COALAGE

McGraw-Hill Publishing Company, Inc. James H. McGraw, President Edward J. Mehren, Vice-President

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

Volume 33

NEW YORK, JUNE, 1928

Editor.

Number 6

JOHN M. CARMODY

Who Will Be Next?

MARK TWAIN is credited with the shrewd observation that everybody complained of the weather but nobody did anything about it. This masterly inaction in matters meteorological has had a limping counterpart in the handling of the problem of overproduction in bituminous coal. Since the war, at least, there has been general agreement that developed mine capacity has been far in excess of requirements. But few producers have volunteered to begin the application of corrective measures at their own properties.

T IS this unwillingness which gives the recent public announcement of a new policy by the Consolidation Coal Company unusual significance. This announcement commits the company to the belief that no permanent relief for the industry can be won "by further cutting wages below a sound economic level" or by selling coal at prices which do not yield a fair margin over cost. Recognizing these facts, the Consolidation company has shut down a number of its least efficient mines for an indefinite period. It couples this action with an appeal to fellow producers to join in the movement.

THE implications involved in the adoption of this program cannot be overestimated. The temporary closing down of mines—both efficient and inefficient—when a continued dearth of orders leaves no alternative is not new. Concentration of operations by interests owning several mines has been resorted to before, although not to the extent, perhaps, that it might have been. There is a note in the Consolidation announcement, however, which suggests a matured decision setting up a long-time policy rather than a short retreat of expediency.

E MPHASIS is placed upon this note because the willingness to pledge the management so publicly to a policy which subordinates tonnage to a sound merchandising program marks the trail out of the economic jungle in which the industry has been stumbling. For more than a decade bituminous coal has been under legislative and social attack. That it so far has successfully repelled these assaults cannot disguise the weakness in its defense—a weakness born of a persistent disinclination of the industry as a whole to grapple voluntarily with the problem of overproduction.

SINGLE-HANDED neither this company nor any other large producing unit can rescue the industry from its present plight. Alone they conceivably can improve their financial position and conserve their assets by rigid adherence to the policy thus laid down. But the benefits to the industry as a whole will come in proportion to the number of responsible operators willing to make their individual contributions and sacrifice to the cause of stabilization. The question now is not how many producers are content to sit on the side lines applauding but how many will actually get into the game. Who will be next?



To Clip Machine-Loading Costs Institute Time Studies And Daily Reports

ROM the days of earliest recorded history, methods of analysis have been used to detect the waste in industry. The universal form of this analysis is bookkeeping, which from the simple notations of total costs and gross realizations has been developed till now there are thousands of complicated systems of accounting, based upon exact information and carried to a concluding figure, sometimes shown in decimals of cents per unit of accomplishment. All productive operations need these figures, for they are to modern business what the eyes are to the human body.

As the production of coal by modern machinery calls for a complete revision of the old operating standards and, particularly, a revision of all underground phases of operation, which, be it said, constitute by far the largest part of total costs, indicative machine-performance records are as valuable to the company as an adequate system of bookkeeping.

As all forms of "pencil work" were delegated in the past to those non - productive workers whose authority did not extend past the mine mouth and as the "check system" relieved the miner of responsibility and served the local management as the base from which the greater part of total costs were computed, the introduction of daily reports covering various phases of underground operations called forth

TABLE I.-INITIAL TABULATION OF MECHANICAL-LOADER OPERATIONS

An and the second s	TATURAL68	rercentag
Ung-lunding conchange		
in intering, car change,		

0	Minutes	Percentage
"perating-loading, car change	-	
p. moving, shifting, etc.	5.180	77 08
Power	25	0 37
Props.	45	0.67
Treat	135	2.01
Tack.	130	1 93
Na Nortation.	205	3.05
Machi	360	5.36
Machine oiling.	30	0.45
Missell.	100	1.50
Customaneous.	255	3.79
No see machine	15	0.22
to coal prepared.	240	3.57
	6,720	100.00

By Walter M. Dake

Consulting Engineer Joy Manufacturing Co., Franklin, Pa.



Walter M. Dake

a mighty protest from those who formerly issued and transmitted verbal orders and who never signed any paper other than their pay checks.

But with the high investment cost of modern cutting, drilling, loading and haulage units, having potential production efficiencies many times greater than ever before, the time element in machine use enters the coal industry, as it long ago entered into manufacturing, and calls for an organized effort to attain the continuous operation and complete coordination of these machines so that their output per shift may be as large as possible.

Without adequate and accurate performance records, how can unnecessary and therefore costly delays be eliminated? Shall we range opinion against fact, where unproductive time is known to be equivalent to wasted dollars and cents?

Though the responsibility for the selection of the particular type of loading machine best adapted to local conditions rests jointly with the management and the manufacturer, and though the limits of operating efficiency are determined jointly by the mining engineers of both companies, the underground organizations must be held responsible for the daily operation and maintenance of the equipment.

In addition, the adequacy of the preparation of the coal at the face, of the power and transportation facilities, of the drainage, ventilation and supply service, of the safety provisions and of many other production phases, all have a part in determining the final costs.

The degree to which items singly or collectively affect mechanicalloader operation cannot be correctly analyzed and judged from observation alone. However, with general report systems which can be used for indicative purposes and with special studies for the final analysis of spe-

FORM A-TIME COSTS PER AVERAGE MECHANICAL LEADER UNIT

	mber	e per uift	e per	e per
Employed as	6 ^N	Rat	Rat H	Rat
Face foreman				
Cutters				
Drillers				
Tampers				
Shotfirers		·····	min	
Loader operator				
Loader helper				
Motorman		· · · · · · ·	· · · · · ·	Sec. est.
Motor helper				
Drivers				
Trackman			arrive.	· · · · · · ·
Track helper				
Timberman				
Timber helper			inter	
Snubbers			******	
Clean-up men			*****	
Total labor		\$	\$	\$
Proportions	d ex-	\$	\$	\$
pense, depreciation	, etc.			CALCER !!
Approximate costs		\$	\$	\$

cific problems, highly accurate recommendations can be formulated for an increase in operating efficiency.

In considering the value and necessity for daily reports, for time studies and for permanent records of mechanical-loader performance it must be remembered that hand-loading practice differs from that of machine loading in such an important though obvious manner as to warrant repeated mention whenever the two methods are compared.

This difference lies in the fact that with mechanical loaders the labor cost per shift for each crew is predetermined by the day-labor wage rates, whereas with hand loading the miner is paid a contract wage based on his production.

In order to impress this point upon all those who have anything to do with the operation of mechanical loaders it is suggested that a list be prepared for each average operating unit in which would appear the face foreman, cutters, drillers, tampers, shotfirers, loader operator and helper, motorman and helper or drivers, track, timber and clean-up men, together with any other labor necessary to deliver the coal to partings. Against these should be placed their rates of pay per shift and the total labor expenditure. This should be estimated per shift, per hour and per minute, so as to show the average cost in dollars for each unit of elapsed time during a single shift.

To this should be added a correct proportion of the investment and general mine-expense charges. This will show the total cost per elapsed

FORM B-DEMONSTRATOR'S REPORT

Date		192
Company		
Location,		
Mch. Type	Mch. Number.	
Shift Started	Finished	
Total Shift Time, in Minutes		
Less Lunch Time, in Minutes		
Total Operating Time, in Mi	nutes	
Av. Tons per Car	'otal Loaded	
DelaysMinut	188	Total
Power		
Cutting		
Drilling		
Shooting		
Props.,		
Picking		
Track		. · ····
Transportation		
Сага		
Meh. Oiling		
Moh. Repairs		
Misc		
No coal		
(Note Additional or Unusual Back)	Delays on Tota	1
	Dama	
	D-6100	mountor
	Mine Superin	tendent

FORM C-TIME STUDY REPORT



minute, hour or loading-machine unit shift. It will represent the actual dollar output per unit of shift time, against which must be balanced the actual tonnage produced. A method of tabulating this approximate cost per mechanical loader unit is shown as Form A.

In other words, mechanical-loader unit costs per minute, at moments when there is no production, represents direct expenditures per minute without return. Inversely, low costs are possible only when there is a complete co-ordination of all operating phases which will insure a continuous output of product at maximum unit efficiency.

Beginning with indicative records of loading-unit operation, the demonstrator's report, Form B, is based on the theory that while he is operating his machine a mechanical-loader operator cannot note the actual shift-time distribution, but that he can time and note all accidental or avoidable delays which shut the machine down. Therefore, spaces are provided for the entry of minutes of delay due to power failure, derailments, lack of mine cars, failure of transportation, etc.

By recording the starting and finishing time of the shift and deducting the lunch period the total time available for operation is shown, from which is deducted the time noted as chargeable to accidental or avoidable delays, leaving an estimated operating time covering the necessary phases, such as loading, shifting machine at the face, car change, moving machine from finished to new face, etc.

Though these records do not constitute accurate shift-time distribution, their comparative percentages for consecutive days or weeks of operation show conclusively the main causes of unnecessary time losses. For instance, consecutive daily re-

ports showing high percentages of lost time due to the item "Picking," which refers to releasing of tight faces by the use of the pick, will point directly to improper face preparation, which may be caused by "gripped" cutting, by incorrect placing or charging of drillholes or by lack of a sufficient number of holes per face.

If either of the items "No cars" or "Transportation" shows high percentages of lost time the cause may be found in lack of mine-car storage room near the machines, lack of coordination of primary and secondary haulage, improper track gage or curves causing car derailments, etc.

Table I is a tabulation of demonstrators' reports recorded during a period of 14 consecutive days, and worked out for indicative percentages of total shift time.

An analysis of the foregoing table quickly shows that the greatest percentage of unnecessary lost time is chargeable to "No cars," and that this

FORM	D-DAILY	REPORT	OF	SECTION
	FC	OREMAN		

Date	Machi	ne No	
Cars Loaded			
Tons Dumped			
	Check		3
Employed as	No.	Hours	Cost
Operator			
Helper			
Motormen			
Triprider		1	
Timbermen			
Trackmen			
Clean-up men			
Cutters			
Snubbers			
Drillers			
Shotfirer			
Miscellaneous			
Cutting			
Maintenance labor			
Cost, parts used			
Lubricants			
Total			
Average per ton			
arrende por comment		Section	Foreman
		Mine	Foreman

(Turn to page 372)

COAL AGE - Vol.33, No.6

Shallmar's Heritage From the Past



By R. Dawson Hall Engineering Editor, Coal Age

ONTINUING the quest for a has been removed. No squeezes have mine with a better record for steady operation than most of those in its field, I came upon the Wolf Den mine, owned by the Shallmar Mining Corporation, at Shallmar, Md. Said H. A. Marshall, the superintendent, in reply to a question regarding the steadier run: "Yes, we run about four days a week where other mines in the region are running two or less. A number of operations have had to drop out entirely. There were 42 mines in this region where now there are only 13.

"It's a hard pace, and probably the only thing that keeps things going as they do is the fact that from the first the company has had a good, wellconsidered plan of operation and kept to it. It might have clipped a few corners in the housing of its men, but from principle it has continuously given them considerate treatment, which pays in the long run. It might have gutted its coal; but if it had,

occurred in the main and chain entries, in which the bulk of the hauling has to be done. What squeezes have occurred have been in withdrawing butt-entry stumps after all the rooms have been finished and pillars drawn.

"This trouble is now eliminated, for the rooms are driven from the inby outward, so that as soon as the rooms are driven and their pillars removed the stumps can be pulled back also. Because of the completeness with which the coal has been extracted the map hanging in the mine office does not bear evidence to the time the mine has been running. A mine map should always belie the sights. The main entry has three age of the operations it records.

"Too many mines have been developed in which 30 or 50 per cent of the development has been thrown away by leaving that percentage of

Shallmar, Gay With Forest and Planted Trees



coal in place, only to make the new work more remote than it need be, making more feed wire necessary, timber costs excessive, roads bad and ventilation difficult. The main entry at this mine is still within 3,000 ft. of the drift mouth. The third pair of panel entries has yet to be started, so the mine though ten years old is still small, still in that sense young, even though the coal is only 4 ft. thick and the content per acre is not large.

'Everything has been driven to headings that advance on the butt up a $4\frac{1}{2}$ deg. grade. At about 250 ft. from the drift mouth pairs of headings called panel entries have been driven right and left. Those to the left are driven on the face, in which direction they rise, those to the right are driven on the strike, thus making

after these ten years of operation, it would have had badly heaved roadways, bad bonding, squeezes, broken roof in the headings and a long haul. "With a few exceptions, a n d then only when retreating the gangway stumps, the coal has been taken out clean, the gobbed areas have fallen tight and the weight



less than a right angle with the butt entry. At distances exceeding the lengths of two rooms, triple-entry butt headingsare driven till they meet other panel double entries above at a distance of about 1,250 ft. In two cases, instead of triple entries double butt entries were driven, but that practice has not



been followed elsewhere in the mine.

"All the rest of the work is just as originally planned. Rooms are driven, on sights, from the butt headings, in both directions to meet. In order to avoid downgrades they are not driven at right angles to the face or to the butt headings, but on a grade of about 1 per cent and always on sights. As the roof is none too good the rooms are driven only 18 ft. wide with 30-ft. pillars between them, which is quite conservative and affords assurance at all times that, with the cover existing, it will be possible to draw the room pillars without squeezes."

ALL this is not exceptional, with such companies as the Consolidation Coal Co. or the H. C. Frick Coke Co. or in regions such as the Pocahontas, but the smaller companies usually are not quite so careful and methodical and if they are the plan is likely to go to the winds when times like the present come. But this mine has had but two superintendents, Thomas Griffith, who planned and built the plant and died about two years ago, and Howard Marshall, who now manages it. Fortunately, they have never been tempted to gain a few months' advantage at the cost of the future successful operation of the mine.

"Mr. Griffith tried," said Mr. Marshall, "to keep the mine in such condition that the unforeseen could not happen. Sometimes the unusual has occurred, however, such as the big cloudburst over the Elk Garden watershed and the Potomac in general that nearly swept away, our village and brought houses from up the river tumbling past our works. But, in general, any mine that finds itself facing the unexpected has not been properly laid out or maintained. In a Clearing Along the Potomac

"Here is an experience that may be useful to those who are troubled with low voltage. Some time back I noted that the voltage was low at the end of the line. I did not want to lay a feed line if the trouble could be corrected without it. I concluded to try to improve the bonding and I put in several cross-bonds. I had the rail bonds examined and where defective replaced, but the resistance in the return was not enough that any improvement in the bonding would greatly increase the voltage.

"Trolley lines run into both of the outside headings of the main entry and by connecting the wire in the left heading with that in the right at a point well within the mine a distinct improvement in the voltage was obtained. However, as soon as the third panel entries, with some of their butt entries, have progressed a little further, a feed wire

> Where Shallmar Generates Its Power

will be necessary and will be supplied, but the interconnection between the two roads will still be all to the good and will make for better voltage. One trolley wire will act as a feeder for the other. Electrical engineers may regard this cure for low voltage as somewhat obvious but it may not have occurred to everyone having this kind of difficulty.

"The seam worked is the Lower Kittanning, or B, and it is split by a middle rock 12 in. thick, which at times is much thicker. In general, that is true of all the Potomac field, but in the southern part, where the Davis Coal & Coke Co. is working, the lower bed is the thinner, whereas in our mine the bottom split is 4 ft. thick and the upper only 12 in.

"The headings are driven so that the bottom of the lower split is the floor of the heading and the top of the upper split is the roof. In the rooms, however, it does not pay to remove the middle rock, especially as the upper split is not as free from ash as the lower.

"The removal of the upper split in the headings makes them of good height and gives a better roof than is found in the rooms. Yet the roadways are kept to a width of 10 ft., so that no timber may be required. This in itself is a great aid to ventilation and saves a large expenditure for timber, though not so much as in some mines because, owing to the excellence of the ventilation, hardly any fungous growth can be discerned at our mine.

"At first the headings were driven wide in the lower split and 10 ft. wide in the middle rock and upper split. The rock from the middle stratum was stowed in the widening of the lower coal bed. But this ma-(Turn to page 355)



COAL AGE - Vol.33, No.6

MECHANIZATION Captures Industry At Cincinnati Convention

longer is on the defensive. No longer do practical operating men ask: "How will it be accomplished?" Today the pioneers in the movement are kept busy telling their fellows how it has been done while the unmechanized find it increasingly difficult to dodge a distinctily personal "why aren't you doing it."

Today the doubters are less boldbecause the failures in the application of mechanization to underground loading are so much fewer than they were only three short years ago. Now the advocates of the machine age in handling coal at the face are much more confident and the successes back of them are much more numerous.

Doubts die hard but they found little encouragement to further living in the fifth annual convention of practical operating men held under the auspices of the American Mining Congress at the Music Hall, Cincinnati, Ohio, May 7-11. That gathering proved to be a field holiday for the proponents of mechanized mining. The spirit of mechanization captured the meeting and all other discussions seemed to assume importance only as they fitted into and became parts of the larger picture.

Beginning with the statistical summary of what has been accomplished in a few years in the way of increasing the tonnage of mechanically loaded coal-from 1,879,726 tons in 1923 to 10,022,195 tons in 1926and proceeding through the impressive roll call of states to the more detailed exposition of achievements in mechanized mining at individual operations, the record made for the machine age was too convincing to give much comfort to those who hold that the old ways necessarily must be the best.

The four-day program of the convention, in which mechanization

plain that the whole burden for the success of mechanical loading cannot be placed upon the machine. Better management, better tracks, larger and better cars-all are needed to give the loading machine an increased opportunity to function profitably. These aids, it is true, were needed before, but the introduction of the loading machine has made their employment imperative.

How the manufacturers of equipment for coal mines are keeping pace with the broader requirements of the coal mines-requirements which, to mention only one instance, absorbed one-third of all the automatic substations sold to industry at large last year-was shown in the covered on pages 361 to 372. exposition of equipment simultaneously held at the Music Hall under the auspices of the manufacturers' division of the Congress. New developments in loading machines, bigger locomotives, improved screens and further refinements in accessories were on display to help the delegate

Harold A. Buzby

ECHANICAL loading no occupied so large a place, made it to the convention visualize the mechanical side of the new machine age.

The broader problems of management claimed attenton at the opening session of the convention on May 7, when H. A. Treadwell, Chicago, Wilmington & Franklin Coal Co., told how the world's largest bituminous mine met the issues of general underground supervision, and H. S. Gilbertson, Lehigh Coal & Navigation Co., contributed an address on the selection and training of personnel. These addresses, as well as other features of the technical sessions of the convention, are treated at length in the report appearing on pages 341 to 355 of this issue of Coal Age. New equipment developments are

The cause of rock-dusting was expounded by Charles Enzian, Berwind-White Coal Mining Co., and J. E. Jones, Old Ben Coal Corporation, who pointed out that 97 per cent of the output of Franklin County, Illinois, came from rock-dusted mines. Daniel Harrington, U. S. Bureau of Mines, presented the case of safety equipment as an accident preventive, and Richard D. Maize, Pennsylvania state mine inspector, discussed the ventilation of gaseous mines.

Haulage systems and power were the topics of the morning session on May 8. In the course of a paper on mine-car design, C. E. Watts, Berwind-White Coal Mining Co., suggested detailed specifications to put all bidders on an equality, use of copper-content steel and gave comparative figures on lubrication costs. R. L. Adams, Old Ben Coal Corporation, gave common practice in haulage in large mines a jolt by advocating the use of gathering locomotives to handle cars from the room entries to the shaft bottom. The underground transportation system of the Ebensburg Coal Co. was described by R. M. Fleming.

Over 150 automatic pumping sta-





tions in the anthracite region are saving the operators \$500,000 annually in labor, according to T. J. Jennings, Philadelphia & Reading Coal & Iron Co. The advantages of automatic substations were treated by W. C. Shunk, Stonega Coke & Coal



Charles C. Whaley

Co. Discussion of these two papers closed the session.

The battle of the wets and the drys in coal cleaning began at the afternoon session. Dry cleaning and its advantages were presented by Thomas Fraser, consulting engineer; E. J. Newbaker, Berwind-White Coal Mining Co.; R. G. Perry, New River & Pocahontas Consolidated Coal Co., and W. J. O'Toole, American Coal Cleaning Corporation.

The side of the wets was heard the next morning, when J. B. Morrow, research engineer, Pittsburgh Coal Co., presented a paper outlining the fundamental factors to be considered in the selection of a cleaning plant. B. C. Osler, Shamokin Coal Co., and G. P. Bartholomew, American Smelting & Refining Co., described Rheolaveur installations, and Thomas F. Steele, South Penn Collieries Co., a Chance cleaning plant. Developments in cleaning in the past fifty years were reviewed by Eli T. Conner and Col. Edward O'Toole.

Discussion of mechanization proper began at the afternoon session on May 9 and continued through the two sessions held on the following day. Probably the most dramatic feature of these sessions was the roll call of progress by states. As is shown in the tabulation appearing on this page, while the progress is spotty, some noteworthy gains have been made by a number of districts. The various papers presented at these sections are covered in pages 348 to 354 of this issue of *Coal Age*.

Technical discussions closed Friday morning with a session devoted to problems of cutting, shearing, snubbing and blasting. Cutting and shearing were handled in a paper prepared by H. C. McCullough, Consolidation Coal Co. T. W. Gray and J. T. Clark, Pittsburgh Coal-Co., offered a paper on recent developments in drilling equipment and practice. The use of the CO₂ cartridge was the subject of a paper by Paul Weir, Bell & Zoller Coal & Mining Co. Sterling S. Lanier, Jr., Norton Coal Mining Co., discussed the use of explosives in a self-tamping recoverable cartridge.

Dr. L. E. Young, vice-president, Pittsburgh Coal Co., was chairman of the general program committee. Mrs. Young headed the ladies' auxiliary.

The meeting of the board of governors of the manufacturers' division of the Congress resulted in the election of H. A. Buzby, Keystone Lubricating Co., as chairman of the division, vice H. K. Porter, Hyatt Roller Bearing Co., who becomes an honorary chairman. Charles Whaley, Myers-Whaley Co., was elected third vice-chairman. C. L. Herbster, Hockensmith Wheel & Mine Car Co.,



L. Wakefield Shugg

succeeded Mr. Buzby as first vicechairman, and F. J. Maple, John A. Roebling's Sons Co., advanced from third to second vice-chairman. P. H. Grunnage, Westinghouse Electric & Mfg. Co.; E. R. Heitzman, Central Frog & Switch Co.; J. T. Ryan, Mine Safety Appliances Co., and R. H. Jeffrey, Jeffrey Mfg. Co., were added to the governing board of the division.

L. W. Shugg, General Electric Co., again served as director of exhibits.

Analysis of Mechanization Progress and Tendencies by States

State	Progress	Mining Methods	Types
Alabama	Progress slow in face of diffi- cult conditions	Changes in methods tending toward longface advancing (length of faces being in- creased	Conveyors
Arkanaas.	Rapid progress in Paris basin	Longwall favored and de- veloped beyond experi- mental stage	Conveyors
Colorado	Progress fair	Changes restricted by rigid enforcement of mining laws	Conveyors; few loading machines
and Indiana	Progressestisfectory	Room and pillar	Londing machines
Kentucky	Little progress	Old layouts being changed more or less; some room- and-pillar mining	Mixed equipment types
Maryland	Little progress; low recovery of earlier mining retards progress at present	Some longface experiments	A few conveyors
Montana	Little progress; just starting	No notable departure from old methods	A few loading machines
New Mexico	Only beginning	Several longface experiments	Conveyors and scrapers
Ohio	At a standstill		
Oklahoma	Slight progress	Longface experiments	Several conveyor units
Pennsylvania			I State and a state
Western	Much effort; progress slow; attempting to master draw- slate	Radical departures from room-and-pillar methods have failed	Chiefly loading machines; some conveyors
Central	Making rapid progress	Room and pillar and modifi- cations thereof for convey- or V system for scrapers	Conveyors, scrapers and rock-handling loaders
Anthracite	Noticeable progress	Slight modifications	Shaking conveyors
Utah	Good progress; underground conditions change abruptly; each mine an individual problem	Room and pillar	Mostly loading machines; a few conveyors and sorapers
Virginia	Merely starting	Room and pillar	Loading machines and sev- eral shaking conveyors
West Virginia Northern	Discouraging; little effort toward mechanizing; con- ditions difficult		ciar shaking courts -
Southern	Progressing; one company with property extending into Virginia is country's largest producer of mechan- ically loaded coal	Room and pillar; some long- face modifications	Loading machines, conveyors
Wyoming	Progress highly satisfactory	Room and pillar with modi- fications	Shaking conveyors with duckbills, also scrapers

RACTICAL OPERATING MEN Hold Fifth Annual Experience Meeting

TITH MECHANIZATION as the magnet, hundreds of practical coal operating men again were drawn to Cincinnati, Ohio, last month to attend the fifth annual convention of operating men held under the auspices of the American Mining Congress and the exposition of coal mine equipment staged by the manufacturers' division of the same organization at the Cincinnati Music Hall, May 7-11.

Since the complete success of mechanized mining depends not only upon equipment but upon the co-ordination of every phase of operation by a sympathetic and alert management the program made provision for the discussion of these complementary themes. Beginning with a discussion of management and safety problems, leading on through power and underground haulage to a review of developments in wet and dry cleaning, the convention then swung into a consideration of mechanization proper and ended with a session devoted to recent progress in cutting, shearing, snubbing and blasting.

Possibly the most significant development in the discussions was the general acceptance of the principle of mechanized mining. Where, a few years ago, the question uppermost in the minds of most practical operating men was "can it be done" interest at the Cincinnati convention centered around what producers had achieved in mechanized operations and how their experience could be given application in solving the problems of those mines which have not yet fallen into line.

Quality of Man Power a Tangible Asset

ACCORDING to H. A. Treadwell, engineer, Chicago, Wilmington & Franklin Coal Co., who spoke at the opening session relating to management and safety problems, mines now often have so many men in them as to necessitate a new type of management. This must be based on accurate reports, made by subordinates, showing the status in every part of the mine at all times.

In a large mine the organization should be as designated in the chart shown on the following page.

Each face boss is mine manager tor his section. Because he has under him only 75 to 100 men, he is able to give intensive supervision to all operations.

The motor boss is really the chief electrician of the mine. He has direct charge of the repair work on motors, of the advance of feeder cable and the bonding of track. He it is who should limit the number of cars on a trip, which motormen too often try to make the largest possible, regardless of damage to equipment or failure to accomplish results.



W. L. Robison

The haulage boss should direct transportation through a good teleshowing time of arrival, number of the workman has not always discov-

loads, from what parting, time of departure from bottom, number ofempties and the parting to which they are destined.

To H. S. Gilbertson, director of personnel, Lehigh Coal & Navigation Co., Lansford, Pa., the quality of the man power is just as tangible an asset to the plant as the freight rate differential or that of coal quality. Men who are intelligent, who do their utmost, who work as a team, are as likely as a low freight rate or a high standard coal to make a mine a success. To get that result labor problems must be considered in terms of the future. The conditions of tomorrow are the outcome of the present.

Men should be chosen for jobs, said Mr. Gilbertson, who are physically and mentally fit, but they must in addition be individually trained. Effort must be made to provide something more than what he picturesquely termed "the folklore method of training." There is a phone system and a dispatcher sheet right way of doing everything, which

ered or learned from his fellow laborers.

A third means of increasing production by improved man power is thorough training in organization, which is needed because the attitude of the management itself often is wrong. Every man has a leader, the man to whom he looks for guidance, the man on whom he leans for help. Who is it?

The foreman is near him every day. If he cannot lead the workman, the foreman must be lacking in the qualities of leadership. Care should be taken that the foremen know how and in what direction to lead.

In the absence of Charles Enzian, mining engineer, Berwind-White Coal Mining Co., Windber, Pa., R. G. Pfahler, his assistant, read his paper. To Mr. Enzian it seemed that rockdusting had been delayed more by a lack of conviction of its efficacy on the part of the operator than by any desire to curtail expense at the risk of life.

Mr. Enzian gave the status of rock-dusting in the various Eastern states. In Pennsylvania about 33 per cent of the mines were thus protected and in Maryland about 5 per cent. He said that in the latter state many of the mines were quite wet and free of gas, rendering the use of rock dust less general than in some other states where the coal was dry and gas was prevalent.

J. E. Jones, safety engineer, Old Ben Coal Corporation, West Frankfort, Ill., declared that 97 per cent of the production in Franklin County, Illinois, came from rock-dusted mines. The county had a capacity of 105,000 tons of coal daily in 1927 and 102,500 tons of that capacity was from mines rock-dusted. In southern Illinois as a whole 30 per cent of the mines needing rock-dusting were so treated. The strip-pit mines did not, of course, need rock-dusting and those having longwall and other workings under a soft shale roof are safe



without such protection, for the continual crumbling of the roof provides the needed inert dust.

Mr. Jones said that the haulage roads of the Old Ben Coal Corporation were given so complete a rockdusting as to render the road dust wholly inert. Dust was shot into rooms from the room necks, but no further provision was made for their rock-dusting. Aircourses if tracked were rock-dusted, and if trackless were guarded by troughs.

Daniel Harrington, chief engineer, safety division, U. S. Bureau of Mines, Washington, D. C., declared in his paper that of 54 ignitions, fires and explosions that occurred in 1927 and caused 229 deaths, 21 were due to electricity. There also were 13 ignitions, fires and explosions with 31 deaths from the use of open lights and 13 disasters from blasting with dynamite or black blasting powder with 37 deaths attendant thereon.

those having longwall and other work- In 1927 non-permissible electrical ings under a soft shale roof are safe equipment caused, by ignitious, fires

Diagram of Underground Officials, C. W. & F. Coal Co.



and explosions, at least 151 deaths; in 1926, 123 deaths. Between Jan. 1, 1921, and Jan. 1, 1928, ignitions, fires and explosions from non-permissible equipment caused 700 out of 1,820 such disaster fatalities.

Mr. Harrington declared a device was needed that would test both for explosive gas and oxygen content. The industry also needed an efficient and not too expensive permissible storage battery to displace electric wiring in mines, an effective and not too costly fireproofing material for mine timber, a device for detecting unsafe or unstable roof, a more dependable roof support than timber, a safe substitute for all kinds of explosives, a device or method for handling hangfires or misfires, a safe and efficient flood light, a wholly enclosed mine car and a car wheel that would not break, a reasonably inexpensive belt haulage to eliminate mine cars and locomotives, a trailing cable that would not arc on being attached or detached from power lines and would not become short-circuited by falls or when wheels passed over it.

He also suggested the need for a device on cutting machines for the complete removal of bug dust from the kerf, a method for propelling mining machines from place to place without "nipping," a device to warn men automatically whenever the methane content exceeds 2 per cent, a method of stopping man trips on grades ranging from 35 to 70 per cent in case of breakages of couplings, pins or ropes, an inexpensive, fire-proof, efficient door.

In discussing Mr. Harrington's paper John T. Ryan, Mine Safety Appliances Co., Pittsburgh, Pa., said that 12 to 17 per cent of the fatalities were due to explosions and that 99 per cent of the unfavorable publicity the industry received because of its accident record was based on this small percentage of its accidents. It should make every effort by rockdusting and ventilation to rid itself of this cause of accident.

W. H. Glasgow, Secretary of Mines, State of Pennsylvania, Harrisburg, Pa., presented a paper by Richard D. Maize, state inspector. Uniontown, Pa., on the ventilation of gaseous mines. Mr. Maize stressed the importance of having two driving units for each fan, either one of which could speedily be connected in case of the failure of the other, to-

in case the other two failed.

He advocated that the intake airthat of the return wherever the inrangement. The intake, he said, is especially at the face, to prevent the

trips and needs to be the bigger despite the textbooks that lay too gases added to the mine air. He take air is conducted through the thought the velocity of the air should haulageway, which is the proper ar- be kept down to 850 ft. per minute,

gether with an auxiliary gasoline drive always more or less obstructed by transport of coal dust by the air current.

C. P. Byrne said that there should way capacity be made greater than much stress on the volume of the be pressure over pillar falls so as to drive the gas either to heading "bleeders" or to drillholes. W. L. Robison, Youghiogheny & Ohio Coal Co., Cleveland, Ohio, presided.

Servicing the Men at the Face

HAULAGE systems and power were topics at the Tuesday morning session, at which A. C. Callen, professor of mining, University of Illinois, presided.

C. E. Watts, mechanical engineer, Berwind-White Coal Mining Co., read a paper describing the present trend, and advocating certain changes, in mine-car design. He recommended that the mining company keep a set of plans and specifications extending 10 minute details, in order that bidders be placed on an equal basis and the user have an opportunity to record and follow up improvements that may be suggested by service.

The use of copper-content steel which has an appreciable resistance to corrosion, was advocated. Use of thinner sheets of this material crimped for extra strength, malleable castings, alloy or heat-treated axles, smaller wheels, neater brake rigging, and tight ends in place of gate ends, was suggested as a way of increasing the present 60- to 66-per cent ratio of live load to total weight.

UBRICATION costs over yearly periods in Berwind mines were \$2.39 and \$2.05 per car per year for two groups of plain-bearing cars, and 33c. per car per year for a group equipped with tapered roller bearings. The data pertain to about 14,000 cars.

Mr. Watts explained that 600 of the Berwind cars, six years old, are of open-hearth steel and the balance copper-content steel. The former deteriorate by shedding large scales of rust but the copper-content cars show only slight pitting. Recently 1,050 more cars with copper content were ordered. The percentage of copper is 0.15 to 0.25.

Wheel & Mine Car Co., called attention to the improved plain bearings that are available today, and said stead the gathering locomotives haul



that the pushing of cars, one argument for the use of anti-friction bearings, is fast passing out of date. In reply Mr. Watts stated that his company ran 18,000 tapered roller bearings 18 months on one lubrication. He believes that a mine car equipped with anti-friction bearings will run 4,000 miles per lubrication.

OMMON practice in locomotive haulage for large mines was given a jolt in a paper by R. L. Adams, chief engineer, Old Ben Coal Corporation, West Frankfort, Ill. John Land, assistant to the underground manager of the company, read the paper, and at points elaborated on the text.

Old Ben No. 8 mine, opened in W. D. Hockensmith, Hockensmith 1910 and brought to a production of over 5,000 tons per day by 1920, uses no main-haulage locomotives, but in-

the trips of 7 to 14 cars directly from the room entries to the shaft bottom. Grades vary from 0 to 5 and 7 per cent, and the cars carry an average of 2.5 tons.

As the production was increased additional gathering locomotives were added, and passing tracks near the shaft bottom extended until now the main roads are double-tracked for a half mile from the shaft bottom in each direction. Of the twelve mines operated by the Old Ben company, the three which were opened by that firm contain no main-haulage loco-Costs over a two-year motives. period show that the haulage in these three runs approximately 2c. under that in the other mines of equal production but equipped with mainhaulage locomotives.

Advantages claimed are: fewer mine cars needed because none stand idle on partings, locomotive waits at partings eliminated, wrecks less severe and more locomotive help available for clearing a wreck, and better supervision of haulage men because they periodically come to the main bottom.

'HAT'S what you call railroad-That's what you can ing," was the comment of an operator after hearing a paper by R. M. Fleming, engineer, Ebensburg Coal Co., describing the underground transportation system at the company's No. 1 mine in Cambria County, Pennsylvania.

Two 221-ton and four 15-ton locomotives, assisted on sections of 4-per cent grade by 15-ton pusher locomotives, handle the main haulage. Round-trip distances are from 2 to 7 miles, the number of cars handled is 48 to 64, and the mine production is 4,000 tons per day.

The coal is 31 ft. thick and the track gage 36 in. The car equipment consists of 1,710 wood-bottom copper-content steel cars weighing

The magnitude of anthracite pumping operations was indicated by a



2,700 lb. each, mounted on Timken roller bearings and having a capacity of $1\frac{1}{2}$ tons.

Man power, except where local conditions demand a hoist, is used between the room face and the room heading. Locomotives of 10-, 12- and 15-ton capacities assemble the cars on the side tracks ready for the main haul. The average daily output per loader is 9½ tons.

The Westinghouse 221-ton locomotives are equipped with 90-hp. motors and semi-magnetic control. The center axle has flangeless tires for permitting easy travel on curves. The wheels are 36 in. in diameter.

Mr. Flemming gave the minimum radius for the $22\frac{1}{2}$ -ton locomotives as 150 ft., and said that the dispatcher times the trip starts so far as possible to avert unnecessary load peaks.

N THE absence of J. T. Jennings, Philadelphia & Reading Coal & Iron Co., his paper was read by Dr. Henry Mace Payne, consulting engineer of the American Mining Congress.

The paper described a 7,000-gallonper-minute automatic pumping station made up of three 500-hp. sixstage centrifugal pumps operating against a 600-ft. head. Details of the control sequence were given.

A supervisory system, not a common accessory to pumping plants, is an interesting feature of the plant. It consists of a panel in an outside substation on which lamps of various colors, a meter and a gong indicate the important station conditions and the duration of the starting cycles.

statement that the annual power cost of pumping is about \$5,000,000. Automatic substations were treated

in a paper by W. C. Shunk, general manager, Stonega Coke & Coal Co., Big Stone Gap, Va.

SURVEY as of April 1, 1928, A revealed that there are 819 automatic equipments in the mining industry and these total approximately 235,000 kw. During the last calendar year 93 automatic equipments, or roughly 33 per cent of the total number sold, went to coal mines.

The advantage of automatic substations from the standpoint of saving in feeder copper was indicated



Mrs. L. E. Young Chairman, Ladies' Auxiliary

by citing the case of a company which in 1915 replaced five power plants, serving six mines, by substations near load centers, and thereby recovered sufficient copper to meet the entire demand of eight mines for eleven years. These eight mines produce about 3,000,000 tons per year.

The discussions of automatic pumping and automatic substations were Over 150 automatic pumping combined. Mr. Wagner gave credit plants are in use in the anthracite to Mr. Jennings for being the first mines of Pennsylvania and these are to put over the idea of full-automatic saving \$500,000 per year in labor. control of mine pump stations. He



Robert M. Lambie

said that the first installation in a mine of the Lehigh company was made in 1924, and that to date 33 units have been installed.

FURTHER advantage that can A be credited to automatic pumping is the feasibility of installing pumps at the various levels, thus saving the lifting of much of the water from the lowest level where a manual pump station of large capacity would be located. As to the "squirrel cage or slip ring" question, Mr. Wagner said his company is using successfully a 550-hp. squirrel-cage pump motor, and that he keeps the starting disturbance to a minimum by careful adjustment of the relays. One requirement is to time the closing of the line contactor to occur before the water in the discharge line attains velocity.

Time clocks are used in connection with float controls to help keep the pumps off the power peaks.

IN CLOSING his remarks Mr. Wagner emphasized that automatic control does not provide automatic maintenance, and that auxiliary contacts should be so constructed as to work with certainty without frequent or daily polishing. "Our experience with automatic pumping stations has been very satisfactory; in fact we have had less trouble than with the manual."

F. L. Stone, of Schenectady, said that cleanliness and satisfactory operation go hand in hand. "Show me an automatic pumping station that is not kept clean and it will be one that gives trouble."

R. J. Wensley, of Westinghouse, said that considering the small extra

cost of the full-automatic substation, this type is fully justified in place of the semi-automatic. He urged the use of standard equipment but added that the coal industry accepts standard equipment more readily than other industries.

Replying to a question by W. D. Turnbull, also of Westinghouse. Mr. the water may part in the suction Wagner said that it is not possible to line and result in a hammer when cause for such trouble if it occurs.

If a pump accelerates too rapidly predict if a new pump installation it enters the pump. This condition will be free of water hammer, and may be averted by proper adjustment that it is very difficult to find the of a time-delay relay controlling the starting contactors.

Neither Slate in Coal nor Coal in Slate

chair, dealt chiefly with this subject.

Thomas Fraser, consulting engineer, of Pittsburgh, Pa., presented formulas for the establishment of values of size and settling ratios for wet and dry processes respectively. His derived value for wet washing is 5 and for dry cleaning 1.92.

In the discussion it was contended that these ratio values were purely theoretical and not borne out in practice, a point which Mr. Fraser readily conceded, with the explanation that the values given are intended for purthe mass of the material being treated influences these ratio values.

J. R. Campbell, American Rheolaveur Corporation, was the first to product goes largely to steam-coal take issue with Mr. Fraser's sizeratio calculation. He said that wet washing fine coal raises the specific gravity of the fluid mass to about 1.2 and accordingly changes the ratio calculation from 5 to 1 to a ratio of 13 to 1. In some cases, he added, the ratio may be as high as 16 to 1.

R. W. Arms, of Roberts & Schaefer, in defense of dry cleaning, declared that the ratio is best determined empirically. He stated that while dry cleaning can't claim a ratio as high as wet cleaning, yet it does show a ratio of 6 to 1 and as great as 8 to 1.

M^{R.} FRASER remarked that the formulas merely indicate the greater need for close sizing in dry processes than in wet. He suggested that the degree of ash rejection be made a compromise between what is desired and the economical limit.

