authorized to train and employ at each of the mine-rescue stations, operated by the department within the state, two rescue crews of six members each. Each member of a rescue crew is to devote four hours twice each month for training purposes and shall be available at all times to assist in rescue work at explosions and mine fires. He shall receive for his services the sum of \$5 per month, payable on requisition approved by the chief of the department and such other

no protest was made on the Cambria and Sheridan values of \$2.40 and \$2.30 respectively, no change was made there, Claude L. Draper, chairman of the board, said.

CANADA

British Columbia Output Gains.—Coal production during the first three months of 1927 increased markedly over the corresponding period of last year in all the mining districts of British Columbia except the Northern district. Vancouver Island produced 359,849 gross tons; Nicola-Princeton district,



Part of Order of 100 New Cars

Third from the right is J. E. Gatloff, of Williamsburg, Ky., president of the company. On his right is W. H. Stewart, mine superintendent, and on his left E. M. Denham, chief engineer of the Gatloff-Mahan-Perkins interests. The cars, which were made by "Hockensmith," are of the steel wood-bottom type with 3-in. axles and tapered roller bearings. They are 22 in. high and have a rated capacity of 5,900 lb. The miners are paid by weight but are given no credit for any over the rating. The cars are fitted with solid-link couplings so as to make it safer for the trip riders, and so less coal will be unloaded onto the track when the locomotive takes up the slack. Cast-iron wheels of 14 in. diameter are used, the end gates are of the lift type, and the steel sides of the body are strengthened by rolled edges.

sums, to be paid by the operating company, as may be agreed upon when engaged in rescue work at explosions or mine fires.

The Appalachian Electric Power Co. plans to erect a big plant at Sprigg, which will serve the neighboring coal fields, according to advices from Bluefield. The company has purchased a fifteen-acre plot of ground at Sprigg, Mingo County, between the Sprigg plant of the company and the main line of the Norfolk & Western Ry., for \$37,425.

WYOMING

Assessed Value of Coal Cut.—Reductions on the assessed valuation of coal at mines in several sections of the state, on the ground that profits of operators has been less last year than for the year preceding have been granted by the state board of equalization. A tentative value of \$2.60 per ton in the Rock Springs, Diamondville, Gebo, Crosby, Kemmerer and Cumberland fields was reduced to \$2.50. Other cuts allowed were: Popo Agie field, \$2.45 to \$2.40; Hanna, \$2.40 to \$2.30; Campbell County, \$1.50 to \$1.40. As

52,215 tons; Northern district, 596 tons; East Kootenay district, 650,187 tons. In the first quarter of 1926 the figures were: Vancouver Island, 291,143 tons; Nicola-Princeton, 44,805 tons; Northern, 750 tons; East Kootenay, 525,423 tons. Coke output in the province declined from 28,764 tons to 23,865 tons.

Teach Safety in Schools.—"Safety first" propaganda has been extended to the day schools in all the mining towns of Nova Scotia, and prizes have been offered for the best essays written on safety. Colliery officials also are competing in reducing accidents and are adopting the no-accident slogan. Two collieries, one of these the biggest in Canada, operated a full month without an accident. Gold watches are given to mine officials making the best showing.

Reported discoveries of high-grade coal in Prince township, 10 miles from Sault Ste. Marie, Ont., have aroused great interest in the district and large areas have been staked. A company under the name of the Red Rock Mining Co. is being organized, with extensive holdings and is planning to test the possibilities of the area on a large scale.

Among the Coal Men

J. B. Warriner was named as vice-president and general manager of the Lehigh Coal & Navigation Co. by the company's board of managers last week. At the same time Edward Hughes was elected vice-president and controller. Mr. Warriner also was made vice-president and general manager of the Alliance Coal Mining Co. and the Cranberry Creek Coal Co. and Mr. Hughes was appointed vice-president and controller of the Alliance and Cranberry Creek companies and the Panther Valley Water Co.

Walter Barnum, president of the National Coal Association, will address the Purchasing Agents' Association of Chicago at an evening meeting to be held June 14. That will be the evening before the opening of the tenth annual meeting of the National Coal Association at the Edgewater Beach Hotel, Chicago, and John R. Whitehead, president of the Chicago association, has given assurance that bituminous operators will be welcome at the meeting.

Elmer Wierhake has been appointed general sales manager for the Smokeless Fuel Co., Charleston, W. Va., following the elevation of Herman Everett to the vice-presidency and general managership. Mr. Wierhake for the past year has been connected with the Cincinnati office of Castner, Curran & Bullitt. Prior to that he opened the Cincinnati office for the General Coal Co. and was a partner in the West Virginia Coal Co. and its successor, the Kentenia Fuel Co. He is one of the younger members of Cincinnati's wholesale coal trade and a director in the Coal Exchange of that city.

Governor Graves of Alabama has announced the appointment of the following as associate state mine inspectors: James A. Fox, William L. Neill, W. P. Smith and George Park, all of Birmingham. Fox succeeds George Kuffner. Neill, Smith and Park were reappointed.

Effective May 5, 1927, the properties of the West Virginia Coal & Coke Co. in its mining fields (including all physical properties and allied operations, which embraces the merchandising stores of the company) will come under the jurisdiction of the general manager of operations, the duties of which office will be upon the above date assumed by W. H. Grady, promoted from the office of general manager of mines.

James Hutton has been appointed sales agent of the Philadelphia & Reading Coal & Iron Co. at Buffalo, N. Y., to succeed William A. Reed, retired. The appointment became effective May 1. Mr. Hutton had served as assistant sales agent at Buffalo since Jan. 10 and prior to that was in the office of R. J. Montgomery, vice-president and general coal agent of the company at Philadelphia. Mr. Reed's retirement was due to ill health. He had been with the company for the past thirty-seven years and since Sept. 1, 1921, had been

Buffalo sales agent. He has left Buffalo to reside in his old home town, Elyria, Ohio.

John Q. Clarke, of the Monongahela Coal Co. and the Clarke Coal Co., was captain of the coal team in the annual charities and community fund campaign in Buffalo, N. Y. from May 2 to 10. The total quota for the city was \$772,835 and the coal quota \$11,255.



Philip M. Snyder

Philip M. Snyder of Mt. Hope, W. Va., who was recently chosen president of the C. C. B. Smokeless Coal Co., succeeding the late Robert Grant of Boston, has also been named vice-president in charge of coal operations of the parent company, the Massachusetts Gas Cos. Mr. Snyder has been active in the New River field for about forty years.

Colonel James S. Browning, pioneer Pocahontas coal operator, politician and historian, is a patient in St. Luke's Hospital, Bluefield, W. Va. His condition is regarded as critical.

S. S. Lubelsky, explosives engineer, Pittsburgh, Pa., will conduct investigations at the Green River mine of the Green River Fuel Co., Mogg, Ky., with a view toward obtaining an increase in the lump coal production and also toward obtaining a cleaner grade of coal by improved blasting.

Maurice L. Sharp, coal analyst, who conducts the work of the coal analytical laboratory of the Bureau of Mines at Anchorage, Alaska, is en route to Pittsburgh, Pa. He will spend a month or more at the Pittsburgh station of the Bureau of Mines, where he will pursue advanced studies in analytical work in preparation for investigation work.

William N. Cummins, who was general manager in charge of the mines of the Red Jacket Consolidated Coal Co. at Red Jacket, W. Va., has been transferred to the Columbus (Ohio) office, which is the headquarters of the company. E. E. Ritter, formerly with the

W. M. Ritter Lumber Co., has been made assistant superintendent of mines.

Charles W. Connor, a former director of the National Coal Association, who for some time has been with the Wakenva Coal Co., Inc., will shortly become general superintendent of coal mines for the American Rolling Mill Co. with mines in the Kanawha and northeast Kentucky fields and with headquarters at Ashland, Ky.

D. C. Lefevre has been appointed superintendent in charge of the farms, sawmills and timber operations of the Clearfield Bituminous Coal Corporation, with headquarters at Indiana, Pa. The appointment became effective April 30.

C. W. Riker, who is well known in the Cincinnati market, has been appointed manager of the Chicago branch of the West Virginia Southern Coal Co.

R. I. Willcox, formerly resident manager of the New York office of the Pioneer Coal & Coke Co., is now associated with the Manhattan office of the Logan Coal Co., Philadelphia.

A. W. Childers, extensively interested in a number of coal companies in the Winding Gulf field of West Virginia, is confined to a Baltimore hospital by illness.

J. H. Shearer of Altoona, Pa., vice-president of the Penn Central Light & Power Co., and Duncan S. Ellsworth, Jr., of New York were elected directors of the Pennsylvania Coal & Coke Corporation at the annual meeting last week, succeeding J. P. Ripley and R. H. Williams, Jr., retired. The other directors were re-elected.

Bates Whatley, a member of the Pittsburgh coal trade for a number of years, has become associated with Cosgrove & Co., Johnstown, Pa.

