

COAL AGE

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

McGraw-Hill Publishing Company, Inc.
JAMES H. MCGRAW, Chairman of the Board
MALCOLM MUIR, President
H. C. PARMELEE, Editorial Director

SYDNEY A. HALE
Managing Editor

Volume 33

NEW YORK, DECEMBER, 1928

Number 12

Signposts to Stabilization

BITUMINOUS coal is being studied as never before: the physicist, the chemist and the fuel technologist are examining its material body in every way scientific ingenuity can suggest; the business leaders in the industry itself are analyzing its economic life. Within the past month the status of coal as a material product again became the subject of comprehensive review at the Second International Bituminous Coal Conference at Pittsburgh. A few days earlier the coal business as an economic force was the underlying theme of the eleventh annual convention of the National Coal Association at Cleveland where the banker, the engineer and the industrial purchasing agent joined with the operator in considering his problems.

THIS unplanned juxtaposition of the two meetings was a happy accident. The material study and the economic analysis are complementary. One cuts across the other and fixes definite limits upon future direction and accomplishment. If the industry is to achieve that ideal of stabilization for which the leaders of the National Coal Association and those co-operating with them are striving, American coal operators must give heed to the lessons to be drawn from the Pittsburgh conference inspired and set in motion by President Thomas S. Baker of Carnegie Institute of Technology.

WHAT are the outstanding lessons to be drawn out of the mass of data poured forth in such profusion at Pittsburgh last month? Whether or not one can agree with the enthusiasts who envisage the day when no coal will be burned in its natural state, there is no escaping the conclusion that coal

as a source of raw material for other industries must grow in importance with each passing year. That growth undoubtedly will be more rapid in Europe than in the United States because Europe feels the urge to produce synthetically many things with which Nature has abundantly endowed the North American continent. American growth, however, is none the less inevitable.

THE inevitability of this growth raises the question whether the coal-mining industry should confine itself to the functions of production or integrate its investment and facilities in such a way as to become partner and profit-sharer in these new developments. This question takes on an added pertinence because another conclusion forced by the Pittsburgh conference is that the reductions in unit consumption through increased combustion efficiency have not run their course. Indeed, in the background lurk possibilities of the employment of new boiler mediums, such as di-phenyl and di-phenyl oxide, which would make present reductions in unit consumption seem picayune.

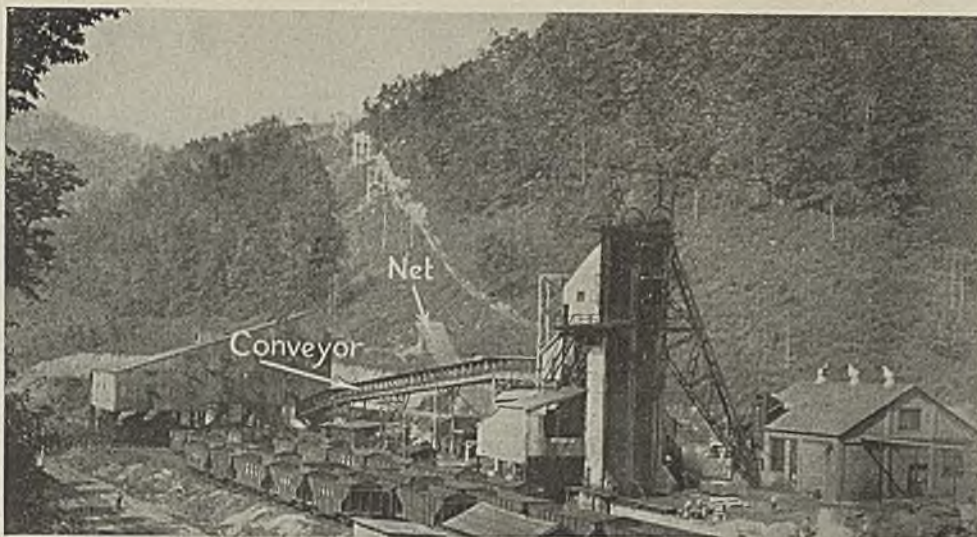
POSSIBILITIES such as these have a direct bearing upon the formulation of any economic program for the stabilization of the industry. They cannot be ignored. They must be weighed carefully because they enter intimately into the problem of balancing supply with demand, and upon the solution of that problem rests the only valid hope for the future prosperity of bituminous coal. Properly appraised they open the door to broader markets in some fields and impress strongly the necessity for greater profits in others.



Courtesy Kennedy & Co., N. Y.

Rendell
The Old Breaker

*From an Etching by
Joseph Pennell*



REFUSE DISPOSAL

From Caretta Mine

IS PROVIDED FOR "FROM NOW ON"

By J. H. Edwards

Associate Editor, Coal Age

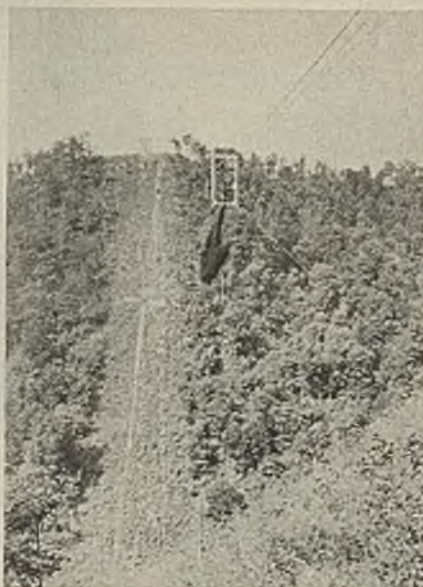
ABOVE state road No. 66 at a point near the center of McDowell County, West Virginia, a huge steel net extends from the top of a high bank on one side of the road to a glistening steel structure adjoining a headframe on the other. Above the net are four wire ropes extending to bright steel towers that center in a cleared strip on the mountainside. This is the new aerial tramway for refuse disposal at mine No. 261, Caretta, of the Consolidation Coal Co.

The steel towers are protected with aluminum paint, hence the striking appearance of the installation. The next thing that catches the eye is the substantial loading terminal structure. The aerial tram has a 1,700-ft. dumping span and was designed to last the life of the mine, which was opened only four years ago.

Before the tram was put into operation the slate and rock were hoisted at the main skip shaft and hauled away by truck. With the new method

this refuse is hoisted in mine cars on overturning cages at the auxiliary shaft. From the dump bin the refuse

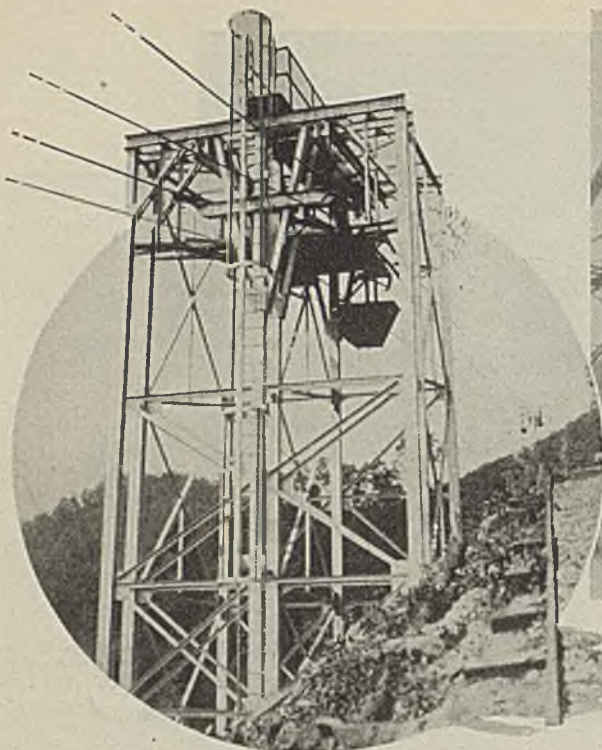
*Down Goes a Bucketful From
1,700-Ft. Dumping Span*



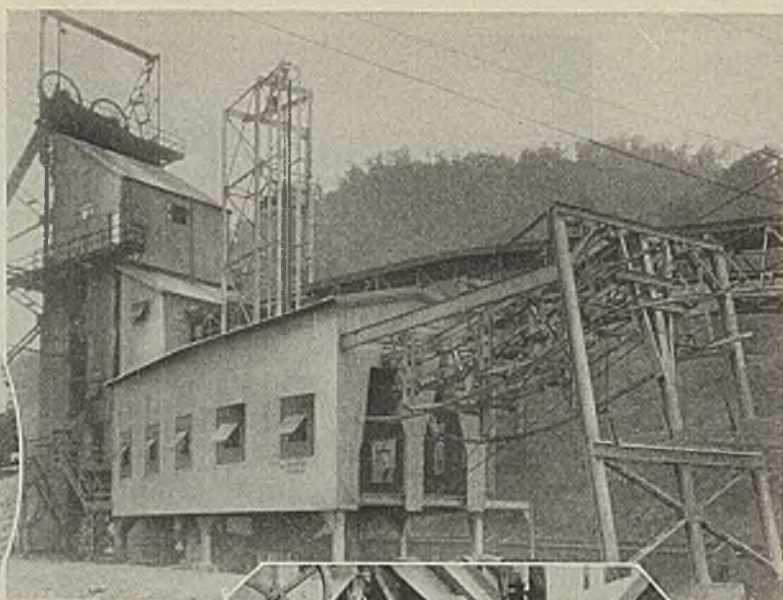
flows directly into the tram-bucket loading chute. The new installation includes a conveyor for bringing picking-table refuse from the tippie to the common refuse bin at the auxiliary shaft.

The tramway is the continuous type known as the Trenton-Bleichert, and was manufactured by the American Steel & Wire Co. At the loading terminal the buckets are spaced and dispatched automatically, which includes automatic closing of the grip on the traction rope. At the tail terminal the buckets remain attached to the traction rope as it travels around a large horizontal sheave.

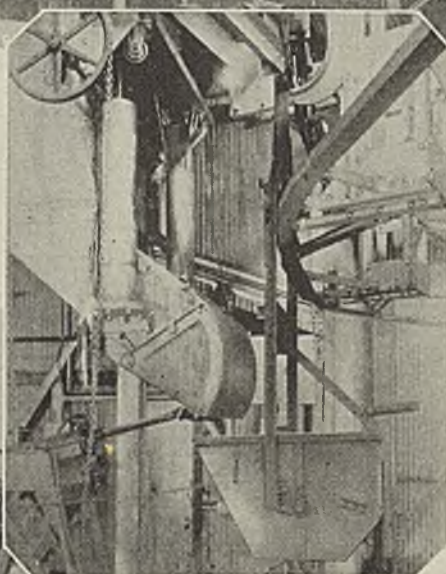
FROM the loading terminal to tail terminal the distance is 3,400 ft. The 1,700 ft. dumping span is across a ravine which has a capacity for three million cubic yards without a shift of the tail terminal tower. There are three intermediate towers on the remaining 1,700 ft. The buckets, which are of the overturning



Bucket Passing Through an Intermediate Tower; the Ladder Is Guarded, Even Though Used Infrequently



Empty Buckets Enter at Left and Loads Emerge at Right



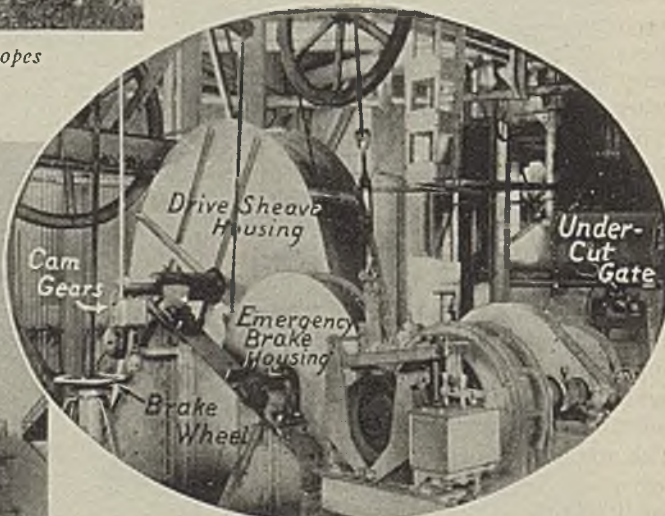
Bucket Chained in Position Opposite Air-Operated Undercut Gate



Tail Terminal Where Buckets Turn Around and Traction Ropes Are Anchored to Weights



Adequate Protection Over State Road and Mine Yard



Driving Unit at Loading Terminal



*Bucket Suspension Frame
Being Clamped to the
Traction Rope*

* * *

gravity dump type, are tipped at the dump by a rack suspended on the track cables and anchored in place by four ropes extending to the ground. Immediately after the buckets dump they swing back to an upright position and lock.

At present fifteen buckets are used and they are dispatched 525 ft. apart. With the rope speed of 350 ft. per minute this provides a capacity of 30 cu.yd. per hour. It is planned ultimately to add ten more buckets and decrease the dispatching distance to 300 ft. The rope speed will remain the same, 350 ft. per minute, but the capacity of the tram will then be 50 cu.yd. per hour.

Track cables are of the locked-coil type having a smooth surface. The loaded-track cable is $1\frac{1}{2}$ in. and

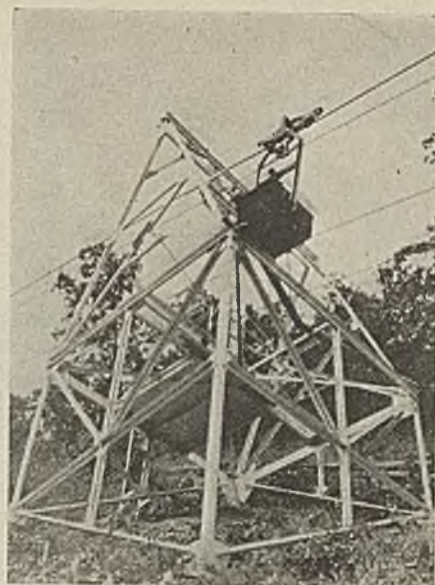
it is kept at a uniform tension of 62,000 lb. The empty-track cable is $1\frac{1}{8}$ in. and its tension 43,000 lb. These tensions are uniformly maintained, regardless of load and temperature changes, by heavy weights to which the cable ends are attached at the tail terminal. The traction cable is $\frac{7}{8}$ in. in diameter.

Roller bearings fitted for grease-gun lubrication are used on the four-wheel bucket trolleys and on the rope guide rollers. The traction rope drive, located in the loading terminal, is a 75-hp. slip-ring motor equipped with magnetic brake.

Operation of the tramway is an easy job for one man. As the buckets enter the loading terminal they are automatically detached from the traction rope. Here also they leave the track rope and run by gravity on a rail through the terminal house, where they pass the loading chute. The regular routine of the operative is to hook a chain to the bucket to stop it at the loading chute, operate an air valve which controls the under-cut gate, unhook the chain and give the loaded bucket a slight push toward the dispatching mechanism.

THE automatic spacer and dispatcher is a new device and is covered by application for patent. It consists of an electro-magnet that operates two interlocking stops which engage the bucket trolleys. The magnet and bumper assembly is mounted with a sliding fit on two guides and is positioned by heavy coil springs. These absorb the shocks as the buckets hit the stops.

An upward movement of the magnet armature releases one bucket and catches the bucket following. A downward movement a short time



*Intermediate Tower—One of
Three—On Aerial Tram
at Carretta*

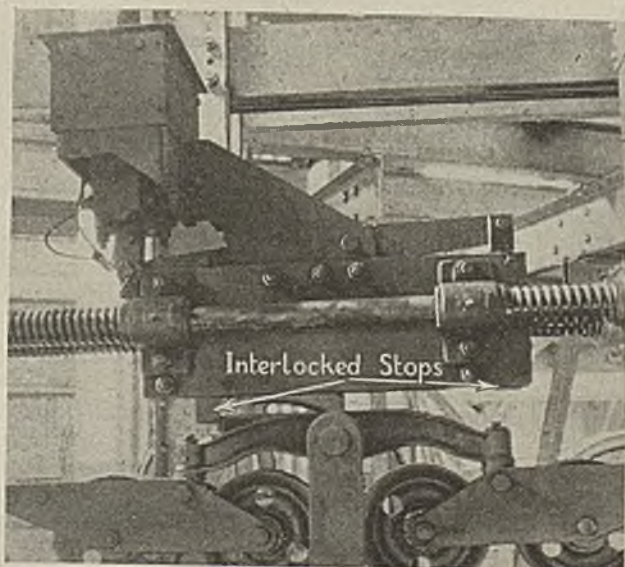
* * *

later advances the captive bucket to the release stop ready for dispatch. As the dispatched bucket coasts down the inclined track a lever extending from it encounters a sloping guide which forces the lever down and clamps the bucket to the traction rope. As the bucket leaves the loading terminal structure it transfers from the rail to the loaded-track rope.

In addition to the solenoid brake on the motor there is a mechanical brake on an intermediate shaft. This brake, which is for emergency use, is operated from a handwheel and is set when the tram is shut down at the end of the shaft. Brakes are required because the loaded buckets overbalance the empties on the hillside.

THE net or screen which protects the mine yard and road from possible dropping of rock and from the falling of a broken rope is itself a substantial structure. It is suspended on ten $\frac{3}{4}$ -in. cables. Attached to these are steel crosspieces which at their ends support short posts. The bottom of the net and the fences at the sides are made of welded mesh.

From the concrete foundations of the loading terminal to the sheave of the tail terminal the whole job shows careful design. Considering the standpoints of safety, durability, efficiency, low cost of operation and reliability, it would be difficult to suggest any changes that would improve the installation.



*When a Control Cam
Energizes
the Magnet
the Bucket Trolley
Will Be Released
to the Left*

"The Ability The Coal Market

COAL chemistry and technique have been making progress since the First International Conference on Bituminous Coal held in 1926, but little that is startling to the popular mind has been achieved. The internal combustion engine for powdered coal has made its bow to the public and Rudolph Pawlikowski described it by proxy at one of the sessions of the Second International Bituminous Coal Conference at Carnegie Institute of Technology, Pittsburgh, Pa., Nov. 19-24. A new rival to coal has been suggested by Georges Claude in the hot waters of the Gulf Stream and other tropical waters and the low-temperature waters beneath them, the first to raise steam in a partial vacuum and the second to condense it.

Many are working on the Bergius hydrogenation process with some success, and Dr. Bergius himself was present to discuss the development. He has been extending his operations, having treated commercially large quantities of coal. Germany has developed the technique of distributing its Ruhr gas by long pipe lines in welded tubes under high pressure and in meeting the problems arising from condensation of naphthalene and the settlement of pipe lines in undermined coal areas.

In his opening address at the conference last month, Dr. Thomas

Dr. Thomas S. Baker



Stockham Baker, president, Carnegie Institute of Technology, said that the same form of ability that had narrowed the market for coal would enable the producer to expand it. Dr. Baker prophesied some change in our urban life as the result of the introduction of coal treatment. A decentralization might take place. New industries might invade the rural regions. Coal treatment might be practiced near the mines.

Cecil H. Lander, director, Fuel Research Board, London, England, said that the English practice of burning raw coal in the open fire was not so uneconomical as it was smoky. It was a practice somewhat well suited to British conditions where heat and cold alternated in winter, making furnace heating of doubtful desirability. Perhaps a very low temperature treatment was the solution for preventing smoke.

BRITISH coal can be bettered less than German brown coal by treatment, and that fact retards the progress of low-temperature distillation in the British Isles. He added that the industry could place its reliance more confidently on coke and gas than on oil, which always is subject to violent fluctuations. Low-temperature distillation had been tested with quantities of a few grammes, in larger laboratory units, in full units treating 10 to 100 tons daily and then in commercial plants. There were in England 16 plants treating 10 tons daily and one truly commercial plant, that at Barnsley, which handles 250 tons a day.

Dr. Karl Krauch, director I. G. Farbenindustrie Aktiengesellschaft, Ludwigshafen am Rhein, Germany, said that, at Leuna, lignite from Middle-German pits, low-temperature distillation tar produced from such lignite and crude oil products are being subjected to the hydrogenation

process. At Leuna the production of gasoline has reached 70,000 tons, of which 40,000 tons is produced from coal. By the end of the coming year it is hoped that the production will be raised to 250,000 tons.

Dr. Frederick Bergius, Heidelberg, Germany, stated that the experiments of 1910-1913 into the transformation of cellulose and lignin in coal had been resumed and a product termed "end-coal" obtained. This "end-coal" contained about 84 per cent carbon and 5 per cent hydrogen when calculated free of ash and water. The "end-coal" was Berginized—that is, subjected to liquefaction under high pressure in the presence of hydrogen. Fractions were obtained similar to those characteristic of coal when treated under the same conditions. Lignin is being similarly treated. The investigations, Dr. Bergius said, showed that the "end-coal" of cellulose is closely related to natural coal and is aromatic in nature. Hence it is more than likely that a large proportion of natural coal is derived from cellulose.

S. W. Parr, professor of applied chemistry, University of Illinois, Urbana, Ill., has been making experiments on the distillation of coal at still lower temperatures than those usually considered as constituting low-temperature distillation. He found the actions at 200 deg. C. to be important. They absorbed heat, that is, were endothermic, as were all those below 300 deg. C. The speed of reaction increases at that point. The character of the reaction depends on the time the coal has been treated at the lower temperatures.

F. zur Nedden, secretary of the Fuel Committee of the Reichskohlenrat, Berlin, declared that just as coal was being converted into gas in the United States, though natural gas was being obtained from the earth, and that just as coal was being used

That Narrowed Will Expand It"

. . . *Slogan of
Pittsburgh Coal Conference*

to make power, though much power was being generated from impounded water, so it seemed likely that oil would be made from coal even though the natural oil resources were not exhausted and that fertilizer also would be made from the same mineral though there are vast saltpeter beds on the Continent.

To him it seemed that the supply of energy in all its various forms always requires long-time foresight. For this reason plants for the improvement of coal will be built without regard to business trends. This kind of investment therefore will act as a stabilizer, ironing out the fluctuations in industrial activity. It affords the same advantages to the community that a good base load offers to a power station.

WITH about one-fifth of the present annual output of bituminous coal in the United States now subjected to chemical processing and with the quantity so used steadily increasing, "one may with considerable justification," said H. C. Parmelee, editorial director of the McGraw-Hill Publishing Co. and former editor of *Chemical and Metallurgical Engineering*, "forecast the time at which coal as a raw material will be as important as coal used for heat and power." Moreover, coal used as power is threatened not only by the present trends in efficiency in combustion but also by the possibility of the replacement of steam-electric power by some other chemical-electric power system.

"Quite lately the chemical engineer has been giving thought to some rather unorthodox ideas of coal as a source of power. Within that field he sees the same type of intensive economic competition between steam-

electric and hydro-electric properties as prevails within his accustomed field between competing methods for the manufacture of a wanted commodity. The fact that energy and not commodity is the end product does not in any way lessen the competition."

THESE thoughts have led to the consideration of whether there is not some other material than water which has preferred thermo-dynamic properties which would permit of marked increases in over-all efficiency in energy transfer from coal to electricity. The mercury boiler has been one answer but the scarcity of mercury definitely limits the use of that element as a new boiler medium. Lately attention has been turned to di-phenyl oxide and di-phenyl which can be furnished in large quantities and at low cost. If these materials should be used successfully on an extensive commercial scale they would result in a very marked decrease in coal consumption.

Whereas some years ago coal was practically the only source of energy supply in the United States, today, said F. G. Tryon, U. S. Bureau of Mines, bituminous coal furnishes only 50.3 per cent of the energy supply and anthracite 8.1 per cent. Compared with 1917, bituminous coal consumption last year declined 6 per cent and anthracite 20 per cent; oil output increased 169 per cent; natural gas, 82 per cent, and water power, 110 per cent. The total energy supply gained 18 per cent, but coal consumption declined 8 per cent.

There has, however, been little change in the relative proportions of the bituminous output taken by different classes of consumers in the past 30 years. The most recent data

available show the railroads using 27.7 per cent of the output; coke ovens, 16; electric utilities, 7.7; steel works, 5.4; general manufacturing, 19.5; coal and water gas, 1; coal mine fuel, 1.1; other mines and quarries, 0.8; bunkers, 1.5, and domestic and unclassified, 19.3 per cent. "Power" industry consumption has been declining; consumption by "heat" and "mixed" plants increasing.

Mr. Tryon did not believe that the end of the reduction in unit consumption through more efficient combustion has been reached. In every group which has made records, including the public utilities and the railroads, the average consumption per unit is still considerably above the minimum; it is reasonable to assume, he said, that an effort will be made to drag down the average to the minimum.

ON FRIDAY at a meeting of the gas section a paper was read by Dr. William Roelen for Dr. Alfred Pott, general director, Ruhrgas Aktiengesellschaft, Essen, Germany, on the Ruhr gas-piping system. He did not suggest that the Ruhr region was setting standards of gas piping for America, but frankly acknowledged that the Ruhr engineers were following the lead of the American engineers in piping an otherwise useless gas to a point where it could be

F. G. Tryon



© Harris & Ewing

consumed. What applied to natural gas in America and to coke-oven gas in the Ruhr and Silesia did not afford justification for the deliberate building of coke ovens at the mines with the purpose of distributing gas by pipe lines.

The distribution pressure depends on the distance. Sometimes it is at 30 atmospheres. Nearer points have lower pressures such as 85 to 99 lb. per square inch. In the Ruhr district itself the pressure used runs from 3 to 6 atmospheres. When the luminosity of the gas was important, compression was objectionable because the benzol is stripped from the gas. Today with gas specifications demanding only thermal units the benzol is all removed before the gas is distributed. What condenses is water, oil and naphthalene principally, and the oil is mostly oil from the compressor, not from the gas itself. The cast-steel pipe has a tensile strength of 50,000 to 58,000 lb. per square inch. The pipe is welded throughout, every second joint in the factory and the other joints in the field.

The coal gas is purified by the dry continuous revivification process, the cleaning boxes being cleaned and filled once annually. The fuel gas ran $\frac{1}{2}$ per cent oxygen and $16\frac{1}{2}$ per cent carbon monoxide. The pipe does not corrode, nor the compressor. Neither oxygen nor hydrogen sulphide affects it. The thermal value of the gas is increased 1 per cent by compression because the water is removed. However, naphthalene is extracted at the same time, partly balancing the effect of water removal. The agreement with the City of Hanover requires that there shall not be over 16 per cent of inerts.

ON SATURDAY Dr. Hugh S. Taylor, professor of chemistry, Princeton University, discussed the part of the catalyst in coal processing, aiding as catalysts do in polymerization, depolymerization, hydrogenation, dehydrogenation, the action of steam, hydration and dehydration. Catalysts suited to one kind of process are unsuited to another.

Lord Melchett (formerly Sir Alfred Mond), chairman, Imperial Chemical Industries, London, England, was not present. His paper was read by Grant D. Shipley. He declared the coal industry must adjust itself to a permanent reduction in the use of coal and should not waste its substance by mining at a loss.

Dr. A. E. Dunstan, chief chemist, Anglo-Persian Oil Co., London, England, in a suggestive address led his hearers to feel that overmuch stress might have been put by others on high pressure and hydrogenation and to ask if the industry might not free itself of the necessity of either or both. A method was described by which phenols in low-temperature tar can be reduced to hydrocarbons under pressure and in the presence of ammonia molybdate and pentamine cobaltic chlorine, and investigations were detailed the purpose of which were to determine whether the same result could be obtained without the use of high pressures. It was stated that cresylic acid could be reduced substantially to hydrocarbons by simply heating in the vapor phase to 750 deg. C., hydrogen not being necessary to effect the conversion.

Howard N. Eavenson, consulting engineer, Pittsburgh, Pa., urged that a five-year program of research be instituted for the coal industry, 40 per cent of the fund to go to pure science and 60 per cent to commercial application of science to the problems of the contributors. He said contributions from industries and coal companies should be contingent on sufficient earnings, the work being done at existing suitable institutions.

Dr. Egloff, director of research, Universal Oil Products Co., Chicago, said, Why not make it a \$25,000,000 fund; he thought the industry should institute its own inquiries, and mentioned some which he alleged were so maintained abroad. The chairman, George S. Davison, said that the European activity was for national self-defense. They had no natural oil and sought to derive it from coal. A. C. Fieldner, chief chemist, U. S. Bureau of Mines, Washington, D. C., said fusing factors of ash, agglutinating factors of coal and gas-making factors might be determined by federal agencies as being of national interest.

Coal Cleaning in Review

For the coal operator probably the most interesting feature of the discussions at the Second International Bituminous Coal Conference held at Pittsburgh last month was the review of coal-cleaning developments here and abroad. This review is treated in detail on pages 735-8 of this issue of "Coal Age."

Low-temperature distillation and pulverized-fuel developments reviewed at the Conference are summarized on pages 751-3; the sessions on origin and composition of coal on page 744.

DISCUSSION of the power and combustion aspects of the coal situation was marked by a new method of determining the melting temperature of ash, further proof that clinkering of ash cannot be predicted from coal analyses, experiments indicating that burning household garbage with coal increases clinkering and a description of a new heating furnace using coke.

The change in the shape and volume of a cylindrical sample of ash heated uniformly in an electric furnace is graphically recorded on a chart in the new fusion-point determination described by Dr. Karl Bronte, Germany. Some coals show a gradual softening while others have halting points or steps ascribed to the melting of individual parts of the mixture. Thomas G. Estep, Carnegie Institute of Technology, stated that 2,000 analyses showed, conclusively that ash-fusion temperature could not be predicted from the sulphur content. Further conclusions were that the fusion temperature cannot be based on the extraneous ash content of the coal.

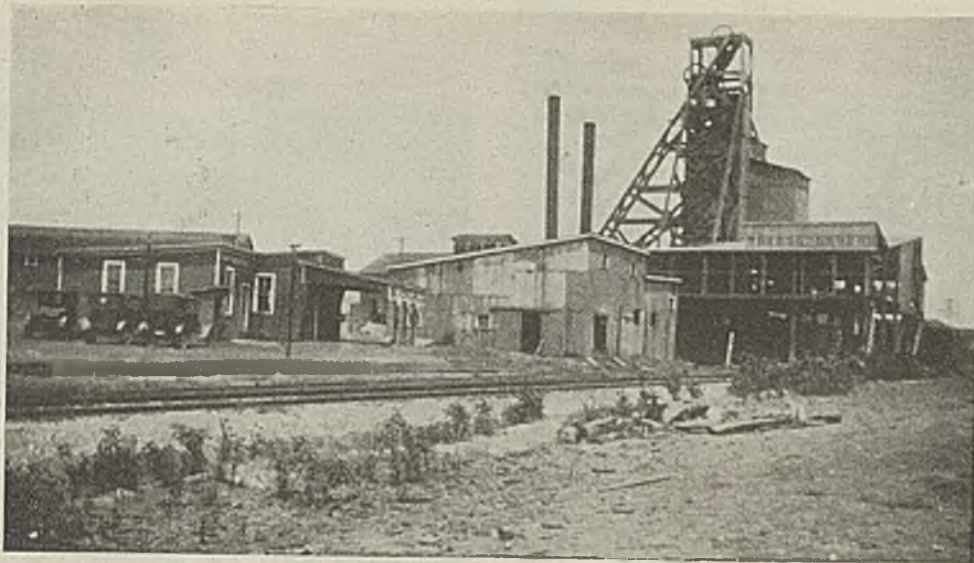
According to W. D. Langtry and J. H. Kohout, Commercial Testing & Engineering Corporation, Chicago, the burning of household garbage with coal in domestic furnaces will lower the fusion temperature of the resultant ash. Coal of better burning characteristics therefore is likely to give poor results, with a consequent complaint from the householder.

Coke is the fuel used in a new heating boiler made by the American Radiator Co. for single houses and apartments. The construction and operation of the furnace was described by Dr. Charles W. Brabbée of the company, who stated that one boiler installed in a 12-room house in Bronxville, N. Y., burned only \$180 to \$200 of fuel per year as against anthracite costs of \$295 to \$310 in years prior to the installation of the coke boiler.

The rating of hot-water and steam radiators according to the resulting comfort, or temperature maintained at knee-height in the center of the room, also was described and Dr. Brabbée predicted that the next five years will bring entirely new standards of heating.

THE trend of power in the future was discussed by A. R. Smith, of the General Electric Co., who predicted that in 12 or 15 years steam plants must be built having an ag-

(Turn to page 753)



Surface Plant, Buckskin Mine

Lifting an Unprofitable Mine Out of the Red

By R. Dawson Hall

Engineering Editor, Coal Age

BUCKSKIN mine of the Big Vein Coal Co., at Buckskin, Ind., is a notable example of a mine run unsuccessfully with hand loading and small cars and now reopened and run profitably through the introduction of modern equipment. A glance at the illustration of the new mine cars before they were taken into the mine in line with one old car shows how fully the Buckskin authorities realize the value of the big car. Loading small cars by hand is wasteful enough of time, but with machine loading it is far worse. A small car will hold many shovelfuls

of hand-loaded coal, but it will be filled by a machine in a little less than a minute, whereupon twice that time will be lost before another car can be placed.

Thus 66 per cent of the time the machine is idle merely because of a lack of cars without considering the time lost in moving the loading machine. With a 4-ton car and a two-minute time of replacement the machine is idle only 33 per cent of time because of car delays. Thus the men who are working the loading machine achieve twice as much. Delays of

other kinds, however, somewhat reduce that figure.

The original car had a capacity of about a ton. The car by which it was replaced was built to carry four tons and would carry that tonnage if loaded by hand. The mine is now operated by day labor exclusively and so the cars are not weighed. The railroad weights show, however, that the cars carry 3.5 tons of merchantable coal. A few cars have been weighed and it was found that the ordinary load was 3.7 tons before removing refuse at the picking tables.

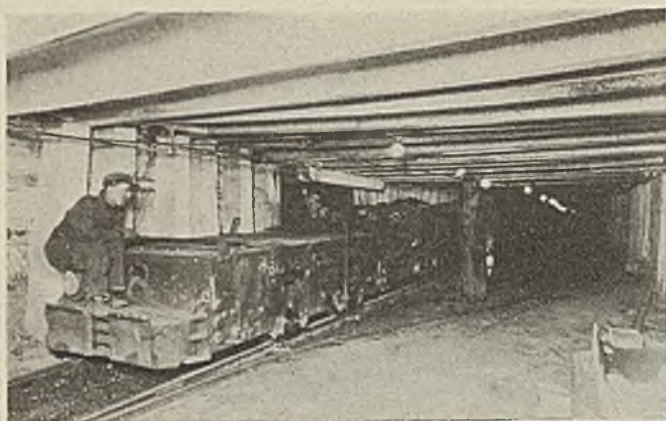
In making the change the manage-

Loading Machine With Operative, Helper, Trackman, Motorman and Trip Rider

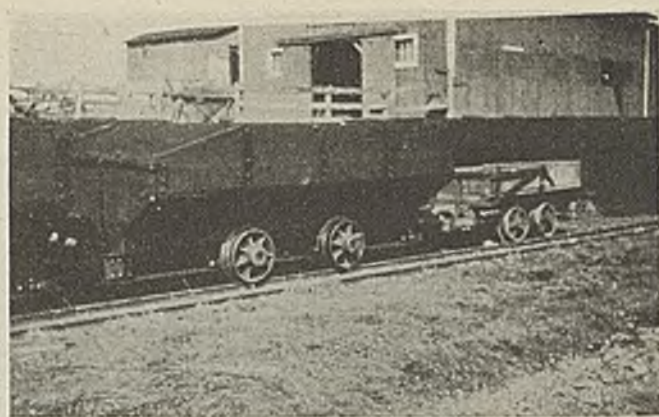


Roof and Coal in Buckskin Mine; Former Strong as a Whole but Uncertain





Trip Standing at Shaft Bottom



New and Old in Car Equipment

ment decided to use Sanford-Day drop-bottom cars and to dump the coal in one compartment of the shaft over the sump, chuting the coal to a skip in the other compartment. Thus there is a skip in one compartment and a cage in the other, but the cage, which is used only for men and material, has a landing of its own above the level at which the cars are dumped. The skip has a longer rope than the cage.

The loaded cars cross the shaft and dump below the cage, the latter being counterweighted to balance the weight of the skip. Only the coal from a single car is hoisted at a time. The depth of the shaft is 212 ft. As the country is almost level the cover probably nowhere exceeds 300 ft. When the mine was opened the purpose was to hoist the coal in each of the two compartments. However, a large tonnage can be obtained with the use of the single skip hoist.

Buckskin mine is worked in the No. 5 seam, the thickness of the bed being 8 ft., though in occasional rolls it may be reduced to about 5 ft. On the whole the roof is good, and wide rooms, some as much as 40 ft. wide, have been driven, but recently it has been found desirable to restrict their width to 24 ft.

The roof is free of drawslate. It might be described as billowy, for it has a rounded, irregular profile. It also has concretions here and there like big warts. Some of these "warts," which, it may be said, are in places 2 ft. in diameter, have a way of falling out, sometimes unexpectedly, but most of them seem quite strongly rooted. It is difficult at times to tell which of these "warts" should be made to come down and which will resist extraction and have to be left.

An illustration, showing a mining machine, gives a clear idea of the nature of this roof. Over the head

of the operative may be seen a deep cavity showing where one of these concretions has fallen and between the two men at the rear of the machine may be seen, perhaps none too clearly, a "wart" that it has been impossible to draw. The irregular nature of the roof can also be seen in the picture of A. J. Hargrove, the superintendent, and John Singleton, the assistant superintendent, the latter testing for gas. To keep the pillars uniform and prevent squeezes the rooms are being driven on sights.

As the present management has been operating the mine less than two years, the panel system is not yet established, but it has been started and will soon be in full operation. The panel entries have four headings driven on 45-ft. centers. On either side 50-ft. barrier pillars will be left. The room entries will be 620 ft. apart in the clear, and they will have two headings driven on 40-ft. centers. Rooms will be driven 300 ft. long from each of these headings.

Pillars 12 ft. thick will be left. Larger pillars are being provided near the old work, because, otherwise, it is feared, the squeezes in the original work might extend to the newer operations. In the future work, which is located well away from the squeeze and where the operations will be carefully and regularly conducted, it is believed, it will be possible with the smaller pillar to get a complete collapse of the panels, the rooms being speedily driven their full length by the aid of the mining machines. On the north side of the mine, where the coal is now being extracted, the grades are heavy, making the spotting of cars difficult, but on the south side the grades are easy and this will make car handling less difficult.

Every ton of coal that leaves the Buckskin mines is loaded by one of the six 5 BU Joy loaders with which the mine is equipped, five of which

work by day and one during the night.

Each machine has a crew of seven men, including machine men, drillers and trackmen, and in addition has a 6-ton locomotive delivering cars and removing them as they are filled. The coal is gathered by a 10-ton locomotive and hauled to the dump.

The coal faces are drilled with six to eight holes. No definite system has been adopted because the impurity in the seam varies and the resistance to the shots depends on the impurity present. The coal is shot in the night shift by men specially appointed for that purpose. So far there have been no time studies, because of the pressure to get the work going.

The two years have been full of the problems that confront one in getting a closed mine and one not too scientifically planned ready for a big tonnage. The output runs consistently 1,020 tons daily. It is realized that when everything is moving rightly and the grades are more favorable for locomotive operation better results will be obtained.

It has been found that the miners have given every co-operation in the mechanization of the mine. Though paid by the day and not by yardage or tonnage they are nevertheless most anxious every night to see their records so that they can judge of their success in putting out a good day's stint of coal. In order to get good service plenty of supplies are kept on hand, watched, however, to prevent waste, and careful maintenance of the machinery is provided so that it will work close to capacity.

Seven men are employed on the picking tables at the surface to keep the coal up to standard. Six certificated men, including the superintendent, are employed in the mine. One of these is the electrician and one the night-shift boss. The mine is successful because of mechaniza-

tion, good management and harmonious labor relations, the men being paid the union wage scale. Later it is expected that equipment will be installed to burn the waste of the picking tables with greater economy in labor and with a reduction of the loss that is incurred in the cleaning of the coal.

Thus Buckskin mine, which was converted in the manner indicated

from a pick mine to a modern 100 per cent mechanized operation under the direction of Charles Gottschalk, consulting mining engineer, of Evansville, Ind., who is vice-president and general manager of the coal company, has found in modernization a way in which it can operate profitably despite the difficulties with which the industry in Indiana and elsewhere is beset.

Plenty of Coal North of Birmingham Field; Conditions Adverse to Development

BELIEVING that, given better freight rates and ore development, the Plateau field has great possibilities, E. M. Jones, mining engineer, Chattanooga, Tenn., writes:

"In the issue for October appears an article by R. Dawson Hall on the Alabama coal field. I trust you will allow me to comment on it lest the opening remarks give the reader a wrong impression. Mr. Hall says:

When the measures reach the northern line of the State of Alabama they contain little workable coal and are scarcely 40 miles in width. Here the coal does not lie in as deep a trough as in the northern field. As a result the coal field has become so unimportant that the inhabitants of Chattanooga and neighboring points are almost oblivious of the coal field in which they dwell.