E. J. Newbaker, general manager, Berwind-White Coal Mining Co.,

sideration from operating men. The months. It took nearly 9 months of Tuesday afternoon session, during experimenting to place this plant on which E. A. Holbrook, of the Uni- a satisfactory operating basis. The versity of Pittsburgh, occupied the difficulty was largely due to an attempt at too refined a separation.

In the early days it was thought advisable by those in direct charge of the plant that not more than $2\frac{1}{2}$ per cent by weight of the input should be lost by rejection. The rejection was raised to 4 and then 6 per cent and performance improved accordingly. The average ash reduction in this plant is about 20 per cent; that of sulphur about 35 per cent. The ash content of the reject is about 36 per cent and the sulphur content about 13 per cent. About 25 per poses of comparison only; in practice cent of the input to this plant is mined mechanically.

exponent of dry cleaning is that its

MECHANICAL cleaning of coal said his company had been operating markets. It is installing a second continues to draw serious con- a dry-cleaning plant for about 18 dry-cleaning plant similar in the main to the first with the addition of one wet unit for the cleaning of sizes greater than $1\frac{1}{2}$ in. and up to 4 in., which sizes represent only a small proportion of the total input.

R. G. Perry, superintendent of the Pocahontas division of the New River & Pocahontas Consolidated Coal Co., gave a paper describing a dry-cleaning plant installed at Ber-wind, W. Va. One feature of this plant is a dust-collecting system consisting of 990 bags or tubes, each 7 in. in diameter. The dust stirred into suspension over the tables is drawn into the tubes of cloth in the expansion chamber, the air escaping





E. A. Holbrook

through the cloth and the dust dropping through, as a result of the lowered pressure, to dust-receiving hoppers. The ash content of coal after treatment in this plant ranges from 6.5 to 6.75 per cent.

Wm. J. O'Toole, of the American Coal Cleaning Corporation, said that the average ash content of coal cleaned in this plant during the last two months is 6.3 per cent. Mr. O'Toole took exception to the use of the term "middlings" in the description of this plant, pointing out that man. the intermediate product between clean coal and reject does not build up or accumulate. The 990 bags mentioned in the paper are so arranged as to occupy a floor space measuring only 17 x 41 ft.

Mr. O'Toole said the dust builds up in a layer about $\frac{1}{3}$ in. thick and then falls from the sides and through the bag. He told F. A. Jordan, of the Youngstown Sheet & Tube Co., that the ash content of the reject from the Berwind plant is 60 per cent.

General tipple practices were covered in a paper by C. P. Anderson, chief coal inspector, New River Co. Perhaps the most important point made by Mr. Anderson is that tipples should be designed with an overcapacity of 50 per cent. He gave as his reasons the fact that time lost due

to time and the output demanded may be increased.

In the discussion Carl T. Hayden, of the O'Gara Coal Co., said that adjustments to screens for the changing of sizes prepared should be reduced to a minimum. Colonel Roberts said the veiling of screens was not a feasible practice. Mr. Hayden believes it well to keep in mind the possibility of reclaiming good coal from tipple reject in planning for the immediate disposal of refuse. In tipples handling mechanically loaded coal he believes picking-table surfaces should be twice those provided for hand-loaded coal. The incasing in concrete of steel legs and headframes of tipples is good practice, protecting them against rust.

Mr. Newbaker disagreed with the statement that an over-capacity of 50 per cent for tipples is necessary. He gave as an example the performance of a tipple designed for 2,800 tons in eight hours which regularly gives 2,500 tons. At this plant lost time due to breakdowns is negligible, averaging only 5 minutes per day over a period of a month.

WET cleaning had its inning at the Wednesday morning session. A. B. Kelley, of Greensburg, Pa., general manager, Humphreys Coal & Coke Co., which is controlled by the American Radiator Co., was chair-

The first paper, "General Principles of Coal Cleaning," by J. B. Morrow, research engineer, Pittsburgh Coal Co., outlined fundamental factors influencing the selection of a plant.

A cleaning plant should produce a "clean" refuse as well as clean coal. Loss to the refuse because of an inefficient plant can be sufficient to more than pay the difference for a plant of higher efficiency. Re-treating units may not pay at a small plant but the situation is different at plants of large capacity where efficiency becomes a prime factor. Metal-mill concentrators are not expected to produce a clean product and "clean" refuse at one operation.

The next paper, by B. C. Osler, general superintendent, Shamokin Coal Co., an anthracite producer, described the Rheolaveur washer at to miscellaneous delays in the tipple Neilson colliery. The first unit was and in the mine must be made up, put into operation Sept. 1, 1927, and that conditions change so that the now a rewash launder, containing two percentages of sizes vary from time Rheo boxes is being completed.

THE rate and quality of feed have varied between wide limits because as yet a storage feed pocket has not been installed and the mine conditions have not been uniform, yet the washer performance has been "most satisfactory and dependable." The entire tonnage of from 31-in. down has been handled by the new plant. The saving during the first six months compared to six months before the installation "amounted to 50 per cent of prior material costs and 11 per cent of prior labor costs."

In discussion of the paper John Griffen, of the American Rheolaveur



A. B. Kelley

Corporation, said that the amount of intermediate gravity material is large. therefore a washer must discriminate closely in order to save coal and yet operate with high cleaning efficiency.

Another Rhéolaveur installation, this one in Colorado, was described in a paper written by G. P. Bartholomew. general manager coal mining department, American Smelting & Refining Co. It is a' free-discharge plant located at Cokedale, washing the coal from the Bon Carbo mine, which product has to be crushed to The in. in order to clean the coal satisfactorily with high recovery. D. A. Stout, chief engineer, Colorado Fuel & Iron Co., read the paper.

Three washing units have been installed, one in August, 1926; another in March, 1927, and the last in September, 1927. The first was the earliest free-discharge Rheolaveur

quent tests, considerable experimentation, and careful attention have raised washability studies.

The washing cost was stated as being under 20c. per ton, including capital charges. Repairs to the plant have been negligible.

"The inefficient coal washer must go the way of the wasteful beehive coke oven," said J. R. Campbell, of the Rheolaveur corporation. Two per cent sink in the washed coal and 5 per cent float in the refuse at gravity of the washability curves was men-tioned as a standard of efficiency washery men might try to attain.

AN INSTALLATION of the A Chance sand-flotation cleaner was described in a paper by Thomas F. Steele, general superintendent, South Penn Colleries Co. The plant is the Von Storch anthracite breaker located at Scranton, Pa. A new steel structure was built in and around the old wooden breaker and only two weeks operating time was lost in the change

ary, 1927.

Four 131-ft. separator cones each on, was 29c. per ton. the plant efficiency until it is exceed- having a proved capacity of 1,250 tons ing the prediction based on the per day are in use. The sand which escapes from the cones is drained to sumps and reclaimed for use. During the last six months only 3.7 lb. of sand per ton of coal was lost as compared to 6 to 15 lb. at certain other sand-flotation plants.

Efficiency of the plant was set forth in tables showing percentages of slate in egg, stove and nut sizes, as 0.20, 0.20 and 0.56 as compared to 2, 4 and 5 when the old breaker was in use. Coal loss to the refuse bank was re duced from 4 per cent to 0.6 per cent.

The use of Chance cones at the Von Storch breaker and at three affiliated operations totaling one and onehalf to two million tons per year was the principal reason that these four properties operated a larger percentage of time last year than any other affiliated anthracite group.

After finishing the reading of his paper Mr. Steele gave the operating and maintenance cost of the cones as 2.79c. per ton. It was understood that this included neither capital charges nor breaker labor not concerned directly with the cleaner proper.

W. H. Lesser said that Madeira, Hill & Co. has a similar plant and he

installation in the United States. Fre- over, which was completed in Janu- ing the sand breaker, including inspectors, car cleaners, car runners, and so

A review of the developments in coal cleaning during his 46 years' experience and a description of changes in mining which demand cleaning on the outside, was given by Eli T. Conner, consulting engineer, Scranton, Pa. His favor for the Chance separator was expressed as follows: "In my long experience with jigs and other devices for the separation of impurities I have found nothing as positive as the Chance separator.

"In the matter of what I have designated as 'primary treatment' I believe it possible by this process to skim off in a merchantable condition a larger percentage of any grade of coal with which I have dealt than by the use of any other device I know of.'

OLLOWING Mr. Conner's paper F Edward O'Toole, general superintendent of the United States Steel Corporation mines at Gary, W. Va., reviewed his 50 years of coal-cleaning experience and dealt at length with the present situation. He said that inside transportation costs have been reduced until it no longer pays for men to spend much time cleaning coal by hand at the face.

The Gary power plant burns in powdered form a bone and refuse which contains an average of 30 per cent ash and which is hauled by rail from several mines of the division. Mr. O'Toole said he is now considering the cleaning of this refuse in order to increase the boiler-plant efficiency and avert expenditure for increasing the steam-generating capacity.

He expressed his lack of regard for the wet process of coal cleaning, calling attention to the undesirability of wet coal for charging byproduct "Where we have a coal, as ovens. in West Virginia, with inherent ash only about 4 per cent we find it necessary to take the ash down to 2 per cent without adding water."

The morning session ended with a short talk by Andrew C. Ramsay, of the New Castle Coal Co., Birmingham, Ala. He mentioned briefly the Arzinger oil flotation process in use at the New Castle washery, where 8 tons per day of fine coal, sold to foundries, is being recovered from the waste. He said that the process will recover at one operation all sizes

expressed satisfaction with its operation. "The longer we operate the plant the more we feel that we made no mistake in selecting the sand process. We worked 279 days in 1927 as compared to 50 to 60 per cent time for many other mines." He said that the total labor and material cost of operat- up to $\frac{1}{4}$ in.

Paresberg-

CIN -

Machine Loaders the Only Optimists

WHAT were record tonnages a of Birmingham, spoke for Alabama, year or so ago are the average tonnages of today, said Dr. L. E. Young, operating vice-president of the Pittsburgh Coal Co., Pittsburgh, Pa., at the meeting held on Wednesday afternoon to take stock of the advances made to date in the mechanization of mines. Over this meeting Dr. Young presided. Glenn B. Southward, mechanization

engineer, American Mining Congress, Washington, D. C., the introductory speaker on the program, said that to those who have not studied the matter machine loading may seem to require more track work than hand loading, but when the tonnage yield is considered this is not found to be true, but what track is laid must be better constructed so that delays and accidents may accordingly be reduced. With longface mining more timbering is required, but when machines. are used in rooms and pillars the new methods demand no more timber than the old.

How rapidly machine loading and other forms of mechanized mining are taking hold was indicated by the statistical report presented by F. G. Tryon, of the coal division of the U. S. Bureau of Mines.

NCLUDING all the many devices by which coal is loaded with little or no hand shoveling, 455 machines were working in 131 mines in 1926 and they yielded 10,022,195 tons of coal, as reported in Coal Age, May. 1928, p. 321. The increase in output of these machines in 1924 over 1923 was 86 per cent; in 1925 over 1924 it was 78 per cent and in 1926 over 1925 about 60 per cent. The last increase is only approximate, because a change was made in the classification of machines during this last year of record.

Hand-loaded face conveyors produced over 1,000,000 tons in 1926. bringing the total well over 11,000,000 tons for that year. In 1926 1.8 per cent of the total bituminous output for the country was loaded mechanically.

After Mr. Tryon's address followed a roll call by states of progress in mechanized mining during 1927.

where mechanization has been retarded by the steepness of the coal measures and the presence of dirt bands. The coal frequently pitches as much as 45 deg., and where the seam is of considerable thickness it is divided by bands of impurities which make selective handling at the face necessary.

Departure from old methods is definitely in the direction of longwall advancing, with faces varying from 175 to 325 ft. The tendency is toward lengthening rather than shortening these faces. About twelve mines are using longwall methods, and the results of that method of operation in general are gratifying.

One mine in 30-in. coal is laid out in rooms and pillars, the rooms, 100



Dr. L. E. Young

ft. wide, being driven with the aid of conveyors. While one-half of the face is being loaded out the other half is being cut and otherwise prepared.

PROGRESS in Arkansas and Oklahoma was reported by Heber Denman, consulting engineer, Clarksville, Ark. As in Alabama, mechanization has progressed slowly, and for the same reasons. This, however, is not true of the Paris field, where eighteen companies are operating. Nine of the companies load their Erskine Ramsay, consulting engineer, entire output on conveyors and two

of them get 50 per cent of their yield by this means. All these companies operate by longwall.

To date there has been only one fairly successful conveyor installation in Oklahoma. This is of the shaking type. The roof in this working is supported by steel jacks.

Colorado is advancing conservatively in mechanical mining, according to D. A. Stout, chief engineer of mines, Colorado Fuel & Iron Co., Pueblo, Colo., who answered the roll call for that state. Conditions in that section of the Rocky Mountain region are peculiar and necessitate making haste slowly. The mining laws of the state are said to prevent the establishment of the most satisfactory methods by which loading and conveying devices may be handled. Drag conveyors have so far given the greatest satisfaction.

Labor has displayed a willingness to do its share in the mechanizing of mines. Mr. Stout said it was proved during the last I. W. W. strike that men not accustomed to underground work can, when properly supervised, use mechanical equipment effectively. Two loading machines, fifteen chain conveyors and four shaker conveyors were installed in the state during 1927. The tonnage produced by such equipment last year was 60,000.

DR. E. E. FYKE, president of the Marion County Coal Corporation, Centralia, Ill., reported progress in Illinois. During the year ending May 1, 1928, 42 loading machines were installed, bringing the total to 100, and 148 conveyor units, raising the total to 168, an increase of 75 per cent in loading machines and 700 per cent in conveyors.

Progress in Indiana was reported by David Ingle, president, Ayrshire Coal Co., Evansville, Ind. In 1926 the state produced 1,800,000 tons mechanically, all coming from 70 loading machines in ten mines. Antagonism from labor to these machines is disappearing, largely, perhaps, because the mines using them offer steadier work and more certain prosperity. Coal producers using loading machines and strip operators are the only optimists in Indiana. their hopes resting on the fact that

they have been able to match reductions in the selling price of coal with decreases in production costs.

For New Mexico W. D. Brennan, general manager, Phelps Dodge Corporation, Stag Canon Branch, Dawson, N. M., reports the operation of two scraper loaders and one shaker conveyor with a duckbill attachment. One of these scraper loaders has made possible man-shift outputs ranging from 8.6 to 15.4 tons. The total tonnage loaded by this equipment in 1927 was 53,563.

T. E. Jenkins, vice-president, West Kentucky Coal Co., Sturgis, Ky., re-



G. B. Southward

ports little advance in mechanized mining in the Kentucky mines covered by his survey. His company has been compelled to abandon scraper loading on longfaces because of the difficulty with which the roof was controlled. His company has confined mechanical loading to entry development with a speeding up of advance without added cost over hand methods. The roof conditions in the mines of this company have made mechanical mining in rooms unsuccessful. His experience is that the labor saving made in loading with scrapers is wiped out by losses in the reopening of closed faces and by the added cost of preparing the coal for market.

AS THE principal seam being worked in Maryland is the Big Vein, or Pittsburgh, in which second and even third mining is now being

conducted in areas many years ago abandoned, mechanization in that state is negligible, according to G. M. Gillette, general manager of the Maryland division of the Consolidation Coal Co., Frostburg, Md. The mechanically. The changes of cover Tyson, or Sewickley, seam, 80 ft. above the Pittsburgh bed, has been so disturbed by hit-and-miss mining in the seam below it that roof conditions are bad and mechanization consequently difficult. Five chain and four shaking conveyor units are in operation in Maryland in longface and room-and-pillar layouts.

Newell G. Alford, consulting engineer, Pittsburgh, Pa., presented a table showing the progress in both central and western Pennsylvania. It showed that to May 1, 1928, 81 scrapers and mechanical loaders and 205 conveyor units had been installed, an increase of 69 and 44 per cent respectively in this equipment over May 1, 1927.

The estimated increase in this equipment for the ensuing 12 months is 43 per cent for loaders and 82 per cent for conveyors. The estimate of coal loaded mechanically in Pennsylvania during the 12 months ending April 30, 1928, is 1,550,000 tons by loading devices and 2,100,000 tons by conveyors.

A descriptive report of progress in central Pennsylvania, prepared by C. Law Watkins, vice-president of the Pennsylvania Coal & Coke Corporation, Cresson, Pa., was read by Mr. Alford in the absence of Mr. Watkins. Scraper loaders and conveyors are held in greatest favor by operators of the thin seams of central Pennsylvania. A small caterpillartype loader in the mines of Peale, Peacock & Kerr, Inc., is the only loading unit known to be in continuous operation.

IN THIS district in 1927 it is esti-mated that 66 mines produced conveyor and loading-machine coal to the extent of 1,483,580 tons, about 3 per cent of the district's output; yet Mr. Watkins said the district was still in the kindergarten class in mechanization. The operators are satisfied with the arrangement of contract pay for conveyor mining. He said that scraper mining in the V, or Y, layout has proved successful and is now past the experimental stage.

Progress of mechanization in Utah was reported by Otto Herres, of the United States Fuel Co., Salt Lake

City, Utah. In seven of the 38 active commercial mines in Utah, mechanical loading is past the experimental stage. During the year ending April 30, 1928, 670,000 tons was loaded



F. G. Tryon

in Utah mines are abrupt and dangerous, making the mechanization problem complicated. The room-and-pillar system is used exclusively and in carlier years production came largely from rooms. Now, however, 50 per cent of the output comes from the pillars left in earlier operation.

George M. Thorn, general manager of the Blackwood Coal & Coke Co., Blackwood, Va., reported for that state. Virginia yielded 257,241 tons of mechanically loaded coal during the year ending April 30, 1928. The output of three loading machines averaged 62,000 tons during the year and one produced 75,528 tons.

Except for several notable exceptions, mechanization has taken slight hold in West Virginia. Reporting for northern West Virginia, Jay I. Snoderly, mining engineer, Bethlehem Coal Co., Fairmont, stated that 10 loading machines produced only 150,000 tons in 1927.

I N southern West Virginia, reported T. H. Clagett, chief engineer, Pocahontas Coal & Coke Co., Bluefield, W. Va., loaders or conveyors have been applied by 25 companies. Some of these installations are experipermanent part of mine operation; still others have been abandoned. One company in the Pocahontas field is using 26 loaders in nine mines, the output of several of which is entirely obtained by means of this equipment. In the Winding Gulf and New River fields conveyors and scrapers are being used in many mines and the installation of additional units is contemplated.

N. V. Hicks, director of mechanical loading, Union Pacific Coal Co., Rock Springs, Wyo., said that 30 per cent of Wyoming's output for 1927 was produced mechanically. At the end of 1927 the mines of this state were in possession of 88 loading devices, not all of which had continued in provide more coal but permit of the regular use throughout the year. The placing of room-entry sidetracks on Rock Springs field is trending toward the use of shaking conveyors with duckbill loaders practically to the exclusion of all other devices.

H. C. Jenkins, Mining Engineering Co., Sheffield, England, reviewed British progress in mechanization. In Great Britain conveyor mining is standard practice as indicated by the fact that 50 to 60 per cent of the output in Scotland, 20 to 30 per cent in South Wales and about 20 per cent in the Midlands is thus produced. Shaking and belt conveyors predominate. The shaking units are confined to use where outputs of 20 to 30 tons per hour are obtained and where the grades are from 10 to 35 per cent downhill.

For uphill transportation belt conveyors are used; also in flat beds when large capacities-say 50 tons an hour-are desired. A satisfactory longface layout for use of conveyors in great Britain is the so-called double-face system, consisting of two adjoining faces, each 300 to 400 ft. long, divided by a single entry. Immediate reductions in cost of 10 to 20c. have been effected by the adoption of this system.

NDER the chairmanship of J. D. Zook, vice-president, O'Gara Coal Co., Chicago, the Thursday morning session of the convention instanced several notable examples of successful mechanized mining operations. "Entry Development with Mechanical Loaders" was handled by Jerome C. White, production engineer of the Pittsburgh Coal Co., Pittsburgh, Pa., who said that in the Montour No. 10 mine of the Pittsburgh Coal Co. four

mental; others have been made a Joy machines are in operation on development work, two of them being worked on double shift.

> Due to variations in time values between the several phases of operation it was found impracticable to maintain a strict development schedule in a four-entry system. With a loading machine in one entry, a cutting machine in the second, a drilling crew in the third and a cleanup crew in the fourth, it was found that a slight delay in any one entry threw the schedule of the entire battery out of balance. So it was decided to drive six entries instead of four, an arrangement which allows a leeway of two entries.

The two additional entries not only



J. D. Zook

the mains. Mr. White said that shearing reduced by 18 per cent the time in which a place could be loaded out and added that the increase in lump coal resulting from shearing and the saving of time in loading more than compensated for the loss due to the increase of cuttings.

O. G. Sharrer, of the Union Pacific Coal Co., Rock Springs, Wyo., presented a paper for George B. Pryde, general manager of the same company, on "Entry Development with Shaker Loaders." This company has in operation 27 duckbill shaking conveyor units which in 1927 produced an average of 89 tons per machine

day. It regards a shaking conveyor without a duckbill or some similar loading device as being of little value.

In narrow work an advance of 15 ft., or $2\frac{1}{2}$ cuts, a shift is easily maintained. The speed of recovery by this means is so great that the cost of handling rock and of retimbering has been considerably reduced. Pillars heretofore believed minable only by hand are being retrieved entirely by these units. A sufficient number of experiments using these units on longfaces have been conducted to prove their practicability for this work. Mr. Pryde believes conditions in 80 per cent of the mines in this country are such as to make profitable the use in them of some system of mechanical loader.

Mr. Sharrer explained that the mines of the Union Pacific Coal Co. are being mechanized by degrees, machines being added so as to counterbalance the natural decline in the labor forces. For this reason labor is not antagonistic to mechanization. N. V. Hicks supplemented these remarks of Mr. Sharrer by saying that the labor decrease in the mines of the Union Pacific Coal Co. against the number employed in 1924 was 12.8 per cent for 1925, 24.2 per cent for 1926 and 33.9 per cent for 1927.

The cost of mining is decreasing in proportion to the increase of mechanized methods. The average earnings per man-year in 1927 increased \$200 over 1924. Mr. McAuliffe added that the number of days worked in 1922. when hand-loading was the practice, was 166, and in 1927, due to the advantages of mechanized methods, the work year increased to 216 days.

J. R. FOSTER, superintendent of the New Orient mine, presented a paper on "Entry Development With Entry Drivers." New Orient is operating two McKinlay machines. During March, 1928, these two units alone drove 1,368 ft. of entry, an average of 26 ft. per machine shift. Crosscuts are driven at intervals of 160 ft. The dust resulting from the operation of the machine is allayed by a spray of water. Entry faces are ventilated by tubing and blowers. One advantage of this machine is the uniformly smooth entry ribs or bore which it makes, this being an aid to ventilation. Another is the great speed of development. However, it has been found impracticable to double-shift this machine because the

timbering and crosscutting cannot keep up with the advance of the face. On May 7, 1928, the two machines drove 101 lin.ft. of entry in a shift.

According to Mr. McAuliffe the Roundup Coal Co. is well satisfied with the results obtained from a Mc-Kinlay heading machine, and Mr. McKinlay said that this unit progressed 91 ft. in a single shift in this company's mine.

The No. 2 mine of the Francisco Coal Co., Francisco, Ind., has been successfully operating three Jeffrey pit-car loaders and two Sullivan loaders, according to J. R. Henderson. general manager of the company, who presented a paper on the operation and results obtained from these machines. During the month of March the two loading machines working in rooms averaged 239 tons a shift each, at a saving of 25 per cent in total cost over hand loading. During the first three months of this year the three pit-car loaders drove 6,210 lin.ft. of entry, including crosscuts and room necks, an average of 15 ft. per machine shift, at a cost 15 per cent below that with hand loading. Co-operation of labor has been no small factor in achieving these results.

ARL FLETCHER reported the Cresults of mechanical loading in the mine of the Old Knox Coal Co., Bicknell, Ind. Here three Joy machines averaged 610 tons per shift over a period of time and effected a saving of 30 per cent in the total cost of producing coal.

E. H. Siemon, assistant general superintendent, Hillman Coal & Coke Co., Pennsylvania, gave a paper by Frank B. Dunbar, of the same company, on "Conveyors in Entries, Rooms and Pillars." Rooms are driven 35 ft. wide on 70-ft. centers and 300 ft. long. One room on an entry is worked at a time, being driven up and the adjoining pillar extracted open-ended before another room is started. A chain conveyor carries coal from the face to mine cars on the entry and two 12-ft. belt conveyors at the face serve to take coal to the main conveyor.

A crew of five men cut, drill, shoot and load the coal, getting 65 to 100 tons per shift from the rooms. It takes 3 to 4 weeks to drive up a room and about as long to bring back a pillar. All work is paid on a tonnage the conveyor to a new location, which leaving another 25-ft. pillar. The was lump and 14 tons of coal was dis-



Eugene McAuliffe

is on a day basis. In entry work a crew gets three and sometimes four cuts per day. The total cost of convevors per ton of coal mined for depreciation, repairs and maintenance is 21c. Mr. Siemon said that the development cost using conveyors is 25 per cent less than with hand loading. In 1927 conveyors thus worked produced 106,000 tons.

INSTEAD of 350 poorly super-vised, slowly progressing rooms, eleven wide places well supervised and working rapidly back from the boundary is the solution which the J. K. Dering Coal Co. has made of its mining problems at No. 6 mine, which it is operating in the No. 4 seam at Clinton, Ind. All its coal is being loaded by mechanical means. The methods were described at the afternoon meeting of Thursday by Lee Haskins, general superintendent of the company. Eugene McAuliffe, president, Union Pacific Coal Co., acted as chairman.

The longfaces to which reference is made are 125 ft. wide. As soon as any one of these faces has been mined back on the retreat for a distance of 210 ft., leaving a place 125 x 210 ft. open, it is abandoned and another is started 25 ft. to the outby. Then this place is drawn back 210 ft. and abanand yardage basis except moving of doned also. A third place is started,

timber in the first place is then withdrawn, and the roof caves. This method has been most successful.

For this system of operation a rapid extension of entries is needed, and to get that result is not easy if all the shooting must be done when the men are out of the mine. So Cardox, instead of powder, has been used to bring down the coal, making it possible to make several cuts in a single shift. In a little over four months five miles of entry has been driven. In this calculation crosscuts are not included, though they form an additional figure of some consequence, for they have been driven at every 45 ft. of advance.

'O DRIVE the entries eight Jeffrey Shortwaloaders and one Jeffrey entry driver were used, all on double shift. On the longface work two of the former loaded the coal. Goodman shortwall machines cut the coal on the longface work, but on the entries the Jeffrey Shortwaloaders not only load but do their own cutting. Five locomotives haul the coal from partings to the shaft bottom, but back of every loader is a trolley-and-reel locomotive.

One mine manager and five assistants are on the job. A mechanic is provided for every two machines, which are thus kept in good condition. In discussion Mr. Haskins said that the coal is 5 ft. thick and lies under from 220 to 300 ft. of cover.

In introducing the speaker Mr. McAuliffe emphasized the desirability of fewer and better mines. He had, when he went with the Union Pacific Coal Co., 17 mines operating and one under construction. Now ne has only 12, and some of these are nearly exhausted of coal. Intensive operation is the answer for many operating problems. T. F. Whalen gave some interest-

ing data regarding the work of the Oldroyd machine at the Sumner No. 3 mine of the Pittsburgh & Erie Coal Co., described in last month's issue of Coal Age. These are given in Table I, p. 353.

Seventy per cent of the mining and loading was in entries and 30 per cent in rooms. The coal thickness is 7 ft. and the capacity of the cars is $3\frac{3}{4}$ tons. In three months 8,275 cars were loaded, or 122 per working day. Seventy-one per cent of the product



Dr. E. E. Fyke

lodged per pound of explosive used. Mr. McAuliffe in introducing the.

next paper-that by W. H. Smitherman, general manager, Wet Branch Coal Co., Dry Branch, W. Va.-said that in order to reduce the interest and obsolescence charges on the machines at his mines he was working most of them double shift. After all, his investment had not exceeded 20c. per ton of annual output, which he declared moderate.

Dawson Hall, engineering R. editor, Coal Age, read Mr. Smitherman's paper. It describes a method of driving an entry 12 ft. wide and then widening it by taking two slabs off the side, each of which is cut with a $7\frac{1}{2}$ -ft. cutter bar, thus leaving ample room for the storage of gob. The coal is only 3 or 4 ft. thick, including the bone, which runs from 3 to 4 in.

BEFORE it is slabbed the narrow place is driven up 200 ft. with a shortwall mining machine, the scoop by which the coal is removed being loaded by hand in this part of the operation. The scoop holds about 1,500 lb. of coal, which it drags to the loading head, and dumps into a mine car. By repeated cycles the coal in the place is loaded out. Three men will make three shortwall cuts with a 73-ft. cutter bar per 8-hour day and thus drive about 22 ft. of entry. One crew has cut and loaded four cuts a day for three successive days, advancing the entry 87 ft. 9 in.

At every 200 ft. a crosscut is The coal over only two of these is shot down and removed. That over the third is left to be loaded out from ' with an 85-per cent recovery.

the adjacent entry. Then follows slabbing for the full 200-ft. face. In a single shift the slab is cut and the his company was driving up rooms on holes are drilled, charged and shot.

During the next shift the slab thus fallen is drawn out and loaded into



about 100 cars, for there is about 150 or 160 tons of it. These two shifts usually require more than eight hours. Nearly all the coal is loaded by the scoop automatically, though one or two men pick down and shovel a small part of it. The entry after the two slabs are loaded out is 26 ft.

wide. The machine is then moved to the other entry of the pair and the operation repeated, the rock shooters working meanwhile in the first entry, shooting down rock and stowing it in the gob and laying track for a further advance. The cars are spotted by a single-drum 5-hp. hoist. About 15 to 20 cars can be handled in a trip.

Written discussion by P. C. Graney, general manager, C. C. B. Smokeless Coal Co., Mount Hope, W. Va., was read by C. R. Stahl of the same company, Stotesbury, W. Va. His firm has a seam from 30 to 40 in. thick and had been operating two Type A Goodman scrapers. Entries are driven in pairs for a distance of 2,000 ft., having a 30-ft. pillar between them. Slate is taken down to give the necessary height.

turned and three cuts made in it, back from 145-ft. faces on an angle and moving the driving units. The of 45 deg. to the entry. About miners are paid by the ton and the 200,000 tons has thus been mined rest by the day.

BARNEY E. PRICE, of the Beth-lehem Mines Corporation, said 60-ft. centers and using scrapers on V-faces for extracting the pillars. Old pillars were being successfully removed by similar means.

Where timber has to be placed between the face and the conveyor and the conveyor can be moved forward only by dismantling it and threading the various sections through the timber, the cost of moving it forward with a 38-in. seam is 22 per cent of



Heber Denman

the cutting and loading cost, declared W. C. Snyder, general manager, Consolidation Coal Co., in a paper on "Conveyors in Long Faces."

Heber Denman, consulting engineer, Clarksville, Ark., described the system of mining at the mines of the Beatty Coal Co., Paris, Ark., which was described in somewhat greater length in last month's Coal Age.

Many of the details given in the paper of W. H. Lesser, mechanical superintendent, Madeira, Hill & Co., have been described in the articles which appeared in Coal Age May 19, 1927, pp. 719-722, and March, 1928, pp. 167-168, where the geological formation and the shaking conveyors respectively were noted.

Mr. Lesser said that with shaking conveyors at Natalie Colliery in any group of fourteen rooms there will be 39 men employed; 28 of these will be miners, 7 will be gangway loaders The pillars on either side are drawn and 4 men extending the conveyors

Such a crew will produce nine

cars per room per day, or 126 cars in all, each having a capacity of 100 cu.ft., or 3 tons. Each room requires one conveyor costing about \$900. Table II shows the cost of loading coal in the Lykens No. 1 seam by room conveyors based on an average for fourteen rooms where the average thickness is 5 ft. and the average pitch 5 deg.

Where coal is from 3 to 4 ft. thick, as in mines of the Clearfield Bituminous Coal Corporation, and where also main entries have to be driven 6 ft. high and room entries 5 ft. 6 in., the usual progress of development per heading, declared T. F. McCarthy, superintendent of that company, in his article on "Rock Work with Mechanical Loaders," is about 4 ft. per day. This paper was read by Arch Miller, Washington



Thomas H. Clagett

Gas Coal Co., Washington, Pa., in Mr. McCarthy's absence.

To maintain an output of 1,500 tons daily 100 ft. of entry must be driven every day, of which only 88 ft. is for haulage headings and the rest is for room necks, for manholes and for crosscuts, which last are driven high so as to provide space for storing mine cars. Consequently, 22 headings must be kept under development, which is altogether too many for efficient operation. With so many places the work is too greatly scattered for economy.

To speed development, entries are driven 10 ft. wide in the coal for 200 to 250 ft. If then the entry is strong

cars per room per day, or 126 cars in all, each having a capacity of 100 cu.ft., or 3 tons. Each room requires one conveyor costing about \$900. Table II shows the cost of loading

> THE road is then laid with steel ties and all joints fishplated. If the heading has been driven wide, a

Table I-Production Figures, Summer No. 3, April, 1928

Tons loaded out	9,153
Davs worked.	19
Average tons daily	466
Employees underground	30
Daily tonnage per man underground	15
Number of places loaded out per day	13
Average tons per place	36
Total feet driven, entry and room	1,995
Average feet driven per day	105

Table II—Cost of Loading Coal by Conveyors, Natalie Colliery

	Cost no	. Room
Taban	Der	Dav
Lording and timbering in room	\$7.71	2 uj
Loading on gangway	2.60	
Extending chutes and moving drive		
units	1,58	
		\$11.89
Machinery	0.19	
Interest on investment, 0%	0.10	
Depreciation on equipment, 7 70	0 22	
Repairs and maintenance.	0.10	
Repairs and maintenancontretere		0.71
and states and the second		
Total cost per day		\$12.60
Tons loaded per day		en 117
Cost of loading, per ton	*****	30.407

Table III—Rockwork in Extending Entry 210 Ft., C. B. C. Corp.

(Minimum performance to be expected with 30 in. of rock) Men Hours

	2	14
Setting break rows of timpers	4	11
Lawing and fightlating 25-lb, rails,	2	16
Daying and insupracing as intraction	2	15
Drilling and shooting (one center noie).	4	40
Loading and gobbing with shovel and		
Dogoing and Rooming with prover and	2	14
conveyor	2	1.44
Duilding wall between break-line timbers	1	41
Dulling wall between bleak the the	2	2
Replacing steel ties with wood	4	Э.
and the first of t		
m		30
Total time		50.
Advence non man nor hour ft		0.6

Table IV—Rockwork in Extending Entry 210 Ft., C. B. C. Corp. 91

(Minimum performance to be expected with 30 in. of rock: loaders on day and drilling crew on night shift)

		Distanc
Men	Hours	Ft.
Setting breakline, laying track. 4 Gobbing and walling	32 192	210 210
completed on third night) 2	48	210
Replacing steel by wood ties (eighth day) 4	32	210

Table V—Similar Rockwork on Double-Shift Basis for 210 Ft., C. B. C. Corp.

(Minimum performance to be expected with 10-ft. entry and 36-in. rock)

	Men	Hours	per Shift, Ft.
Tracklaying Drilling and shooting Londing Replacing steel by wood ties	· 2 · 3 · 4	$ \begin{array}{r} 16 \\ 72 \\ 144 \\ 32 \\ \overline{264} \end{array} $	210 70 35-40 210

Drilling and shooting take more time than with wide entry because of increased work in leveling off rock to work ahead and because workers are impeded by the rock over which they work.

double row of heavy round props are set on 3-ft. centers so as to leave a span for a 10-ft. haulway. Other props are placed in the gob area of the entry at from 4- to 6-ft. centers.

The rock is drilled to a depth of 6 to 10 ft. for its entire distance by jackhammers unless so much rock falls as to interfere with the operations of the drilling crew. A Myers-Whaley loads this rock either into a car, if the heading is narrow, or into the gob, if it has been widened, a special motor-driven Myers-Whaley gobbing conveyor with an over-all height of 24 in. being used which carries the rock into the gob. This conveyor has a reach of 13 ft. from the center of the track and can be retracted to 9 ft. It has a vertical adjustment of 30 in. at the discharge end and revolves through an angle of 360 deg.

One runner operates the shovel; two men with a locomotive shift cars behind it and sometimes a fourth man is provided to break rock down to a size that the shovel can handle and to trim the sides of the roadway.

WITH a gobbing conveyor four men are needed: A machine runner, a timberman to withdraw and replace props, two men to throw



David Ingle

back rock to points beyond the reach of the conveyor, build gob walls and do other work. Usually if the roof is good and has not drawn too much over the break posts the props can be

taken out and put back without stopping the shovel.

After the coal has been taken out, provided the roof conditions are good and the rock properly shot, four men can advance the entry 108 ft. in a single shift and can do all the work for a 200-ft. advance in four shifts, or a total of 128 man-hours. Where there are slips and close timbering the advance is much slower.

With good roof, the operations now was loading 50 to 55 per cent of tabulated can be performed at a rate of one linear foot per man per hour where the entries are driven narrow, and where they are wide and the rock is gobbed an advance of $\frac{3}{4}$ ft. per man-hour can be expected.

In course of the discussion the chairman said that last year the Union Pacific Coal Co. loaded 40.6 per cent of its coal mechanically and ing by hand methods.

its coal in that manner. It saved last year \$1,500,000 by operating as it did over the cost of operating when only 5 per cent of the coal was mechanically mined. Two mines near those of the Union Pacific Coal Co. which are loading coal mechanically are producing a greater percentage of lump coal than they did when load-

Five Steps in Loosening Coal for Loading

M. GILLETTE, general man-G. ager of the Consolidation Coal Co., presided at Friday morning's session. In the absence of H. F. Mc-Cullough, of the Consolidation Coal Co., C. C. Hagenbuch, of the same company, read Mr. McCullough's paper on "Cutting and Shearing."

Mr. Hagenbuch cited instances where, with shearing, explosives costs had been decreased 50 per cent and resulted in larger sizes and the average tons per miner increased 46 per cent. It was also stated that the miners preferred sheared coal even at a lower loading rate because they could earn more and the work was easier.

Where top cutting is necessary to protect the roof or to regulate the thickness of the "top coal" left up, shearing proved to have marked advantages in obtaining easily loaded loose coal and also increased the percentage of the larger sizes.

"HE speaker stated that in trying T to obtain a greater tonnage per foot of rib line it is necessary to get more coal per place. With track cutting machines the width of a place is limited and when it is found necessary to get more coal by deeper cuts recourse is made to shearing. The statement was made that by the use of track cutting machines and shearing the tonnage per foot of rib line and per miner has been increased.

T. W. Gray, assistant general superintendent, and J. T. Clark, superintendent of mechanical loading, Pittsburgh Coal Co., were joint authors of "Recent Developments in Drilling Equipment and Practice." This paper was presented by Mr. Gray, with illustrated slides showing all the equipment under discussion, and followed the cycles of operation in their normal sequence from pre-



G. M. Gillette

paring to drill to the actual loading.

Mr. Gray, in introducing his sub-ject, said: "When we went into drilling on a large scale, and as one drill after another proved unsatisfactory, we began to realize what a real job drilling was."

Mr. Gray's illustrations showed the following types of equipment now in use at Pittsburgh Coal Co.'s mines: (1) Electric drills mounted on undercutting, shearing, and on the combination undercutting and shearing machines; (2) drilling machines of self-propelling track units designed to drill while on the track in the working place; (3) electric and airdriven hand breast drills and electrical-driven post or column drills.

Mr. Gray stated that on account of using 500 volts in the mines his company was leaning toward air drills because of the difficulty of obtaining a permissible hand drill for this voltage. His illustrations showed that

one man handled the air drills though two men constituted a crew. This crew averaged 100 6-ft. holes per shift. In closing Mr. Gray said that in his opinion the manufacturers of drilling equipment were weak. Six feet per minute seemed to be the capacity of the present machines whereas it should be near 15 ft. per minute.

N THE absence of Paul Weir, superintendent of the Bell & Zoller Coal & Mining Co., C. H. Dodge, of the H. C. Frick Coke Co., read the paper "The Use of the CO2 Cartridge."

B. L. Lubelsky, of the Safety Mining Co., the firm which makes the equipment, in answer to a question as to the addition of ash to the coal due to the 4-in. plug of clay used in the hole, said that the coal is not contaminated because machine cuttings are used for tamping, that practice being safe seeing that the temperature at no time exceeds 300 deg. F.

In his paper S. S. Lanier, Jr., vicepresident, Norton Coal Mining Co., presented a new way of using an old-time product—black powder—in a shell so designed as to cause the full force of the explosive to act at the back of the drillhole, an expanding device being used instead of tamping.