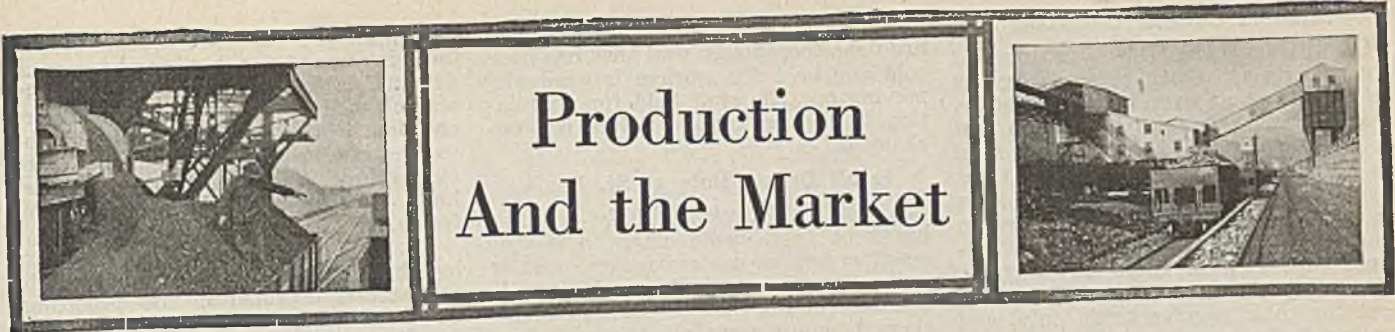
Obituary

Patrick McCormick, aged 78, retired coal operator and a pioneer resident of Patton, Cambria County, Pa., died on May 3, in the Clearfield Hospital. Death was attributed to mumps. He was engaged in the coal business for many years and recently disposed of his holdings to the Pennsylvania Coal & Coke Corporation.

Jesse M. Deitrich, aged 42, secretary of the Pine Valley Coal Co., near Johnstown, Pa., caught the full force of a blast of dynamite at the Yasting mine on April 30, and was almost instantly killed. Deitrich accompanied George Lallement, a miner, into the mine to instruct him in the use of explosives when the charge of dynamite they were carrying is believed to have come in contact with an electric wire.

Frank Coil, 42 years old, coal operator, was killed at Madisonville, Ky., May 1 when his automobile, in which he was riding, collided with an empty coal gondola of a string of cars at the grade crossing. He was well known in coal circles around Madisonville. He is survived by his widow, Mrs. Leila Coil.

Dr. Warren Benjamin, chief surgeon of the United States Fuel Co., Salt Lake City, Utah, is dead following a brief illness from a heart ailment. He was born in Kingston, N. Y., and came to Salt Lake City in 1902.



Consumer Indifference Grows in Soft-Coal Trade; Anthracite Market Gains Ground

Undaunted by the suspension of mining operations which drags its weary course in the Central Competitive Field and the Southwest, consumers of bituminous coal show no indications of deviating from their consistent attitude of indifference. In fact industrials are placing reliance on their storage piles to such an extent that non-union coals are finding it anything but easy to make inroads into the states where such tonnage might most reasonably be expected to displace union coal.

Increasing evidence of this fact is seen in the markets of the Middle West. Thus far, eastern Kentucky and West Virginia high-volatile coals, instead of taking the place of Illinois and Indiana fuels, are going begging in the regions usually supplied by the latter. Steam tonnage is being gradually moved from the Illinois fields, but comparatively little impression has been made on the accumulated "no bills" of domestic sizes.

Dominance of Reserves Shown

The record-breaking total of storage coal in consumers' bins—75,000,000 tons on April 1—revealed by the Bureau of Mines stock report gives eloquent proof, if any was needed, of the dominant rôle of this element in market developments.

There was a slight reaction in demand in Kentucky markets last week. Steam inquiry is fair, however, and screenings are kept pretty well cleaned

up, while retailers are active buyers. Output in western Kentucky during the last week in April was but little short of the new record set the week before.

Removal of the embargo on lake shipments on May 4 caused a freer movement of tonnage and strengthened the position of West Virginia smokeless, which is easily the center of market interest in most marts. An outstanding exception is the Atlantic seaboard region, where the trade continues to mark time. The only substantial movement is on the fulfillment of existing contracts. This situation is mirrored in steadily declining output in the central Pennsylvania mining fields.

Prepared Sizes Firmer Inland

Further improvement in price tone on prepared sizes of West Virginia coal was in evidence in inland markets as a result of the better movement of the lakes. The backwash of this is seen in increasing firmness in high-volatile prepared coals in the same centers. The tendency in slack, however, was somewhat weaker, due to the increased production of prepared sizes. *Coal Age* Index of spot bituminous prices on May 9 was 175 and the corresponding weighted average price was \$2.11, a decline of 2 points and 3c. from the preceding week.

Bituminous production during the week ended April 30 reached the highest point since the suspension began,

with a total of 8,421,000 net tons, according to the U. S. Bureau of Mines. Loadings for the first two days of last week, however, fell considerably behind the totals for the same days of the preceding week.

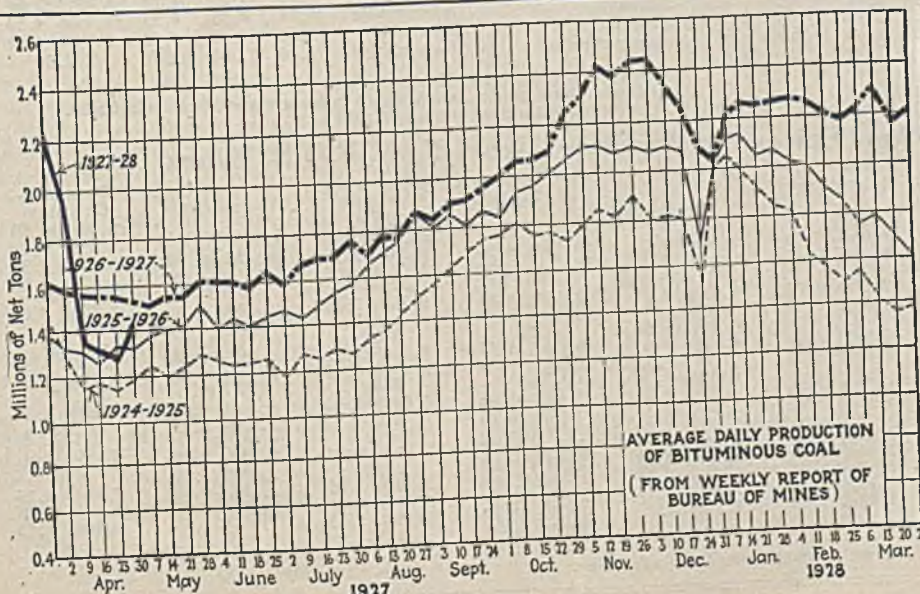
Dumpings at lower lake ports during the week ended May 8 included 1,184,803 tons of cargo and 36,678 tons of vessel fuel, a total of 1,221,481 tons.

The labor difficulty which has tied up operations in Illinois, Indiana, Ohio, western Pennsylvania, the Southwest and Iowa is no nearer settlement. Negotiations between union officials and the shaft-mine operators of Indiana fell through last week and both sides are sitting tight elsewhere.

Anthracite Trade Reviving

The hard-coal situation is improving steadily. Demand is improving markedly in anticipation of the 25c. advance in company prices June 1. Stove is stronger, pea is steady and egg and nut are improving. The steam sizes are satisfactory. Anthracite production during the week ended April 30—1,925,000 net tons—was the highest for any week since Dec. 4, last, comparing with a total of 1,662,000 tons during the week ended April 23.

Increasing softness characterizes the Connellsville coke market, despite a marked curtailment of output. Demand is very light, coke is accumulating and spot prices are declining.



Estimates of Production

(Net Tons)			
BITUMINOUS			
	1926	1927	
April 16.....	9,306,000	8,001,000	
April 23 (a).....	9,271,000	7,937,000	
April 30 (b).....	9,125,000	8,421,000	
Daily average.....	1,521,000	1,403,000	
Cal. yr. to date (c)...	185,621,000	204,621,000	
Daily av. to date.....	1,822,000	2,008,000	
ANTHRACITE			
April 16.....	2,086,000	1,762,000	
April 23.....	2,087,000	1,662,000	
April 30.....	2,098,000	1,925,000	
Cal. yr. to date (c)...	19,567,000	25,642,000	
BEEHIVE COKE			
April 16.....	233,000	176,000	
April 23 (a).....	228,000	169,000	
April 30 (b).....	210,000	176,000	
Cal. yr. to date (c)...	4,908,000	3,211,000	

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

Midwest Outlook Uncertain

Conditions in the Midwestern market are uncertain. Consumers display as little interest as ever in the situation, confident of their ability to obtain coal at satisfactory prices when they need it. Meantime they are sitting tight and depending on storage stocks. As a result there is little activity save in smokeless; Kentucky and West Virginia high-volatile coals go begging. Illinois operators are reserving their coal for their regular trade only, and are making no sacrifices to move it.

Steam sizes have been gradually moving out of the southern Illinois mining fields, but there has been only a limited call for domestic sizes, of which there is still a large accumulation of "no bills." Pretty much the same situation prevails in the other Illinois fields, with the likelihood that there will be considerable difficulty in moving the tonnage in storage in the Mt. Olive district unless the suspension lasts much

longer than many expect. In the Standard field, too, though coal that has been sold and held for storage is gradually moving out, the stuff held for speculation is still on track. Prices are unchanged.

Small Orders Rule at St. Louis

At St. Louis, rainy, chilly weather has kept up to some extent a run of small orders on dealers for emergency coal. This is usually in small quantities and for the cheaper coals although there is more early placing of orders for winter storage than is customary. This is quite evident from calls for coke. Anthracite continues to show a decrease and smokeless is not in demand. Local wagonload steam is quiet and carload is hard to gage. There is still a plentiful supply and very little outside coal is coming in. Country steam is quiet and country domestic is hard to find. There is no change in the local situation as to prices.