"Chattanooga's inhabitants are 'oblivious of the coal field' not because of the lack of coal in the nearby mountains but for three reasons: (1) Because when they use coal for household purposes—and that is the principal use—they naturally demand a blocky, high-volatile product which the field cannot supply; (2) because when they use the coal for burning clinker in cement kilns they also desire high-volatile coal, and (3) because when they use the coal for raising steam in boilers they insist that it shall not coke in the furnace. Only a small quantity is used for coking in byproduct ovens.

"Many of the men who fire boilers dislike to break up the surface of the fire to let the air through, after the coal cokes or cakes, with the result that, where possible, a high-volatile or a non-coking coal is purchased. This viewpoint is difficult to change because the purchasing agent or manager does not wish to be bothered with the complaints of the firemen and will purchase for them the kind of coal they want.

"Domestic coal is brought from

northeastern Tennessee and from central Kentucky. There is not any in this field. The coals in this region are all friable and have a high fixed-carbon content. The freight rate also tends to keep the mines closed. We pay 97c. per ton for a haul of less than 14 miles and pay \$1.41 for a 161-mile haul. Even the Chamber of Commerce will not raise its voice to correct this situation.

The article quoted states:

A hundred miles of relative sterility greets one as one travels from Chattanooga toward Birmingham; for this distance the coal field is neither wide nor operable. Cumberland Mountain, Sand Mountain, Raccoon Mountain and Lookout Mountain have coal measures but hardly any merchantable coal.

"The engineer who made that statement to Mr. Hall was sadly in need of facts to justify his reckless statements. Cumberland Mountain, as an example, has many hundreds of square miles of the 'Sewanee' seam with a thickness averaging 42 in. or more, the bed being clean and entirely free from partings. The Tennessee Coal, Iron & R.R. Co. owns over 60,000 acres. This it holds at a high value. There is a vast quantity of this and other coals that our Birmingham engineers know nothing about. It would be refreshing, however, if they should find it out and say so. Engineers ought to base their opinions on facts, not on emotions. These coals have from 4 to 9 per cent ash and 22 to 30 per cent of volatile matter.

"The coals are friable and when mined have only a small percentage of lump; they are too far from the Gulf Coast to be shipped there; they have no substantial market at home because there is no great iron industry like that around Birmingham, although there is a great quantity of iron ore. The field is not idle because of a lack of coal, for there are

mines in the Cumberland Mountain that have operated at a profit for as much as 60 years."

* * *

[To the authoritative statement quoted in the article cited by Mr. Jones may be added one by Milton H. Fies, vice-president in charge of operations, DeBardeleben Coal Corporation, in a paper on "Alabama Coal Mining Practices," presented at the Birmingham meeting of the American Institute of Mining and Metallurgical Engineers, Oct. 1924. It says:

The coal measures in this field [the Plateau region] have never been mined profitably. Several furnaces were built in this region north and east of Birmingham with the hope of procuring an adequate and suitable fuel and ore supply, but all of these ventures proved failures, as far as procuring raw material in this region. The coal seams in this field are pockety, irregular and uncertain.

It may be added that in Jackson, De Kalb, Morgan, Marshall, Madison, Cullman and Morgan counties there are no mines at all recorded in the mine inspector's report of 1927, and in Etowah County none having over 5 men. In Blount County, which adjoins Jefferson County (of which Birmingham is the capital), there is one mine which produced 127,000 tons in 1927 and two good mines just barely over the Jefferson County line. One mine at Oneonta which had 47 men was running and one at Trafford with 37 men. No other mines are recorded in the county as employing more than 5 men. The St. Clair County mines were all south of the northern line of Jefferson County. All these mines are regarded as being in the Birmingham region. Mr. Jones does not claim there are any mines in the area under discussion but their absence surely suggests that the statements in my article are not overdrawn.—R. DAWSON HALL.]

Cents—Not Per Cent

J. R. Campbell, bituminous representative, American Rheolaveur Co., Pittsburgh, Pa., writes: "In reporting the coal preparation meeting of the Engineers' Society of Western Pennsylvania, held Oct. 30 in Pittsburgh, Pa., you quote me in *Coal Age* for November, page 683, as saying that a reduction of 1 per cent in ash will reduce the cost of pig iron 10 to 15 per cent per ton, whereas the reduction is actually 10 to 15c. On the same page it is stated that centrifugal filters are used for dewatering coal under 48 mesh. Actually, however, mesh filters or heat driers are used in a complete washing plant for dewatering sizes below 28 or 48 mesh."

ECONOMIC FUNDAMENTALS

... Convention Theme of

FUNDAMENTAL economic facts which must be faced before the ideal stabilization of the bituminous coal industry can be achieved formed the backbone of the discussions and addresses at the eleventh annual meeting of the National Coal Association, at the Hotel Cleveland, Cleveland, Ohio, Nov. 14-16. A noted mining engineer told the operators assembled what it was costing the industry to carry excess idle capacity; a purchasing agent gave them an insight into how the buyer views the coal salesmen and what the industry can do to improve its status with its customers; a noted banker, who has had unusual opportunities for studying coal at close range, outlined a program of rehabilitation.

The delegates themselves exchanged opinions on topics such as better merchandising, the place of research in the coal industry, improvement in safety work and the legislative outlook at Washington. As a climax to the three-day gathering the coal men were given a picture of what may be done toward stabilization through the development of trade-practice codes in co-operation with the Federal Trade Commission and the Department of Justice. By appropriate resolutions the convention went on record against legislative proposals singling out coal, favored further study of the trade-practice code movement and renewed its pledge to continue accident-prevention labors.

E. C. Mahan, president, Southern Coal & Coke Co., was enthusiastically re-elected president, W. H. Cunningham, president, Truax-Traer Coal Co.; F. S. Love, president, Union Collieries Co.; J. B. Pauley, chairman of the board, Miami Coal Co., and P. J. Quealy, president, Gunn-Quealy Coal Co., were named vice-presidents. C. E. Bockus, president, Clinchfield Coal Corporation, was again given the treasury portfolio and Harry L. Gandy was again the directors' choice for executive secretary.

"I am not here to dwell on the dead past, but primarily to excite

your imagination regarding the possibilities of associational activities that will make for future achievement," declared Mr. Mahan at the opening session, presided over by D. A. Thomas, president, Montevallo Coal Mining Co. "We have heard much of the merits of the movement toward mergers and consolidations of operating companies, but a merger movement of transcendent value concerns



E. C. Mahan

the merger between bituminous coal producers and the real idea of collective effort through the national association of their industry.

"That sort of merger calls for neither a sacrifice of independence nor a sharing of profits and it affords the only possible means of putting the industry as a whole on a profitable basis. The salvation for the fit, as well as for the unfit, is not through the murder of the latter. The remedy lies in making the unfit fit, and that involves the merger idea of which I have spoken. It is the sole escape from the slough of despond in which many victims of cut-throat competition are muddling about.

"The only reason this merger has not been more widely adopted is the strong spirit of individualism in the industry. But the working of the go-it-alone policy has been blackened

by such a frightful mortality list that the survivors are fast awakening to the need of a larger association movement. When the operators of this country decide to discard a go-it-alone policy, the day of profit taking, in contrast to price cutting will have dawned."

THE need for accident prevention is obvious, asserted W. L. Robison, vice-president, Youghiogheny & Ohio Coal Co., and chairman of the safety committee of the association. With an industrial death roll of 25,000 and 2,000,000 injured every year, the compensation bill of industry alone approximated \$250,000,000. Originally started as a humanitarian movement and still grounded in that cause, accident-prevention work also is a successful commercial proposition paying big dividends to management.

"Accident prevention," said Mr. Robison, "will increase production by keeping the man who is employed at work doing a specific production job everlasting at that job, uninterrupted by accident, unhampered by physical disability. It not only improves and increases the production in tons, but it will also improve the quality of the work performed. Continuity of work makes for better work. Hence, in this light, accident prevention surely pays. It also reduces labor turnover."

Replacement, continued the speaker, is expensive. The amount paid out directly in accident compensation does not cover the true cost; the actual cost is three to four times the compensation payment. Accident prevention reduces overhead. Accidents mean delays. Fatal accidents mean shutdowns on the day of the accident and on the day of the funerals of the killed, lost production, increased overhead and destroyed morale.

The Southern Appalachian Efficiency Association, stated R. E. Howe, secretary, holds monthly meetings of the operating men at which a special effort is made to get safety committees for every mine. At these

National Coal Association

meetings, accidents, their causes and how to prevent their repetition are discussed. The association publishes a monthly accident record showing the tons per man at different mines: the reaction has been helpful, as workers are anxious to keep at the top of the list.

At the mines of the Red Jacket Consolidated Coal Co., explained Landon C. Bell, the workers have organized a voluntary safety "court" which holds regular sessions at which the men are compelled to "report any act or circumstance which, whether it produced an accident or not, tended in that direction or might have in the ordinary course of events done so." The work of the "court" is supported by fines levied against the careless.

THERE is renewed interest in accident-prevention work in Alabama, according to Mr. Thomas. An effort is being made to enlist a large corps of speakers so as to get "away from the cut-and-dried situation that very often exists in the men hearing the same thing from the same superintendent or some local operator week in and week out." Alabama has decreased materially the number of deaths from rock falls, but fatalities from electrocutions and premature explosions have increased. The state inspection department is furnishing operators with detailed lists of accidents, giving names and ages of the dead or injured, number of dependants, causes of accident and whether preventable.

The West Kentucky Coal Co., said C. F. Richardson, president, demands written reports on each accident as in too many cases superintendents and foremen pay too little attention to accidents to find out whether they could have been prevented. With written reports it is easy to check up on the boss who fails to take proper steps to prevent the recurrence of particular types of accident. Mr. Richardson was opposed to a fine system but did favor the suspension of workmen who were guilty of careless practices.

Henry La Viers, general manager,

South-East Coal Co., stated that the number of accidents increase directly as the number of men employed in the year increases. In other words, the mine hiring the smallest number of new men has the least accidents. Mr. La Viers suggested that all accident statistics show the age and the period of employment at the particular operation of each man injured or killed, as he believed there were more accidents among the younger men employed.

"The present slump in the coal business" is an aftermath of the World War, said S. A. Taylor, past president, A.I.M.E., in opening his address on "The Cost of Maintaining Excess Capacity." Between 1850 and 1910 bituminous output approximately doubled every decade. Since 1910, however, the industry has had

to face greater efficiency in utilization and the introduction of substitute fuels. With no increase in efficiency and no gain in substitutes, the 1925 output would have been 415,000,000 tons greater than it was—or almost double the 1910 output.

Mr. Taylor expressed the belief, however, that the efficiency gains had about passed their peak although substitute fuels—particularly oil—must be reckoned with as a real competitive factor. Nevertheless he believed that "we can expect that the next few years will see this great basic industry [bituminous coal] coming back into its old stride."

USING the Pittsburgh district as a starting point in determining the cost of carrying an excess productive capacity of 300,000,000 tons, Mr. Taylor estimated that the investment in plant and houses was \$4 per ton and the total capital investment \$5. On a 5 per cent depreciation basis the depreciation cost was 20c.; maintenance, 2½c.; taxes, local, county and state capital, 2¼c.; interest on investment, 30c.—a total of 55½. For the country as a whole he estimated maintenance, depreciation and taxes at 15c. per ton; interest on an aver-

Mr. Glover's Fourteen Points

(1) The solution of the problems of the industry must come from within, but government co-operation unhampered by burdensome regulation is needed in the solution of some of these problems.

(2) Coal executives must give more time and attention to marketing.

(3) We must materially decrease the number of sales units by consolidation of physical properties and selling agencies.

(4) For the present we must forget inter-district bones of contention.

(5) We must have strong, aggressive local organizations supported by every district operator; we must educate ourselves to use co-operative marketing efforts wherever they can be applied effectively.

(6) We must co-ordinate the activities of local groups in a national way through the National Coal Association.

(7) We must have sympathetic co-operation and develop trade relations between all organizations interested in the production, sales, distribution, transportation and efficient utilization of coal.

(8) We must have more research work and use science to win back some of the ground the industry has lost.

(9) We must know our own coals intimately and market them intelligently.

(10) We must limit our production to constructive sales and limit our shipments to bona fide orders; we must control the sale and the price of our product.

(11) We must have inter-district exchange of credit information and the benefit of accurate information on prices made by competitors on past sales.

(12) We must spend more money on sales promotion, market extension and constructive salesmanship to make it harder for price alone to secure business.

(13) We must have a code of ethics and trade practices fair to the industry and in harmony with codes in other industries.

(14) We must remember the industry is too big to permit of individual action on major problems; we must relinquish our individuality in the interest of the common good.

age capital investment of \$3.50 per ton, approximately 20c.

In other words the cost of carrying the idle capacity approximated \$105,000,000 per annum. He saw no relief from this situation except through the formation of district operating and selling combinations as elimination of operating companies by the bankruptcy route only meant worse competition because the new owners could further cut prices. He felt that an increase of 50c. per ton on average realizations would spell a prosperous industry.

Membership and taxation were the topics of discussion at the morning session Nov. 15, presided over by Mr. Robison. Walter Barnum, president, Pacific Coast Co. and chairman of the membership committee, pointed out that the organization had lost numerically the past year but had increased its tonnage over 10,000,000. There was, however, still about 125,000,000 tons outside the National in local member territories. The big question was how to bring this tonnage in.

THE taxation discussion, led by Otis Mouser, president, Stonega Coke & Coal Co. and chairman of the taxation committee of the association, opened with a review of unsuccessful efforts to induce Congress to consider the peculiar problems of the mining industry in enacting the 1928 revenue bill. These conditions, however, now are being studied by the Congressional Joint Committee on Taxation and by the Bureau of Internal Revenue.

Mr. Bockus thought that the most sensible suggestion yet advanced was that made by Mr. Gandy that the bill of administration be not changed at every session of Congress but that the work be carried on by experts with figures for the various brackets adjusted from time to time to meet revenue needs. This idea was endorsed by the meeting.

W. B. Reed, tax expert for the association, stated that article 222 of Regulation 45 put into words the idea of practically all operators; i.e., "that when a mine had once reached the stage of production, the things necessary to maintain the flow of coal from the face to the tippie should not be capitalized." Beginning with a number of unpublished decisions, however, this doctrine was broken down by the revenue officials until now the Board of Tax Appeals "seems hopelessly wedded" to the doctrine that the twelve months' basis

shall apply to wasting as well as continuing industries.

"Merchandising means selling and salesmanship in the coal industry appears to be in its embryo," asserted Thomas Williams Harris, Jr., purchasing agent, E. I. du Pont de Nemours & Co. and vice-president, National Association of Purchasing Agents. "If there is to be a close margin between cost and selling prices, it behooves every coal company to obtain the maximum return on its coal based on comparative quality with other coals and suitability for the ultimate consumer."

Mr. Harris urged the wider employment of technically trained men in the sales department of the coal companies—men who could fire a boiler and tell the purchaser how to effect combustion economies. He suggested that the National Coal Association could encourage this movement and that it also could develop a large amount of usable data on combustion. Efficient selling, based upon sound combustion knowledge, would reduce sales costs because salesmen could concentrate upon consumers whose requirements the producing company could most adequately serve.

"I wonder if you men are keeping up the enthusiasm in your sales departments the way it should be kept up?" queried Mr. Harris. Salesmen, he pointed out, need the backing of their superiors. The man with a future is the man who never lets down. The attitude that "the coal business is rotten," pessimistic salesmen and pessimistic purchasing agents form a bad combination.

THE idea of employing combustion engineers was warmly seconded by Mr. Ricardson. H. N. Taylor, president, Sheridan-Wyoming Coal Co., added that the combustion engineer in addition to knowing his specialty and salesmanship must also be a diplomat of the first order so that he may sell improved boiler-room practices to the front office of his customer without killing his coal in the power plant.

At the afternoon session, presided over by C. A. Owen, president, Imperial Coal Corporation, H. A. Glover, vice-president, Knox Consolidated Coal Co. and chairman of the marketing committee of the association, maintained that intelligent marketing was a specific for a sick industry and that operators must become market-minded. In furtherance of intelligent marketing Mr.

Glover outlined a 14-point program summarized in another column of this issue of *Coal Age*.

It is certainly an unsound basis for industry to be buying coal at less than cost of production, remarked Mr. Richardson, who expressed general approval of Mr. Glover's points. Unless some means is found to keep unwanted coal off the market, declared H. L. Findlay, vice-president, Youghiogheny & Ohio Coal Co., all the training and educational work, all the research will do little good. When the problem of adjusting production to demand has been solved "price is going to take care of itself. Then your educated salesmen and combustion engineers and all the factors we have been talking about will be able to function and show their real value."

In the absence of J. P. Williams, Jr., chairman of the research committee, Mr. Gandy reviewed the activities of the association in that direction for the past year. The aim of the organization, he explained, was not to do original research work but to act as a clearing house for the industry in keeping the operators abreast with what was going on in the scientific world. Demands for the various summaries and reviews on research published by the association indicated that it was succeeding very well in its mission.

MR. THOMAS reported that progress was being made in Alabama in increasing the use of powdered fuel and pulverizers have been installed in a number of plants which formerly used hydro-electric power. The management of one such plant recently stated that he was making his current at a cost slightly under $\frac{3}{4}$ c. per kilowatt-hour, "as compared to an average of about $1\frac{1}{8}$ c. in our state for hydro-power.

The afternoon's program concluded with an address by Fred W. Shibley, vice-president, Bankers Trust Co., New York, on "Net Profits Through Co-operation." Mr. Shibley's address is abstracted on page 741 of this issue.

At the final session on the morning of Nov. 16, presided over by P. M. Snyder, president, C. C. B. Smokeless Coal Co., E. L. Greever, counsel for the Pocahontas operators, outlined the Watson bill. This analysis was followed by the discussion of the trade practice movement in industry covered on page 749 of this issue. Installation of officers and adoption of resolutions ended the meeting.

COAL CLEANING

Occupies Foreground In Pittsburgh Conference

AMONG the most striking of the suggestions at the sessions on purification and cleaning of coal which formed part of the Second International Conference on Bituminous Coal was one by R. Lessing, consulting chemist and chemical engineer, of London, to the effect that calcium chloride might be used not merely in the float-and-sink test but as a medium for actually washing coal and that the dust be removed before washing and used as pulverized fuel. By this method the coal is floated in an unagitated liquid of the exact specific gravity desired.

Dr. Lessing was not present to read his paper but it was read for him at the meeting of Wednesday, Nov. 21. In this paper he remarks that though slack usually is less clean than lump coal, the dirt in it is in merely mechanical admixture and therefore readily cleaned. Because the dirt is not attached to the coal the latter can be better separated from its impurities than coal of large size which has its foreign matter integral with itself. By cleaning slack can be made into a purer fuel than lump coal.

The difficulties arising from moisture in washed coal, said Dr. Lessing, can be greatly reduced by removing the dust which consists largely of the always friable fusain (mineral charcoal) with the pulverized matter from the more friable portions of the clarain (attritus) and durian. The latter is described by Dr. Lessing as dull coal with a high-ash content which is almost entirely composed of pure clay substance. In another session Reinhardt Thiessen, of U. S. Bureau of Mines, said that except in local inclusions of small volume durain could not be found in American coal measures.

By the removal of these dusts it is possible to wash coal without forming a "slurry" which will retain moisture. "According to the laws

governing the relation between specific gravity and size a large particle of clean coal and a small particle of refuse, say for instance in a size ratio of 5 to 1, would travel together in water in the same direction and practically at the same velocity. The two particles although discrete and free to



Byron M. Bird

move away from each other would not part company but would find their way together either into the 'clean' coal product or into the refuse.

"As the laws of Rittinger and Stokes relative to the falling of bodies in water hold good only for true spheres and require certain constants to render them applicable to cubes and other shapes, their value is much diminished when the difference in shape of the clean-coal particles and shale particles assert themselves and still more when, as in the case of fusain, the porosity of the particles introduces difficulties because air is absorbed, affecting the buoyancy of the particle."

These facts induced Dr. Lessing to introduce a system not dependent on size of particle. After pre-

liminary work in the laboratory, the Clean Coal Co., Ltd., built for the collection of data a semi-commercial plant capable of treating about 2 tons of coal per hour.

"The first commercial coal unit," says Dr. Lessing, "was erected at the Yniscedwyn Colliery of the Messrs. Amalgamated Anthracite Collieries, Ltd., and has been in operation for some time, dealing with 20 tons of anthracite duff per hour of a size $\frac{1}{8}$ to 0 in."

IT WAS eventually found that while all the dust below 0.01 in. should be removed in order to make ready drainage possible, leaving 0.25 to 0.5 per cent would not have any serious deteriorating effect. This dust can be used for pulverized fuel. From 10,000,000 to 20,000,000 tons of each dust is raised in Great Britain annually. Dr. Lessing suggests that this is the preferable source for powdered fuel as it needs only separation and collection.

The new washer has a discrimination that is superior to the float-and-sink test, which latter is rendered less sensitive when the coal is covered with dust. Ordinarily, a calcium-chloride solution is used in the washer as the separating fluid, but it can be replaced wholly or in part by other liquids when a modification of the density, viscosity or other properties is desired. The dust recovered is used either in the colliery boilers or shipped in specially designed coal cars.

The last traces of calcium chloride can be removed from the product without difficulty. Coal which naturally contains chloride—and in passing it may be said some British coal does—gives a much lower chloride test after the process than before, the original salt being washed out. To remove the chloride the clean coal and refuse suspended in the solution are placed in draining hoppers; the solu-

tion is allowed to run off, while water is superimposed on it.

Most of the salt is recovered in its original strength and a small layer of weak liquor only is interposed between the strong liquor at the bottom and the clean water at the top. This weak liquor is passed through a simple tubular steam-heated evaporator before being again put in circulation. A small portion of solution, so dilute as not to stand the cost of concentration, is run to waste until water free from added chloride passes out. The chloride thus lost usually is equivalent to not more than $\frac{1}{2}$ gallon of strong liquor per ton of coal.

Weak liquor is formed at a rate of 70 gallons per ton of raw coal, its average specific gravity being approximately 1.2. The evaporator raises this gravity to 1.4. By a special treatment the liquor is rendered entirely non-corrosive to iron and steel, and the semi-commercial plant which has been used for three years has remained free from corrosion troubles.

Dr. Lessing remarks in his paper: "Detailed comparison between three coals, containing 9.5, 6.7 and 3.2 per cent ash respectively, in their influence on the blast furnace shows the ascertainable saving from coal to pig iron to be of the order of 20c. per ton of pig for every per cent of ash reduction. These figures do not include the saving derived from the faster driving of the blast furnace nor the increment in value due to the higher quality of the iron produced.

IN DISCUSSION George R. Delamater, fuel engineer, W. S. Tyler Co., Cleveland, Ohio, said that for most American bituminous coals the specific gravity obtainable with calcium chloride was insufficient. It ran from 1.40 to 1.43; what was wanted was a specific gravity of 1.45 to 1.50. J. R. Campbell, American Rhéolaveur Corporation, Pittsburgh, Pa., has experimented with it and found it inadequate and in float-in-sink tests zinc chloride which can be brought to a gravity of 1.50 is used.

Dr. Carl Glinz, professor, Technische Hochschule, Berlin, said, in an address entitled "Coal Cleaning Problems of Today," that in making metallurgical coke 6 per cent of water in coal was actually desirable and 12 per cent was permissible. Stating that the actual proportion of hydrogen sulphide in purified city gas is less than a grain in 1,000 cu.ft., F. W. Sperr, Jr., director of research, the Koppers Co., Pittsburgh, Pa., de-

clared that the regulations usually specify that there shall be less than 300 grains of organic sulphur in that quantity of gas. The sulphur compounds other than hydrogen sulphide are of an organic nature and with the exception of carbon disulphide are present in very small quantities. Where low sulphur coals are used, the removal of carbon disulphides is not undertaken.

In America, said Mr. Sperr, enormous quantities of coal with less than 1 per cent of sulphur are available at a low price and as a rule the local conditions must be quite unusual to favor the use of coal containing more than 1.5 per cent of sulphur. Furthermore, in any consideration of the possibilities of utilizing higher sulphur coals for gas manufacture, it must be emphasized that neither the dry nor the liquid process of purifying gas removes any appreciable quantity of organic sulphur.

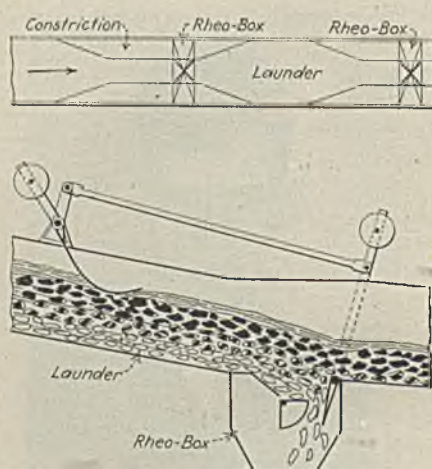


Fig. 1—Means of Controlling Depth of Stratification

However, the possibility of using higher sulphur coals, if conditions warrant it, is indicated by the fact that city gas in England, since the regulations applying to organic sulphur were abolished in 1905, usually contains from 350 to 500 grains of such sulphur per 1,000 cu.ft. Moreover, K. L. Dawson declares that the gas authorities of the City of Halifax have hardly any complaints from odor when the sulphur is kept below 350 grains in the volume stated.

"In comparing the relative economies of removing sulphur by coal washing or by application of liquid purification to producer gas made from unwashed coal, said Mr. Sperr, the principal question is the efficiency of the coal-washing process. It is quite obvious that coal washing will be much the cheaper method where it

can reduce the coal sulphur to 1 per cent or less.

The cost of the Seaboard process applied to the removal of hydrogen sulphide from producer gas made from coal containing 2 per cent of sulphur might be as low as 0.4c. per 1,000 cu.ft. but with a production of 140,000 cu.ft. of producer gas per ton of coal this would mean 56c. a ton of coal and the cost of cooling and tar removal would greatly increase the figure." It was said that the Nova Scotia operators had been able to reduce their sulphur content of $3\frac{1}{2}$ per cent down to 3 per cent, a decrease of only 14 per cent.

Charles Enzian, chief engineer, Berwind White Coal Mining Co., Windber, Pa., declared that "only about 20 per cent reduction in sulphur could be obtained with bituminous coal but with semi-bituminous about 35 per cent could be eliminated.

At the session on Nov. 22, A. France, Compagnie Internationale de Rhéolaveurs, Liège, Belgium, said that in the stratification, or, as he termed it, the "alluvionnement," of materials of different specific gravity in a laundry the work was aided by the variation in the rapidity of the stream of water with depth. The surface water travels fast, that near the bottom runs only slowly. Consequently, a piece of heavy material finding itself unsupported by the rapid water falls into a layer of water less speedy. Thus the stratification is well defined (see Fig. 1).

IN EUROPE, said Mr. France, the washery builders had been disposed to guarantee that the ash in the washed coal would not be any greater than 2 per cent above the fixed ash, which ash content is taken as the ash in coal of 1.5 specific gravity, a wholly arbitrary figure. Mr. France said that coal should be washed with reference to market conditions and reasonable recovery rather than in accordance with any other standard.

Mr. France described the rewashing qualities of the Rhéolaveur and said that the middlings gave a bed of fine material that prevented the fine fragments of coal from settling in among the heavy material to be withdrawn by the boxes. He declared that with jigs the addition of middlings increased the bed so much as to reduce the "setzage," or settling, and with air tables made necessary the use of a greater quantity of air and in this way prevented settlement of the fine particles of coal.

Mr. France said a new development

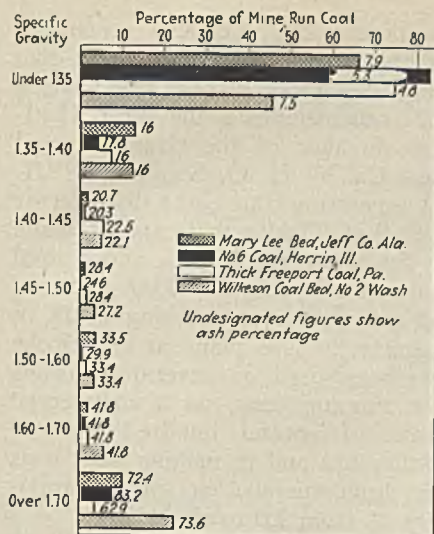


Fig. 2—Shows Weight of Coal per Cent Lying Between Specific Gravities Stated

of the process called for a wide launder in the region of stratification with a narrowing of the launder where the refuse material is to be removed. This narrowing deepens the stratification bed and so makes it possible to extract the refuse material more perfectly without disturbing the upper strata. Beyond the box the launder width is enlarged so as to permit of further stratification. Constriction can be introduced near the next box.

ANOTHER development is an automatic regulator which maintains an even bed in the launder. If the bed increases the arrangement of levers increases the opening in the Rheo box.

Mr. France declared that the dry-cleaning process was inefficient for particles below $\frac{1}{2}$ mm. and not very efficient between $\frac{1}{2}$ and 2 mm. If all the fine material between 0 and 2 mm. is eliminated the coal between 2 and 8 mm. after rewashing can be dried to 8 or 10 per cent with the simplest of screens. If this coal be allowed to drain for 24 hours the moisture will drop to 5 per cent.

Mr. France contended that coal can be dried inexpensively after wet washing if the same process is used before washing as seems desirable before air cleaning. In any event the purchaser does not like dry and dusty coal, said Mr. France, and it is necessary that certain coals have 4 or 5 per cent moisture if good coke is to be obtained. He also declared that the fine pyritic particles are blown into the dust hopper in dry cleaning and are later mixed with the clean coal, putting the dry process at a disadvantage as compared with the wet.

An address on "The Interpretation of Float and Sink Data," by Byron M. Bird, supervising engineer, Southern Experiment Station, Birmingham, Ala., followed. When operators are trying to estimate the probable work of a washer which they plan to construct, said Mr. Bird, they are disposed to use as a basis for their judgment the results obtained at a similar washer, without, however, giving any regard to the inherent ease with which some coals are washed and the intrinsic difficulty of washing other coals. A coal which has a large percentage of material having a specific gravity between 1.40 and 1.70, that is, which contains much bone, always is more difficult to wash to a given per cent of ash than one which consists mainly of clean coal on the one hand and rock on the other. The problem therefore of applying results on one coal to the washing of another is to find the specific gravities or ash contents at which the coals are equally difficult to wash.

"A determination," said Mr. Bird, "of whether two washing problems are equally difficult depends first on some comparison of their float-and-sink data and second on some fair evaluation of other factors such as variations in screen analysis, in the proportion of flat-shaped particles and in other particulars."

Mr. Bird showed a diagram, Fig. 2, constructed according to the method of H. F. Yancy to exhibit how the difficulty in cleaning different coals varied because of the various percentages of materials of different specific gravity as revealed by the float-and-sink-test.

HE EMPHASIZED the importance of specific gravity even in non-gravity washers, saying that "any process that removes ash-forming im-

Fig. 3—Shows Percentages of Coal in Various Ranges Around a Specific Gravity of 1.50

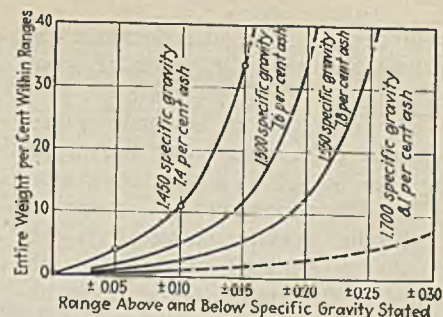
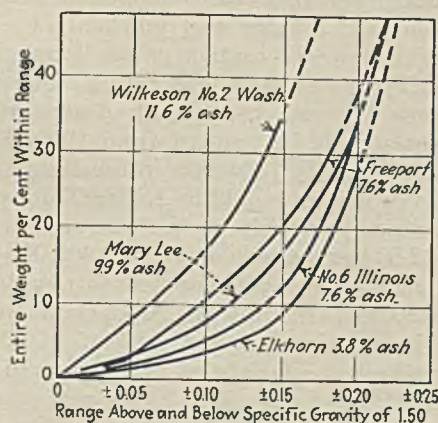


Fig. 4—Shows Percentage of Coal in Various Ranges Around Various Specific Gravities for No. 6 Illinois Coal

purities from the coal depends upon some physical or chemical property that varies according to the ash content of the coal. As the specific gravity of coal varies almost directly with ash content, these other physical properties must also vary with specific gravity."

Seeing the importance of the percentages of material near the specific gravity chosen for separation Mr. Bird presented a chart showing the weight per cent of the coals in Fig. 2 within ranges of 0.05, 0.10, 0.15 and 0.20 on either side of a specific gravity of 1.50 (Fig. 3). These may most easily be plotted by preparing curves of specific gravity against entire weight per cent from the data in Fig. 2, the percentages are corrected in the ranges 0.05, 0.10, etc., as explained later. The difficulty of separation is proportional to the steepness of the curve.

He also showed curves both for Wilkeson and Illinois coals in which the specific gravity ranges were plotted as against percentage weights as in Fig. 3 but for varying specific gravities, namely, 1.45, 1.50, 1.55 and 1.70. According to Fig. 4, the lower the specific gravity, the greater the percentage weight included in the range, showing that washing became progressively more difficult as the specific gravity chosen was reduced. The curves, says Mr. Bird, indicate clearly the fallacy of assuming that because a process is efficient in a separation at 1.70 specific gravity it is necessarily efficient at 1.45 specific gravity.

ACORRECTION should be made for the quantity of material that is relatively pure rock. "If that is not done an anomalous situation would exist where the addition of 10 per cent of roof rock, though greatly raising the ash content of the raw coal and lowering the percentages of recoverable washed coal apparently would make a given coal easier to

wash because it would decrease the percentages near the point of separation."

The correction to be made is difficult to determine. Let the dividing line be set at a specific gravity of 2. The percentage of material of a specific gravity above 2 is not usually determined but can be obtained with some degree of probability from the extrapolations of the curves. Suppose one coal shows 10 per cent of such material and another 20 per cent, the percentage weights should be calculated with that part eliminated so that the figures would be increased by multiplication by the factor $100 \div 90$ in the one case and $100 \div 80$ in the other.

As a short method of finding the specific gravities at which curves such as shown in Fig. 3, show problems of equal difficulty, Mr. Bird plots the curves shown in Fig. 5. These show the adjusted percentage weights of material between any given limits, say 0.15 for all specific gravities. From these curves he determines what specific gravities of each of these coals will give a certain chosen



Fig. 5—Shows Percentage of Coal Within a Range 0.15 Above and 0.15 Below the Specific Gravities Stated on Line of Ordinates

percentage weight, say 15, within the specific gravity range. Thus, referring to Fig. 5 and finding where 15 per cent of the coals is within a range of 0.15 specific gravity, the Mary Lee coal is as difficult to wash at 1.513 specific gravity as the Wilkeson coal at 1.645. He also uses similar curves for intervals of 0.10 specific gravity. He has found that for practical purposes this interval gives curves nearly enough superposed for practical purposes; Fig. 6 shows this very well. However, where small percentages are involved in the use of an interval of 0.10 specific gravity, as is the case for separations at high specific gravities, the interval of 0.15 specific gravity is somewhat more accurate because it involves a larger percentage of the total coal.

After specific gravities have been found for two coals at which they are equally difficult to wash, the efficiency of washing on the one may be applied to the other. (Percent efficiency is 100 times the ratio of the yield by washing to the yield by float-and-sink at the same ash content.) If the coals differ markedly in the proportions of shales that slime badly, or in other important particulars affecting the efficiency of the washing process under consideration, the recoveries predicted by considering the specific-gravity problem alone should be corrected accordingly.

James B. Morrow, research engineer, Pittsburgh Coal Co., Pittsburgh, Pa., in an address emphasized the importance of the auxiliary equipment in the cost of coal-cleaning plants. The cost of the main unit was a matter of secondary importance and did not give any idea of the final expenditure needed. The adjuncts might be expensive or inexpensive according to the needs of the plant. There was no general expression for the cost per ton of coal cleaned that would apply even approximately to all conditions. In the discussion that followed T. M. Chance said that the remodeling of the Mount Union tiple for Chance cleaners so as to wash 400 tons per hour and ship 600 tons cost \$106,000. Charles Enzian declared that a dry washer of 400-ton per hour capacity cost \$1,013 per ton-hour.

THE paper by F. R. Wadleigh, consulting fuels engineer, Consolidated Gas Co. of New York, which followed was read by Prof. Alexander, Carnegie Institute of Technology. It stated that the gas companies desired cleaner fuel and were willing to pay more for a cleaner product than they would for one not so pure. He quoted F. S. Sinnott, however, as stating that cleaning coal may reduce the fusing temperature of the ash in coal. Where a coal contained 10 per cent ash a large coal gondola filled with it would contain on an average 5.27 tons of worthless refuse. Suppose the ash content of American coals could be reduced from 10 to 8 per cent, the reduction in the freight to be carried would be 8,162,000 tons annually, which at an average of \$2.50 per ton would save \$20,405,000. Dr. Lessing had assumed that with 250,000,000 tons of production in Great Britain an average haul of 43 miles and a freight of 3s. 8d. per ton, the cost of ash where 10 per cent was present was £4,500,000.

Thomas M. Chance, consulting mining engineer, Philadelphia, Pa., said in his paper that the first Chance cone was installed at the West Nanticoke breaker of the Grand Tunnel Coal Co. by H. O. Staples in 1921. Its separating cone had a diameter of 7 ft. 9 in. Today there are 28 plants in the anthracite region, and a total estimated capacity of 12,000,000 tons annually, three cones being 15 ft. in diameter. The plant at Nanticoke has been used on several occasions for running tests, on a commercial scale, of several hundred tons of anthracites and in making such tests has been operated at specific gravities of from 1.6 to about 1.78.

HIGHER gravities have been obtained by mixing with the silica sand, commonly used, a small percentage of trap-rock sand or of magnetic iron-ore tailings having specific gravities of from 3 up to 3.3 as compared with about 2.65, which is the average specific gravity of the silica sand or quartz sand ordinarily used.

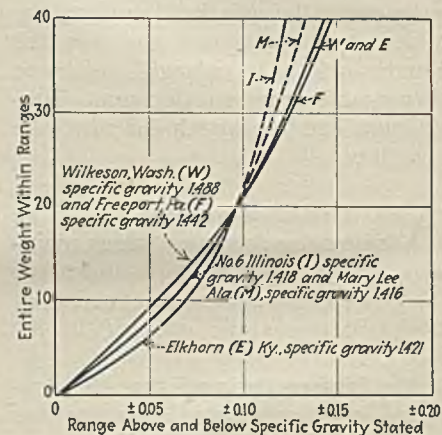


Fig. 6—Shows Gravities at Which the Coals Specified Exhibit, on Washing, Approximately Equal Difficulty

In discussion Mr. Chance said that the bituminous coal from Mount Union arrived at tidewater just about as free of water as if shipped dry. Coal with 7 per cent of water will freeze hard; with $5\frac{1}{2}$ per cent it will not freeze. Never has a car of coal from Mount Union been condemned for freezing though the washer runs all winter.

Godfrey S. Tait, consulting engineer, Washington, described the action of some of the types of washers now on the market. In the discussion James Drinkwater, Link Belt Co., Chicago, Ill., said that there were 160 Simon Carves washers in England and that since 1920 these washers had formed 85 per cent of the entire new construction.

Governing Factors for Economy in TIMBER TREATMENT

By *A. D. A. Crawford*

*Lee, Higginson & Co.
Formerly Special Engineer, Hudson Coal Co.*

WHEN granted that no coal or mining company can afford to treat its own timber if there are available commercial plants to which it can turn (see *Coal Age*, November, 1928, pp. 667), there arises the question of what plant to utilize. Consideration of this question will show that the freight rates to be paid will be the determining factor though the business reputation of the firm, the quality of the work produced and its experience in framing and treating mine timber must all be taken into account. Generally, however, the final decision is governed by the freight rates in force.

In certain sections of the country, notably the Middle West, railroads, in order to obtain traffic or for other reasons, have granted to various preserving companies a freight rate known as a milling-in-transit rate, under the conditions that:

(1) The point of milling or processing must lie on a fairly direct line between the point of origin and that of final destination.

(2) The weight of material shipped from a milling or processing point to the ultimate consumer must be equal to the weight of the material going into the preserving plant. There is some slight charge for this stop-off privilege but usually it is small and the consumer therefore gets the benefit of practically a through rate from point of origin to the mine with the privilege of stopping off for treatment on the way.

(3) The process must be completed within a specified time, usually eighteen months or two years. In the East trunk lines are unfavorable to milling-in-transit rates and have been reluctant to grant them.

As an illustration of the effect of freight rates, consider the figures in Table I, involving treatment at two plants, one of which is in New Jersey and takes a higher freight rate.