However, either black or permissible powder may be used. Mr. Lanier said that only one-half or onethird of the normal charge is needed when the shell is provided. As no deleterious gas or smoke is formed. shooting can be done at any time. Analyses have been made by the Bureau of Mines, the test giving the highest percentage of carbon dioxide showing only 0.35 per cent of that gas. The shell protects the coal, according to Mr. Lanier, and from a number of tests the proportion of 14-in. screenings has been found to be reduced over 10 per cent.

The use of the shell, Mr. Lanier declared, increased the realization on the coal, divided the powder cost in two and decreased labor costs 2c. per ton by eliminating the work of making and distributing dummies and tamping them in the hole. The cost of paper alone at the Nortonville mine in 1927 was \$934.16.

is then filled with explosive and pushed back to the rear of the hole. was used in blasting.

The fuse is drawn through a long hollow socket wrench, which turns a nut on the back end of the tamping stem. A few revolutions of the burr force the conical washer forward and expand the corrugated segments. These grip into the circumference of the drillhole. The slot is then ready for firing. The shells remain in the room until all the coal has been worked out.

G. St. J. Perrott, of the Pittsburgh Experiment Station, U. S. Bureau of A knotted fuse is inserted through Mines, said that black powder was a hole in the end of the shell, which not, nor was it likely to be made, a permissible, no matter what method

Shallmar's Heritage Keeps Production Costs Low (Continued from page 338)

terial was always air slaking and falling, making the roads untidy and dirty. For this reason the practice was discontinued. The top of the upper split does not spall or air-slake.

"Consequently the material in the road is all coal and the road cleanings make a fair fuel, even for hand stoking. Formerly the boilers used 220 tons of good coal monthly. Now that road cleanings are used, 90 tons of the higher grade product suffices. Using powdered coal, doubtless, the bone from the picking tables and Bradford breaker, together with road cleanings would suffice for all local power needs, but with hand stoking a little of the better coal to be used on occasion is a considerable assistance.

"The crosscuts formerly were stopped with cemented 'middle rock,' but it slaked and made a leaky stopping. Now tile is used and occasionally Mahoning sandstone with cement, and permanence is assured. This makes frequent inspection and repair unnecessary and reduces leakage."

Wolf Den Mine is one of the few mines that, without the use of a single door, is provided with adequate ventilation. The fan and airways make it possible by splitting to supply to each area all the ventilation it needs.

T the tipple the coal below $1\frac{1}{2}$ in. A¹ the upple the coal as a slotted, step, is screened out on a slotted, step, is shaking screen, and the large coal is cleaned by hand on a picking table. The finer coal goes to a Bradford breaker which removes such small particles of rock as the product contains. The tipple ships straight mine-run in which the hand-picked lump is mixed with the cleaned fine coal from the breaker. Stoker coal also is made

which contains no material of over 1 in. diameter, the larger coal being broken down to that size.

In all the many details at the mine it is clear that there are no expenditures today for the mistakes of yesterday. The years 1917 to 1927 have paid their own accounts; there are no due bills which 1928 may be called on to pay, as is the case in mines where in past years slipshod work has been permitted.

And now a word as to the village. Shallmar stands out as an example of neatness and verdure. Despite the narrowness of the valley, for the site is merely an island between the old and present courses of the mountain stream, Shallmar has a little park space given over to a plantation of mountain laurel, and it is thriving well. There is a good baseball ground, for Shallmar is an enthusiastic and successful member of the local league.

A Typical Shallmar Street

There are well kept privet hedges -not everywhere, but at least at points that will most enhance the appearance of the town. The trees are whitewashed from the roots to a height of about 8 ft. Rounded stones gathered from the clearing of the ground have been piled in neat cairns and duly whitewashed, giving an air of cleanliness to the village and contrasting cheerfully with the verdure of the trees, the clearing gang having removed from the site only those trees which would interfere with building and road making.

HALLMAR nestles in the moun-D tains, which it adorns rather than disfigures. Let them who may question whether the miner is susceptible to beauty. Certain it is that men part from their old homes among the hills with regret. Why should they long to see the village once again, unless it is that a lingering sense of its beauty still continues to animate them?

The company has a group insurance policy on all its men, feeling that death in the home is no less ruthless and disturbing to social happiness than death in the mine. All this and the personal atmosphere of friendliness and mutual comprehension make the visitor visualize Shallmar rather as a community than as a mine. The mine operation and the work-a-day world are up on the hill almost hidden by the interlacing trees, but the real life is in the village below. After all, one of the best gifts in life is contentment, and contentment in the long run makes for smooth running and success in business. Part of the steady run of the mine depends on that atmosphere of goodwill. Only those who have tried to run mines where discontent prevails can place a true value on the advantage of maintaining friendly relations between capital and labor.



XECUTIVES of American industry realize today that they A have made a serious mistake through the last quarter century in allowing themselves to become so absorbed in the problems, the achievements and the fascinations of production that they have neglected distribution. Our methods of distributing our goods have grown by main strength and awkwardness. And so the American business man faces this well-known problem. It is constantly discussed and if all the paper that has been used up in writing about distribution were placed in one pile it probably would interfere with the orderly progress of some star.

Something else has been happening that has not been generally

In the April issue of "Coal Age" Mr. Whitehorne raised the pertinent question: "Who Pays the Cost of Price Cutting?" It is a question which industrialists everywhere, awakening at last to a new conception of the relation between production and distribution, are asking. In the present article-an abstract of an address before the National Association of Purchasing Agents at Kansas City, Mo., last month - Mr. Whitehorne tells how the present unhealthy situation may be met. Like charity, the author suggests, the cure for the evils of price cutting begins at home.

examine into the causes and see if any common-sense corrections can be found. Obviously, there are two causes-what the seller does and what the buyer does.

Well, what do they do that causes price cutting and demoralizes markets? Let's take the seller first.

THE seller in a buyers' market be-comes afflicted with overproduction. This brings on an acute attack of volume-itis, and pressure is put upon his salesmen to get orders. At the buyer's doorstep his salesmen meet other salesmen who are suffering from the same anxiety. Some of them are armed with the weapon of cut price-to get orders, to get volume for the factory they have been

What's Wrong With This

noticed: this tremendous increase in production has brought with it an intense pressure on sales. The growing output of the factory-everybody's output-has been driving the salesman to desperate ingenuity. And American industry also has become so engrossed in selling that it has neglected the efficiencies of purchasing. The world has honored and courted the salesman while the purchasing agent has gone his way unseen and unsung. And yet for every sale there must be a purchase, and the practices, the policies and the principles of the man who buys have as much influence upon the success of the transaction as the methods and the motives of the man who sells.

The time has come, therefore, to turn some thought upon this business of buying that has so much to do with whether sales are profitable or not. We have got to throw the searchlight on the present status of the purchasing function in industry just as we have got to study and reform the process of distribution in this country.

think in terms of B.t.u. per ton of exercised about the prevalence of coal. We invest thousands of dollars price cutting with nobody knowing in machines that will make possible just what to do. the continuous saving of a fraction of a cent. We select and organize is certain, that there is no general

By Earl Whitehorne

Assistant Vice-President McGraw-Hill Publishing Company, Inc.

our purchasing too often "by guess told to sacrifice the profit. They do. and by God"; we sell at whatever price will get the order and we deliver the goods by an overgrown mechanism of distribution so cumbersome that it often costs more to get the shipment into the customer's hands than it cost to manufacture.

In other words, while we pour science and efficiency into our production we proceed with the selling and the buying of these commodities that we have so zealously and skillfully produced, by a system so hit or miss that as soon as we get into a buyers' market the sellers start to cut prices and the purchasers begin to profiteer and there is a general warfare between the very men who must depend upon each other for the conduct and prosperity of business. And economic warfare is no less destructive of dollars than the battling of $W^{\rm E}$ HAVE reduced our manu- armies. And so today we have facturing to a science. We many branches of industry very much

What should be done? One thing our labor and support each operation cure-all for price cutting-no panacea with 4.5 hp. We govern the very that will save the world. The only against the salesman. And when the motion of a man's hand. Yet we do sensible approach that I can see is to salesman knows that the sales man-

And when one does, many do. And this induces a kind of hysteria, a state of mind that is just a form of fear. It is price cowardice. It is a kind of mob psychology that will sweep right through the salesmen of any branch of any industry.

There is only one thing that cures this kind of demoralization. If the salesman's boss possesses the intestinal fortitude to control him and to lead him out of his fear it can be stopped. Otherwise it runs its course till it ceases from exhaustion.

Price courage is a simple thing. When a manufacturing company enters the market with a line, its officials set a schedule of prices based on their costs, which in turn are regulated by competitive conditions. If the president of that company will permit his sales manager to come in and talk him into permitting a price cut to get some big order and the salesmen find it out, then the salesmen will everlastingly be importuning the sales manager to let them cut to meet another bidder on this job and that. But when the sales manager knows that the president has price courage. that gives him the guts to stand up

ager also has price courage he will battle with the buyer and refuse to telephone the office and ask for a better price.

To put it flatly, the salesman who believes in his boss carries price courage wherever he calls. Price cutting is not the salesman's fault. It is the fault of the executive who cannot face the fact that the only relief in a market demoralized by overproduction and price cutting is reduced production. It is the fault of the executive who lacks the pluck. to reduce his output rather than sell at a loss.

Industrial America at present is volume mad. But manufacturers ultimately will have to face the economic law that to sell at a loss

But in too many cases the purchas- doesn't. ing agent still lacks the responsibility to buy what he is told, and his per- discovered one very interesting thing:

volume in the interest of profit. a mental attitude that is protective, Now let's take a look at the buyer. detective and combative. They are The purchasing agent always has working with the defensive idea of been the red-headed stepchild of in-dustry. In the beginning the boss lowest price instead of the construc-did the buying in odd times. Then tive, productive idea of developing he detailed a young man to help him. the greatest possible value for the As buying has grown in volume pur-chasing agents have become more the same. But psychologically and important until today in many pro- economically it is very different. One gressive corporations the buying is is positive and the other is negative. done by a vice-president with an able One stimulates and the other destaff, and he is a big man with a presses. One promotes co-operation broad knowledge of markets and men. and good service, and the other

In the last few months I have disand authority he needs to make his cussed this business of buying with job measure up to his titular func- a good many men-purchasing agents tion. Too often he is just expected and sales executives both. I have

Business of Buying?

industry. And when prices fall be- to save money on price. low cost they will have to accept tail production voluntarily as their contribution toward restoring the market to a balance.

This sounds very idealistic. I realize that. But price cutting today is due more to the folly of the seller than to the cupidity of the buyer, and the seller will have to provide his share of the reform. And, of course. he can-for he always has the power to refuse to sell. He can control the price at which he himself sells, if he is willing, when necessary, to sacrifice chasing agents today working with

is waste and an offense against formance is measured by his ability

He is more or less in the untheir individual responsibility to cur- enviable position that the policeman occupied say twenty years ago. The policeman's job as he saw it then was to walk his beat and swing his club and hope that he could catch some culprit doing something. And the whole world hated the cop. And then came the automobile and traffic, and we took the cop and set him on the cross walk to help the people and to keep the cars moving. Now the world is for him. He is our friend.

Just so there are too many pur-

ONTRARY to a somewhat popular impression A within the industry itself, the coal trade holds no monopoly on business ills. Production madness and its inevitable concomitant-ruinous price competition-are doing as deadly work in other lines of commercial activity as in bituminous coal. Volume without adequate profit summarized so many balance sheets in so many lines of industrial enterprise in 1927 that top executive interest is turning from questions of production processes to a more searching examination of distribution wastes. Business is beginning to discover that an insane scramble for orders at any price has encouraged the growth of ethically dishonest buying practices. The elimination of these practices is a challenge to industrial leadership.

man after man has told me with pride and enthusiasm of the ideal relations which he has established with some buyer or some seller.

With this customer or this vender they have understanding and reciprocity. They know each other. The seller appreciates just what this buyer needs in quality and in service. He knows the organization and how it works. He and the purchasing agent pull together like a team of good gray horses. They keep each other advised as to the trends of the market. When the factory is running slack they anticipate requirements a bit. They discuss costs and profits at times and protect each other. The buyer knows that in an emergency that seller's factory will turn itself inside out to take care of him.

There is no price cutting between this pair. They are dealing in values.

KNOW one purchasing agent who tries each year to call at least once upon the presidents of the principal companies from whom he buys. He wants to get acquainted, to see the factories and judge whether or not they are efficient, to size up the organizations, the plants and the prin-ciples that stand behind the goods.

I know of one very large industrial buyer-one of the greatest in the country-who not so long ago sent a vice-president-no less-traveling the country calling on the presidents and sales managers of the manufacturing companies from whom he buys, just to inquire whether they were entirely receiving from his people. I dare say he carried smelling salts to adby the shock. And when this vice- compared with the mere price factor, said that he believed this trip was one of the best investments his company had made, reckoned in terms of good will and insurance of material and service supply.

who are doing this kind of thing. They do it because it helps them in their business. It costs money in the long run to scatter business in small purchases, now from one and now from another. It costs money to haggle with salesmen. It costs money to bicker over bids. It costs money to break in new venders, to establish specifications and assume quality.

As one large buyer stated it to me: "There are four factors in every purchase that should be given consideration in the order named: (1) Suitability to the need; (2) quality of the article; (3) responsibility of the vender; (4) price.

"DRICE is only one of the ele-I ments that must be weighed in establishing a value and it should not be considered until the other three factors have been established as sat-isfactory." That is a pretty broad statement but I believe it is a true one. This man knows what he is talking about.

Therefore, if the purchasing agent is to contribute his share toward overcoming this practice of price cutting that industry is suffering from and stewing about right now, he must face these facts and, facing them, he will bring new dignity to his profession and new opportunity to himself. He must recognize that nothing short of this ideal relationship between the seller and the buyer is really efficient and profitable. He must set his entire operation as nearly as possible on that plane and make value, not price, the chief objective. He must study the cost of buying as well as the cost of goods.

For who knows today which costs the more, to shop among 50 venders or to establish a close co-operative relationship with twelve? How much more does it cost to interview 50 salesmen than to give the same time to representatives of six selected suppliers who qualify completely in all the other factors of value?

are good ones aplenty on both sides. makes clear the moral and economic satisfied with the treatment they were But the point I make is that we have principles which all men desire to too little accurate knowledge of what follow once they are generally it costs to buy-too little recognition understood and have gained social minister to those who were overcome of the relative importance of value as standing. president returned home and had re- too little measuring of price against lieve that in this kind of a situation covered from the entertainment he the other factors. And in a word in- this leadership can best come from dustry will have to learn more about two sources-the industrial associathe economics of buying and or- tions and the industrial press. I, ganize its purchasing on a more con- therefore, offer these two suggestions, structive basis for the production of which I believe will bring more imbetter values in trade before we put .mediate influence to the correction of There are many enlightened buyers an end to the ruthless waste of price the practice of price cutting than any cutting.

> HOW do we start? That is the pertinent question. There is a simple way, I believe. There are four things to be done. I have mentioned them on other occasions but they need much repeating:

(1) If the purchaser would demand firm bids, then general price cutting would soon cease. For a firm bid is like a signed order. It's the word of the house. It puts industry on the one-price basis just as solidly as the modern department store. It means that a price made is the best and final price and the buyer is expected to place the business by selecting the firm bid that offers the best value-not price alone but value.

(2) While this practice of firm bids is crystallizing into a custom, whenever bidders are called back by a purchasing agent and asked for a better price, let the bidder demand that the other bids be shown to him, so that he will know that he is not being lied to, and that his price is indeed high for equal value.

(3) While the trickery of baiting bidders still continues in the world of business let bidders hold postmortem comparisons of bids, by submitting their bids on closed business to their trade associations for comparison and report.

publicly proclaim that he will thereafter shun the man who cuts his price, because the first price is supposed to represent the honest value of the goods, and the man who cuts stands self-convicted either of trickery or weakness.

PRICE cutting is just an economic disease. It can be cured. It can be cured by public opinion within industry. And immediate relief can be sought only through the building of public opinion among buyers and sellers. But the only way there is to develop public opinion is by discus-

Oh, I know the arguments! There sion that corrects loose thinking and

This calls for leadership and I beother action which might now be attempted:

(1) That the trade, industrial and business publications of the country promote the widest possible discussion of the economic inequity of price cutting, drawing out the opinions, principles and practices of the leading men of the field and developing a more common acceptance of the truth of it and a more general adoption of these simple resources of correction.

(2) That the trade and industrial associations of each branch of industry support this purpose by calling a conference of the leading purchasing agents of the group to meet with a representative number of their prominent sales executives, for a discussion of the ethics and economics of this business of buying to the end that trade practice in that field may be improved both in selling and in purchasing in so far as price cutting is concerned.

HAVE asked a good many sales HAVE asked a good when they executives this question, when they have been discussing this buyers' market: "What is your own purchasing agent doing? Is he buying in the way that you would like to have your own customers buy? Does he foster price cutting?'

To many of them it has been a (4) Let the buyer frankly and new slant on the subject. And yet there is no single influence more important to success in sales than the methods and principles of the man who buys. It is worth while, therefore, for the sales-minded chief executives of industry to see that their own purchasing methods are right.

> The industrial press can help promote such a check-up. And a systematic discussion of the business of buying by such groups of purchasing agents, with executives present, would have far-reaching effect in automatically applying common sense and curing this malady.

TOMORROW'S BOSSES

Training Men for Positions Of Responsibility

C Lewis W. Hine.

T IS often said of the average industrial worker that he is incap-L able of seeing beyond the end of his nose, that he is concerned solely with what is in the pay envelope, that he is lacking in ambition, and that, as a class, he is managed most easily on an empty stomach.

There is, unfortunately, a large element of truth in all these statements. No one who has dealt with wage earners at close range for several years could fail to have it borne in upon him. If it were the whole truth then the outlook for better manpower results in the industry would be rather dismal. But it is not, for the simple reason that one consideration of overwhelming importance is left out of the picture. It may begranting the worst-that the general run of workers are naturally short-sighted, mercenary and "dumb." But all men are not equal. Moreover, it is a fact that nearly every man, conscious of his own shortcomings and limitations, elects a leader, who may be a fellow worker, a politician, a priest or minister, a union official or a foreman. In fact, he may choose more than one of this number, attributing to each an authority in particular matters.

Looking at the matter from the other standpoint, men of proven courage, wisdom or integrity attract followers, and by the power of their

other men to do things of which they would be quite incapable if left to themselves. Without such inequalities, such leading and such following, there could be no such thing as handling men in numbers. In fact, organization consists chiefly in lining men up under effective leadership.

Under the form of organization which prevails in the industry this leadership rightfully belongs to the foreman, or mine manager, as he is sometimes and, perhaps more properly, called. It has frequently been pointed out that in all industry the foreman to the individual worker is the company. It is with him alone that he has personal contact. The general manager, or even the superintendent, is likely to be a remote person, whose interests are regarded as impersonal and whose experience is likely not to furnish quite so sympathetic an understanding of the problems and point of view of the common workman. It is pertinent, therefore, to consider to what extent the present-day foreman is equipped to make the fullest use of his strategic advantages on the job.

NOW, it has been said in this se-ries that the really effective organization is the one which comes nearest to "enlisting the whole man." This kind of organization is something which the coal industry seems to lack. On the contrary, several hundred thousand coal-mine workers have found leadership in an association of their own making, in which the lines of authority and subordination are drawn quite independently of the producing organization. Under all the circumstances prevailing, we hire and pay for but a part of the man.

Why these two separate organizations of the same body of men?

The answer is found partly in the requirements of the organized miners' economic program. It did not fit that program to permit the foreman to exercise too broad a personal leaderexample and the authority of their ship over his men. "No man can character and achievements, compel serve two masters"; the foreman's

By H. S. Gilbertson

Director of Personnel Lehigh Coal & Navigation Co.

prestige has had to suffer, to the detriment of the industry. Even leadership on the actual job often has been impaired, as in the exercise of mine authority in matters pertaining to the proper use of explosives, timbering, safety practices, etc. But is there not another explanation?

SUSPECT it is not to be found to any great extent in the personnel of the men chosen to take charge of the mines but rather in the atmosphere in which they have grown up and the system under which they operate. Mine foremen, as a class, are men of exceptional natural ability. The nature of their work and its responsibilities develop in them elements of great strength which should not be underestimated. They have commonly and frequently shown themselves courageous, reliable and resourceful to a remarkable degree. But there are in them latent personal forces which have yet to be harnessed and expanded.

One of the characteristic weaknesses in the mine foreman's position may grow out of his very resourcefulness. Numerous difficulties arise in the course of the day's work which his own pride and the traditions of his calling tell him should be settled on the ground without appeal to higher authority or counsel. It is, for instance, common for foremen in all industries to insist more or less tenaciously on the right of summary discharge as a necessary element of the authority which goes with the management of a shop or factory. In these latter days, however, they often have found themselves confronted either with the protection which the workers' organization throws about its members or else by a policy of the general management which dictates a different form of discipline. Under these circumstances some foremen have developed a technique of working offending employees out of the organization by giving them disagree- the interests affected. able jobs.

This, of course, has solved the immediate local problem, but it has given a footing to newer and bigger problems which someone else sooner or later is called upon to deal with. Back of such incidents is the condition that the foreman often is kept in ignorance of the far-reaching possibilities for evil of local mistakes.

HERE is a good deal to support I the opinion that the mine foreman in some quarters of some companies is regarded by those higher up primarily as a pusher boss. So much attention is likely to be given to drumming in the necessity for production that little attention or instruction or counsel is given with reference to the many factors which constitute the necessary preliminaries to an effective production program. It is not impossible, for instance, to find a foreman who will permit his rails to get out of alignment, his airways to become blocked or his roof or timbers to get into a dangerous condition, on the plea that his organization must bend its energies to production. He is likely not to realize that production is the net result of getting all the conditions in the mine properly established.

How many mine companies provide their foremen with detailed cost analyses? Many, no doubt, do. But are there not still companies where the foreman is told, simply, "You must get your costs down"?

Are foreman expected to know something about the economic situation of the industry, or is that something that belongs exclusively to the higher strata of management?

It is, of course, of first importance that foremen should be men who can "get out the coal," and when we are discussing these various matters relating to the handling of men we are thinking of furnishing the proper and most efficient background for production. We deem it broadly essential to good production in all its phases that the foreman should be conversant with the general problems of the industry, keenly appreciative of the needs, desires and limitations of the rank and file and, withal, that he should possess such integrity as to hold undisputed leadership, not only in matters of actual mine operation but in many of the varied interests of life. If there is one thing which the troubled history of the coal industry teaches it is that the "business is mainspring of action, other than the

Applied to production methods, this simply should be means that foremen selected and trained with reference to the handling of the human problem.

But can leadership in foremen be cultivated?

An increasing number of industries and concerns, including a goodly number in the mining industry, are answering in the affirmative, by installing courses of more or less systematic training. It is doubtful if any measure in the program of industrial relations produces more evident and encouraging results. From a recent report on this subject by the Chamber of Commerce of the United States we find much that is suggestive in the statement of purposes in establishing such training:

To enable him [the foreman] to see the plant as a whole, and his immediate place in wage scales. the picture.

To urge greater care in issuing and handling orders.

To urge greater appreciation of the diffi-culties of the "green" employee. To promote quantity and quality of pro-duction through the foreman's study of modern methods of handling labor, materials and machinery

To better acquaint the foremen with the plans, policies and ideals of the company, so that they, in turn, may more accurately interpret to the men the policies, ideals and enthusiasm of the management.

To emphasize that the place to begin to educate and stimulate the workers to do more, broader and sounder thinking of the fundamentals of industrial economies is with the foreman. From him it will naturally percolate to the workers.

It is unquestionably true of personalities, as of the stars and planets, that larger bodies attract the smaller. Bigger foremen would attract better and surer followings. The kind of bigness we must seek in the foreman cannot be produced by any set formula to meet any particular design. What can be done is to expose him to new and broadening influences. It is the response to these influences which he makes himself that will constitute leadership.

Napoleon passed out this comment on the art of handling men : "Human beings are controlled through their imaginations; that is what distinguishes them from animals. A soldier does not face death in order to earn a few pence a day or to win some paltry order of merit: none but the man who touches his heart can stir his enthusiasm."

There is, of course, a vast difference between the thrill of impending battle and the dull daily routine of industry, but there is a business" formula fails to cover all pocketbook, in every individual and

every group of men. He who finds it is the leader. Thus, in 1921, the men's clothing industry in Chicago was in a severe depression. The question of wage rates for the ensuing year had gone to arbitration, in accordance with the terms of an agreement between the manufacturers and the Amalgamated Clothing Workers of America, and resulted in a wage reduction of 10 per cent. This was followed by a second reduction in about a year.

It fell to the lot of Sidney Hillman, president of the workers' organization, to announce these adjustments in big mass meetings. When he did so, he received a tremendous ovation from the assembled workers. The result could not have been brought about if Hillman and his organization had stood for nothing but advancing

T IS interesting to note, in passing L to how great an extent the union of workers in the coal industry also has made use of personality and imagination. Its leaders have been men of force and they have made their appeals as dramatic as the situations confronting them have made possible. While they often have overdone these tactics, they are scarcely to be blamed for using the most effective weapons at hand. Quite as much blame, perhaps, sometimes has attached to whosoever may be responsible for conditions which have lent themselves to dramatic treatment.

It is only fair, however, to say that the type of foreman (the product of his times and common in many industries) who sometimes gave offense (though probably not nearly so greatly or so often as legend would have us believe) has practically disappeared. Many of the old-school foremen survive, to the credit and welfare of the industry; studious, well-informed and cool-headed men who have much to teach the new generation of their successors about the wise handling of men, about interest in the job and about the proper spirit of loyalty to the well-being of the organization to which they belong.

An incident in the career of one such man who has passed off the scene is illuminating. On one occasion he was cursed out by an upstart for some trivial misunderstanding. The men quickly drove this offender off the place. We need more of such leaders and such followers. With patient and intelligent effort, the industry can develop them.

HAT'S NEW In Mechanical Mining Aids

HIGH SPOTS CINCINNATI SHOW AT

YEAR is none too short a period between expositions to judge by the wealth of new material at the American Mining Congress Exposition, held in the Music Hall, Cincinnati, Ohio, May 7-11. In that time two new loading machines and a large number of conveyors of various kinds have been developed.

No less than three new types of screen were shown. One of the loaders is of a quite revolutionary character in that it makes one job out of two. The same conveyor that raises the coal from the ground carries it back to the car or to the room conveyor. The other loader has a device to bring down coal that the blast has shaken but not dislodged.

Furthermore, a year is not too short a time in which a new idea may be hatched in the brain of an operating man, or a new conviction arise in him from the condition of the market. The mind which at one exposition may be irresponsive may come to the next to make a choice between rival mechanical contrivances. Every year shows that those who were formerly indifferent have become attentive, and those who were merely attentive have become doubting, and those doubting have left convinced.

Back at the mines which are not mechanized, back at the office where all conversation drifts to the old hand methods of operation, there is less chance for new ideas. A day in an exposition is worth as much as three months at the job in its opportunity for development.

No less than 110 exhibitors had space in the exposition, and many of them had several exhibits other than the major one they had selected to feature.

Machines Fit Their Figures to All Seams

machinery at the exposition of the American Mining Congress was the new coal-loading machine recently developed under the supervision of J. F. Joy. This is being manufac-tured and marketed by the Bethlehem

Steel Co. (See Fig. 2.) The machine, at first glance, looks unusually long, but the actual length is only 27 ft. $3\frac{1}{2}$ in. The appearance of length is a result of the lowness and narrowness of the machine combined with its simple construction and its well-balanced features in design. The loader is only $26\frac{3}{4}$ in. high clear of the rail and 41 in. wide.

A feature of this machine is the loading chain, of which there is but one. It adapts itself in a most ingenious way both to taking up the coal from the floor and to carrying it rearward on top of the machine, to

June, 1928 - COAL AGE

With the rear part of the machine stationary, the front or digging end of the machine is swung back and forth over a distance of 20 ft., loading the coal as it sweeps across the face. The carrier chain adapts itself to the swinging motion of the digging arm and runs at full speed as the arm swings back and forth.

The machine runs on a caterpillar

Fig. 1-Conveyor Will Negotiate Curve



Notable among the exhibits of face either a mine car or a room conveyor. having a 4-ft. wheel gage, advancing as often as may be necessary to keep the conveyor fully loaded. The coal is delivered at a height of from 21 in. to 4 ft. 9 in. above the rail.

At this exhibit also was shown the model of a shaking conveyor with a discharge gooseneck head. This is designed to expedite the delivery of coal, allow a better handling of cars and opportunity to hand-pick coal underground if desired. The machinery on the discharge head is designed to impart motion to the conveyor, elevate the coal to the proper height for discharge, transport itself and shaking conveyor from room to room and spot cars for loading.

The shaking conveyor consists of two-wheeled open-ended pans, one end of the bottom projecting slightly into the pan in front, so as to afford a continuous channel for the flow of



Fig. 2-One Chain Suffices

10 cu.ft. of coal at a time and it can be held till the belt has taken away the load.

The Sullivan Machinery Co., Chicago, Ill., showed its new coal loader (see Fig. 5), the swiveling end of which embodies a flight conveyor with short arms on the forward sprocket for assisting in the loading of the coal and revolving arms on a shaft above the conveyor for the purpc se of breaking down the coal that has been shaken loose but has not fallen to the floor.

In the booth of the Link-Belt Co., also of Chicago, Ill., were photographs of the new Armstrong shovel, which will be built in two sizes. No matter what size may be chosen, when the shovel is retracted it will revolve within a diameter of 11 ft. 6 in. The two sizes are designated by the traveling height, which is 42 in. in one case and 60 in the other. The first size has a shovel capacity of 900 lb. and the second of 1,320 lb.

The Joy Manufacturing Co., Franklin, Pa., showed an improved type of 5 B.U. permissible Joy Loader equipped with an automatic controller and designed for use in gaseous mines.

New conveyors of all types made their appearance at Cincinnati. The Ironton Engine Co., Ironton, Ohio, has a jigging conveyor (see Fig. 6)

Fig. 5-Loader Pulls Down Coal

which can be reversed in 4 minutes. The motor exhibited was totally inclosed, but open motors are provided when desired. The motor rotates a crank through worm gearing mounted on anti-friction bearings. The crank imparts the reciprocating motion to the troughs by a bell crank and driving arm with connecting rods between them. This arm extends under the trough, thus providing a low and central connection.

The drive weighs 3,500 lb. and its height with a 25-hp. inclosed motor is approximately 35 in. With an open-type motor the height is about 37 in. A smaller drive is built which has a 15-hp. open-type motor, weighs



Fig. 4-Shovels Coal on Conveyor

2,500 lb. and is only 27 in. high. A loading boom is provided for lifting the coal into the cars, but the conveyor, which will work up a slight incline as well as downhill, can be used for this purpose. However, in that case the drive has to be set at some distance from the trips to be loaded.

Other new shaking conveyors are those of the Conveyor Sales Co., New York City—the Cosco equipment. This company, which has had



COAL AGE - Vol.33, No.6

coal. A swivel arrangement between the pans allows them to swivel freely with each other so that they readily can be hauled around curves and taken from room to room. Between the short sides of adjacent pans vertical plates are swiveled, one on each side, which bridge the gap between the sides of the pan when the conveyor is being used for moving coal. (See diagram, Fig. 1.)

The Myers-Whaley Co., Knoxville, Tenn., showed its new singlemotion non-automatic shovel, a modification of the already well-accepted double-action automatic shovel. This new machine (see Fig. 4) is peculiarly



Fig. 3-Shovel Mechanism

well adapted to the loading of coal. The shovel is 46 in. wide and pivoted to the front end of the front conveyor. It has ears on each side, to which are attached lifting rods for raising or lowering the lip of the shovel. These are shown in Fig. 3.

After moving the machine under its own power into a prepared place the operative drops the shovel down, then crowds the entire machine forward, forcing the shovel under the coal. When the shovel is filled he raises its front end to an angle at which the coal will slide off the shovel and onto the belt conveyor which carries it back. The shovel lifts 8 or

much experience in conveyor work, has recognized the importance of strength in the construction of differential drives. The rocking lever shaft, the connecting rod and crankshaft of the B-15 drive are all manufactured of chrome vanadium steel and the driving arms of special alloy steel. The height of the drive is about 21 in. and the motor may be 15 or $18\frac{1}{2}$ hp.

The A-20 drive (see Fig. 7) has a motor of 20 to 30 hp. and an over-all height of 42 in. It also has reciprocating parts of chrome vanadium steel.

In the booth of the Conveyor Sales Co. was shown the "Duckbill" designed by the Rock Springs Loader Co., Rock Springs, Wyo. This device for attachment to the end of shaking conveyors for the loading of 14 in. diameter, have axles having a



Fig. 7-Drive for Thick Coal

long and 710 lb. when 15 ft. in length. It has a sturdy pipe frame, and the wheels, of agricultural type and of along the conveyor frame. The belt is 12 in. wide and the clearance in the low position is 24 in., in which instance the top of the belt is 22 in. above the floor.

Mindful of the need for a conveyor that will receive coal at a low level near the face and deliver it at a high level over the car and that the cars in

Spotwelded lug

Chain



coal will work in seams as low as 36 in. and on grades varying from 5 per cent downhill to 50 per cent uphill. As it requires only 36 in. of space between the face and timber it can be worked on longfaces where close timbering is required.

The Mining Engineering Co., Baltimore, Md., showed not only its shaking conveyor but also its belt conveyor with illustrations showing how readily it can be dismantled and its pieces taken through the timber for reassemblement.

At its capacious booth the Lorain Steel Co., Johnstown, Pa., showed a low-type sectional face conveyor made in lengths up to 90 ft. Low flight conveyors also were shown for bringing coal out of rooms and a face conveyor about 12 ft. long.

The Link-Belt Co. showed two "Kangaroo" shaking conveyor drives, one of 3 hp. and one of 15 hp. The former drive weighs 1,620 and the latter 4,200 lb. A 5-hp. motor drive also is made. All have totally inclosed motors. This firm also exhibited the "Jax" face conveyor, a light belt on a two-wheel truck that can readily be moved from point to point as it weighs only 640 lb. when it is 12 ft.

June, 1928 - COAL AGE

Fig. 6-Jigging Pan Has Worm Drive

three-point adjustment so that the level of the point of delivery can be varied. That level also can be changed over a wide range by moving the wheels forward or backward

Fig. 9-A British Post Cutter

Fig. 8-Pan for Snubbings thick seams are getting higher every day, the Brown-Fayro Co. showed a "Brownie" mine-car loader mounted on large steel wheels. Its over-all length is 16 ft., so that, even in a room 30 ft. wide, double shoveling is not necessary. The shoveling height is only 12 in. and the delivery height can be varied from 40 to 60 in.

above the floor. (See Fig. 10.)



In the matter of coal cutting the Sullivan Machinery Co. showed its longwall machine which stands only 12 in. above the floor, and its combined cutting and shearing machine which works from the room track.

In the booth of the Mining Engineering Co. was exhibited the Siskol electric header (see Fig. 9), a radial cutter adapted for the cutting of narrow places at almost any degree of inclination. The header is relatively light, the machine weighing 650 to 700 lb. and the whole equipment including the crossbar only 800 lb. It is driven by a 3-hp. compressed-air motor. The equipment is made by the International Channelling Ma-chines, Sheffield, England.

The Sullivan Machinery Co. also showed an incline for the loading of coal with double-drum 25-hp. electric hoist and scraper bucket. Interesting details were the Taylor snubbing pan of the Goodman Mfg. Co. (see Fig. 8). The pan is used the pan. The lugs engage the coal to remove the coal made by snubbing and compel it to follow when the for the emplacement of Cardox and thus to give the undercut on pan is drawn out from under the cut cartridges.



Fig. 10-For Car Loading at Face

being shot a fair fall that will make loading more readily effective. It has a flange welded on the rear end of the pan and seven lugs of triangular shape spot-welded on the surface of by a chain fastened to the front end.

The Chicago Pneumatic Tool Co., New York City, exhibited mounted and unmounted coal drills, among them one of flameproof qualities. This company also had on display a new drill and accessories for making 44-in. straight and smooth holes

Big Units Cut Transportation Costs

MANY a loading machine fails company included the special-mixture hem Steel Co. (see Fig. 2). Its because the cars are too small or chilled-tread wheels said to have a length over the bumpers is 12 ft., its their delivery behind the machine is life about twice that of an ordinary too irregular.

That the mine-car problem is acute is shown by the fact that no less than ten companies were exhibiting mine cars at the Cincinnati exposition.

The Lorain Steel Co., Johnstown, Pa., showed an all-steel car only 28 in. high but holding nevertheless about 5 tons when level full.

The Island Creek Coal Co. is installing 700 new cars of the type of one exhibited at the exposition by the American Car & Foundry Co. This is of medium height and composite construction. The exhibit of this

Fig. 1-Car with Short Axles



chilled-tread wheels said to have a wheel.

The Bonney-Floyd Co., Columbus, Ohio, showed a high-capacity steel car the axles of which do not extend clear across the body. On each side of the car two short axles are attached at their ends to a cast-steel side frame. The design is interchangeable for wheels with plain and all types of anti-friction bearings.

Spring bumpers and spring drawbars are included in the design. No pressed steel is used in the car but instead it is made of plates and standard shapes. The manufacturer claims this as an advantage because bent or damaged parts can be easily replaced or straightened. (See Fig. 1.)

Another special-design low - type large-capacity car was exhibited by the Enterprise Wheel & Car Cor-poration, Huntington, W. Va., and Bristol, Tenn. This car has a socalled armor-plate bottom construction with a short double-supported axle for each wheel.

An all-steel car standing but 231 in. above the rail and having a capacity of 4.4 tons was shown by the Bethlelength over the bumpers is 12 ft., its inside width 6 ft., inside length 10 ft., its water-level capacity 74 cu.ft. and its capacity with 6 in. of topping 104 cu.ft. The combination cross member and wheel hood is stamped from one piece instead of being of built-up and riveted construction. Two hundred rivets are eliminated and the job is 500 lb.

Fig. 2-Stamped Steel Car



COAL AGE - Vol.33, No.6



Fig. 3-Automatic Car Coupler

lighter than former cars of the same capacity. The new car is said to be as strong as the old or even stronger.

Five models of cars, each onefourth size, were exhibited by the Watt Car & Wheel Co., Barnesville, Ohio. Four were of cars furnished to the Union Pacific Coal Co., the Stonega Coke & Coal Co., the PursPa., exhibited one of its car wheels which was cast in 1909 and removed from mine service in March, 1928. It is of the plain-bearing open-cap type. The bore shows only $\frac{1}{32}$ to $\frac{1}{16}$ in. wear although the tread is worn to the breaking point.

A "Naco" steel mine-car wheel was displayed by the National Malleable & Steel Castings Co., Cleveland, Ohio. It was designed to fill the need for wheels which, though lighter, will have less tendency to flatten and break at the flanges than ordinary wheels. The same company showed the Willison automatic car coupler (see Fig. 3) and a line of swivel and link hitchings. The Pittsburgh Knife & Forge Co., Pittsburgh, Pa., showed mine-car couplings, drop-forge swivels, machine bits and drop-forge links.

The locomotive "parade" was led by a 38-ton Baldwin-Westinghouse



glove Coal Mining Co. and the Im- Fig. 4-Automatic perial Coal Corporation.

Another model was that of a special design for mechanical loading. The proposed car is 6×16 ft. inside and extends 30 in. above the rail. The level capacity is 164 cu.ft., or approximately 4 tons. It is fitted with spring draft gear and with springs on each axle box.

The Sanford-Day Iron Works, Knoxville, Tenn., demonstrated automatic drop-bottom cars by a working model of a drift mine with electric locomotives pulling the trips through a dump house where the cars were dumped without stopping. It has developed an 8-wheel "Whopper" automatic bottom-dumping car (see Fig. 4).

Plain-bearing wheels of improved type with disk closure were to be seen at the booth of the Hockensmith Wheel & Mine Car Co. The Phillips Mine & Mill Supply Co., Pittsburgh,

June. 1928 - COAL AGE

Fig. 4-Automatic Bottom-Dumping Car

machine, one of two built for the Berwind-White Coal Mining Co., Windber, Pa. This mammoth underground locomotive (see Fig. 5) was operated with its wheels resting on eccentric rollers which subjected the trucks to conditions far more severe than would any mine tracks, however badly laid. The combination of side and cross equalization of the three trucks appeared to do a perfect

Fig. 5-38-Ton Main-Line Locomotive



Fig. 6-Rheostat for Gassy Mine

job of stabilizing the locomotive and dividing the wheel loads.

This locomotive is the largest and most powerful underground unit ever built. The drive equipment consists of three 133-hp. 500-volt motors force-ventilated by a common blower. The control is semi-magnetic, has six steps through series position and five steps through parallel and gives overload protection.

Timken roller bearings are used on the armatures and main journals. The duty of the locomotive will be to pull trips of 50 to 60 cars, each of 3.45 tons total weight, on a haulway 4 miles long having a maximum grade of 5.6 per cent and an average grade of 2.37 per cent. The speed when hauling 50 loaded cars on the average grade will be 9.4 miles per hour. The motors will develop a total of 399 hp.