Demand in the Louisville market was

somewhat lighter last week. While there is some steam inquiry and general demand is keeping screenings fairly well cleaned up, many large buyers are sufficiently stocked to stay out of the market for a while. A number of others, however, are keeping stockpiles high. Retailers have been buying freely.

Production in western Kentucky during the last week of April was close to the record established the preceding week. Tonnage is moving from eastern Kentucky to the lakes more freely now and further improvement is expected as congestion at lower lake ports eases.

In western Kentucky new prices were issued May 1 showing a minimum of \$1.90 on all steam, \$2 on small prepared and \$2.15 on large prepared, but the next day a new list was posted, with the low on screenings and mine-run at \$1.75; small prepared, \$1.85@ \$2; large prepared, \$1.90@ \$2, and all 6-in. block and 3-in. lump or nut, \$2.

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

Low-Volatile, Eastern					Midwest				
Market Quoted	May 10 1926	Apr. 25 1927	May 2 1927	May 9 1927†	Market Quoted	May 10 1926	Apr. 25 1927	May 2 1927	May 9 1927†
Smokeless lump	Columbus	\$2.85	\$3.10	\$3.35	\$3.25@ \$3.50	Chicago	\$2.60	\$3.15	\$3.15
Smokeless mine-run	Columbus	2.00	2.10	2.15	2.00@ 2.30	Chicago	2.40	2.60	2.60
Smokeless screenings	Columbus	1.25	1.45	1.55	1.25@ 1.50	Chicago	1.90	2.50	2.50
Smokeless lump	Chicago	3.10	3.35	3.35	3.25@ 3.50	Chicago	2.30	2.85	2.85
Smokeless mine-run	Chicago	2.00	2.00	2.05	1.90@ 2.25	Chicago	2.05	2.35	2.35
Smokeless lump	Cincinnati	3.00	3.10	3.10	3.00@ 3.25	Chicago	1.55	2.00	2.00
Smokeless mine-run	Cincinnati	1.80	2.35	2.25	2.25	Chicago	2.40	3.05	3.05
Smokeless screenings	Cincinnati	1.35	1.85	1.85	1.75@ 2.00	Chicago	2.15	2.45	2.45
*Smokeless mine-run	Boston	4.60	4.45	4.40	4.35@ 4.50	Chicago	1.80	2.50	2.50
Clearfield mine-run	Boston	1.90	1.75	1.75	1.60@ 1.85	Chicago	2.15	2.65	2.65
Cambria mine-run	Boston	2.10	2.00	2.05	1.90@ 2.25	Chicago	1.95	2.20	2.20
Somerset mine-run	Boston	2.00	1.85	1.90	1.70@ 1.95	Chicago	1.35	2.10	2.10
Pool 1 (Navy Standard)	New York	2.60	2.85	2.85	2.50@ 3.00	St. Louis	2.50	3.00	3.00
Pool 1 (Navy Standard)	Philadelphia	2.80	2.85	2.85	2.75@ 3.00	St. Louis	2.15	3.00	3.00
Pool 1 (Navy Standard)	Baltimore	1.95	2.15	2.15	2.10@ 2.25	St. Louis	1.40	2.00	2.00
Pool 9 (Super. Low Vol.)	New York	2.10	2.10	2.10	2.00@ 2.25	St. Louis	2.50	2.75	2.75
Pool 9 (Super. Low Vol.)	Philadelphia	2.35	2.15	2.15	2.00@ 2.30	St. Louis	1.80	2.00	2.00
Pool 9 (Super. Low Vol.)	Baltimore	1.75	1.80	1.80	1.75@ 1.85	St. Louis	1.15	1.75	1.75
Pool 10 (H.Gr. Low Vol.)	New York	1.85	1.75	1.75	1.65@ 1.90	Louisville	1.75	1.85	1.90
Pool 10 (H.Gr. Low Vol.)	Philadelphia	2.05	1.80	1.80	1.70@ 1.90	Louisville	1.25	1.65	1.65
Pool 10 (H.Gr. Low Vol.)	Baltimore	1.60	1.65	1.65	1.60@ 1.70	Louisville	1.10	1.65	1.65
Pool 11 (Low Vol.)	New York	1.60	1.60	1.60	1.50@ 1.75	Chicago	1.75	2.05	2.05
Pool 11 (Low Vol.)	Philadelphia	1.70	1.65	1.65	1.55@ 1.75	Chicago	1.15	1.65	1.65
Pool 11 (Low Vol.)	Baltimore	1.45	1.55	1.55	1.50@ 1.60	Chicago	1.15	1.65	1.65

High-Volatile, Eastern					South and Southwest					
Market Quoted	May 10 1926	Apr. 25 1927	May 2 1927	May 9 1927†	Market Quoted	May 10 1926	Apr. 25 1927	May 2 1927	May 9 1927†	
Pool 54-64 (Gas and St.)	New York	1.40	1.50	1.50	1.40@ 1.60	Big Seam lump	Birmingham	2.15	2.00	2.15
Pool 54-64 (Gas and St.)	Philadelphia	1.45	1.45	1.45	1.35@ 1.60	Big Seam mine-run	Birmingham	2.00	1.75	1.75
Pool 54-64 (Gas and St.)	Baltimore	1.25	1.50	1.50	1.45@ 1.55	Big Seam (washed)	Birmingham	2.00	2.00	2.00
Pittsburgh sc'd gas	Pittsburgh	2.30	2.55	2.55	2.40@ 2.50	S. E. Ky. block	Chicago	2.40	2.25	2.25
Pittsburgh gas mine-run	Pittsburgh	2.05	2.30	2.30	2.15@ 2.25	S. E. Ky. mine-run	Chicago	1.65	1.65	1.65
Pittsburgh mine-run (St.)	Pittsburgh	1.80	2.25	2.25	2.10@ 2.35	S. E. Ky. block	Louisville	2.05	2.25	2.25
Pittsburgh slack (Gas)	Pittsburgh	1.55	1.65	1.65	1.45@ 1.60	S. E. Ky. mine-run	Louisville	1.50	1.60	1.60
Kanawha lump	Columbus	2.05	2.10	2.35	2.25@ 2.50	S. E. Ky. screenings	Louisville	1.05	1.15	1.15
Kanawha mine-run	Columbus	1.55	1.55	1.60	1.50@ 1.75	S. E. Ky. block	Cincinnati	2.50	2.35	2.35
Kanawha screenings	Columbus	1.00	1.10	1.15	1.05@ 1.25	S. E. Ky. mine-run	Cincinnati	1.55	1.55	1.55
W. Va. lump	Cincinnati	1.85	2.10	2.10	1.75@ 2.50	S. E. Ky. screenings	Cincinnati	.90	1.25	1.20
W. Va. gas mine-run	Cincinnati	1.55	1.60	1.60	1.50@ 1.85	Kansas lump	Kansas City	4.00	4.35	4.35
W. Va. steam mine-run	Cincinnati	1.40	1.40	1.35	1.25@ 1.50	Kansas mine-run	Kansas City	3.00	2.85	2.85
W. Va. screenings	Cincinnati	1.00	1.25	1.15	1.00@ 1.35	Kansas screenings	Kansas City	2.50	2.50	2.50
Hooking lump	Columbus	2.35	2.25	2.25	2.00@ 2.50					
Hooking mine-run	Columbus	1.55	1.65	1.65	1.60@ 1.75					
Hooking screenings	Columbus	1.05	1.15	1.30	1.20@ 1.35					
Pitts. No. 8 lump	Cleveland	2.15								
Pitts. No. 8 mine-run	Cleveland	1.80								
Pitts. No. 8 screenings	Cleveland	1.35								

*Gross tons, f.o.b. vessel, Hampton Roads.
 †Advances over previous week shown in heavy type; declines in italics.
 ‡Quotations withdrawn because of strike.

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

	Market Quoted	Freight Rates	May 10, 1926		May 2, 1927		May 9, 1927†	
			Independent	Company	Independent	Company	Independent	Company
Broken	New York	\$2.34		\$8.25@ \$9.25		\$8.25@ \$8.35		\$8.25@ \$8.50
Broken	Philadelphia	2.39	\$9.25	9.00@ 9.25	\$8.25@ \$8.35	8.25@ 8.50	8.25@ 8.50	8.25@ 8.50
Egg	New York	2.34	9.00@ 9.50	8.75@ 9.25	\$8.25@ \$8.35	8.25@ 8.35	\$8.25@ \$8.50	8.25@ 8.35
Egg	Philadelphia	2.39	9.25@ 9.75	9.15@ 9.25	8.25@ 9.00	8.25@ 8.35	8.25@ 9.00	8.25@ 8.35
Egg	Chicago	5.06	8.48	8.13	7.63	7.63	7.63	7.63
Stove	New York	2.34	9.25@ 9.75	9.25@ 9.50	8.50@ 8.85	8.75@ 8.85	8.50@ 8.85	8.75@ 8.95
Stove	Philadelphia	2.39	9.60@ 10.00	9.35@ 9.50	8.85@ 9.50	8.85	8.85@ 9.50	8.85
Stove	Chicago	5.06	8.84	8.33@ 8.58	8.08	8.08	8.08	8.08
Chestnut	New York	2.34	9.25@ 9.50	8.75@ 9.15	8.00@ 8.35	8.25@ 8.35	8.25@ 8.50	8.25@ 8.35
Chestnut	Philadelphia	2.39	9.25@ 9.50	9.00@ 9.15	8.25@ 9.00	8.25@ 8.35	8.25@ 9.00	8.25@ 8.35
Chestnut	Chicago	5.06	8.71	8.38@ 8.58	7.63	7.63	7.63	7.63
Pea	New York	2.22	6.50@ 7.25	6.00@ 6.25	5.75@ 6.50	6.00@ 6.50	5.50@ 6.00	6.00@ 6.50
Pea	Philadelphia	2.14	6.50@ 7.00	6.00@ 6.50	6.00@ 6.75	6.00	6.00@ 6.75	6.00
Pea	Chicago	4.79	6.03	5.65@ 5.80	6.10	6.10	6.10	6.10
Buckwheat No. 1	New York	2.22	1.85@ 2.50	3.00@ 3.50	2.65@ 3.00	2.50@ 3.00†	2.75@ 3.00	2.50@ 3.00
Buckwheat No. 1	Philadelphia	2.14	2.00@ 2.50	2.50@ 2.75	2.50@ 3.00	2.50	2.50@ 3.00	2.50
Rice	New York	2.22	1.50@ 2.00	2.00@ 2.25	1.75@ 2.00	2.00@ 2.25	1.75@ 1.85	2.00@ 2.25
Rice	Philadelphia	2.14	1.75@ 2.25	2.00@ 2.25	2.00@ 2.75	2.00@ 2.25	2.00@ 2.75	2.00@ 2.25
Barley	New York	2.22	1.00@ 1.50	1.50@ 1.75	1.25@ 1.50	1.50@ 1.75	1.20@ 1.50	1.50@ 1.75
Barley	Philadelphia	2.14	1.50@ 1.60	1.75	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Birdseye	New York	2.22		2.00	1.35@ 1.60		1.35@ 1.60	