Consideration of the total costs in Table I shows that while the economy of treating at the higher cost is still considerable and well worth while, the freight rate alone has reduced it by \$50,000 a year. In this tabulation the treating plants are considered as close to the mine in the one instance and not so strategically located in the other. One other condition may possibly arise: that of the treating plant being near the timber itself. If this

Table I—Cost and Annual Charges,
Treated and Untreated Timber

Costs	Un- treated	Treated, Low- Rate Plant	Treated, New Jersey Plant
Cost untreated f.o.b. point of origin.....	\$0.1275	\$0.1275	\$0.1275
Peeling.....		.0200	.0200
Freight to treating plant.....		.1575	.1710
Freight direct to collieries.....	.1575		
Freight treating plant to collieries.....		.0450	.1140
Sawing.....	.0250	.0250	.0250
Framing.....		.0200	.0200
Unloading at mine.....	.0250	.0250	.0250
Treatment.....		.1025	.1025
Chemicals.....		.0600	.0600
Labor renewal.....	.3000	.3000	.3000
Total.....	\$0.6350	\$0.8825	\$0.9650

Annual Charges	Un- treated	Treated, Low- Rate Plant	Treated, New Jersey Plant
Life			
3 years.....	\$0.2375	\$0.3300	\$0.3610
4 years.....	.1835	.2550	.2790
5 years.....	.1505	.2090	.2285
6 years.....	.1290	.1790	.1960
7 years.....		.1580	.1729
8 years.....		.1421	.1554

Annual charge allowing for 20 per cent destroyed by crush and life of eight years for remainder:

Low-rate plant:
20% × \$0.3300 + 80% × \$0.1421 = \$0.1797

New Jersey plant:
20% × \$0.3612 + 80% × \$0.1554 = \$0.1965

Total Costs, Based on Annual Consumption of 1,000,000 cu. ft. of Timber per Year.

Life of untreated timber—three years

Life of treated timber—eight years

Treated timber destroyed by crush—20 per cent

Yrs.	—Treated—		—Saving per Year—	
	Un- treated	New Jersey Plant	Low- Rate Plant	New Jersey Plant
1	\$237,500	\$179,700	\$196,500	\$57,800
2	475,000	359,400	393,000	115,600
3	712,500	539,100	589,500	173,400
4	712,500	539,100	589,500	173,400
5	712,500	539,100	589,500	173,400
6	712,500	539,100	589,500	173,400
7	712,500	539,100	589,500	173,400
8	712,500	539,100	589,500	173,400

is so, savings of course will result in accordance with the above calculations, though the freight charges must still be considered.

One item which might well be included is the cost of seasoning timber after treating. This secondary seasoning is advantageous in that it saves freight and also provides uniform drying under the supervision of experts in piling, etc. A charge of 1½c. per cubic foot is the average and is perfectly just in view of the fact that seasoning requires two handlings from the treating car to the railroad car instead of one. In addition, it ties up a certain amount of ground space and involves carrying the timber longer, with consequent increase in interest charges.

If the treating plant is at an appreciable distance from the mine the saving in freight will more than offset the cost of secondary seasoning. Green pine ordinarily weighs approximately 60 lb. per cubic foot; during the initial seasoning before treatment it will lose about 25 lb. The treatment will just about restore the timber to its original weight, and during the secondary seasoning approximately 80 per cent of the added weight, or 20 lb., will be lost. If the freight rate from treating plant to mine is 20c. per 100 lb., this will mean a saving of 4c. per cubic foot, due to secondary seasoning. If, however, the rate from treating plant to mine is small and the freight rate low, the saving will not cover the extra charge and it will not be economical to season the timber after treatment.

In this connection it may be considered that seasoning at the point of origin of all types of timber, whether it is to be subsequently treated or not, would result in an appreciable economy. While this is true, the average timber producer has neither the facilities, the money to tie up nor the inclination to do it, particularly if the

terms of payment are by weight. It is extremely doubtful if it would be worth while for mining companies to set up a separate seasoning yard for loading and reloading timber in order to save freight where the timber is not to be treated. The treating companies involved, however, already have the seasoning facilities and ground and it is therefore economical to season the timber before shipping it to the point of consumption.

THE preservative treatment of mine ties is somewhat different from that of timber for two reasons: (1) Ties have a longer life untreated than timber does; (2) the crush or squeeze factor is absent. Whether untreated ties last longer than timbers because of the fact that they frequently are made from superior species of wood such as oak, or whether it is because they are saturated by water, or because of the absence of crush, is immaterial; the fact is that they do.

The railroads have proved to their satisfaction that the treatment of ties is a paying proposition. It was formerly considered that mechanical wear was so great that the ties would break down prematurely and the preservative would not be given a chance to show its proper savings. However, experience has disproved this and many railroads expect an average tie life of 20 to 30 years. These same ties untreated would not average over 6 or 7 years at the most. Most of the experience of railroads has been with creosoted ties, but creosote is not desirable around the mines. How-

ever, there is very little doubt that mine ties treated with the proper preservative will give a service of from ten years upward.

In Table II the assumption is made that untreated ties will last five years and that treated ties will last ten. This assumption is conservative from both sides, for it is doubtful if untreated ties will actually last five years and it is probable that treated ties will last more than ten years. The ties are 5½ ft. long and 5 in. thick, with a 4 in. face.

After the fifth year the economies for treated ties amount to \$34,500 per year, based on treatment at a point near the mine. Costs and economies for treatment near the point of origin and at a point neither near the mine nor point of origin might be worked out as well.

It is apparent from an inspection of the annual charge table that treated ties must have a life of between eight and nine years to "break even." Solving the annual charge formula

$$\frac{Pr(1+r)^n}{(1+r)^n - 1}$$

for "n" the "breaking" point is found to occur at 8.42 years. In other words, if treated ties last 8.42 years the treatment will pay for itself; any life in excess of 8.42 years will result in an economy.

In addition to the economies to be derived from the use of treated mine timber and ties it is apparent that treated timber may be used to good advantage for shaft timbers, breaker and tippie timbers, etc. It is likely also that its use would pay in mine-car construction though the rough handling to which the cars are subjected must be considered. Side-sills and end-sills which do not come into direct contact with the coal or ore would undoubtedly show an economy in favor of treated material but door boards and floor boards which are subject to abrasion by the irregular-shaped pieces of coal or ore might not, especially if the penetration was poor.

IT SHOULD be borne in mind that treated material should not be cut, bored or framed after treatment, and that consequently the treating company would have to cut and bore the sills. Many companies have been framing railroad-bridge timbers for years so that this is not a great difficulty, but it must be considered in computing costs.

Wood preservation has developed

into a very large industry, with plants located throughout the country. There were over one hundred pressure plants in operation in 1927. The total amount of timber treated in 1927 was over 20 per cent more than that for 1926. This indicates a very heavy increase in the consumption of treated timber. The public utilities, state highway departments, oil companies, architects and engineers have become fully convinced that if the railroads can show such excellent results in timber preservation, other consumers of timber likewise can well afford to follow suit and treat any timber which is subject to decay.

It may be safely said that the operation of small wood-preserving plants by the individual mining companies is not the best policy. The present commercial wood-preserving plants are located so that competitive prices for treated material are easily obtainable, the plants are operated the year round by experienced men and the individual mining company need not increase its fixed charges to take advantage of timber preservation. Treatment by the individual mining companies may result in unsatisfactory results, mainly because of the lack of skilled supervision. In addition, it would be well to consider the benefits of specialization as any mining company that tries to manufacture everything that it uses is doing something that the modern businesses no longer consider wise.

IT IS therefore safe to assume that as a general policy it would be better for most mining companies to buy their timber treated than try to do their own treating. For instance, the American Telephone & Telegraph Co., which is the largest consumer of telephone poles in the world, does not operate its own treating plant though it is true that some railroads own and operate private plants. However, this practice is not increasing. Railroads have generally decided that transportation is their legitimate function and that in the long run they are better off when they permit private manufacturers to furnish the manufacturing facilities for the majority of the things required.

Any mining company that really desires to reduce its maintenance charges can well afford to study the possible savings to be obtained from the use of treated timber. The figures that have been given above are truly conservative and can be duplicated and probably greatly bettered by nearly any mining company.

Table II—Cost and Annual Charges, Treated and Untreated Ties

Costs	Treated	Untreated
Cost per tie.....	\$0.1650	\$0.1650
Freight to collieries direct.....		1000
Freight to plant.....	1000	
Freight plant to mine.....	0400	
Peeling.....	0120	
Treatment.....	1230	
Chemicals.....	0720	
Labor renewal.....	5200	5200
Unloading at mine.....	0200	
Tie plates.....	1500	
Total.....	\$1.2020	\$0.7850

Life	Untreated	Treated
5 years.....	\$0.186	\$0.285
6 years.....		.244
7 years.....		.215
8 years.....		.193
9 years.....		.176
10 years.....		.163

Total Costs and Economies, based on a consumption of 300,000 ties per year
Life untreated—five years
Life treated—ten years

Years	Untreated	Treated	Saving per Year
1	\$55,800	\$48,900	\$6,900
2	111,600	97,800	13,800
3	167,400	146,700	20,700
4	223,200	195,600	27,600
5	279,000	244,500	34,500
6	279,000	244,500	34,500
7	279,000	244,500	34,500
8	279,000	244,500	34,500
9	279,000	244,500	34,500

Sustained Co-operation Points Way to Net Profits*

THE WAY to net profits in the bituminous coal industry is the broad highway of co-operation leading to a grouping of sectional operations on an economic basis. The industry is now traveling on a turn-pike which is not more than an old-fashioned country road, pervaded with the ruts of tradition and many rough boulders. This ancient highway must be ploughed and its boulders dynamited. It must be properly graded, ditched, rock-ballasted and surfaced before the going will be smooth and comfortable.

The National Coal Association has accomplished much in industrial, commercial and chemical research. It has even approached the somewhat delicate subject of placing the essential facts in relation to the industry before the public, realizing that an enlightened public opinion is the most effective agency it can employ to rescue it from a senseless and futile price competition. I am convinced, however, that it has not gone far enough, for the people do not realize that in purchasing coal at current prices they are starving to death an essential industry, pauperizing labor and destroying the purchasing capacity of at least \$3,000,000,000 invested capital as well as of over a million men and women.

The bituminous industry is one of the great basic industries of the world. All the existing operators may go bankrupt as the result of the continued uneconomic conditions, but men will continue to mine and market coal, for coal is a necessity of human existence. Moreover, it is not a characteristic of mankind to do business forever simply for exercise and, therefore, it can be predicted with confidence that coal will be mined and marketed in future years at a fair profit. The law of economics will gain control and the industry will progress as any sane industry should.

By Fred W. Shibley

*Vice-President, Bankers Trust Co.
New York City*

This law as applied to the coal industry demands that it shall be so conducted as to result in a profit to capital, fair compensation to labor and efficient and economical satisfaction of consumer requirements. It is necessary, therefore, to establish

"There is no industry in this country in a more deplorable condition at the present time than the coal industry, but men who study their markets and their production procedure, relate their products to their economic markets and reduce their costs through scientific production practices are hard men to defeat, and the coal operators who are so studying and striving will not be defeated."—*From "The New Way to Net Profits," by Fred W. Shibley.*

standards representative of these three primary requirements.

The business man who forecasts his income from sales, plans his production and sets up a budget to control his operations as planned, finds himself in possession of a standard sales dollar to serve as a yardstick for measuring his current operations and comparing them with the standard forecast. We realize that the coal industry is not conducted on economic principles for the sufficient reason that the profit factor has been squeezed out of the standard dollar by expanding costs which have grown so great in comparison with the dollar of income that they have burst the economic circle.

OF the dollar received for bituminous coal by the operators, approximately 68 per cent goes to the miners, 12 per cent goes for supplies, 11 per cent goes for other operating expenses and 9 per cent goes for general expenses, such as salaries, legal expense and selling expense—100 per cent in all. This is a break-even sales dollar, not one mill of profit in it. It looks to me in the light of my knowledge of the industry like a very modest sales dollar indeed. That 9 per cent to cover salaries, etc., appears to be suffering from a forced contraction in order not to burst the circle.

However, such as it is, it stands as an economic tragedy, a sales dollar floating between hell and heaven, liable at any moment to blow up.

This unprofitable sales dollar cannot be transformed into a sound economic sales dollar until the operator is schooled to appreciate the fact that the welfare of the entire industry means his welfare and that the industry as a whole must be placed on a profitable basis before he can profit permanently. Furthermore, the consumers, in particular the railroads, public-service corporations and manufacturers, must be so educated that they will realize that they are enemies of their own enterprises when they stifle the purchasing capacity of all those connected with the coal industry.

In order to educate both producers and users in the economics of the industry and its inter-relation with other industries, it is necessary to come to a knowledge of what should be good standard practice in the coal industry and set up standards for all men to look at and contemplate—standards so fair as to receive approval by operators, miners, consumers and government.

If one corporation efficiently man-

*Abstract of an address entitled "Net Profits Through Co-operation in the Coal Industry," delivered before the eleventh annual meeting of the National Coal Association, at Cleveland, Ohio, Nov. 15, 1928.

aged and financed, owned all the mines and produced all the coal necessary, it is entirely probable that the corporate policy of this great corporation would provide for the following essentials:

(1) It would know the consumer capacity of each market by sizes and qualities of each kind of bituminous coal in both the United States and Canada;

(2) It would know the competitive conditions in each market as between coal and the other sources of heat and power and it would know further on what basis coal had to be sold in each market, not only to meet these trade conditions but to broaden the market for coal;

(3) It would adapt its several qualities of coal to the markets most suited to each class of product;

(4) It would standardize sales prices and advertise broadly and continuously the details of each such price and, in the event prices were changed, the specific reasons for such changes;

(5) It would standardize its methods of distribution as far as possible, the fundamental principle of its distributing policy being to keep coal flowing on as even a level as possible throughout the year as between the mine and the consumer;

(6) It would utilize industrial, commercial and chemical research to the utmost in order to cheapen and add safety to the methods of production;

(7) It would employ scientific research constantly to discover and develop markets for the byproducts of coal.

Under operation of all the mines by such a corporation there would be tremendous economies effected through the co-ordination of all the several departments of the great enterprise and there also would be: No overproduction, no sales to anyone at less than the cost of production, no shipments of unsold consigned coal, no duplication of sales effort, no unfair and unethical sales practices, no expensive invasion of unnatural sales territory, and consequently no uneconomical haulage charges.

UNDER such ideal conditions capital would receive a fair return, labor would be satisfied. Methods of production and distribution would be standardized and economies effected that would result ultimately in very cheap prices to consumers of coal. Instead of purchasing at prices



F. W. Shibley

© Bachrach

yielding a profit to no one, buyers would find that in paying an equitable price they were stimulating consumer capacity for their own service and products, that the business of the nation was being strengthened and the national prosperity increased.

And right here it should be stated that the predictions of a broadening national prosperity recently made by Charles M. Schwab and Henry Ford can never materialize as long as certain classes of capital and labor are pauperized through a persistence of uneconomic conditions. The coal industry is one of the greatest national industries. The agricultural industry is the greatest of all industries. There can be no extended national prosperity until the farmer and the producer of coal each receives his fair share of the national dollar of income.

In this illustration of an ideal corporation lies the economic standards necessary for the rehabilitation of the coal industry.

The co-operation I am advocating is simply a determined effort on the part of the operators to attain as near as possible to the economic and ethical standards set by such a corporation as I have described. I want the operators to co-operate along educational lines. I do not want them to conspire. I want every move which they make to be known in Washington and have the approval of the federal authorities.

I want them to spend some of the few dollars they have left in a nationwide campaign, advertising to the American people economic conditions in the industry. I want them to sell their industry to the American people, something which has never been well done.

THE time has come to show up the operator who, in ignorance of his costs, sells his product constantly below the cost of production. The time has come to educate consumers to pay a fair price for the product in their own interests. A great deal of education will be necessary along this line. The railroads have seen the truth for several years. They would pay more for coal willingly, as some are now doing, if they only dared to do so. They know their individual prosperity rests in part on the prosperity of the coal industry. They know that blood cannot be drawn from a stone.

But many large industries refuse to recognize the economics of the situation. They continue to play the necessities of one operator against the pitiable condition of another, beating down the price to a ruinous level. These people in many instances are manufacturers of equipment used by the operators, or of merchandise consumed by the miners. They are killing the goose that lays the golden egg, but they do not know it, or cynically disregard the fact.

It is necessary particularly that you should so influence public opinion through an educational campaign that it shall think sympathetically and favorably of your industry for the reason that public opinion exercises the greatest influence upon the national government. I know something of your past experience with Washington, but this is another day and we are facing a new future.

There is a big thought formulating in the air, a thought which has taken possession of the imaginations of thinking men. This thought is taking form about the idea represented by the word of co-operation, co-operation as between business and the government, co-operation as between the various industries of the nation to spread economic knowledge to the end that the business of the nation shall be conducted with the minimum of waste and the maximum of efficiency. There is nothing communistic or socialistic in this great thought. It emphasizes individual control of industry under the Golden Rule which for too many centuries has received but a limited application in the business relations of human beings.

CO-OPERATION as here advocated between operators, miners, consumers and government cannot be effected prior to an exhaustive educational campaign. It is my recommendation that you consider the sug-

gestion thoughtfully and at length. Reason it out yourselves and ask these pertinent questions of yourselves:

Do coal operators know their true costs?

Do operators realize that they are drifting toward a great cataract known as bankruptcy?

Do consumers realize what might happen to them if a large number of operators were obliged to discontinue operations for want of working capital?

Do railroads appreciate their obligation to the coal industry?

Do public-service corporations properly evaluate the service of coal producers and their indirect contribution to their success?

Do manufacturers realize the importance of restoring from \$300,000,000 to \$500,000,000 represented by increased earnings and increased wages in the coal industry to consumer purchasing capacity?

Do the great majority of the people know that by paying 50c. a ton more for the coal they use they would receive indirect dividends greatly in excess of this modest increase in price?

Finally does labor know the truth about the coal situation? Do the miners realize that the people who are keeping them in a hand-to-mouth condition of existence are the operators who sell below cost and the consumers who purchase at less than cost? Do they know that they can never prosper as long as these two people trade on so uneconomic a basis?

BITUMINOUS operators must pull their own chestnuts out of the fire. They must turn to in a hearty spirit of co-operation and find the solution of their own problem. Only through such united and unselfish action can come a solution of the bituminous coal problem.

Research is the oldest, the newest and altogether the best machinery for this purpose. I recommend that you organize a National Bituminous Coal Research Committee within this body, as an extension of your research department, similar to the Copper and Brass Research Association, which has proved so effective in recent years, and that through your membership you recommend to each district organization that they organize special research work to discover the facts on which to build a genuine co-operative movement to correct the evils of the industry.

Then when the facts are in hand, my advice is that you prepare a plan based on standards, standards such as have been outlined governing the treatment of invested capital, of labor, of selling practices and of service to consumers and submit this plan for approval to the federal authorities. It is conceivable that the people in Washington could be brought to see the honesty, the fairness and the economics of the plan, especially with such an advocate of co-operation and co-ordinated industrial effort as Mr. Hoover in the White House.

With such consent the plan can then be sold through a campaign of publicity to consumers on the one hand and ignorant uneconomic producers on the other hand. The bituminous coal industry has been oversensitive as to the facts in its case. The public should be taken into its confidence, for the public thus treated generally develops into a friend.

Much can be accomplished toward a betterment of conditions through the merger of properties lending themselves to economic groupings. But the desire for co-operation and

decide to continue dying financially by that lingering, but apparently fascinating, disease called "selling at less than cost."

I believe we are entering upon a period in which great producing and distributing corporations will exercise a dominating influence in business. The consuming public is intelligent and discriminating. It favors stabilization in prices and is not inclined to view with favor an industry in which prices fluctuate violently and one which punishes them whenever the opportunity offers. The great corporation is a price stabilizer. As a rule it is efficiently managed because it can afford the best ability to be obtained.

The coal industry lends itself to consolidation. Mine operations can be readily controlled by a central organization and there can be no argument, of course, as to the possible economies in distribution. But how consolidate under present conditions? When the blind lead the blind both are likely to fall in the ditch.

The time for consolidation in the industry is when a basis is found for the control of operations on stabilized

The Shibley Road to Net Profits

(1) A comprehensive educational campaign to teach the operators and the public the economic facts of the bituminous coal industry;

(2) Sustained organized effort by the National Coal Association and its local members to reach a common understanding of a plan of procedure which will place the industry on a profitable operating basis and which will meet with the approval of the government, labor and the consumers;

(3) Concentration of producing and marketing effort through consolidations formed on economic lines and so financed as to insure most efficient operation.

the thorough understanding of its fundamental principles must be acquired before an economic consolidation can be undertaken. It is only through co-operation and subsequent consolidation that the menace of overproduction can be minimized.

GREAT corporations, efficiently managed, can produce and market coal so much cheaper than scattered individual operators that there is reason to believe that they can maintain the industry on an economic basis even if the individual operators

economic lines. *When that time comes the industry can count upon banking support which would appear to be essential.*

I do not believe a Moses is presently required to lead the coal industry out of the wilderness wherein it is now wandering. What is needed now is simply the determination of the leading men in the industry to get together and stay together until they work out an economic plan which they can sell to their fellow operators, to the miners, to consumers and the federal authorities.

International Conference Studies Complexities Of Coal

SO MANY fundamentals in the nature and chemical constitution of coal remain to be discovered that the classification committees are halting to obtain more complete data before venturing to complete their task. At the sessions of the Origin, Composition and Classification Section of the Second International Coal Conference Dr. Reinhardt Thiessen, U. S. Bureau of Mines, Washington, D. C., declared that contrary to previous conceptions the European durain was unlike any of the strata to be found in American coal—a decision so important as to throw much doubt on the present ability of scientists to make any final division of coals on the basis of origin.

Dr. George L. Stadnikoff, Karpov Institute of Chemistry, Moscow, Russia, declared that all bituminous coal could be divided into two classes: (1) Humic coals, which at low temperature produce a tar rich in phenols and from which organic solvents can extract a large quantity of bitumen; (2) boghead coals, which at low temperature give nearly 50 per cent of tar containing only about 2 per cent of phenols but from which organic solvents can extract only a small quantity of bitumen. Many coals are found, he said, with characteristics ranging between these two extremes. The bogheads have a higher percentage of hydrogen than other coals.

A. C. Fieldner, chief chemist, U. S. Bureau of Mines, Washington, D. C., described the progress that has been made in the classification of North American coals. R. H. Sweetser, assistant to the first vice-president, American Rolling Mill Co., Columbus, Ohio, said that the actual percentage of carbon was the basis for the classification of coal, just as the actual iron percentage was the basis for classification of iron ore. To try to classify on the pure-coal basis was as futile as to give siderite, a carbonate of iron, the place it would oc-

cupy in a classification if the carbon dioxide it contained were removed. The water, nitrogen, sulphur and inherent ash were as much a part of the coal as found as the carbon dioxide was a part of the siderite.

Dr. George H. Ashley, Pennsylvania State Geologist, Harrisburg, Pa., agreed that the moisture should be considered in a classification of the coals based on their nature. He would combine volatile matter and moisture in ascertaining the "coal ratio," which would then be written: Fixed carbon divided by the sum of volatile matter and water. Dr. Ashley gave a table of coal ratios:

Ratios for Coals of Different Types

Lignite	under 0.50
Low-rank sub-bituminous coal (Sheridan, Wyo.)	0.50-0.75
High-rank sub-bituminous coal or low-rank bituminous coal (Gallup, N. M., and Hanna, Wyo.) ..	0.75-1.00
Medium-rank higher-volatile bituminous coal (Northeastern Missouri, Iowa and northwestern Illinois)	1.00-1.25
High-rank high-volatile bituminous coal (Pittsburgh, Pa.)	1.25-1.75
Medium-volatile bituminous coal (Connellsville, Pa.)	1.75-2.50
Low-volatile coal	2.50-3.50
Higher-rank low-volatile coal (Merthyr or Coal Hill)	3.50-5.50
Semi-anthracite	5.50-8.00
Anthracite	8.00

Dr. Thiessen said that a blue green algae formation has been discovered in process of formation in Australia. It contained much oil and probably was the source of the Koorangite or kerosene shales and of bogheads. No natural coals are from a single source. Thus bogheads contain spores and cannel has algal and humic matter. Humic coal also has some cannel. Each of the three types of coal—boghead, cannel and humic coals—includes within it some material characteristics of the other. All the nitrogen and sulphur in coal probably is inherent.

That lignite might be improved by broiling it at a temperature between

250 and 300 deg. C. was suggested by Dr. Fran Podbreznik, of Belgrade, Kingdom of the Serbs, Croats and Slovenes. At 150 deg. C. the liberation of carbon dioxide begins, as was proved by the turbidifying of barium-hydroxide solution. The humic acids in dry distillation become humic anhydrides and humic lactones with emission of water. Carbon dioxide results from the breaking up of carboxyl groups.

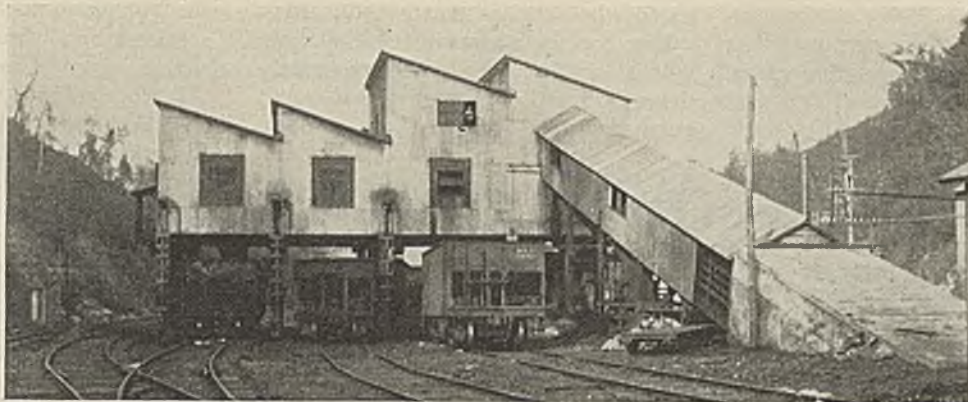
LIGNITES disintegrate too easily for industrial or domestic heating, said Dr. Podbreznik, and this defect may be overcome by heating the coals before shipment to a temperature of 250 to 300 deg. C. so as to eliminate progressively water, carbon dioxide, humic acids, a part of the total sulphur as hydrogen sulphide and a part of the coal tars, thus converting the free humic acids into lactone humic acids and probably into humic dilactones and oxetones.

Dr. Thiessen gave a history of the nomenclature of coal from the days of Potonié. He showed slides which exhibited structureless coal of the European durain type in both the anthraxylon and the attritus of North American coals and said that the durain was a special form of attritus.

Dr. S. A. Waksman protested against trying to derive coal from a single substance. Low-moor peat and high-moor peat are, he said, different and some fungi attack lignin rather than cellulose and vice versa. Dr. David White, U. S. Geological Survey, Washington, D. C., questioned whether heat of vertical pressure had influenced the maturing of the coal. He doubted whether there had been more than 2,000 ft. of cover at any one time over the Pittsburgh coal but would grant for argument that there might have been 6,000 ft.

The thermal gradient with depth was 1 deg. F. in 25 ft. in California, though normally but 1 deg. F. in 60 ft. Suppose that around Pittsburgh in the Post Paleozoic it was 1 deg. F. in 25 ft., then the temperature would be only 240 deg. F. above that at the surface and not enough to create an exothermic condition. The German folding was quite recent and the effect of the heat on a coal already aged might be different from that on a coal that was still young.

Dr. Thiessen said that in a Wisconsin peat bog or reed swamp he had found fusain or mineral charcoal 10 ft. below the surface where the timber had been cut down during the Civil War.



Achieve Quick Development with MACHINE LOADING

By P. H. Weise

Mining Engineer
South Fayette Coal Co.
Pittsburgh, Pa.

DEVELOPING a tract of 320 acres up to a full-time production of 1,500 tons per day in a period of a year and a half perhaps may not seem an impossible achievement although one requiring planning and effort. When it is added, however, that the mine is being operated on the full-retreat system and that the development has included the driving of approximately 34,200 lineal feet of entry, the unusual difficulty of the task becomes even more apparent. This problem the officials of the South Fayette Coal Co. solved at the Melrose mine without resorting to the robbing of pillars or to excess development around the slope bottom.

Preliminary operations at the mine, which is located near Brownsville, Pa., were started in 1926. The workings are in the Pittsburgh seam, which at this point has a total thickness of 7 ft. Directly over the seam is 1 ft. of drawslate and 6 in. of rider coal. This is overlaid by the main roof, which is coarse-grained sandstone, easily controlled and well adapted to pillaring operations.

Jeffrey Shortwaloaders were used to develop the mine, the first of two machines being started in September, 1926, and the second a short time later. In five months the mine output rose to 1,000 tons per day, and, as may be seen from the map (Fig. 2), no pillars were drawn in the vicinity of the slope bottom, and excessive room driving, with consequent loss of protection was avoided. In nine months the full production of 1,500 tons was obtained.

Entries and rooms both for hand

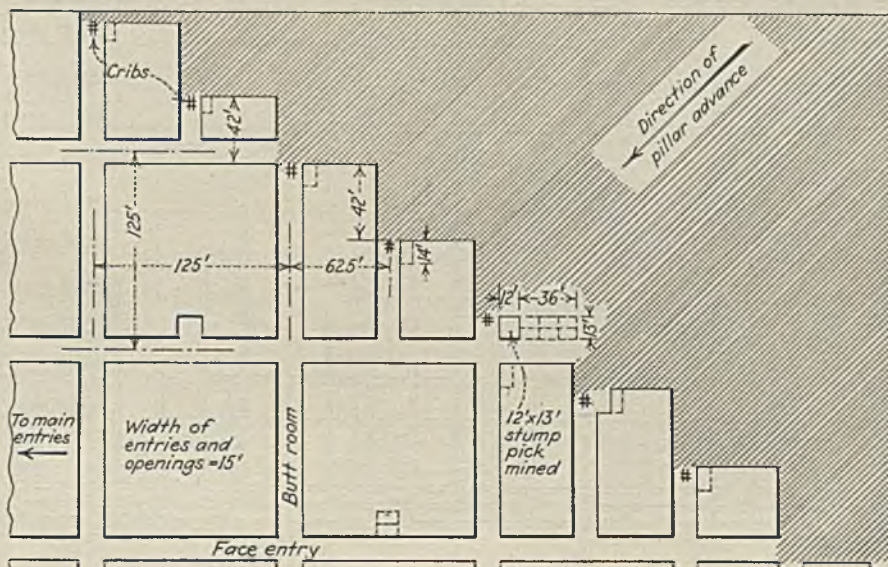
and mechanical loading are driven 15 ft. wide. During development the machines were confined solely to advancing entries and worked two shifts per day, the average rate of advance per machine per shift over the development period of one year and seven months being 18 ft. At present the urge for development is past and the

loaders are being used to drive rooms on the night shift.

The Shortwaloader combines the functions of a cutting and loading machine. It first undercuts the coal and then by means of auxiliary cutter chains pulls the broken coal back into a conveyor from which it travels over a loading boom into the car. In the Melrose mine during the entry-driving period 6 ft. of the total seam thickness of 7 ft. was extracted, 1 ft. being left to hold up the drawslate. When the drawslate was removed as fast as an entry was advanced the progress of the machine was found to be slowed materially. The slate therefore was taken down later.

In using the machine the face is undercut to a depth of 6 ft. and bored

Fig. 1—Pillar Removal by Splitting



for five shotholes. Three of these are drilled at the top of the cut, one along each rib and the other in the center. Two additional holes are drilled near each rib at points about 3 ft. above the bottom. These are loaded and shot first, so as to break the thin bony bands which occur at this horizon. Shattering the bands is necessary to allow the top shots to bring down the rest of the cut. The middle hole of the top row is then fired, followed by the two rib shots, after which loading proceeds until the cut is cleaned up.

So long as the two machines used worked in adjacent entries seven men were employed in their operation. Three of these were required on each machine for the necessary cutting, drilling, shooting and loading operations and one motorman was employed to change cars for both machines. The cars had a capacity of 2.2 tons and when loaded were placed in the nearest breakthrough to the machine.

April, 1928, saw the completion of the development work and the start of pillar removal at the back end of the property. The area in which removal is progressing is shown in Fig. 2, and the process of removal of individual blocks in Fig. 1. Large square pillars are believed to be best both from the standpoint of ease of handling and the quality of coal derived. In addition, the company policy provides that rooms be driven just fast enough to provide places on the pillar line. As a result, less timber is needed, also less equipment, less track and

less of the supplies that go with them suffice for the operation of the mine where rooms are not prematurely driven. Furthermore, the coal is not crushed by the weight of the rock.

WHEN a single pillar measuring 115x115 ft. is to be extracted, a roadway is driven through the middle, dividing it in two. As soon as this is completed a crib is set in the end next the gob and extraction starts (see Fig. 1). The half pillars—50 ft. x 115 ft.—are removed by taking lifts across the end as shown. Each lift is 14 ft. wide and as deep as the length of the cutter bar, which is 6 ft. The faces of the half pillars are carried on a line so that during the progress of extraction one is just 42 ft. behind the other. As the lifts are extended they are protected with 6-in. round timbers set on 4- to 6-ft. centers. Completing the lifts results in a clean fall to the end of the pillar.

A slightly different method of attack is necessary when the pillar approaches the roadway. When only 13 ft. remains between the gob and the road, a cut 6 ft. deep and 12 ft. wide is taken in the end opposite the crib (as in Fig. 1). A second cut then completes the two lifts necessary to go through the rib. As the pillar is only 13 ft. thick it is not necessary to lay curves to reach any of the coal. A second series of lifts is started upon completion of the first, and a third

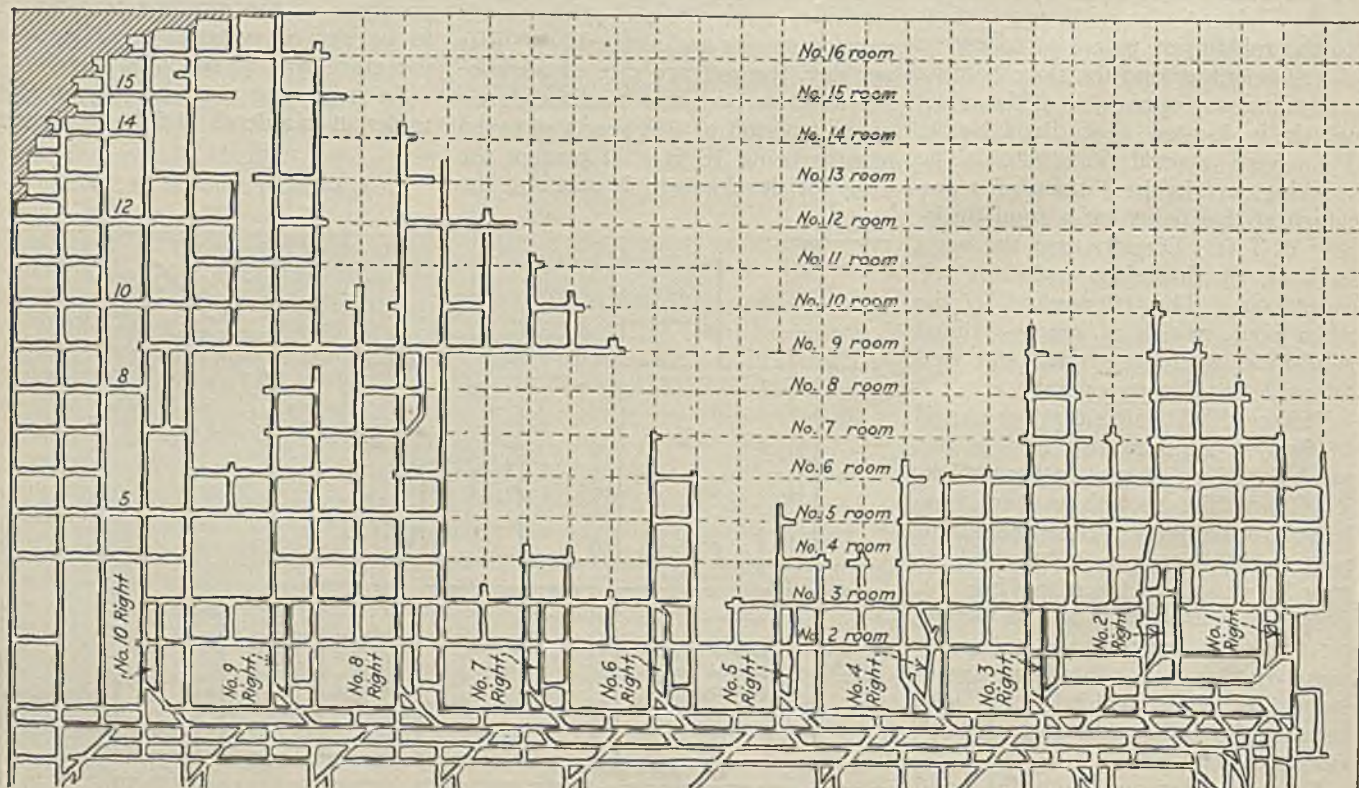
series completes the mining of all but a square stump about 12 ft. x 12 ft. which is removed by pick work.

All the pillars will be kept on line when the preliminary work is sufficiently advanced to permit it. This line is carried up the dip. This, though a seeming disadvantage, is offset by the fact that all water and bad conditions are left behind. The progress of robbing the individual pillars proceeds on schedule, the split (see Fig. 1) being started as soon as the preceding pillar has been two-thirds removed.

Hand loaders are employed to drive all rooms and other openings, the Shortwaloaders being used in development only. Animals are used to gather the trips of 15 to 25 cars which are hauled to the bottom by 6-ton locomotives. The cars are dumped by a Phillips crossover dump and the coal goes to the tippie on a 36-in. belt conveyor 568 ft. long set on a slope of 14 deg. 2 min. Shaker screens and loading booms prepare lump, egg, nut and slack for shipment.

In conclusion it is the opinion of the officials of the company that entry driving by mechanical means greatly speeds up development. In fact, the rapid driving of the headings quickly brought production to the figure desired and at a capital expenditure which could not be approached by hand loading. The use of loaders allowed all the openings to be driven without such an outlay as would have made room development imperative.

Fig. 2—Right Half, Melrose Mine



Teaching the Foreman To Interpret Economic Facts



By Hugo Diemer

*Director of Management Courses,
La Salle Extension University,
Chicago, Ill.*

RECENT events in connection with hearings before the Congressional Committee trying to find the trouble in the coal industry have made it evident:

(1) That neither investigated nor investigators were in possession of all the relevant facts.

(2) That the correct interpretation of facts required a background of knowledge and judgment which was not in the possession of many of the members of the various groups involved.

This matter of preparing men's minds to function properly in the interpretation of business and economic facts is one that is being appreciated more and more by progressive business managements. As a typical example of this recognition I may cite the action of officials of the Bridgeport Brass Co., who take their employees into their confidence to the extent that they present for open discussion monthly graphic charts illustrating the previous month's sales, as well as financial and production data. These charts are supplemented by wooden blocks of various colors and dimensions to make the data more striking. It took considerable preliminary education of factory representatives and foremen, however, to train their minds to appreciate the real significance of these charts, blocks and data.

Industry has gone through a good deal of experience and no small amount of trouble in attacking this problem of getting men to think straight on business and economic problems. The first approach was through propaganda in the form of lectures and inspired articles in house organs and employee papers, endeavor-

ing to show the advantages of the American economic system and the big-heartedness of the American employer. This sort of thing had its day and its run and did not get anywhere. It was found that the recipients of this type of propaganda recognized it as such.

PROGRESSIVE industries came to the conclusion that the best way to prepare not only the workers and foremen but also executives and officials for correct thinking was to realize first the fundamentals of industrial organization and management—those fundamentals which have resulted in reduced costs and higher wages.

John D. A. Morrow, president of the Pittsburgh Coal Co., in a recent address before the Illinois Manufacturers' Association, made this striking statement: "Many have taken it for granted that the accepted principles of scientific management, as practised in the manufacturing industries, are applied in coal mining. Unfortunately, that has not been the case."

We cannot expect to make extensive progress in the development of a right attitude toward and right judgment of economic and business facts until all parties to the situation, including particularly the higher officials of corporations, are willing to do the hard studying and thinking which constitutes the foundation for sound judgment. How to get them to do this is a difficult question.

I have been told that one progressive manufacturer went out to one of the universities and employed a professor well versed in industrial economics and placed him in his organization to do nothing but play golf with his board of directors and principal executives and meet them in committees. His idea was to make this a painless and unnoticed education in the fundamentals of modern management. It would seem, however, that such surreptitious methods ought not to be necessary in these days when a constantly increasing percentage of businesses are showing no profits.

IF IT is true that 0.3 per cent of our population own 95 per cent of our property and that 65 per cent of our corporations pay no income tax because of small earnings or actual deficit, why should not a mine foreman or a miner be informed of these facts? On the other hand, if it is true that, roughly speaking, our present wealth per capita in quantity of goods and our earnings per capita expressed in purchases have approximately doubled in the last quarter century, why should not a mine foreman or a miner be informed of these facts also?

If the facts are justifiable as rep-

resenting economic conditions entirely wholesome and consistent with the purposes of the Constitution of the United States, then the reasons for their justification and economic wholesomeness or advantageousness should be clearly set forth. The manner of their presentation should leave no doubt that they are genuine facts and accompanied by sound arguments, free from any taint of propaganda.