The Jeffrey Manufacturing Co. exhibited an 8-ton gathering locomotive of the cable-reel type with inclosed electrical equipment. A feature on it, new to locomotive design, is a hydraulic brake acting on each armature shaft. Being quick acting, it is meant for room service, and to prevent its use on entries and consequent rapid wear the lever cannot be set, but must be held by hand. There is an independent mechanical brake on the wheels.

The control is by contactor and when taking power through the reel, permits only of series operation. A transfer switch, making contact to the





reel or to either trolley pole, is mounted on the back of the controller. Relay overload protection is provided, and the control has relay and mechanical interlocks.

The motors are box-type with screw handhole cover over the commutator and junction box in the frame. Through bolts are used in the axle caps. All wiring is asbestoscovered and is protected with heavy rubber-hose conduits.

One of sixteen 8-ton cable-reel locomotives purchased by the Pittsburgh Coal Co. was exhibited by the General Electric Co. (see Fig. 7). All electrical parts except the cable and the trolley poles are inclosed for the purpose of making the locomotive safe for use in gassy mines. The cable reel is driven direct without gears from the armature shaft. This is a new feature. Five miles per hour is the rated full-load speed with the motors in parallel, and only the slower series connection can be used with cable reel.

A new construction for removable covers of motors and control apparatus to be used in gassy mines was displayed by the Goodman Mfg. Co. (see Fig. 6). A continuous tongue protruding from the machined fitting surface of the cover fits into a matching groove in the box. Slight springing of the cover by internal pressure generated by an explosion or arc cannot affect the clearance of the space through which hot gases must escape.

The covers can be hinged if desired. They are held in place by clamps which can be secured by padlocks. This construction will enable an authorized person to remove a cover in a few seconds.

A 30-hp. motor for a 4 to 4½ milesper-hour locomotive and having tongue-and-groove handholes was on Fig. 7-8-Ton Gathering Locomotive

display; also a complete contactor control of the same construction for an 8-ton locomotive. This controller has doors on three sides, providing access to all parts.

In the exhibit was included a combination main switch and fuse with the tongue-and-groove covers. Two spare fuses are provided and the fusebox cover is interlocked with the main switch.

The Ironton Engine Co., Ironton, Ohio, had on exhibit a full-size sectioned locomotive worm-drive unit of the type recently applied to Ironton trolley and cable-reel locomotives. It is fitted with ball bearings throughout and is identical with a design that has a background of ten years of service on battery locomotives. The $4\frac{1}{2}$ -ton trolley locomotive in which the unit is used is 25 in. high and the 7-ton, 30 in. high.

One of the busy places in the exhibit hall was the booth of the West Virginia Rail Co., where a new portable turnout was being demonstrated. This is the one responsible at least in part for Dr. Fyke's "300-ton average," described in the May issue of *Coal Age*. With this turnout (see Fig. 8) the straight rails are not disturbed; therefore it is practicable to

Fig. 8-Turnout with Unbroken Rail

move it frequently as the working face advances. At the same booth was to be seen a new steel tie for heavy main-line haulage, also a new size for light to medium service.

The Bethlehem Steel Co. showed the new heavy-duty steel tie which it makes for the Keystone Metal Tie Corporation, New York City. It is built for main-line tracks. Simplicity, ruggedness and turned-down broad ends characterize the design. The material is copper-content steel.



Fig. 9-Self-Dumping Mine Cage

The Cincinnati Frog & Switch Co., and also the Weir-Kilby Corporation, Cincinnati, Ohio, exhibited frogs, switches and other track materials. In the exhibit of the Carnegie Steel Co., copper-steel ties were featured.

For spotting trips at scraper loaders or conveyors the Brown-Fayro Co., Johnstown, Pa., exhibted the "Brownie" model HI low-speed heavy-duty hoist. It can be equipped with 5-, $7\frac{1}{2}$ - or 10-hp. motor and is built to develop a rope pull of 5,000 lb. at 20 to 50 ft. per minute. The height is 29 in. and the weight without motor, 1,765 lb.



COAL AGE - Vol.33, No.6

366

At the same booth was shown the "Brownie" type HG room hoist, 24 in. high, equipped with a 5-hp. motor. The weight standard-equipped is 1,125 lb. and the rope capacity is 1,000 ft. of $\frac{3}{8}$ -in., 800 ft. of $\frac{7}{16}$ -in. and 600 ft. of 1-in.

A 25-hp. hoist for scraper loading and general purposes was shown by the Sullivan Machinery Co. It is a double-drum machine featured by a design that is especially compact.

Standardization in design has been introduced by the Eagle Iron Works, Des Moines, Iowa, in its self-dumping cages. All wheel stops, both front and rear, from now on will be of the same pattern. The new self-dumping cage known as O.C.6 is illustrated in Fig. 9. It has fewer working parts than its predecessor, making less demand on the stock-room inventory.

A pre-opening cager mechanism was shown by the Fort Pitt Mine Equipment Co., Pittsburgh, Pa., and a model of an overturning skip by Allen & Garcia Co., Chicago, Ill.

How Coal Is Prepared and Why

about greater care in preparation: A clearer conception by the consumer of the loss due to dirty or illsized coal, an ability on the part of the same consumer to demand and get what he wants in the present buyers' market and an increase in the impurity in coal due to mechanical loading or payment by the day instead of by the tonnage of clean coal produced. Preparation has traveled fast in its technical status and in volume. Passing along the aisles of the exposition one could not for one moment doubt that.

represented, which of course by no means exhausts them all. Of dry cleaners two were shown, which is perhaps 50 per cent of those being manufactured. But even at that the array was surprising and perhaps perplexing.

The American Rheolaveur Corporation, of Wilkes-Barre, Pa., showed a model of a free-discharge plant, which before the eyes of the

HREE changes are bringing ment Corporation, Philadelphia, Pa., sieves need not be removed from the exhibited a cylindrical glass model in which rising water created such a dense quicksand that in it only the slate and the more impure of the bone coal would sink to the bottom.

Largest of all models was that of the Menzies Hydro-Separator exhibited by the Roberts & Schaefer Co., Chicago, Ill. In this the coal was washed, then drained and finally sized on an Arms screen.

For coal under 1/2-in. diameter the Deister Concentrator Co., Fort Wayne, Ind., showed its Deister-Overstrom diagonal-deck coal-wash-Of washers no less than five were ing table. This table, which is illustrated in Fig. 1, has a capacity ranging from 6 to 15 tons per hour for anthracite and from 8 to 10 tons per hour for bituminous.

Both the American Coal Cleaning Corporation, Welch, W. Va., and Roberts & Schaefer Co. represented the merits of their dry-cleaning processes, the latter showing an Arms air separator.

A development of the Delatester, a



spectators, separated coal from refuse. It also exhibited an illuminated device known as a "scene-in-action picture" which gave a clear idea of the operation of a sealed discharge plant.

A working model of large size was exhibited of the Chance coal cleaner in actual operation, cleaning anthracite coal up to pea size. To show the theory on which the practical result depends the Coal Cleaning & Equip-

Fig. 1-Wet-Washing Table

mechanical device which even a boy can use to determine by float-andsink methods in a washery the quality of the raw product and of the washed coal or refuse, was exhibited by G. R. Delamater, Cleveland, Ohio. This new apparatus is of such size that egg and stove coal in 50-lb. samples can be tested with it as well as smaller sizes. Provision is made so that the

apparatus, a scale beam being provided so that each sieve can be weighed in the machine. Fig. 2 shows the movable equipment with only part of the tank showing. W. S. Tyler



Fig. 2-Float-and-Sink Apparatus

Co., Cleveland, Ohio, in the same booth exhibited its Ro-Tap testing screen shakers.

Only one exhibitor had a model of a tipple-the Morrow Mfg. Co., of Wellston, Ohio, which exhibited a four-track steel tipple somewhat in miniature but in active operation.

A screen looking like a nest of printers' ink rolls and known as a "coal separator" (see Fig. 3) was shown by the Frederick Iron & Steel Co., Frederick, Md. This separator both screens the coal and feeds it. The bars of the ordinary bar screen are in this separator replaced by rolls which not only can be kept absolutely in line but which by their revolution aid in the rapid removal of undersize coal.

What is more, by a clever device the width of the spaces between the rolls on either half of the separator can be adjusted to suit the needs of the market merely by revolving a wheel till a certain reading is obtained which corresponds to the opening desired. Thus all or only half the coal can be screened if the customer should desire completely screened coal or coal with a smaller proportion

of screenings respectively. The reciprocation of the screen causes the coal to move toward the lower end.

Further improvements are being made by the Hendrick Mfg. Co., Carbondale, Pa., in its flanged lip screen. The perforated slots are staggered and tapered, being smaller at the top than at the bottom, and this is true of the shape of the openings in the "riser" as well as of the cross-section of the plate on the "tread" of the This feature prevents coal "stair." from lodging in the perforations.

Seven vibrating screens, some new, some old, were exhibited at the exposition. Among the latter may be mentioned the Arms screen of Roberts & Schaefer Co., the screen of the Traylor Vibrator Co., the Hum-mer screen of the W. S. Tyler Co. and the Leahy No-Blind screen of the Deister Concentrator Co.

A new screen was shown by the Niagara Counterflow Screen Co. This machine is operated by an eccentric shaft mounted centrally on the frame of the screen. By this arrangement the screen is moved horizontally and vertically, and as this is done in opposition to gravity, the material tends to be held on the screen.

Similarly the Pittsburgh vibratory screen exhibited by Pittsburgh Coal Washer Co., Pittsburgh, Pa., depends on an eccentric shaft which is mounted on self-aligning ball-bearing pillow blocks. The exhibitors claim that because of the inherent qualities of this design the screen cloth must vibrate uniformly over the entire surface and that regardless of the variable loads due either to change in volume or size of feed.



Fig. 3-Revolving Screen Bars

Another type shown was the Rotex heavy-duty screen of the Orville Simpson Co., Cincinnati, Ohio (see Fig. 3). It is laid almost level. The exhibitors assert that the screening is more exact, for on a steep screen gravity "acts to pass the material through the meshes obliquely."

The screen is inclined at 4 deg. and a $3\frac{1}{2}$ -in. level circular motion is imparted to it. This horizontal motion distributes the material over the screen, and to aid in preventing clogging, 3- or 41-in. solid rubber balls which are imprisoned between the crosspieces in the screen strike at at random against the entire under surface of the screen cloth and thus

prevent blinding. The Traylor Vibrator Co. showed its new vibrator conveyor for feeding purposes. This is of light weight and stops and retarders of its make.

handles a big tonnage. It is suitable for feeding crushers and screens and for the distribution of material to storage and to cars.

So much good coal is going to waste at picking tables that it is strange more use is not made of the principle of the Bradford breaker which the Pennsylvania Crusher Co. emphasized at its booth.

A gravity-operated dump was shown by the Phillips Mine & Mill Supply Co. designed to accommodate all the various types of mine cars in use, dumping them either right or left at a speed of 7 to 10 cars a minute.

A new automatic bumper stop feeder has been developed by the Mining Safety Device Co. A model of this device was exhibited in this company's booth with others of the automatic scale and dump feeders, automatic feeders, cushioned horn

Pumps Should Be Certain as Gravity

life, but bound inseparably with life stanced the exhibit of the Aldrich is about 1 in. thick and is applied as is the proper functioning of the pump. Pump Co., of Allentown, Pa., which a grout while the pipe is being re-A pumping unit that is just about to included two of the Kosmos porce-volved. play out operates uncertainly and inefficiently, involves hours of overtime for mechanics and dollars for repairs and makes large standby capacity necessary.

The American Mining Congress Exposition at Cincinnati showed that the manufacturers had this factor of successful pump operation in mind and had made important advances toward its accomplishment.

Much has been said about pump on dependability and life may be in- 5-ft. lengths. The lining of cement lain plungers it uses in its pumps. According to this company, one firm Heights, Ill., had in its inclosure a having 300 in use asserts that the large working exhibit of a centrifugal output cost is only 51c. per plunger per month.

But the short life of pipes is almost as perplexing as that of pumps. For this reason the American Cast Iron Pipe Co., of Birmingham, Ala., showed in its booth its Simplex ward its accomplishment. cement-lined cast-iron pipe, which is is accomplished by trapping a small as 2 in. and in quantity of liquid in the pump and

The La Bour Co., of Chicago pump lifting a mixture of water and air, an achievement which has hitherto been regarded as impossible. It is accomplished, however, by means of an impeller of unusual shape and a separator, to which the discharge is connected. The displacement of air
New Mechanical Mining Helps at Cincinnati Show

using the velocity of discharge of this liquid to entrain the air and carry it

out of the casing. This company also displayed the La Bour gathering valve, a device to be used on mine pumps to prevent the complete emptying of the suction line when the sump becomes dry. The valve is so constructed that it closes the suction line when the water level of the sump falls to a point where air would be drawn into the line. A float is provided which locks the mechanism after the pump's suction has closed the valve.

By the use of helical gearing on the main drive shaft the Deming Co., of Salem, Ohio, has greatly decreased vibration in its mine gathering pump, thus lengthening its life. One of these pumps was exhibited in the Deming booth. Timken roller bearings are now used in the construction of this type. Corrosion and scoring of the piston rod, always a source of annoyance in the average mine pump, has been reduced by the use of stainless steel for that part, the high chromium percentage of this steel increasing its resistance to wear.



Fig. 1-Worm-Gear Reducer for Pump

cago, Ill., exhibited pumps in connection with motors, laying emphasis on its ability to supply a complete unit without any divided responsibility for its proper functioning.

To show how efficiently its pump is oiled the Weinman Pump Mfg. Co., of Columbus, Ohio, had furnished the pump in its booth with glass windows which enabled the spectator to observe the movement of the oil.

A worm-drive gathering pump possible damage.

from which gearing is entirely eliminated and replaced by a De Laval worm-gear reducer (see Fig. 1) was shown by the Dravo-Doyle Co., of Pittsburgh, Pa. This pump is silent and safe. The worm operates on ball bearings, plastic bronze being used for all other bearing surfaces. As the width of this pump is only 25 in. it can be crowded against the rib in a heading where conditions make this necessary, still leaving space for cars to pass.

At this booth was shown also the De Laval centrifugal pump, which was opened up to show its interior Foot valves were construction. shown in which a valve deck with rubber valves was provided instead of the usual flap construction. This is said to reduce maintenance cost and decrease the possibility of leakage which the warping of the large flap would inevitably cause.

The "Insta Control" for centrifugal pumps also was on display. This appliance, by opening the circuit of the holding coil or operating a relay, closes down the pump in case it loses its suction, thus preventing

Making Power Reliable and Adequate

the pressing problem of the electhe American Mining Congress Exposition kept that need well in mind.

Fairbanks, Morse & Co., of Chi-

"Televox," a mechanical man which in response to a whistle will start the equipment in an automatic converter substation, was displayed by the Westinghouse Electric & Mfg. Co. It was designed for the regulation through an ordinary telephone of a 200-kw. motor-generator set.

A new "one-side-of-line" contactor starter developed especially for motors stationed underground was exhibited by the Ohio Brass Co. This starter uses a series relay for cutting out the steps of resistance and bimetal time-element units for the

Fig. 1-Hidden Copper-Weld Bond



June, 1928 - COAL AGE

Of particular interest to electrical

trical engineer; the manufacturer at engineers was the exhibit of the General Electric Co. which demonstrated clearly that a "Capacitor" could correct low power factor in the line leading to an induction motor. This unit contains a condenser by which the inductive effect of the motor is counteracted. In the demonstration a 3-hp. motor was used. At full load the power factor was 88 per cent. Connecting the "Capacitor" to the circuit raised the power factor to 92.

The Westinghouse company showed one of its new SK explosiontested motors for general use, and a type KH room-hoist motor also explosion-tested.

An induction motor cut away to show the iron rod which automatically changes position in the rotor slot was exhibited by Fairbanks, Morse & Co. This motor is the new variable-leakage double squirrel-cage design which exerts a high starting torque with low current and operates at improved power factor. At start-

ERTAINTY in operation is still resistance-step and overload controls. ing, magnetism holds the iron rods down in the bottoms of the slots, thus choking the current in the lower bars. As the rotor reaches a certain speed the rods are thrown out against the upper bars, changing the magnetic condition.

> The National Carbon Co., a unit of the Union Carbide & Carbon Corporation, showed some large graphite and the newly developed shunts it is now introducing. The 24 B shunt is fastened with spring-clip washers which maintain tight contact regardless of the expansion and contraction

> > Fig. 2-Mica Undercutter



New Mechanical Mining Helps at Cincinnati Show



Fig. 3-Commutator Grinding Device

which changes in temperature involve. The 21 H shunt is attached by three hollow rivets. The holes through the rivets skillfully provide for an increase of the cooling area.

A hidden copper-weld rail bond with a new type of terminal was on display at the booth of the Electric Railway Improvement Co. The same terminal can be used on cross bonds. (See Fig. 1.)

The Rome Wire Co., of the General Cable Corporation, showed its new non-metallic trench-lay cable, and the Martindale Electric Co., Cleveland, Ohio, exhibited a portable lamp guard which is insulated with soft rubber.

To its line of resurfacing stones the Ideal Commutator Dresser Co., Sycamore, Ill., has added a tool rest for brush arm mounting and a motordriven flexible-shaft mica undercutter (see Fig. 2).

The undercutter is of special interest because it can be used without removing brushes if there is a 3-in. space between holders. The saw makes its cut parallel to the flexible shaft instead of at right angles to it. It is kept in the slot without difficulty.

A device for grinding commutators was shown by the Martindale Electric Co. An attachment is supplied for attaching the device to the brush holder with a wheel and screw feed for advancing the grinding stones across the face of the commutator and another wheel and screw for regulating their position in a direction at right angles to the axis of the commutator. (See Fig. 3.)

Fittings for 6/0 trolley wire, a eral pieces of non-aligning clamp, a hanger extension adapter which requires no thread house exhibit.



Fig. 4—Hanger for Steel Girders

on the pipe, and a hinge-type support for trolley-guard boards were shown by the Electric Railway Equipment Co. The guard support is clamped to the boards, eliminating drilling.

The Ohio Brass Co. exhibited 6/0 fittings, and the circuit-breaker switch which is now made in 800 and 1,200amp. sizes. There was also a safety switch for butt-heading work. It is a quick break with magnetic blowout and is contained in an insulating case. This company also showed a hanger for use on steel girders (Fig. 4).

An adjustable clamp for trolley and feeder, a section insulator switch with feed tap on the blade, and several pieces of 6/0 equipment comprised the new items of the Westinghouse exhibit.

That Mines May Be Safer-and Better

SAFETY developments were found on every side at the Cincinnati exposition. One, the Cardox, or "safety mining cartridge," of the Safety Mining Co., Chicago, Ill., can no longer be regarded as new, having received much notice already in the pages of *Coal Age*.

It is said that 3 to $4\frac{1}{2}$ lb. of carbon dioxide is used per cartridge, that the coal yield per cartridge ranges from 8 to 30 tons and that the cost for supplies varies from 40 to 50c. per discharge, depending on the weight of the charge and the freight rate on supplies.

To get a cushioning effect in firing a shot without using either air spacing or compressible stemming, the Hercules Powder Co. has developed and was exhibiting at the exposition the new permissible, Hercoal F, which it is claimed has all the merits of black blasting powder without its disadvantages.

With most permissible powders the shock is so severe that the coal is shattered, and space must be provided for expansion other than by breaking down the wall around the borchole, but with Hercoal F, though it is a permissible, there is so much bulk that the disruptive action is greatly toned down.

A bag carrying powder made out of a fabric specially treated and coated like Ventube was shown by E. I. duPont de Nemours & Co. Fungus, acid water, dry rot or wet and humid conditions do not injure it. Consequently, it has a long life and is not likely to be torn, permitting

Fig. 1-Jack Truck for Setting Timber



the explosive contents to spill. It also is a non-conductor of electricity.

Another improvement is a good reliable blasting rubber-covered cable, proof against rotting, highly resistant to rubbing and not delectable nest material for rats. In the old cable the covering was of cotton saturated with paraffin. The rats liked the "Sunshine" wax and found the cotton made good bedding. Thus many cables ceased to be properly insulated. As they continued to be used there were some unfortunate accidents.

Not only did the Lorain Steel Co. exhibit the longwall jacks that have contributed so much to the safety and efficiency of longwall and longface operations but also a jack for the setting of timber on roadways, a job that usually is accompanied by some danger and which generally hampers transportation.

The Santmayer timber jack is a relatively light screw jack with a V-shaped head for holding the timber, if round timber is to be placed, or a channel-shaped head, if steel girders are to be held in position (Fig. 1).

Each jack has a steel base of suff-

New Mechanical Mining Helps at Cincinnati Show

cient size to serve its purpose without being cumbrous or obstructive. No less than 585 of these jacks have been installed in the H. C. Frick Coke Co. mines. Fig. 1 shows a truck for transporting these jacks from place to place.

Electric cap and hand-lamp lighting competed in early days with the light of the safety lamp, a light which even then it easily excelled. Today the candlepower is beyond all such comparisons. Both the Mine Safety Appliances Co. and the Koehler Mfg. Co. have lamps of this character. The Koehler lamp was exhibited by the Portable Lamp & Equipment Co., of Pittsburgh, Pa., which presented both flame safety and electric lamps. The new Super-Wheat which the Koehler company makes has a 15-cp. gas-filled bulb with an auxiliary bulb of 6 cp. for use when the larger lamp is not required or when it is necessary to conserve the battery during some emergency. However, the big bulb in practice will give from 13 to 15 hours of service before the battery needs recharging, whereas as much as the smaller bulb.

was showing its Model F that gives 12 cp. using its main and 5 cp. using is even a better form of illumination. the acetylene which is consumed at fans and of its smaller disk fan. its auxiliary filament. Its Model G



Fig. 2-Small Rock-Duster

It gives 17 cp. with its main and the same light as Model F with its auxiliary filament.

A trip light was emphasized by the Concordia Electric Co., Pittsburgh, Pa. It is of rugged construction and likely to withstand the hard usage such a light always gets. The electrolyte is solid and will not leak.

Flood light at the face is one of the ideals of modern operating practice whenever and wherever it can be achieved with safety. The Carbic Manufacturing Co., a subsidiary of the Union Carbide & Carbon Co., exhibited a flare light larger and more powerful than would suit most coal 24-hour service can be obtained from mines but suited, however, to work in strip-pit operations and in surface The Mine Safety Appliances Co. work around a colliery. Its beam candlepower is 8,000 and its cost of operation is 40 to 50c. per shift.

It uses carbic and water to form

the burner. Carbic is a caked carbide held together by a binder. The water eats off the bottom, consequently if a cake is not entirely used it can be set aside for some future occasion, which cannot be done where ordinary carbide once has been exposed to water. If the carbic light is accidentally upset, the water runs out and gas generation stops promptly.

The Mine Safety Appliances Co. has added a high-pressure rockdusting machine to its appliances for keeping the mines safe. This machine will operate through 500 ft. of 3-in. hose, thus making it particularly applicable to back-entry dusting.

A small machine for mines that cannot afford the more expensive equipment has a blower that delivers about 350 cu.ft. of air per minute under a pressure of about 20-in. water gage. (See Fig. 2.)

Both the E. I. duPont de Nemours & Co., of Wilmington, Del., and the Robinson Ventilation Co., of Pittsburgh, Pa., exhibited fabric ventilating pipe at the exposition, the former Ventube and the latter Flexipipe. The Flexipipe is manufactured by the Bemis Bros. Bag Co., of St. Louis, Mo. The Robinson Ventilating Co. showed a number of its blowers in operation in connection with Flexipipe and also a working model of one of its large reversible mine ventilating

What the Industries Are Doing for Mines

termed "accessories." Yet, on a right study of these features of mining much money may be saved in mine operation.

Among these, preservative treatment of timber had space in the exposition. A new preservative, zinc meta-arsenite, was demonstrated by the Curtin-Howe Corporation, New York. This preservative was developed in the laboratory of the Western Union Telegraph Co. and has been adopted as its standard.

After treating, the effective penetration with zinc meta-arsenite can be proved by a visual test. All that is necessary is to cut a thin section of the treated timber or take a boring and spray it with starch iodine solution.

At a booth of the American Wood

CEVERAL exhibits at the expo- Impregnation Corporation, Chicago, Sition were devoted to what are Ill., which handles Wolman salts, were shown comparative samples of Wolmanized and untreated woods taken from mines of Central Europe.

The Ahlberg Bearing Co., Chicago, Ill., manufacturer of "CJB" Master ball bearings, demonstrated the uniformity with which its races were ground and the precision of a ball for use in such a race by an arrangement where the outer race of a bearing was held stationary and the inner race was rotated slowly. The bearing contained but one ball, yet this ball moved slowly and uniformly around. The heat of a lamp near the outer race was sufficient to expand it so that the ball would drop to the bottom.

Precision and uniformity of size, material and hardness were cleverly demonstrated by the New Departure

Mfg. Co. Steel balls of about 1/2-in. diameter were projected so as to drop onto a flat steel anvil. Thence they bounced to a height of about 2 ft., through the inner race of a ball bearing that was being rotated in synchronism with the projecting device, down onto another anvil and thence bounced back up into a hole in the side of the box.

This company also exhibited a special design of mine-car wheel containing two New Departure ball bearings of the angular contact type mounted opposed. The bearings are in a sleeve housing over which the wheel slips. In one direction the wheel is held in position by a rubber ring and in the other by a steel cap. The rubber ring cushions the shock of the thrust on the flange, thus protecting the wheel and bearings. (See Fig. 1.)

Other exhibitors of bearings were the Timken Roller Bearing Co., Canton, Ohio, and the Hyatt Roller Bearing Co., Harrison, N. J.

The Keystone Lubricating Co. exhibited the 150-lb. size of Keystone pneumatic safety lubricator, a new development designed for speedy and certain action in handling lubricants as heavy as semi-solid greases. With this outfit mine cars can be greased at the rate of four wheels per minute.

The Lincoln Steel & Forge Co. also exhibited a new lubricating machine which is especially suited to mine cars and other mine equipment. A Curtis compressor is used for its operation.

A timing device on a railroad-car scale which prevents any record of weight being made if a car is allowed to pass over the scale too fast for accuracy was exhibited by the Streeter-Amet Weighing & Recording Co. To the line of Simplex jacks, Tem-

pleton, Kenly & Co., Chicago, Ill., have added a post-pulling and timber jack which can be used also for supporting conveyors.



Fig. 1-Mine-Car Ball Bearing

Registers for issuing metal scrip were shown by the Osborne Register Co., Cincinnati, Ohio. The scrip is like a coin, being made of brass, copper or nickel silver of about 11in. diameter. This is stamped with the name of the company and the denomination (1c. or \$5, as the case may be) with the redemption provisions on the back.

To Clip Costs Institute Time Studies (Continued from page 336)

delay equals 5.36 per cent of 14 per shift in direct ratio to the shifts, or 360 minutes. Therefore increasing number of improperly the failure of secondary haulage to prepared faces encountered per shift. provide mine cars for the machine caused a loss, over the period re- aration, which gives maximum corded, of exactly 6 hours of me- quantities of "free coal" per place, inchanical-loader unit time. As, for for this, a known direct expenditure without return has been already tabulated, the management can find just exactly what loss is being sustained.

Combining the "No car" lost time with "Transportation" failure, or lack of co-ordination between primary and secondary haulage systems, a total of 8.41 per cent of 14 shifts, or about 91 hours, is shown as lost time.

Adding "Track" delays to these two items, a total of 10.34 per cent, or slightly more than 13 out of the 14 shifts, is indicated as lost time chargeable to general trackage conditions and to the lack of proper coordination between primary and secondary haulage systems.

The delay due to "Picking" down tight coal, which is 2.01 per cent of the 14 shifts recorded, not only shows a direct loss of $2\frac{1}{4}$ hours at a known rate of expenditure per hour but also indicates an indirect loss in machine efficiency while actually loading coal. As machines have definite loading capacities per minute, this factor decreases the total output In other words, proper face prep-

creases the tonnage loaded per operating minute. This does not mean that coal should be pulverized so that maximum quantities can be loaded in a given time but it does mean that all coal at the face should be loosened from the ribs and from the back of the cut by correctly located, charged, tamped and blasted drillholes, giving the greatest percentage of the sizes required and yet without wasted time for manual face preparation.

Again referring to the foregoing table, the items "No coal prepared" in advance of the loader and "Cutting machine" repair, totaling 3.79 per cent of the 14 shifts, indicate a lack of a sufficient number of working

FORM E-DAILY CONDITION REPORT On Machine No. .

Lar	cm	ne	2.0	04	٠	٠
	D					

Date
Sathering head
Rear conveyor
Forward and reversing clutch
Diff. & H. & L. mech.
Tydraulic system
Electrical equipment
fain chassis
Miscellaneous

FORM F-SUPPLY REQUISITION	
Section No	
Date	
Oil and grease, gal	
Timber (enumerate length, etc.)	
Explosives	
Powder	
Саря	
Rails	
Ties	
Miscellaneous	

places per loading-machine unit and therefore lost time chargeable to lack of planning or lack of proper supervision and co-ordination at the working faces.

Also the lost time under the items "Machine repairing" and "Oiling," totaling 1.95 per cent of the 14 shifts, indicates lack of adequate inspection, lubrication, maintenance and repair methods, whereby the greatest portion of operating-shift breakdowns can be forestalled and mechanical units kept in condition for uninterrupted shift service.

Miscellaneous items of lost time such as "Power" off, setting necessary "Props," etc., should be classed as accidental delays, and need not be analyzed in detail unless they consume a considerable portion of total operating shift time.

Taking the tabulated report of 14 shifts at its total value, we have a 77.08 per cent operating and a 22.92 per cent inoperative time shown. Of this inoperative portion 18.09 per cent, representing $20\frac{1}{4}$ hours or a little more than $2\frac{1}{2}$ out of 14 shifts, is shown to be avoidable and 4.83 per cent is shown to be accidental lost time.

As the total $2\frac{1}{2}$ lost shifts in 14 recorded shifts constitutes an enormous proportion of available operating time, a further analysis by minute time studies was made. These time studies are taken on pocket-size pads with perforated and consecutively numbered sheets, shown as Form C. The average results of time studies show total shift-time distribution as in Table II.

Comparing the indicative tabulation with actual time distribution, it is to be noted that necessary operations accounted for 74.86 per cent of the average shift, or 2.22 per cent less than was shown by the first record, and that unnecessary lost time was shown to be 25.14 per cent of total shift time.

The general trackage conditions and lack of proper co-ordination between primary and secondary haulage systems was in reality responsible for 19.06 per cent of unnecessary lost time instead of the indicated 10.34 per cent shown by the daily demonstrators' reports, and therefore was the first problem to be solved.

The delay listed under "Picking" tight coal and breaking large lump are shown to be slightly greater than

as indicative reports, but the average are designated so that exact causes loading time of 1.07 minutes per car of 1.63 tons shows conclusively that face preparation was not adequate and that the machine was not functioning at its rated capacity while records were taken, necessitated a actually loading coal.

Miscellaneous items of lost time was shown to be practically the same given on demonstrators' reports, but

TABLE II.—FIRST TIME STUDY BEFORE CH	IANGISS 1	VERE MAD	15
Average time started Average time finished. Average tons per car Number of ears loaded.			7:30 a.m. 3:531 p.m. 1.63 112.5
Average connage loaded			183
	Minutes	Percentage	
Loading.	168.75	35.66	
Car change.	120.50	25.46	Necessary
Shifting machine	11.25	2.38	operation
Moving machine.	53.75	11.36	74.86 per cent
Machine or cars off track	5.50	1.16	
NO CARS AVAIIADIE	81.00	17.11	
Picking tight goal and benching house	3.75	0.79	
Blocked by outting machine	0.00	1.09	
Splicing motor eshio	0.00	1 90	Tinnecessary
Setting cars to hand loaders	3.25	0.69	lost time
Late starting shifts	7.00	1.48	25, 14 per cent
A REAL PROPERTY OF THE ADDRESS OF TH			
Average shift time	473.25	100.00	
Average roading time per car			1,50 min.
Average distance from loading muching to mitch when he do were	In and		1.07 mm.
Number of places cleaned up	mcea		8
Average move from place to place			5.47 min.
a place to place			
		and hencel	ALL CALLEY
TABLE IIISECOND TIME STUDY AFTER SOME LA	RGE CAR	IS WERE IN	STALLED
Shift time			489 min.
Average tons per car-Steel			4.1
Old cars			1.8
Number of cars loaded-Steel			22
Toppage loaded Old cars			102 7
volarge loaded,			202.2
	Minutes	Percentage	
Loading	100 25	40 75	
Car change	99.25	18 30	Necessary
Shifting machine	20 50	4 19	operation
Moving machine	31 50	6.44	69.68 per cent
Machine or cars off track	4.00	0.82	
No cars available.	96.00	19.63	
Picking tight coal and breaking lump	27.75	5.68	
Late starting shifts.	9.00	1.84	Unnecessary
No material	1.50	0.31	lost time
	10.00	2.04	zu. Jz per cent
Average shift time.	489.00	100.00	
TADLE IN MARKED A			DEN MADE
TABLE IVIHIRD TIME STUDY AFTER MANY IMPR	OVEMEN	IS IND DI	SEM WADE
Shift time			480 min.
Average tons per car			4.2
Tonnage loaded			257
A STATE AND A STAT	Minutes	Percentage	
Loading	255.0	53.13	
Car change	68.0	14.20	Necessary
Moving machine	22.0	4.58	operation
No cars available	52.0	2 01	oz. 74 per cent
Picking tight cool and breaking in	30.0	6 25	Unnecessary
Loading machine cable	13.0	2.70	lost time
No coal prepared.	26.0	5.40	17.26 per cent
A NAME OF THE ATT A PARTY OF THE OWNER AND A PARTY OF THE ATT ATT A PARTY OF THE ATT A PA			
Average land:	480.0	100.00	1 25
Average con channel time per car			4, 23 min.
Average distance from loading machine to quitch where loads were t	alaced		120 ft.
Number of places cleaned up			
Average move from place to place			4.72 min.
I THE LET'S MILL THE PERMIT SHARE WANTED			
TABLE V _ FOUDTH INTER STATES	BUOOT	NC AND	AR-CHANCE
THE TIME STUDY AFTER IMPROVING	SHOOT	ING AND C	JAR-OHANGE
Shite of METHODS			1 m - 2 / 1 -
Average handles.			480
Number of ange last			4.1
Toppage loaded			283
			200
A CONTRACT OF THE OWNER	Minutos	Porcentage	
	Ininuces	Torocanago	
Loading.	279.5	58.21	

Shifting machine. Moving machine. Carl off track on main haulage. Bad top, setting props.	25.5 	5.30 13.54 7.38 4.17	operation 88.55 per cen Accidental lost time
Average loading time per car, minutes.	480.0	100.00	4.05 0.80
Number of places cleaned up. Average move from place to place, minutes	ere placed, fect		. 60 . 13 . 5

making up these items are noted for elimination.

As the small size of mine cars, at the property from which the above great number of car changes behind the loaders for a relatively small output per shift, the management installed new steel cars of 4-ton capacity as rapidly as these units were received from the manufacturer. A time study taken when the mine was partly equipped with new cars shows the effect of this item on total production, though lack of proper coordination between primary and secondary haulage systems and lack of proper face preparation is noted to be worse than recorded in previous time studies.

Taking the necessary operating phases as shown by the second time study, it is noted that total percentage of shift time taken up in minecar changes has been reduced from 25.46 to 18.30 and that the greatest part of this has been converted into machine-loading time, which shows an increase from 35.66 per cent in the first to 40.75 per cent in the second time study.

CHECKING this by actual ton-nage output record, it is noted that 202.2 tons was loaded into 84 old and new mine cars averaging 2.42 tons per car, as against 183 tons into 112 old mine cars averaging 1.63 tons per car.

This increase of 19.2 total tons output per shift was accomplished with the same number of employees per crew, while the percentage time for loading and car changing was 2.07 more with the smaller type of mine car and an output of 183 tons than with the larger type and an output of 202.2 tons.

Though an increase is shown in percentage of total time used for shifting machines into advantageous loading position at the faces, which was due to lack of experience on the part of runners in loading mine cars of greater capacities without stopping, the decrease in time of moving machines from finished to fresh faces shows a decided reduction.

This was accomplished by enlarging and clearing breakthroughs so that machines could travel by the shortest route from place to place. However, comparing only the necessary operating percentage of shift time shown in the two records, it is noted that with the larger cars 19

-	183 Tons	1	202 Tons	9 - 1 - E - 7	252 Tons		283 Tons
r Accidenta	Unneoussary and accidental delays 25.14 %		Unnecessary and accidental delays zo 32%		Unnecessary and accidental delays 17.26% Moving		Unnecessary and accidental delays 11.45% Moving 13,54%
20	Moving 11.35 %		Moving 644%	And at faces	4.58 % 60 car changes	Shifting at faces	530 % by car changes
Operation	238 % 112 car changes 25.46 %	Shifting at faces)	84 car changes 18.30 %	Shiring	14.20%		Logding
Necessory	Loading into loton av. cars 3566% of total shift time		Loading into 242100 av. cars 40,75% of total shift time		Loading into 42ton av. cars 53.13% of total shift time		into 414on av. cars 58.21% of total shift time

Fig. 1-How Shift Time Was Utilized as Shown by Four Detailed Studies

additional tons was produced in 25 minutes less working time.

Having replaced all the small mine cars with large 4-ton units and having decreased the excessively high percentage of primary and secondary transportation losses by installing telephones from the outside to mechanical-loader sections of the mine, instituting an adequate dispatching system on primary haulage and supplying sufficient trackage for empty and load storage near the operating machines, the time studies shown in Table IV were recorded.

The increased "Necessary operating" time from 69.68 per cent, as shown in the second tabulation, to 82.74 per cent in the third, resulted in a largely increased output per shift, which is directly attributed to the conversion of "Car change" and unnecessary "No cars available" delays into actual machine-loading time, due to the adoption of the larger mine cars and a more complete co-ordination of the transportation system.

This increased tonnage per shift s was produced under practically the n same physical mining conditions and in with exactly the same number of men per unit crew as were employed at F the time the first tabulation was recorded.

A further analysis of this third compilation shows an "Unnecessary lost time" percentage amounting to 17.26 of total shift and that two avoidable items under this general heading are chargeable to improper face preparation and insufficient number of working places for the 252-ton output per shift.

The latter item was easily taken care of by laying track in additional rooms and seeing that they were cut, drilled and shot for the loaders; but the former item called for a close study of drilling and blasting

methods involving the number, direction, declination and depth of holes, quantities of explosive per hole and rotation of firing the charges.

A special foreman was temporarily added to each mechanical-loading section for this purpose and a systematic record of methods was checked against loading time per car and percentage of lump and slack produced until a satisfactory system was evolved.

Upon finding a satisfactory method of shooting that could be established as a standard, drillers and shotfirers were instructed in accordance with it, and the entire organization was notified to adhere strictly to this method of face preparation.

Also, an opportunity for a further reduction in car-change time was recommended by the mining engineer, who modified the former standard method of driving room crosscuts in order to reduce the distance centers between switches.

The fourth tabulation of time studies was recorded after the proved method of face preparation had been in use for a period of seven weeks

ORM	G-DISTRIBUTION	OF	MECHANICS'
	LABOR		

	Date	192		
Machine No.	Check No.	Hours	Cost	
1				
2				
3				
4				
5.				
6				
7				
8				
9				
10				
Total				
Other equipm	ent			

and the modified method of driving room crosscuts had been adopted.

Analysis of this tabulation shows a further increase in "Necessary operating time" and decrease in lost time, here designated as accidental, for a total of 283 tons output per shift. This is attributed to a still further decrease in car change time by "staggering" room crosscuts and tracking them to give a maximum car change distance of only 60 ft. and by eliminating practically all avoidable lost time.

The result of systematic face preparation is shown in the decrease from 4[‡] minutes loading time per car to approximately 4 minutes, which is partly converted into actual machine-loading time.

A graphic comparison of the four time studies just analyzed is shown as Fig. 1, and the form is recommended for use by mine managements in quickly presenting the summary of such studies to the operating organization.

IN ADDITION to the mechanicalloader operator's report each section foreman should turn in a record of all men employed per unit crew, as shown on Form D, together with a report for the master mechanic giving details of specific mechanical trouble developing in each machine or a notation to the effect that the unit operated satisfactorily and needs no particular adjustment or repair. A simple form covering this requirement is shown as E.

A form, shown as F, covers all material and supplies delivered to each mechanical-loader section, and when combined with repair-labor cost will make up a completed maintenance and general mine supply figure for each operating unit.

Some organizations have openly or passively resisted the introduction of report systems, and in such cases the tonnage produced by their mechanical loaders has not been increased. Those who have made and analyzed daily reports and time studies of operation have been gradually increasing outputs per machine shift, correspondingly decreasing their total costs.