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

Some fancy block sells at \$2.25, but not much. At times, however, there is shading on these quotations. Eastern Kentucky screenings are up to \$1.25@ \$1.50; mine-run, \$1.50@ \$1.75, though some goes for less than \$1.50; egg, nut and lump, \$1.75@ \$2; block, \$2 and up, some fancy grades bringing \$2.50.

Northwest Trade Steady

The market at the Head of the Lakes is fairly steady save for a slight easing in smokeless as a result of a liberal all-rail movement to the Twin Cities. Fair shipments are moving from the docks to industrial consumers, but sales to retailers show a seasonal decline.

Cargo receipts continue heavy. During the week ended April 30 there were 69 cargoes, including 2 of anthracite, discharged, and 49 more loads, of which 4 were anthracite, were reported en route. Receipts may be affected soon by the eastward movement of iron ore, which has been light thus far.

Prepared sizes of smokeless coals are now quoted at \$7.50; mine-run, \$5.50, and screenings, \$4.75. Kentucky lump, egg and stove are \$6@ \$7; dock-run, \$5.75; screenings, \$4.75; Youghiogheny, Hocking and splint screenings remain at \$4.50, or 50c. higher than at this time a year ago.

The coal trade in Milwaukee is in the doldrums, as usual at this period, when demand is nearing low ebb and the interest of dealers is centered on the business of getting things in order for a new season. Prices are unchanged and demand fluctuates with the thermometer. Industrial demand is slightly better at the Twin Cities, with the call for domestic grades limited to the usual seasonal level.

Running Time Low in Southwest

No change was reported in the market situation in the Southwest in the past week. Only a few mines in Kansas and Arkansas, other than those working on contracts, were in operation, due as much to the lack of demand as to the miners' strike. Oklahoma mines continued at a fair rate of production, and a few strip pits in the Hume-Worland (Missouri) district also were working. Prices are unchanged.

Reflecting unusually warm weather, there was a lessened demand for domestic lump and nut as well as steam sizes in Colorado last week. Progressive market weakness is shown by the increasing number of "no bills" and curtailed running time at the mines. Prices are unchanged. In Utah, too, output has been hard hit by unfavorable weather. Lump is becoming a drug on the market. Retail prices are steady and no further cut in mine prices is expected this summer. Labor conditions are good.

Summer Swing at Cincinnati

A pronounced stiffening in prices at Cincinnati reflects freer movement to the lakes, seasonal demand from inland points and buying for industrial consumption. Smokeless is the headliner, most factors naming \$3.50 for lump and egg, based on the claim that they are sold up on contract allotments. The spot market is between that and \$3.25. Stove is \$2.75; nut and mine-run, \$2.25

@ \$2.50. Screenings, however, are weak at \$1.75@ \$2, with a further shaving likely because of the increased production of prepared.

High-volatile coals also are sharing in the advance. Several West Virginia producers have boosted 4- and 6-in. lump from \$1.75 to \$2.25, occasioned mostly by the signing of tonnage for the lakes. Hazard and Harlan egg and 2-in. are even stronger since the recent 10c. advance; mine-run is a trifle weaker and slack is on the fence between conflicting sentiments.

There was a further gain in the movement of coal loads through the Cincinnati gateway last week. The total interchanged was 15,559, an increase of 946 when compared to the preceding week and 4,907 more than in the same week last year. Included in last week's total were 4,282 cars en route to the lakes. The number of empties en route to the mines increased from 13,837 to 14,421 cars.

Aside from firmness in West Virginia smokeless and splints, conditions are unchanged in the Columbus market. The retail trade is quite active and prices are steady. Steam, however, is dull and featureless. Contracting is slow, with large consumers depending on their reserves for current needs.

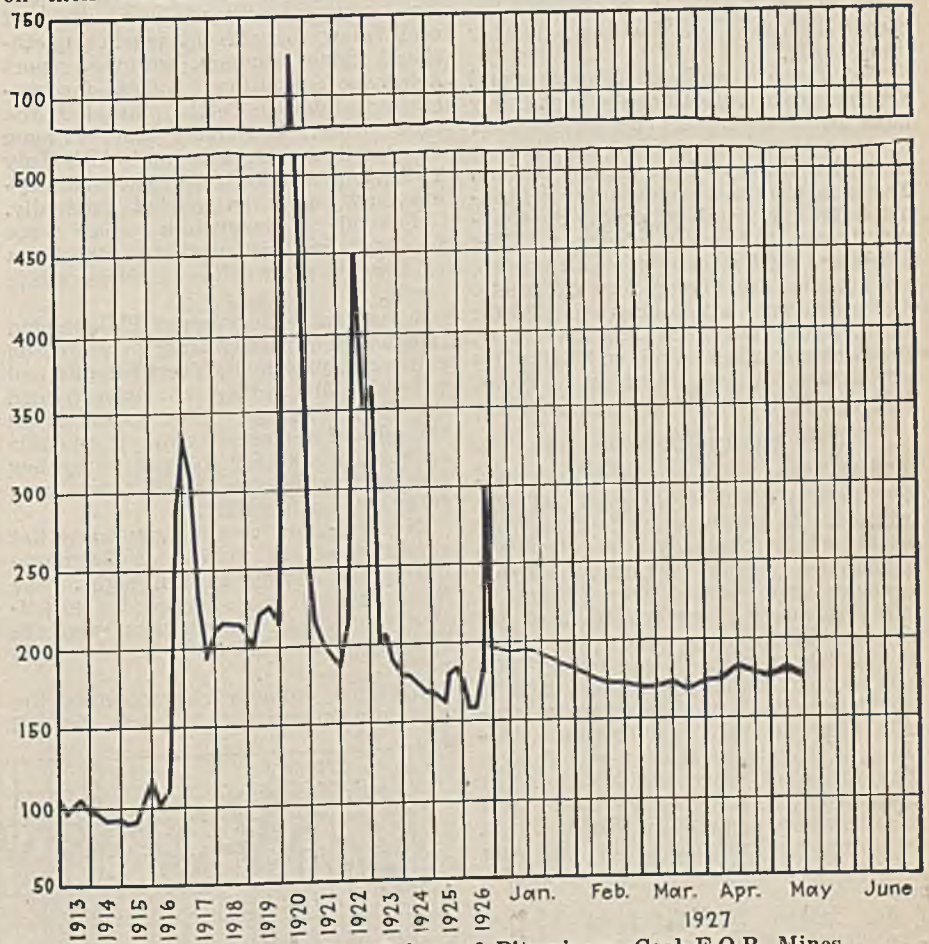
Screenings are extremely weak owing to heavy production of prepared sizes and curtailed consumption by byproduct plants.

The recent quiet tone of the Cleveland market is undisturbed; if anything, demand is at the lowest ebb in many a day and prices on strip-mine coal from the No. 8 field and on fuel from the Moundsville region are softer. Retail yards are buying lightly. Smokeless prepared sizes are less plentiful and quotations have advanced 25c.

Easing Still On at Pittsburgh

Further softness pervaded the Pittsburgh district market last week. Overproduction, light demand and heavy accumulations on track offer scant encouragement to the spread of the open-shop movement, which is not being pushed. Most spot buying is confined to bargain-counter offers.