If national economic and social statistics are a matter for public concern and consideration, and if their publication results in a truer understanding of causes and effects and leads to constructive thinking, legislation and administration, is it not equally true that the best interests of a given industry or business are served by a policy of freedom of dissemination of business information? Most foremen and even workmen today are intelligent enough to understand and interpret facts. The continuous presentation of facts with a discussion of causes and effects will result in that type of thinking which will recognize misstatements and propaganda.

IT IS singular that the development of right thinking as a basis for any sort of study helps develop a real understanding and correct interpretation of facts. My experience in directing the correspondence training of thousands of foremen has brought me an abundance of letters indicating the change in attitude and viewpoint that results from the development of right thinking.

The subject matter on which this thinking has been done, however, contains absolutely nothing in the way of preachment on economic or social questions but deals wholly with fundamental principles of industrial organization and administration and their application. Is not a mental condition such as was indicated by these letters far more satisfactory than the old conception of "boss and bossed"—a conception advocating a majority of "yes" men and, under a fine disguise, the continuance of the "master and slave" fear idea?

It is superior knowledge of job methods and processes which has been the determining factor in times past in causing a man to be selected from the ranks for the position of foreman; that knowledge is still an important asset in the equipment of the better qualified foreman.

However, possession of this superior knowledge of job methods and

processes does not suffice if the foreman is to function successfully in his new capacity. Two new qualities are needed—leadership and the personality that helps to make leadership effective. These are necessary, for when a man is promoted from the ranks to the position of foreman he assumes leadership and responsibility.

In all cases where a foreman has been promoted it is assumed that he has had sufficient personal qualities to justify his selection for the new capacity. In many cases allowance is made for the development of such qualities as are lacking at the time of his promotion. It is expected that this development will take place in the process of caring for the larger responsibilities he has assumed. However, they should come as a result of the new knowledge with which he is expected to equip himself to justify his promotion and to prepare himself for further advancement, as the ambitious man would desire to do.

EFFECTIVE development of the desired qualities will depend upon the character of the new knowledge he acquires. I have been in close touch with foremanship training for the last ten years, both as a personnel director of a company utilizing foremanship training programs and later as author, editor and director of training courses for foremen. It is my experience that the most effective training programs for foremen are those in which they develop sound business and economic judgment, not through the memorizing of text book material on such subjects as economics or sociology but through a study of their own work.

This study includes such matters as the foreman's duties and responsibilities; understanding, selecting, handling and developing men; planning and controlling production and operating methods; fundamentals of cost keeping; improving working conditions; getting best results out of equipment; the value of analyses, surveys, investigations and researches, such as job analysis, time study and methods engineering, and fundamentals of personnel work, including programs for training, safety, recreation and employee representation.

By the time a man has worked his way up to the position of foreman he usually has a very good understanding of the operations of his department. Hence it is not further

operative technique which the foreman needs to develop in order to make himself a more valuable man to his company and to himself. The further development which a man reaching a foreman's position needs is of two kinds: the first deals with the direct qualities, abilities and methods essential to the job, thus supplementing what he has gained from experience; the other deals with matters over which he is not a directing force but in which he is a participating agent or contact point.

IT IS in this latter capacity that development gives him the ability to deal understandingly with higher executives who handle such matters as production control, industrial engineering, personnel management and the technical phases of the industries. Training such as this must not be confused with process courses or courses in company history, products and systems. Such courses do not teach the basic fundamentals of good foremanship.

Such courses may logically follow as a second- or third-year program after a first year spent in a thorough course on foremanship fundamentals. These fundamentals are universally applicable, no matter what the product is to be. I have testimony to this effect from foremen in pineapple plantations in Hawaii, lumbering operations in Manchuria, fisheries in Alaska, sugar plantations in Cuba, American industries of all kinds from automobile to fruit canning and from paper boxes to steel mills.

THE training which I have outlined has been applied to the individual foreman by the correspondence method. The basis of his training has been his check-up on his own job and duties and his analysis and survey of the men and conditions in his own department. In many instances this individual instruction has been supplemented by group conferences and discussions. In such cases it is essential that a company employee rather than an outside lecturer shall be the conference and discussion leader.

Foremanship training along these lines has been carried on by the writer during the past seven years with over six thousand foremen, and has brought about a constantly widening knowledge and appreciation of management science and philosophy on the part of men in a position to apply it in the most practical way.

SOFT COAL INDUSTRY

Studies

FAIR-PRACTICE CODES

ADoption of a fair-practices code as one important step in the stabilization of the bituminous coal industry was submitted for consideration of members of the National Coal Association at the eleventh annual meeting of that organization, at the Hotel Cleveland, Cleveland, Ohio, Nov. 14-16.

After hearing the movement explained by Executive Secretary Harry L. Gandy and by operators who conferred several weeks ago with representatives of the Federal Trade Commission and the Department of Justice, the meeting unanimously adopted a resolution calling upon the officers and directors of the organization to "continue the investigation of this matter of trade practices and take such action as they may deem necessary in connection therewith."

The trade-practice-code movement in this country started several years ago, but it is only within the past two years that the development of such codes in co-operation with the federal authorities has assumed national proportions. Since the organization of the Division of Trade Practices of the Federal Trade Commission in April, 1926, Mr. Gandy pointed out, the Commission has adopted the plan of classifying provisions of codes submitted under one of three heads:

(1) Provisions approved by the Commission;

(2) Provisions received by the Commission as expressions of the trade; and,

(3) Provisions disapproved as contrary to law.

The specific provisions of the codes studied by representatives of the National Coal Association which seem to have some bearing upon the problems of bituminous coal may be grouped under five heads, viz.:

(1) *Provisions involving unfair or dishonest treatment of customers.*—

In a number of cases the code makers have found it necessary to bind them-



© Harris & Ewing
Harry L. Gandy

selves not to carry on dishonest or fraudulent practices, including misrepresentation and the use of inferior materials. Condemnations of these practices naturally have been approved by the Commission.

(2) *Provisions relating to discrimination among customers.*—Condemnation of price discrimination is characteristic of the codes examined. Included in the discriminations named are open differences in quotations, open or secret allowances, rebates covered by failure to collect full transportation costs on sales f.o.b. point of origin, bulk prices on mixed lots. Several codes contain general provisions condemning the practice of making price discriminations among customers not based on differences in grade, quality, cost of sales, handling or transportation. The last general provision, as well as several of the specific provisions enumerated, have been approved by the Commission.

(3) *Provisions condemning attempts to obtain business by improper dealings with employees of competitors or employees of customers.*—Commercial bribery in its various manifestations is generally condemned in the codes studied. Some provisions also specifically disapprove of the practice of giving money or

other things of value to purchasing agents or others in a position to influence the placing of orders. These expressions of condemnation have been approved by the Commission.

(4) *Provisions relating to channels of distribution.*—The Commission has expressed approval of the general statement that it is unfair for members of an industry to attempt to distribute their products otherwise than through established channels, but has not passed upon provisions embodied in five codes condemning the quoting of prices to a consumer in any territory below the retail prices quoted by the wholesaler in the same territory.

(5) *Provisions relating to price maintenance.*—Provisions relating to price determination and maintenance appear to be in the twilight zone and the attitude of the Commission has not been uniform. A statement in one code that selling below cost except to meet prices made by a competitor is an unfair trade practice was received as an expression of the industry and was not approved. The Commission likewise has declined to recognize as binding requirements that code signatories install and maintain scientific cost systems as a means of determining what a reasonable price would be. The Commission has not committed itself on the legality of provisions for uniform sales contracts, reporting of prices to a central agency or according competitors access to plants and records. The Commission also has declined to approve provisions that departures from published price lists be regarded as an unfair trade practice or that dumping may be so characterized.

The question of the legal status of the provisions of the code, Mr. Gandy emphasized in his résumé, "is one of great importance. It is essential to know, first, whether such 'unfair conduct' on the part of an individual competitor who is under no definite agreement with his fellow

competitors to refrain from practicing it may be established as illegal and, second, whether such action on the part of a competitor who has entered into a mutual agreement not to practice it would give it the status of an illegal action as constituting a violation of such agreement."

The positive provisions of the law relating to the question are found in the Sherman, Clayton and Federal Trade Commission acts. The first-named statute, explained Mr. Gandy, continues a sweeping prohibition against all monopolies and combinations in restraint of trade. The Clayton act hits price discriminations not "made in good faith to meet competition." The Federal Trade Commission condemns unfair methods of competition, but does not particularize as to methods.

Determination of whether specific practices offend the law has been left to the Commission with its decision subject to court review. "The practices referred to in this review as approved by the Commission after a trade-practice conference are for the most part based directly on these decisions or on some extension of the principles involved in them. In other words, the legality or illegality of articles of a code definitely approved by the Commission is in no way dependent upon the adoption of a code of fair or unfair practices by an industry. The great advantage of having them embodied in such a code is that violations are more likely to be brought to the attention of the Commission."

THE legal status of code provisions merely "accepted by the Commission as expressions of the trade" has not been clearly established. The Commission has specifically avoided designating practices condemned in code provisions falling in this group as "unfair" because such a designation would make them unlawful under the terms of the act.

There are, however, many practices which should be prescribed or proscribed in a code which cannot be brought "into the category of unfair methods of competition." To enforce these provisions it probably will be necessary to have those signing the code enter into some express or implied agreement for the enforcement of the provisions of that code. That the Commission will be sympathetic to such a plan is indicated by its approval—two members dissenting—of a rule in the code of the cottonseed oil mills group making clandestine

The Highway to Real Success

Before stabilization of the bituminous coal industry is finally worked out there must be a changed attitude on the part of the thinking men of the coal industry. In my opinion it resolves itself down to this: we are going to have to be satisfied with running, say, three days a week at a profit in preference to running six days a week at a loss.

Our whole training has been on the six-days-a-week proposition. I cannot see any way to accomplish results along this line. I do think that we can run three days a week and make money. If we can once get it into our thinking that it is better to run three days a week and make money than to run six days a week and lose money, I think that we will be on the highway to real success.—*E. C. Mahan before the National Coal Association at its eleventh annual convention, Cleveland, Ohio, Nov. 16.*

violation of the code an unfair method of competition.

Amplification of the Commission's attitude on code provisions in the second class is contained in a recent communication from the Commission to the secretary of the Western Door Manufacturers' Association, in which the Commission says:

Group II rules condemn practices with regard to the legality of which the Commission expresses no opinion, the rules being received by the Commission as expressing the opinion of the industry that the use of such practices constitute unfair methods of competition.

It is a matter of public importance that the question of the enforceability of Group II rules be judicially determined. To expedite such determination, the Commission has taken the position that the clandestine violation of any Group II resolutions by one who has subscribed thereto in consideration of the like subscription by others in the industry is in and of itself an unfair method of competition, calling for action by the Commission, even though the practice condemned by such rule has not heretofore been held violate of the act by the Commission or any court.

As to the minority members of an industry who refuse to subscribe to the Group II rules, it is not now apparent how such rules could be enforced against them unless the Commission, in considering a specific complaint, should conclude that a proceeding could be sustained regardless of the rule.

The public interest indicates that no rule should be received by the Commission which would work an undue hardship on the public or on one who has agreed to abide thereby. Such a rule, if not rejected by the Commission in the first instance, would be disapproved when its true character became known.

The Commission has no hard-and-fast rule postponing the effective date of the rules until 85 per cent of the industry has subscribed thereto.

A canvass of organizations which have entered the movement, said Mr. Gandy, showed that those industries which have given the codes a fair trial are convinced of the soundness of the procedure and are gratified with the results. Such industries are

willing to recommend the procedure to others. It is generally agreed that the permanent effectiveness of the program will depend upon joint policing by the associations involved and the Commission.

A GENUINE determination to make the plan successful is the first requisite to its successful accomplishment, declared H. A. Glover, vice-president, Knox Consolidated Coal Co., who also expressed the view that this plan had all the good that might be squeezed out of the Watson bill (S. 4490) with none of its bad features. He also stressed the necessity of perfecting the local association machinery to handle the movement.

"Everything in connection with our conference [with Messrs. Donovan and Myers] indicates that they were willing to go along with us on any sort of a reasonable basis," said President Mahan. "This attitude I think was perhaps initiated by the incoming President. Certainly it was Mr. Hoover who sponsored the idea, and we have a hopeful situation to look forward to in Washington for the next few years toward the coal industry."

H. L. Findlay, vice-president, Youghiogeny & Ohio Coal Co., stated that the eastern Ohio operators already had started work on the trade-practice plan and were now considering changes in their local association to embrace such activity. Western Kentucky, reported C. F. Richardson, president, West Kentucky Coal Co., also is studying the question.

Coal Conference Sees Expansion in Use of Low-Temperature Process

THOUGH low-temperature carbonization of coal is still in a more or less experimental stage, delegates to the Second International Bituminous Coal Conference at Pittsburgh, Pa., Nov. 19-24 were unanimous in predicting expansion of its use. Considerable progress has been made, limitations and possibilities have been tentatively defined, and increasing utilization is expected to have a considerable influence on the coal industry.

The progress, limitations and possibilities were set out in considerable detail by the various speakers at the seven sectional meetings devoted to this subject. Among the score of papers presented at these sessions were addresses by James Balph, secretary, Coal Carbonization Co., and M. J. McQuade, president, Ben Franklin Coal Co. of West Virginia; Dr. F. P. Kerschbaum, Metallbank und Metallurgische Gesellschaft; Yoshisada Ban, Japanese Imperial Fuel Research Institute; A. W. Gauger and Donovan J. Salley, University of North Dakota; Josef Plassmann, Chemisch-Technische Gesellschaft; W. H. Allen, Jr., American Gas & Electric Co.; Harold Nielsen, "L. & N." Coal Distillation, Ltd.; R. H. Crozier, Mineral Oils Extraction, Ltd., and Dr. Walter F. Rittman, Carnegie Institute of Technology. A summary of the views there expounded shows:

The chief importance of low-temperature distillation to the coal industry is expected to be in broadening the field of uses for coal. Where coal is now burned primarily for heat, the spread of low-temperature distillation will allow the production of a high-grade smokeless fuel, gas for domestic use, tar, fuel oil and motor spirits, assert the proponents of the various low-temperature processes.

The purposes to be achieved vary with the different countries developing the process. In Germany the problem to be met is the utilization of the large reserves of brown coal which may easily be won. France and Great Britain are engaged in the

production of a high-grade domestic fuel to eliminate smoke and England is especially interested in a source of fuel and motor oils which at present must be purchased from others.

IN THE United States low-temperature carbonization is offered as a solution for the ills of overproduction, primarily because it opens up new markets and enables the operator to dispose of slack coal—the greatest problem of the operators. It is proposed that power plants—located at the mine or near the market—employ such a process to cheapen the cost of power.

Before any low-temperature carbonization plant may be said to be a commercial success it must be so constructed and operated as to produce a high-grade smokeless fuel and suitable quantities of high-quality gaseous and liquid byproducts at a low cost. Tar usually is considered to be the most important of the byproducts and should be free of dust or ash and have the highest possible market value. In England, however, the major product desired in many processes is an oil suitable for fuel use without further refining, the yield of coke being a secondary consideration and the production of gas nil or at most in very small quantities.

GAS yield as a rule is much less than in the high-temperature processes and many producers operate their retorts so as to eliminate it entirely. Others get a small yield, but all insist on it being of high quality. The usual product has a B.t.u. value of about 800 and is sold to gas companies or used for carburetting. Wherever possible, producer gas is used for heating the retorts, thus releasing the richer gas for sale. In some cases, however, it is used for heating retorts, especially if the process normally yields only a small quantity or there is no ready market.

The first cost of a low-temperature plant must of necessity be kept as low as possible if a cheap

fuel is to be produced. Rapid heat transfer is desired, both from the standpoint of products recovered and increase in through-put. To insure that the coal particles be quickly heated, many operators advocate the use of fine coal or dust, though it is found that this is a disadvantage in that the size of the resultant semi-coke is small. If the product is to be briquetted, however, this is not a serious drawback.

Continuous, automatic operation is desired in all cases to eliminate the entrance of air into the system, with its consequent effects on the products, and to increase the plant output. Maintenance and upkeep also must be kept at a low figure and several processes employ a special heat-resistant metal to increase the life of the retorts. In addition to the above characteristics, many operators are of the opinion that a plant producing a finished fuel of proper size is simpler and cheaper than those requiring that the coke be briquetted.

Domestic fuel is manufactured from slack, using the Hayes process, by the West Virginia Super Fuel Co., Moundsville, W. Va., Volatile matter and fixed carbon in the coal average 39.4 and 51 per cent respectively and the average yield per ton of coal carbonized is 1,439 lb. char, 2.9 gallons tar oil, 2.1 gallons light oil and 3,750 cu.ft. of 800-B.t.u. gas. Semi-coke is briquetted and sold to domestic customers. The 100-ton plant cost \$250,000 and the labor cost is given as 50c. per ton of raw material.

Experimental work has shown that a variety of coals from Ohio, Indiana, West Virginia and eastern Kentucky may successfully be treated by the "Carbocite" process to yield a domestic fuel. The yield at the Philo (Ohio) plant of the American Gas & Electric Co. per ton of 36-per cent volatile coal is: coke, 72-73 per cent; gas, 1,800-2,600 cu.ft., and tar, 30 gallons. Estimated cost of 200-300 ton plant is \$900-\$1,000 per ton of daily capacity.

Superheated steam is employed as the heating medium in the Trumble process for the recovery of oils from oil shale and the treatment of coal and lumber waste. A free-burning domestic fuel and oils, ammonia, creosote and tars are produced. The cost of 1,000-ton per day plant, together with hydrogenation and refining equipment, is given as \$600,000.

OPERATING on a coking coal of slack size, the "KSG" plant now being erected near New Brunswick,

N. J., will treat 700 tons per day of 24 hours, according to Dr. R. P. Soule, International Coal Carbonization Co., New York. Use of the International Bitumenoil process was described by J. N. Vandegrift, research engineer, New York.

Low-temperature carbonization of non-caking coal and aspirated fines by the "Lurgi" and "C.T.G." processes is being done in Germany. A 65-ton per day "C.T.G." plant may be constructed for \$80,000. Distillation of German brown coals up to 50 per cent moisture was described by Prof. Dipl. Ing. F. Siedenschnur, Freiberg, Germany. Low-temperature distillation processes in France are being resorted to to produce an artificial anthracite. The Compagnie des Mines des Vicoigne, Noceux, et Drocourt, is producing briquets to retail at \$3 to \$3.50 per ton. A. Léauté, Société des Combustibles des Purifiés, Paris, France, described the making of briquets from Trent amalgam and their carbonization.

Oil is the primary product desired in the carbonization of coal in the Turner Retort, experimental and commercial plants having been erected at Poynton and Coalburn, England, respectively. Superheated steam is the heating medium and a 1,000 ton per day plant can be erected for £110,000. A £200,000 plant, according to Charles Turner, Glasgow, Scotland, will yield 100 per cent on the investment besides returning the original cost in four years. The "L and N" process for the carbonization of coal was also described.

F. C. Greene, of the Old Ben Coal Corporation, Chicago, Ill., described a new low-temperature plant recently put into semi-commercial service. The production of "Carbonalpha," the name given to pure, finely-divided carbon suitable for a motor fuel, and manufactured by the Private Technological Institute, Dongen, Holland, was described by Dr. Jacobus G. Aarts, director of the Institute.

continued, and it was during this process that self-heating was observed in the dirt band. During a short stoppage in the work the officials observed the dirt band in the middle turn red, become more intense and communicate combustion to the coal on either side. Later investigation revealed that the fire lagged behind the progressive ignition of the dirt band, and apparently shows that this shaly material is more readily oxidized and reaches the point of ignition more quickly than pure coal.

Excavation proceeded up the old chute until the fire was reached and put out. It was found that the fireclay roof overlying the lower, or Corbie, seam had fallen, to be followed by some of the Craigie coal above. The coal and fireclay were in a finely divided condition, which, when coupled with the filtration of air from the chute, was favorable to spontaneous combustion. From the ignition of the dirt band observed during the fire fighting process it is probable that this dirt material would oxidize rapidly and would, and probably did, start the fire.

Several instances of ignition of dirt bands have been recorded in an old publication—"Colliery Managers' Handbook," Caleb Pamely. Recent fires—other than in mines—include a railway embankment of shales and a shaly stratum overlying a seam of coal. The latter was near kindling temperature when excavated and later caught fire when exposed to the air. In addition, Graham (Trans. I.M.E., Vol. LXVII, pp. 100) has shown that phenomenal oxidation can take place in beds of clod, the absorption of oxygen being much greater than in the adjacent coal.

Dirt Band May Be Cause Of Spontaneous Combustion

By James Cooper

Assistant Professor of Mining, Heriott Watt College,
Edinburgh, Scotland

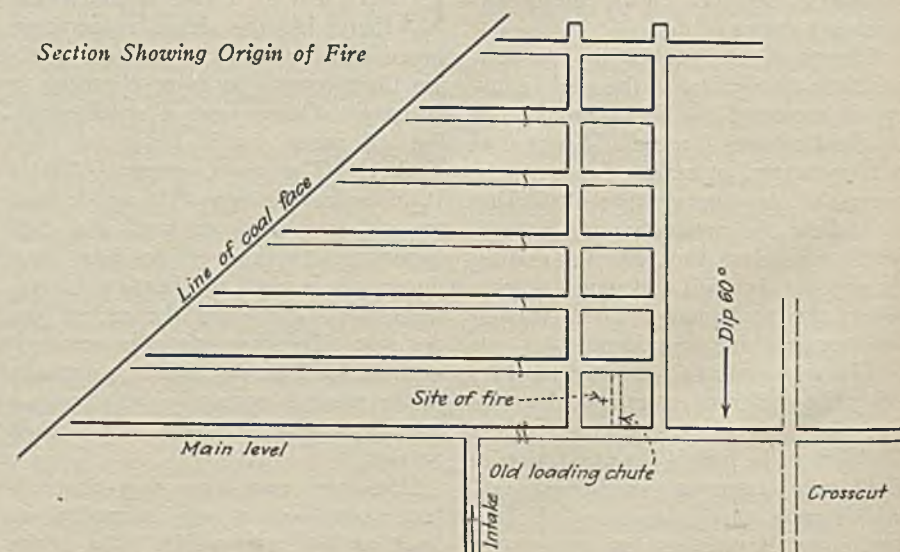
FIRES in British mines resulting from spontaneous combustion have always been associated with heating of the coal substance. However, suggestions have been put forth on several occasions that the strata associated with the coal beds, such as fireclay, dirt bands and shales, may play an important part in the incidence of self heating. One such occurrence will be described in the following paragraphs.

The fire occurred in the Lombard mine, where the Corbie, Craigie and Beattie coals, three adjacent seams, are worked. These are separated by dirt bands and shale, and the whole lies between a sandstone roof and floor. Ignition was observed in a dirt band in the middle of the Craigie bed.

The seams pitch 60 deg. in this mine and only the bottom, or Corbie bed, is extracted. The levels are horizontal, as shown in the illustration, and part of the Craigie coal is ripped out along one side to give the proper width. Thus the middle, or Craigie seam, is observable overhead in all the levels. Fire was discovered

in an old loading chute, as shown in the sketch. It was apparently extinguished, but after an interval of 8 hours, smoke was again observed and a brisk fire was found. The officials then decided to remove the roof coal and goaf débris until the fire was located.

Extraction of the Craigie bed



Technicians Report Status of PULVERIZED FUEL

At Pittsburgh Conference

PULVERIZED fuel has made distinct advances in the marine and steam-railway fields but has lost some of its former advantages over stoker fuel for stationary plants because of the increased efficiency of stoker firing, it was brought out at the three sectional meetings on that topic at the Second International Bituminous Coal Conference, Pittsburgh, Pa., Nov. 19-24. The discussion of powdered coal as a fuel for internal-combustion motors indicated that the future will see an increasing adoption of this means of converting coal to power.

Probably the best known pulverized-fuel internal-combustion engine now in use is the "Rupamotor," described by Rudolph Pawlikowski, manager of the "Kosmos" Machine Works, Germany. This 80-hp. engine has been the subject of continuous experimentation using various feeding systems, injection mechanisms and kinds of coal. The engine, which is of the Diesel type, has operated 9,000 hours on minus 300 mesh coal without renewal of the cylinder liners.

Recently a 150-hp. four-cylinder Diesel oil engine was converted to pulverized fuel by redesigning the injector mechanism. Discussion brought out the fact that the brown coal, which disintegrated easily without

grinding, was thought to be a considerable factor in the success of the coal-burning engine.

Firing of railway locomotives was described by American and German speakers and several papers were devoted to the discussion of the combustion of powdered fuel in furnaces. Several striking examples of the increased efficiency of industrial furnaces equipped with powdered coal burners were cited. The amount of coal required to treat materials in non-ferrous furnaces was materially decreased with consequent reduction in fuel cost.

Pulverized coal as a marine fuel promises to become important in the future. The steamship "Mercer" has made six trans-Atlantic voyages on schedule using pulverized fuel. Coal has been found to be 92 per cent as efficient as oil on this vessel and in actual practice 18,000-B.t.u. oil at \$1 per barrel is equivalent to 14,000-B.t.u. coal at \$4.80 a ton. If the pulverizing were done by steam power and the exhaust used, it is stated that the efficiency could be raised to equal that of oil and \$1 oil would equal \$5.20 coal. The reliability of the process has been proved not only by the voyages of the "Mercer" but by those of the "Lingan," a Canadian collier, and the "Stuartstar," operating between England and Buenos Aires.

perature of 430 deg. C. has shown that some coals are more amenable to treatment than others. Thus the yield of oil from boghead cannel has been found to be no greater than that obtained by destructive distillation under ordinary pressure, whereas the black cannel frequently found in bituminous coal gave an increased yield under hydrogenation conditions.

AS a result of his experiments Mr. Graham has increased faith in the eventual commercial success of the Berginization process. Ease of hydrogenation depends upon the constitution of the chemical complexes which make up the coal, and such constitution must necessarily depend upon that of the original coal-forming matter and also upon the nature of the changes which have taken place during the coalification process. Through hydrogenation, we can learn much more regarding the constitution of coal than we could from analysis, distillation and oxidation, the means hitherto available. The surest way to extend our knowledge of the action of hydrogen under high pressure upon coal is to continue our researches regarding that mineral not simply as a black mass containing so much carbon, hydrogen, oxygen, etc., but rather as a mixture of molecular complexes each of which will act in a different way when subjected to hydrogenation, distillation or oxidation.

Dr. J. P. Arend, directeur de Société Arbed et Terre Rouge, Luxembourg, showed charts exhibiting his determinations of the best temperatures for the hydrogenation of several fuels, and J. V. Henri Winkler read a paper by Prof. G. Hugel, École Nationale Supérieure du Pétrole et des Combustibles Liquides, Strasbourg, France, on hydrogenation of pitch and asphalt.

The program of the conference included 37 general and section meetings and the presentation of over 100 papers. There were five general sessions of the conference proper and two evening meetings for the public at large. The sectional meetings were devoted to detailed discussions of progress in low- and high-temperature distillation work, pulverized fuel, power and combustion, origin and composition of coal, cleaning and purification, liquefaction, tar and oil, gas and fertilizers.

* * *

Other features of the Conference are covered on pages 735-8, 744 and 751 of this issue.

Ability That Narrowed Coal Market Will Expand It Is Pittsburgh Slogan

(Continued from page 728)

gregate capacity of all that are now in existence. The one to two ratio of waterpower to steam is expected to hold true during the next 15 years, but the cost of waterpower is expected to increase while steam generation costs will decrease.

Interesting experiments into the treatment of coal under heat and pressure in the presence of hydrogen, a method now known as Berginization, were described by J. Ivon Graham, assistant director, mining research laboratory, University of Birmingham, Birmingham, England.

An effort has been made to test the action on durain, clarain, vitrain and fusain separately and also on the alpha, beta and gamma compounds extracted by the successive solvent action of pyridene and chloroform on coal. Researches have been made as to the effect of Berginization on coke made from lignite and, more recently, to the effect of catalysts, fine grinding, temperature and pressure.

Similar treatment (without the use of a catalyst) of about thirty different coals at a pressure of about 150 atmospheres and an average tem-

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

SYDNEY A. HALE, Managing Editor

NEW YORK, DECEMBER, 1928

Mine track traffic denser than on railroad

A MINE producing 5,000 tons daily in 2½-ton cars will have perhaps 100 round trips a day—many more than the general run of railroads. These trips usually are divided between two parts of the mine, so that there is that number of single trips to and from any one part of the workings. This is a high traffic density and it demands the best kind of track, careful maintenance and good ballasting. Too often it gets none of these.

Near the shaft, wherever the haulage is in the intake, the rigors of winter are as greatly felt along parts of the track as at the surface and all through the mine heaving occurs from roof pressure, pushing the track out of line and grade. The presence of water and steep grades also make difficult the maintenance of a good roadbed.

Despite these facts little attention is paid to the track once it is laid down, and not much then. At every joint the wheels strike the forward rail or roll down onto it. Only rarely and by chance are the two rail ends at a joint at a precise level. This irregularity strains and wears the wheels, damages the rail, injures the bond and increases haulage resistance.

The idea that any sort of track is good enough for a mine dies hard. It is now proved to all who can be convinced by an argument that good switches pay dividends, but there are still some who should learn that because a track is underground is no reason why it should be neglected. It has a big service to perform and must do it under exceptionally unfavorable circumstances. Why not build it right and maintain it in good condition?

Are engineers people?

ON THE morning following the last Presidential election the usually urbane *New York Times*—an ardent supporter of Governor Smith—closed its editorial obeisance to the will of the voters with these words:

He [Mr. Hoover] has shown the engineer striving to the Presidency. Hereafter it will be his opportunity to prove to the people that they have sent to the White House not merely a practical engineer but a full-rounded man equal to the great tasks laid upon him, at home and abroad.

In the past fourteen years the President-elect has

made such a record in economic, commercial and humanitarian achievements that were it not for the natural pride his fellows feel in the accomplishments of one of their profession probably few outside that profession would be conscious that Mr. Hoover was an honored figure in the engineering world before his relief work in Belgium caught the public eye. The implication that the engineer is a cold, calculating person—a human machine—when applied to Mr. Hoover, therefore, becomes a patent absurdity that falls of its own weight.

The idea that the engineer is a chilly alien unresponsive to the emotions which stir the common lot, however, is a prevalent one. It is one of those unfortunate fictions accepted as fact by too large a part of the public struck dumb by orderly thinking in a disorderly world. Doubtless there are men trained in engineering so enmeshed in dry technique that they are out of touch with the human element—but men of that breed never go far. There have been, and probably still are, frigid lawyers, icy doctors, ruthless captains of industry and hard-boiled editors, but they do not represent a typical cross-section of their callings. While the essence of engineering is straight thinking, the successful application of that thinking lies only in a broad and sympathetic understanding of men. That is fundamental.

A machine may be admired for its beauty or uncanny accuracy but it can never inspire. The leadership that enthuses men to carry on, grimly or laughingly as circumstances dictate, in the face of difficulties is a human leadership and one of the highest attributes of successful engineering. Engineers owe it to themselves and to their profession to disabuse the public mind of the false notion that they are apart from the rest of the human race. They owe it to themselves, to their profession and also to the public to make the public understand how large a part men are in any engineering operation.

A banker-industrialist looks at the coal business

“THERE can be no extended national prosperity until the farmer and the producer of coal each receives his fair share of the national dollar of income.” In these words, F. W. Shibley, vice-president of the Bankers Trust Co. of New York, addressing the eleventh annual meeting of the National Coal Association, fitted coal and agriculture into the national picture. Recognition of the effect of the plight of the farmer, of course, is not new, but few outside of the industry itself and the railroads have had a full appreciation of what a sick coal trade has meant and still means to the country at large. Were recognition more general there would be less complacency on the part of the buyer when he purchases coal at prices less than the cost of production.

Industry at large has a bigger stake in coal than it has been made to realize. Mr. Shibley would have that fact brought home to the leaders of industry by an educational campaign financed by the operators. The necessities of the coal industry may not safely be made the plaything of the purchasing agent. Pauperization of coal capital and labor is a poor foundation upon which to build prosperity for other industries. A coal-purchasing policy which yields the producer no profit postpones the introduction of mining methods which would reduce costs. An enlightened public opinion, Mr. Shibley believes, would end this policy.

That this keen observer offers no encouragement to those who would have the bankers step in now and finance large-scale consolidations is not surprising. Banking interests hoping to pass on the securities they underwrite to the investing public are not sold on the idea that an amalgamation of weaknesses makes for strength. But Mr. Shibley does something better—he orders the steps which the industry must undertake to put itself upon a plane where it will be attractive to the banking fraternity. The road to net profits, as he sees it, is through co-operation. "The bituminous coal industry must pull its own chestnuts out of the fire." Self-help is the first step on the road to rehabilitation.

Do pillars leak?

IN MOST mines water is found seeping out of the coal. If it is not so found it probably is because there is none seeking an outlet rather than because the water is imprisoned and cannot gush forth. Coal has been proved to hold gas at high pressures within a few feet of the face, so that coal is not porous. It is evident then that the water must come through crevices or other channels. In fact, studies of the strength of barrier pillars have brought to light instances of water traveling long distances through coal or rock, especially when under pressure. Consequently what is to prevent the more mobile air from doing the same?

With one well-sealed mine fire it was found that the smoldering embers received air when the water gage on one side of the fire was greater than that on the other and that they received less air when the water gage on the two sides was made more nearly equal. From these facts it is clear that when a current passes for some miles along one side of a line pillar and returns on the other there must be leakage no matter how perfect the stoppings may be. Obviously such leakage will be decreased if a lower water gage is provided, as can be done if ample or shorter airways are maintained.

Pillars tend to crevice where the clay or lime rock under or in partings within them weathers and is extruded. Where the bottom rock is lifted in roadways the clay has a better opportunity to extrude, thus weakening the face of the pillar and making its

outer edges unable to resist the passage of air, for the clay in freeing itself from the pressure of the rib splits off the face of the coal, admitting air to further weather and soften the bottom and partings, thus increasing extrusion and the area of the pillar subject to air permeability.

Moreover, when the bottom and the partings are alike hard and remain so, the pressure at the edges of the pillar due to roof weight and coal and clay expansion causes the coal face to bulge and crevice. It soon scales but before actually scaling it admits air, though the heart of the pillar may still be air resistant if it is large, uncreviced and unchanneled. It is always well, therefore, to put stoppings well away from the creviced face of the pillar wherever that can be done. Unfortunately, the roof may have sagged and be pervious and the rib sides may be permeable though hardly as much so as the pillar face. Where heavy shots are fired crevices are opened and new ones form. Thus air is admitted to the pillar, making the extrusion of lime and clay within and below the pillar more rapid than it would otherwise have been.

Rock-dusting reduces air leakage, but it has less ultimate effect where the action of the air on the clay or lime is rapid, for the dust films are rapidly broken, making matters much as if rock-dusting had not been done. Large unbroken pillars can be provided, when four headings are driven to an entry, the two headings on one side of the central pillar being used as an intake and a return during development and as intakes solely in later operation and the two headings on the other side being similarly intake and return at first and returns only thereafter. Or a big pillar can be left on one side of the original intake and return system and these can be used at a later stage as intakes, the air returning through room roadways on the other side of the pillar.

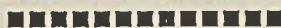
Large pillars, lower pressure with more or larger airways, less bottom lifting, lighter shots and rock-dusting all will reduce air leakage where it is a troublesome source of loss, but do what one will some air leakage seems to be inevitable, especially with some coal seams.

It can be done

THE Robinson mine of the Colorado Fuel & Iron Co. has been operated for more than twelve years without a fatal accident. In West Virginia last year 72 per cent of the mines employing 55,000 workers produced 80,000,000 tons of coal without a fatality. Other mines and groups of operations in other fields have hung up records of achievement in fatal and major non-fatal accident prevention. They have proved that it is not always necessary to use a coffin as a yard-stick in measuring tonnage. They have proved that coal without blood is not an unattainable ideal. Dare the rest of the mines of the country set a lower goal?

The BOSSES

Talk it Over



Controlling Night Delivery Of Supplies

C“Say Mac,” said Jim, “what do these night men do for twelve hours every night?”

“I don’t know; probably little enough from the kicks I’m getting lately,” Mac replied. “It looks as if a house cleaning is in order. You usually have to fire a night crew every two months to get anything done.”

“Those are the well-known ‘harsh words’, Mac,” Jim continued. “Perhaps we’re not making it easy for them to do their work. Have we any means of telling them exactly what they’re supposed to do?”

“No, we haven’t,” Mac admitted. “We probably ought to extend our report system to the night force, with a good method of ordering supplies.”

“Well, we’ll work on the thing, and try to get up some means of assigning the jobs with assurance that they will all be done when they should be. Reducing the hours is a thing that will require a little thought, however. We might put on another boss for the supply men alone.”

“Another boss might be all right,” said Mac. “If he can get the stuff to the right place, the added convenience will help the day force to do a bigger day’s work. Supplies scattered all over or left at the wrong place are costing us money. We might dispense with the extra boss, though, and put the night crew on piece work—give them a certain job and let them go when they get through.”

—What system of ordering supplies would get the best results?

—Should the night men be required to submit delivery reports?

—How would you apportion the work of the night crew to avoid overtime?



All foremen, superintendents, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for

Influence of Foreman Emphasized

Foreman's Influence Extends From Face to Sales Office

IN ORDER to have the qualities of a good foreman a man must be primarily interested in his work—not merely be going through the daily routine simply to earn his living. He should always have the safety of his men uppermost in his mind and look out at all times for the interest of the company, at the same time being able to handle his men in a firm, yet not too rough a manner, which latter might have a tendency to decrease their efficiency, which is the exact opposite of what his aim should be.

A foreman has many opportunities to improve his job, such as correspondence courses, attending local foremanship training meetings, reading articles in mining magazines and by doing some careful and constructive thinking.

The foreman can do much to affect sales, for by his methods of handling men he can materially increase or decrease the production per man from the mine. If he is not interested the tonnage will drop, the coal will become dirty and slacky, and the sales manager will begin to receive complaints. On the other hand, by continually talking big lumps, clean coal, and more of it, in an intelligent manner to as many men per day individually in their working places as possible, he can increase the production, size and quality of the coal.

When machinery becomes old and worn and when the upkeep begins to cost more than the allotted amount a foreman should report such a condition on the grounds of inefficiency, and should do his best to recommend the purchase of what he honestly believes to be the most suitable type for the place, and then do all in his power to see that the same is maintained in first class condition at the lowest possible cost.

The foreman is one of the most important men on the job and has a tremendous influence from the face to the sales office.

DANIEL B. WENTZ, JR.
Philadelphia, Pa. General Coal Co.

Successful Foreman Knows Men And Approved Mining Practice

A GOOD foreman should have both a good theoretical and practical knowledge of coal mining and the faculty of profiting through the application of proved successful methods of mining and the use of machinery. By extensive reading of periodicals, text books, machinery catalogues, etc., compiled by authorities on coal production, preparation and sales he can easily keep abreast of the times. He should be resourceful to a large degree and always have an eye to costs and efficiency. He must be a diplomat in the handling of men, have a weather eye always focussed on possible assistants and men who may be depended upon in emergen-

cies and withal a good disciplinarian. He must know his men and be able to get close to them without forfeiture of their respect.

Although the requisites of a good foreman will vary in accordance with the property and conditions to be met in different sections of the country, fortified with the qualifications mentioned above, one may become a good foreman anywhere.

A foreman's attitude toward production may easily affect the sales in that contracts made by the sales department may have to be broken through a drop in production, whereas spasmodic and

understanding of the human equation—or man values, if you will—was a large factor in his success, for all his employees were almost frantically eager to satisfy every customer.

Isn't there something here that many mine managers might well ponder? It has been part and parcel of the *Coal Age* preachments for years; Eugene McAuliffe has rammed it down the throats of all who run and read in this disjointed mining industry. But it seems that our medicine must be bitter else no benefit can accrue.

We are witnessing today a most painful recrudescence of the mining industry. Machinery and headwork are carving large chunks from the anatomy of out-worn mining procedure, and by astounding major operations grafting in their place budgets, schedules, dispatchers, standardized equipment, and shooing to the green pastures that relic of a discarded mode of transportation—the mule.

With such a tremendously changed horizon none but the most hopelessly optimistic could hope to find a harmonious metamorphosis in the make-up of the average mine manager. A new age, my masters, and a new personnel must arise to master the monster unknown to the coal mines of yesteryear.

The qualifications of a mine manager, according to the mining laws of most states, are almost identical: knowledge of the mining law, principles of ventilation, the nature and properties of noxious gases, the development and operation of coal properties and so on. All very fine and necessary, but scarcely sufficient to solve the modern mechanical equation.

It has become more and more imperative that each state must conduct a medium through which the technique of modern methods of mining can be taught those denied the resources of our colleges and universities. The machine shop in the mines is the most important department, but scarcely complimentary to the mine manager whose training and experience is of the shuttlecock and battledore variety, and who is now pathetically hopeless in this complicated maze of bewildering mechanics.