Are we to range opinion against fact where unproductive time is known to mean wasted dollars and cents? Or shall we eliminate unnecessary and therefore costly delays by preparing adequate performance records and analyzing them methodically?

Lexington Welcomes MINE INSPECTORS

At Annual Meeting

 \neg WO days devoted to a study of \equiv accidents and one day inspecting the Blue Grass Region were spent by the Mine Inspectors' Institute of America which met at Lexington, Ky., May 14-16. At the session of Monday, May 14, the president of the Institute, William Boncer, . mine inspector, Department of Labor & Industry, Richmond, Va., occupied the chair.

A standardization committee was appointed consisting of R. M. Lambie, chief inspector, Charleston, W. Va.; W. H. Glasgow, Secretary of Mines, Harrisburg, Pa., and Frank Hillman, safety inspector, Woodward Iron Co., Mulga, Ala.

J. M. Carmody, editor of Coal Age, emphasized the progress of the mining industry and the need for the inspectorate to guide it toward safety without hampering its progress. With limitations the obligations of safety inspectors might be compared to those of traffic policemen. When that force was first appointed in New York it believed its whole duty was to bind traffic down to regulations. The rules -always and only the rules-were the guiding principle. The police believe they were simply to rule.

Later a new point of view was introduced. It was realized that next to the duty of regulating traffic lay the duty of expediting it. Thereafter came progress. The mine inspectors have a similar duty to make industry safe, but to do it without undue interference with economic development. It is a job requiring imagination, a sense of relative values, a receptivity to new ideas and an ability to forecast the future.

R. Dawson Hall, engineering editor of Coal Age, said that there was need for greater uniformity in laws between one state and another where conditions were similar. Care must be taken lest the laws be so written as to exclude the introduction of safety provisions.

light is strictly within the law of most dition." Itemizing these expenses, he had a fibrous or combustible wrapping of the states because it is not a safety added: "In addition the loss of pro- on them and had in their composition

Hidden Cost of Accidents

-Lost time of injured employee.

1-Lost time of injured employee. 2-Lost time of other employees who stop work out of curiosity, sym-pathy or to assist the injured employee. 3-Time lost by foreman, supervisors or other executives: (a) Assisting injured employee; (b) investigating cause of accident; (c) arranging for some other employee to continue in-jured employee's production; (d) selecting and training new employee to selecting and training new employee to replace injured man; (e) preparing state accident reports or attending hearings before the Industrial Commissioner.

4—Time spent on case by first-aid attendant and hospital department staff, when this time is not compen-sated by insurance.

5-Cost due to injury to mine, equip-

ment or to loss of coal. 6—Cost due to decreased production and failure to fill orders on time. -Cost to employer under employee

welfare and benefit systems.

8-Cost due to loss of profit on the injured employee's productivity and on idle mine or equipment.

lamp. No matter how excellent it is; no matter if it will detect small percentages of methane; no matter if it has the full approval of the Bureau of Mines and the inspectors it may not be a legal detector of gas because it does not have a flame.

At the afternoon session R. E. Simpson, engineer, the Travelers Insurance Co., Hartford, Conn., discussed the hidden cost of accidents. Mr. Simpson declared that "An analysis of more than 10,000 accident reports drawn from the claim files of the Travelers Insurance Co. has disclosed the amazing fact that the uninsurable cost, which in the event of an accident must come from the pocket of the employer, is at least four times the cost of compensation and medical, cite Mines," advocating the exclusive attention."

Said Mr. Simpson: "An explosion may occur while a shotfirer is alone in a mine. In this case there is one fatality, the direct cost of which is borne by the insurance carrier. The AS THEY now stand there is a incidental cost (borne by the mine serious question whether a me- owner) is the expense involved in rethane detector that does not show a storing the mine to a workable con-

duction sustained while this repair work is being done must be taken into account, together with the possibility of canceled contracts and extra sales expense to regain lost business."

The total of incidental or hidden costs of an accident are listed in the accompanying panel, those in Mr. Simpson's standard list that are not applicable to present-day coal mining being omitted.

L. W. Brown, state mine inspector, Wheeling, W. Va., in discussion put the actual losses at five times the insurable loss, and J. J. Rutledge, chief mining engineer, state of Maryland, Baltimore, Md., said the ratio was about equal to $4\frac{1}{2}$. He declared that an explosion which killed a shotfirer and wrecked a mine cost the company that owned the colliery \$28,000 and the insurance company only \$4,500. C. A. McDowell, safety and personnel manager, Pittsburgh Coal Co., Pittsburgh, Pa., instanced rehabilitation as a big, though hidden, cost of accident.

R. M. Lambie said that accidents should be reduced by proper engineering standards which must be laid down and followed. Roof-control rules would eliminate many accidents. Old "log-cabin methods of mining' must be discarded.

 $\mathrm{E}^{\mathrm{ACH}}$ mine should prescribe, after a careful study of the needs of the roof, how timbers should be set, said L. W. Brown. The miner should set all the timbers the schedule requires and more if needed. Posts are not set tightly in many instances. Mr. Brown had pulled down with one hand six posts in a single room. Caps, said Mr. Brown, are cut too thin. A 6-in. post needs a 3-in. cap 15 in. long. A thinner cap will not have the requisite "give." Determine where, when and how a prop shall be stood; see that these needs are met, and many accidents from roof falls will be avoided.

P. J. Friel, state mine inspector, Shamokin, Pa., read an article on "Electrical Firing of Shots in Anthrause of electric shotfiring using the generative or magneto type of battery. In his district such shots have been standard practice in a number of mines during the past ten years and no accidents have happened from that cause in all that time.

Mr. Friel objected to the use of time fuses, remarking that all of them the elements that tend to cause misfires with ordinary fuse. When the first shot of a series fails, the rest fail also.

H. H. Hamilton, special representative, E. I. duPont de Nemours & Co., Pittsburgh, Pa., said that the magneto insured better detonation and thus the full efficiency of the explosive. Storage batetries become weak and are uncertain. Sometimes they are stowed away with caps, with consequent danger.

Mr. Friel said that in the anthracite region as many as seven or eight shots were fired at one time. Questioned, he said it was a strong union district, but he had no trouble in introducing electric shotfiring. The district leaders backed him up when the facts were duly presented. Asked if there were any failures to ignite, he said none. Sometimes one of the cartridges does not fire because of the paper being left folded over the end of one or both cartridges.

Nicholas Evans, state inspector, Johnstown, Pa., developed the fact that the mines which Mr. Friel inspected pitch heavily. They are therefore without rails. In flat seams the leads get on the rails, and the miners try to use them after the insulation has been worn off. Thus there is risk that the electricity in the rails will fire the shots prematurely.

ED FLYNN, chief inspector, Ten-nessee Coal, Iron & R.R. Co., Birmingham, Ala., said that one company producing 4,000,000 tons annually and employing 7,000 men had used caps and fuse 15 years without an accident. When squibs were used the miner had to tamp his hole full and tight and had to use damp tamping in order to get conditions favorable to the use of the squib; with any other method the miner who wanted only ignition and did not care about a windy shot need not tamp either full or tight and could use any kind of tamping. That was where the elimination of the squib, desirable as it was, was not entirely a gain in safety.

L. W. Brown said that where men fired their own shots the detonators often were not kept separate from the cartridges of permissible powder. He had found them lying together under loose rock. Shotfirers should be employed to avoid this danger. Mr. Friel said there was the same hazard with fuse and caps.

On the morning of Tuesday J. T. Beard, a former associate editor of beyond the trolley line it uses double- adjacent to Lexington.



W. H. Jones

Coal Age, now resident at Danbury, Conn., read an article on the "Propagation of Local Gas Explosions in Mine Workings" which, containing details of explosions in several mines, does not admit of briefing except to say that it shows that while explosions occur in mines that produce other minerals than coal, they usually are localized and do not extend throughout the mine.

N. MAY, professor of industrial A. education, University of Kentucky, Lexington, Ky., delivered an address entitled "At the End of the Airway," discussing vocational training and its value and saying that in 1907 the late Dr. Norwood instituted "the first short course specifically for coal miners ever given in this coun-Discussion largely ranged try." around this statement. The work of Andrew Roy in Maryland in 1890 was instanced as earlier than that in Kentucky as also the classes taught by James T. Beard in Illinois and Iowa between 1885 and 1896.

J. J. Rutledge said that in Maryland there were seven night classes, five elementary and two advanced. The latter were in electricity. Not one of those who have attended has been seriously injured in the mines. The increase in salary of those who have attended has been \$40,800.

At the afternoon meeting R. C. Beerbower, Goodman Mfg. Co., Pittsburgh, Pa., read a paper on the explosion-proof cable-reel gathering locomotive and its availability for safe operation in gaseous mines. This locomotive when on the entries where trolley lines are strung uses the current from these lines. When it goes of Kentucky and the stockfarms

conductor cable of which it carries 450 ft.

When operating the locomotive on cable, an interlocking switch, located in the inclosed controller, disconnects the live circuit from the trolley pole and the ground circuit from the locomotive frame and automatically transfers these two circuits to the reel cable, thereby establishing a full metallic circuit through the return cable to the rail on the entry. The locomotives are equipped with low-speed motors that drive them at a speed of 4 to $4\frac{1}{2}$ miles per hour on full drawbar pull with motors in parallel. When operating the locomotives on cable, the controller is so arranged that the motors can operate only on series, thereby further reducing the speed."

Mr. Beerbower compared the machine from a safety standpoint to a cutting machine except that it never got closer to the face than a car length whereas the electrical parts of a cutting machine are at the face.

ELECTION of officers followed the paper. W. H. Jones, first vice-president, was made president; Nicholas Evans, second vice-president. and C. W. Stuart, former state coal mine inspector at Thomas, W. Va., third vice-president, were advanced to first and second vice-president respectively. O. P. Pyle, chief mine inspector, Nashville, Tenn., was made third vice-president. C. A. McDowell, J. J. Rutledge, J. T. Beard and J. H. Edwards were re-elected secretary, treasurer, editor-in-chief and publicity editor respectively with W. B. Hillhouse, assistant secretary.

Knoxville, Tenn., was chosen for the next meeting. Fifty-three members were present, five from west of the Missouri. Seventy-two persons attended, of whom nine were chief mine inspectors, twenty-two state and ten company mine inspectors.

In the evening a complimentary dinner was given to the institute by four of the Kentucky and Tennessee Coal Associations at which addresses were made by F. Paul Anderson, dean of the department of mechanical engineering, University of Kentucky and others. Joe Johnson spoke on behalf of Flem S. Sampson, Governor of Kentucky, who was unable to be present. On Wednesday morning the party was taken on a sightseeing trip to see the Shriners' Home for Crippled Children, the University

PREPARATION Past, Present and Future Engrosses Anthracite Engineers

ADICAL changes in market have always occurred, and Sometimes troubled, the anthracite region, according to Charles Dorrance, consulting engineer, Scranton, Pa., speaking in the Westmoreland Club, Wilkes-Barre, Pa., June 2, at the meeting of the Engineers' Society of Northeastern Pennsylvania, of which he is president.

Mr. Dorrance said that the first mining operations in the anthracite region were strippings, which were later followed by water-level tunnels. When the American Institute of Mining Engineers was formally founded in 1871 at a meeting in Wilkes-Barre, mining science, later to be fostered by that organization, was at a low ebb. In 1873 it was complained in a paper before the institution that the mining engineer was seldom con-sulted. The mine foreman was supreme.

Up until 1880 and virtually up to 1890 pillars were never drawn. At first the coal was undercut, but later holes were drilled by jumpers in the coal and shots fired without undercutting. In 1850 hand-boring was introduced and about 1910 jackhammers came into use.

At first only coal of building-brick size had favor on the market. Later rakes were introduced to separate a somewhat smaller size which the public had been induced to buy. The rakes were indeed only rarely used except when the men were watched while loading. By 1870 they had almost entirely disappeared.

Gradually the underground transportation system gained in importance till today the Delaware, Lackawanna & Western Ry. has less track between New York City and Buffalo than the hill. Glen Alden Coal Co., its subsidiary, has underground.

In 1880 only 6,000 tons was hauled per mule employed, but today the Glen Alden with about 10,000,000 tons production annually has only about 125 mules.

In earlier years short-term leases were general and they had their usual evil effect. Only with a long lease or ownership could an operator consider the importance of permanence of

HARLES DORRANCE describes the many important changes in anthracite preparation since 1820 and Thomas F. Steele shows that changes in preparation are still necessary. By more modern methods 24 men and boys now do methods 24 men and boys now do the work of 71, saving \$220 per day in labor with an increased daily production of 20 per cent. Only four men are actually em-ployed in cleaning coal after crushing, yet this and even a larger tonnage can be handled by three men. With the former jig methods 25 men would be needed.

construction or conservation of coal. Ruinous competition was the order of the day, and coal rushed to tidewater frequently was auctioned for anything it would bring.

Even in the early days the harder anthracites commanded a price a dollar per ton higher than that of the softer and more free-burning coals of the northern section. The foundry preferred the strong Lehigh and Schuylkill coals with their conchoidal fracture to the "checkered" coal of the Wyoming region.

In the years from 1820 to 1840 the consumer did his own coal breaking.

In 1839 anthracite was first used for smelting iron. In 1840 there were six such pig-iron furnaces and many more later. That marked a big change in the anthracite industry.

With the entry of anthracite into the furnace field the Wyoming area was still further at a disadvantage. The coals that were best suited for furnace use were mined and others that gave a checkered coal that broke under the overburden were left in the

The Wyoming officials tried to induce the market to take smaller coal so that the larger coal could be sent to the furnace. Thus between 1840 and 1860 there was a big change in the market. Coal with less than 2 per cent of sulphur and a conchoidal fracture was desired. When the public had been educated to leave its coal breaking to the producer, coal over 4 or 5 in. diameter was broken for the domestic consumer. In 1848 a liery of that company.

large mechanical breaking plant was built in the Scranton region and in 1851 a plant was built that both broke the coal and screened it.

In 1856 at Elizabethport a plant for the further breaking of egg and furnace into smaller sizes was established at Tidewater. This was inspected by the Delaware & Lackawanna R.R. Co. in 1856 or 1857, and it was decided after some consideration that this further breaking or cracking should be done not at the retailers' yards but at the colliery. So in 1859 such a second set of breakers or crackers was established.

In 1870 pea coal began to have its innings. Of recent years, said Mr. Dorrance, engineering in the anthracite region has gone ahead but the selling has gone back.

Thomas F. Steele, general superintendent, South Penn Collieries Co., Scranton, Pa., described the coal preparation at the Von Storch colliery, which was the subject of an address by the same author at the Cincinnati convention, as is reported on page 347 of this issue.

The cars at this plant, said Mr. Steele, are dumped on a 6-car rotary operated by one man, the largest rotary dump in the anthracite region. All coal over $4\frac{1}{2}$ -in. round mesh is picked before it is crushed in the main crushing rolls, which are of 51-in. diameter, have a face of $50\frac{1}{2}$ in., and operate at 22 r.p.m. The No. 2 rolls are of 36-in. diameter, have a 57-in. face and a speed of $28\frac{1}{2}$ r.p.m. The $\frac{1}{10}$ -in. mesh material is removed in shakers before the product is delivered to the Chance separator cones, thus maintaining clean sand and more uniform gravity.

IN discussion A. B. Jessup, vice-president and general manager, Ieddo-Highland Coal Co., Jeddo, Pa., who presided, said that 40 per cent undersize did not reduce fuel values. It was likely that specifications to be prepared would permit more variation, but slate tolerances are likely to be greatly curtailed or eliminated. New equipment made them needless. Bone was another matter, for bone was coal.

Charles Dorrance declared that an increase of prepared coal could not be expected from the use of better equipment, for the coal saved from the bank was compensated by the slate removed from the coal. W. H. Lesser, mechanical engineer, Madeira, Hill & Co., Frackville, Pa., briefly described the breaker at Natalie col-

COAL AGE

Published by McGraw-Hill Publishing Company, Inc. JOHN M. CARMODY, Editor

NEW YORK, JUNE, 1928

Can anthracite be packaged at the mine?

AN anything be done to increase the sale of anthracite besides improving its quality, extending customer service and advertising its merits more intensively? Do buying habits of the public in other commodities offer a field for study on the part of anthracite operators and distributors? Does it lie within the scope of modern merchandising service to develop methods in line with accepted ideas of convenience?

Today literally thousands of products reach the ultimate consumer in cartons and bags that were handled only in bulk a generation ago. Merchants of that day shook their heads and said the cost would be prohibitive. Experience has proved otherwise. Convenience, assurance of quality, of brand and of weight have won the public to a practice that our grandfathers thought economically unsound.

Stranger things have happened than the sale of anthracite to domestic consumers in bags or other suitable containers sealed at the mine, guaranteeing brand, weight and quality. Who will have the courage to investigate its possibilities and perhaps experiment in a limited and selected field? Innovations maks news; news attracts attention; attention can be fanned into interest and into action.

The time to consider this is now, when a cooperative advertising campaign of large proportions is getting under way and when fresh minds, untrammeled by tradition, are searching for ways and means to extend markets.

And now it is Mather

ATHER has so long been regarded as the synonym for safety that it comes as a distinct shock that it should be the victim of an explosion in which 195 lives out of 209 in the mine were lost. Everywhere people are inquiring how workings with everything ordered according to the best safety standards could in these days of rock-dusting have so severe an explosion.

It is needless, perhaps, to enumerate the precautions that had been taken at Mather—rock-dusting of tracked roadways, fourteen rock-dust barriers containing an average of $3\frac{1}{2}$ tons of inert dust, permissible explosives and detonators carried by different persons, the first by miners, the second by shotfirers who also were furnished with approved electric shotfiring devices, use of incombustible matter exclusively for stemming, facilities provided for watering roadways, water sprays on all cutters, storage-battery locomotives and draft animals for gathering, not less than five headings in the principal entries and sometimes six, with headings in threes and fours on main entries of less importance, testing of the mine atmosphere by analysis as well as by safety lamps and exclusive use of approved electric cap lights.

The inspectors, hunting around, as they should, for every possible breach of safety, declare that, as far as they had been advised, no analyses were made to determine the relative proportion of combustible and incombustible dust on the surface of rock-dusted passageways and that no means had been provided for sprinkling coal at the face before it was loaded into cars.

It will be difficult at this date to establish the exact quality of the rock-dusting and yet this is the consideration above all others it is desirable to have made abundantly clear. In too many mines rockdusting is more symbolic than effective. At Mather it apparently was inadequate or the explosion would not have killed so many men. Top cutting introduces a lot of dust. Supposing that dust to have been entirely prevented by proper spraying, there must have been much dust from the heavier shooting that is necessary to free coal when it cannot be snubbed and must be shot in opposition to gravity. This fine dust is likely to spread far and wide in the return air current.

Unless the law provides that rock-dusting be done efficiently, as proved by frequent tests, the whole practice of using inert dust will fall into disrepute, especially among those who already question its efficacy.

Moving from the mines

EVERY few years important social changes modify conditions around the mines. .Good roads, automobiles, buses, street cars and railroad trains, especially just now the three former, are changing mining conditions materially. Time was when the miner, figuratively, "jumped out of bed into the mines," and this convenient location was regarded as one to be favored.

Today many of the miners live in nearby villages and towns where there are more advantages in the way of schools, churches, movies, lodges, clubs, paving, street lights and sidewalks, and where they are not annoyed by the smoke from burning gob piles, by the sliding of rock banks, the cavings over extracted coal, the flying dirt from the mine tipple, the rattle of cars on the railroad and its unsightly tracks. They live on the hills or at stream junctions away from the narrow confines of valleys. With bath houses, they can go to their work clean and return from it in the same condition, thus preserving their self respect.

The operator will soon be rid of the necessity for building a town or a store to supply his men. He will cease to occupy in regard to them the position of a feudal baron, which former conditions thrust on him. Living in towns where the horizon is wider than in mine villages, the miner and his boy will drift into other industries and so the overmanning will be corrected. Reforms and unfortunate conditions alike arise more often from economic exigencies than from any purposeful intention.

The exodus from the mines is starting. With it may come other ills which are not visible, but come it will, and many fortunate conditions will accompany it.

Further research into flames of explosives needed

E UROPEAN studies of the flame resulting from the ignition of explosives and those of our own Bureau of Mines have shown that many hitherto unsuspected problems have yet to be solved. Efforts, for instance, to reduce the heat of explosion by the use of cooling constitutents which absorb that heat have the disadvantage of making complete detonation less certain and thus introduce another hazard. Perhaps also they delay combustion and so increase the duration of the flame, which again is not desirable. Should they so delay complete combustion that it is not attained till air exterior to the borehole is introduced to finish the process a further danger is involved.

Which way safety lies is not evident. It may be that a balance will have to be struck in order that assurance of detonation may be obtained without at the same time an excessive temperature in combustion, and low flame may be secured without long flames or secondary flaming. Indeed, perhaps the duration of the flame is more important than its temperature.

Again comes the question, whence arise these secondary flames of great volume and duration but low luminosity which the photographs show under some circumstances with certain explosives? Are some of these flames always present though sometimes invisible? Are they more dangerous than the primary flame because larger and of greater duration and because they are formed more nearly at the time when the walls of the shothole are breached?

Again are they due to secondary combustion of the explosive, the primary being incomplete? Are they due to the ignition of methane-air mixtures by the compression due to the shock wave or is the shock wave so hot (without being hot enough to be luminous) that it will itself ignite firedamp, or again can the secondary visible flames be traced to invisible inflammation which does not register on the photographic film but which penetrates the shock wave and ignites the firedamp mixture beyond it?

It must be remembered that hydrogen gives a flame that has little actinic value and that the film registers in no way the temperature of the flame but merely its brilliance. In fact an explosive dampened by the addition of a cooling agent, such as common salt, may give on a photograph a particularly vicious looking flame and yet be relatively harmless. Salt burns with a luminosity that registers readily but it decreases the temperature of the gases.

All these problems, as R. W. Payman recently stated before the Midland Institute of Mining Engineers, are fully appreciated by the Mines Research Board of Great Britain and doubtless they will form subjects for the experimental work of our own Bureau of Mines.

No one can assert that they are purely and inexcusably theoretical. Dr. Payman has shown how vital they are in determining safety in mines. It is to be hoped that the scientists in the research bureau of this country and Great Britain will by further experimental work read us answers to the riddles thus propounded to us by Nature.

Summer courses and fellowships

N WHAT grounds can competition be justified as a philosophy of business other than that it develops the most efficient use of brain power? If that be true, it must follow that training for the job is of the utmost importance.

Where is competition keener than in the coalindustry? Where is there greater need for trained men who know their product from its geology to its final utilization, through the various processes of production and marketing?

It would appear to be the part of wisdom for responsible executives in the industry to take a personal interest in the mining courses throughout the country. Men of brains gravitate toward those industries that offer the largest opportunities for intellectual achievement and financial reward. Nor should moral support be withheld from such summer courses as those being conducted at Carnegie Institute of Technology, Pittsburgh, Pa., and West Virginia University, Morgantown, W. Va.

Equally important are fellowships in research in coal announced for 1928-29 by the University of Alabama, Carnegie Institute of Technology and the College of Mines, University of Washington, Seattle, Wash. These fellowships, all conducted in co-operation with the U. S. Bureau of Mines, challenge the industry to make the best use of the discoveries of the men pursuing these researches, and to offer to them commercial opportunities when they leave the laboratory for the firing line.

The BOSSES Talk it Over



Getting More Lump Coal

JIM and the Old Man had spent the afternoon going over their shipments of prepared sizes for the month. The Old Man was trying to increase his sales realizations by shipping a greater percentage of larger sizes and less screenings.

"Jim," said the Old Man, "when you and Mac got control of the shooting by drilling and doing the shooting by the company you decreased your fines, but since then the market has become worse and we must do something to raise our lump-coal percentage."

"I hardly know what to do," said Jim. "Since we changed our drilling we also changed to a more suitable explosive, and that helped some."

'Just then Mac came in, but he could offer no relief. Finally the Old Man said: "I have been hearing and reading a lot about shearing. One company not only increased its lump coal by shearing but also decreased explosives costs 50 per cent and increased the tonnage per miner 46 per cent." increase the lump coal when you add more bug dust due to an extra cut in the face. Why, that would run our slack percentage away up."

"I don't understand that either," answered Mac, "and, besides, there is another machine to pay for and another crew to run our costs up. They're high enough now."

The Old Man tried to explain the effect of this increased slack by saying "I'll admit it makes one more cut of slack and may increase our slack percentage somewhat, but our net increase of 4-in. or 6-in. lump will overcome the smaller slack increase."

Mac asked: "How does that come?"

By this time Jim was beginning to think there might be something to the Old Man's idea and said: "I can see where that is possible because there are two more 'free faces' to shoot to, which would give each shot less work to do."

"Jim," returned the Old Man, "think this over carefully and let me know your answer when I return early next week. And, in the meantime, I will also go further into this problem."

"I can't see," replied Jim, "where shearing could

Is the Old Man right in saying that the increase in the larger sizes will overcome the increase in slack due to the extra machine cuttings? What will overcome the extra cost of shearing? Is Mac right in saying that it will increase the mine cost?

Is the Old Man right when he says shearing will increase the tonnage per londer?

Assuming that you had control of the drilling and were using the most satisfactory explosive, would you consider shearing to increase your lump coal percentage?

All foremen and superintendents are urged to discuss these questions Acceptable letters will be paid for

Stress Importance of Car Supply

Urges Angle-Face System

For Steady Supply of Cars

CONTINUOUS supply of cars to Athe miner is a factor for economy and safety in a mine. Moreover, there are many instances where the output could be increased 25 per cent or more by giving the loader more cars and supply-ing them more regularly—and without increasing either the personnel or the quantity of equipment.

Of the three good systems for supply-ing more cars at the face the angleface room, where it can be adopted, will prove the most efficient. It requires hardly any extra work from company work of the loader. With this system the rooms are turned and driven singletrack, being extended far enough to get the track lined up on centers and the centers being driven about 5 ft. from one rib. The wide side of the room is cut ahead and a short turn is made in the track. These turn rails can be used until the room is done if two extra pairs of short rails are used until the room is driven far enough for long rails to be laid down. With this system two or more cars can be loaded at once, de-pending on the width of the room.

The single-track room with switches laid in the breakthroughs is a good system where conditions are adapted to its use. Among its disadvantages, however, is the fact that the seam has to be nearly level, for one man cannot change cars. The remedy for this, of course, is to put two men in one place and increase the width of the room accordingly.

The double-track system also will increase the output per room, but under ordinary circumstances either of the other systems would accomplish the same result with less labor and expense. The most important requirement, how-ever, is good management, without which no system can meet with much success in minimizing human labor, that most expensive substitute for equipment. In larger operations, therefore, the services of an engineer in economy to make a constant study of cost-cutting operation would be a paying investment. Wolfpit, Ky. H. T. WALTON.

Must Suit Action to Mine

THE METHOD of distribution to be adopted by Jim and Mac will largely depend on the mine. If there is only a single track and there is not room enough for, or it is not desired lo lay double track, switchovers will have to be installed at various points. If, however, there is sufficient room a double track could be laid in the room and the two tracks connected to the single track by suitable switch points. Where it is not desirable or possible

to get two cars in a room a suitable siding can be installed nearby for spare cars. The cost of extra cars required will be more than compensated for by increased output. In a mine that can bear the cost the employment of an engineer to study the layout work is a good move. The big job then is to get the mine staff to work with him so that he can effect real economies.

Brentford, England. W. E. WARNER.

Engineering Technique Needed To Raise Tonnage per Loader

N HELPING Jim and Mac to in-I crease their tonnage per loader I would suggest that a careful survey be made of their transportation equipment, power condition, nature of roof struc-ture, method of cutting the coal, system used by the loaders, etc.

If Jim and Mac are fortunate enough to have a surplus of mine cars and sufficient locomotive power, they will find that portable room sidetracks or switchoffs into crosscuts will enable them to

HE man who ana-I lyzes these problems and writes out his solution is helped in his thinking as much as the man who reads it. How do you get lump coal?

keep loaders supplied with cars at all times. If they find this method too ex-pensive due to depressed market conditions, initial cost of equipment and installation charge, however, and they are cutting their coal with arcwall machines a section of the cut along the rib can be left in such a way that two mine cars can be placed and loaded at a time without working any hardship on the loaders.

If they are cutting the coal with bot-tom machines and their roof conditions are favorable they can carry their work-ing faces on an angle of 45 deg. and keep the track along the rib and by the use of a slight curve and a few sections of rail at the face two to four cars may be conveniently handled without dis-commoding the loader, depending, of course, on the length of each face. If roof conditions are exceptionally good it may be advisable to consider carefully some modification of longwall as better efficiency can be obtained from systems of this nature where natural conditions warrant such modifications. Adrian. W. Va. C. T. GRIMM.

Cites Many Leaks That Cause Costly Waste of Human Labor

HE PROBLEM of a slow turn and dissatisfied miners which vexes Jim and Mac is as old as coal mining. As their main-line haulage is efficient their trouble may be in distribution-maybe they have left bodies of coal unworked on account of dips or bad roof. These long and short headings may interfere with the schedule and are hard to adjust.

If there are swags and adverse grades, the services of the mining engineer will be needed in grade revision to prevent spillage and derailments as well as to get the full haulage value of the locomotives. The importance of the latter point is most likely to be overlooked by the average superintendent, who is unaware that a locomotive that will pull 133 tons on a level track is able to haul only 23 tons on a 5-per cent grade.

If Mac's motors are too small ventilation from the outside does little to in-crease their capacity. If his track is in first-class condition for haulage he can arrange two tracks in a room to give the loaders a chance, but they should not be crowded, as pointed out by Alexander Bennett in *Coal Age* last month, for, as he says, they will then load a large amount of impurities. What is needed is a regular supply of cars that will allow the miners to load a clean product without 30 minutes' wait for the next car after one is loaded.

Perhaps Mac has not properly con-centrated his loaders, which is necessary, for the motor cannot supply cars satisfactorily if they are scattered in various sections of the mine.

As Mac has a telephone his dispatcher can arrange a schedule for long and short hauls, placing all heavy loaders in one section if possible.

JOHN W. JONES. Altoona, Ala.

Russians Get Better Results

Through Use of Larger Cars

A^S JIM AND MAC'S haulage system up to the point where the gathering motors take charge of the trips is said to be satisfactory we must look for the cause of trouble between that point and the working face. If a careful study of the time required, with good tracks, to gather a trip and deliver it to the main-line parting shows that there are not sufficient cars it would be advisable to consider the possibility of using larger cars before ordering additional units.

When I became consulting mining engineer for the Kuzbas coal trust in southwest Siberia 3-ton mine cars were being used, which looked like soap boxes to an American engineer. The coal seams range from 6 to 55 ft. thick. These small cars were replaced first by 1-ton units and later by 2-ton cars. Eventually we put into service

twenty 4-ton units which had been shipped from America but were left rusting outside the mine for nearly three years before the Russian engineers could be persuaded to place them in a mine where I considered condi-tions ideal for this size. The increased efficiency in haulage was such that the day of the 1-ton mine car in the Kuzbas mines will soon be past.

A steady supply of cars means in-creased production, lower costs, greater concentration of working places-with closer supervision-and a contented set of miners. Earnings of the men will be increased and their health improved through the elimination of sweating periods of work followed by idling in a cold, chilly atmosphere waiting for cars. Safety also will be promoted in that dangerous conditions will be more readily perceived in time with the men steadily "on the job."

Where roof conditions permit I have operated the diagonal working face with the mine track paralleling the face, so that two or three cars can be placed instead of one, with good results. Diagonal crosscuts on an angle of 35 deg., with a switch for extra cars, also is advantageous, providing a means of quick changing. With favorable grades a miner will often change his own cars rather than wait for the locomotive.

In mines of sufficient size it would be well to appoint an engineer whose duties would be confined to studying problems and planning improvements in car supply and haulage. His wages would be saved many times over by the increased efficiency resulting there-from. J. W. POWELL, Welch, W. Va. Mining Engineer.

Plenty of Cars Means More Coal

WHETHER there should be two or more cars at a time per room to speed loading depends upon what system of operation is used in the mine. Where the miners push a mine car from the heading or gangway to the face and, when loaded, run it out on the heading the only remedy for lost time waiting for cars is to have side tracks close to the loaders, and they must be long enough to hold more mine cars than the outside locomotive would haul. This would give the gathering locomotive a steady supply of cars and the outside locomotive a steady supply of trips, with no waiting by the men either.

In mines where the coal is cut by machines and two men work together they should have no less than two rooms, so as to give them enough coal for continuous loading without having to wait for the cutter. In operations where the coal is hauled from the face of rooms gathering locomotives two men by should have two rooms; then the locomotive could place cars for one room and pull them from the other, and vice versa.

Where it is not possible to provide two men with two rooms a switch should be laid inside the room to hold one or more additional cars and the gathering

locomotive could bring two or more Contrast "Before and After" cars at a time to each room. Where cars at a time to each room. the grade permits, the men could change cars themselves. Where the men work one to a place or room and do not have to handle the cars themselves they should be given two rooms each and the result will be surprising. The increase in cars will be justified in most instances by increased tonnage per man and better earnings for the men. MINE FOREMAN. Hooversville, Pa.

Switch in Last Breakthrough Preferred to Double Track

SEVERAL points require considera-tion in the matter of more cars and less waiting per loader. It is neces-sary, first of all, to keep empties on the siding, so that the gathering motor will not have to wait. Good track and wire also are essential, and the motor must be kept in good shape. Do not, however, give the motorman more men than he can haul from.

Ordinarily it is not practicable to drive a room wide enough for two tracks, but a switch in the last breakthrough will pay-it saves time for the motor crew as well as the loader. As a rule rooms are driven about 300 ft. deep. If the room is in 200 ft. and has a breakthrough switch in 160 ft. the motorman runs in with an empty and kicks it in the breakthrough, gets the load, kicks the empty into the face and goes out with the load-he has saved for the motor crew and all the loaders the time it would have taken him to run twice 160 ft. per car. A little simple multiplication will show the saving with a given number of loaders served and the number of cars per loader. Incidentally the loaders and motor crew will be much better satisfied. C. E. LIVELY.

Capels, W. Va.

Employment of Practical Men

And Less Slavish System Urged

IN STUDYING the problem of bring-ing down the coal so as to obtain a larger percentage of lump, a subject that constantly puzzles the operator. I have been struck with the prevailing mania for system touched on by George Edwards in the March issue of Coal Age. Despite Mr. Edwards' belief in the efficacy of adherence to systems planned by engineering specialists I have known some mining engineers to fall down on this problem of how to get out a better grade of coal.

If practical, experienced miners are employed, however, there will be no need for such slavish adherence to system as Mr. Edwards advocates. But if the producer continues to engage farmers, cotton pickers and men from the big cities who never saw a coal mine before he will have his work cut out for him to produce more coal and of a better grade. ALBERT WRONOWSKI. Eldorado, Ill.

Shows Value of Dispatching

KENTUCKY operator had a very A efficient telephone system serving the offices, shops, stores and official residences of his many mines. The superintendents had large desks and each had two phones, one on each side, so that it wouldn't be necessary to get up to go from one side of the desk to the other. One of the mines was large enough to employ seven assistant fore-men, and yet in this mine, like the others, there was not one telephone or signal system.

The foreman worried all day long; if he was on the outside he wondered where in the h--- the main line had gone to, and if he was on the inside he wondered what in the name of heaven was wrong on the outside. This boss was so leg tired by noon that he wasn't worth a thin dime as an executive during the afternoon.

The accidents on haulage at these mines were terrible. There were four haulage accidents for every roof and coal accident; seven men were killed in one year by trips running together. The company finally was persuaded to try phones in just one operation and give them a fair chance. Today all the company's mines are hooked up to compare with the outside system, and there is a terrific commotion if just one phone in a section is out of order; in fact, having grown used to phones and signal sys-tems they feel they couldn't operate without them. GEORGE EDWARDS. Welch, W. Va.

Dispatching Pays Dividends

TO GET the best results in a mine producing 1,000 tons or over a dispatching system by telephone is nec-essary and the dispatcher must have the full backing of the official organization. With a thoroughly worked out system the section bosses will keep the dispatcher informed each day of the number of men at work and the number of cars needed, so that he will be en-abled to place the equipment where it is needed at the proper time.

I recall a wreck of a main-line motor with 40 loads before we had telephones. It was an hour's walk before another motor could be reached, and, as the motorman and brakeman probably wasted a lot of time trying to put the motor back on the track before going for another motor, there was a loss of about three hours. After we got phones we had another wreck at the same point, but the dispatcher was called and he had another motor on the scene promptly and the gathering motormen on that section did not even know there had been a wreck. Similar saving of time is possible when leads burn in two or there is controller trouble on gathering motors.

The dispatcher should keep a record of all motors going and coming, the number of empties taken into the different sections and the number of loads

taken out. At the end of the day when the dispatcher hands over a record of the day's work to the mine foreman the total production for the day is in hand.

THOMAS SELKIRK, New River & Pocahontas Consolidated Coal Co. Laviand, W. Va.

Phones Save Life and Limb

THAT any operator or mine man-ager would think of trying to run his mine without a telephone seems hardly credible. Instances too numerous to remember could be cited to prove the value of their installation in cutting time losses in getting out the coal as well as in case of accident, where they are life and limb savers.

Dispatching by telephone will soon justify its first cost and upkeep by increased output as well as through indirect savings by reason of less wasteful 'use of the haulage equipment, better distribution of cars and consequent greater satisfaction among the employees. The duties of the dispatcher should be limited to that work and he should be placed not at the shaft bottom but at some junction where his presence would save the wages of a flagger or switcher.

Anyone hesitating about putting in a phone system should inspect a mine where telephones are in use and learn how the management would feel about trying to run the mine without them. Linton, Ind. W. H. LUXTON.

Trade Literature

Motor Maintenance Equipment. Martin-

Motor Maintenance Equipment. Martin-dale Electric Co., Clevcland, Ohio. Cata-log No. 10. Pp. 35; illustrated. Speeding Up Production with Automatic Control. Monitor Controller Co., Balti-more, Md. Bulletin No. 110. Pp. 20. Pneumatic Tools and Accessories. Chi-cago Pneumatic Tool Co., New York City. Catalog No. 561. Pp. 70; illustrated. Compressors and Vacuum Pumps. Inger-soll-Rand Co., New York City. Form No. 3150. Pp. 41; illustrated. Choosing a High Temperature Cement. General Refractories Co., Philadelphia, Pa. Pp. 20; illustrated.

Pp. 20; illustrated.

A second and revised edition of Armco Ingot Iron has been issued by the American Rolling Mill Co., Middletown, Ohio. Pp. 48; illustrated.

Pp. 48; illustrated. Bethlehem Steel Joists and Stanchions for Dwellings, etc. Bethlehem Steel Co., Bethlehem, Pa. Catalog S-28; 72 pp. General Electric Co., Schenectady, N. Y., recently issued these bulletins: CR4065, Dec. Magnetic Controllers, GEA-948; CR7896, Automatic Throw-Over Panels, GEA-934; CR4066, CR4068, CR4166 and CR4168 D-c. Magnetic Controllers, GEA-85A; Direct-current Motors, Type BD, GEA-752; Centrifugal Air Compressors, Single-Stage, GEA-233B; Adjustable Speed Direct-current Motors, Type CD, GEA-894; CR1028, A.C. Enclosed Starting Pneostats, GEA-950; Arc Suppressor Plates, GEA-308A. Trico Fuse Mfg. Co., Milwaukee, Wis.,

Trico Fuse Mfg. Co., Milwaukee, Wis., anounces a new bulletin, 206-B, describing Trico Powder-Packed Renewable Fuses.

"The Story of Armco" is the title of a 41-page book gotten out by the American Rading Mill Co., of Middletown, Ohio.

Takes Issue with Mr. Howes

In Foreman vs. Electrician

SOME of the statements by Harry C. Howes in the April issue of Coal Agc, it seems to me, are subjects for debate. As Mr. Howes says, the foreman's job is to get out the coal, and the responsibility is on him as long as everything runs right, but when a motor or machine breaks down the responsibility is on the electrician, who is charged with keeping the machinery in good running condition. If machine runners and motormen are to be properly instructed in the care and treatment of this equipment the electrician must have complete charge of this work, for in my opinion the foreman does not possess the knowledge to do this.

Mr. Howes suggests that when a machine and a locomotive are down at the same time only the foreman knows which should be repaired first. Suppose, however, that a loaded trip is waiting for the locomotive, which has an armature burned out, necessitating that a new one be installed, and that the machine-with a large number of places ready to be cut-has a stack of resistance burned out. The machine can be repaired in 20 minutes, and by getting the machine in operation several men are prevented from leaving the mine. It will require at least two hours to get the locomotive in operation. Does the mine foreman always know how long it will take to make such repairs?