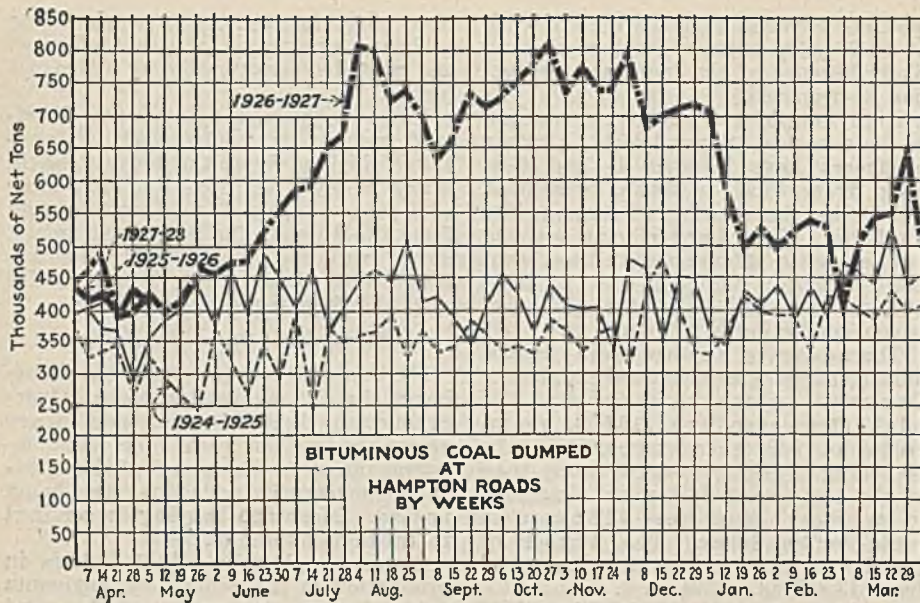
There has been a slight upturn in production in the central Pennsylvania field. Output during the week ended April 30 increased from 11,566 to 12,469 cars, but the number of "no bills" still exceeds 3,000. Total loadings for April were 53,482, a decline of 36,102 from the March total. Current quotations are: Pool 1, \$2.40@ \$2.65; pool 71, \$2.25@ \$2.35; pool 9, \$2.10@ \$2.20; pool



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

	1927			1926	1925
	May 9	May 2	Apr. 25	Apr. 18	May 10
Index	175	177	174	174	161
Weighted average price.....	\$2.11	\$2.14	\$2.11	\$2.11	\$1.95
					\$2.01

This diagram shows the relative, not the actual, price on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportion each of slack, prepared and run of mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke: 1913-1918," published by the Geological Survey and the War Industries Board. Owing to the suspension of operations in certain unionized fields the figures for April 18 and 25, and May 2 and 9 are tentative only.



10, \$1.80@2; pool 18, \$1.65@1.75. Orders in the Buffalo market are limited to occasional calls from consumers who have run low on stocks or from those whose storage capacity is not large. Some factors report a stiffening in the price of slack, but there is no dearth of it, despite the recent lightness of the three-quarter lump trade.

The Toronto trade continues normal and featureless. Dealers are kept fairly busy by householders laying in their season's supplies, but there has been a decided falling off in small orders. There is a fair movement for bituminous for industrial purposes, Pocahontas being somewhat stronger. The yards are well stocked with all grades, and supplies are coming forward freely. Three-quarter bituminous is \$6.40; slack, \$5.65; West Virginia smokeless, \$8; Pennsylvania smokeless, \$5.90. Retail prices for anthracite are: Stove, \$15; egg and nut, \$14.50; pea, \$12.50.

New England in Doldrums

In the New England steam coal market there are no developments of any interest. In no direction is there any buying of consequence and prices are unchanged. The Hampton Roads agencies are making every effort to supervise output, except in rare instances. Often in the past week certain shippers have been obliged to say they had no spot coal at the piers, that it would have to be ordered down for specific requirements, and this is something of a change from a month ago. The range of price for No. 1 Navy Standard is \$4.30@4.60, with most sales being made at \$4.35@4.50. Slack is offered at low prices, but mine-run is being held with some degree of firmness.

For inland delivery from Boston, Providence and Portland on-car figures are perhaps a shade firmer because of less spot coal pressing for disposition, but this is likely to change any day with the arrival of cargoes for distribution from the railroad terminals. Those factors who have their own rehandling facilities are more conservative as to sales; \$5.75@6 is still the range, but the average is nearer \$5.90 than \$5.75.

Neither all-rail nor by water is there

market for central Pennsylvania coals in any volume. Prices there are as low as at any time thus far this season.

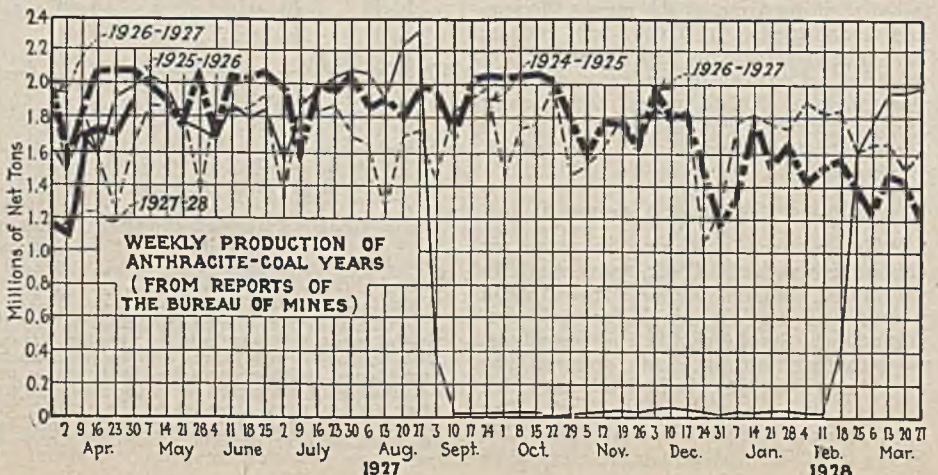
New York Trade Still Slipping

The bituminous coal market at New York slipped last week. There was less buying, resulting in more offers of coal below the current market quotations. Some shippers, however, report a few more inquiries. Indications generally point to a better market in the near future. Consumers' reserves have decreased considerably and with July 1 drawing near it is thought that buyers may enter the market gradually. Central Pennsylvania coals are plentiful in this market. Operators continue to clear sidings before loading again.

Movement of tonnage at Philadelphia is confined almost entirely to quotas on contracts, principally for railroads and utilities. Most other industries depend on their storage piles, with little thought of replenishment. It remains to be seen whether the prevailing low level of prices has lulled them to a false sense of security.

No deviation from the generally flat condition of the market at Baltimore during the last month is in sight. The light demand has sharpened competition to such an extent that even the better grade coals can be had for little money.

Extreme dullness characterizes the Birmingham market. Orders for all



Car Loadings and Supply

	Cars Loaded	
	All Cars	Coal Cars
Week ended April 30, 1927	1,026,440	162,583
Week ended April 23, 1927	955,215	150,787
Week ended May 6, 1926	995,641	165,627
Week ended April 24, 1926	973,304	166,586

	Surplus Cars		Car Shortages	
	All Cars	Coal Cars	All Cars	Coal Cars
April 23, 1927	269,933	95,588
April 15, 1927	269,473	93,866
April 23, 1926	286,203	126,959

grades are scarce and even shipments on contracts are on a minimum basis. The Southern Ry. has inquiries out for supplies for the coming year; most of the other principal lines, however, have stocked considerable coal. Retailers are buying domestic grades cautiously, with quotas for spring and summer below normal, though a number of producers report a larger tonnage than usual contracted for fall delivery.

Steam prices are slightly off on some grades when compared with recent schedules, but further declines are unlikely. Big Seam mine-run is \$1.50@1.75; washed, \$1.75@2; Carbon Hill mine-run, \$1.75@2; washed, \$1.75@2.25; Cahaba mine-run, \$2.25@2.50; washed, \$2@2.50; Black Creek washed, \$2.25@2.75; Pratt mine-run, \$1.85@2.10; washed \$2@2.25.

Hard Coal Gains Strength

Demand for the domestic sizes of anthracite at New York last week showed some increase over the preceding week. Movement was better and more mines are operating. Indications are that May will show considerable improvement over April, part of which, at least, can be attributed to the price increases scheduled for June 1. One of the large operating companies announced a 10c. increase over its schedule on May 1. Independent coals are moving more freely but quotations range at about last week's schedule, not so much coal, however, being sold at the lower prices.

Summer filling orders picked up noticeably in Philadelphia last week. Chestnut is being handled in greatest volume, though stove also is in active demand and egg is gaining strength. Pea is in a strong position and the steam situation is satisfactory. Buckwheat particularly is much sought.

Wet, chilly weather in conjunction with the low price schedule has brought a fair volume of business for the season in the Baltimore market, not only for

fill-ups but for next winter's supply. Demand at Buffalo picked up a little last week, and further betterment is expected. Lake shipments during the week ended April 30 were 50,500 tons; one cargo of 10,000 tons cleared for Milwaukee; the rest went to the Head of the Lakes. Some of the cargoes loaded in advance of the season, however, are still awaiting sailing orders.

Connellsville Coke Sags

Though production has been declining steadily in the Connellsville coke region, demand has been so light that coke continues to accumulate and the spot market is lower. Spot furnace has fallen to \$3 and there are unconfirmed reports of sales for even less. Spot foundry has eased to \$4@\$.75. Further curtailment is considered inevitable.

Production of beehive coke in the Connellsville and Lower Connellsville region during the week ended April 30, according to the Connellsville Courier, was 121,590 net tons. Furnace-oven output was 70,300 tons, an increase of 200 tons in one week. Merchant-oven output was 51,290 tons, a decrease of 7,870 tons.

There has been little change in the Birmingham coke market. Domestic grades are sluggish. Foundry quotations are \$6 for spot and \$5.50 for contract.

Hope for Prompt Action In Maynard Case

In view of the unsatisfactory character of the decision of the Supreme Court in the Claire Furnace case the attorneys for the Maynard Coal Co., as well as those of the Federal Trade Commission, are particularly anxious to advance that case as rapidly as possible. It is now before the Court of Appeals for the District of Columbia, where it has been held in abeyance awaiting action on the Claire case. A rehearing is now being sought. The court, however, is engaged in a fixed program of patent appeals lasting until adjournment for the summer. It has been suggested that a rehearing be asked prior to adjournment so that the members of the court could study the arguments during the summer. This, however, would be a departure from ordinary procedure and it is regarded as more probable that the rehearing will be set for next fall.