Equal to the foregoing in importance is the new relationship between management and miner. Mr. Bulldozer is reluctantly making his last stand, and a happy day it is that the elemental, caveman-with-his-club attitude of the big boss is making way for more humanitarian methods.

I have no patience with the suggestion-box farce conducted as a sop to the vanity of the sap. Such methods savor too much of encouragement to the snitch and the bootlicker.

The shrewd mine manager mixes with his men and takes an avid interest in the little things that comprise the routine of the toiler. Like the small

When and How

Having adopted the practice of making deliveries of supplies at night, is that enough? If the work is done in a slipshod, unsystematic manner has anything been gained?

How would you answer the questions on the opposite page? Payment is made for letters accepted and published.

irregular increases will oftentimes cause a drop in prices and resultant trouble in disposing of the product.

In displacing old equipment with the right kind of machinery for the job, the foreman should bear in mind that machinery neglected and carelessly handled is the most expensive item around a coal mine and that inadequate or unsuitable equipment of any kind is invariably the cause of high costs and inefficiency.

J. F. MUSGROVE,
Vice-President and General Manager
Denver, Colo. Frontier Coal Co.

Real Boss Has High Integrity, Knows Man and Machine Values

ON a sweltering summer afternoon I slipped into a prosperous drug-store in a nearby city for light refreshment. Standing at the soda fountain, I noticed behind the counter the proprietor and a small boy, who worked there after school hours, with their heads together over a catalogue of elaborate soda fountains. My curiosity aroused, I edged closer to get an eyeful.

It seemed that the store had outgrown its present equipment and an elaborate new soda fountain was imminent to cope with the increasing business. The proprietor, wealthy and prominent, was earnestly hobnobbing with one of the most humble of his employees. The boy's face was flushed with pride that his opinion should be so obviously valued.

This proprietor was shrewd and his

boy soda jerker and the drug-store proprietor, remote as the poles in many things, they are one in the enthusiastic desire to make good and get results. Get to the hearts of the men by square shooting. Seek their counsel in introducing innovations, at the same time subtly pointing out the benefits they will derive from their introduction. Make them co-partners in the venture of introducing revolutionary measures by putting in their mouths the expression of ideas they had never thought of, and encouraging all to parade the plan as their very own.

Outworn machinery must be scrapped as ruthlessly as the most dangerous and undesirable. Modernize the equipment and standardize the units most generally used, such as switches, locomotives, mine cars.

A wise mine manager should be courteous and firm, and see that each order is executed faithfully to the letter. Preach safety morning, noon and night, and see that it can be made practicable by supplying the necessary materials toward this end.

Thousands of dollars are at the disposal of most mine managers, as well as the lives of hundreds of men, and only men of unquestionable integrity should be considered and trained to thoroughly understand every phase and department under their supervision.

ALEXANDER BENNETT.

Panama, Ill.

Foreman Must Realize Extent Of His Influence for Success

CAN the foreman's attitude toward production affect sales? It certainly can. For successful management of a coal property three basic factors must be considered: cost, production and preparation. In the present market, the mine has to have a low cost. To get low cost it must have large production per man employed. To get the maximum efficiency the mine must run regularly or at least five full days per week. Unless the coal produced is as well prepared as that from the rest of the field, the sales company, however good, is unable to dispose of the full-time production. In the effort to produce low-cost coal, the mine foremen are prone to cut down the working force to a minimum and the first place the majority of them begin is on the preparation, which is considered a necessary evil.

When the cost at the mines is cut at the expense of the preparation, the sales cost begins to go up. Complaints begin coming in from old and established customers, and if preparation continues to be substandard, rejections follow. Then it is necessary for the sales force to find new customers. A "high-powered salesman" can always sell a new customer, but the product sold is what gets the repeat sales, which are necessary for successful sales management.

If the mine foreman of any mine will install a set of rules governing

the preparation and a man to supervise the work to see that the system is followed he is assured of a more regular run for his mine. If his mine is able to run full time he can take his choice of the labor, thereby building up an efficient organization which will enable him to get the maximum production with the minimum cost and knowing that the product from his mine is equal to any from the field and superior to the most.

W. E. STRAUGHAN.

U. S. Veterans' Hospital,
Oteen, N. C.

Aid to Success of Foreman Is Knowing "When and How"

TO BE a real mine foreman a man must have the basic qualities of industry, thrift and fair dealing; never lacking in moral courage, ready to reward merit and free from favoritism. With this background he will aim at that best of all assets, satisfied customers, by doing his utmost to produce coal in the best possible condition so as to give the highest efficiency in consumption.

The end sought cannot be achieved, however, without a thorough grounding in the science of mining, kept up to date by regular perusal of the progressive periodicals and books charting the advances in the profession. The foreman's interest in the progress of mining science will be stimulated by regular attendance at institute and association meetings as well as mining and machinery expositions.

But even this knowledge and enterprise may be ineffectual in making a success of running a mine unless the foreman be enough of a psychologist in his relations with his employer and the men under him to know how and when to insist upon abandoning equipment and methods that are becoming obsolete. This quality also is necessary to instill and keep alive in the men the co-operative spirit which is indispensable to satisfactory results when old equipment and methods are replaced by new.

W. H. LUXTON.

Linton, Ind.

Hard Knocks and Hunger for Knowledge Are Useful Assets

APART from the qualifications required by law, a mine foreman should be able to judge of what a good day's work consists, and in nearly every case this requires a wide and varied range of practical experience in every phase of underground work. This usually is gained through an early introduction to the school of hard knocks, backed with a natural desire to acquire technical knowledge through intensive study. He should be a fair judge of human nature, have self-control and perseverance, be unbiased in his opinions, and have the initiative to adopt new methods whereby the safety and welfare of the workers will be assured and in-

creased production will certainly result.

The quality of the product, of course, will be the prominent factor in protecting and consolidating the economic position of the foreman as well as his employer. There should, however, be perfect co-ordination between the foreman and the sales staff, as the least disruption in harmony between these two most important units will react disastrously upon the entire operation.

A good mine foreman will keep well informed on all new or proposed improvements to mine machinery, so as to lighten the constant worry and bugbear of repairs and replacement expense to obsolete machinery. Numerous foremen have failed in their trust because of the shortsighted policy of "wait and see."

JOHN BENNETT.

Cassidy, B. C., Canada.

Foreman Must Know His Job And Keep Everlastingly on It

IN addition to having a good practical and theoretical knowledge of mining methods, a foreman should be possessed of sound "horse sense" and be an organizer able to direct the working forces of a mine in the use of the equipment so as to produce the greatest quantity of good, clean, marketable coal with safety and economy. He must realize that it is the men under him who must get out the coal and that his duty is to direct them. Only by carefully checking over production costs in each section of the mine can the actual causes of excessive costs be found and removed.

The utmost frankness and honesty in dealing with the men is necessary to get their co-operation in the safe operation of the mine, the loading of clean coal and elimination of waste in supplies and care of equipment. The same candor should be used with the employer in order to keep down costs as much as possible while keeping the equipment up to date.

To better fit himself for his job the foreman should subscribe to the leading mining journals and thus keep informed about improved machinery and methods of mining. Most of all, he should work in harmony with other departments, especially the sales force, so that he can provide what the market demands.

ERNEST KRAUSE,
Ex-Mine Foreman.

Masontown, Pa.

Ability to Solve Difficulties And Plan Ahead Is Boss' Need

IN THE SELECTION of a mine foreman some of the things I would take into consideration are his knowledge of mining methods and mine gases, his experience and his personality. He should be well versed in the distribution of ventilation, laying out and location of tracks and partings, and the handling of drainage, electricity and timbering.

Not only should he be able to handle

and direct his men but he must not lack self-control. If he knows men he will have a corps of assistants whom he can depend upon to execute his orders and with whom he can discuss the many perplexing problems that inevitably arise. An appraising eye for the future is necessary in order that plans may be made ahead of present needs and dead-work be reduced to the minimum when times are dull.

Close attention to the placing of shots and insistence on careful preparation will lighten the task of the sales department and insure larger earnings for the men. The foreman also can insure loyalty in his men by taking a prominent part in safety and first-aid work, thus impressing upon them his interest in their welfare. Lastly, he must keep abreast with progress through careful perusal of the best mining papers and text books.

J. A. R.

Sullivan, Ind.

Realization by Anticipation

Is Goal of Skilled Foreman

A GOOD mine foremen should be clean-cut, honest, conscientious, sober and industrious, with plenty of initiative and willing to do the right thing by the other fellow. A foreman who is sympathetic, listens to all grievances, imaginary or otherwise; willing to lend a helping hand and has the safety of his men uppermost at all times will gain the respect and confidence of his men.

Experience in practically all kinds of inside labor and realization of what constitutes a reasonable day's work is indispensable, though this must be supplemented by keeping in touch with the trend of modern mining and visualizing the work ahead. With the superintendent, the foreman must decide what coal and how much is to be taken from each

section and how many men will be required to do this. He has to provide an efficient routine for his assistants and workmen to carry out, and sometimes settle problems relative to layout, provision of haulage roads, size of airways, quantity of air circulated, the provision of pumps (ditches and siphons where practicable) and the many other things relative to coal getting which require no little skill and knowledge of mining.

Upon his choice for assistants the efficiency of his supervision will depend, not only as regards the quantity and quality of production, but in relation to labor turn-over. It should not be forgotten, however, that the foreman's attitude toward production has an important bearing on sales. The end to be sought, of course, is a clean quality coal produced safely and at a low cost.

In the displacing of old equipment with new, a foreman may hit a snag. And no less important is the maintenance of mining equipment. The foreman, however, is the key man to the whole situation. The successful safety campaign is dependent upon his interest. If he is indifferent, the men will show indifference. If he believes in safety and practices it, his men will be convinced that he is interested in their welfare and will work with him to turn out clean coal and make the mine safe.

WM. W. HUNTER.

Mount Hope, W. Va.

Trade Literature

Automatic Pumping with Vacuum Pump Primer. Barrett, Haentjens & Co., Hazleton, Pa. Bulletin 850.

Regulators. Locke Regulator Co., Salem, Mass. Catalog No. 50. Covers hydraulic regulators, combination pressure regulators, balanced valves, pump governors, tank and float valves, temperature regulators and engine and turbine stop equipment.

Northern Equipment Co., Erie, Pa., recently issued two four-page bulletins illustrating and describing the New Copes Type SS Differential Water-Pressure Regulating Valve and the New Copes Type DS Pump Governor.

Marion Steam Shovel Co., Marion, Ohio, has issued Bulletins 334, 335 and 336, covering its 2-cu.yd., and Bulletin 337, covering its 14-cu.yd. shovels, draglines and clamshells.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: Silent Gears, Fabroil and Textolite, GEA-482A, pp. 32, illustrated. Crane and Hoist Motors, GEA-78A. Automatic Switching Equipment for Synchronous Converters in Mining Service, GEA-572A. CR2927 Pressure and Vacuum Switches, GEA-821A. Automatic Transfer Switch, Type DB-441, Form B, for Mine Gathering Locomotives. GEA-952. High-torque Double Squirrel Cage Motors. GEA-81B. Automatic Supervisory Equipment, Synchronous Selector Type, GEA-1006.

Sulzer Dry Quencher. Dry Quenching Equipment Corporation (subsidiary of International Combustion Engineering Corporation), New York City. Publication DQ-3. Six-page folder illustrating and describing the type C dry quencher.

Flexible Couplings. The Falk Corporation, Milwaukee, Wis. Bulletin 180. Pp. 15; illustrated. Contains information not included in the issue it supersedes and lists one additional size of coupling—20½c.

Oster Mfg. Co., Cleveland, Ohio, recently published a booklet on "Selling Pipe Machines Through the Ability to Meet Common Objections on the Part of the Prospect." Pp. 12.

Die-ology is the title of a 4-pp. folder issued by the Interstate Drop Forge Co., Milwaukee, Wis., covering the subject of drop forgings.

The following are recent bulletins of the General Electric Co., Schenectady, N. Y.: GEA-19E, CR 7006-D4 and D5 Ac., Enclosed Magnetic Switches suitable for

starting small single two- and three-phase alternating-current motors. GEA-874B, Type Wd-200A Arc Welder, belt, motor, or gas-engine drive. GEA-723, Coal- and Ore-Bridge Equipment for alternating-current operation. GEA-1028, Form J, Class BU Totally Enclosed Motors for use in explosive atmospheres.

Cars and Trailers. Lakewood Engineering Co., Cleveland, Ohio. Catalog No. 16-A. Pp. 56; illustrated. Narrow-gauge cars and track, trailers, trucks and skids are described.

Rapid Narrow Driving in Low Coal with the Goodman Entryloader. Goodman Mfg. Co., Chicago, Ill. Bulletin 2801. Pp. 15; illustrated.

Superheaters. Foster Wheeler Corporation, New York City. Catalog No. 304. Pp. 48; illustrated.

Resistance Thermometers. Leeds & Northrup Co., Philadelphia, Pa. Catalog No. 80. Pp. 28; illustrated. Describes the use of these instruments for controlling, recording and indicating temperatures.

American Manganese Steel Co., Chicago, Ill., has issued a booklet entitled "The Manganese Steel," giving the history, advantages and application of Amsco manganese steel.

Proportional Pressure Oil Braking System. Ottumwa Iron Works, Ottumwa, Iowa. Bulletin No. 275. Pp. 15; illustrated. Describes this system as applied to mine hoists.

Why Timken Tapered Roller Bearings Save Money for Mine Operators. Timken Roller Bearing Co., Canton, Ohio. Pp. 43; illustrated. Describes the principal advantages of Timken bearings in all types of mining machinery.

M-S-A High-Pressure Rock-Dust Distributor. Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin No. 212. Pp. 8; illustrated. Describes the construction and application of this machine, which is capable of carrying rock dust through 500 ft. of 3-in. hose.

Industrial Lubrication. Acheson Graphite Corporation, Niagara Falls, N. Y. Pp. 64; illustrated. Describes the application of Gredag lubricants and graphite powders.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: GEA-556B, Automatic Welding Head and Control, and GEA-1052, General-Purpose Synchronous Motors "7500 Series"—Form EI.

New Obround Condulets—Form 7. Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2119. Pp. 20; illustrated.

Foreman Training Advocated

THE OLD MAN is hardly fair to his foremen as the improvement in methods has not yet had time to show its real worth. A year is not long for a trial, for, whatever the merits of the methods, the men have to become used to them before they operate to advantage. A training course for the foremen is advisable. One in which the foremen visited mines in different districts and noted their methods and ways of carrying them out probably would give the best results. Their minds would thereby be broadened and they would receive an insight into the management of mines in general.

Assuming a four weeks' course, a week could be spent in each of four different mining districts and a number of different mines visited. The foremen could take notes on the methods at these mines, and on their return, they, together with the responsible mine officials, could hold a general discussion and bring out any points which they might adopt to advantage. Results would depend largely on the powers of observation of the foremen. It might, therefore, be better if a group of foremen could be accompanied by an experienced mining engineer to call their attention to various improvements. A few lectures on the relation of the different departments to one another and how they either hinder or help each other also would help.

W. E. WARNER.

Brentford, England.

NOTES

From Across the Sea

MYSTERIOUS explosions have led the British to make inquiries into the possibility that the electrification of dust clouds may cause a discharge of electricity—a sort of mine lightning—that may ignite gas and dust. In this country there have been explosions for which it was difficult to ascribe a cause. No men were present in the mine; no lightning flashed from the clouds to communicate within and no current was delivered on the mine system. Consequently some explanation had to be found, and the usual one was that the roof fell on explosives or caps and detonated them or that sparks were struck by falling roof. Electrification is another possible causation, and it is one that has not been so frequently mentioned.

In a recent publication of the British Safety in Mines Research Board (No. 43) on "Spontaneous Electrification in Dust Clouds," S. C. Blacktin says: "During a sandstorm in South Africa it was found by experiment that the air, even to a distance of two miles, manifested a negative electric charge, the particles of sand being themselves positively electrified."

"This observation led to a study of the spontaneous electrification of dust clouds of various materials. Almost all kinds of finely divided matter, when blown into a cloud of dust by an air current, were found to become electrically charged, apparently with an opposite charge upon the air. On some substances the charge was positive, on others negative, while a third class might yield particles some of which were positively and others negatively charged."

"Such experiments were not designed to discover whether exceptionally large accumulations of electricity could be produced from dust clouds, but a later research has shown that, when fine sugar dust is whirled in a copper vessel, sparks up to one centimeter in length can be drawn from the vessel."

IT IS NOT stated that the experiments made and recorded by Mr. Blacktin resulted in the ignition of any of the dust clouds raised, though such sensitive dusts as those of lycopodium, rice and potato starches were tested as also those of British and American coals and of lignites from New Zealand.

The experiments proved that the electrification as shown by electrometer readings increased with increased air-current pressures and was quite different for different coals; for instance, at 20 mm. air-current pressure the Arley coal gives 129 times as large a reading as the Silkstone. The experiments also showed that the electrification increased with increases in the weight of dust used.

The experiments were all made with dust that went through a 200-mesh screen, but the actual fineness could hardly be so determined, for a very pulverulent dust naturally would have a larger percentage of almost microscopic material than would be found with a less pulverulent dust.

Later emery dust was introduced to prevent the coal dust from agglomerating. Strange to say, this dust was found to form a cloud with air without generating an appreciable electric charge. In the experiments 24 times as much emery as coal was used. Again it was found that some dusts were more active than others. The dust from a certain New Zealand lignite from Pukemito produced over four times as great a voltage as the dust from an Arley coal, the most active formerly tried. With 8 grams of emery and coal dust an electrification of 1,393 volts was observed. "As might be expected," says the bulletin, "even in the absence of emery, visible sparks were obtained on discharging the conductor

which had been in contact with the charged coal dusts, provided sufficient dust was used. The igniting power of these sparks is the subject of further investigation, which will be described in a later paper."

With emery to rice starch 48:1 and a weight of 49 grams an electrification of 5,400 volts was obtained. Again by grinding coals for long periods of time their electrification tendency increased, especially where the coal normally is not much electrified. This shows that the tendency is not due to the chemical composition but to the size of the particle. Finally using electrified dust of from 0 to 10 microns (a micron is a thousandth of a millimeter) from Pittsburgh and Pocahontas with emery to coal dust 50:1, a charge of 82 volts in one case and 170 in the other was obtained.

American engineers will look forward to later developments and reports regarding this phase of mine hazard, as there are to be found in America some extremely friable coals and some with resinous constituents which, running all through the coal, readily pass into the most impalpable of dust and perhaps may act under friction less like coal than like the starch of rice.

R Dawson Hall

On the **ENGINEER'S BOOK SHELF**

The Preparation of Coal for the Market, by Henry Louis, Emeritus Professor of Mining, Armstrong College, University of Durham; 217 pp., 4½ x 7½ in.; \$2.25; Methuen & Co., London, England.

The firm of A. France Foquet, of the Rhéolaveur, instituted a series of lectures on modern methods of coal cleaning at Heriot Watt College, Edinburgh, and Professor Henry Louis was chosen by the governors of the college to deliver them. These form the substance of the book.

American readers will find due space accorded to the Robinson and Chance washers, the Pardee spiral separators, the Sutton-Steele (American Concentrator) table, the Arms air concentrator, the Dorr thickener, the Hummer and Overstrom vibrating screens, the Oliver filter and the Bradford breaker, but the Hydrotator and the Menzies washer are dismissed in two lines as using the same principle as the Draper washer. The general principle is indeed the same, but the manner in which it is exemplified is sufficiently different to justify more space.

The theory of coal cleaning and the determination of its efficiency are given some consideration. In earlier days the value of a plant was likely to be gaged

on its ingenuity. Today it is judged by its actual results, its labor saving and its use of water rather than by its degree of ingenuity. "What will it do?" rather than "What skill does it exhibit?" is the determining factor.

* * *

Patents Law and Practice, by Oscar Geier; fourth edition; 46 pp.; 6 x 9 in.; Richards & Geier, New York City; free upon application.

The author of this brochure has labored "to give-up-to-the-minute information to merchants, lawyers, manufacturers and those generally interested in the subject of inventions and trademarks." Mr. Geier covers briefly the law in regard to patents, who may receive patents and what is patentable.

The process of patenting an article is given in detail together with the preliminary searching, the drafting of specifications and claims and Patent Office procedure. Sections on interferences, reissues, appeals and disclaimers are also included. Infringements are defined and actions in infringement by suit and injunction are explained in detail. Validity and infringement searches, false marking, interfering patents and assignments, grants and licenses receive attention.

Among the Manufacturers



SHAREHOLDERS of the Grasselli Chemical Co. have ratified the action of the directors authorizing the sale of the properties and business of that company to E. I. du Pont de Nemours & Co., Inc. The Grasselli Chemical Co., an Ohio corporation, will be dissolved and its acids and heavy chemical business and that of the du Pont company will be transferred to a new company, the Grasselli Chemical Co., a Delaware corporation. The explosives business will be merged with the du Pont explosives department.

* * *

A NEW Prest-O-Lite acetylene plant at East Avenue and Short Street, South Charleston, W. Va., has started production. J. J. Robinson is in charge of the plant and S. P. Murphy, whose headquarters are at Cincinnati, Ohio, is district superintendent.

* * *

THE MARSHALL SUPPLY CO., INC., operating in Pittsburg, Kan., and Tulsa, Okla., has been appointed distributor of the products of the Botfield Refractories Co., Philadelphia, Pa.

* * *

THE ANACONDA COPPER MINING CO., through its subsidiary, the American Brass Co., of Waterbury, Conn., is rebuilding its electrical cable plant at Hastings-on-Hudson, a suburb of New York City.

* * *

THE NEW YORK SALES OFFICE and display room of the C. F. Pease Co., Chicago, formerly located in the Grand Central Terminal, has been moved to new quarters occupying the entire 7th floor, Ashforth Building, at 12 East 44th St., New York City. T. K. Murney, Eastern sales manager, is in charge.

* * *

THE TIMKEN ROLLER BEARING CO., Canton, Ohio, has put into effect a program that will provide the necessary equipment for raising its output of 175,000 bearings per day to over 200,000 per day. The program has necessitated the expenditure of about \$6,000,000 during the current year and covers additions to both the steel-mill and bearing factory. Provision has been made for additions to the mill at Canton and the purchase of the plant and equipment of the Weldless Tube Co. at Wooster, Ohio.

A MERGER of the National Equipment Co., of which the Koehring Co., Milwaukee, Wis., is the parent company; the Parsons Co. of Newton, Iowa, manufacturers of power trench excavators, and the Insley Co., Indianapolis, Ind., producers of construction hoisting machinery, into a \$9,000,000 corporation has been announced by Phil A. Koehring, president and treasurer of the central corporation.

* * *

THE INTERNATIONAL COMBUSTION ENGINEERING CORPORATION has organized the Combustion Corporation of America as a holding company for its subsidiaries. This step was taken, according to the management, to unify the company's power-plant activities in America. Subsidiaries which will be taken over include the Coshocton Iron Co., Green Engineering Co., Raymond Brothers, Impact Pulverizer Co., Heine Boiler Co. of St. Louis, Heine Boiler Co. of Phoenixville, Pa., Hedges-Walsh-Weidner Co. of Chattanooga and Ladd Water Tube Boiler Co.

* * *

BARNEY G. TANG, assistant general superintendent of the Schenectady works of the General Electric Co., has been made general superintendent to succeed the late James A. Smith.

Publications Received

Wages and Hours of Work in the Coal-Mining Industry—Studies and Reports, Series D, No. 18. International Labor Office, Geneva, 1928. Price, \$1.50. Pp. 279; tables. P. S. King & Son, Ltd., Westminster, London S. W. 1, England.

Statistical Abstract of the United States, 1928. Pp. 841; tables.

Measurement of Air Quantities and Energy Losses in Mine Entries, Part III, by A. C. Callen and C. M. Smith. Prepared under a co-operative agreement between the Engineering Experiment Station, University of Illinois, and Illinois State Geological Survey. Bulletin No. 184. Price, 35c. University of Illinois, Urbana, Ill. Pp. 59; illustrated.

Tests of the Fatigue Strength of Steam Turbine Blade Shapes, by Herbert F. Moore, S. W. Lyon and N. J. Alleman. Report of an investigation conducted by the Engineering Experiment Station, University of Illinois, in co-operation with the Allis-Chalmers Manufacturing Co. Bulletin No. 183. Price, 25c. University of Illinois, Urbana, Ill. Pp. 36; illustrated.

THE BIRMINGHAM (Ala.) office of the Sullivan Machinery Co. is now located at 613 North Ninth St., having been moved from 2108 First Avenue North. This is a temporary address, as this branch will move into a new building there upon its completion.

* * *

THE SWEET'S STEEL CO., Williamsport, Pa., announces that Samuel C. Rebman, who represented the company as district sales manager in the Pennsylvania anthracite fields, has been made sales manager at the branch office in New York City. Hugh G. Daley, formerly with the Carnegie Steel Co., has been appointed sales manager in charge of the Pennsylvania anthracite coal fields, with headquarters in Philadelphia, Pa.

* * *

THE WAGNER ELECTRIC CORPORATION, St. Louis, Mo., announces the removal of its Los Angeles branch office and service station to 1220 S. Hope St. H. N. FELTON, manager of the Milwaukee office since 1927, has been made branch manager of the New York office. F. T. COUP, in charge of the Cincinnati office since 1921, has been moved to the Milwaukee office as branch manager. PAUL F. FORSYTH has been appointed manager of the Cincinnati office.

The Sulphur Problem in Burning Coal, by J. F. Barkley. Bureau of Mines, Washington, D. C. Technical paper 436. Pp. 7.

The Technology of Low-Temperature Carbonization, by Frank M. Gentry. Williams & Wilkins Co., Baltimore, Md. Price \$7.50. Pp. 399; illustrated.

Mineral Resources of the United States in 1927 (preliminary summary). Bureau of Mines, Washington, D. C. Price, 20c. Pp. 120.

How to Use Current Business Statistics, by Mortimer B. Lane. Bureau of the Census, Washington, D. C. Price, 15c.

The Cheat Mountain Coal Field of Randolph County, West Virginia, by David B. Reger. West Virginia Geological Survey, Morgantown, W. Va. Bulletin 3. Pp. 34; map. Price, \$1. Describes a new field of New River coal in eastern West Virginia.

Scientific and Industrial Research Council of Alberta, Eighth Annual Report, 1927. Pp. 48. Industrial Research Department, University of Alberta, Edmonton, Alberta, Canada.

Earning Power of Railroads, 1928, by Floyd W. Mundy. Jas. H. Oliphant & Co., New York City. Twenty-third issue.

OPERATING IDEAS

from Production, Electrical and Mechanical Men

Bail Added to Transfer Car Saves Labor

Temporary use of the old washing plant for handling the production from the new shaft mine of the Stith Coal Co., America, Ala., called for a cheap method of conveying the coal about 300 ft. to the washer.

A track was laid between the two points and one of a recent purchase of drop-bottom mine cars borrowed for the service. The curve portion of the track was elevated so that a hoist in-



one end of the car to the other as it went around the curve. To save labor and make the operation safer, a 1½-in. rod was attached to the car bumpers so as to form a loop around one side of the car.

The rope clevis is hooked around this rod and can slip from one end of the car to the other. This it does automatically as the car rounds the curve by its own momentum.

Because A. B. Aldridge, manager of the company, suggested the attachment which works so well, the car has been dubbed the "Aldridge Special" by the men around the mine.

Loose Belt Drives May Save Money

Power transmission through belts may result in some peculiar conditions, according to W. F. Schaphorst, mechanical engineer, Newark, N. J. Tight belts cause the journals to consume too much power, while slack belts result in wear and loss of 1 per cent of power for each per cent of slip. With a given belt, however, slippage may be permitted and power still saved. Belts then should be run slack if possible; at the same time the

slip should be prevented. Proper care is a big factor and a pliable belt will go a long way toward achieving this result.

The value of running belts properly is emphasized by a formula giving the money saved per year by converting a tight, slipping belt into a loose, non-slipping drive. The saving in dollars is

$$\left[\frac{WV^2(T_a - T_b)SP}{17,688 T_a T_b} \right] CND$$

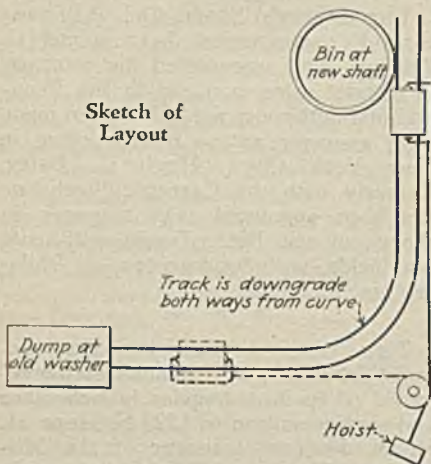
In the formula W is the weight of the engine flywheel in pounds; V is the velocity in feet per second of the flywheel rim at normal speed; S is the per cent saving in belt slip, expressed decimally, which is equal to 2 per cent if the belt slipped 4 per cent while running tight and 2 per cent while slack; P is the engine horsepower; C is the cost of power in dollars per horsepower hour; N the number of working hours per day; D the number of working days per year; T_a the time in seconds for the engine flywheel to come to a stop after the throttle is closed, the belt being loose and the engine driving the belt and pulleys only, and T_b is the time in seconds for the flywheel to stop with a tight belt. T_a will be greater than T_b because of the lessened power consumption of the bearings.

Four tests are required to obtain the figures used in the formula: (1) The belt slip with a tight belt, (2) the stopping time while running light, (3) the belt slip running slack, and (4) the flywheel stopping time running slack. Should it be found that there is more slip running slack than when running

tight, the value $\frac{SP}{100}$ will be negative

and the advantages of loose running may be lost. An example with W as 3,000 lb.; V as 88 ft. per second; S as .03, or 3 per cent; P , 200 hp; C as \$0.015; N equal to 12 hr.; D as 300 days; T_a 180 seconds, and T_b as 150 seconds, showed a yearly saving by running slack of \$472. Such a saving should make a test like this well worth the time of any power plant engineer.

Sketch of Layout



stalled in a shop building nearby could handle the car both ways. Gravity takes the load from the curve to the dump and takes the empty from the curve to the loading point.

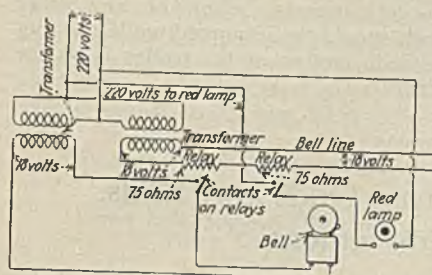
As first used it required the services of one man to change the rope from

Rope Clevis Sliding to the Back



Efficient Slope Signals

An improved signal system for slopes is now in use in a Western mine, according to Morgan F. Powell, electrician, Union Pacific Coal Co., Rock Springs, Wyo. With the system formerly in use there was considerable line drop in the bell-ringing voltage, as the slope was rather long. The trouble



Wiring Diagram, Slope Signal System

was remedied by putting in a new system, shown diagrammatically in the accompanying illustration.

At present two 75-ohm Bunnell relays and two 220 to 12-18-volt bell ringing transformers give very satisfactory service. The intensity of the bell sound and the brilliancy of the red light are the same regardless of the distance of the source of the signals.

Home-Made Tester Shows Armature Defects

Shorted coils or commutator bars, open circuits in armatures or crossed leads may be easily detected by use of a home-made armature tester, according to Thomas James, superintendent Mine No. 3, Knox Consolidated Coal Co., Vincennes, Ind. The apparatus consists of a telephone receiver, dry

cells, buzzer, leads and testing fork. Fig. 1 is a sketch showing the method of testing an armature and Fig. 2 shows the application of the instrument in testing bonds.

In testing an armature without defects the testing fork may be applied from bar to bar of the commutator and the same buzzer tone will be heard in the telephone receiver. A shorted coil or commutator bar will silence the telephone receiver, while an open circuited coil will result in a very loud noise. Crossed leads will result in a softer or louder buzz as the case may be. After a little experience the different tones

Cash In on That Idea

If you have worked out a new mechanical kink, an electrical problem or a short cut in some job you can turn it into money—\$5 paid for bright ideas that find their way into these pages. Photographs and sketches help to put it over.

may be distinguished and the trouble indicated.

The outfit also may be used as a bond tester, care being taken that the power is off when the tests are made. If the bond is good there will be no receiver noise. An increasingly defective contact will, however, be indicated by a corresponding increase in the receiver noise.

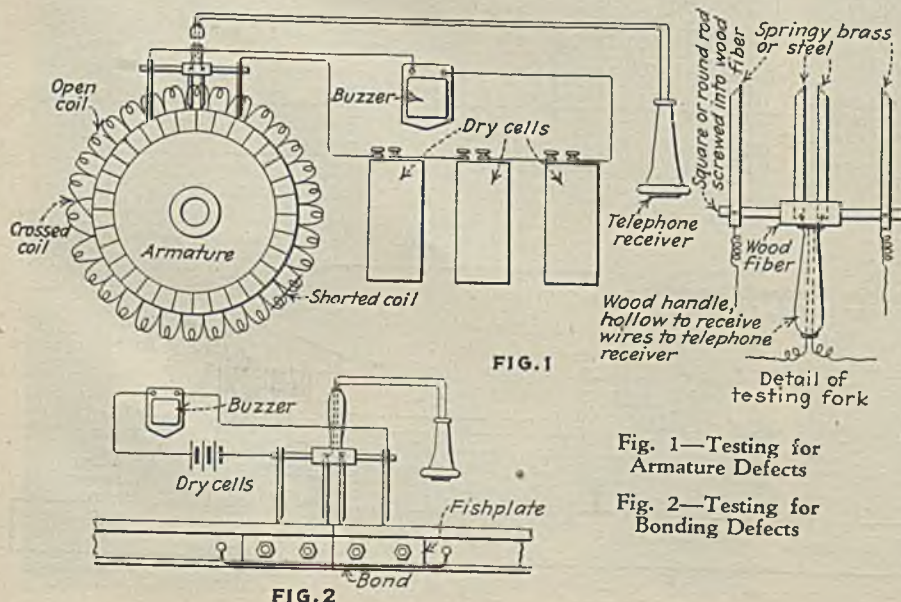


FIG. 1

Fig. 1—Testing for Armature Defects

Fig. 2—Testing for Bonding Defects

Wheel-to-Rail Arcs on "Wireless" Equipment?

Report of arcs occurring at the points of contact between wheels and rail on battery cutting machines and battery locomotives bearing permissible plates indicate that there is need for provision to control stray battery current.

In the case of the cutting machine the trouble was found to have been caused by a combination of two grounds and an open circuit. One ground was in the mining machine motor, while the open circuit and the other ground was in the ampere-hour meter of the power truck.

The grounds themselves caused no arcing outside of the permissible inclosing cases, but the mining machine—a track-mounted type—continued to operate by receiving power from the battery truck through the track as one conductor of the circuit.

Arcs from wheels, due to such a condition, might be prevented by a flexible bond of large capacity between the frames of the power truck and cutting machine. As a further precaution, it would be possible to install current-failure relays in each conductor of the connecting power cable so that an open circuit in either would lock out the controller.

In the case of the battery locomotive, which was operating in a "wireless" mine, it was reported that "fire flew from the wheels." This happened on a section of track where steel ties were used. No outside stray current was detected and no trouble had been located in the battery or locomotive when the report was made.

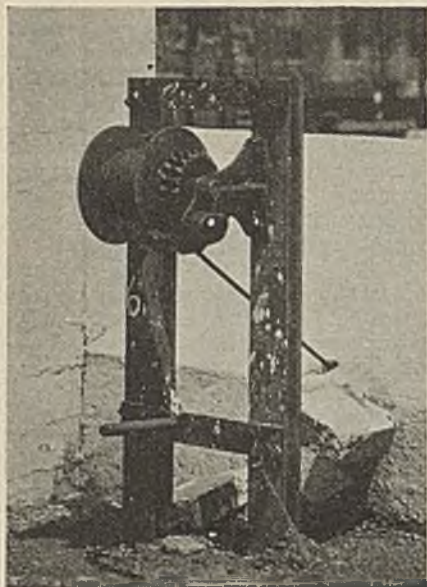
In this case the most plausible explanation would seem to be disappearing grounds in the motors, and a shunting of the current through the rail from one truck to the other. If this can actually occur, then it seems that there is need for bonding together the frames of each motor.

Windlass Utilized to Open Air Door

When a synchronous motor was installed on the fan at Virginia mine of the Gulf States Steel Co., Bessemer, Ala., a door was placed near the fan in the air passage to prevent circulation temporarily while the fan gains speed, thus holding down the load and giving the motor a chance to pull into synchronism.

In case of power interruptions at night the master mechanic had to be called to aid in restarting the fan because it took one man to reopen the door against the pressure. He soon got tired of this, so was prompted to make use of a worm-gear hand windlass which was available.

This windlass is mounted outside near



Allows the Master Mechanic to Get His Sleep

the door of the motor house. The wire rope works through a hole in the side of the air tunnel and over a sheave inside. Now one man can start the motor and open the doors without help.

Some Precautions Against Haulage Accidents

All mining companies, according to the Mining Section News Letter of the National Safety Council, October, 1928, edited by D. Harrington, may well read the attached instructions from a general superintendent to his underground workers, particularly those who are more or less directly interested or involved in haulage, and should by all means be familiar with these hints:

"The dangers incident to motor haulage are many, but with proper and careful operation accidents from this source can be eliminated.

"When the motorman gets his motor in the morning he should examine it carefully and see that it is in good operating condition, well cleaned and oiled. Before leaving the motor barn he should see that the sand boxes are filled and that the sand pipes are open.

"Motormen should always be careful to see that the controller is closed before putting the pole on the wire, and they should never attempt to work on the motor until they are sure that the power is cut off and the trolley pole is removed from the wire.

"Before starting the trip, proper signals should be given by the brakeman, and when all is ready the motor should be opened up steadily, so as not to start the trip with a jerk. Motormen and brakemen should both see that a torch is provided for the rear end of the trip and that this torch is always in place

and kept burning. Before starting the trip, always be sure that the road is clear. Extreme care also is necessary in going downgrade to see that the trip is under control.

"A gong should be sounded continuously when approaching curves, curtains, trap doors or places where workmen are liable to be working.

"No person should be allowed to ride on the motor or in the mine cars except when authorized by the mine foreman.

"Flying switches or flying couplings are dangerous and should not be made under any circumstances. The motor

trip should never be allowed to stand in curtains or trap doors. Motormen should always be on the lookout for men or mules traveling haulageways and, if necessary for the prevention of a possible accident, should slow down or stop until the road is clear and the men or mules are in a safe place.

"In rerailing motor or cars there is much danger, and the shells provided for this purpose should always be used. No adjustments, oiling or any other work should be attempted while the motor is in motion or the trolley is on the wire."

Squeeze Block, Made from Odds and Ends, Is Safe and Convenient

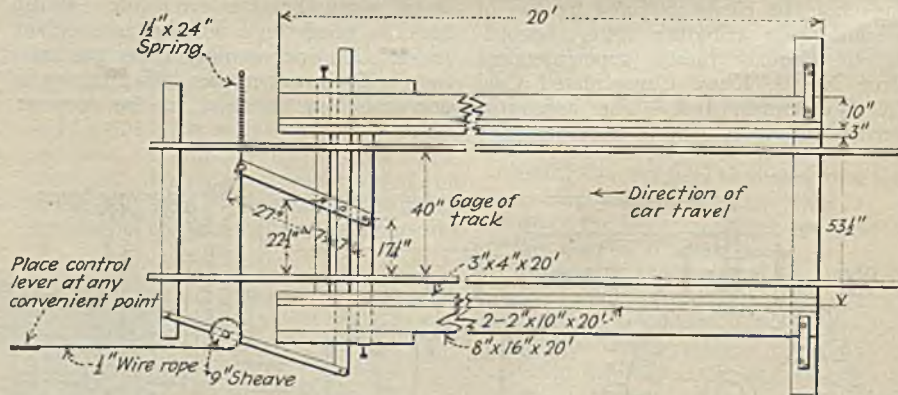
SPRAGGING of mine cars, a task always fraught with some risk of physical injury, is particularly dangerous when practiced on a tippie that is fed from a track having an appreciable pitch. For, if a sprag is missed and the car is moving with a fair velocity, it may wreck the dump and cars.

There are many excellent mechanical retarding devices, both manually and automatically operated, on the market. When, however, for one reason or another it is not practicable to install one of these, the "squeeze block" in use at the Jones mine of the Albuquerque and Carrillos Coal Co., Madrid, N. Mex., and described by A. H. Bushnell of that place, would appear to have many advantages.