If the machine is fixed first the places will be cut and shot down while the locomotive is being repaired and made ready to haul the coal, which would not have been there if the locomotive had been attended to first. Of course, conditions may require that the foreman and electrician get together at once and make a speedy decision between them on the action to be taken, and that is where the necessity for co-operation comes in.

Planning how to improve ventilation, haulage and many other things that concern him most will keep the foreman's attention sufficiently occupied without being held responsible for problems with which the electrician is better quali-J. H. BLAIR. fied to cope. Moundsville, W. Va.

Block Signals Prevent Wrecks Caused by Guesswork System

U P UNTIL about ten years ago, when I became assistant foreman of a certain mine, the motor boss would tell a motorman that "the other motor" left at a certain time, "and I think you can make it down to the siding before the other motor gets back from outside.' Sometimes this guess system worked, but frequently it didn't, and there would be a run together, with the main haul-age tied up several hours.

Since we put in a block signal system, however, we have overcome these costly wrecks, saved the lives of many motor crews, increased output and re-duced costs. With a board installed for the miners to check in and out on, the haulage crews know just when and where to place cars, and we have a much better satisfied bunch of men.

The haulage motormen handle the block signals themselves, and the motor boss spends his time in sections where coal is being gathered instead of at the main heading telling haulage men he "thinks they can make it."

J. R. THOMAS, Davis Coal & Coke Co.

Coketon, W. Va.

Mine Incomplete Sans Phone

VEN if a mine has only two loco-E motives the returns through increased tonnage, lessening of accidents, curtailment of delays, better distribution of cars to loaders and promotion of satisfaction among the employees will make the installation of telephones well worth while.

If conditions are such that it is not desired to obtain larger tonnage, which would be possible with the same number of locomotives if phones were installed, some of this equipment could be taken out of service, thus reducing the haulage JOHN BOHN, cost. Mine Foreman. Hooversville, Pa.

Publications Received

State Laws Relating to Coal-Mine Tim-

State Laws Relating to Coal-Mine Tim-bering, by J. W. Paul and J. N. Geyer. Bureau of Mines, Washington, D. C. Tech-nical paper 421. Price, 10c. Pp. 57; 6x9 in. Use of the Miners' Self-Rescuer, by S. H. Katz and J. J. Forbes. Bureau of Mines, Washington, D. C. Miners' Cir-cular 30. Price, 10c. Pp. 26; 6x9 in. The Geology of the Virginia Triassic, by Joseph K. Roberts. Virginia Geological Survey, University, Va. Bulletin 29. Pp. 205; 6x9 in.; illustrated. Included in this description of the natural resources is the coal of the Richmond and Farmville basins. description of the natural resources is the coal of the Richmond and Farmville basins. Permissible Single-Shot Blasting Units, by L. C. Ilsley and A. B. Hooker. Bureau of Mines, Washington, D. C. Technical paper 429. Price, 10c. Pp. 24; 6x9 in. Analyses of Arkansas Coals. Bureau of Mines, Washington, D. C. Technical paper 416. Price, 5c. Pp. 26; 6x9 in. The Use of Stemming—Its Value and Relative Merits of Various Materials, by Charles S. Hurter. Explosives Service Bulletin, E. I. du Pont de Nemours & Co., Wilmington, Del. Four-page folder. Limits of Inflammability of Gases and Vapors, by H. F. Coward and G. W. Jones.

Limits of Inflammability of Gases and Vapors, by H. F. Coward and G. W. Jones. Bureau of Mines, Washington, D. C. Bul-letin 279. Price, 20c. Pp. 99; 6x9 in. Wire Ropes for Mines. Safety in Mines Research Board. Paper No. 41. Price, Is. net. Pp. 76; 6x9 in.; illustrated. Notes Is. net. Pp. 76; 6x9 in.; Hustrated. Notes regarding the manufacture and use of wire rope. H. M. Stationery Office, Adastral House, Kingsway, W.C.2, London England. Analyses of Oklahoma Coals, by C. L. Cooper. Bureau of Mines, Washington, D. C. Technical paper 411. Price, 10c.

Cooper. Bureau of Mines, Washington,
D. C. Technical paper 411. Price, 10c.
Pp. 62; 6x9 in.
Mining of Thin Coal Beds in the Anthracite Region of Pennsylvania, by Dever C.
Ashmead. Bureau of Mines, Washington,
D. C. Bulletin 245. Price, 30c. Pp. 113.
Geology and Coal Resources of the Salina Canyon District, Sevier County,
Utah, by Edmund M. Spieker and Arthur
A. Baker. U. S. Geological Survey, Washington, D. C. Bulletin 796-C. Pp. 170.

NOTES From Across the Sea

FOR a long time the mining world in America has been awaiting hopefully the time when some form of indicator would be evolved that would not only show the presence of methane on careful examination but would give a visual indication of danger that could hardly be overlooked. The "Ringrose" firedamp alarm lamp is devised to do this. It has just been accepted by the British Board of Trade, acting under the Coal Mines Act of 1911 as amended by the Act of 1927.

When danger from methane exists this lamp shows a bright red light. It is made with either one of two settings. One of these will cause the lamp to light up in 14 per cent of methane. Units thus regulated will be used in places containing electric coal cutters and in mines worked by naked lights. The other will show its red ray only when concer with show its red ray only when $2\frac{1}{2}$ per cent of methane is present. But, of course, other settings can be provided. The lamp, when suitably equipped, will show as little as $\frac{1}{4}$ of a per cent of methane.

The rules require that no filament but that provided by the makers may be used, that a new filament must be fitted to the lamp before each working shift and the lamp tested by a responsible official, and that the setting be changed only by the makers, who are required to examine the lamp every three months. The lamp is intended, of course, solely to be used for warning and not for light.

A current of air passes through protecting gauges into a porous pot within the lamp containing a wire that is kept hot by a battery current. When the air entering the pot contains firedamp the methane-air mixture is burned by the heat of the wire, and this causes a partial vacuum within the pot, which vacuum when sufficient so deflects an aneroid diaphragm that an electric current is completed, lighting a red bulb. By the correct setting of the various ele-ments, or of one of them, the red bulb may be caused to glow as soon as any definite percentage of methane is reached.

IN THE United States whitewash often is used on the ribs and roof at the foot of the shaft and at the mouths of entries. In at least one mine in England, the Sneyd Colliery, at Burslem, the main roads, which aggregate a distance of three miles, are whitewashed five or six times yearly, according to Albert Marshall, in a paper before the North Staffordshire Institute of Mining Engineers. This fills up the crevices and reduces the opportunity for coal dust to rest on the ledges at the sides. When the dust on the walls of a roadway is removed by sweeping, it is thrown into

2

the air to lodge in some other place. Consequently at intervals the roadways at the Sneyd Colliery are cleaned by spraying rather than by any other method. Some whitewash falls and is mixed with the coal dust from the ribs and with that lying on the floor, making the coal dust less dangerous.

Mr. Marshall said that this treatment by actual test either made the headings lighter by 49 to 93 per cent or reduced the need for as many lamps as had formerly been used. About 240 gallons of whitewash can be applied in a single shift. This is sent down in barrels and

applied by a pump and spray, one man actuating the first and the other handling the second.

Two men cover 255 lin.ft. of roadway in an 8-hr. shift. The average cost per linear foot treated per year taken over a period of six years is about 2c.

When a rope begins to lift a cage from its position on the keps a severe strain is thrown on it and wires in the rope may part or become strained beyond the elastic limit. As a result the rope may fail then or later. To avoid this, according to *Glückauf*, at the Hannover shaft of the Krupp interests in Germany, shock absorbers have been attached to the rope sheaves or to the capping of the rope at the cage. Tests have shown that when shock absorbers are introduced the vibrations in the rope are more rapidly eliminated than when they are omitted.

R. Dawson Hall

On the **ENGINEER'S BOOK SHELF**

"Financial and Business Forecasting"— four symbols of of forecasting are: (1) The Basic Business Cycle Theses Basic business statistics; (2) a knowl-Explained, and the Art of Forecast- edge of economic principles; (3) per-The Basic Business Cycle Theses Explained, and the Art of Forecasting Discussed Without the Use of Higher Mathematics, by Dr. Warren F. Hickernell, Alexander Mamilton Institute, New York; 2 volumes; pp. 914; price \$10.

To the business man or manufacturing executive who wishes to possess a working knowledge of the basic theories of the business cycle minus the all-toofamiliar perplexing mathematical formulas; a quick though vivid view of the waves of prosperity and of over-speculation which have characterized the course of business in the United States and Europe for more than a century past and finally the basic methods now in use in financial analysis and forecasting, this two-volume publication by Dr. Hickernell will prove most interesting and enlightening.

The cyclic theories of Mills, Jevon, Moore, Juglar and Mitchell are ex-plained in a simple manner, and their strength and weaknesses pointed out. Many business men believe that the business cycle, with all its attendant evils, is inevitable. The fact is made clear, however, that there are cures for such cycles of wide variation in business and industrial activities, and a smoothing of the business cycle is even now being applied.

The scholar may stop with an analysis of the causes and effects, but for the man in active business the question of how to apply theory to his own affairs asumes paramount importance. Dr. Hickernell devotes his second volume to a study of financial analysis and fore-casting, bringing out the fact that the

spective, based on a study of business history; (4) good judgment in applying principles to the interpretation of statistics. It is necessary to study individual commoditizes, individual securities and local business conditions, as well as the general trend of business.

Year Book on Coal-Mine Mechaniza-tion 1928; 273 pp., octavo; American Mining Congress, Washington, D. C.; price \$3.

*

*

This little volume brings together almost if not all that has been written by G. B. Southward on mechanization since he commenced to make a nationwide study of that subject for the Amer-ican Mining Congress. Opening with the larger part of the various papers presented at the session on "Develop-ment of Mechanized Mining," Wednes-day May Q including the addresses by day, May 9, including the addresses by Messrs. Young, Southward and Tryon, it republishes 38 surveys of mechanization with their mine maps.

Following this are descriptions with illustrations, each item receiving two pages, of ten mechanical loaders, three scrapers, eleven belt and chain con-veyors, two portable mine-car loaders and seven shaking conveyors. This section is the the section is up-to-the-minute, including, as it does, several pieces of equipment that had their debut at the Cincinnati Exposition. A good bibliography fol-lows. The two semi-annual reports made by G. B. Southward to the mechanization committee in 1927 then follow. It is an excellent summary of follow. It is an excellent summary of the present status of mechanization.

WORD from the FIELD

Four Coal-Mine Explosions In a Week Kill 230

FOUR coal-mine disasters occurred between May 19 and May 25, killing 230 men, as shown in attached table.

The testimony at the inquest held at Waynesburg, Pa., June 5, indicated that the methane content on the main return at the Mather mine had run from 0.55 to 2 per cent. All track roadways had been rock-dusted. The others had been protected by rock-dust barriers. The roads at the bottom also were sprinkled. Water was used on all cutter-bars. Double-lock doors were used exclusively. The mine was worked on single panel with full retreat. Cable-type permissible mining machines were used. Gathering was done by animal and permissible locomotives.

L. O. Lougee, consulting engineer, of Pittsburgh, questioned as to his inspection of the mine for safety, said he was perfectly well satisfied with the conditions he found on viewing the mine. C. P. Byrne, state inspector, answered an inquiry with the statement: "This mine, compared with the majority of mines in my district, was one of the best mines for safety. It was well officered, well laid out and the management was closely interested in it." The state inspectors' commission reported that an accumulation of explosive gas, probably due to an interruption in air circulation in one of the sections of the mine, was ignited by storage battery. The commission advocated legislation requiring rock-dusting. The jury de-clared that gas and coal dust were ignited in some unknown manner.

The report of the inquest at Yukon, June 4, before Coroner H. G. Camper, declared that the explosion was caused by a door being left open by machine men, allowing an accumulation of gas, and also by the machine men failing to test for gas with a safety lamp. The lamp was found wired to the box on the motor 40 ft. from the face where the explosion occurred. The mine was found in good condition, properly ventilated and in compliance with mining laws.

The Black Mountain Corporation, a subsidiary of the Peabody Coal Co., reports: "Explosion at Black Mountain caused by three workmen blasting a large rock in mine. These men set off 30 sticks of dynamite at one time. This action incomprehensible, but we presume some of the sticks exploded accidentally. A dust explosion followed. Due to the great amount of dynamite



Aim at Profit, Not Volume, To Remain in Business

The craze for volume is at the root of profit-destroying influences in industry, said Edward J. Mehren, vicepresident of the McGraw-Hill Publishing Co., in an address on "Teannwork for Profits in a Buyers' Market," before the department of manufacture, Chamber of Commerce of the United States, at Washington, D. C., May 9. "We'd sooner have volume than profits," said Mr. Mehren. "A full factory and red ink seem as popular as 70 per cent operation and plenty of black. Crazy for volume. Swollen sales expense to get the last 20 per cent of business. Ruinous prices to fill up the factory.

"We fail to realize that the law of diminishing returns cannot be flouted. The nearer we get to perfect performance the smaller the gain for given effort. It can't be escaped. The top business costs more than it is worth and only injects an undesirable color scheme into our balance sheets. Some men refuse to acknowledge the law, and even after they land in the bankruptcy courts fail to realize that it was the expenditure of two dollars to get every dollar of top sales that 'put them on the blink." "I know all the stock defenses of the present passion for volume. I know that increase in production reduces production costs and if expenses remain

"I know all the stock defenses of the present passion for volume. I know that increase in production reduces production costs and, if expenses remain the same, increases profits. The trouble is that the rapacious maw of sales gobbles up all the production savings and a goodly percentage to boot.

and a goodly percentage to boot. "Let business men be business menthis be our slogan; and no one is a business man who, in the craze for volume, takes less than a savings bank return on his capital, who swaps dollar for dollar or, worse than all, pays for the privilege of being in business."

used in one shot only damage to the mine was the blowing out of stoppings. Mine has always been free of gas and never has generated any fire-damp. Mine was not rock-dusted. Chief Inspector Jones says briefly that the cause was coal dust."

F. W. Leamy, vice president, Hudson Coal Co., reports that "the exact cause of the accident at the Conyngham mine (No. 5) on May 25 has not yet been determined."

Mine Mather No. 1	Location Mather, Pa. Yukon, W. Va.	Owner Pickands, Mather & Co. Yukon Pocahontas Coal Co.	May 19 22	Time 4:07 p.m. Entrance	Fatalities 195
No. 30	Kenvir, Ky.	Black Mountain Coal Co.	22	6:45 p.m.	8
No. 5.	N. Wilkes-Barre, Pa.	Hudson Coal Co	25	10:30 a.m.	10

Shuts Less Efficient Mines; Urges Others to Follow

Convinced that neither a policy of continuous wage reductions nor of forced sales at prices which do not yield costs of production and proper overhead offers any hope for the economic rehabilitation of the bituminous coal industry, the Consolidation Coal Co. late last month announced a program of indefinite shutdowns for "some of the least efficient mines" and invited other producers to join in the movement.

The announcement was made in a public statement by George J. Anderson, recently elected president of the company. In applying the program to its own operations, the Consolidation company has closed down four operations in Somerset County, Pennsylvania, and six in northern West Virginia.

This step, it is understood, means the elimination of 2,500 workers, or practically 20 per cent of the men employed in the two fields. By this policy the company hopes to give steadier employment and better earnings to the 80 per cent of the working force still retained. In its announcement, fellow producers are asked to give "all proper consideration and courtesy" to applications from former Consolidation employees thrown out of work by the new program.

Producers generally applaud the Consolidation program and some have announced their intention of applying it to their own operations.

Lake Cargo Rate Situation Further Muddled

The lake-cargo rate situation was further complicated last month when Northern lines other than the Baltimore & Ohio filed tariffs with the Interstate Commerce Commission reducing rates from Ohio and western Pennsylvania 20c. per net ton, effective June 18. The Baltimore & Ohio has filed tariffs reducing rates from the Fairmont district 10c.

These tariffs, if allowed to become effective, will restore the relationship between the Northern and the Southern fields contemplated by the Commission's last decision in the lake cargo case. That decision ordered a cut of 20c. in the Northern rates. The Commission later suspended tariffs of Southern lines making a like reduction but its order of cancelation was enjoined by the United States District Court at Richmond, Va., on April 14. An appeal to the Supreme Court has been taken from this decision.

The Northern tariffs, while naming

the rates authorized in the Commission's decision of last year, provide for a rebate of 20c. on submission of satisfactory proof that coal moved has been dumped for lake loading. The rebate provision expires Dec. 31, 1928, unless sooner withdrawn or modified. Southern interests have asked the Commission to suspend the tariffs.

The action of the Northern lines followed a meeting between railroad officials and representatives of lake-coal districts other than Pittsburgh at Cincinnati, Ohio, May 3. At that time Daniel Willard, president of the B. & O., and W. L. Cole, president of the Louisville & Nashville, urged shippers to agree to a compromise which would reduce the base differential from 45 to 35c. This the coal interests declined to accept.

Prepare to Repel Inroads On Utah Coal

The first annual convention of the Retail Fuel Dealers' Association of Utah was held at the Newhouse Hotel, Salt Lake City, May 14 and 15, and from the keen interest shown in the gathering by the operators and the part they took in the proceedings, the affair might well have been billed as a joint convention of dealers and operators. The independent dealers made it plain during this convention that they are just as much concerned in upholding the coal industry of Utah against inroads by substitute fuels as the operators, with their heavier investments are, and that if necessary they will fight hard for the industry.

The keynote of the convention was protection of the coal industry from substitute fuels and greater service to the consumer so as to make coal more popular. Not much was said about smokeless coal, though it was indicated that it was coming in the next few years, but might be delayed.

Among the speakers who represented the operators were James M. Orr, general manager of the Utah Coal Producers' Association, whose address was entitled "Burn Utah Coal." Mr. Orr called attention to the vast coal resources of Utah, and predicted that the time would come when the coal industry of the state would be greater than the metal industry.

F. A. Sweet, president of the Standard Coal Co. and one of the prominent operators of Salt Lake City, spoke on "Meeting Gas and Oil Competition." Mr. Sweet expressed the belief that Utah's coal industry was about to be developed on a large scale and would soon compete with the oil industry of California.

J. Edward Taylor, manager of the Mutual Coal Co., spoke on his company's relation to the retailer. Price Crawford, of the Liberty Fuel Co., showed what combustion service can do for the retailer. L. E. Adams, general sales manager of the Spring Canyon Coal Co., spoke on "Relation of Retailer to Producer."



John A. Garcia

The School of Mines and Metallurgy of the University of Missouri, Rolla, Mo., conferred the degree of Doctor of Engineering on Mr. Garcia May 24. He received the Bachelor's degree in mine engineering there in 1900 and the Engineer of Mines degree in 1903. Following extensive experience in the Oklahoma and Illinois coal fields Mr. Garcia formed, with Andrews Allen, a consulting organization specializing in construction, development, operation, and examination and reports on bituminous coal mines. This organization, which now consists of about 100 engineers, has examined practically every mining district in the United States. Mr. Garcia spent a large part of the last year in Russia, where his company is engaged in extensive consulting work for the Soviet Government.

Personal Notes

PATRICK J. FARRELL, chief counsel of the Interstate Commerce Commission, was given a recess appointment to membership on the Commission by President Coolidge on June 7.

CAPT. EDWARD STEIDLE, head of the mining department, Carnegie Institute of Technology, Pittsburgh, Pa., has been appointed dean of the School of Mines and Metallurgy, State College, Pa.

E. H. WEITZEL resigned June 1 as vice-president of the Colorado Fuel & Iron Co. It is said to be unlikely that a successor will be named to fill his position, his duties being distributed among other officials of the company.

COL. CLARENCE T. STARR sailed for Russia May 25, having joined the engineering firm of Stuart, James & Cooke, New York City, as resident partner at the scene of their extensive activities in the coal fields near Kharkov, Russia. Colonel Starr formerly was with the coal section of the Chamber of Commerce of the United States, later was assistant to the president of the Pittsburgh Terminal Coal Corporation and recently was engaged in engineering work at Pottsville, Pa.

JOSEPH P. JENNINGS, one of the best known engineers in the anthracite field, has resigned as general superintendent of the Pennsylvania Coal Co., Dunmore, Pa. He began practice as a consulting engineer June 1, after 35 years' service with the Pennsylvania company.

SAM MCGURK, Williamson, Ill., has been appointed superintendent of mine No. 2 of the Mt. Olive & Staunton Coal Co., Staunton, Ill. He succeeds Robert Nixon, who died May 18.

D. TERPSTRA has disposed of a large part of his holdings in the Premier Red Ash Coal Corporation at Raven, Va., to the McQuail interests.

HEBER DENMAN, Clarksville, Ark., resigned as general manager of the Arkansas Mining Co. on May 2. He was succeeded by J. G. Puterbaugh, Mc-Alester, Okla.

MARTIN GALLAGHER and L. E. Brunswick have resigned as division superintendents of the Wheeling & Lake Erie Coal Co. to take positions with the Pennsylvania Coal Co. at Scranton, Pa.

JOSEPH FLETCHER, general manager of the Jackson-Walker Coal & Mining Co., Pittsburg, Kan., has announced his retirement, effective June 1, after 63 years in the coal industry, 40 of them with the Jackson-Walker company.

JJHN R. SHARPE, Chicago, formerly employed in the Virginia bituminous field, has been made general superintendent of the following Philadelphia & Reading Coal & Iron Co. collieries: Bast, Hammond, West Shenandoah, Shenandoah City, Ellangowan, Maple Hill, Tunnel Ridge, Mahanoy City, North Mahanoy and Gilberton.

R. R. KIRKPATRICK, who for nineteen years was with the Utah Fuel Co. as engineer, superintendent of coke ovens and superintendent of the Sunnyside Mine, Sunnyside, Utah, has resigned to take charge as superintendent of the Blue Blaze Coal Co. mine at Consumers, Utah.

WILLIAM H. WILLIAMS resigned from the vice-presidency of the Delaware & Hudson Co. May 8 after 21 years' service. His place was filled by the election on May 9 of F. W. Leamy, who had been assistant to the president. Mr. Leamy will be in charge of the accounting and treasury departments.

RUSSELL T. THORNBURG, formerly with the U. S. Bureau of Mines, has been appointed as safety director for the Consolidation Coal Co. at Coalwood, W. Va., and also will have charge of the safety work at the mines of the same company at Jenkins, Ky.

Anthracite Prices at New York Effective June 1

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

	Broken	Lgg	Stove	Chestnut	1 60
D., L. & W. Coal Co	\$8.25	\$8.50	\$8.85	\$8.50	\$5.00
Lehigh & Wilkes-Barre Coal Co	8.25	8.50	8.85	8,50	5.00
Hudson Coal Co	8.25	8.50	8.85	8.50	5.00
Lehigh Valley Coal Sales Co	8.25	8.50	8,85	8.50	5.00
Janna & Co	8.25	8.50	8.85	8.50	5.00
Phila. & Reading Coal & Iron Co	8.25	8.50	8.85	8,50	5.00
Coal & Navigation Co	8.25	8.50	8.85	8.50	5.00

Wholesalers Attack Problems Of Trade Without Dismay

Cincinnati, Ohio, June 6.-With an attendance that outnumbered any other meeting of the organization in recent years the twelfth annual convention of the American Wholesale Coal Association, held here yesterday and today, was voted by the members attending to have outrivaled any of those preceding it in inspiration and enthusiasm. Most of the talks were filled with a broad vein of determination to overcome the obstacles that confront the trade.

Fred Legg, president of the Logan & Kanawha Coal Co., Cincinnati, and head of the association, who welcomed the 300 wholesalers at the opening session Tuesday morning at the Hotel Gibson, said: "The coal industry has been in trouble all over the world. There is an excess of capacity for present needs. The industry has been charged with responsibility for this condition, but it is the outgrowth of scientific development and engineering skill.

"The railroads, consuming one-fourth of all coal used, have been able to reduce the amount consumed to move freight since 1920 by about 21 per cent. We are not here to conduct the funeral of coal," he said, "but to work con-structively for the future."

The high point of the first meeting was the address of Harry Turner, pres-ident, Turner Coal Co., Topeka, Kan., on "A Greater Kingdom for Old King Coal." Mr. Turner asserted that the trade was lagging behind other industries in the manner in which its story was put over to the public. He pleaded for a \$250,000 campaign fund to spread the word to the nation.

Tuesday afternoon the golfing members hied themselves to the Makatewah Club, where several interesting matches were played. In the evening the annual banquet was held in the Florentine Room of the Hotel Gibson with Judge H. B. Lindsay, of Knoxville, Tenn., as toastmaster and Dr. Ashley Chappel, of Asheville, N. C., as the speaker of the evening. Harry Turner, William I. Donnelly, John Laing and E. C. Mahan, president of the Network C. Mahan, president of the National Coal Association, spoke extemporaneously.

Mr. Mahan said that he was heartened by the show of enthusiasm at the convention and believed that the right track had been found to solve some of the problems of trade and distribution in the industry.

Thursday morning the delegates heard an address by Ira Cochran on "Coal and Congress."

Mr. Cochran quoted accusations which blamed the wholesalers for boosting the price of coal demanded of the retail consumer and depressing the price paid for the coal at the mines in such a way as to push the operators and the industry to the verge of bankruptcy in order to sell the coal below cost to

large buyers. "I would not want to leave you under the impression that all the coal industry and all the consumers entertain any

June, 1928 - COAL AGE

More Union Pacts Signed in Illinois; **Revolt Against Lewis Spreads**

miners' unions in southern and central Illinois, meeting in Belleville, Ill., on May 20, repudiated the officers of the Illinois United Mine Workers and elected others to take the places of the officers "ousted." This was the first step in a nation-wide movement to oust John L. Lewis as international presi-dent of the United Mine Workers. Resolutions requesting Lewis' resignation were passed at a meeting of 300 miners representing 42 locals held at Bellaire, Ohio, May 23.

Reports from Springfield, Ill., stated that Harry Fishwick, president of the Illinois district of the United Mine Workers, refused to consider seriously the action of the Belleville group.

the action of the Belleville group. New Orient mine of the Chicago, Wilmington & Franklin Coal Co., at West Frankfort, Ill., reopened on May 2, under the Jacksonville scale with the customary force of 1,800 men reduced about one-third. Mine No. 10 of the Indiana & Illinois Coal Co., Natomic has resumed with 1,000 men Nokomis, has resumed with 1,000 men, while Mine No. 2 of the Mount Olive & Staunton Coal Co. at Staunton, started April 30 with 700 men. Others that have signed union pacts are the Franklin County mine of the Brewerton Coal Co., Gillespie Coal Co., Saline County Coal Corporation, with six mines em-ploying 2,000 men; O'Gara Coal Co., with eight mines employing 3,500 men. Two thousand northern Illinois coal

miners have broken away from the United Mine Workers and formed their own union, called the Northern Illinois

such views, for they do not. A very noisy minority are urging these things, in season and out. They have persuaded a great many people that the wholesaler is responsible for high prices when they are high, and that he is equally responsible for low prices when they are low. So the wholesaler is re-sponsible for the entire dilemma in which the industry now finds itself. From this premise it is but a short step in the somewhat illogical reasoning to a stabilization plan which eliminates the hated middleman.

R. E. Starek, Chicago, was elected president; George E. Copeland, Boston, vice-president, and Harold R. Holmyard, Cincinnati, secretary-treasurer.

Four W. Va. Mines Cut Wages

Effective May 1 the Winding Gulf Colliery Co. made a general wage reduction at its four mines in the Winding Gulf field. The reduction, it is reported, approximates 20 per cent. Other operators in that region and in the New River field are not contemplating similar action, according to late information from West Virginia.

Men claiming to represent 78 local Mine Workers' Union, in order to negotiate a wage scale other than the Jacksonville agreement with the op-erators in the field. Seven mines in Bureau, La Salle, Putnam and Woodford counties are affected. Early in May the miners in a secret ballot agreed to return to work at \$6 a day and a \$1.36 pick mining rate. The operators would not accept the proposal. They held for \$5 a day and \$1.20 pick mining. rate, offered the men early in the year. Negotiations followed.

It was finally decided to vote on the question of the \$5 a day and \$1.20 pick mining rate and the vote was over-whelmingly in favor of returning to work at the lower scale. The La Salle County Carbon Coal Co., operating the old Union Coal Co. mine at La Salle, negotiated the first contract at the reduced scale with its miners. Other companies are expected to make similar agreements, to run for three years.

Four hundred and sixty miners em-ployed by the Old Ben Coal Corporation in its No. 8 mine, at West Frankfort, Ill., rebelled from the leadership of the United Mine Workers May 11. The local union negotiated a machine rate contract with the company after the union officials had displayed no inten-tion of doing so. The contract placed machine cutters on a straight day basis of \$10.07. The mine worked for two days under the contract but when the union officials declared a strike at the operation and promised to pay strike benefits the miners did not re-enter the mine.

Strip Plant Formally Opens With 1,500 Visitors

The Northern Illinois Coal Corpo-ration formally opened its new large strip mine at Wilmington, Ill., 58 miles from Chicago, on May 22. Fifteen hundred guests inspected the property, which covers a 7,500-acre tract. The coal bed, which is the closest one to Chicago, is 38 to 42 in. thick and lies approximately 30 ft. from the surface. A new steel tipple has been erected and all sizes are made.

Coal is produced in the operation of a large dragline, an immense electric shovel-the largest in the world, de-signed by the Marion Steam Shovel Co.-and a smaller steam shovel for the actual picking up of the coal and loading it into cars which take the coal to the tipple. The dragline and shovel were pictured in an article describ-ing this plant in greater detail in *Coal* Age last month.

The plant at present is producing an average of 1,200 tons a day, but it is expected that when production gets under full swing 3,500 tons daily will be mined. Two immense electric shovels will be in use when capacity is reached. The second shovel now is in

387

course of construction on the property.

The electric shovel was the center of attraction to the visitors. It was compared in size to an eight-story building in Chicago. It has a 12-yd. dip and was specially designed and constructed for coal stripping. Some of its features are the application of hydraulic jacks for equalizing stresses and leveling the lower frame; initial use of direct-current motors, and the use of single - reduction herringbone - gear drive for hoist machinery.

The tipple can handle from 400 to 600 tons per hour, separating the coal into four segregated sizes or any mixture of the four desired. The visitors were interested in watching the pickers working at the side of picking tables which carry the sorted coal along it to loading booms and thence into the railroad cars on four tracks.

Of further interest is the gravity system of handling the cars, no mechanical power being necessary to shunt them around to the right positions while being loaded and subsequently made up into trains.

Ebensburg to Hold Fair And First Aid Meet

Exhibitors from 28 states already have enrolled for the fourth annual Cambria County Industrial Exposition, to be held at Ebensburg, Pa., July 2-7. Coal-mining machinery will play a prominent part in the exposition, which is sponsored by Charles M. Schwab, chairman of the board, Bethlehem Steel Corporation. The climax of the sixday show will be the annual first-aid contest for the championship of Pennsylvania, on July 7.

The Pennsylvania Coal Producers' Association will hold its semi-annual meeting in conjunction with the show, beginning 9 a.m. July 6, devoting the afternoon to golf and winding up with a dinner at 7 p.m.

Coming Meetings

Mining Society of Nova Scotia. Annual meeting, June 19 and 20, at Halifax, Nova Scotia, Canada.

Colorado and New Mexico Coal Operators' Association. Annual meeting, June 20, Boston Building, Denver, Colo.

20, Boston Building, Denver, Colo. Illinois Mining Institute. Summer meeting on the Steamer "Cape Girardeau," from St. Louis, Mo., to Cairo, Ill., June 21-24.

American Institute of Electrical Engineers. Annual convention, June 25-29, at Cosmopolitan Hotel, Denver, Colo.

Institute of Chemistry of the American Chemical Society. Second session, July 23 to Aug. 18, at Evanston, Ill.

Anthracite Educational Exposition, Willow Grove Park, Philadelphia, Pa., auspices Anthracite Boosters' Association, Aug. 4-11.

Seventh International First Aid and Mine Rescue Contest, Aug. 20-22, Butte, Mont.

Rocky Mountain Coal Mining Institute. Summer meeting, Rock Springs, Wyo., Aug. 27-29.

American Society of Mechanical Engineers. Summer meeting, St. Paul and Minneapolis, Minn., Aug. 27-30.

Industrial Coal Consumption And Stocks Shrinking

Coal stocks in industries in the United States on May 1 showed a further decline of 2,800,000 tons as compared with the total on April 1, according to a report by the National Association of Purchasing Agents. Consumption in April—35,230,000 tons—also registered a decline from 38,588,000 tons in the preceding month and was $8\frac{3}{4}$ per cent lower than in April, 1927.

Industrial coal stocks are now 40 per cent lower than a year ago, when they were very high due to preparation for the strike. They are still $18\frac{1}{2}$ per cent higher, however, than at the same time in 1926, which was a normal coal year, indicating the possibility of a further decrease.

DAYS' SUPPLY OF COAL ON HAND IN VARIOUS INDUSTRIES

Byproduct coke	22
Electric utilities and coal-gas plants	65
Railroads	38
Steel mills	35
Other industries	35
Average of total stocks throughout the country.	37

ESTIMATES OF PRODUCTION, CONSUMPTION AND STOCKS

	U. S.	Industrial	On hand in
	Output	Consumption	Industries
Jupe	41.999.000	36,690,000	66.510.000
July	38,697,000	33,560,000	62,585,000
August	48,907,000	33,900,000	59,697,000
September	48,592,000	33,195,000	59,179,000
October	51,400,000	35,813,000	60,154,000
November	47,100,000	35,514,000	57,940,000
December	47,309,000	37,225,000	55,725,000
January	49,645,000	37,678,000	52,909,000
February	46,933,000	36,301,000	50,595,000
March	49,452,000	38,588,000	48,388,000
April	39,081,000	35,230,000	47,432,000
May 1			43,670,000

Indiana Association Disbands

The Indiana Bituminous Coal Operators' Association was disbanded at a special meeting at Terre Haute June 4. This action was said to be due to the feeling that because of the present status of labor relations between the operators and the United Mine Workers there was no further need for the organization.

Phil Penna, secretary, suggested his own resignation, which was accepted and the decision made to wind up the affairs of the association at once.

Safety Records Win Trophies

"Sentinels of Safety," bronze trophies presented by the *Explosives En*ginecr to mines and quarries having the best safety record, have been awarded for 1927 by the U. S. Bureau of Mines to the Jeddo-Highland Coal Co.'s Highland No. 6 mine in the anthracite group and to No. 2 mine of the United States Coal & Coke Co. in the bituminous coal group.

The Highland No. 6 mine, at Jeddo, Luzerne County, Pa., worked 134,680 man hours last year and had a loss of only 0.119 day per thousand man hours of exposure. The U. S. company's mine, at Gary W. Va., worked 688,937 man hours with an accident frequency rate of 1.5 and an accident severity

rate of 0.132, while the average rates for the whole bituminous group were 97.3 for frequency and 15.739 for severity.

Powhatan Mine Reopens

After a long period of idleness, operations have been resumed at the Powhatan mine of the Pursglove Coal Co., in Belmont County, Ohio, where it was recently decided to attempt operations on a co-operative basis. The mine normally employs about 800 men. Production is being steadily increased and the number of employees will be augmented from time to time.

Put Mines on Double Time

The Consolidation Coal Co. has announced that the Pinnickinnick and Columbia mines of the company, near Clarksburg, W. Va., will immediately be put on double time with a view to doubling production, if possible. Within the last year extensive improvements have been made at the two mines and much additional equipment installed.

Sets Up Mining Scholarship

The Union Pacific Coal Co. has established an annual scholarship in mining engineering to be awarded to a son or ward of an employee. The scholarship will pay \$600 per year plus tuition and matriculation fees. Students will be given vacation period employment in a capacity directly related to the studies pursued and an opportunity to enter the service of the company upon graduation.

Obituary

FRANK P. BLAIR, former president of the Shoal Creek Coal Co., Chicago, died June 8 at his country home near Mukwonago, Wis., aged 56 years. He organized the Shoal Creek company in 1901 and served as its president until a few years ago, when he retired from active business.

DAVID BOIES, anthracite operator, died June 2 in Hahnemann Hospital, Scranton, Pa., after undergoing an operation four days previous. He was 46 years old. Graduated from Yale in 1904, he entered the engineering department of the Scranton Coal Co., leaving two years later to become president of the Spencer Heater Co. In 1921 Mr. Boies disposed of this interest and became president of the Racket Brook Coal Co.

FRED S. HILL, brother of the late John A. Hill, died at Denver, Colo., May 30. For a number of years Mr. Hill represented the McGraw-Hill Publishing Co. in Denver territory. Mr. Hill was in his 64th year.

SANFORD B. BELDEN, vice-president, Jeffrey Manufacturing Co., Columbus, Ohio, died at the Hotel Chatham, New York City, May 15. Death is believed to have been caused by an embolus.

Senate Coal Hearings Come to Close; Watson Sponsors Union Bill

H EARINGS before the Senate committee on interstate commerce on the Johnson resolution calling for an inquiry into conditions in the bituminous coal fields of Ohio, Pennsylvania and West Virginia came to an end on May 17, when Chairman Watson announced a final adjournment. The inquiry began with a subcommittee tour of the Penn-sylvania coal fields on Feb. 23, and formal hearings at Washington, D. C., on March 7. A subcommittee is scheduled to consider legislation for action by the second session of the present Congress.

The day after adjournment Senator Watson introduced a bill (S. 4490), drafted by counsel for the United Mine-Workers and embodying the union's ideas of proper legislative relief. This bill proposes the creation of a Bituminous Coal Commission of five members to serve as a permanent federal agency to regulate interstate commerce in soft coal, mergers, co-operative marketing and provides for the licensing of producers and shippers in interstate commerce.

Affidavits by the score tumbled into the records of the committee during the closing days of the hearings. Witnesses for the operators came armed with sworn statements to support their charges that union sympathizers had resorted to intimidation and violence in their efforts to prevent open-shop operation in Ohio and western Pennsylvania. Union spokesmen countered with affidavits to substantiate their claims that armed guards employed by the operators had indulged in orgies of brutality.

H. E. Willard, secretary, United States Coal Co., who testified April 26, traced the early history of union relationships in the coal fields and said that the assistance and co-operation of the operators had put the United Mine Workers on its feet. "Since 1902 until the present time," he added, "our com-pany has never had a year that our mines have not been closed in utter violation of the printed contract with this organization."

HIGH wages, he declared, have re-sulted in increased absenteeism and indifference. The miners do 25 per cent less work under the \$7.50 scale than they did under lower rates. His company had invested nearly \$1,000,-000 in a rehabilitation program to put its mines on a competitive basis, but the effort had been in vain.

"You cannot conceive of any mortal wanting any more than \$7.50 a day?" asked John L. Lewis, international president of the miners' union.

No, I do not concede anything of that kind. We all want more."

"Do you live on \$7.50 a day?" "No; I do not," retorted the witness.

"Do you ?"

"No," answered Mr. Lewis, "but I am asking more on behalf of the peo-ple in the mines."

Mr. Willard stated that his company had lost \$59,772.58 in 1923; \$176,-833.40 in 1924, \$197,559.22 in 1925, \$129,098.11 in 1926 and \$176,822.65 in 1927. Except in 1923 the average price paid his company by the railroads had exceeded the average received from other consumers. No railroad had attempted to change the labor policy of his company, he said.

Walter L. Robison, vice-president, Youghiogheny & Ohio Coal Co., re-viewed the futile efforts in Ohio last year to make a new contract with the union. Practically none of the former employees had returned to work at the Florence and Dorothy mines since openshop operations had been started.

THE Hanna interests, R. L. Ireland, THE Hanna interests, R. D. Herand, general manager of affiliated bitu-minous operations, declared, would have continued to deal with the union had it

THE Watson bill provides for the creation of a Bituminous Coal Commission of five members as a permanent government body with authority to:

(1) License producers and shippers in interstate commerce;

.(2) License and regulate marketing pools and co-operative selling associations and the maximum prices charged by such agencies;

(3) License and regulate mergers, combinations and consolidations.

No company not engaged in interstate commerce prior to the enactment of the law would be permitted to so engage without license and no com-pany so engaged prior to the act would be permitted to join a pool or consoli-dation without license. Licensees would be required to permit employees to deal collectively by representatives of their own choosing in the making of wage agreements.

Companies desiring to employ only non-union labor would be required to apply for "secondary" licenses in order to continue in interstate trade. Such licenses would provide that workers should be free to terminate their employment at will and to join a labor union, have the right of peaceful assemblage to hear and discuss principles of organized labor and collective bargaining; that all payments should be in lawful money of the United States; that employees would be free to trade where they choose, to select check-weighmen and that scales and weight records be open to inspection by rep-resentatives of the Bureau of Standard Weights and Measures and the com-mission and that corporations holding secondary licenses make annual reports in the manner prescribed by the commission.

Licenses would be subject to revocation on 30 days' notice upon proof of failure to comply with the provisions of the act and regulations of the commission.