The Maynard case is not exactly parallel with that of the Claire Furnace Co. The Commission served a default notice on the Maynard company and did not do so on the Claire Furnace Co. A penalty of \$100 a day is provided for failure to respond within thirty days of the issuance of the default notice. This factor probably would bring a clear-cut decision from the Supreme Court. On the other hand, there is a chance that the court might throw out the Maynard case altogether on the ground that the Federal Trade Commission had no jurisdiction over coal at the time the information was sought. It will be recalled that the executive order of the President had placed matters pertaining to coal in the hands of the Fuel Administration. If that were done the decision

Purchasing Agents Report On Industrial Stocks

Seasonal industrial activity was reflected in coal consumption during March, which totaled 44,120,000 tons, or a daily average of 1,423,225 tons, according to a report by the National Association of Purchasing Agents.

A further increase in coal reserves in the hands of industrial consumers is shown by the stocks on April 1, which totaled 75,406,000 tons, or sufficient for 54 days at the prevailing rate of consumption.

Comparative Estimate of Output Consumption and Stocks

	(In Thousands of Tons)		
	Output	Industrial Consumption	On Hand in Industries
November.....	68,556	42,324	45,535
December.....	66,104	45,085	49,373
January.....	63,128	44,671	55,010
February.....	58,756	43,536	57,450
March.....	64,075	44,120	65,735
April 1.....	75,406

in the Maynard case would be no more satisfactory than that in the Claire Furnace case.

While the Federal Trade Commission seems anxious to go ahead with mandamus proceedings in the Claire Furnace case, it is recognized that the Attorney General may not be willing to have the issue raised on so poor a case as that which was brought against the Claire Furnace Co. The Department of Justice is more likely to want to proceed gradually in establishing the rights of the Federal Trade Commission. The customary practice would be to wait on another case which would involve only a point or two among those at issue. This would be followed by other test cases involving other points.

Navy Seeks Coal Bids

Bids will be opened May 26 at 10 a.m. by the Bureau of Supplies and Accounts, U. S. Navy Department, Washington, D. C., for supplying semi-bituminous coal for ships, bituminous or semi-bituminous coal for navy yards and naval stations and anthracite for various depots throughout the country during the year beginning July 1, 1927.

Tenders sought on steaming coal, mine-run, for ships include 20,000 gross tons at New York, 6,000 tons at Philadelphia, 7,600 tons at Washington, 150,000 tons at Hampton Roads and 4,000 tons at Norfolk, Va.

Supplies required for navy yards and naval stations are: Boston, 30,250 net tons; Chelsea, Mass., 6,160 tons; Hingham, Mass., 675 tons; Brooklyn, N. Y., 63,500 tons; Iona Island, N. Y., 2,000 tons; Lake Denmark, N. J., 1,000 tons; Philadelphia, 61,600 tons; Lakehurst, N. J., 10,100 tons; Naval Academy, Annapolis, Md., 29,100 tons; Navy Yard, Washington, D. C., 41,900 tons; Indian Head, Md., 6,700 tons; Naval Operating Base, Hampton Roads, Va., 26,900 tons; Norfolk Navy Yard, 33,600 tons; Naval Hospital, Portsmouth, Va., 8,600 tons; Charleston, S. C., 6,160 tons; Pensacola, Fla., 7,300 tons; Great Lakes, Ill., 36,950 tons.

Anthracite requirements call for small amounts varying from 50 to 1,900 tons for various naval depots.

Toledo Breaks Dumping Record

All previous records for coal dumping on the Hocking Valley docks at Toledo, O., were broken April 30 when 1,126 carloads went into vessels for upper lake ports. The last record was 1,119 cars. The total number of cars dumped in April was more than three times the number dumped in April last year. About 35,000 cars, or two weeks' normal dumping, were on hand at the ports.

Coal Produced per Man and Average Days Worked, By States, 1923-1925

State	1923			1924			1925		
	Days Mine Worked	Average Per Year	Tonnage Per Day	Days Mine Worked	Average Per Year	Tonnage Per Day	Days Mine Worked	Average Per Year	Tonnage Per Day
Alabama.....	232	680	2.93	220	684	3.11	246	738	3.00
Arkansas.....	97	329	3.39	134	433	3.24	112	335	2.99
Colorado.....	174	774 (a)	4.45	178	806	4.52	192	781 (a)	4.07
Illinois.....	158	795	5.02	148	765	5.16	161	860	5.33
Indiana.....	136	738	5.43	136	779	5.75	159	934	5.89
Iowa.....	181	498	2.75	161	452	2.80	153	464	3.02
Kansas.....	139	443	3.19	151	496	3.29	169	580	3.44
Kentucky.....	152	735	4.83	173	565	3.27	209	753	3.61
Maryland.....	178	608	3.42	173	536	3.00	186	512	2.75
Michigan.....	222	593	2.67	178	415	3.08	166	527	3.18
Missouri.....	155	477	3.07	135	457	3.36	171	1,136	6.64
Montana.....	179	896	5.00	173	909	5.26	202	742	3.68
New Mexico.....	216	708	3.28	204	662	3.25	202	742	3.68
North Dakota.....	182	837	4.60	165	925	5.62	153	1,013	6.61
Ohio.....	150	742	4.95	143	689	4.82	151	707	4.67
Oklahoma.....	133	398	2.99	124	379	3.05	153	413	2.70
Penna. (bitum.).....	213	882	4.15	180	772	4.27	200	873	4.36
Tennessee.....	183	536	2.93	159	487	3.05	211	656	3.11
Texas.....	178	484	2.72	166	523	3.16	150	478	3.19
Utah.....	160	1,077 (a)	6.73	182	1,037 (a)	5.70	179	1,078 (a)	5.90
Virginia.....	212	832	3.92	226	843	3.73	254	936	3.69
Washington.....	213	680	3.19	202	688	3.41	193	681	3.52
West Virginia.....	169	919	5.44	182	995	5.48	225	1,111	4.94
Wyoming.....	192	1,004	5.23	176	950	5.41	178	1,051	5.90
Total bituminous.....	179	801	4.47	171	781	4.56	195	884	4.52
Penna. (anthracite).....	268	592	2.21	274	550	2.00	182	386	2.12
Grand total.....	195	763	3.91	192	733	3.81	192	777	4.04

(a) Probably too high because of practice of men going into mine to shoot coal and load mine cars on days when tipples and mines as a whole are not in operation. Compiled by U. S. Bureau of Mines.

Foreign Market And Export News

British Trade Less Active; Prices Weaker

London, April 29.—The recent period of activity experienced in the Welsh market appears to be declining, and with contracts expiring at a faster rate than they are being renewed, prices of most sorts are weaker. Several collieries have sold their output well into May, but the majority are ready to make cuts of 6d. or 9d. to get orders.

European demand is poor, especially from France and Belgium. The Navigazione Generale Italiana has bought 35,000 tons for May-September delivery. Offers have been invited by the Egyptian Ministry of Public Works for 10,000 tons of best large for prompt delivery. Business with South America is fair.

Cut prices in the north of England market have attracted a few European customers, chiefly for gas coals in quantities up to 6,000 tons.

Best Admiralty large tends weaker as orders run out. Buyers tied to named coals are still paying 23s. @ 23s. 6d., but full range offers at 22s. 6d. @ 23s., with second grades much weaker at 21s. 9d. to 22s., as against 23s. before the holidays. Dry large is low but unchanged at 21s. 6d. for best grades and 19s. @ 19s. 6d. for ordinaries. Supply of black vein Monmouthshire large is improving, but prices keep steady at 21s. 6d. @ 22s. Western valleys are weaker at 20s. and Easterns are a drug at 19s. @ 19s. 6d. Smalls are steady in places, but bests are offered down to 13s.; good bunkers, 12s. 6d., and cargo brands down to 12s.

Best Blyth steams are 14s. 6d.; best Durhams, 19s. @ 20s.; Tynes, 14s. @ 14s. 3d.; unscreened steams, 13s. @ 14s.; steam smalls, Blyths, 10s. 6d.; Tynes, 10s. @ 10s. 3d.; specials, 11s.; gas coals, bests, 17s. @ 17s. 6d.; seconds, 15s. @ 15s. 6d.; specials, 17s. 6d.; unscreened bunkers, Durhams, 16s. 6d.; seconds, 15s. @ 16s.; Northumbrians, 15s. @ 15s. 6d.; coking coals, 15s. @ 15s. 6d.; households, 22s. @ 22s. 6d.; cokes—patent foundry, 22s. @ 26s.; furnace, 22s. @ 26s.; gas, 21s. @ 22s.; beehive, 32s. 6d. @ 35s.

The Welsh export trade was again affected by the holiday suspension of shipments in the early part of last week, and consequently the volume remained low. As against the previous

week, however, there was a gain of 26,000 tons, due to larger shipments to South America, Spain and Portugal. The summarized direction of exports (in tons) was: France, 131,373; Italy, 43,944; South America, 87,648; Spain, 38,314; Portugal, 23,584; Greece, 6,020; coaling depots, 41,954; Belgium, 6,036; Holland, 1,994; Irish Free State, 6,133; Canada, 7,979; Germany, 1,691; other countries, 13,298.