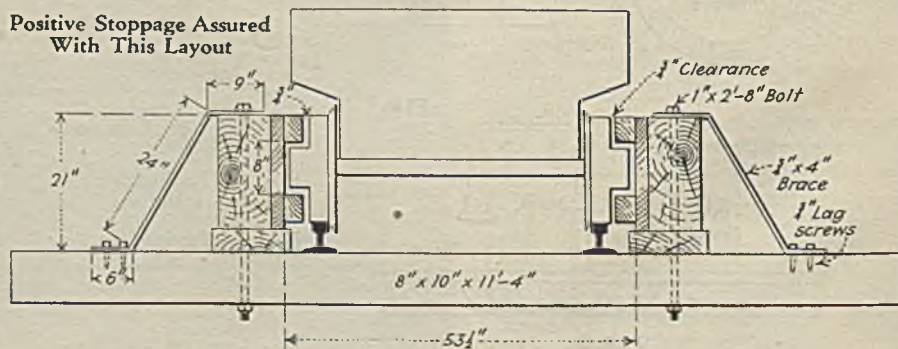
As shown in the accompanying drawings, the device is extremely simple. It can easily be built in a short time, and at nominal cost, entirely from material found around any mine. No special parts are required and no machine work, beyond the drilling of a few bolts, is necessary. Cut timbers, a spring, a small sheave, a few braces, some bolts and other odds and ends, make up the block which can be installed with practically no interference with normal operation.

The lever and ratchet for controlling the block, which can also be used as a trip feeder, are placed at any point convenient to the operator. Aside from the faces of the squeeze blocks, which are easily replaceable, there are few if any parts that require periodic renewal.

Details of Simple Mine-Car Retarder



Positive Stoppage Assured With This Layout



Bronze Welded Cast-Iron Pipe Incased in Concrete Makes "Everlasting" Borehole

AS a result of an unfortunate experience in "losing" a borehole that was used as a duct for electric wires, the Sloss-Sheffield Steel & Iron Co., of Alabama, developed a type of installation which should last as long as would ever be needed at any mine.

It was at Flat Top mine that the borehole was lost and was replaced by a trouble-proof installation. The original hole was cased with steel pipe around which cement grout had been poured.

Apparently the pipe was eaten away by corrosion at some point where it was touching the wall of the hole and not protected by grout. Influx of acidulous water then destroyed the cable insulation and caused a ground. Efforts to clear the hole for a new cable were unsuccessful. The hole was but three years old when the trouble occurred.

The new installation has three improvements over the one that failed; the casing is uniformly surrounded with concrete; it is of cast iron instead of steel and a fiber duct insulates the inside of the casing.

A unique method of installing the cast-iron pipe was employed. This

pipe, of 4½-in. inside diameter and 5-in. outside diameter, was delivered to the job in 24-ft. lengths. These were made up in the Birmingham factory of the American Cast Iron Pipe Co. by butt welding pieces having plain ends. The welds were made with a gas torch and Tobin bronze filler rod.

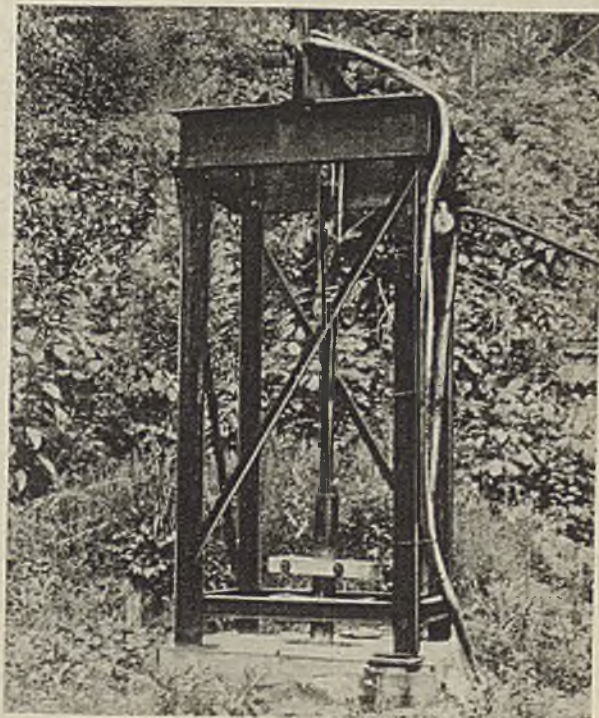
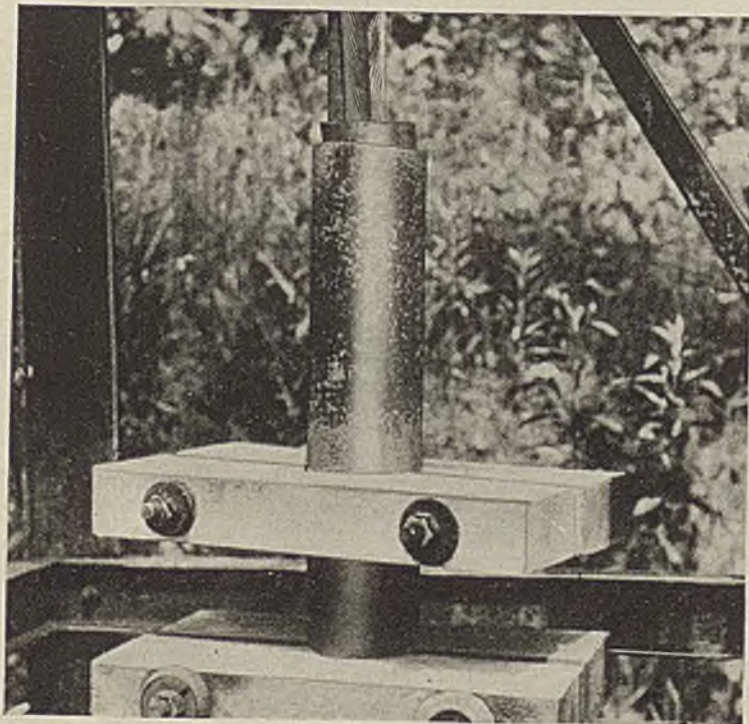
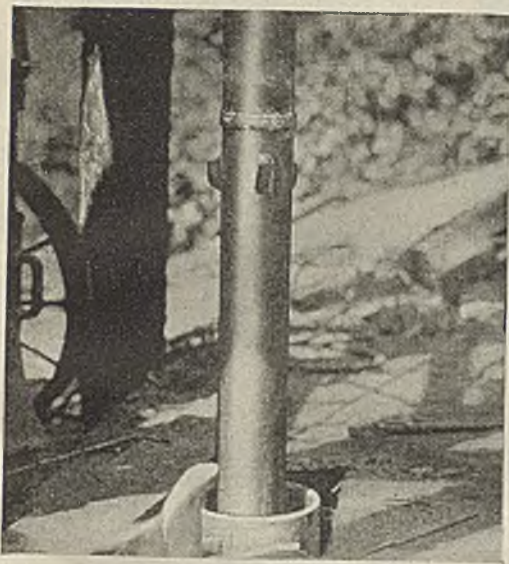
The 8-in. borehole, 316 ft. deep, was plugged at the bottom and allowed to fill with water. The lower end of the first section of pipe to be placed in the hole was plugged to keep water from entering. This caused the casing to displace a column of water 5 in. in diameter which supported so much of the

Upper Left: Welding Completed, Ready to Lower

Lower Left: Casing, Duct and Power Cables

Upper Right: Adding Sections of Duct

Lower Right: Cables Suspended From a Steel Frame



pipe weight that the light drill rig was use for the lowering.

As the casing was lowered into the hole the 24-ft. sections were joined with bronze welds made by a workman from the factory. He also attached, near each joint, four 1-in. blocks of cast iron to act as spacers to keep the pipe away from the walls of the hole.

The fiber duct, of 3½-in. inside diameter, was installed as the pipe was lowered and the lengths assembled so as to break joints with the pipe. It took two days for the lowering and welding.

The water was not drained from the borehole before grouting the casing, but instead the grout was poured in and as it settled it caused the water to run out of the top. The 1-in. cast-iron lugs insured that the pipe would be surrounded at all places by at least 1 in. of cement.

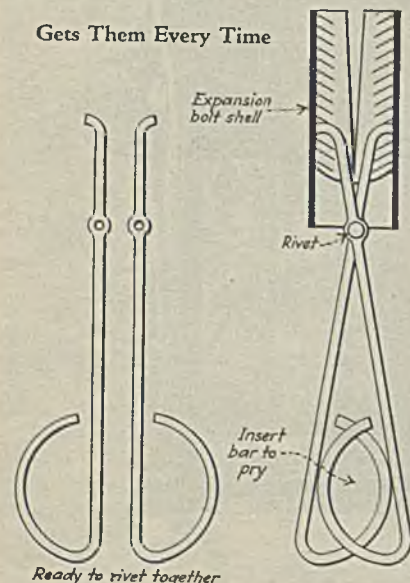
When the borehole and casing plugs were removed, the fiber conduit was held from slipping by a bronze ring upon which it rested. This ring was welded into the pipe before plugging.

As now used, the borehole contains a 1,000,000-circ.mil 250-volt positive line and two negative lines of the same size and voltage. The positive line is insulated with braid and rubber but the negative lines are bare.

A. F. Elliot, general master mechanic and chief electrician of the company, called attention to the fact that use of a fiber duct in a borehole reduces the rate of heat transfer and that this should be taken into consideration if the cables are to be heavily loaded.

Reclaiming Trolley Hanger Shells

The shells in which the expansion bolts of the trolley hanger assembly work usually are lost, according to John G. Leller, mine electrician, North-East Coal Co., Auxier, Ky., unless some special device is made for reclaiming

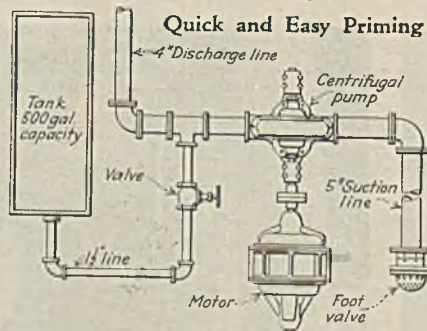


them. Accordingly, he has developed the handy little tool shown in the illustration. The over-all length is about 7 in., and it is forged from tool steel and riveted together as shown.

In using the extractor the expansion bolt is first removed and the nut punched up and out of the shell. The extractor is then inserted in the shell and engaged by squeezing the handles together. A small bar is then pushed through the handle loops and the shell pulled out.

Centrifugal Pump Primed From Auxiliary Tank

Priming of a 5-stage 5-in. Gould centrifugal pump is accomplished by means of a primary storage tank holding 500 gallons, according to C. E.



Lively, Capels, W. Va. An inch and one-half line from this tank taps into the discharge line, as shown in the figure. When starting the pump the valve is opened in the small priming line and the pump and suction line filled from the water in the tank. The pump is then started, the valve in the pumping line being left open until the tank is filled for the next priming operation.

Series Capacitor Allows Longer A.C. Lines

Voltage drop due to inductance is the disadvantage of a.c. transmission. It has been demonstrated in laboratories for years that this can be overcome by connecting a condenser in series with the conductors, but only recently has the idea been put into practice.

The capacitors must be of the proper size to produce a tuned circuit such as is used in radio receivers. Then an effect is obtained which gives the line a characteristic somewhat as if it contained resistance only.

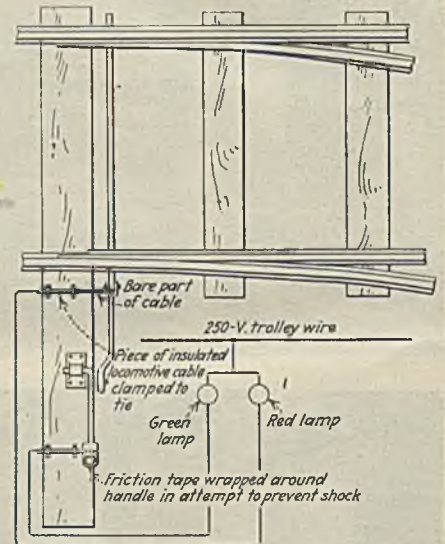
This use of capacitors should not be confused with that of connecting them in parallel with motors to improve power factor of the load. It is possible that the application will prove practical on 220-volt a.c. underground lines feeding mining machines and loading equipment. In that case the high-voltage cable might be kept out of the mine and the transformers installed at the top of the borehole.

Practice Indicates Need For Signal Switch

The number of mines using admittedly unsatisfactory contact methods for control of signal lights that indicate an open or closed condition of track switches reveals that there is a market for a contact device fulfilling practical requirements.

Efficiency and safety demand that a motorman know the position of a track switch when he is several hundred feet distant. This can best be indicated to him by red and green lights located at the switch. The accompanying sketch shows a common arrangement in 250-volt mines. The electrical ground connection to the respective signal lights is by way of the lever, connecting rod, tie rod and switch points.

The chance for a poor or open electrical connection in these several joints makes it likely that once in a while a person throwing the switch with bare hands will receive a shock. This prohibits the use of the open contact in 550-volt mines, and makes its use questionable in 250-volt mines. Usually



Users Admit That This Method Leaves Considerable Room for Improvement

canvas gloves are depended upon for insulation, but in some instances the handles of the switch levers are covered with friction tape. Even so, there remains the danger of stepping on the bare "hot" wire which is clamped to the tie.

Other ways such as inserting an insulated push-button switch in the wood tie are employed, but in very wet mines these devices cause trouble. It appears that if there were developed and manufactured a contactor which would be rugged, moisture resisting and moderately low in cost its use would extend to practically all mines employing electric haulage.

WORD *from the* FIELD

Commercial Coal Stocks At Seasonal Average

Commercial stocks of bituminous coal, used largely for industrial purposes, amounted to 41,100,000 tons on Oct. 1, 1928, according to a survey just completed by H. O. Rogers and F. G. Tryon, of the U. S. Bureau of Mines. In comparison with the stocks reported on July 1, the date of the last previous survey, this is a decrease of 600,000 tons. The reserves on Oct. 1 compare favorably with the average for this season in other recent years.

Exports during the third quarter of 1928 averaged 399,000 tons a week against 270,000 tons in the previous quarter and 351,000 in the third quarter of last year. The weekly rate of home consumption averaged 8,246,000 tons, slightly less than in the corresponding period a year ago.

In addition to the stocks in the hands of consumers there were 9,443,011 tons of bituminous coal on the docks of lakes Superior and Michigan.

The stocks of domestic anthracite held by the coal merchants reporting are close to the average for this season of the year.

Public utility power plants of the country consumed 3,820,881 net tons of coal in October, an increase of 397,008 over the preceding month, according to the Geological Survey. Fuel-oil consumption by these plants totaled 645,965 barrels in October and 604,547 barrels in September. The average daily production of electricity in October was 255,000,000 kw.hr. and the total for the month, 7,901,000,000 kw.hr., which established a new record.

Anthracite Shipments Higher

Shipments of anthracite for the month of October, 1928, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., amounted to 6,618,256 tons as compared with 5,701,707 tons during the same month last year, indicating an increase of 916,549 tons. Compared with the preceding month of September, October shipments show an increase of 1,025,628 tons.

Shipments by originating carriers for October were as follows:

Railroads	October, 1928	October, 1927
Reading	1,336,326	1,128,115
Lehigh Valley	1,155,891	855,244
Central R.R. of New Jersey	662,115	597,743
Del., Lackawanna & Western	970,571	877,481
Delaware & Hudson...	860,478	698,441
Pennsylvania	532,037	542,917
Erle	676,390	536,257
N. Y., Ontario & Western.	184,267	184,286
Lehigh & New England.	240,181	281,223
Total	6,618,256	5,701,707



Photo by Blank & Stoller
John M. Carmody

Carmody Leaves "Coal Age" To Direct "Factory"

John M. Carmody, who for the last year and a half has been editor of *Coal Age*, was appointed editor of *Factory and Industrial Management*, effective Nov. 15. Joining the staff of *Coal Age* as associate editor early in January, 1927, he became editor in chief a few months later. Previous to his connection with the staff of this paper he was engaged in the study of industrial relations for the U. S. Coal Commission, later becoming vice-president of the Davis Coal & Coke Co.

Mr. Carmody is peculiarly well equipped for his new position, having had broad experience in factory management and industrial relations. He went from school into the steel business, rising to the post of manager of structural shops. Subsequently he entered the garment industry, becoming manager of production and labor. He also was associated with Harrington Emerson and made a study of management engineering as a profession.

His winning personality has won him many warm and lasting friendships and has brushed aside most of the obstacles in the accomplishment of any tasks he has set for himself. His associates bespeak the same success for him in his new field and their best wishes go with him.

Say Future of Coal Industry Is in Hands of Science

Liquefaction of coal, utilization of forest wastes as cattle fodder and progress in coal research were discussed by prominent foreign and American scientists at the coal luncheon of the American Institute held at the Hotel Commodore, New York City, Nov. 10. The luncheon was a preliminary to the second International Coal Conference held at Carnegie Institute of Technology, Pittsburgh, Pa., Nov. 19, and was presided over by Dr. Thomas S. Baker, president of Carnegie "Tech."

"The second International Fuel Conference is intended primarily to bring science to the aid of coal producers as it has been brought to users in the past," said Dr. Baker, who then continued with an outline of the fuel conference. At the conclusion of his remarks he introduced Dr. Friedrich Bergius, Heidelberg, Germany, who spoke on the liquefaction of coal.

"The process of liquefaction of coal was developed as the result of an attempt to shorten progress of development of wood to coal," said Dr. Bergius. Continuing his remarks, he stated that investigation has shown that 60 per cent of wood waste can be converted into pure carbohydrates which are assimilable by the digestive system. The chief use of the product for some time to come will be as a cattle fodder.

Great Britain has in the past placed her dependence on easily won coal, according to Dr. Cecil H. Lander, director of fuel research, Department of Scientific and Industrial Research, London, England. Increasing difficulty in producing coal and the high cost of substitutes have brought attention to the coal problem and resulted in the formation of the Fuel Research Board. Two main lines of study are pursued by the board. The first consists of a survey of all the seams and determination of their characteristics to prevent wasteful or wrongful use. The second object is the behavior of the coal under actual operating conditions, the various tests being made at East Greenwich.

Continuing, Dr. Lander discussed low-temperature carbonization and pointed out the benefits which may be derived. The chief drawback to its use in England is, however, that the product derived from the process displaces commercial lump coal, as the demand for fuel is not elastic. Consequently those operators producing domestic fuel are loath to use it and bring pressure on others to prevent their installing plants. Low-temperature carbonization, therefore, is considered to have only a local use in England.

A. C. Fieldner, in charge of experi-

ment stations, U. S. Bureau of Mines, Washington, D. C., who was the next speaker, reviewed the present situation in regard to motor fuel and the possibilities of future production of such from coal. If all the present motor-fuel requirements were produced from coal the production of the latter would be increased about 60 per cent, or about the extent of present capacity of the mines.

Factors resulting in the present depression, Mr. Fieldner continued, are water-power competition, overproduction, the conflict of union and non-union interests, fuel oils, natural gas and increased efficiency of utilization. Coal producers, said Mr. Fieldner, may combat this condition by the introduction of mechanized mining, more efficient preparation and research. The coal man invoking the aid of science will be the winner in the future struggle.

West Virginia Problems Up At Institute Meeting

At the winter meeting of the West Virginia Mining Institute, held at Beckley, Dec. 3, T. G. Fear, general manager of operations, Consolidation Coal Co., described in detail the organization and working plan of the "Safety Court" which on Jan. 1, 1928, became a definite part of the company's safety program. At the same meeting the constitution of the institute was amended to call for but one meeting per year instead of two, and that to be held in December.

The safety court of the Consolidation Coal Co. evolved from a "kangaroo" safety court started at Jenkins, Ky., in the early days of that operation. Since the beginning of the year about 300 monthly sessions have been held at the 35 operating mines of the company, and over 1,500 cases of safety rule infractions tried. The maximum fines of \$1, collected through the payroll if necessary, are distributed to charity. In cases of flagrant or repeated violations, offenders are disciplined.

Mr. Fear said that as a result of the safety court activities the company now has 10,000 "safety inspectors" instead of six. Safety improvement, attributed largely to the safety court, is indicated by the following tonnages per fatality: 1926, 258,000; 1927, 345,000; first 11 months of 1928, 521,700.

P. D. McMurrer, of the West Virginia Coal & Coke Co., Omar, read a paper, "Modern Tendencies in Tipple Design," by Thomas A. Stroup, chief engineer. "Cheap Coal" was the subject of a paper by Josiah Keely, president and general manager, Cabin Creek Consolidated Coal Co. He suggested many proved ways of avoiding expensive installations where investment must be held to a minimum. Ingenuity and fundamental thinking were evidenced by his paper.

In a paper, "New Markets for West Virginia Coal," David B. Reger, assistant geologist in charge of the West Virginia Geological Survey, suggested

Employment and Wages High in Industry

Industrial wage earners' incomes this autumn reached their highest level since 1920, a year of inflation, and employment in manufacturing was at the highest point since April, 1927, according to monthly reports to the National Industrial Conference Board by approximately 1,500 manufacturing establishments employing an average of about 800,000 workers.

The outstanding phenomenon in the labor situation, however, according to the Board's analysis, is the marked stability of wage rates and earnings, which since 1923 have fluctuated less than 5 per cent and during the current year have shown a slightly upward trend.

Employment in September was more than 6 per cent higher than at the low point in November, 1927, and 4 per cent higher than in September a year ago. But not only was the number employed greater, but the total number of hours worked by them in September was 10.8 per cent greater than that in the low month of November, 1927, and 6.2 per cent greater than September a year ago. These figures are averages based upon the reports from individual plants in 25 different industries and hence reflect greater improvement in some than in others.

that the mining interests of the state acquire control of the retail distribution as has been done by the oil companies, foster the construction of coking plants, brick and tile plants, and cement plants in the state, and sponsor mining education and research.

Stanley Higgins, secretary of the New River Operators' Association, said that the state appropriation for industrial education for mining, the principal industry of the state, is but \$20,000 per year as compared to \$300,000 for agriculture.

Walter B. Dalrymple, inspector, the New River Co., Macdonald, in a paper, "Mechanized Coal Loading," said that the company has "done very well with entry-driving machines but not so well

with the heavy drag flight longface conveyors." The light jiggling conveyor has been more successful.

E. S. Wade, superintendent, Beech Bottom mine, West Penn Power Co. and retiring president of the institute, presided. New officers elected were: president, C. E. Lawall, professor of mining, West Virginia University; vice-presidents, Mr. Fear; M. L. Garvey, manager, New River Co., Mt. Hope; John Koch, superintendent, Hitchman mine, Hitchman Coal & Coke Co., Wheeling; executive board, Josiah Keely, president and manager, Cabin Creek Consolidated Coal Co., J. W. Bischoff, manager, West Virginia Coal & Coke Co.; R. F. Carson, mining engineer, Huntington, and L. S. Taylor, mining engineer, Elk River Coal & Lumber Co., Widen.

F. K. Copeland, President of Sullivan Co., Dies

Frederick Kent Copeland, president of the Sullivan Machinery Co., Chicago, since 1892, died at Claremont, N. H., Nov. 10, following an operation for appendicitis. He was born in Lexington, Mass., in 1855 and was graduated from the Massachusetts Institute of Technology in 1876. After several years spent in Iowa and Colorado in mining engineering work he helped organize the Diamond Prospecting Co. in 1884 and became its president. This company engaged in contracting with the diamond core drills made at Claremont, N. H., by the Sullivan Machine Co. In 1892 the two companies were merged, with Mr. Copeland as president. Under his leadership Sullivan products were developed for a wide range of purposes, serving the mining, quarrying, construction and manufacturing industries.

Mr. Copeland combined a great capacity for leadership with an unusual power for grasping and analyzing facts, and with keen foresight and sound judgment. His counsel in the industries of which he was a part was often sought and highly valued. In business he was a strong individualist, believing that helping other men to help themselves, in an atmosphere of fair play, is the best social and industrial policy.

Mine Executive Takes to the Air

C. A. Griffith, general manager, Pruden Coal Co., Knoxville, Tenn., and H. G. Tierney, field circulation representative of the McGraw-Hill Publishing Co., about to take off for a flight. The new "Waco" plane, which replaces a previous model owned by Mr. Griffith, is powered by a Wright "Whirlwind" engine. Mr. Griffith finds it a time saver in traveling between Knoxville and the mine at Pruden, Tenn.



Mechanization Dominates Annual Meeting Of American Mining Congress

Mechanization dominated the sessions of American Mining Congress held at Washington, D. C., Dec. 5 to 8. The interest in mechanization transcended that in the rehabilitation of the industry, regarding which it was felt little new could be said. J. B. Pauley, chairman, Miami Coal Co., Chicago, discussed at the Friday morning session "What Mechanization Means to the Mine Operator," saying that it is neither humane nor profitable to build industry on the work of blistering hands, that mechanization of the loading operation should be welcomed as lightening heavy toil. The industry had been hampered in mechanization by its dire necessities, for, as Andrew Carnegie had said: "Good business is never done with a worried mind."

Mr. Pauley related his experiences in installing twenty machines at one time at a cost of a quarter of a million dollars. These soon paid for themselves and built up a bank account. He added that no longer was there need to worry about the increased volume of slack with loading machines, for units could be bought that would deliver as large a percentage of lump as the hand shovel and regularity and continuity of operation were being obtained.

The paper of Col. M. C. Rorty, vice-president, International Telephone & Telegraph Corporation, stated that the reduction of labor by men leaving work was enough to reduce the forces in any industry to a level that would meet the decreased demand for labor due to mechanization. The pace of new methods was not a killing one; old methods were just as trying. Men liked the rhythm of a well-organized plant, especially those who did not want the labor of thought. Mechanization, however, demanded more skilled labor than hand labor.

At the meeting of the board of directors at noon Friday Robert E. Talley, United Verde Copper Co., Clarkdale, Ariz., was elected president for the ensuing year.

AT THE informal luncheon to delegates J. G. Bradley, president of the American Mining Congress, acted as chairman, introducing Secretary of Labor Davis; H. N. Eavenson, consulting engineer, Pittsburgh, Pa.; W. E. E. Koepler, secretary, Pocahontas Coal Operators' Association, Bluefield, W. Va., and four metal-mine representatives.

Mr. Eavenson declared that the Pittsburgh district had committed itself to coal cleaning as never before and had constructed one plant which would clean the product of five or six mines. He did not believe that so large a coal-cleaning unit had ever been constructed for the bituminous mines of this country, and in fact it was doubtful if any was to be found abroad of equal capacity.

Mr. Koepler said that the Pocahontas

region also had laid especial emphasis on coal cleaning in the last few years, and in the last few months had introduced many new loading machines. He was not disposed to discuss the problems of the coal industry. They had been described too often in public places. As a result a number of quite incapable people had been moved to propose impossible solutions, to the disadvantage of the industry.

A nominating committee was appointed consisting of A. G. Mackenzie, secretary Utah chapter of the Congress; Ex-Governor J. F. McDonald, president, Downtown Mines Co., Leadville, Colo., and H. B. Fernald, Loomis, Suf-fern & Fernald, accountants, New York City.

At the afternoon session J. G. Bradley presided and read a paper on "The Clearing House of Mining," saying that what affected one industry was likely to affect a kindred one. A burden put on the zinc industry was quite likely to be imposed eventually on coal. Consequently some co-ordinating body like the American Mining Congress was necessary.

HE DECLARED that a desire to be President caused much undesirable activity among politicians and politically minded persons. Excellently well fitted as Mr. Hoover was for the presidency, his success in obtaining that office raised up the possibility of men seeking that honor as a reward for "department building."

The industry must deal with human nature as it finds it, and it must face the fact that Mr. Hoover's great and honorable achievement may be copied by imitators of lower attainments and less lofty principles. Thus Mr. Roosevelt rose by denouncing in forcible language improper methods of conducting business and was followed by a crowd of imitators who scourged industry even when honorably conducted. For these reasons there was need for a clearing house such as the American Mining Congress to protect the interests of the mining man.

J. W. Furness, chief, Minerals Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., spoke on "The Flow of Minerals Into World Trade." Coal was a minor item in his remarks, but incidentally he stated that the eight countries he discussed took the following order in regard to coal output and showed percentage productions as follows: United States, 38; Germany, 20; United Kingdom, 15; France, 5; Japan, 3; Belgium, 2; Italy, 1; Spain, less than 1.

H. Bentley MacKenzie, former American commercial attaché to Buenos Aires, read a paper on the mineral resources of the Argentine. "Coal deposits," said Mr. MacKenzie, "have been found in the province of Mendoza, the territory of Neuguen and in

the Patagonian territories to the South. Two or three of these show some promise, and one seam discovered in Patagonia was several feet in thickness and extended for several miles. There is some question as to the quality of the coal in Argentina, and transportation costs would be high, with the result that there has been no important development in this industry to date. At this session two papers were read on minerals other than coal.

The standardization meeting was held on Thursday morning instead of on Saturday. Col. W. R. Roberts reported the status of affairs. He said that almost every phase of mining activity had been affected by the mechanization movement and that a research body was necessary to give the standardization body the basis for the formulation of its standards and for the revision of those already formulated. That informative material would be supplied quite largely by the new national committee on mechanized mining under L. E. Young, vice-president, Pittsburgh Coal Co., Pittsburgh, Pa., as chairman, with thirteen general chairmen and fifteen local chairmen, each with a committee. The ventilation committee had been reconstructed under A. W. Hesse, chief engineer, Buckeye Coal Co., Nemaquin, Pa.

At the afternoon session C. E. Bockus, Clinchfield Coal Corporation, Dante, Va., presided. H. E. Willard, secretary United States Coal Co., spoke on "The Coal Industry." He said that it was anomalous that purchasing agents can, and have, met to keep prices down below the cost of production, but that coal producers are not allowed to meet to keep coal prices up to such production costs.

J. D. Francis, vice-president, Island Creek Coal Co., discussed "Coal's Relation to Government," saying that mergers and co-operative sales agencies seemed the only legal ways in which the price of coal might be kept above the cost of production. All other forms of combination could be arranged only with the help of Congress, and the regulation and interference that would go with such provisions would make the cost of such advantages much greater than the privileges.

"HOW Anthracite Is Meeting Competition" was the subject of the remarks by A. B. Jessup, vice-president, Jeddo-Highland Coal Co., Jeddo, Pa. He declared that the consumer tested coal by trying to find if he could burn it in his furnace. It was a star chamber proceeding. If it wouldn't burn, he blamed the coal. Now, fortunately, Anthracite Service came in to show him that the fault was not with the coal but with the furnace.

Mr. Bockus remarked that a banker had told him that the industry seemed to him like a hive of bees. They were swarming but who could make them hive? He thought of smoke and tin pans as a corrective, but finally realized the trouble—there was no queen bee. That is the trouble with the industry.

If it only had a queen bee like the U. S. Steel Corporation in the steel industry, how easy it would all be!

The following were elected directors for three years: J. T. Skelly, Hercules Powder Co., Delaware; Robert E. Tally, United Verde Mining Co., Arizona; S. Livingston Mather, Cleveland-Cliffs Iron Co., Ohio; and for two years W. H. Lindsey, Napier Iron Works, Tennessee.

Harlan County Operators Open Rescue Station

The twelfth annual meeting of the Harlan County Coal Operators' Association, held at Harlan, Ky., Nov. 23, was featured by the opening of its new mine-rescue station. These officers were re-elected: L. P. Johnson, president; D. B. Cornett, vice-president, and E. R. Clayton, secretary.

Judge H. B. Lindsay, of Knoxville, was toastmaster at the dinner, and the speakers included Secretary Clayton, who described the mine-rescue station provided by the association; J. F. Bryson, the new safety director; G. S. McCaa, chief engineer in charge of primary instructions units, U. S. Bureau of Mines, Pittsburgh station; J. A. Dickinson, superintendent of the Mahan Ellison Coal Corporation; J. F. Daniel, chief, Kentucky Department of Mines, and President Mahan and Executive Secretary Gandy of the National Coal Association.

Montana Miners Reject Pact

There was a virtual suspension at coal mines in Montana Dec. 6 following refusal of district 27, United Mine Workers, to confirm the new wage agreement negotiated the week before. The new pact contains the following provisions: Basic day wage rate, \$7.19; loading-machine operators, \$9.25; mining rate reduced 16c. per ton; yardage and dead work reduced 20 per cent.

Open 12 Schools for Miners

Schools for miners, to prepare them for the state examinations for foreman and firebosses, have been opened in twelve towns in the mining sections of Ohio under the direction of the State Department of Vocational Education in conjunction with the Department of Mining at Ohio State University. The schools are conducted at night and teachers are furnished by the Department of Vocational Education. They are located at Neffs, Amsterdam, Nelsonville, Glouster, Corning, Shadyside, Byesville, Salineville, Steubenville, Adena, Chauncey and New Lexington.

The teaching staff consists of two full time and two part time teachers. About 350 miners are enrolled in the schools. The first year's studies consist of mine gases, ventilation, mathematics and geography. The second year's course consists of such subjects as roof control, transportation and drainage.



Delbert H. Pape

Has joined the Cosgrove-Meehan Coal Corporation forces in the capacity of assistant to the president, effective Dec. 1. His headquarters will be at the general offices of the company, in Johnstown, Pa. With the exception of two years with the Oregon Short Line R.R. Mr. Pape's entire business career has been in the coal industry, comprising many years' experience in the Southwest before he became prominent in association work in the East as assistant secretary of the National Coal Association and later executive secretary of the Monongahela Coal Operators' Association.

Accept Wage Cut in Wyoming

Union coal miners in southern Wyoming voted Nov. 24 to accept the new wage agreement adopted by the joint scale committee of operators and United Mine Workers. The vote was 2,031 to 1,338, with one local having 26 votes missing.

The new agreement, which is effective as of Dec. 1 and will continue until April, 1932, provides for these reductions: Pick mining, 16c. per ton; shooting and loading, 13c.; loading, 10½c.; yardage, 20 per cent; all inside day labor, \$1.20; all outside day labor, \$1.05; greasers, slate pickers, switch boys and boys coupling at partings, 85c.; hoisting engineers, outside, placed on day wage rate of \$8; power-house engineers, reduced \$1.05 per day; loading-machine operators, put on a day rate of \$9.

New Permissible Plates By Bureau of Mines

Approvals of permissible mining equipment were issued by the U. S. Bureau of Mines during November as follows:

(1) "Brownie" room hoist; Crocker-Wheeler 5-hp. motor and starting switch; 250-500 volts, d.c.; approvals 162 and 162A; Brown-Fayro Co., Nov. 30, 1928.

(2) Deming "Oil Rite" mine pump; General Electric 3-hp. motor and control; 250 volts, d.c.; approval 161; General Electric Co., Nov. 9, 1928.

(3) Oxweld Acetylene Co. methane indicating detector; approval 802; Oxweld Acetylene Co., Nov. 27, 1928.

McGraw-Hill Co. Expands Facilities in Chicago

Signalizing the rapid development of its publishing operations, the McGraw-Hill Publishing Co. is having erected in Chicago a building to bear its name and for the first time is placing there a resident vice-president as head of its Chicago interests. The building is now in course of construction at 520 North Michigan Avenue, in a rapidly developing new business center and will house all the McGraw-Hill interests centering in Chicago. The resident vice-president will be Edward J. Mehren, a native Chicagoan, who has been with the McGraw-Hill organization in New York for 22 years in editorial and publishing capacities.

These two moves are a logical result of the rapid expansion of the company's activities in Chicago. It now publishes there four papers, *The Magazine of Business, Factory and Industrial Management, System*, and *Harvard Business Review*, the latter published for the Harvard University School of Business Administration. A fifth magazine, *Industrial Engineering*, will soon be transferred from New York to Chicago.

Three Coal Company Officials Killed in Mine Blast

An explosion in an unused mine of the Himler Coal Co., at Himlerville, Ky., on Nov. 27, killed the president, general manager and mine superintendent of the Glogora Coal Co., of Huntington, W. Va. The dead men were Richard Williams, 36, of Huntington, president; C. H. Beidenmille, 37, of Huntington, general manager, and C. D. Schlegel, 40, of Glo, Ky., superintendent of the company's Kentucky mine. They were inspecting the property with a view to its possible purchase.

Truax-Traer Financing

The Truax-Traer Coal Co. announced on Nov. 16 an issue of \$3,000,000 fifteen-year 6½ per cent convertible debentures and 100,000 shares of common stock to finance its recent purchase of the Black Servant Coal Co. as well as the contemplated acquisition of the Cabin Creek Consolidated Coal Co. in West Virginia. The Truax-Traer company has operated strip mines in North Dakota for a number of years. Josiah Keely will continue as president and general manager of the Cabin Creek company.

Michigan Ratifies New Scale

Union coal miners in district 24 (Michigan) have ratified the new wage agreement recently negotiated by representatives of the miners and operators. The new scale carries a reduction of 19 per cent on all classes of labor except mechanical loading, which retains the old rate.

Sees Co-operation of Contented Labor Holding Future for Anthracite

ANTHRACITE problems in relation to the future and lightning control were the topics considered at the joint meeting of the Lehigh Valley Section of the A.I.E.E. and the Engineers' Society of Northeastern Pennsylvania, held at the Necho-Allen Hotel, Pottsville, Pa., Nov. 16. After a dinner and a short business session W. H. Lesser, mechanical engineer, Madeira, Hill & Co., Frackville, Pa., chairman of the meeting, introduced E. H. Suender, general manager, anthracite mines, Madeira, Hill & Co., who spoke on "Anthracite Problems."

"So much has been said and recorded in the archives at Harrisburg and Washington," Mr. Suender remarked, "that it is difficult to present any new information. I believe, however, that all superintendents and operators should become better acquainted with the problems confronting the anthracite industry and that all operators and men should be equipped to combat critics within and borers without."

Continuing, Mr. Suender stated the anthracite industry is in an era of keen competition, resulting in narrower margins, corresponding cuts in overhead expenses and a tendency to merge which is now being aided by the government. Larger businesses will result in raising the ethical standards and nothing is to be feared from the trend toward mergers though it is difficult to say what will happen 50 years hence. However, past growth may be studied as a guide to the future and the anthracite industry may look forward hopefully if it retains its present high standards of service, quality and ethics.

Difficulties besetting anthracite in the past have resulted from government interference and strikes. The last strike caused the loss of 5,000,000 tons to the industry as well as the good will of the country at large—the latter being the more important. To regain this good will a price must be paid and is being paid by operators, workers, professional men and retail dealers in the anthracite field. Though the anthracite industry is said to be on the wane nine billion tons yet remain to be mined and in the face of the general national prosperity only pessimists could conclude that it has a poor future.

Gas, soft coal, coke and other fuels gained at the expense of anthracite during the last strike and increased efficiency in use has still further reduced the possible demand. However, consumption is increasing with expansion in industry and in spite of the difficulties in its path anthracite has made its product the best serviced fuel in the world and is regaining its lost markets by advertising and research.

The future depends upon lower prices for domestic sizes, so if the wage scale is to be kept up to its present level the cost of production must be cut by increasing the tonnage produced per man.

Co-operation and teamwork on the laborer's part and attention to every possible economy in operation by the management therefore is necessary. Men without vision and ideas have no place in the industry.

Difficulties may be expected if the problems to be met are not brought home to the worker, for upon him rests a large part of the burden of rehabilitation of the industry. Industrial warfare is as useless as national warfare and the



E. H. Suender

present labor agreement was accordingly designed by operator and miner to prevent future strikes. If both sides be not in agreement it is better to let the question be decided by disinterested parties rather than resort to hostilities.

In conclusion, Mr. Suender remarked that present activity did not mean that the problems had been solved but that progress had been made. Continuation of the co-operative spirit and a seasonable winter will greatly improve conditions. In the event of another strike, however, it is difficult to see how growth of the industry will continue. But granted continuity in supply and a continuation of co-operation, the anthracite industry is rendering a real service to society.

Following Mr. Suender, J. H. Cox, transmission engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., gave an account of the effects of lightning on high-tension lines as revealed by tests made in Tennessee with the klydonograph and the Norinder cathode-ray oscillograph. Present practice in lightning protection was outlined.

AT A MEETING of the directors of the Consolidation Coal Co., held at 15 Broad St., New York City, Thomas I. Parkinson was elected to the board in pursuance to an amendment to the by-laws increasing the directorate.

Personal Notes

HODGE BURRESS, formerly with the O'Gara Coal Co. at Harrisburg, Ill., has accepted a position as division superintendent with the Utah Fuel Co., at Castlegate, Utah.

C. H. MACDONALD, manager of the market research department of the Colorado Fuel & Iron Co., has been appointed director of sales of the company.

FRANK MARTIN, of London, Ky., has been appointed district mine inspector for the Fourth District of Kentucky, composed of Bell, Knox, Whitley and McCreary counties, according to an announcement from the office of J. F. Daniel, chief of the State Department of Mines.

ANDREW H. SMITH, formerly with the Hudson Coal Co., Scranton, Pa., started on Dec. 1 as instructor in mine foremanship in the extension department of West Virginia University. He probably will locate at Mt. Hope, where two classes per week will be held, but he also will hold classes at Beckley. Mr. Smith takes up this new branch of the university's extension training after 25 years with the Hudson company.

S. D. DIMMICK, vice-president of the Glen Alden Coal Co., Scranton, Pa., was injured Nov. 19 when his automobile figured in a crash with another machine. Mr. Dimmick was driving his wife and two women friends to his home when the accident occurred. Mr. Dimmick suffered injuries about the shoulder and legs but his condition is not serious.