"been willing to accept economic conditions." During the five years ended Dec. 31, 1927, these operations had produced 7,758,036 tons of coal at a pro-duction cost of \$16,707,390; the sales realization had been \$17,330,009. In the past three years, however, the annual realization has been less than the production cost. During the five-year period these mines sold 4,953,997 tons to railroads and received \$11,978,596.65 from the carriers.

Mr. Ireland made an extended defense of the Hough injunction, citing cases of intimidation and violence of the various types now specifically enjoined. The Ohio operators, he insisted, wanted peace, but they were prepared for war. "We have machine guns, riot guns and rifles. We have tear bombs loaded with tear gas and we have Very pistols, relics of the war, which shoot gas shells and star bombs. We hope we will never have to use them, but they are there in case we need them, because we are going to protect our property and the men who

are working for us." R. L. Wildermuth, president, Lorado Coal Mining Co., filed photographic exhibits to illustrate favorable living conditions at the company camps in Logan County, West Virginia. He also presented statements of earnings of a number of workers which showed that one loader had earned \$3,487.81 last year.

When the hearings were resumed on April 30, Louis McGrew, editor, Pittsburgh Labor World, charged that Pittsburgh operators, and particularly the Pittsburgh Coal Co., were fostering the communistic movement in western Pennsylvania. Later the coal company issued a statement denying that it had in any way aided or encouraged such a movement or the activities of the "Save

the Union Committee." J. D. A. Morrow, president, Pitts-burgh Coal Co., who took the stand at the afternoon session and did not con-clude his testimony until the close of the following day, presented an elaborate statement covering the labor policy of the company, open-shop mines, Jacksonville agreement, safety, wages, fulltime operation, attractive mining towns, illicit liquor traffic, disorderly houses, open-shop living conditions, miners' pension funds, better mining methods, the union's "peaceful persuasion" cam-paign, coal and iron police, competitive market conditions, union responsibility for overdevelopment in Kentucky and West Virginia and discriminatory freight rates.

MR. MORROW stated that coun-sel had advised that the Jacksonville agreement, if a closed-shop con-tract, was illegal "and it was the duty of the officers of the Pittsburgh Coal Co. to terminate that illegal relationship."

"Is there anything in the Jacksonville agreement which makes it a closed-shop contract?" asked Oliver K. Eaton, of counsel for the union.

Witness objected to making a direct answer, because, he said, "We are on notice that the United Mine Workers contemplating suit for damages is

against our company. It is not reason-able or fair to expect that I will present to this committee or you the legal reason for our breaking this contract." Senator Gooding, acting chairman,

sustained the objection.

Mr. Morrow defied Mr. Eaton to prove that deductions had been made from non-union miners' wages to pay for bootleg liquor. Moral conditions in the Pittsburgh camps, he insisted, were better than when the company was operating on a union basis. The witness admitted that the company had spent thousands of dollars for detectives.

"In the main," said Mr. Morrow, "these detectives have been employed for the purposes of the company with respect to the activities of its own suboperating officials inside the mines. We have some very definite ideas as to the way we want our men treated. Most of the detectives have been employed for the purpose of going in the mines and working as miners to find out how our mine superintendents and foremen actually treat our workmen.

AGES at the present time, Mr. W Morrow stated, were not as high as the company would like to see them but they would increase when the new production methods began to function properly. It had been impossible to establish these methods during the union regime. Mr. Lewis and Philip A. Murray, vice-president of the union, denounced the statement that the union had tried to block the introduction of improved machinery as an unqualified falsehood. Mr. Morrow retorted that his statement applied to underground management as well as machinery and cited the U. S. Coal Commission report and cases in Illinois, northern 'West Virginia and the Southwest to support his contention.

C. E. Lesher, executive vice-president, submitted figures showing that 880 cutters employed by the Pittsburgh com-pany average \$97 per pay last year; 18,966 loaders, \$50; 1.797 pick miners, \$64; 7,813 day men, \$70. Average earnings for all men had been \$6.02 per day and \$1,797 for the year. The labor turnover was 303 per cent.

Statements were introduced into the record on May 2 from Horace F. Baker, president, Pittsburgh Terminal Coal Corporation, in reply to various charges made against the company during the earlier hearings. The statement said that the union had charged:

(1) That there has been a conspiracy on the part of the company through its police officers to abuse, mistreat, assault and harass members of the union and their families;
(2) That such abuse and mistreatment by company police was habitual;
(3) That the company encouraged and fostered vice in the mining communities under its control;
(4) That employees are held in a state of virtual peonage by company police.

"These charges," declared the Baker statement, "were absolutely false and the Pittsburgh Terminal Coal Corporation and its officers and employees resent them and brand them as part of the reckless, vicious campaign of misrepresentation which has been used in this strike to bolster up a lost cause.'





Col. William M. Wiley

At the annual meeting of the Chamber of Commerce of the United States, held in Washington, D. C., May 8-11, Colonel Wiley, who is vice-president and general manager of the Boone County Coal Corpo-ration, Sharples, W. Va., was elected a director of the national chamber. Since 1918 he has been a director in the Kausenha 1918 he has been a director in the Kanazuha Coal Operators' Association and has been active in the National Coal Association.

PICK miners in the employ of company, according to one of the Baker exhibits, averaged \$6.48 per day the first half of March and \$6.22 the second half of the month. Loaders aver-aged \$6.13 and \$6.22; cutters, \$10.85 and \$10.37; day men, \$6.40 and \$6.43. Mr. Baker accused union men of violating the terms of their agreements in refusing to vacate company houses and said actual evictions were made in only seven cases.

When hearings were resumed on May 15, John G. Sersch, a captain in the Pennsylvania R.R. police, denied that he had been "loaned" to the Pittsburgh Coal Co. by the railroad. He had accepted service with the coal company because it paid better, but returned to railroad service after five months be-cause he "liked things back home better." He denied that there had been any abuses of power by the coal and iron police during his régime. "Gin joints and bawdy houses" had been closed up whenever they were located. During his employment, he said, he had never been

insulted by a striker. Albert W. Duke, division engineer for the railroad, submitted statements to disprove testimony offered earlier in the hearings by Thomas Sagle, of the Roseville Coal Co., alleging that the railroad had torn up a switch connection with the Roseville mine because the company was operating union.

A. E. Owen, assistant purchasing agent, testified that the only interest the railroad had in buying coal was to get it as cheaply as possible, quality and service considered. He denied that railroad purchasing agents had held meetings for the purpose of agreeing upon a campaign to beat down prices. C. D. Young, general purchasing agent, outlined the gen- Coolidge at an earlier hearing.

eral policies of the railroad and gave the lie to the statement that the railroad had voiced the desire that miners' wages should be substantially reduced.

ON BEHALF of northern West Virginia interests a statement was received from E. J. McVann taking issue with testimony of Van A. Bittner that one mine in the Fairmont section paid as low as \$1.25 a day and board and em-ployed 175 to 200 men. The mine in question, according to an affidavit submitted, never employed more than 10 men, the operator does not board the workers and the minimum day rate is \$4 for eight hours' work. The next day Mr. Young further out-

lined Pennsylvania R.R. policies as follows:

"It has been the fixed policy of the purchasing department of the Pennsyl-vania R.R. since its organization 62 years ago to buy at a reasonable market price, and at such a price as to insure delivery as required. Bituminous coal we find to be a product a very high percentage of the purchases of which it is necessary and desirable to confine to the line of our own railroad from operators who may be able to give us commercial business. The total purchases made by us of off-line fuel have been as follows: 1924, 1.1 per cent; 1925, 1.3 per cent; 1926, 1.4 per cent, and 1927, 1.1 per cent, and these figures are characteristic except in extreme emergencies, such as occurred in the year 1922

"As the Pennsylvania R.R. is the largest coal-carrying road in the country, it is evident that its problem in dealing with the coal operator is entirely dissimilar to that of other roads on the line of which the transportation of coal from the mines is only incidental or on which there are no coal operations. Coal is generally purchased from operators in as close proximity to the point of consumption as is reasonably practicable, given to consideration being due reliability which insures continuous production, the length of haul, the quality of preparation and the varying characteristics of the fuels required for the different services."

C. B. Heiserman, vice-president and general counsel, insisted that charges made against the railroad by the union be withdrawn. After conference with his associates Mr. Lewis formally withdrew an allegation that the railroad was standing 60 per cent of the losses accruing to the Monroe Mining Co. at its Webb mine. Mr. Young reiterated several times that the railroad had no interest in the labor affiliations of the producers.

The final sessions of the subcommittee on May 17 were taken up with the introduction of several hundred amdavits by union representatives and a discussion on injunctions between H. A. Warrum, chief counsel for the union, and E. L. Greever, counsel for south-ern West Virginia operators. Mr. Bittner, in addition to submitting affidavits, made answer to the attack upon his Blocton "rattlesnake" speech by W. H.

48,300,000 Tons of Soft Coal Stocked On April 1; Would Last 34 Days

CONSUMERS' stocks of bituminous coal continued to decline during the first quarter of 1928, amounting on April 1 to 48,300,000 tons, according to a survey by the U. S. Bureau of Mines and the Bureau of the Census. On Jan. 1, the date of the preceding survey, there were 55,500,000 tons in storage. During the month of January there was a net decrease of 4,000,000 tons and from Feb. 1 to April 1 stocks were still further reduced by 3,200,000 tons.

A slight increase in consumption occurred in the first quarter of 1928, reflecting in part the colder weather of midwinter and in part greater activity in the coal-consuming industries. The average consumption was 10,636,000 tons a week, as against 9,912,000 tons in the last quarter of 1927. In comparison with the first quarter of 1927, however, the consumption showed a decrease of 6.9 per cent.

Exports averaged 199,000 tons a week during the first quarter of 1928, and the total of consumption plus exports was 10,835,000 tons a week.

Stocks of anthracite in retail yards on April 1 were 7 per cent greater than on April 1, 1926, but 29 per cent less than on the same date a year ago. Stocks of hard coal on the upper lake docks on April 1 totaled 673,150 tons, as against 690,089 tons a year previous.

Average Weekly Consumption and Exports of Bituminous Coal

(In Thousands of Net Tons)

							To	otal
							C	on-
			Ne	t U.S.	11	-	sum	ption
			Col	nsump-		Ex-	8	nd
Period			ti	on (a)	p	orts	Ex	porta
1921-Jan. 1	to Mar.	31.		8.740		40.5	- 9	145
1922-Jan. 1	to Feb.	28.		8.730		194	8	.924
1923-Janua	ry		(b)	11.370		276	II	646
1923-Febru	ary		(6)	11,550		226	11	776
192)-Mar.	I to May	31.		8,300		269	8	569
1926-Janua	ry		(b)	12,700	1.00	251	12	951
1920-Feb.	I to Mar.	31	(b)	11,960		287	12	247
1921-Jan.	I to Mar.	31		11.430		387	11	817
172/-Apr.	l to June	30		8,889		370	9	259
1921-July	I to Sept.	. 30		8,360		351	8	711
1921-Oct.	l to Dec.	31		9,912		273	10	185
1928-Jan.	I to Mar.	31	(c)	10,636		199	10	,835
(1) Produ					2			

(a) Production plus imports and minus exports, plus or minus changes in stocks. Allowance is made for stocks at the mines; coal in transit, including ubilled loads, coal in cars en route to destination, and coal on the Lake docks; and stocks of commercial consumers. (b) Bituminous coal required to meet shortage of anthracite. (c) Subject to revision. The trend of consumption by classes of consumers shows that in comparison with the same period a year ago the railroads, beehive coke ovens, steel works, general industrial plants, foreign bunker trade and consumption of coalmine fuel show a decrease. Byproduct coke ovens, gas plants and retail dealers show an increase, and electric utilities report virtually no change. In comparison with the months of November-December, 1927, on the other hand, all but three of the classes of consumers show an increase in the rate of consumption.

At the rate of consumption prevailing in February and March, the stocks on April 1, 1928, were sufficient to last 34 days. A year ago, when exceptionally heavy reserves had been accumulated in anticipation of the strike, supply was sufficient for 53 days. These figures, however, show nothing of the wide variations in the reserves of individual consumers. In every large community there will be found consumers who maintain a stock much above the average, and others who carry little or none.

The number of days' supply which consumers find it advisable to keep in

Electric Safety Lamp Gains in Oklahoma

The campaign of the state mine inspector's staff to introduce the electric safety lamp into all coalmine operations in the Oklahoma gaseous fields to take the place of the open-flame cap lamp is meeting with success, in the opinion of Miller D. Hay, chief mine inspector.

At the present time most of the larger mines of the state are working with the electric cap lamps, according to Mr. Hay. He estimates that 90 per cent of the coal produced in the state is mined by men working with the electric safety lamp.

Only a few of the smaller operations are fighting this program in the interest of safety in the operation of the Oklahoma mines, Mr. Hay believes. In some cases in the Haskell County district he has brought suit in the district court asking injunctions to prevent the operation of coal mines where the open-flame lamp is used in violation of a shutdown order from the mine inspector's office.

Feb (a) Apr (a)

Days' Supply of Bituminous Coal in Hands of Various Classes of Consumers, Jan. 1, 1919, to April 1, 1928

the factor of the stand the stand of the	1, 1919	1, 1921	1, 1926	1, 1927	1, 1928	1, 1928	1, 1928
Byproduct coke plants	32	28	21	38	38	29	25
Steel plants	42	38	24 32	62	45	41	39
Coal-gas plants	81	66	60	77	79	81	74
Electric utilities.	49	48	40	24	27	22	17
Railroads	32	24	23	59	41	38	40
Tetal hitumineus	42	36	26	53	41	36	34

(a) Calculated at average rate of consumption during February and March, 1928.

stock tends to vary with the distance from the mines. Localities remote from the mines, especially those whose communications with the mines have in the past been interrupted by traffic congestion, generally carry stocks above the average. Thus while the average for industrial plants over the country as a whole was 39 days on April 1, the plants in New England and the lake dock territory had enough coal for 50 days. Stocks at both byproduct coke plants and steel works show a decrease on April 1 when compared with the amount in storage three months ago. Complete returns from the byproduct plants show a total of 4,673,885 tons of coking coal in stock on April 1, of which 1,127,650 tons was low volatile and 3,546,235 tons high volatile. The steel works and rolling mills reporting had 1,191,524 tons of steam coal on hand and 840,767 tons

Total Stocks of Bituminous Coal in Hands of Commercial Consumers on Various Dates Between Nov. 11, 1918, and April 1, 1928 Relative Rates of Consumption in February-March, 1927; November-December, 1927, and February-March, 1928





Days' Supply of Bituminous Coal on Hand at Industrial Plants Other Than Steel and Coke Works, April 1, 1928

How Stocks of Bituminous Coal at Industrial Plants on April 1, 1928, Compared With Those on Jan. 1, 1928

of gas coal, a total of 2.032,291 tons. In terms of days' supply the stocks of both groups of consumers were as follows:

Byproduct Coke Plants	-Days' Feb. 1	Supply-Apr.
Low volatile	. 31 . 29	25 25
Average	. 29	25
Steel Works .	-Days' Feb. 1	Supply-
Steel Works . Gas coal	—Days' Feb. 1 . 40 . 34	Supply- Apr. 38 32

Stocks of railroad fuel declined during January and February, but increased slightly in March. From Jan. 1 to March 1 there was a net decrease of 1.165,000 tons. During March, however, 921,000 tons was added to the railroad reserves and the total on hand April 1, as reported by the American Railway Association, was 14,486,000 tons. The stocks on comparable dates tons. The stocks on comparable dates in recent years were: April 1, 1921, 9,700,000 tons; April 1, 1922, 19,844,-000 tons; April 1, 1923, 7,385,000 tons; April 1, 1924, 18,722,000 tons; April 1, 1925, 11,147,000 tons; April 1, 1926, 9,090,000 tons; April 1, 1927, 22,806,000 tons; Jan. 1, 1928, 14,729,000 tons; Feb. 1, 1928, 14,074,000 tons. Coal brought to the surface prepared

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. The quantity of such coal en route to destination varies in direct ratio to production and from current reports of car loadings it is evident that the amount of coal on wheels on April 1 was considerably less than on the same date last year and also less than at the beginning of 1928.

Another important item in the reserve in transit is the coal in cars unbilled at mines or in classification yards. The American Railway Association states that on April 1 there were 1,500,000 tons (29,995 cars) of unbilled coal on wheels awaiting shipment.

A small number of operators follow the practice of storing soft coal at the mines. From a list of 43 companies who have at some time in the past stored in appreciable quantities at the mines or at some intermediate point, the Bureau has received reports of 303,000 tons in storage on April 1 as against 448,000 tons on Jan. 1.

On April 1 there was 4,320,796 tons of bituminous coal on the upper lake docks, of which 3,282,115 tons was on Lake Superior and 1,038,681 tons on Lake Superior and 1,038,081 tons on Lake Michigan. Stocks on other dates in recent years 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; March 1, 1925, 3,840,000 tons; April 1, 1926, 2,892,000 tons; April 1, 1927, 2,085,000 tons.

have declined since the first of the year. A group of 21 such plants supplying gas for city use and producing coke suitable for household fuel had 750,000 tons on hand April 1, a decrease of 37,000 tons since Jan. 1. Figures for other dates since Jan. 1. Figures for other dates in recent years are: March 1, 1922, 987,000 tons; March 1, 1923, 92,000 tons; March 1, 1925, 631,000 tons; April 1, 1926, 53,000 tons; April 1, 1927, 470,000 tons; July 1, 1927, 584,000 tons; Oct. 1, 1927, 799,000 tons; Jan. 1, 1928, 787,000 tons; Feb. 1, 1928, 749,000 tons.

Stocks of bituminous coal in retail yards decreased sharply during the last quarter of the coal year, and the ton-nage on hand April 1 though greater than on April 1, 1926, was 23 per cent Stocks of coke at byproduct plants less than at the same date a year ago.



Saw Mechanical Equipment "Do Its Stuff"

Inspection party leaving Royalton No. 7 of the Franklin County Coal Co., Royalton, Ill., after "taking a look" at the mechanical suubbing and mechanical loading equipment recently installed. Left to right are: J. M. Rollo, representing the Egyptian Powder Co.; C. W. McReaken. division superintendent, Peabody Coal Co., Marion, Ill.; T. W. Phillips, division engineer, Peabody Coal Co., Marion, Ill.; William Smith, general superintendent, Franklin County Coal Co., Herrin, Ill., and William Burnett, Jr., divi-sion chief electrician Peaboda Coal Co. sion chief electrician, Peabody Coal Co., Carterville, Ill.

392

Mine Fatalities in April Show Decline From Last Year's Rate

Accidents at coal mines in the United States during April, 1928, caused the death of 134 men, 95 occurring in bituminous mines and 39 in the anthracite mines of Pennsylvania, according to reports received from state mine inspectors by the U. S. Bureau of Mines. The death rate per million tons of coal mined during the month was 3.42 for the industry as a whole, based on a production of 39,140,000 tons. The fatality rate for bituminous mines alone, based on a production of 32,200,000 tons, was 2.95, and that for anthracite, with a production of 6,940,000 tons, was 5.62.

6,940,000 tons, was 5.62. The rates for the corresponding month last year were much higher for bituminous and for the total industry because of three major disasters—that is, accidents causing the loss of five or more men—which caused 110 deaths in bituminous mines. The rates for April, 1927, were 6.37 for bituminous mines, based on 221 deaths and 34,674,000 tons of coal; 5.89 for anthracite, based on 42 deaths and 7,127,000 tons of coal, and 6.29 for the industry as a whole, based on 263 deaths and 41,801,000 tons of coal. The rate for the preceding month was 2.46 for bituminous, 6.37 for anthracite and 2.89 for both.

During the first four months of 1928 603 men lost their lives from accidents in coal mines. The production of coal during these months was 185,423,000

tons, resulting in a death rate of 3.25. The bituminous rate for this period was 2.88 based on 466 deaths and 161,714,0000 tons of coal; that for anthracite was 5.78 based on 137 deaths and 23,709,000 tons. For the same period in 1927 the rate for bituminous mines alone was 3.40 per million tons, based on a production of 204,607,000 tons and 696 deaths. The rate for anthracite mines was 6.67, based on 25,638,000 tons and 171 deaths. The death rate for the industry as a whole was 3.77, based on 230,245,000 tons and 867 deaths.

The total loss of life from four major disasters occurring during the first four months of 1928 was 54. The fatality rate based exclusively on this figure was 0.291 per million tons of coal. The corresponding rate for the period from January to April, 1927, was 0.512, based on 4 major disasters which caused the loss of 118 lives, 6 of which occurred on the surface.

A comparison of the accident record for the first four months of 1928 with that for the same period of 1927 shows:

		Jan	Jan	
	Year	Apr.,	Apr.,	
	1927	1927	1928	
All causes	3.704	3.766	3.252	
Falls of roof and coal	1.907	1.716	1.731	
Haulage	0.586	0.639	0.513	
Gas or dust explosions:				
Local explosions	0.153	0.178	0.103	
Major explosions	0.258	0.456	0,291	
Explosives	0.183	0.156	0.167	
Fleetricity	0.167	0.130	0.108	
Other services	0 450	0 491	0 339	

Pennsylvania Safety Drive Shows Results

"The widespread safety effort is beginning to show results," the latest report of the Pennsylvania Department of Labor and Industry shows. April was Safety Month in Pennsylvania and the use of safety devices was explained in mines, mills, factories, stores, offices, schools, streets and highways.

schools, streets and highways. "The totals of 139 fatal and 10,928 non-fatal accidents reported during April," says the report, "were the lowest for any month in more than five years.

"In the sphere of industrial accidents, with which the Department of Labor and Industry is concerned, accidents in April show a 12.8 per cent decrease compared with March. Fatal accidents were 9.6 per cent less and non-fatal accidents were 1,611, or 13 per cent less than in March. Compared with April, 1927, accidents in April of this year fell 18 per cent in the fatal group and 13 per cent in the non-fatal group.

"Accidents have shown consistent reductions for each of the first four months in 1928, compared with the corresponding months last year."

During the four-month period of 1927 there were 686 fatal accidents as compared with 596 this year. There were 54,623 non-fatal accidents in the period in 1927 and 47,384 in 1928.

Coal-Mine Fatalities During April, 1928, by Causes and States

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

	125				Une	lergr	ound	1		ST	12 1			5	baft	1417		ije .	- Star	S	urface		1		Total State	by 88
State	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal.	Mine cars and loco- motives.	Gas explosions and burning gas.	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives	Electricity.	Machinery.	Boller explosions or bursting steam pipes	Railway cars and locomotives.	Other causes	Total.	1928	1922
Alabama				111	3	(ILLIC		-		-		9		+ 9164	1.0	10.00				in al	1		1	2	- 11	6
Alaska			1222	100	-				2								1					248				0
Arkansas.														100							1 4 4 4 4		12.5	12	2	2
Colorado	10 I -		1				1.00				198	2	****	1.0.0			1.14				1000	1.1.1.1		221	3	4
Indiana Indiana	3				1.	4.2				****		2		10.01				1.5	2.1	2.5	1000	1			2	· 0
Inuiana	2	15-1									1	ĩ			1.1		1.1				and a				1	2
Kanage	1					1.00		5.63	50		1233				2.									192	0	0
Kentucky	4	11192	4		1.0			199	200			8				100				134	12 23		•	0.91	ð	0
Maryland	13.00		199.04													12					1	100	1.1.1	122	ů	U I
Michigan	1.044	2.0						COR.	1								2015			1			••••	100	ő	ò
Missouri.	A	1.00				1.2		100				12.11		100					1.1	2.1	1.1.1			123	Ō	1
Montana.		1000					1.11				12						100				Citer.				0	0
North Dekete		10.54			42	1.1.1					1.0	1000		12.5							i.i.i.			dee	0	0
Ohio.		1.541	1000				100		106			2	-		199						1.000				2	4
Oklahoma	-	1 1			10			1.00				1				1.25	· · · · ·	20.00	1		10.00	1			23	33
Pennsylvania (bituminous)	7	5	3	4	1		1				1.1 4	21	14.0			1.10			0.0		1.1.4	10.0		4	0	Ő
South Dakota		1122	125.01	1.00	200							1					****								1	1
Tennessee	1	ALC:				1223.5	1.2					110.00				12.0								44	0	0
Utah	1.14										100.2	2				12		in			Re.			22.8	2	3
Virginia	Å	100	12.24		2.6.4	1		1.1				5		2.00				1.44		1.4	1 X				5	3
Washington	0.0	1.000	1-1						1.4	12	1255		1				12.		1.81		2000			125	34	144
West Virginia	11	1.00	8	11	2		1		***			33	1	1.1.1.1			1		10.0		2.030			•••	1	1 1 1
Wyoming.	1		125.00									1	1.5		241	1.23	THE STATE		-	1	1000	1	-		1000	
Tatal day					-		2			1000	1	90	1	1055	N. Lev		1		1		1	1	1	4	95	221
Pennergiania (antinous)	44	6	17	15	0 5		4				2	33	2				2	2		1.14	- See	1	1	4	39	42
(anthracite)	14	0	2	1.00				1000			-	-				-			123	-			-	-	12/	
Total, April, 1928 Total, April, 1927	58 68	12	22 32	15 108	11 12		35	'i'	3	3	29	123 248	3			2	32	3				2	8	13	134	263

Hard-Coal Independents In Merger

Consolidation of the Jeddo-Highland Coal Co. and the Hazle Brook Coal Co., large independent anthracite producers, was announced May 10 by Donald Markle, president of Jeddo-Highland, and E. B. Leisenring, president of Hazle Brook. The Markle company will acquire a substantial stock interest in the Hazle Brook company and the executive offices of the latter company will be moved from Philadelphia to Jeddo, Pa. It is contemplated that Donald

It is contemplated that Donald Markle will be president of both companies, though each will retain its old operating management. A. B. Jessup will continue as vice-president and general manager of Jeddo-Highland. T. E. Snyder will remain as vice-president in charge of operations and E. P. Humphrey as general manager of the Hazle Brook properties.

Hazle Brook properties. An annual production of 2,500,000 tons is expected by the consolidated companies, each of which has an output of about half that figure. Founded in 1858 by George B.

Founded in 1858 by George B. Markle, the Jeddo-Highland company was operated as G. B. Markle & Co. until 1921, when the name was changed to the Jeddo-Highland Coal Co. The company was operated by John Markle from 1889 to 1926, when his interest was purchased by the third generation of Markles, comprising the minority stockholders, and these are now operating the company. The main office is at Jeddo and there are four operations.

Judge Leisenring in 1864 opened the Upper Lehigh and Hazle Brook collieries, now a part of the Hazle Brook Coal Co. His son, Edward B. Leisenring, and his son-in-law, John S. Wentz, later acquired other properties which were placed under the same management. In 1923 the late Col. Daniel B. Wentz merged the seven collieries then owned into the present Hazle Brook company.

Alabama Safety Meet Set

The Tenth Annual Alabama First-Aid Contest will be held in the Municipal Auditorium, Birmingham, June 23. Teams from the coal mines throughout the district, which have been training during the past year, will participate in this meet, which will be held under the auspices of the Alabama Mining Institute, state mining department, U. S. Bureau of Mines and the Joseph A. Holmes Safety Association. A program for the contest is now being arranged and prizes selected to be awarded to the successful contestants.

To Open New Strip Mine

The Indiana Coal Co., which recently took over the option held by the Central Coal Co. on 3,500 acres of coal lands northeast of Huntsville, Mo., will soon begin operations with two large stripping machines.



Photo by Underwood & Underwood John E. Berwind

John E. Berwind, Operator, Dies of Heart Attack

John E. Berwind, vice-president of the Berwind-White Coal Mining Co., died at his home, in New York City, on May 23 as the result of a heart attack. Although past 73 years old he had been active in business until a month ago, when he was stricken with laryngitis.

Born in Philadelphia, Mr. Berwind joined his two brothers, Edward J. and Harry A. Berwind, in organizing the Berwind-White company nearly 50 years ago and helped develop it to a leading place in the industry. He was interested in many other corporations, served on a number of directorates and was noted for his philanthropic interests.

He was president and a director of the New River & Pocahontas Consolidated Coal Co., the Porto Rico Coal Co. and the World's Maritime News. Co.; vice-president and a director of the Havana Coal Co. and the Wilmore Steamship Co. and a director of the Archer Coal Depot Co., New York Produce Exchange Bank, New York and Porto Rico Steamship companies, Scandinavian Trust Co., Windward Island Estates Co. and the Northern Insurance Co. of New York.

Lord Buckland Killed In Fall From Horse

Lord Buckland, 50, one of the leading British colliery owners, was killed May 23 as the result of being thrown from a horse on his estate in Wales. As Henry Seymour Berry he became associated with the late Lord Rhondda as a coal producer and eventually was made chairman or director of nearly 60 companies. He was created the first Baron of Bwlch in 1926. It is understood that he was to have taken a prominent part in a merger of South Wales mining and industrial interests contemplated by Sir Alfred Mond.

Economic Progress Reviewed By Industrial Board

A review of today's most pressing business problems and of the contributions of science and engineering to economic progress was the outstanding feature of the twelfth annual meeting of the National Industrial Conference Board, held in New York City, May 17. Particularly notable were addresses by Gilbert H. Montague, New York attorney, who declared that the Sherman law was being satisfactorily modified by interpretation, and by Charles H. Herty, adviser to the Chemical Foundation, New York, on the great contribution that chemistry has made to economic progress.

economic progress. Magnus W. Alexander, president of the Board, discussed the various estimates of unemployment put out during the last six months, showing how the various figures were built up, and proving the unreliability of the figures of 4,000,0000 and more unemployed. He made a satisfactory defense, also, of the thesis that the mechanization of industry should not be curtailed because of any temporary effect it might have on the unemployment problem.

Virgil Jordan, chief economist of the Board, made the point that our private foreign loans will be funded and refunded indefinitely, just as are the bonds of large corporations in the United States. This he held to be the normal expectation. Nevertheless, our large loans abroad set up a new financial relationship between the rest of the world and the United States—a relationship into which we were thrust in the four years of the war and for which, therefore, we have had no preparation in the way of adequate experience in international finance. The resulting problems are intricate and difficult.

William J. Schultz, financial economist of the Board, contended that one of the large problems before business today was to assist in bringing the government's expenditures, and consequently taxation, under proper control.

Charles Nagel, of St. Louis, formerly Secretary of Commerce and Labor in President Taft's Cabinet, approved the view of Mr. Montague that the courts are coming nearer and nearer to the business man's view of a proper interpretation of the anti-trust laws. We are still, he declared, making law every day, for law is nothing more than an adaptation of authoritative expression to changing custom.

Loyall A. Osborne, president of the Westinghouse Electric International Co., was re-elected chairman of the board, and Magnus W. Alexander, president and chief executive of the organization.

New Missouri Mine?

The Adams Coal Co., Kirksville, Mo., is purchasing complete machinery and other equipment for a new mine.

Among the Manufacturers

ERLE S. ORMSBY, formerly president and general manager, Donk Bros. Coal & Coke Co., and B. F. Rassieur announce the formation of the Ormsby Rassieur Mine Equipment Co., 959 Bell Telephone Building, St. Louis, Mo.

WM. MCCORMICK has resigned as Pittsburgh sales manager of the Niles Tool Works Co. and the Pratt & Whitney Co. and is now Western sales representative of Leeds, Tozzer & Co., 75 West Street, New York City.

H. R. SYKES is now manager of sales of the locomotive division of the Cincinnati Car Co., Cincinnati, Ohio.

* *

T. H. EDELBLUTE Co. has moved its offices to 835 Oliver Building, Pittsburgh, Pa.

THE LINDE AIR PRODUCTS Co. has opened a new district sales office at 48 West McLemore Ave., Memphis, Tenn. H. N. Smith will be in charge.

O. W. YOUNG, formerly located with the Western division sales office of the Hyatt Roller Bearing Co., has been appointed chief engineer with headquarters at Newark, N. J.

W. F. BRANNAN has been elected president of the Anchor Post Fence Co., Baltimore, Md., succeeding the late Herbert G. Thomson.

*

*

C. O. BARTLETT & SNOW Co. Cleveland, Ohio, announces the appointment of J. R. Allison to its Pittsburgh (Pa.) office at 406 Bessemer Building.

THE ROLLWAY BEARING Co., INC., Syracuse, N. Y., announces the appointment of Alfred E. Munch, Jr., as representative in the Chicago-Milwaukee district, with headquarters at 544 Railway Exchange Building, Chicago.

THE NATIONAL FLUE CLEANER Co., INC., Groveville, N. J., announces the recent appointment of the following district representatives: Walter G. Heacock Co., 30 Euclid Arcade, Cleveland, Ohio, and 413 Penobscot Bldg., Detroit, Mich.; Jack Deerwester Co., 1621 University Avenue, St. Paul, Minn.; Charles Zinram, P. O. Box 487, Erie, Pa.; Laib Co., Louisville, Ky.

THE COLUMBUS MCKINNON CHAIN Co., Tonawanda, N. Y., recently purchased the chain block electric hoist and crane division of the Chisholm & Moore Manufacturing Co., Cleveland, Ohio. The sales offices and plant will remain in Cleveland and will be operated as the Chisholm-Moore Hoist Co., a division of the Columbus McKinnon Chain Co. SULLIVAN MACHINERY Co., Chicago, has appointed these new distributors: Funkhouser Machinery Co., Kansas City, Mo.; C. Taylor Handman, Cincinnati; Paul A. Pie, Commercial Trust Building, Philadelphia; H. W. Dexter, 22 Laura St., Jacksonville, Fla.; M. H. Elder Culvert & Machinery Co., Atlanta, Ga.; C. H. Ineson, Exchange Place Building, Rochester, N. Y.; Joseph C. Fiorello Co., Buffalo, N. Y.; Staata Abrams, Firemen's Building, Newark, N. J., and Hunter Machinery Co., Detroit, Mich.

THE ROLLER BEARING CO. OF AMER-A. which has been engaged in New-

*

*

ICA, which has been engaged in Newark, N. J., since 1919 in the manufacture and sale of roller bearings, has purchased the plant of the Mercer Motor Car Co., in Trenton, N. J. The purchasers will install their present equipment in the Mercer plant and install a large amount of new equipment.

GEORGE D. WHITCOMB Co., Rochelle, Ill., announces the appointment of Ralph Rollins as sales representative in North Carolina, South Carolina and southern Virginia, with headquarters in Charlotte, N. C.

*

*

GIFFORD-WOOD Co., Hudson, N. Y., recently acquired the trolley bucket conveyor business of the Conveyors Corporation of America of Chicago, Ill.

EICKHOFF BROTHERS have established a direct sales and engineering office at 393 Seventh Avenue, New York, in charge of Ingo Maddaus.

*

* * *

CARBIC EQUIPMENT utilizing acetylene, formerly sold by the Carbic Mfg. Co., Duluth, Minn., will in the future be distributed exclusively by the Oxweld Acetylene Co., 30 East 42d St., New York City.

REPRESENTATIVES of the leading manufacturers of wrought iron in various parts of the country have formed the Wrought Iron Research Association, the principal object of which is to gather and disseminate information about this time-honored metal. L. M. Johnston, vice-president A. M. Byers Co., Pittsburgh, Pa., was elected president of the association and Snowden Samuel, secretary, American Swedo Iron Co., Philadelphia, Pa., secretary-treasurer. Headquarters of the association will be in Pittsburgh, Pa. JOSEPH V. SANTRY has resigned as president of Combustion Engineering Corporation, an American subsidiary of International Combustion Engineering Corporation. H. D. Savage, for many years vice-president, succeeds Mr. Santry. George T. Ladd has been elected vice chairman of the board of directors of Combustion Engineering Corporation.

FOOTE BROS. GEAR & MACHINE Co., Chicago, recently appointed Woodbury & Wheeler, 55 2nd St., Portland, Ore., as representative in Portland and vicinity. The Cunningham Electric Co., 2123 Pacific Ave., Tacoma, Wash., will handle the line in Tacoma and vicinity.

THE INGERSOLL-RAND DRILL Co., with offices at 314 N. Broadway, St. Louis, Mo., was succeeded by Ingersoll-Rand, Inc., on May 1. A new branch operating under the St. Louis office has just been opened at 226 West A St., Picher, Okla.

*

*

*

THE HYDRAULIC PRESSED STEEL Co., Cleveland, Ohio, has been purchased by the Truscon Steel Co., Youngstown, Ohio, and will be completely modernized.

*

THE H. K. PORTER Co., of Pittsburgh, Pa., announces the removal of its Chicago office from 447 Monadnock Building to the New Engineering Building, Wells Street and Wacker Drive.

*

THE R. D. NUTTALL Co.'s commercial activities hereafter will be handled through the parent company, the Westinghouse Electric & Mfg. Co. E. J. Mullen, formerly assistant sales manager of the Nuttall company, will head the new set-up.

[•] D. W. WILSON has been elected vicepresident and general manager of the Dry Quenching Equipment Corporation, a subsidiary of the International Combustion Engineering Corporation.

THE TIMKEN ROLLER BEARING SERV-ICE & SALES Co. announces the appointment of W. H. Post as manager of the Pittsburgh branch office of the company.

*

* *

ELLIOTT Co., Jeannette and Pittsburgh, Pa. announces the opening of a new district office in Denver, Colo., at 512 Mining Exchange Building. M. C. Sickels, formerly district manager in Cleveland and Chicago, is in charge of the new Denver office. F. A. Calmus, for the past two years district manager of the company's Kansas city office, has been transferred to San Francisco, where he will open up a new sales office.

Indicators of Activities in the Coal Industry



average prices were \$1.76, \$1.73, \$1.71 and \$1.77. The monthly April Index was 144 as compared with the May

unrevised Index of 1421. Due principally to the late opening of the lake season, dumpings at the lower lake ports to May 28 were 4,476,-463 tons under the totals for the corresponding period in 1928. Cargo dump-ings May 28, 1928, were only 4,412,065

tons and bunker fuel loadings were 165,-457 tons. During the week ended June 3 cargo dumpings totaled 1,086,007 tons and vessel fuel dumpings were 43,713 tons. The lake situation, however, is still very much disturbed because of the perennial rate war between Northern and Southern mines.

in Review

MARKETS

ARKET conditions in the bitu-

M minous coal trade last month were a study in conflicts and

contrasts. When due weight is given to the general industrial situation and to the quantity of coal still held in storage by large consumers, the output for May

was surprisingly heavy. In fact, it was

the constant pressure which maintained a daily average production of 1,384,000.

tons that was responsible for the continued unsatisfactory showing from the

May output is estimated by the U. S. Bureau of Mines at 36,542,000 net tons. This was an increase of 4,354,000 tons

over the preceding month in the face of a decline of 3,358,000 tons in consump-tion in April. Although there have been

increases in industrial activity in some lines during May, this additional ton-nage for the most part has been ab-

sorbed by the lake trade and by shrewd buyers who found prices so tempting they again added to their stockpiles.

Such selling, however, has had a de-

pressing effect upon price levels. Coal Age Index of spot bituminous prices was 142 on May 5, 148 on May 12 and 140 on May 19 and 26. The corresponding

weighted average prices were \$1.72, \$1.79 and \$1.70. These figures are pre-liminary. The revised Index figures for April were 145 on April 7, 143 on April 14, 141 on April 21 and 146 on April 28 and the according to the figures

April 28 and the corresponding weighted

standpoint of sales realizations.

On the export side there has been no unusual developments to absorb additional production. On the contrary, April figures—the latest available showed shipments of bituminous coal totaling only 711,101 gross tons, as compared with 756,375 tons in March and 1,234,994 tons in April, 1927. Anthracite exports in April were 182,-131 tons as compared with 188,351 tons in March and 199,190 tons in April, 1927.

The domestic anthracite trade in May showed a substantial gain over April figures. Production rose to 8,117,000 net tons-an increase of 1,208,000 tons over the preceding month and slightly in excess of the May, 1927, figures. Stove and egg led in demand. Steam sizes opened strong but buckwheat and barley weakened as production increased. The fact that sizes larger than pea were marked up 25c. on June 1 probably was the chief factor in the May gains.

N EITHER domestic nor steam coals were active in the Chicago market last month. Demand hardly supported a 50 per cent running time for the mines operating in Illinois, Indiana and western Kentucky and there was no incentive to a resumption at idle pits. "No bills" were the common lot of almost every mine, with the larger domestic and steam sizes making up the greater part of the surplus load.

Forced sales and inter-district competition held down prices. Ordinary grades were offered as low as \$3 f.o.b. Chicago and better grades commanded only 25 to 30c. more. Western Kentucky mine-run and screenings were quoted at 90c.@ \$1.15 mines and Indiana strip mine-run was offered down to \$1.25.

While industries were eating into stockpiles except when bargain figures on freshly mined coal proved too tempt-ing to resist, retailers showed no inclination to order heavily because of the indifference of household consumers. Western Kentucky lump and egg were dumped on the market at \$1 by some shippers and there was no dearth of ton-nage at \$1.25@\$1.50 although premium and trademarked grades commanded up to \$2.25.