Production during the week ended April 23 totaled 3,640,000 tons, against 4,683,000 in the preceding week, the reduction being due to the Easter holiday. Production in the next few months is likely to be below that for the last three months, as the depression shows signs of increasing. In many districts the pits are working short time owing to the very slow domestic demand, which is rapidly decreasing with the approach of summer. Export demand also is less satisfactory.

Belgian Market Recovers From Decline

Brussels, April 28.—In the Belgian market there has been an improvement, chiefly in bituminous and anthracite coals. In duffs used by brick and lime plants also there has been a less pronounced betterment. German competition for bituminous trade is less in evidence at present and French collieries are handicapped by the exchange situation in competing with Belgian producers.

Orders for anthracitic coal have been coming in large volume from France and Holland, where wholesalers are laying in supplies in anticipation of an advance in prices at the time winter supplies usually are laid in. As a consequence the market is much steadier, especially in the Borinage, though there is little likelihood of a rise in prices at present.

The coke trade remains weak and some independent producers are selling below the syndicate's rates. A more stable tendency is seen in briquet quotations as a result of better demand from the mercantile marine. Orders for ovoids are satisfactory.

The situation all in all is sufficiently stronger to indicate that the corner has been turned from the recent decline.

Industrial Upturn Indicated In French Market

Paris, April 27.—The French coal market is devoid of outstanding features. A revival from the recent low level of industrial consumption is attested, however, by a decrease in the number of unemployed workers, which fell from 82,000 on March 10 to 68,400 on April 14. Sales of semi-bituminous, quarter-bituminous and lean sized products have increased in anticipation of the May cut in discount on coals from collieries in the Nord and Pas-de-Calais. The Paris municipal tax (Octroi), however, has been increased 10 fr., or from 30 to 40 fr. per ton.

Export Clearances of Coal Week Ended May 5

FROM HAMPTON ROADS		Tons
For New Brunswick:		
Amer. Str. Evansville, for St. John..	5,336	
For Jamaica:		
Nor. Str. Dago, for Kingston.....	1,527	
For Italy:		
Ital. Str. Equatore, for Porto Ferrajo	6,905	
For Canal Zone:		
Amer. Str. Marore, for Cristobal....	8,682	
Amer. Str. Chimore, for Cristobal....	20,013	
For Canada:		
Swed. Str. Isa, for Chandler.....	2,115	
Dan. Str. Josey, for Chandler.....	2,663	
For Martinique:		
Br. Str. General Lukin, for Fort de France	4,405	
For Trinidad:		
Nor. Str. Edvard Munch, for Port of Spain	4,013	
For Cuba:		
Br. Str. Carronpeak, for Havana....	3,967	

Hampton Roads Coal Dumpings

	(In Gross Tons)	
	Apr. 28	May 5
N. & W. Piers, Lamberts Pt.:		
Tons dumped for week.....	134,085	119,298
Virginian Piers, Sewalls Pt.:		
Tons dumped for week.....	131,617	107,919
C. & O. Piers, Newport News:		
Tons dumped for week.....	129,532	133,186

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

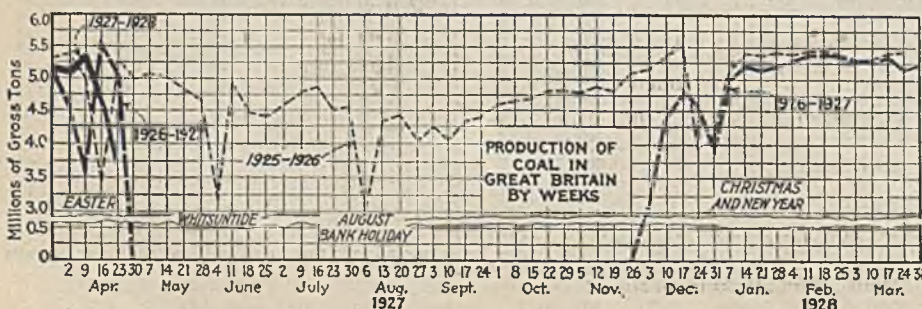
Pier and Bunker Prices

	(Per Gross Ton)	
	PIERS	BUNKERS
	April 28	May 5†
Pool 1, New York...	\$5.40 @ \$5.75	\$5.50 @ \$5.75
Pool 9, New York...	4.80 @ 5.00	5.00 @ 5.25
Pool 10, New York...	4.60 @ 5.00	4.75 @ 5.00
Pool 11, New York...	4.30 @ 4.75	4.50 @ 4.75
Pool 9, Philadelphia...	5.00 @ 5.05	5.00 @ 5.05
Pool 10, Philadelphia...	4.75 @ 4.95	4.75 @ 4.95
Pool 11, Philadelphia...	4.40 @ 4.50	4.40 @ 4.50
Pool 1, Hamp. Roads.	4.90	5.00 @ 5.10
Pool 2, Hamp. Roads.	4.70	4.65
Pool 3, Hamp. Roads.	4.20 @ 4.25	4.25 @ 4.35
Pools 5-6-7, Hamp. Rds.	4.25 @ 4.40	4.40
Pool 1, New York...	\$5.65 @ \$6.00	\$5.75 @ \$6.00
Pool 9, New York...	5.05 @ 5.25	5.25 @ 5.50
Pool 10, New York...	4.85 @ 5.25	5.00 @ 5.25
Pool 11, New York...	4.55 @ 5.00	4.75 @ 5.00
Pool 9, Philadelphia...	5.25 @ 5.40	5.25 @ 5.40
Pool 10, Philadelphia...	5.00 @ 5.10	5.00 @ 5.25
Pool 11, Philadelphia...	4.65 @ 4.75	4.75 @ 5.00
Pool 1, Hamp. Roads.	5.00	5.10
Pool 2, Hamp. Roads.	4.80	4.75
Pools 5-6-7, Hamp. Rds.	4.35 @ 4.50	4.50

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

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

Quotations by Cable to Coal Age		April 30	May 7
Cardiff:			
Admiralty, large.....		23s. 3d.	
Steam smalls.....		14s.	
Newcastle:			
Best steams.....		19s.	
Best gas.....		17s. 6d.	



Industrial Notes

The Prest-O-Lite Co. announces the sale of the storage battery branch of its business to a new company, Prest-O-Lite Storage Battery Corporation. The entire capital stock of the purchasing company is owned by the Automotive Battery Corporation of New York. That portion of the Indianapolis plant of the Prest-O-Lite Co., Inc., used for the manufacture of storage batteries has been leased to the new company. The Prest-O-Lite Co., Inc., will continue the manufacture and sale of acetylene gas for use in the oxyacetylene process of welding and cutting metals, automobile lighting, lead burning, etc., involving the operation of thirty-two plants, located in industrial centers throughout the country, and also will continue operation of that portion of its Indianapolis plant devoted to the manufacture of gas cylinders, acetylene generators and other apparatus.

The Reed-Prentice Corporation, Worcester, Mass., manufacturers of machine tools, has appointed the following sales representatives on the Pacific Coast: Shaw-Palmer-Bakewell Co., Los Angeles; A. L. Young Machinery Co., San Francisco; P. Sinnock & Co., Portland.

Leading industrialists, mining men, electrical engineers and business men joined with the officials of the Westinghouse Electric & Mfg. Co. from Philadelphia and elsewhere in the formal opening, April 26, of the new Westinghouse Building in Wilkes-Barre, Pa., the first home and service shop maintained by this organization since it entered the field in northeastern Pennsylvania some twenty years ago. The sales department, formerly located in the Miners' Bank Building, occupies the second floor of the new building at 267 North Pennsylvania Ave. The entire first floor is given over to the service shop, which is equipped with the latest design of tools and equipment, enabling it to handle any type of machinery in operation thereabouts. H. L. Huntley has been appointed service manager in charge.

The Philadelphia district offices of Combustion Engineering Corporation, Heine Boiler Co., and Ladd Water Tube Boiler Co. have been consolidated at 807 Bankers Trust Building.

The L. B. Foster Co., distributor of steel rails and track equipment, has opened offices in the Illinois Merchants Bank Building, Chicago. Adequate warehouse and storage yard facilities have also been provided and plants for the housing of fabricating and reclaiming machinery are in process of erection, so that a complete service can be had, and work shipped, from this point. The Chicago office will be under the management of Reuben A. Foster, vice-president of the firm.

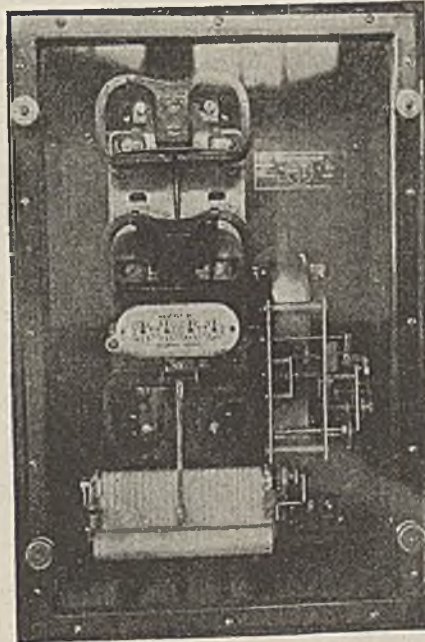
Harrison W. Wood has joined the service staff of the Quigley Furnace Specialties Co., Inc., of New York. He will cover the Central South and South Atlantic States. He will have his headquarters at Atlanta, Ga.

New Equipment

Three-Phase Four-Wire Watt-Hour Meter

As a result of increasing demands and shifting conditions, some companies are changing many of their circuits from three-phase, three-wire, or two-phase three-wire, to three-phase four-wire.