JAMES M. ORR, general manager of the Utah Coal Producers' Association, has resigned, effective Jan. 1. So far his successor has not been named.

J. ELMER EVANS, executive secretary of the Retail Fuel Dealers' Association of Utah, has resigned and is succeeded by Frank H. Coulter, who had been with the Mutual Coal Co. of Salt Lake City as auditor.

JOHN R. DOOLIN, prominent in Utah coal mining circles since 1907, when he went to that state from the Colorado Fuel & Iron Co. has been appointed general manager of the National Coal Co., of Salt Lake City.

Industrial Coal Stocks Increase Slightly

Industrial coal stocks in the United States and Canada on Nov. 1 were slightly larger than on Oct. 1, according to the monthly report of the National Association of Purchasing Agents. The total on hand Nov. 1 was 41,520,000 tons, compared with 40,778,000 tons the month before.

Due primarily to increased requirements with the approach of winter, con-

sumption of hard and soft coal was sufficiently greater to reduce the number of days' supply on hand to 34. This was one day less than on Oct. 1.

DAYS' SUPPLY OF SOFT COAL IN VARIOUS INDUSTRIES

		Change
Byproduct coke.....	28	+1
Electric utilities and coal-gas plants...	54	-3
Railroads.....	28	-2
Steel mills.....	29	-2
Other industries.....	35	-2
Average total stocks throughout the country.....	33	-2

ESTIMATES OF OUTPUT, CONSUMPTION AND STOCKS

	U. S. Production	Industrial Consumption	On Hand Industries
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.....	44,748,000	34,844,000	43,670,000
June.....	41,264,000	32,784,000	40,890,000
July.....	41,785,000	33,527,000	40,700,000
August.....	48,598,000	33,890,000	39,415,000
September..	48,332,000	34,223,000	40,090,000
October....	58,914,000	36,500,000	40,778,000
November..			41,520,000

New Engineering Laboratory Dedicated at Princeton

A notable group of engineers and educators gathered in Princeton, N. J., on Nov. 15 to take part in the dedication of the new engineering laboratory of Princeton University. President John Grier Hibben, members of the board of trustees and of the faculty, and delegates from other educational institutions and engineering societies formed an academic procession that started from Nassau Hall and arrived at the entrance hall of the new building at 12:30. There, the architect of the building, Chas. Z. Klauder, presented the key to President Hibben, who accepted it with a short address on Princeton's conception of engineering education.

The delegates were entertained at luncheon at the Princeton Inn, where addresses were made by Carlton S. Proctor, president of the Princeton Engineering Association; Dean Augustus Trowbridge of the graduate school and Dean Dexter S. Kimball of Cornell University. President Hibben presided.

Coming Meetings

Iowa Coal Operators' Association; annual meeting, Dec. 11, Des Moines, Iowa.

Coal Mining Institute of America; annual meeting, Dec. 12, 13 and 14, at Pittsburgh, Pa.

Philadelphia Coal Exchange; annual meeting, Dec. 27, at Philadelphia, Pa.

Monongahela Coal Operators' Association; annual meeting, Jan. 10, 1929, at Morgantown, W. Va.

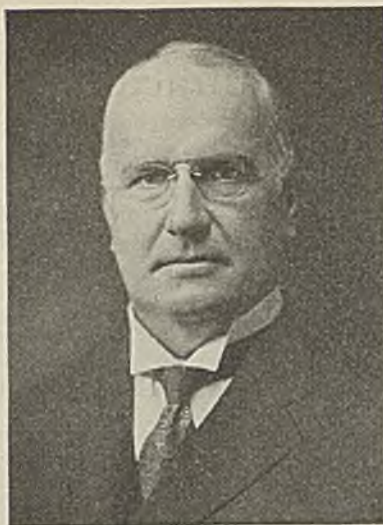
American Wood Preservers' Association; annual meeting, Jan. 22-24, 1929, at Louisville, Ky.

American Institute of Electrical Engineers; annual winter convention, Jan. 28-Feb. 1, 1929, at 29 West 39th St., New York City.

Midwest Power Conference and Exhibition, Feb. 12-16, 1929, at Chicago, Ill.

American Institute of Mining and Metallurgical Engineers; annual meeting, Feb. 18-22, 1929, at Engineering Societies Building, 29 West 39th St., New York City.

World Engineering Conference, October, 1929, at Tokyo, Japan.



Sidney J. Jennings

Sidney J. Jennings Dead; Was Noted Engineer

Sidney Johnston Jennings, vice-president of the United States Smelting, Refining & Mining Co., who had a notable career as a mining engineer, died suddenly Nov. 17 of heart disease in New York City, at the age of 65.

Mr. Jennings was born in Hawesville, Ky., and received his education in Hanover, Germany; in Tours, France, and at Harvard. He gained his first practical experience at quicksilver mines in California and as a surveyor and engineer in the building of plants for the Anaconda Copper Co. in Montana.

He then went to South Africa and held several important engineering positions. After the occupation of Johannesburg by the British he directed the work of the committee that reorganized the water supply, sewers and trolley lines of the city.

In 1907 Mr. Jennings came to New York and joined the United States Smelting, Refining & Mining Co. as vice-president in charge of exploration and new investments. At his death he also was president of the Hanover-Bessemer Iron & Copper Co. and of the United States Fuel Co., of Utah. He was president of the A.I.M.E. in 1918-19 and of the American Mining Congress in 1922-23.

Operators Have Right To Lay Off Men

C. P. Neill, umpire of the Anthracite Conciliation Board, handed down a ruling Nov. 19 in Hazleton, Pa., in which he confirmed the right of a coal company to dismiss coal loaders whenever conditions of work and employment warrant. The grievance reached the board and was passed on to the umpire from Exeter, Pa., where an employee of the Lehigh Valley Coal Co. had filed a protest against being laid off during a dull period.

Washington Letter

By PAUL WOOTON
Special Correspondent

A HEAVY contribution to the economy program was exacted from the Bureau of Mines, the annual budget submitted to Congress, Dec. 3 reveals. The budget submitted by the President at the opening of Congress allows a total of \$2,249,670 for the Bureau. Small increases were allowed on a few items. The recommendation for all experiment stations is \$205,450.

Some \$15,000 additional is made available for the work of the mining division, which has under way studies of geophysical methods of prospecting, mining methods and costs; underground mechanization; mine ventilation; ground movement; subsidence; sampling of ore and coal; shaft sinking; exploration work and other matters of great interest to those engaged in metal mining. The total amount recommended is \$144,220.

On May 28 Congress passed the Welsh act arbitrarily increasing the salaries of all federal employees, regardless of individual merit. Apparently in compiling the budget it has been the intention, in many instances, to make no allowance for the increased salaries, which means a proportionate reduction in the amount of work that can be done.

In the case of the \$91,500 item providing for general administrative expenses allowance is made apparently to take care of only a part of the Welsh act increases. In the same way an increase to \$422,000 in the amount recommended for the investigation of mine accidents apparently does little more than allow for the general salary increase. There is a reduction of \$35,000 in amount allowed for operation of mine-rescue cars and stations. This is due to the fact that a new mine-rescue car was authorized last year, but this year the \$326,130 recommended will have to absorb the salary increase.

The estimate for the testing of fuel is \$179,210. This is largely a service activity for other departments of the government, but after the increased pay is taken into account there is left something near \$10,000 for a study of the recovery of liquid fuels from coal. Provision is made for \$82,200 for the care of buildings at Pittsburgh. This is a slight increase, apparently more than offset by salary increases.

The Geological Survey was allowed an increase of \$130,000 in the amount recommended for topographic mapping. Slight increases were allowed when the Welsh increases are deducted for geological surveys and for the engraving of maps. The amount recommended for geological surveys is \$350,000. In addition, \$67,500 is proposed for the continuation of the investigation of the mineral resources of Alaska.

Illinois Factions Proclaim Truce At Mining Institute Meeting

ILLINOIS operators and mine workers are determined that the signing of the new wage scale shall usher in for them a period of co-operation and mutual understanding so that Illinois coal instead of fuel from rival states shall dominate Illinois markets. This was the keynote of the Illinois Coal Mining Institute meeting held in the Country Club, Benton, Ill., Nov. 9 and 10.

Both J. D. Zook, president and commissioner of the newly formed Illinois Coal Operators' Labor Association, and Harry Fishwick, president of district 12 of the United Mine Workers, sounded this note at the banquet which closed the formal program of the Institute. Both declared that steadier work demanded accord and that accord demanded co-operation and that they expected to attain all three.

The morning of Nov. 9 was spent in registration, preparation, greetings and golf. The afternoon session, which about 120 members attended, was devoted to business and discussion. James S. Anderson, division superintendent, Madison Coal Corporation, and president of the institute, was in the chair. F. F. Tirre reported that during the year 96 members had been added and that now there were 378.

THE election of officers resulted in these unanimous selections: President, J. E. Jones, safety engineer, Old Ben Coal Corporation; first vice-president, A. C. Callen, dean of mining, University of Illinois; second vice-president, J. D. Zook; secretary-treasurer, F. F. Tirre; executive board, J. S. Anderson, J. A. Garcia, B. E. Schonthal, A. D. Lewis, J. A. Jeffreis, W. J. Jenkins, Dwight Wilcox, W. C. August, Harry Treadwell, J. A. Hitt, Paul Weir and C. J. Sandoe. The suggestion that a boat trip should be arranged for the summer, as in past years, was unanimously approved.

R. Dawson Hall, engineering editor, *Coal Age*, spoke briefly on the necessity for a study of the elements of roof failure in the coal mines, so that methods might be determined that would enable the State of Illinois to recover a larger percentage of the coal in the ground without undue difficulty and cost. Too often, he said, it has been regarded as satisfactory to say that mining is followed by subsidence without any attempt to analyze just what actions modify subsidence and just what stresses are set up in the unmined coal.

E. H. Johnson emphasized the importance of speed of extraction in furnishing favorable conditions for working. He suggested this as a subject needing elucidation. Professor Callen said that in the matter of stress distribution in mine roofs altogether too little was known. Mr. Jones declared that in a mine in West Virginia where

the cover ran from 650 to 1,500 ft. and the coal was 6 ft. thick, the roof and floor being of sandy shale, much trouble had been caused by the floor suddenly raising over large areas as much as 4 ft.

The chair introduced the subject of mechanical loading and Mr. Treadwell remarked that the Chicago, Wilmington & Franklin Coal Co. had been most successful in the operation of the McKinlay entry-driving machine. It can be relied on to advance 35 ft. a day of 8 hours where the entry is long. It was not desirable to use it on short panel entries because of the loss of time in dismantling it and reassembling it in order to change its location. Mr. Treadwell said that judgment should be used in handling powder. In cushioned blasting the loading density should be below a certain figure. It was better that it should be 0.5 or 0.6 than 0.25, for with the lower figure misfires and burning powder were likely to ensue.

Lee Haskins, Peabody Coal Co., was not willing to discuss the theory of coal extraction but was willing to say that

he had been driving up his rooms 25 ft. wide with all kinds of trouble. Now he is retreating, taking out the coal in faces 125 ft. wide and 210 ft. long, leaving 25-ft. pillars between workings as he retreated, and he was having wonderful success. He was, of course, using all speed in taking out the coal. In 30 days he removed all the coal in a 125x210-ft. space.

He could not advance any theories to justify his statement that the width of face could not be safely increased to 150 ft. nor the pillar prudently be reduced from 25 ft. to 20 ft. or 15 ft.; he had tried to do these things and had failed. Each space was robbed of timber after it was completed. He was getting 90 per cent of recovery where before he got only 66.

He was able to make speed because he shot with Cardox when the men were in the room. He had shot as often as five times in a day, but usually he got three or four falls daily. Accidental deaths at the face usually run about 47 per cent of all fatalities, but since he started the present method of mining he had been fortunate enough not to lose a single man by a face accident.

At the banquet the principal speaker was L. W. Baldwin, president, Missouri Pacific R.R. Other speakers besides those mentioned were Mayor Moore, of Benton; Judge Walter W. Williams, John A. Garcia, who showed moving pictures of the boat trip; T. C. Powell, president, Chicago & Eastern Illinois R.R., and Louis Checkes, of St. Louis. At the banquet 311 were present.

THE next day five trips were provided. One was to the Valier mine of the Valier Coal Co., where the timber and wire trains were inspected, the road-cleaning machine, the electric switch throwers operated by motormen through the trolley pole, the signal system and the rock-dust grinding equipment. J. L. Holt, superintendent, was in charge.

Some went to the New Orient mine to see the heading driven with the McKinlay entry drivers, the Joy loaders and the bottom and surface equipment. The McKinlay machines have driven as much as 52 ft. in 8 hours and actually progressed for each machine 2,900 ft. in 100 8-hour shifts. Two machines work in adjacent headings and crosscuts are made every 150 ft. They could have been made further apart under the agreement but it was found best to put them closer as it facilitated the prompt placement of cars. Of course, air ducts were provided.

At Old Ben No. 8 Mr. Jones exhibited the Goodman power shovel working on a longwall face, and at the mine of the Franklin County Mining Co. were shown a great variety of pit-car loaders, J. M. Seymour, the general manager, directing the party. At No. 2 mine of the Bell & Zoller Coal & Mining Co., Mr. Weir showed his party the surface plant, the shaft bottom and the hoisting equipment.



Photo by Blank & Stoller

Walker W. Stevenson

Appointment of Walker W. Stevenson as assistant to the president has been announced by the Consolidation Coal Co., effective Nov. 15. He will have offices at 15 Broad Street, New York City. Mr. Stevenson is well known to industrial coal buyers through his extensive work as consulting combustion engineer and from his long association in various executive capacities with the Semet-Solvay Co. As superintendent of both the Ashland By-Product Coke Co., Ashland, Ky., and the Ironton By-Product Coke Co., Ironton, Ohio, he was in a large measure responsible for the introduction of Semet-Solvay coke as a household and industrial fuel through the sales areas of the Central Western states.

Death Rate From Accidents in Coal Mines Continues Decline in October

ACCIDENTS at coal mines in the United States in October, 1928, caused the death of 182 men, according to reports received from state mine inspectors by the U. S. Bureau of Mines. Of these fatalities 144 occurred in bituminous mines in various states and 38 in the anthracite field of Pennsylvania. The death rate per million tons of coal mined during the month was 3.09, based on a production of 58,914,000 tons, as compared with 3.75 for October, 1927, based on an output of 51,180,000 tons and 192 deaths. The rate for bituminous mines alone was 2.86 for October of the present year, with a production of 50,360,000 tons, and that for anthracite mines was 4.44, with an output of 8,554,000 tons. The corresponding death rates for 1927 were 3.40 for bituminous mines, based on 43,827,000 tons and 149 deaths, and 5.85 for anthracite mines with 43 deaths and 7,353,000 tons. The death rate for the industry as a whole in September, 1928, was 3.13.

For the ten months from January to October, 1928, accidents at all coal mines in the United States resulted in the loss of 1,771 lives. Coal output during this period was 466,385,000 tons, showing a death rate of 3.80 per million tons as against 3.78 for the same ten months of 1927, based on 1,901 deaths and 503,433,000 tons. The record for bituminous mines alone for the 1928 period was 3.47, with 1,400 deaths and 403,334,000 tons; that for anthracite mines, 5.88, with 371 fatalities and

63,051,000 tons. The same period for 1927 showed 1,486 deaths in bituminous mines, 436,181,000 tons, with a death rate per million tons of 3.41; that for anthracite showed 415 deaths, 67,252,000 tons and a rate of 6.17; for both bituminous and anthracite mines 1,901 deaths were reported, with a production of 503,433,000 tons and a fatality rate of 3.78.

On Oct. 22 of the present year an explosion occurred at McAlpin, W. Va., which caused the death of 6 men. This major disaster—that is, one causing the loss of 5 or more lives—brings the number of such accidents during the first ten months of 1928 up to 12 with a resulting loss of 314 lives. There were 8 major disasters during the corresponding ten months of 1927 with a loss of 155 lives.

Comparing the accident record for January to October, 1928, with the same months of 1927, a reduction is noted in the death rates for falls of roof and coal, explosives, and electricity, while the haulage rate remains unchanged. The rate for gas and dust explosions is considerably higher. The comparative rates follow:

	Year 1927	Jan.-Oct. 1927	Jan.-Oct. 1928
All causes.....	3.732	3.776	3.797
Falls of roof and coal..	1.922	1.913	1.827
Haulage.....	.594	.592	.592
Gas or dust explosions			
Local explosions.....	.154	.165	.088
Major.....	.259	.282	.673
Explosives.....	.184	.177	.122
Electricity.....	.167	.179	.157
Other causes.....	.452	.468	.338

Take Laboratory to Study Use of Anthracite

The Frost Research Laboratory of Norristown, Pa., has been engaged by the Anthracite Operators' Conference to conduct research on improved methods of using anthracite fuel in domestic heating. The scope of the work involves the investigation, testing and development of apparatus for the burning of anthracite, the removal of ashes and the control of temperature. Contact will be established with manufacturers of heating and related equipment, governmental bureaus and scientific and trade associations for the interchange of ideas and mutual assistance.

The Anthracite Operators' Conference has established this service to provide without cost to manufacturers, designers and inventors adequate research facilities where tests of appliances and technical assistance upon the design of coal-burning equipment may be obtained subject to approval by the Conference committee. The Conference through the inauguration of this arrangement seeks to stimulate an intensive development of automatic apparatus for efficient burning of anthracite, the dustless removal of ashes and the uniform control of combustion to the end that hard coal as a fuel may be raised to the standard demanded by modern living conditions.

Coal-Mine Fatalities During October, 1928, by Causes and States
(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground										Shaft				Surface						Total by States						
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of Gas or Coal Dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machinery	Mine fires (burned, suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1928	1927	
Alabama.....	2						1					3													3	15	
Alaska.....																									0	0	
Arkansas.....				1																					0	0	
Colorado.....	2		1									3													4	2	
Georgia and North Carolina.....																							1	1			
Illinois.....	4		3		1							8													8	11	
Indiana.....	3						1					4													5	4	
Iowa.....	1											2													2	2	
Kansas.....	1						1					1													1	1	
Kentucky.....	9		6									15													15	14	
Maryland.....	1											1													1	0	
Michigan.....		2	1									3													3	3	
Missouri.....																									0	0	
Montana.....																									0	3	
New Mexico.....			2									2													2	2	
North Dakota.....																									0	0	
Ohio.....	2		1									3													5	2	
Oklahoma.....																									0	4	
Pennsylvania (bituminous).....	12	1	10				2			4		29													29	22	
Tennessee.....	1											1													1	3	
Texas.....																									0	0	
Utah.....	2											2													2	2	
Virginia.....	2	1	2									5													5	6	
Washington.....	2											2													2	2	
West Virginia.....	18	4	16	6	1				2		1	48							1				1	3	51	48	
Wyoming.....	3	1										4													4	1	
Total (bituminous).....	65	9	42	7	2		5		2		5	137													144	149	
Pennsylvania (anthracite).....	22	4	3		1		1				4	35			1				2			2	3	6	38	43	
Total, October, 1928.....	87	13	45	7	3		6		2		9	172			1				3				2	4	9	182	
Total, October, 1927.....	101	7	31	13	8		9	1	3		5	178	3		1				3	2	1		4	10		192	

Current Prices of Mining Supplies

SINCE LAST MONTH

MOST of the price changes of the month have been upward. These rises include cast iron pipe, steel plates, and scrap metal. Locomotive cable is four per cent cheaper, present price for No. 3 being \$86.60 and for No. 4, \$63.30. Jute brattice cloth is down one cent per square yard, and duck is up four and five cents. Current quotations for trolley wire are as follows: Round, 17.875c.; grooved, 18.125c.; figure 8, 18.875c.

STEEL RAILS—The following quotations are per gross ton, f.o.b., in large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard Bessemer rails.....	\$43.00	\$43.00	\$43.00
Standard open-hearth rails.....	43.00	43.00	43.00
Light rails, 25 to 45 lb.....	36.00	34@36	36@38

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh mill for large mill lots, together with warehouse prices at Chicago and Birmingham:

	Pittsburgh	Chicago	Birmingham
Standard spikes, ½-in. and larger.....	\$2.80	\$3.55	\$3.50
Track bolts.....	3.60	4.55	3.90
Standard section angle bars, splice bars or fishplates.....	2.75	3.40	3.50

WROUGHT STEEL PIPE—On deliveries from warehouses at the places named the following discounts hold for welded steel pipe:

	New York	Black Chicago	St. Louis
1 to 3 in. butt welded.....	50%	54%	49%
2½ to 6 in. lap welded.....	45%	51%	46%

	New York	Galvanized Chicago	St. Louis
1 to 3 in. butt welded.....	36%	41%	36%
2½ to 6 in. lap welded.....	32%	38%	33%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches		Thickness Inches
		External	Internal	
1	\$0.17	1.315	1.049	.133
1½	.23	1.66	1.38	.14
1¾	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

CAST-IRON PIPE—Prices, f.o.b., per net ton, for bell and spigot pipe, Class B and heavier, in large mill lots:

	Birmingham	Burlington, N. J.	New York
4 in.....	\$41.00	\$39.00	\$41.60
6 in. and over.....	38.00	36.00	38.60

	Pittsburgh	Chicago	St. Louis	San Francisco
4 in.....	\$49.50	\$49.20@50.20	\$46.60	\$51.00
6 in. and over.....	46.50	46.20@47.20	43.60	48.00

Gas pipe and Class "A," \$3.00 per ton extra.

BOLTS AND NUTS—Discounts from list, Apr. 1, 1927, on immediate deliveries from warehouse in New York and vicinity: Machine bolts, square heads and nuts, up to 1x30-in., full packages, 50%; Carriage bolts up to 4 x 6-in., full packages, 55%; Nuts, hot-pressed or cold-punched, blank or tapped, square or hexagonal, full packages, 55%.

STEEL PLATES—Following are base prices per 100 lb. in large mill lots f.o.b., for ½-in. thick and heavier:

Pittsburgh.....	\$1.90	Birmingham.....	\$2.15
-----------------	--------	-----------------	--------

STRUCTURAL RIVETS—The following quotations are per 100 lb., in mill lots, f.o.b. mill, for ½-in.:

Pittsburgh.....	\$2.90	Cleveland.....	\$2.90	Chicago.....	\$3.60
-----------------	--------	----------------	--------	--------------	--------

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized, base, in New York and territory east of Missouri River:

	Per Cent
Plow steel round strand rope.....	35
Special steel round strand rope.....	30
Cast steel round strand rope.....	20
Round strand iron and iron tiller.....	5
Galvanized steel rigging and guy rope.....	7½
Galvanized iron rigging and guy rope (add to list).....	12½

DRILL ROD—Discounts from list at warehouse:

New York.....	60%	Cleveland.....	55%	Chicago.....	50%
---------------	-----	----------------	-----	--------------	-----

FRICTION TAPE—Size ½-in. in 100 lb. lots in Eastern territory, per lb., \$0.29

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

	6 in. x 8 in. by 8 Ft.	7 in. x 9 in. by 8½ Ft.
Chicago, white oak, heart, untreated.....	\$1.40	\$1.78
Chicago, oak, empty cell creosoted.....	1.80	2.40
Chicago, oak, zinc treated.....	1.60	2.10
Chicago, Southern pine, creosoted.....	1.60	2.10
St. Louis, white oak, untreated.....	1.10	1.65
St. Louis, red oak, creosoted.....	1.40	2.05
St. Louis, sap pine or cypress, untreated.....	.80	1.20
Birmingham, Southern pine, untreated.....	1.10	1.25
Birmingham, Southern pine, creosoted.....	1.60	1.75

STEEL MINE TIES—Prices range from \$0.38 to \$0.60 per tie, f.o.b. Pennsylvania and West Virginia districts, depending on quantity, gage of track and weight of rail.

CALCIUM CARBIDE—In drums, round lots in New York market, per lb., \$0.05@0.06.

BRATTICE CLOTH—Prices f.o.b. cars New York, Philadelphia, St. Louis or Chicago, per sq. yd.:

Jute, 24-oz., double warp.....	\$0.19½	Jute, waterproof.....	\$0.22
Jute, 22-oz., single warp.....	.17½	Duck, waterproof.....	.39
Jute, 18-oz., single warp.....	.15	Duck, non-inflammable.....	.37

COTTON WASTE—The following prices are in cents per lb. for bale lots:

	New York	Cleveland	Chicago
White.....	10.00@13.50	16.00	15.00
Colored.....	9.00@13.00	12.00	12.00

MACHINE OIL—Medium bodied, in 55 gal. metal barrels, per gal., as follows:

New York.....	\$0.30	Cleveland.....	\$0.36	Chicago.....	\$0.36
---------------	--------	----------------	--------	--------------	--------

SCRAP IRON AND STEEL—The prices following are f.o.b. per ton paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought.....	\$12.25@12.75	\$11.75@15.25	
Stove plate.....	9.50	14.00@14.50	\$10.00@10.50*
No. 1 machinery cast.....	15.00@16.00	16.50@17.00	14.00*
Machine shop turnings.....	7.25@7.50	8.50@9.00	8.00
Cast borings.....	6.75@7.00	11.75@12.25	9.50
Railroad malleable.....	10.00@10.50	16.00@16.50	14.50@15.00†
Re-rolling rails.....	13.00@13.50	16.50@17.00	13.50
Re-laying rails, 56@60 lb.....	23.00@24.00	23.00@25.00	
Heavy melting steel, No. 1.....	11.75@12.00	14.50@15.00	14.00
Iron and steel pipe.....	10.75	11.50@12.00	

*Net ton. †Automotive.

SCRAP COPPER AND BRASS—Dealers' purchasing prices in cents per lb.:

	New York	Cleveland	Chicago
Crucible copper.....	\$14.00@14.25	\$13.75	\$12.75@13.25
Copper, heavy, and wire.....	13.25@14.00	13.00	12.12½@12.50
Copper, light, and bottoms.....	11.75@12.25	11.00	11.00@11.50
Brass, heavy, yellow.....	7.75@8.00	8.50	8.00@8.50
Brass, heavy, red.....	10.75@11.25		10.25@10.75
Brass, light.....	6.25@6.75	6.75	6.75@7.25
No. 1 yellow rod turnings.....	9.00@9.50	9.50	8.75@9.25

COPPER WIRE—Prices of bare wire, base, at warehouse, in cents per lb. are as follows:

New York.....	21.62½	Cleveland.....	21.25	Chicago (mill).....	17.875
---------------	--------	----------------	-------	---------------------	--------

TROLLEY WIRE—In carload lots, f.o.b., producing point, all sizes, per lb.:

Round.....	\$0.17875	Grooved.....	\$0.18125	Fig. 8.....	\$0.18875
------------	-----------	--------------	-----------	-------------	-----------

TROLLEY WHEELS—Price f.o.b. Jersey City, N. J., each:

4-in.....	\$1.00	5-in.....	\$1.40	6-in.....	\$1.70
-----------	--------	-----------	--------	-----------	--------

MINING MACHINE CABLE—F.o.b. producing point, net, per M. ft.:

No. 2 Duplex Flat, Braided		Two Conductor, Round Rubber Sheathed	
Size 2-133.....	\$168.00	Size 2-133.....	\$625.00
Size 3-133.....	150.00	Size 3-133.....	560.00
Size 4-133.....	132.00	Size 4-49.....	440.00

LOCOMOTIVE CABLE—F.o.b. cars, Trenton, N. J., single conductor, braided, net, on reels containing 1,500 ft., per M. ft.:

Size 3.....	\$86.60	Size 4.....	\$63.30
-------------	---------	-------------	---------

FEEDER CABLE—Price per M. ft. in larger buying centers east of the Mississippi River:

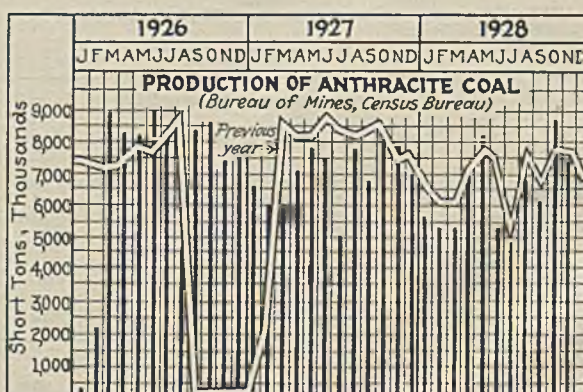
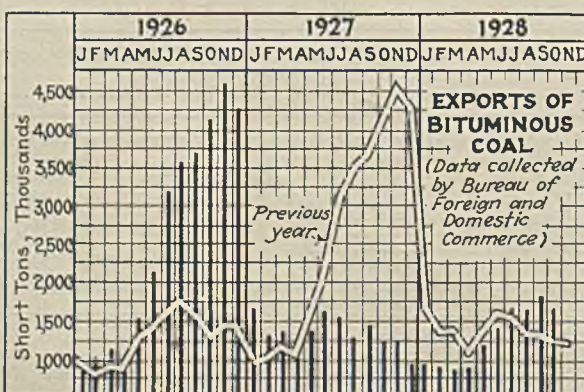
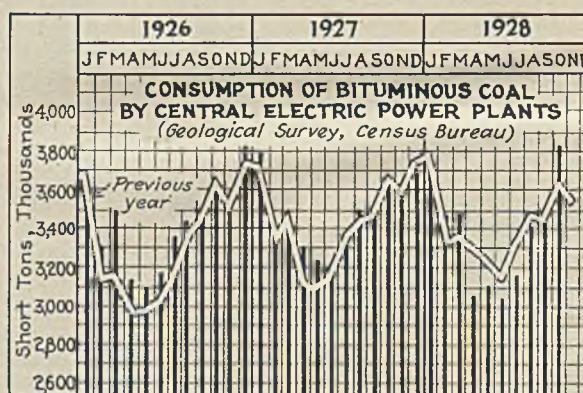
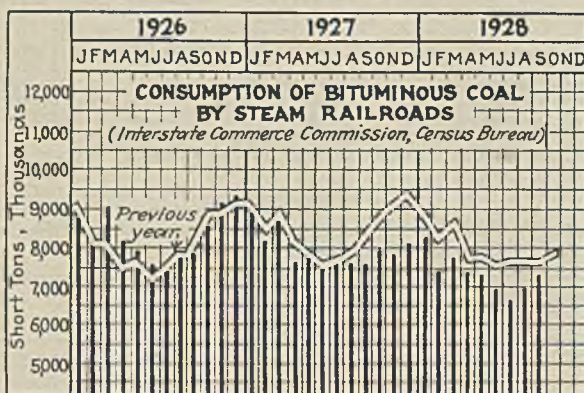
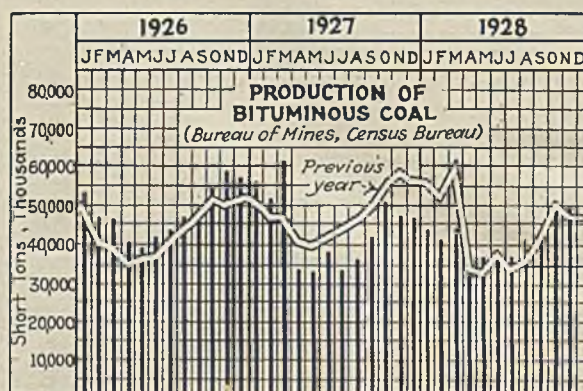
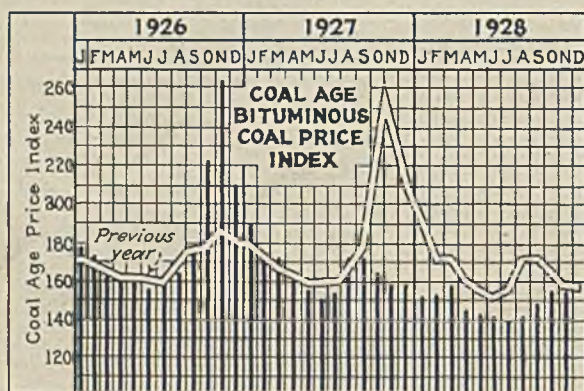
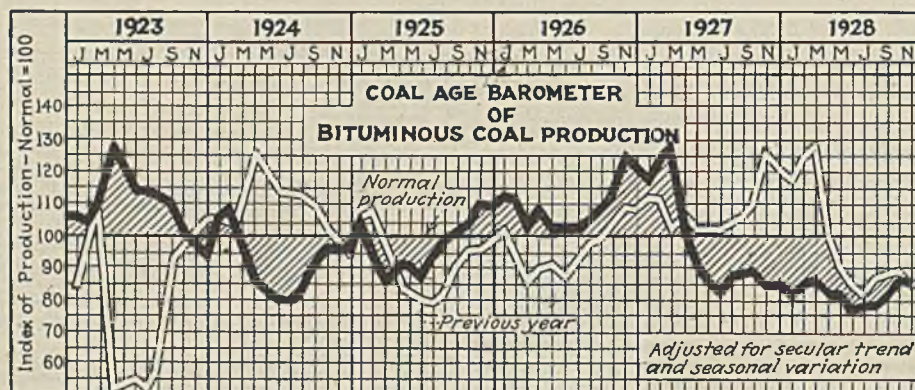
B. & S. Size	Two Conductor	Three Conductor
No. 14 solid.....	\$31.00 (net)	\$45.00 (net)
No. 12 solid.....	136.00	180.00
No. 10 solid.....	185.00	235.00
No. 8 stranded.....	305.00	375.00
No. 6 stranded.....	440.00	530.00

From the above lists discounts are: Less than coil lots, 50%; Coils to 1,000 ft., 60%; 1,000 to 5,000 ft., 65%; 5,000 ft. and over, 67%.

EXPLOSIVES—F.o.b. in carload lots:

Black Powder	West Virginia	Districts Pennsylvania	Missouri
FP, NaNO ₃ base, 800 kegs per car, per 25 lb. keg.....	\$1.70@1.80	\$1.70	\$1.75
Ammonium permissible			
1½ x 8 in. sticks, 20,000 lb. per car, per 100 lb.....	14.00@15.00	13.75	14.00

Indicators of Activities in the Coal Industry



MARKETS

in Review

A GENERAL slowing up characterized the bituminous coal markets of the country last month. Despite an appreciable decrease in production there was a decline in average spot price levels. To an unusual degree conditions were similar in the various trading centers from the Atlantic seaboard to the West and Southwest.

The decrease in output was due to a number of causes, principally lessened demand because of unseasonably warm weather throughout a large portion of the country, though the closing of navigation on the lakes was an unfavorable circumstance of considerable moment. Floods in some of the mining districts also disrupted running time and curtailed shipments. Holidays and the shorter month were still another cause for a smaller tonnage than in the preceding month. Reduction of prices as a result of the establishment of a lower wage scale in Illinois and Indiana was partly responsible for the fall in average quotations.

Bituminous production last month, according to preliminary estimates of the U. S. Bureau of Mines, was 45,762,000 net tons; the revised total for October was 50,360,000 tons. The average per working day increased from 1,863,000 to 1,883,000 net tons, again exceeding the best daily average made in any previous month during the current year. A year ago the output was 40,628,000 tons and the daily average was 1,638,000 tons.

CONSUMERS' stocks, as indicated by the Bureau of Mines estimate as of Oct. 1, which showed a total of 41,100,000 net tons, are the lowest for this

season in any year since 1922, representing a decrease of slightly more than 20,000,000 as compared with the same date a year ago. Dumpings at the lower lake ports last month totaled 4,523,336 tons. For the season to Dec. 3 cargo dumpings were 33,119,111 tons, which exceeds last year's record-breaking total.

Coal Age Index (preliminary) of spot bituminous prices in November was 150½, compared with the revised October figure of 155½. By weeks the figures for November were: 143, Nov. 3; 154, Nov. 10; 150, Nov. 17, and 155, Nov. 24. The corresponding weighted average prices were \$1.73, \$1.86, \$1.82 and \$1.88. Revised Index figures for October were: 158, Oct. 6; 156, Oct. 13; 154, Oct. 20, and 155, Oct. 27. The corresponding weighted average prices were \$1.91, \$1.89, \$1.86 and \$1.88.

In November there was a recession in anthracite production, the output being 7,458,000 net tons, as against 8,554,000 tons in the preceding month and 6,902,000 tons in November, 1927. The November daily average this year was 311,000 tons; for the preceding month it was 329,000 tons. Stove continued to be in such demand as to make it difficult for shipments to keep pace; nut also was beginning to move into the scarce category.

BUYERS had it pretty much their own way in the Midwestern market during November. Softness was rather marked throughout the list. Retailers, having fairly heavy stocks, were not interested in additional shipments, even at bargain prices, as the public was not buying. Southern Illinois coals and

high-quality trade-marked stuff from Indiana and western Kentucky alone held firm.

Prepared smokeless grades, which had held first place in the Chicago market for over two months, broke badly toward the close of the month as a result of protracted mild weather and the closing of lake navigation. Lump slipped from \$3.75@4 to \$3.50@3.75; egg, from \$3.75@4.25 to \$3.50@4, with cars in distress as low as \$3 and \$3.25, respectively. Stove and nut dragged in sympathy and mine-run was a drug on the market at \$1.65@2.25, with the average around \$2.

Premium high-volatile fuels from eastern Kentucky and West Virginia were second in favor but the average movement was none too good. Prices were maintained because floods in the mining regions slowed output and shipments. Ordinary grades were a problem to every seller.

MIDWESTERN coals, both steam and domestic, on the whole were stagnant. Producers in all fields had sidings jammed with unsold cars of practically all sizes. Southern Illinois circulars on prepared sizes, however, were well maintained, and the same was true of Indiana No. 4. Western Kentucky lump and egg were off about 25c. at \$1.75@2 toward the end of the month. Screenings from this field were firm, but this was far from true in the case of other fields, despite the fact that screenings were anything but plentiful due to the slowness of the larger sizes.

Since the establishment of the lower wage scales in Illinois and Indiana prices on mine-run have been reduced;

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

Market Quoted	Nov. 3, 1928		Nov. 10, 1928		Nov. 17, 1928		Nov. 24, 1928	
	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken..... New York.....		\$8.25@8.50						
Broken..... Philadelphia.....	\$8.50@8.75	8.25	\$8.50@8.75	8.25	\$8.50@8.75	8.25	\$8.50@8.75	8.25
Egg..... New York.....	8.60@8.75	8.75	8.60@8.75	8.75	8.60@8.75	8.75	8.50@8.75	8.25
Egg..... Philadelphia.....	8.75@9.00	8.75	8.75@9.00	8.75	8.75@9.00	8.75	8.75@9.00	8.75
Egg..... Chicago*.....	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59
Stove..... New York.....	9.00@9.25	9.25	9.10@9.25	9.25	9.10@9.25	9.25	9.10@9.25	9.25
Stove..... Philadelphia.....	9.25@9.50	9.25	9.25@9.50	9.25	9.25@9.50	9.25	9.25@9.50	9.25
Stove..... Chicago*.....	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.10
Chestnut..... New York.....	8.60@8.75	8.75	8.60@8.75	8.75	8.60@8.75	8.75	8.60@8.75	8.75
Chestnut..... Philadelphia.....	8.75@9.00	8.75	8.75@9.00	8.75	8.75@9.00	8.75	8.75@9.00	8.75
Chestnut..... Chicago*.....	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Pea..... New York.....	4.50@5.00	5.00	4.50@5.00	5.00	4.50@5.00	5.00	4.50@5.00	5.00
Pea..... Philadelphia.....	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
Buckwheat..... New York.....	2.75@3.00	3.00@3.25†	2.75@3.00	3.00@3.25†	2.70@3.00	3.00@3.25†	2.50@3.00	3.00@3.25†
Buckwheat..... Philadelphia.....	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25
Buckwheat..... Chicago*.....	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
Rice..... New York.....	1.50@1.75	2.25	1.50@1.75	2.25	1.50@1.75	2.25	1.50@1.75	2.25
Rice..... Philadelphia.....	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75
Barley..... New York.....	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75	1.00@1.50	1.70@1.75
Barley..... Philadelphia.....	2.90 -	2.90	2.90	2.90	2.90	2.90	2.90	2.90

*Net tons, f.o.b. mines. †Domestic buckwheat, \$3.75 (D. L. & W.)

southern Illinois is \$2; central Illinois, \$1.75; Indiana No. 5, \$1.90; No. 4 is listed at \$2.25 but can be had for considerably less.

It was an unusually poor month in the Illinois mining fields with perhaps less tonnage moved than in any November in many years. The weather was unseasonably warm and local credit conditions were unfavorable. High-grade coals have been in best demand in the St. Louis trade, steam business continuing on the increase. Domestic deliveries, however, have been lower than usual and country business has been slow, though steam stocks are low. Immediate prospects are dependent on weather conditions.

Lingering Indian summer also was responsible for a slow month at the Head of the Lakes. Industrial and municipal buyers it is true have been taking fair tonnages, but utility demand has been unusually low and dealers continue to buy only for immediate requirements. Shipments from the docks in November are estimated to have fallen substantially under the October total of 29,928 cars. Considerable coal has been moving to the Twin Cities, but there is much competition from all-rail shipments to that market.