EASTERN coals fared no better than the Western offerings. Smokeless mine-run dragged, particularly in the local Chicago market; country dealers were somewhat more liberal with orders. Mine-run was quoted at \$1.65@\$2 and lump and egg, \$2.75@\$3, with the bulk of the tonnage in both cases going at the top figures. High-volatiles were a drug on the market. Shipments to the Middle West were subnormal last month.

There was a better movement of an-thracite and coke towards the end of May as retail dealers sought to stock up in advance of the 25c. advance scheduled for June 1. Nevertheless the volume of tonnage sold was nothing to brag about. The Chicago trade looks for no real improvement in demand until after the July holidays. No change has been announced in June contract prices on West Virginia low-volatile.

St. Louis territory still is in the In spite of curtailed production the doldrums. There is some trade in Illi-Midwest screenings market was weak, nois and western Kentucky steam

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

		Section St.				Ended-			
		May 5	1928	May 12	. 1928		1928	May 26.	1928
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken.	New York	Standard and	\$8.00		\$8.00		\$8.00	*********	\$8,00
Broken.	Philadelphia	\$8.00@\$8.25	8.00	\$8.00@\$8.25	8.00	\$8.00@\$8.25	8.00	\$8.00@\$8.25	8.00
Lgg.	New York	8,00(0) 8,25	8.25	8.00@ 8.25	8.25	8.00(a) 8.25	8.25	8.00@ 8.25	8.25
Egg	Philadelphia	8.25@ 8.50	8,25	8.25@ 8.50	8.25	8.25@ 8.50	8.25	8.25@ 8.50	8.25
Egg	Chicago*	7.38	7.38	7.38	7.38	7.38	7.38	7.38	7.38
Stove	New York	8,40@ 8.60	8.60	8.45@ 8.60	8.60	8.35@ 8.60	8.60	8.35@ 8.60	8,60
Store.	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60(@) 8.85	8.60	8.60@ 8.85	8.60
Chestmal	Chicago*	7.63	7.63	1.03	1.03	0.00 0 25	7.05	0 00 0 15	1.03
Chestnut.	New York	8.00@ 8.25	8.25	8.00(0) 8.25	0.20	0.00(0) 0.45	8 25	8 25 6 8 50	0.20
Chestnut	Philadelphia	8.25(0) 8.50	0.20	7 39	7 38	7 38	7 38	7 38	7 38
Pea	Unicago*	1 750 5 00	5.00	4 65@ 5 00	5.00	4 75@ 5 00	5 00	4 75@ 5 00	5 00
Pea	Dhiladalahia	5 00@ 5 25	5.00	5 00@ 5 25	5 00	5 00@ 5.25	5.00	5.00@ 5.25	5.00
Pea.	Chicago*	4 45	4 45	4.45	4.45	4.45	4.45	4.45	4.45
Buck.	New York	2 65@ 3.00	3.00†	2.65@ 3.00	3.00†	2,75@ 3.00	3.00†	2.75@ 3.00	3.00†
Buck.	Philadelphia	3 00@ 3.25	3.001	3.00@ 3.25	3,00†	3.00@ 3.25	3.00†	3.00@ 3.25	3.00+
Rice	New York	1.90@ 2.25	2,25	1.90@ 2.25	2.25	1.85@ 2.25	2.25	1.85@ 2.25	2.25
Rice	Philadelphia	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2,25@ 2.50	2.25	2.25@ 2.50	2.25
Barley	New York	1.40@ 1.75	1.70@ 1.75	1.40@ 1.75	1.70@ 1.75	1.50@ 1.75	1.70@ 1.75	1.40@ 1.75	1.70@ 1.75
Darley	Philadelphia	1.50@ 1.75	1.75	1.50@ 1.75	1.75	1.50@ 1.75	1.75	1.50@ 1.75	1.75
birdseye	New York		1.60		1.60	**********	1.60		1.60

* Net tons, f.o.b. mines. † Domestic buckwheat \$3.25 (P.&R.) and \$3.50 (D.L.&W.)

grades, but very little demand for do-mestic sizes. Industrial buying as a whole is held back by stockpile accumulations and by a slight falling off in general business. Money is tighter and collections slower. The outlook for any early storage buying is very nebulous.

W ITH demand for prepared coal at a low ebb, Kentucky operators faced a discouraging situation last month. Producers in the western field were offering large coal at 50c. less than they had hoped and some companies shipped large sizes on mine-run orders in order to keep mines open to take care of contract commitments. Screenings alone showed strength but prices were unsatisfactory.

In the eastern part of the state the price range on sized coal was higher, but production experienced another reverse after the middle of the month. The unsettled condition in the rate situation has not helped the movement of lake-cargo coal from the Kentucky mines and buyers wait for bargain offers. Retail buying has been backward. Public utilities and railroads have been the best customers.

Movement of coal from the docks at the Head of the Lakes is showing a seasonal slacking but the volume is not subnormal for this time of the year. It is estimated that May shipments closely approximated the April total of 14,135 cars. Industry is absorbing a substantial tonnage despite a disposition to restrict buying to current requirements.

Part of this caution is dictated by price considerations. Dock quota-

ton on May 1, but buyers are hoping that further reductions will be made. For this reason a number of large interests are holding back on contract re-newals. Salesmen are kept busy trying to round up orders and a good volumefor the most part for moderate tonnages-has been turned in.

At the opening of the season there was a carry-over of approximately 2,500,000 tons of bituminous coal and 325,000 tons of anthracite on the docks. The first cargoes of the new season reached the Head of the Lakes on May 7. Up to May 28 there were 137 cargoes of bituminous coal and three of anthracite unloaded. Dock operators view the year's prospects with cheer and look forward to a heavy movement up the lakes. An active fight for business in southern Minnesota continues.

The May 1 price schedules were as follows: Pocahontas lump, egg and stove, \$7.50; nut, \$7; mine-run, \$5; screenings, \$4.25; Kentucky lump and egg, \$6@\$7; stove, \$6; dock-run, \$4.50; nut, pea and slack, \$4.40; screen-ings, \$4.25; splint and Youghiogheny block, \$5.75; lump and egg, \$5.50; stove and nut, \$5; dock-run, \$4.75; nut, pea and slack, \$4.15; screenings, \$4.

S OUTHWESTERN markets were dull during May. Prices on domestic grades were unchanged at Kansas City, but Kansas steam quotations sagged 15 to 25c. Demand for Arkansas anthracite was so slow that there was some question whether Spadra mines would reopen as early as planned. May storage prices were as follows : McAlestions were cut an average of 50c. per ter lump, \$5.25; Henryetta lump, \$3.50;

Bernice grate, \$6.15; egg, \$6.40, No. 4, \$8.15; chestnut, \$5.15; Arkansas semianthracite lump, \$3.75@4.50; Paris lump, \$5. Spadra June prices, as an-nounced last month, were: Grate, furnace, egg and range, \$5.50; No. 4, \$7.50; chestnut, \$4.50. There was little change in the Colo-

rado market during May. Demand was active in nut and slack, but slow movement of larger coals piled up approxi-mately 350 "no bills" in the field. Running time was little better than 50 per cent. Walsenburg and Cañon City lump was \$4.75; washed nut, \$4.50; washed chestnut, \$3.25; Crested Butte anthracite, \$5 to \$8, according to size. Best northern lignite was held at \$3.75. Southern Colorado slack was \$1.10@ \$1.40. Rock Springs and Kemmerer lump was \$4.25; nut, \$4; steam coals, \$1.15@\$1.30.

Cincinnati's expectations of a big May were shattered by the upsets in the lake cargo rate situation. The action of the Northern carriers in meeting the reduction from the South induced the majority of the independent lake buyers to stay out of the market. The tonnage from Kentucky and West Virginia dumped at the lower ports came largely from a small number of producers. On top of this inland Western buyers went on a strike and squeezed the market tighter.

S HIPMENTS through the Cincinnati gateway under these conditions de-The weekly totals clined steadily. averaged between 11,000 and 12,000 cars. For the week ended May 26 the coal interchange movement was 3,824 cars under the figures for the corresponding week in 1927 and for the week ended June 2 the decline under last year's figures was 5,598. Dumpings at lake ports to June 2 were 91,059 cars, a decrease of 68,436 cars when compared to 1927.

Low-volatile coals have weathered the storm better than the high-volatile grades. Early May orders boosted standard lump and egg to \$3.25 and this level was well maintained. Mine-run held at \$1.75@\$2 until the last week when some coal sold up to \$2.25. Slack, however, was extremely weak, with some tonnage finding it difficult to cling to a \$1 minimum.

The better known brands of highvolatile coal suffered less than unad-vertised offerings. In the latter division some choice 4- and 6-in. lump sold down to \$1.60@\$1.75 although Kentucky fought hard to maintain a \$2 minimum. Egg broke badly at times and some of this size masqueraded under mine-run prices. Steam mine-run was irregular, going as low as \$1.25; byproduct and gas coal commanded 40 to 50c. above this figure. Slack prices weakened the middle of the month.

D ULL and featureless" character-ized the Columbus trade during May. Little hope is held out for an early improvement although tonnage from both the southern and eastern districts was heavier last month than m

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

LOW-VOLATILE EASTE	RN		Week I	Ended	
LOW-YOLATIDE, MASTE	Market Quoted	May 5, 1928	May 12, 1928	May 19, 1928	May 26, 1928
Smokeless lump	Columbus	\$2.85@\$3.00	\$2.75@\$3.00	\$2,75@\$3.00	\$2.70@\$3.00
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 1.95
Smokeless screenings	Columbus	1.00@ 1.25	1.00@ 1.20	.90@ 1.15	.85@ 1.00
Smokeless lump	Chicago	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00
Smo'celess mine-run.	Chicago	1,75@ 2.00	1.75@ 2.00	1.65@ 2.00	1.65@ 2.00
Smokeless lump	Cincinnati	2.85@ 3.25	2.85@ 3.25	2.75@ 3.25	2.75@ 3.25
Smokeless mine-run	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.25
Smokeless screenings	Cincinnati	1.00@ .1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Smokeless mine-run*	Boston	3.90@ 4.15	3.90@ 4.10	3.90@ 4.10	3.85(0) 4.10
Clearfield mine-run,	Boston	1.50@ 1.80	1.50@ 1.80	1.50(@ 1.80	1.50(0) 1.80
Cambria mine-run	Boston	1.90@ 2.20	1.85@ 2.15	1.85@ 2.15	1.80(0) 2.10
Somerset mine-run	Boston	1.65@ 2.00	1.65@ 2.00	1.60@ 2.00	1.60@ 2.00
Pool I (Navy Standard)	New York	2.35@ 2.60	2.35@ 2.60	2.40(0) 2.60	2.40(0) 2.00
Pool I (Navy Standard)	Philadelphia	2.30@ 2.60	2.30(a) 2.60	2.30@ 2.60	2.30(0) 2.00
Pool 1 (Navy Standard)	Baltimore	2.15@ 2.25	2.15(0) 2.25	2.150 2.25	2.15(0) 2.25
Pool 9 (super. low. vol.)	New York	1.85@ 2.05	1.90(0) 2.10	1.83(4) 2.00	1.00(2) 2.00
Pool 9 (super. low. vol.)	Philadelphia	1.80(0) 2.15	1.80(0) 2.15	1.00(4) 2.15	1 80(2) 1 95
Pool 9 (super. low. vol.)	Baltimore	1.80(0) 1.95	1.60(0) 1.95	1,00(0) 1.90	1.60(0) 1.90
Pool 10 (h. gr. low, vol.)	New York	1.00(0) 1.90	1.60(0) 1.90	1 40@ 1.90	1 60@ 1.80
Pool 10 (h. gr. low. vol.)	Philadelphia	1.60 1.60	1.50@ 1.60	1 50@ 1.60	1 50 @ 1 60
Pool IU (h. gr. low. vol.)	Balumore	1.50 1.60	1 400 1 65	1 45@ 1.65	1 45@ 1 65
Pool 11 (10W. Vol.)	New LOFK	1 40 0 1 65	1 40@ 1.65	1 40 @ 1 65	1 40(0) 1 65
Pool II (low, vol.)	Baltimore	1 40@ 1 50	1 40 00 1 50	1 40@ 1 50	1.40@ 1.50
Pool 11 (low. vol.)	Dalumore	1.40 9 1.30	1.40@ 1.50	1.10@ 1.50	ning more
HIGH-VOLATILE, EAST	ERN	1000			
Pool 54-64 (gas and st.)	New York	\$1.25@\$1.40	\$1.25@\$1.40	\$1.25@\$1.40	\$1.25@\$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.25@ 1.45	1:25@ 1.45	1.25@ 1.45	1.25@ 1.40
Pool 54-64 (gas and st.)	Baltimore	1.35@ 1.40	1,35@ 1.40	1.35@ 1.40	1.35(0) 1.40
Pittsburgh ac'd gas	Pittsburgh	2.00@ 2.15	2.00@ 2.20	2.00@ 2.10	2.00(0) 2.10
Pittsburgh gas mine-run	Pittsburgh	1.75@ 1.85	1.75@ 1.85	1.75@ 1.90	1.75@ 1.90
Pittsburgh st. mine-run	Pittsburgh	1.40(a) 1.80	1.40(0) 1.80	1.40@ 1.80	1.40(0) 1.80
Pittsburgh gas slack	Pittsburgh	1.20@ 1.30	1.20@ 1.30	1.12(0) 1.42	1.10(0) 1.22
Kanawha lump	Columbus	1.75@ 2.20	1.75@ 2.15	1.75(4) 2.15	1.75(4) 2.15
Kanawha mine-run	Columbus	1.25@ 1.60	1.25(0) 1.05	1.25@ 1.60	1.23(4) 1.00
Kanawha soreenings	Columbus	. 90(0) 1.20	. 95(0) 1.20	1 45@ 2.50	1 50 @ 7 50
W. Va. lump	Cincinnati	1.13(4) 2.43	1.03(4) 2.30	1.00(4) 2.30	1 50@ 1 70
W. Va. gas mine-run	Cincinnati	1.30(0) 1.73	1.30 1.03	1 25 0 1 40	1 15@ 1.40
W. Va. steam mine-run	Cincinnati	1.20(0) 1.40	1.23(0) 1.30	0.00 1 15	00@ 1.00
W. Va. screenings	Cincinnati	2 00@ 2 25	2 00 0 2 25	2 00@ 2 25	2 00@ 2 25
Hocking lump	Columbus	1 60 0 1 75	1 60@ 1.75	1 60@ 1 75	1 60@ 1 75
Hocking mine-run	Columbus	1 10 0 1 25	1 10@ 1 30	1 10@ 1 30	1 15@ 1.35
Ditta No Shuman	Claveland	1 75@ 2 10	1 75@ 2 10	1.75@ 2.00	1.75@ 2.00
Ditto No. 6 mino min	Claveland	1 250 1 70	1 25@ 1 70	1 30@ 1.75	1.30@ 1.75
Fitts. NU. O dune-fun	Cleveland	1 10 0 1 30	1 10@ 1 30	1 75@ 1 35	1 2500 1 36

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

Pomeroy Bend to the docks affiliated with the Pittsburgh Coal Co. Reduction in industrial consumption and resort by buyers to old stockpiles kept the steam trade quiet. This, however, may later prove an element of strength as some storage reserves are below normal.

The Cleveland market also has been colorless. As in central Ohio, the spring season sounded the knell of interest in domestic buying. Industrial demand, on the whole, however, has been fairly consistent. The rate of industrial activity in the Cleveland commercial district appears to have been seasonally normal the past month and this, of course, has resulted in a certain steady

flow of tonnage to industrial plants. Lake coal buyers in the Pittsburgh district have been marking time awaiting the action of the Interstate Commerce Commission on the protests of Southern interests against the reductions field filed by the Pennsylvania and New York Central lines. Aside from inter-company sales, most lake buying is held to early requirements. The falling off in lump demand was a temporary help to the slack market but competition from nearby districts dissipated price gains, sending steam coal from \$1.15@ \$1.20 to \$1.05@\$1.10 and gas from \$1.20@\$1.30 to \$1.10@\$1.25.

THE Central Pennsylvania situation during May brought little cheer to the field although some operators saw hope for a better future in the readjustment of rates to New England points effective June 5. Loadings for the first 26 days of the month totaled 46,365 cars, or only 126 cars more than the total to April 26. A slight reduction in "no bills" was reported but the number of unbilled loads averaged 2,500 cars. Contractings had been slow. This situ-ation is further depressed by the fact that a number of contract buyers have shifted to the cost martlet shifted to the spot market.

Prices in the field ranged as follows during May: Pool 1, 2.25@2.55; pool 71, 2@2.25; pool 4, 1.80@2.55; pool 9, 1.85@2.25; pool 10, 1.55@2.90; pool 11, 1.40@2.70; pool 14, 1.60@1.80; pool 18, 1.50@2.70. Towards the end of the month the undercurrent Was weaker. Generally, specking prices was weaker. Generally speaking prices were firmer in the Altoona section than

around Johnstown. New England coastal trade showed no improvement during May. Larger agencies with established connections moved a fair volume of tonnage, but shippers solely dependent upon the spot market had their troubles. Prices were depressed and the indications are that further recessions will take place during June and July as even the largest shippers have difficulty in avoiding accumulations at Hampton Roads.

NAVY Standard coal is offered f.o.b. vessels ar., Hampton Roads, at \$3.90@\$4, with second grades 15 to 20c. less. Slack and nut-and-slack took a slight spurt early in May, but the spot market soon settled back to a \$3.50 top. The spot market on cars at Boston and

April. Some coal is moving out of Providence has dropped from \$5.30 to \$5 per net ton. Consumer reserves are heavy and there is coal on track at Bos-ton. The market for central Pennsylvania coals is extremely narrow.

At New York buyers continued to play a waiting game during May and prices were low. Contract deliveries moved without trouble and there was a reasonable amount of spot buying in the choicer grades. Federal government bids opened during the month showed quotations ranging from \$1.28@\$2 for mine-run, f.o.b. mines. Producers are counting upon the gradual depletion of stockpiles to add life to the market in the late summer and early fall.

The only gain in the Philadelphia bituminous market last month was in the matter of tonnage. Prices on spot deliveries held firmly, but, as for several months past, the common complaint was that the levels were too low. Many contracts have expired with no move upon the part of buyers to renew. With many factors in the trade still willing to place tonnage at less than the cost of production, the Baltimore market naturally registers no improvement in spot business and little interest in contract renewals.

BIRMINGHAM trade has shown no sign of rallying from the buying slump which has marked its course for several weeks. Spot sales are restricted to immediate requirements and contract deliveries to both railroads and industrials are held down to minimum tonnages. A number of new railroad contracts have been signed with prices and tonnages approximately the same as last year. A fair amount of domestic business has been booked, but there is no great buying urge.

dragged and only curtailment in production brought about by a softer steam demand prevented troublesome accumulations of sized coals which normally find their outlet through retail channels. June prices on lump coal are as fol-lows: Big Seam, \$1.75@\$2; Carbon Hill,\$2.50@\$2.80; Cahaba,\$3.65@\$4.40; Black Creek, \$3.90@\$4.15; Montevallo, \$4.40@\$5.15.

Outside of a heavy demand for egg and stove the anthracite market at New York last month was devoid of developments of interest. Demand for stove, however, was so strong that some companies had to pick up tonnage to take care of their orders. Prices on domestic sizes above pea were advanced 25c. by the larger companies on June 1.

THE June increase also boosted May business in the Philadelphia market and reports from the mining region were more cheerful. A number of interests operated close to 95 per cent of normal. As orders increased a scarcity developed in certain sizes. Stove bookings were refused by some shippers after the middle of May and egg was tighter. Pea, too, was in greater demand, but chestnut moved slowly. The local re-

tail price situation has improved. Early in the month the demand for steam sizes quickly absorbed all offerings in the Philadelphia district, but with increasing call for the larger domestics the juniors began to weaken and buckwheat and barley were much easier towards the close of May. Rice, however, has maintained its position, helped by the fact that a number of former consumers of buckwheat have shifted to this size.

Retail dealers at Baltimore reported an average run of business for May, On the contrary, white-ash coals with gains toward the end of the month.

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

			- week	Ended	
MIDDLE WEST	Market Quoted	May 5, 1928	May 12, 1928	May 19, 1928	May 26, 1928
Franklin (III.) lump	Chicago	\$2.60	\$2 45@ \$2 60	\$2 45@\$2 60	\$2 45@ \$2 60
Franklin (Ill.) mine-run	Chicago	1.90@ 2.40	1.90@ 2.40	1 90@ 2 40	1 90@ 2 40
Franklin (Ill.) screenings	Chicago	1.75(0) 1.90	1 4000 1 90	1 40@ 1 90	1 40@ 1 90
Central (III.) lump	Chicago	2 25@ 2 35	7 75@ 7 35	2 25@ 2 35	2 75 2 35
Central (III.) mine-run	Chicago	1.85@ 2.25	1 85@ 2 25	1 85@ 2 25	1 85@ 2 25
Central (III.) screenings	Chicago	1.60@ 1.75	1.40@ 1.75	1 40@ 1 75	1 4000 1 75
Ind. 4th Vein lump.	Chicago	2 25@ 2 50	2 256 2 50	2 50 2 75	2 50 2 75
Ind. 4th Vein mine-run	Chicago	1.80@ 2.10	1.80@ 2.10	1 40@ 1 25	1 40@ 2 75
Ind. 4th Vein acreenings	Chicago	1.75@ 2.00	1 75@ 2 00	1 45@ 1 85	1 45@ 1 85
Ind 5th Vein lump	Chicago	2.00 2 25	2 00@ 2 25	2 256 2 50	7 75 7 50
Ind. 5th Vein mine-run	Chicago	1.40@ 2.00	1.40@ 2.00	1 40 @ 7 10	1 400 2 10
Ind. 5th Vein screenings	Chicago	1.40(@ 1.75	1 40@ 1 75	1 15@ 1 50	1 15@ 1 50
Mount Olive lump	St. Louis	2.35@ 2.50	2 35@ 2 50	2 356 2 50	7 3560 2 50
Mount Olive mine-run	St. Louis	2.10	2 10	2 10	2 10
Mount Olive acreenings	St. Louis	1.50	1.50	1 50	1 50
Standard lump	St. Louis	2.00@ 2.15	2.00@ 2.15	2 00@ 2 15	2 00@ 1 15
Standard mine-run	St. Louis	1.75@ 1.80	1.75@ 1.80	1.75@ 1.80	1.75@ 1.80
Standard acreenings	St. Louis	1.25@ 1.30	1.25@ 1.30	1.25@ 1.30	1 25@ 1 30
West Ky, block	Louisville	1.50@ 1.65	1.50@ 1.65	1 50@ 1 65	1 25@ 1 50
West Ky, mine-run,	Louisville	.90@ 1.25	.90@ 1.25	.90@ 1.25	85@ 1 00
West Ky, acreenings,	Louisville	1.05@ 1.15	.90@ 1.15	90@ 1.15	8500 1 00
West Ky, block	Chicago	1.35@ 1.50	1.35@ 1.50	1.00@ 1.50	1.15@ 1.50
West Ky, mine-run,	Chicago	.90@ 1.15	.90@ 1.15	.90@ 1.15	9000 1 15
West Ky, screenings,	Chicago	.90@ 1.15	.90@ 1.15	.90@ 1.15	90@ 1 15
SOUTH AND SOUTHW	EST		1000 1110		
DU G L	D				
Big Seam lump	. Birmingham	\$1.75@\$2.00	\$1.75@\$2.00	\$1.75@\$2.00	\$1.75@\$2.00
Big Seam mine-run	. Birmingham	1.40(0) 1.75	1.40(0) 1.75	1,40(0) 1,75	1.40@ 1.75
Big Seam (washed)	. Birmingham	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
S. E. Ky. block	. Chicago	1.75@ 2.25	1.75@ 2.25	1.60@ 2.25	1,60@ 2.25
S. E. Ky. mine-run	. Chicago	1.35@ 1.50	1.35@ 1.50	1.25@ 1.50	1.25@ 1.50
S.E. Ky. block	. Louisville	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25
S. E. Ky. mine-run	. Louisville	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.25@ 1.50
S. F. Ky. screenings	. Louisville	1.00@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25
B. E. Ky. block	. Cincinnati	1.75(4) 2.50	1.50(0) 2.25	1.75@ 2.35	1.75@ 2.35
S. E. Ky. mine-run	Cincinnati	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
S. E. Ky. screenings	. Cincinnati	1.00@ 1.25	1.00@ 1.25	.80@ 1.25	.90@ 1.10
Kansas shalt lump	, Kansas City	2 50 2 75	1.00	4.00	4.00
Kansas strip lump	. Ransas City	2,500 2,15	2,50(0 2.60	2.50	2.50
Kansas mine-run	. Kansas City	1 00 3 1 50	2.33(0) 2.50	2.35@ 2.50	2.35@ 2.50
Kansas screenings	. Ransas City	5.00@ 3.50	3.00@ 3.50	3.00@13.50	3.00@ 3.50

PERATING IDEAS from Production, Electrical and Mechanical Men ?

Determination of Interpole Relation Made Easy By Few Simple Rules and Sketches

UNLESS THE electrical man is frequently called upon to check or make connections of interpole fields he is likely to forget the required polarity relation. The rule for a motor is that the interpole ahead of a main pole, in the direction of armature rotation, should have the same polarity as the main pole. If the machine is operating as a generator this polarity should be opposite to that of the main pole.

Inquiries made among several men in charge of the maintenance of mining equipment indicate that quite a number of them make no attempt to remember the interpole rule. Instead, they rely upon their knowledge of electrical fundamentals to enable them to figure it out when needed. This eliminates cut-and-try connecting, which is poor inasmuch as it is likely to involve extra labor, delay and possible damage to the equipment.

One method is to sketch a two-pole motor or generator as shown in the larger of the accompanying drawings. First the direction of armature rotation and polarity of the main fields are assumed and marked on the sketch. Next the direction of current in the armature conductors is determined by Fleming's rule, a fundamental which every energetic electrical man should know. This rule is indicated in the upper part of the smaller sketch.

Referring again to the larger drawing, and more specifically to the motor sketch, an application of Fleming's rule will indicate that, in the armature conductors under the north pole, the current must flow toward the reader. This condition is recorded by plus signs marked in the circles designating armature conductors. Under the opposite main pole the current is flowing away from the reader and is designated by negative signs. With respect to a center line, A-B, the armature lamination then becomes an electromagnet with a south pole at the top. It is this tendency of cross magnet

It is this tendency of cross-magnetization of the armature that must be counteracted by the interpoles. A pole always induces an opposite across an air gap. Therefore, the interpole placed at the top must have south polarity. It then tends to induce a north in the part of the armature adjacent to it and, consequently, neutralizes the southpole effect of the armature conductors.

In the generator sketch, the same direction of armature rotation is assumed as for the motor. However, an opposite polarity is assumed for the main poles. The current and the interpole polarity are next determined in the same manner as with the motor.

The lower part of the smaller sketch illustrates a suggested method for recording, in a compact form in a pocket notebook, the interpole rules. The







Fleming's and Interpole Rules

sketch at the left indicates that, with generators and converters, a leading interpole should be of opposite polarity to a trailing main field. The sketch at the right indicates that, on a motor, a leading interpole should be of the same polarity as a trailing main field.

Making Conveyor Heads Proof Against Gas

The danger of sparks, of either mechanical or electrical origin, igniting any gas that may be present is one of the chief objections frequently raised to the use of mechanical equipment underground. Many companies, even those operating mines that are normally considered non-gaseous, to avoid this danger are installing flame-proof equipment at all points underground.

ment at all points underground. The photograph shows the driving head of an Eickhoff conveyor being fitted with a flame-proof motor in the Library (Pa.) shops of the Pittsburgh Coal Co. This driving head has also been equipped with skids to facilitate moving it from place to place underground.

At the present time an extensive pro-

Operating Ideas from PRODUCTION, ELECTRICAL and MECHANICAL MEN



Reduces Danger of Explosion

gram of mechanization of underground operations is being carried on in American coal mines. The time will doubtless come when the percentage of handloaded coal will be as small as that which is now undercut with the pick. To make assurance doubly sure, and to avoid all danger of every kind so far as possible, the equipment that will be employed to drive the loaders of the future will doubtless be fitted with flameproof motors.

Extinguisher on Motor Prepares for Fire

A fire extinguisher is nowhere more strategically placed than on a mine locomotive, which is constantly "on the move" and covers much of the territory where fires are likely to occur. Furthermore, protection from fire on a locomotive itself suggests the importance of carrying an extinguisher on it.

At the Nemacolin mine of the Buckeye Coal Co., Nemacolin, Pa., an elaborate installation of fire-fighting equipment has been made which includes the keeping of an extinguisher on every locomotive. As pictured in the accompanying photograph, the extinguisher is mounted in an iron box bolted to the body, within the cab.

One on Every Motor



Protective Features of Automatic Control Of Mine Substations

SOME of the protective features incorporated in present-day standard automatic motor-generator set control systems are brought out clearly in the following general description together with the accompanying schematic diagram, according to M. F. Packard and R. E. Powers, general engineers, Westinghouse Electric & Mfg. Co.

inghouse Electric & Mfg. Co. The unit is shut down if operating or prevented from starting if:

(1) The alternating-current supply line voltage should fail, reverse or become seriously unbalanced.

Send It In

BILL, why don't you send that kink to Coal Age? They publish ideas like that every month as operating hints for mining men, and pay for them besides. Now that you have it working all right you might as well get one of those five-dollar bills.

If phase failure, phase reversal, or low voltage should occur while the unit is idle an induction-type polyphase voltage relay (47) will operate to shunt the master relay operating coil to prevent starting of the unit until line conditions are restored to normal.

In event of a phase failure or current unbalance during operation of the unit, protection is afforded by a polyphase induction-type phase balance current relay' (46). This relay is supplied with current from the secondary of current transformers in the circuit of the synchronous motor.

During the normal operation of the set the currents in the elements of the relay will be equal, thus balancing the torques of the elements. During periods of unbalance, the currents in the relay elements will be unequal, destroying the balance of torques within the relay, thus allowing the contacts to close. Upon closing, the contacts of 46 shunt the operating coil of the master relay to take the unit out of service.

relay to take the unit out of service. If the phase failure is outside of the station polyphase-voltage relay (47) will not allow the unit to restart. If the failure is inside the station the unit will attempt to restart; as soon as voltage is applied, heavy unbalanced currents will be drawn from the line, causing the current balance relay 46 again to close its contacts. Under these

conditions the circuit is completed to the lookout relay, so that the unit will be locked out of service until inspected and the trouble corrected.

(2) The machine windings reach a temperature at which it is no longer safe to operate.

The unit is protected from continued overload of such character as would endanger the machine windings due to excessive temperature, by an alternating-current thermal overload relay (49). The relay consists of a bimetallic current element submerged in oil. The case of the relay is lagged so that the heating and cooling curves of the relay correspond very closely to the heating and cooling curves of the unit it is protecting.

it is protecting. The relay is heated by current from the secondary of current transformers located in the main leads of the motor. Therefore the current passed through the relay element always is proportional to the current that is passed through the windings of the synchronous motor. Should the machine windings reach a temperature at which it would no longer be safe to operate, the thermal relay (49) will have reached a point where its contacts close to short-circuit the operating coil of the master relay, thus shutting the unit down temporarily.

The thermal relay is of the selfresetting type and its contacts will be opened after a sufficient time interval has elapsed to allow the unit to cool down to a point where it is again safe to operate.

(3) The set runs inverted, due to motoring from the direct-current end.

Motoring from the direct-current end is prevented by a sensitive type reverse current relay that will operate on from 1 to 2 per cent reverse current. The contacts of the reverse-current relay shunt the master relay to disconnect the unit temporarily.

. (4) The unit has been subjected to overspeed.

Protection to the unit from excessive speed is afforded by a centrifugal overspeed device mounted on an extension of the main shaft. The overspeed device ordinarily is set so as to operate on 15 per cent overspeed to shut the unit down. The hand reset feature incorporated in this relay makes it necessary that an operator visit the station to investigate the cause of the overspeed and to reset the relay before the unit may be restarted.

the unit may be restarted. (5) The lockout relay has been operated.

The lockout relay is energized by any one of a group of protective relays, and its functioning indicates that the motorgenerator set or supply line is not in condition electrically or mechanically for the unit to be restarted until an investigation has been made and the lockout relay reset.

The lockout relay is operated by the following protective devices:

(a) Induction-type alternating-current overload relays (51). The overload relays ordinarily are set to close their contacts at a high value of current and their operation indicates serious trouble within the station.

(b) Polarity relay 36, the operation of which indicates that the polarity of the direct-current generator has become reversed and that supervision is necessary to reverse the residual magnetism of the field poles before the unit may be restarted.

(c) Bearing thermal relays (38), whose operation indicates that a bearing has reached a dangerous temperature and that inspection and maintenance are required.

(d) Time-delay relay (48), which protects against possible damage to the windings of the starting auto-transformer through overheating resulting from incomplete start. The time setting of relay 48 is adjusted so as to cover a complete start of the unit, with additional margin to compensate for low starting voltage or added friction due to cold oil in the bearings. If the unit stays on the starting taps during the time setting of 48, lockout relay 30 will be energized and the unit locked out. This relay also serves as a timing

to permit operation. It is impossible device in conjunction with field-failure reclosed upon the passing of the overrelay 40.

(e) Current balance relay (46). During the starting period the contacts of the current balance relay are connected through an interlock on the starting breaker so as to energize the lockout relay in the event that an unbalanced condition exists within the unit.

(f) Field-failure relay (40). If the excitation of the unit fails, the operating coil of the field-failure relay, which is energized by the field current, becomes de-energized, allowing the relay to open. In the open position, with the running breaker closed, the auxiliary contacts of the field-failure relay complete a circuit to timing delay relay (48), which in turn energizes the lockout relay upon expiration of its time setting.

The lockout relay is a hand reset device normally latched in the closed Operating current passes position. through the coil only in the event that The a protective relay has operated. relay is equipped with annunciator targets so connected that they indicate clearly what protective device has operated to lock the unit out of service.

A direct-current breaker or contactor, equipped with series overload trip mechanism and resistance-measuring service restoring relays, protects the equipment from overloads exceeding the commutating ability of the unit, by opening of the machine breaker. The breaker or contactor is automatically load or the removal of the short-circuit.

The operation of the push button deenergizes the master relay, and consequently causes the removal of control potential for bus A1 and MPI by the opening of master contactor 4. The machine contactor or breaker 72 and alternating-current line breaker 42 are immediately opened to disconnect both the alternating- and direct-current ends from the supply voltage and load.

Wires Carried Overhead To Outside Line

In the outside substation at the Nellis (W. Va.) mine of the American Rolling Mill Co. it was found desirable to locate the feeder panels on the side opposite to that from which the 250-volt feeders should leave the building.

Instead of the usual and more expensive method of taking the feeders under the floor and out to the pole line, they are carried overhead just below the eaves line of the building and then through the wall. Strain insu-lators, at one end, are anchored to the inside wall just back of and above the feeder panel. At the other end, they are fixed to a bracket on the outside surface of the opposite wall.

Taps are brought straight up from the back of the panel to the feeder



COAL AGE - Vol.33, No.6

Operating Ideas from PRODUCTION, ELECTRICAL and MECHANICAL MEN



Economical and Safe

cables. The strain bracket on the outside of the building is used also to anchor the ends of the pole line conductors. The span inside of the building is supported at three points by insulated racks hung from the roof structure.

Condition of Equipment Depends on Repairman

Repairing equipment only when it refuses to operate and then doing the most temporary job possible is now practiced at few if any mines. An example of the changed economic order is given by C. L. Umberger, of Middlesboro, Ky. One photograph shows the condition

One photograph shows the condition common to all of the battery locomotives at a certain mine when Mr. Umberger went on the job as chief electrician. Another photograph shows one of the same group of locomotives after being put into proper operating condition.

How the locomotives were used at all is difficult to understand. Generally speaking they had no brakes, sand rigging, headlights, ampere-hour meters, shunt trips or fuses. A night electrician

It Ran, But How?

looked after the battery-charging, but even so not over four hours' service per charge could be obtained.

The first procedure in reconditioning the locomotives was to dismantle and clean the parts. All loose frame rivets were then replaced with new ones and the frame given a coat of gray paint. Missing parts were replaced and all other parts put into first-class condition. The type G-11 Edison batteries, now 11 years old, were reconditioned. During 14 months of service follow-

During 14 months of service following the overhauling one of the locomotives lost but 7 hours' time, 4 hours one day and 3 hours on another. Proper maintenance of the battery-charging equipment and of the locomotive ampere-hour meter made it possible to do without a night electrician to supervise battery charging.

Coal Analyses at Tipple Improve Product

In so far as correction of mine practice is concerned, the place for making proximate analyses of railroad car samples is at the mine rather than at the point of consumption. The former affords opportunity for immediate investigation and probable correction of abnormal product. At the Nellis mine of the American

At the Nellis mine of the American Rolling Mill Co., located at Nellis, Boone County, W. Va., sixty per cent of the railroad cars are sampled and analyzed at the mine. The analyses are made in a laboratory located close to the tipple. The building, constructed of brick and having outside dimensions of 14x20 ft., is divided into two rooms without doors between. In the smaller room is the motor-driven pulverizer and the automatic electric drying oven. The other room is the laboratory proper. The man in charge of the laboratory

The man in charge of the laboratory has a helper who spends most of his time in the tipple taking samples from the loading booms. The average sample from lump cars is 200 lb., from nut cars 150 lb. and from slack cars 125 lb. These samples are crushed and automatically quartered in a motor-driven machine



Impurities Checked at Source

located on the picking table floor. Ash and sulphur are the only items determined in the laboratory analysis.

A third man spends his time in inspecting the coal from individual mine cars. This is done on a small picking table located under the trestle adjacent to the tipple. All of the coal from a car is picked over and, on the average, one car per month per loader is thus inspected. About $2\frac{3}{4}$ per cent is the allowable quantity of pickable refuse.

Table Lightens Work of Truing Forgings

In most blacksmith shops, at the mines as well as elsewhere, if a large variety of forging must be done, there is a constant need for some large smooth surface upon which more or less intricate work may be trued up and brought to line. The illustration shows a device of this kind in use in the blacksmith shop of the Pittsburgh Coal Co. at Library, Pa.

This table is extremely simple in construction. It consists of a piece of steel 13 in. wide, 5 in. thick and 64 in. long. This is planed smooth on both sides but left rough on the edges and ends. It is supported by two old bearing pedestals, evidently originally intended for holding the bearings of a mine fan or some other large piece of equipment.

This block was made in the shop from various odds and ends. That it is a convenient piece of equipment may be judged from the forging which is rest-

Has the Appearance of a New Locomotive



Operating Ideas from PRODUCTION, ELECTRICAL and MECHANICAL MEN



Made from Odds and Ends

ing upon it. It would be difficult to bring such a forging to a true line without the aid of some such device as this.

Salvaging Mine Timbers Proves Lucrative

At the anthracite colliery of the West End Coal Co., Mocanaqua, Pa., all track ties and timbers recovered in retreat are loaded into mine cars and taken to a salvage yard outside. Here, as indicated by the accompanying illustration, sound pieces are saved for further use and badly deteriorated pieces burned.





If only one end of a timber is bad or a timber is merely broken it is sawn into short props, blocks, cap pieces, etc. Two old men are engaged in this work in the yard. The practice has effected an appreciable saving.

Avert Break in Service: Protect Phone Lines

By carrying the mine telephone cables in a pipe conduit, the Knott Coal Corporation in its No. 6 mine, in eastern Kentucky, has avoided much trouble due to breaking of the cable by falls of roof in summer. The arrangement also has provided a clearer line. The mine man-



Phone Line Protected-Clear Signals

agement says the scheme is rather expensive but that it certainly pays.

The cable used is of copper, weatherproof covered. The conduit is $\frac{1}{2}$ -in. galvanized pipe, which is readily bent to meet any change of direction or straightened if disturbed by a heavy fall of roof. It is supported by wooden pegs driven in the ribs in close proximity to the roof.

Auxiliary Drive Used on Fan Near Plant

Although the fan of the McKell Coal & Coke Co., at Kilsyth, W. Va., is within a few hundred feet of the company's a.-c. generating plant, an auxiliary power unit was installed for emergency service.

For this duty an 80-hp. Fairbanks-Morse type VA two-cylinder Diesel engine was selected. It is installed in the fan house, and is direct-connected



Drive Arrangement

through a friction clutch to a countershaft. The 85-hp. motor which is the regular drive is belt-connected to a clutch pulley on the same countershaft. This arrangement of clutches allows connecting or disconnecting either the engine or motor while the fan is running. The fan size is $11\frac{1}{2}x4\frac{1}{2}$ ft.

The Diesel engine is started by air which is compressed by a small gasoline-engine-driven compressor. By taking off one belt and putting on another this compressor can be driven from the countershaft.

Starting the engine from cold, bringing it up to speed, and closing the clutch connecting it to the fan requires less than 30 seconds.

Auxiliary Power Unit for Fan



404