Up to this time the Westinghouse



Improved Watthour Meter

To meet the change from three-phase three-wire and two-phase three-wire to three-phase four-wire circuits this meter has been improved. It differs from the regular instruments of this kind in that it has an additional metering element and disk.

Electric & Manufacturing Co., East Pittsburgh, Pa., has furnished three-element meters in the standard OA house and switchboard types. Now a line of three-element RA demand meters has been added to the OA design, making a complete line of three-element meters.

The new meters are similar to the standard RA and OA house and switchboard type instruments, differing from them only in that they possess an additional metering element and disk. All of the desirable qualities of the two-element meters are said to be retained in the new product.

Accurately Unloads Compressor

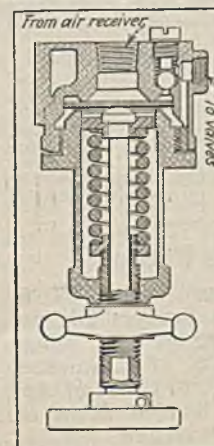
The accompanying illustration portrays the new improved Simplate differential unloader with which Chicago Pneumatic Air Compressors are now equipped. According to the manufacturer this new control valve possesses advantages not heretofore obtainable in other types of unloaders. The valve

proper is a single plate of stainless steel ground to a flat surface. The diameter is also ground to fit the cap with a few thousandths of an inch clearance. The edge is well rounded to prevent its sticking as a result of cocking on its seat. The cap contains a ball check valve, spring and ball check screw. The flanges by which the unloader is attached to the compressor or panel are on the cap. This permits dismantling the unloader for examination or cleaning without disturbing the piping or valves. The device operates with a 5-lb. range between unloading and loading of the compressor. An unloader is set to unload generally with 100 lb. and the reloading pressure is 5 lb. lower or 95 lb.

As the air pressure rises to 100 lb. the pressure on the upper side of the valve balances that of the spring on its under side and air escapes past the seat into the annular space around the outer edge of the disk. Because of the close fit of the disk in the cap and the ball check valve the air cannot escape and a slight pressure is built up, which, acting upon the surface of the disk, balances the pressure of the spring on the lower side of the disk and the disk moves down against the seat in the body. The ball check valve is then exposed to full receiver pressure and being held on its seat by only a light spring immediately moves off the seat and uncovers a $\frac{1}{4}$ -in. hole for air to pass through on its way to the unloading inlet valves.

Upon a drop of receiver pressure equal to the range, in this case, 5 lb. the pressure of the spring balances the pressure due to the air on the disk and causes it to permit leakage past the lower seat into the space around the stem. This leakage is restricted slightly by the upper spring holder which has a moderately close fit in the body and a slight overbalancing pressure is built up which causes the valve disk to return to the upper seat with a positive movement and air is vented from the unloading piping past the upper spring holder.

The action of the valve in opening and closing is positive and because of



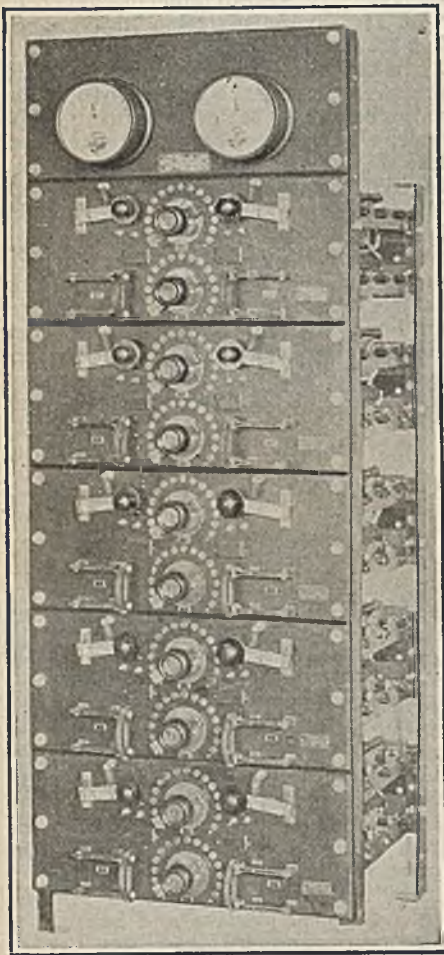
Novel control valve is made of single plate of stainless steel.

the absence of tight lapped fits its response to pressure changes is accurate.

The unloader is now built for standard pressures from 50 to 125 lb.; for low pressure work of 40 lb. or less; and for high pressure work up to 500 lb.

One of the outstanding features of this new unloader is the large quantity of air which it will allow to pass through it without interfering with its operation. Enough air is afforded for unloading the largest compressors without the use of an auxiliary unloader.

Summarized, the advantages of the new Simplate unloader, according to its manufacturer, are: Elimination of an auxiliary unloader, thereby simplifying the unloader piping; greater sensitiveness in operation due to absence of close fits; a wider application of pressure ranges; it is easy to install, clean and serviceable and is also inexpensive to repair.



Automatic in Operating and Control

The sectional battery-charging panel shown in the accompanying illustration has been developed and placed on the market by the General Electric Co., Schenectady, N. Y. It is intended for charging batteries of either the nickel-iron or lead-acid types and for charging either by the constant-current or constant-voltage systems.

Dings Wins Patent

An injunction decreed by the U. S. District Court of the Eastern District of Wisconsin in favor of the Dings Magnetic Separator Co., of Milwaukee, was affirmed by the U. S. Court of Appeals in a decision handed down on Jan. 18, without modification.

This injunction restrains a competi-

tor from building ventilated magnetic pulleys which infringe patent No. 1,369,516 and is the result of an action brought by the Dings company against a manufacturer of magnetic pulleys. The suit which has now been decided in favor of the Dings company establishes the fact that this company is the owner of the patent on ventilated pulleys and that others offering that construction are infringing.

New Companies

The Banner Winifrede Coal Co. has just been organized in West Virginia with a capital stock of \$50,000. Among those interested in the company as incorporators are A. B. Emmanuel, E. C. Lambert, J. W. White, J. W. Peters and S. D. Stokes. The company has been authorized to mine and sell coal at wholesale and retail.

The Bellwood Coal Co. has just been ushered into existence in West Virginia with a capital stock of \$100,000. The company is authorized under its charter to purchase, lease and acquire coal lands as well as to engage in the business of producing and selling coal. Incorporators of the company are George S. Couch, V. L. Black and Thomas B. Jackson.

Articles of incorporation have been filed by the Earl Cox Corporation of Sullivan, Ind. The corporation is formed for the purpose of mining coal and the directors are Earl Cox, Noel Mosler and Edna H. Cox.

The Mary Francis Coal Co. of Barbourville, Ky., with a capital of \$75,000, has been incorporated by Mary F. Congleton, Claude Congleton and Isaac Congleton.

The Parsons-Elkhorn Coal Co., McDowell, Ky., capital \$50,000, has been incorporated by A. F. Parsons, C. G. Hall and Earl Shag'ey.

Coming Meetings

Oregon Coal Dealers' Association. Seventh annual convention, Portland, Ore., May 13 and 14. Secretary, O. F. Tate, Board of Trade Building, Portland, Ore.

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

National Industrial Conference Board. Eleventh annual meeting, Hotel Astor New York City, May 19.

Retail Coal Dealers' Association of Texas. Annual convention, McAlester, Okla., May 19 and 20. Secretary, C. R. Goldman, Dallas, Texas.

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

National Foreign Trade Convention, Detroit, Mich., May 25-27. Secretary, O. K. Davis, India House, Hanover Square, New York City.

Society of Industrial Engineers. Fourteenth national convention, Hotel

Stevens, Chicago, Ill., May 25-27. Executive secretary, E. Van Neff, 17 E. 42d St., New York City.

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

Pennsylvania Retail Coal Merchants' Association. Annual convention, Wilkes-Barre, Pa., June 1-3. Secretary, W. M. Bertolet, Reading, Pa.

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

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

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

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

National Coal Association. Annual meeting June 15-17, at Edgewater Beach Hotel, Chicago. Executive Secretary, Harry L. Gandy, Washington, D. C.

Illinois Mining Institute. Summer meeting June 16-18 at La Salle, Ill., by Steamer Cape Girardeau. Secretary, Frank F. Tirre, 603 Fullerton Bldg., St. Louis, Mo.

American Society for Testing Materials. Thirtieth annual meeting, French Lick Springs Hotel, French Lick, Ind., June 20-24. Secretary, C. L. Warwick, 1315 Spruce St., Phila., Pa.

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

Mining Society of Nova Scotia. Annual meeting at Baddeck, Nova Scotia, Canada, June 21-22. Secretary-Treasurer, E. C. Hanrahan, Sydney, N. S., Canada.

International Chamber of Commerce. Fourth congress at Stockholm, Sweden, June 27 to July 2.

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

Illinois and Wisconsin Retail Coal Dealers' Association. Annual convention, the Hotel Pfister, Milwaukee, Wis., June 28-30. Managing Director, N. H. Kendall, 706 Great Northern Bldg., Chicago, Ill.

Annual First-Aid Meet for championship of Pennsylvania (open to mining and industrial teams), Ebensburg Fair Grounds, July 9. Superintendent, H. D. Mason, Jr., Box 334, Ebensburg, Pa.

Second (Triennial) Empire Mining and Metallurgical Congress opens at Montreal, Can., Aug. 22 and continues to Sept. 28, under the auspices of the Canadian Institute of Mining and Metallurgy. Secretary, George C. Mackenzie, 604 Drummond Building, Montreal, Can.