DEMAND for smokeless continues to be a notable feature of the trade, some of the docks having run short of prepared sizes and found it difficult to keep receipts abreast of shipments. Stocks of bituminous coal on hand as of Dec. 1 were estimated at 6,900,000 net tons; anthracite, 575,000 tons. Compared with Nov. 1 this was an increase of 500,000 tons in bituminous

and a decrease of 21,000 tons in anthracite.

Except for a drop of 25c. in some McAlester, Wilburton and Henryetta (Okla.) lump, prices were unchanged in the Kansas market. Wholesale demand was generally dull with running time at the mines cut to about half at times to prevent serious accumulations of lump and nut. Reduced production, however, tightened the situation in screenings. Under the influence of lower temperatures, retail trade improved toward the close of the month, running slightly ahead of a year ago, but with large stocks in retail yards the improvement was not reflected in the wholesale trade.

Continued warm weather last month caused the bottom to drop out of the market in Colorado and New Mexico. "No bills" have risen to more than 1,000 cars and the mines are on about two-thirds running time. November mine quotations were: Walsenburg-Canon City lump, \$5.75; washed chestnut, \$4.75; fancy chestnut, \$3.25; Trinidad coking lump, \$3.75; lump-and-nut, \$3.50; fancy chestnut, \$3.25; Crested Butte large anthracite, \$9.50; brooder mixture, \$7.25; chestnut, \$5; northern Colorado 6-in. lignite lump, \$3; 2½-in. lump, \$2.75; Rock Springs-Kemmerer lump, \$4.50; nut, \$3.75; steam coal, \$1.35.

STEAM coals are beginning to show improvement in the Kentucky fields while prepared sizes have drooped, giving the market a draggy aspect. Screenings have shaken off some of the weakness that gripped them since early summer. Operating time in both eastern and western Kentucky, however, is still

far lower than normal for this season.

A drop in temperature which occurred in the last week in November quickened deliveries to domestic consumers, and this is expected to result in better dealer demand, which has lagged following September and October buying. Railroad, utility and industrial consumption, however, has been close to normal.

Fluctuation has been marked in the Cincinnati market during the last month. Up to the close of the lake season the trade was fairly smooth except for the usual complaints about prices and profits. But when the pent-up flood of coal that had been moving to the lakes was diverted inland prices sagged. Toward the end of the month, however, there was some wintry weather, which caused domestic grades to move in larger volume, with some changes in quotations. Though the movement through this sector last month was not as heavy as in October it was more than 10 per cent heavier than in November a year ago.

SMOKELESS prices at the mine were advanced Nov. 25 and are as follows: Lump and egg, \$3.75; stove, \$3; nut, \$2.75; slack, \$1.25; mine-run, \$2@ \$2.25, with some low grades to be had at lower figures. Mine-run was very weak and egg stronger. High-volatile coals were sluggish at previous prices.

Warm weather for the greater part of last month had a depressing effect on domestic grades at Columbus. Since this trade is now entirely a weather proposition it will require considerable cold weather to instill renewed strength. Retailers are well stocked but prices remain firm.

The steam trade also is quiet with no immediate prospects for improvement. Large consumers are casting around for bargains, which are frequently offered. Those with contracts are taking minimum requirements and accepting bargain offers. Screenings and mine-run have been weak and declining prices have ruled for the greater part of the month. The close of the lake season has added a further complicating factor to the situation.

THE situation in the Cleveland market, which was markedly quiet early in the month, felt a further softening tendency with the close of lake navigation. In the smokeless trade lump has weakened, egg managing to hold its own fairly well. Eastern Ohio coals are not giving any cause for enthusiasm. The one crumb of consolation was a cold wave early in the last week of November, which helped to enliven the domestic trade.

Increased industrial and railroad buying in the Pittsburgh market has failed to improve the general situation resulting from overproduction. Slack has become practically a drug on the market, the minimum price for steam slack—60c.—being even lower than in former periods of depression. Three-quarter gas also was unusually low at the end of the month.

Unless there is a marked improvement in demand it is likely that some mines

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

LOW-VOLATILE, EASTERN	Market Quoted	—Week Ended—			
		Nov. 3, 1928	Nov. 10, 1928	Nov. 17, 1928	Nov. 24, 1928
Smokeless lump.....	Columbus	\$4.00@ \$4.25	\$4.00@ \$4.25	\$3.75@ \$4.00	\$3.50@ \$3.75
Smokeless mine-run.....	Columbus	2.25@ 2.50	2.15@ 2.35	2.00@ 2.25	2.00@ 2.15
Smokeless screenings.....	Columbus	.85@ 1.00	.85@ 1.00	.75@ .90	.65@ .85
Smokeless lump.....	Chicago	3.75@ 4.25	3.50@ 4.00	3.50@ 4.00	3.50@ 3.75
Smokeless mine-run.....	Chicago	1.65@ 2.25	1.65@ 2.25	1.75@ 2.00	1.75@ 2.00
Smokeless lump.....	Cincinnati	3.75@ 4.25	3.75@ 4.00	3.50	3.75
Smokeless mine-run.....	Cincinnati	2.00@ 2.25	1.75@ 2.00	2.00@ 2.25	2.25
Smokeless screenings.....	Cincinnati	1.25	1.00@ 1.25	2.00	1.75@ 2.00
*Smokeless mine-run.....	Boston	4.25@ 4.35	4.25@ 4.35	4.30@ 4.40	4.35@ 4.45
Clearfield mine-run.....	Boston	1.65@ 1.85	1.65@ 1.85	1.60@ 1.80	1.65@ 1.80
Cambria mine-run.....	Boston	1.80@ 2.20	1.80@ 2.20	1.75@ 2.15	1.75@ 2.15
Somerset mine-run.....	Boston	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 1 (Navy Standard)....	New York	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50
Pool 1 (Navy Standard)....	Philadelphia	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60
Pool 9 (super low vol.)....	New York	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95
Pool 9 (super low vol.)....	Philadelphia	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15
Pool 10 (h. gr. low vol.)....	New York	1.55@ 1.80	1.55@ 1.80	1.55@ 1.80	1.55@ 1.80
Pool 10 (h. gr. low vol.)....	Philadelphia	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 11 (low vol.).....	New York	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50
Pool 11 (low vol.).....	Philadelphia	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
HIGH-VOLATILE, EASTERN					
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@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Pittsburgh gas mine-run....	Pittsburgh	2.00@ 2.10	2.00@ 2.10	1.90@ 2.10	1.90@ 2.10
Pittsburgh gas mine-run....	Pittsburgh	1.75@ 1.90	1.75@ 1.90	1.65@ 1.85	1.65@ 1.85
Pittsburgh slack.....	Pittsburgh	1.50@ 1.80	1.50@ 1.80	1.50@ 1.75	1.50@ 1.75
Kanawha lump.....	Columbus	.90@ 1.10	.90@ 1.10	.90@ 1.00	.80@ 1.00
Kanawha mine-run.....	Columbus	2.25@ 2.50	2.25@ 2.50	2.00@ 2.25	1.75@ 2.00
Kanawha screenings.....	Cincinnati	1.35@ 1.60	1.35@ 1.60	1.35@ 1.50	1.25@ 1.45
W. Va. lump.....	Cincinnati	.50@ .85	.50@ .85	.50@ .80	.50@ .75
W. Va. gas mine-run.....	Cincinnati	2.00@ 2.75	2.25@ 2.75	2.00@ 2.50	2.25@ 3.00
W. Va. steam mine-run.....	Cincinnati	1.20@ 1.45	1.25@ 1.50	1.15@ 1.50	1.35
W. Va. screenings.....	Cincinnati	1.40	1.25@ 1.35	.50@ 1.00	1.25
Hooking lump.....	Columbus	.35@ 1.00	.50@ 1.15	.50@ 1.10	.50@ 1.00
Hooking mine-run.....	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Hooking screenings.....	Cleveland	1.40@ 1.60	1.40@ 1.60	1.35@ 1.60	1.35@ 1.55
Pitta. No. 8 lump.....	Cleveland	.65@ 1.00	.65@ 1.00	.65@ .90	.65@ .85
Pitta. No. 8 mine-run.....	Cleveland	1.90@ 2.25	1.90@ 2.25	1.75	1.75
Pitta. No. 8 screenings.....	Cleveland	1.40@ 1.65	1.40@ 1.65	1.20@ 1.35	1.20@ 1.35
Pitta. No. 8 screenings.....	Cleveland	.75@ 1.10	.75@ 1.10	.70	.70

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

will have to curtail output, and there is the additional factor that the cessation of lake shipments will bring Southern producers into more direct competition in border territory with coal from this district. Production by captive mines has been well maintained.

AFTER a slow start business in the central Pennsylvania field picked up notably in the last half of November. Railroad buying increased and other consumers followed suit, with the result that prices have become firmer and there has been an appreciable decline in the number of "no bills." Loadings for November—62,035 cars—though 4,853 less than in the preceding month, were 13 per cent higher than a year ago. Month-end quotations at Altoona were: Pool 1, \$2.65@2.75; pool 9, \$2.20@2.30; pool 10, \$2.05@2.15; pools 11 and 18, \$1.80@1.85.

Steam coal turned firmer in the New England market late in November although there were few indications of increased buying. Higher marine freights have encouraged more interest in futures than for several months, and the trend of spot quotations was toward somewhat higher levels. Potential output being far above what the current market can absorb, a slump, of course, is within the possibilities at any stage. There was no accumulation at the Virginia terminals, however, and "down East" factors were under no pressure to move coal.

Spot Navy Standard at the end of the month commanded \$4.35@4.45 at Hampton Roads, and nut-and-slack brought \$3.80, failing to move up as expected. For inland delivery from Providence and Boston mine-run sold at \$5.50@5.60 on cars; nut-and-slack moved at \$5, with occasional sales at \$5.10@5.20.

The withdrawal of several steam colliers from the Boston-Portland service to run to New Haven and New York has created a vacuum in transportation for trip-to-trip charters that formerly were depended upon, and rates have advanced from 70c. to 90@95c. Even barges are now in demand for this trade.

CONDITIONS in the New York bituminous market failed to improve last month. Buyers bought only on a hand-to-mouth basis. Contract coal moved without difficulty but plenty of free coal was to be had, and in some instances at almost the buyer's price.

Improved industrial conditions in the Philadelphia district have been reflected in a slight betterment in the coal trade, large consumers showing more inclination to increase stocks. And the outlook for further improvement is promising. Slack offerings are less plentiful since the closing of lake navigation, though there is still a considerable surplus. Export trade is at the seasonal average.

Lower average temperatures made domestic fuel more active in Birmingham than during the previous month. There was a fair increase in new business, which, with heavier shipments on contracts, helped movement from the mines.

Lower domestic grades improved their status slightly, though they moved sluggishly.

COMMERCIAL trade was weak throughout the month, though spot buying improved slightly as compared with October and there was some increase in shipments on railroad contracts and industrial consumption improved somewhat. It was extremely hard to move screenings.

Steam sizes were the drawbacks in the anthracite market at New York last month. Demand for these coals being slow and giving operators more or less difficulty in keeping down accumulations. Of the domestic sizes stove was most wanted, chestnut was next, while egg, which early in the month was easily moved fell into the discard. In some instances operators found it advisable to break down this size to help meet the demand for stove. Pea coal was almost a drug. The local harbor contained many loaded boats of the smaller sizes.

GREATER activity was reported in Philadelphia last month, despite occasional spells of warm weather. Demand, for stove and nut at least, has gained ground steadily, so that the producers have had to carry a large number of orders over into December. Nut now is nearly as tight as stove. The increase in mine demand was all the more gratifying to the producers, coming on the heels of an advance of 15c. in the price of stove on Nov. 1. Lower temperature early in the month put most of the mines on capacity production, which continues throughout. The retail price situation is more stable with less cutting in evidence.

The real problem is pea, which con-

tinues to move with difficulty, all shippers having surpluses standing unconsign in cars. Buckwheat is the best mover of the steam sizes, but here too there is an excess, particularly of rice and barley.

There has been a falling off in the domestic trade at Boston, and fewer orders are booked for December than last month. Small orders are the rule, future possibilities being dependent on the weather. Welsh and Scotch coal is coming in, but complaints of excessive degradation continue to be heard.

EXPORTS of bituminous coal from the United States during October—the latest month for which figures are available—were 1,497,204 gross tons, as compared with 1,250,232 tons in October, 1927. Anthracite exports also increased from 310,062 gross tons to 404,927 tons. Coke exports rose from 69,072 gross tons to 99,884 tons. Cumulative figures for the year, however, are below the corresponding figures for 1927 except in the case of coke.

As usual, Canada was the biggest customer for American coal in the export field. Consignments of soft coal to the Dominion in October totaled 1,365,798 tons. Cuba was second with 41,456 tons, Brazil third with 14,141 tons. British West Indies took 12,676 tons and Italy 11,517 tons.

Imports for the same month were 28,006 gross tons of anthracite, 51,397 tons of bituminous and 7,421 tons of coke. The figures for October a year ago were 5,413 tons of anthracite, 53,608 tons of bituminous and 15,426 tons of coke. In October of this year the United States imported 41,393 tons of bituminous coal from Canada and 6,003 tons from the United Kingdom.

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

MIDDLE WEST		Market Quoted	Week Ended			
			Nov. 3, 1928	Nov. 10, 1928	Nov. 17, 1928	Nov. 24, 1928
Franklin (Ill.) lump.....	Chicago		\$2.75@3.00	\$2.75@3.00	\$2.75@3.00	\$2.75@3.00
Franklin (Ill.) mine-run....	Chicago		2.25@2.40	2.25@2.40	2.25	2.25
Franklin (Ill.) screenings....	Chicago		1.10@1.60	1.10@1.60	1.00@1.60	1.25@1.60
Central (Ill.) lump.....	Chicago		2.40@2.65	2.40@2.65	2.40@2.65	2.40@2.65
Central (Ill.) mine-run....	Chicago		1.85@2.25	1.85@2.25	1.75@2.25	1.75@2.25
Central (Ill.) screenings....	Chicago		.90@1.10	.90@1.10	1.00@1.30	1.00@1.30
Ind. 4th Vein lump.....	Chicago		2.75@3.00	2.75@3.00	2.75@3.00	2.50@3.00
Ind. 4th Vein mine-run....	Chicago		1.40@2.25	1.40@2.25	1.40@2.25	1.35@2.25
Ind. 4th Vein screenings....	Chicago		1.25@1.45	1.25@1.45	1.25@1.45	1.10@1.50
Ind. 5th Vein lump.....	Chicago		2.00@2.50	2.00@2.50	2.00@2.50	2.10@2.50
Ind. 5th Vein mine-run....	Chicago		1.25@2.00	1.25@2.00	1.25@2.00	1.30@1.90
Ind. 5th Vein screenings....	Chicago		1.00@1.10	1.00@1.10	.85@1.00	.75@1.00
Mount Olive lump.....	St. Louis		2.35@2.50	2.35@2.50	2.35@2.50	2.35@2.50
Mount Olive mine-run....	St. Louis		2.00	2.00	2.00	2.00
Mount Olive screenings....	St. Louis		1.25	1.25	1.25	1.25
Standard lump.....	St. Louis		2.25@2.40	2.15@2.25	2.00@2.10	2.10
Standard mine-run....	St. Louis		1.75	1.75	1.75	1.75
Standard screenings....	St. Louis		.40	.45	.50	.60
West Ky. block.....	Louisville		1.85@2.10	1.85@2.10	1.85@2.25	1.75@2.10
West Ky. mine-run....	Louisville		.90@1.35	.90@1.25	.90@1.25	.90@1.15
West Ky. screenings....	Louisville		.40@.75	.40@.80	.40@.60	.50@.65
West Ky. block.....	Chicago		1.75@2.00	1.75@2.00	1.75@2.00	1.65@2.00
West Ky. mine-run....	Chicago		.85@1.25	.85@1.25	.85@1.00	.85@1.00
West Ky. screenings....	Chicago		.50@.70	.40@.60	.45@.60	.50@.75
SOUTH AND SOUTHWEST						
Big Seam lump.....	Birmingham		\$2.00@2.25	\$2.00@2.25	\$2.00@2.25	\$2.00@2.25
Big Seam mine-run....	Birmingham		1.25@1.50	1.25@1.50	1.25@1.50	1.25@1.50
Big Seam (washed).....	Birmingham		1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00
S. E. Ky. block.....	Chicago		2.25@2.85	2.25@2.75	2.25@2.75	2.25@2.50
S. E. Ky. mine-run....	Chicago		1.25@1.60	1.25@1.60	1.25@1.60	1.25@1.50
S. E. Ky. block.....	Louisville		2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00
S. E. Ky. mine-run....	Louisville		1.25@1.75	1.25@1.75	1.25@1.75	1.25@1.70
S. E. Ky. screenings....	Louisville		.15@.90	.15@.90	.35@.90	.35@.95
S. E. Ky. block.....	Cincinnati		2.50@3.00	2.25@2.75	2.25@2.75	2.50@3.00
S. E. Ky. mine-run....	Cincinnati		1.25@1.50	.60@1.20	1.10@1.35	1.15@1.60
S. E. Ky. screenings....	Cincinnati		.35@1.00	.60@1.00	.40@1.00	.50@1.10
Kansas shaft lump.....	Kansas City		4.00@4.50	4.00@4.50	4.00@4.50	4.00@4.50
Kansas strip lump.....	Kansas City		3.50	3.50	3.50	3.50
Kansas mine-run....	Kansas City		2.75	2.75	2.75	2.75
Kansas screenings....	Kansas City		1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75

WHAT'S NEW

In Coal-Mining



Equipment

Portable Air-Compressor Line Expanded

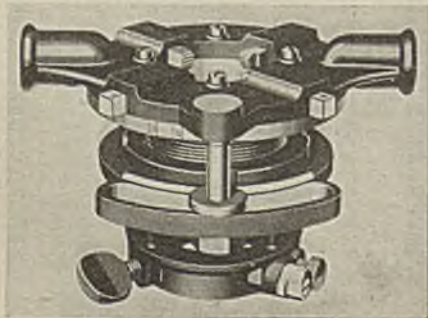
Five sizes of portable air compressors have been added to the machinery lines manufactured by the Gardner-Denver Co., Denver, Colo. These sizes have been designed to meet all the requirements within the scope of a portable machine, and are powered by heavy-duty, four-cylinder Buda engines. High-tension magnetos and impulse starters insure cold-weather starting and a governor holds the engines to rated speed.

Two-cylinder vertical single-acting Gardner compressors are used, with ample water jackets. Large-area suction and discharge valves are provided. The frame is a one-piece steel casting, with the air receiver and gasoline tank mounted on an extension. These compressors can be supplied on any standard mounting, including skids, steel- or rubber-tired wheels or trailers. The small size is designed for mounting on a Ford truck.

Quick Adjustment Part Of New Die Stock

Quick and simple adjustment to take any size of pipe from 1 to 2 in. are features of the new Nos. 11 and 11A self-contained Beaver die stocks, manufactured by the Borden Co., Warren, Ohio. In the threading end, so the manufacturer states, one set of dies may be quickly set within the range of the tool, or adjusted to thread over or under standard. Threads may be cut on any kind of pipe. The threading dies are made of specially heat-treated high-grade alloy steel and the die head and

All the Parts Contained in One Tool

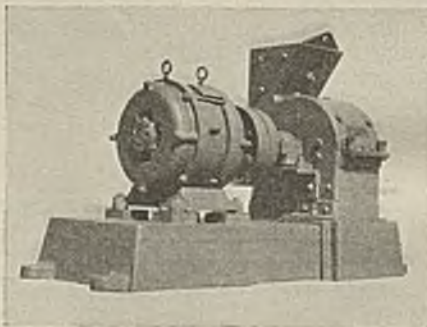


threaded barrel are in two parts, it being necessary to buy only the threaded barrel in making repairs.

It is also asserted that the work holder centers the pipe more accurately, can be quickly set to hold firmly any pipe size, eliminates loose parts and adjusting to properly center the pipe, will grip any size coupling for threading short nipples and will eliminate loss of time in hunting for and changing loose parts.

Efficient Crusher Needs Little Space

Extreme compactness and rigidity are claimed for the "Little Tiger" crusher manufactured by the Montgomery Coal Washing & Manufacturing Co., Bir-



Economizes on Space

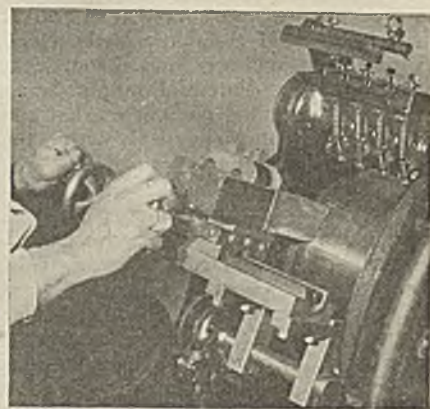
mingham, Ala. It is lined throughout with manganese steel and all the parts are readily accessible upon the removal of only four bolts.

Sturdy Pliers for Hard Service

Savings in time, labor and money are claimed for the "Master Pliers" manufactured by the Joslyn Mfg. & Supply Co., Cincinnati, Ohio. These pliers are made with a compound joint, giving a considerably increased leverage and cutting capacity, in addition to box joint construction, which always insures alignment of the jaws. The manufacturer states that a special analysis crucible vanadium tool steel is used in their construction and that drops—even in zero weather—will not cause the tool to break.

Commutator Dressing Made Easy

Removal of long flat spots and eccentricities in commutators is made easy by the use of the "Perfect Tool Rest" and the "Ideal Commutator Resurfacers," according to the Ideal Commu-



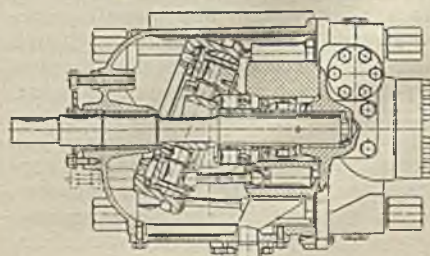
Irons Out the Rough Spots

tator Dresser Co., Sycamore, Ill. All commutator irregularities, says the manufacturer, can be easily and quickly removed and an accuracy of 1/1000 in. often can be attained. It is not necessary to dismantle the machine, with the result that considerable time can be saved in dressing up a faulty installation.

Hoist Motor Can Be Run At Constant Speed

Hydraulic transmission of power has long been recognized as one of the most flexible and satisfactory means of obtaining variable control of speed without the disadvantages of declutching. Variable Speed Gear, Ltd., of London, recently placed on the market a

Hydraulic Transmission



What's NEW in Coal-Mining Equipment

hydraulic gear specially designed for hoists and other colliery equipment.

For those who are not conversant with this type of gear it may be briefly described as consisting of two generally similar units, one of which functions as a pump supplying fluid to the other, operating as a hydraulic motor.

These units can be directly opposed to one another with a common connecting or valve plate, or they may be separated by any reasonable distance with a separate valve plate for each unit and connected by piping.

In the pump unit the main shaft is driven in one direction and carries a universally mounted rotating block or cylinder barrel, which is free to move axially. This cylinder barrel contains cylinders bored parallel with the main shaft, having ports of reduced section opposed to two Ridney-shaped ports contained in the face of the valve plate, which is stationary. The cylinder barrel rotates in contact with the valve plate face in a state of hydraulic balance, initial contact being obtained by means of spring loading.

Each cylinder is fitted with a piston connected by a ball-ended rod to the socket ring, which in turn is connected to the main shaft by a universal joint. The socket ring rotates in a non-rotatable but pivotable member called the tilting box, bearings being interposed to take the thrust and radial load. When the socket ring is vertical the pump is in the neutral or no-stroke position, but any deviation from the vertical imparts stroke to the piston and causes delivery through one of the valve-plate ports and returns through the other. The greater the tilt the more the delivery given owing to the increased travel of the pistons. By reversing the angle of tilt, the flow also will be reversed, and what was previously the delivery port will become the return port.

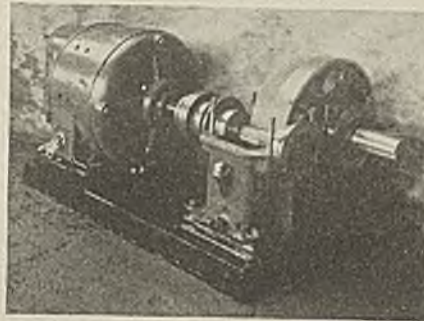
Control of the pump can be effected in several ways according to the different sizes and types of machines and the duty conditions; viz., by lever or wheel control for hand or mechanical operation, or automatically by pressure of the oil in circuit. The facility of control of these pumps renders them particularly valuable for hydraulic systems employing oil as the circulating medium.

The hydraulic motor is similar in construction to the pump end, except that it usually has a fixed tilt and no controls or valves, these being necessary for the majority of purposes in the pump end only. Speed and direction of motion of the motor end are governed by the amount of fluid and the direction of flow given by the pump. When the pump end is in the neutral position the motor end is stationary.

The medium of transmission is oil, which is practically incompressible, and as the machine cases are full and the oil is applied under pressure to all important working surfaces, lubrication is perfect and wear negligible.

Improved Speed Reducers Have Roller Bearings

The Farrel-Birmingham Co., Inc., Buffalo, N. Y., announces a new series of speed reducers which have Sykes continuous-tooth herringbone gears and anti-friction bearings. The improve-



Single Reduction Unit With Motor

ments claimed for the new reducers are roller bearings of the type which combine journal and thrust capacity, both pinion and gear shafts being held from end float and therefore protected from abuse from the connected mechanism; a mechanical efficiency of 98½ to 99 per cent for single reduction and 98 to 98½ per cent for a double reduction; simpler lubrication than with the plain-bearing units, as the same oil may be used for gears and bearings and the splash and flood automatic system is possible throughout the series; considerable saving in space and interchangeable roller bearings. The latter provision allows the gear units to be made interchangeable and manufactured in a larger quantity than the plain bearing units, thus reducing the initial cost.

All Coal Sizes Handled By Portable Conveyor

The newest member of the Link-Belt loader family to enter the coal trade is a portable flight conveyor, furnished in 21-, 26- and 31-ft. lengths. The new machine has been specially "trained" for the handling of all sizes and grades of coal and coke—from the smallest to the largest. All frame and trough members are bolted and can be easily re-



Specially Trained for Its Work

newed when necessary. Axles are of the swivel type, easily adjustable for different positions.

A double strand of chain with special attachments constitutes the conveying medium. Materials are conveyed at the rate of 60 cu.ft., or 1½ tons, a minute when handling coal. The head shaft is provided with bronze bushed take-up bearings and the foot sprockets are bronze bushed and revolve on a fixed shaft locked in place. The head shaft bearings and foot sprockets are lubricated through their shafts by Alemite fittings.

Completely inclosed motors are standard and all gears are protected by guards. The head shaft is driven from a countershaft with suitable reduction gearing by a 5-hp. motor. The raising and lowering of the conveyor is accomplished by a chain arrangement of worm gearing and drive.

Like the portable belt conveyor, the flight machine may be operated in conjunction with an overhead I-beam trolley, chain block and bail. It also may be fitted with a screening chute and screens of the woven wire or bar type, depending upon the material to be handled.

Socket Wrenches for Heavy Duty

Heavy-duty socket wrench sets are now being manufactured by the Bonney Forge & Tool Works, Allentown, Pa. Each set is composed of 10 sockets, running in size from 1½ in. to 1¾ in. opening. The manufacturer states that



Sturdy and Complete

it is designed for hard service, being proportioned so that, though light in weight, it has a heavy reserve strength factor. Each set consists of 10 sockets, ratchet handle and a short and long extension sliding "T" handle, and is packed in a black enamel carrying case.

Composite Gears Stop Breakage

Because cast-iron teeth break under shock load and often in general practice gears are subjected to such load, a demand for steel gears is now common, according to the Hill Clutch Machine & Foundry Co., Cleveland, Ohio. When cast-iron gears break the usual method is to replace them with steel or, as an alternative, make them in two parts, a

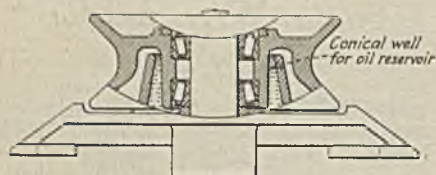
What's NEW in Coal-Mining Equipment

hub and a rim. A cast-steel gear is liable to defects in the teeth and the two-piece gear is too expensive.

To eliminate these disadvantages this company is now prepared to supply gears with forged-steel teeth and a semi-steel hub, made by casting a hub in an annular forged ring. After casting, the completed gear is finish machined and the teeth cut. The junction of the steel and semi-steel center is a laminated weld of steel and iron and the finished gear is one integral piece. The thickness of the forged steel rim is proportioned to the teeth.

Rope Rollers Equipped With Timken Bearings

Lubrication once every two or three months and reduced rope wear are features of the rope rollers manufactured by the Vulcan Iron Works Co., Denver, Colo. All slope, knuckle and curve rollers, and sheaves are equipped with Timken bearings. The lubricant is held in and dirt kept out by special seals and traps, and ample reservoirs are supplied. A new supply



Minimize Wear and Attention

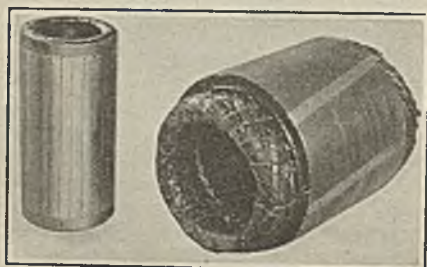
of lubricant is not necessary except at long intervals.

These rollers reduce rope wear as the Timken bearings allow them to start easily. Long life is assured as the bearings are adjustable for wear and the chromium steel rollers are unbreakable and wear-resisting.

High-Speed Motor Made In All-Welded Design

A squirrel-cage motor for use in various kinds of machinery requiring high-speed motors has been perfected by the Lincoln Electric Co., Cleveland, Ohio. This motor is of the so-called shell type, an all-welded design. It is supplied in

Shell Type Squirrel Cage Motor



3 hp. and 5 hp. The 3-hp. unit has an external diameter of 6.5 in., and an external length of 4.5 in. The 5 hp. is of the same diameter and is 6 in. in external length. Both motors are manufactured for either two- or three-phase, 60-cycle current and a speed of 3,600 r.p.m.

The stator is composed of laminated sections arc-welded together. The welding is done while the shell is under pressure and is placed in six transverse slots. The rotor also is entirely arc-welded and provided with either a straight or tapered bore. The welding does away with the necessity of a solid shell about the laminations and also replaces the conventional rivets.

As normally used the stator is secured in the frame of the machine and the rotor is mounted on the tool shaft. If desired the stator will be supplied with 6 ft. leads.

Issues Line of Portable A.C. Instruments

A new line of portable alternating-current instruments designated as type PY5 is announced by the Westinghouse Electric & Mfg. Co. They are of the direct-reading type and are applicable for general testing and laboratory work where high accuracy is required.

The ammeters have a double range which can be changed while the meter is in use by a series-parallel switch mounted in the case. They may be used on circuits up to 500 cycles and also on direct current with but slight reduction in accuracy.

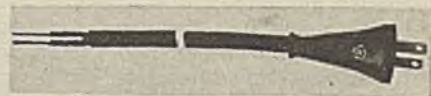
The voltmeters have an accuracy of $\frac{1}{4}$ per cent and can be used without appreciable error on direct current and on alternating current up to 133 cycles. The single-phase wattmeters also have an accuracy of $\frac{1}{4}$ per cent and may be used on circuits up to 400 cycles without requiring correction for phase displacement.

Type PY5 Portable Voltmeter



No Wiring of Cap With All-Rubber Cord Sets

The merchandise department of the General Electric Co. at Bridgeport, Conn., announces new GE Flex all-rubber cord sets, made up in 10- and 20-ft. lengths of No. 16 and No. 18 type SJ GE-Flex Junior all-rubber cord. One end of the cord set has a GE-Flex all-rubber cap, while the other end is stripped ready for wiring. This set may



also be obtained with a pony attachment compound plug body and a GE-Flex all-rubber cap. The cord and cap consist of one mold with the prongs molded into the cap, thus eliminating the necessity of wiring the cap. Breaking of wire at cord holes or breaking of compound also is guarded against.

This set is particularly recommended for hard service, and is suitable for use in railways, mines, ships, construction work and industrial service in general.

Safety and Strength In Cable Clip

Two jaws fully grooved to the cable and a load capacity three times greater than the ordinary are features claimed for the new Eureka "triple-strength" cable clip, made by the Eureka Copper Products Corporation, North East, Pa.



Strong and Safe

It is so designed that there is no distortion of the cable and any size wrench may be used to tighten it without fear of damage.

Greater safety is claimed because of the triple grip on the cable, an important fact from the user's standpoint. A considerable saving in cable results from lack of injury to the strands. There also are savings in clip cost and labor, as fewer clips are necessary.

Induction Motor With High Starting Torque

An improved single-phase repulsion induction motor is announced by the General Electric Co. This motor, in sizes including $\frac{3}{4}$, 1, $1\frac{1}{2}$ and 2 hp. at 1,800 r.p.m., supplements the company's present line of SCR motors. It is of the constant-speed, high-starting torque type for general application.

One of the most important improvements is the more efficient use of the stator punchings. As a result of this modification the active core section is unusually large, permitting a design of low-flux density and larger bore. Therefore it is possible to make this motor with small over-all length. The motor

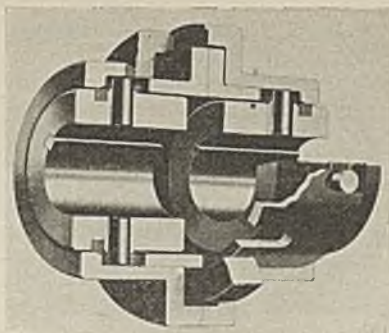


Power in Compact Form

is inclosed except for ventilating openings in the lower portion of each end shield. With only a slight change in the inclosing features, the motor may be made of the totally inclosed type, somewhat reducing the rating.

Flex-Ring Couplings Fix Bad Drive Conditions

Flexible couplings of a new type are now being manufactured by the T. L. Smith Co., Milwaukee, Wis. The new couplings are known as Flex-Ring full-floating couplings and in design approach the universal joint with a shock-absorbing member added. It is asserted



Sectional View, Flex-Ring Coupling

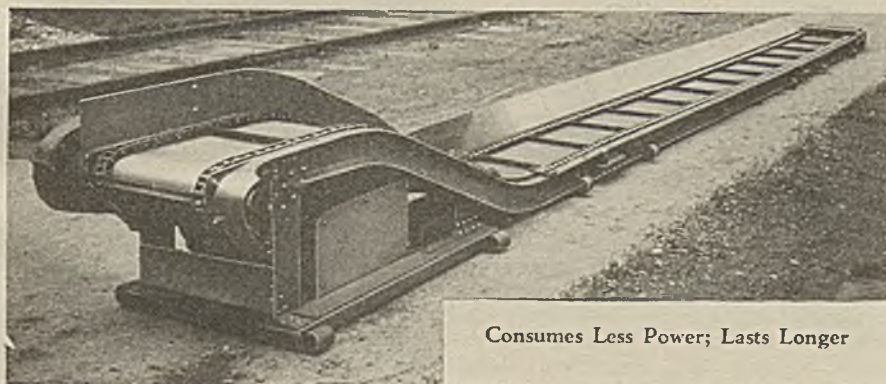
by the manufacturer that these couplings compensate for all possible conditions existing in a direct drive such as angular misalignment of shafts, offset between shafts, end-play of shafts and shock. An important feature of the Flex-Ring is the fact that it will handle all these conditions even when present to an excessive degree.

Low Type Face Conveyor Needs Less Power

Longer wear is the chief advantage claimed for the new "Low Type" sectional face conveyor made by the Lorain Steel Co., Johnstown, Pa. These conveyors are of all-steel construction and have a hardened steel chain running on rollers instead of the belt carrier of the face conveyor formerly made by this company. This model is designed to replace the former 12-ft. belt face conveyors used with the Lorain main conveyor.

Another outstanding advantage claimed for the new face conveyor is smaller power consumption. This is due to the practice of allowing the chain to run on rollers, and longer wear results from the substitution of the steel drag chain for the belt conveyor formerly used. It is said that the steel conveyor will outwear six of the belts and in addition will work better in wet coal.

This conveyor is made up in four sections which include a 6-ft. section, a 10-ft. section and the head and tail pieces. It is powered by a 3-hp. motor and the total weight of the complete conveyor and driving unit is 1,815 lb.



Consumes Less Power; Lasts Longer

Speed and Power Feature Gas Shovel and Crane

Power, speed and great strength are combined in a $\frac{3}{4}$ -yd. gasoline shovel and crane, known as the type 1030, just put into quantity production by the Bucyrus-Erie Co., Erie, Pa. A $72\frac{1}{2}$ -hp. gasoline motor permits the use of $5\frac{1}{2}$ -in. hoist drums, high line speeds for fast closing and hoisting of a $\frac{3}{4}$ -yd. clamshell and fast overhauling of a dragline bucket. Four to five complete revolutions are made per minute.

To take care of the great speed, over-size contracting-band clutches are used, with a large brake of the contracting shoe type to stop the swing. This allows the operator to swing faster without fear of overheating or rapid wear on



Hits the Dirt Hard and Fast

the clutch bands, as "plugging" of the swing is not necessary to stop. This separate brake also adds life to the swing clutch.

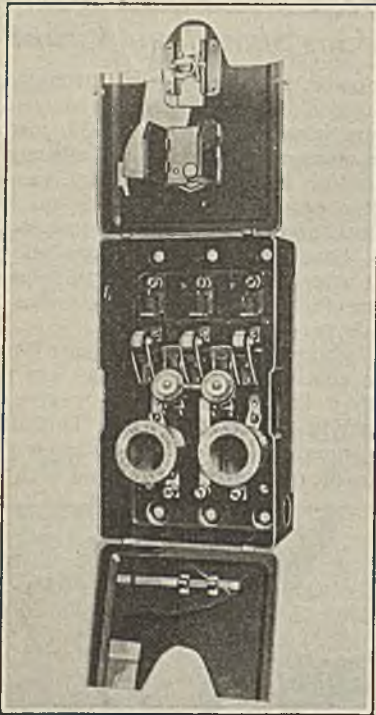
To prevent any chance of the swing gears working apart and springing the shafts, the gears are tied together and held in positive alignment by a steel box housing. This insures perfect meshing—permanently—and the gears are completely inclosed, running in oil.

Simplicity is a feature of the mounting—there is only one drive shaft and one gear and pinion, below the deck. The gear is well up out of the dirt, completely housed and running in oil. The mounting has a 2-way brake which quickly locks the machine in either direction while permitting free travel the other way.

Many Advantages Mark New Manual Starter

A new manual across-the-line a.c. motor starter (CH-9115) is announced by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. Designed to meet the need for an inexpensive manual starter, it embodies such advantages as overload cutouts giving complete motor protection; cadmium-plated double-break roller-type contacts, and small-size safety dustproof inclosing case.

The roller-type contacts break the arc in two places, insuring long life. In addition the contact rollers present a



Three-Pole Manual Starter; Covers Open

new contact surface each time. Complete motor protection is obtained during both the starting and running periods. Thermal overload cutouts provide the necessary time interval required to take care of starting inrushes without shutting down the motor.

Strongly Constructed Stable Arc Welder

A self-contained, light weight, readily portable arc welder known as the S-1960 Model is announced by the Lincoln Electric Co., Cleveland, Ohio. The new unit has a rating of 200 amp., according to N.E.M.A. standards, with a current range for welding duty of from 50 to 300 amp. It operates at 1,500 r.p.m. Motive power is provided by a 4-cylinder Continental Red Seal engine.

Steel is used in the welded base, in the generator and in the magnetic field, resulting in a very strong and light-weight outfit. The weight of the welder is 158 lb. and it is 76 in. long and 25 in. wide.

Portable Welding Outfit

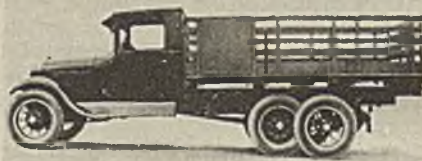


Colored Fuses Are Handy

A new and practical color creation in plug fuses for electric light circuits has been placed on the market by the Trico Fuse Mfg. Co., Milwaukee, Wis. These fuses have colored tops, a color for every size. All fuses 0-6 amp. have a brown top; 10 amp. are yellow, 15 amp. are blue, 20 amp. are pink, 25 amp. are red, and 30 amp. are green. All users will appreciate the idea as it enables them to know the capacity of the fuse by the color. Another practical feature is embodied in the packing of these fuses. The five-unit carton has a "peep hole" so that one fuse can be seen without opening the package, and the border around the entire carton is in the color to match the color of the fuses inside. This feature makes it handy to know the capacity of the fuse in the box.

Unit Doubles Capacity Of Ford Truck

A unit that doubles the carrying capacity of the new AA Ford truck is now being produced by the Twin-Flex Corporation of Detroit and Toronto. The truck need not be changed in any essential part and only four holes need be



Six-Wheel Truck With Double Capacity

drilled in the frame to install two auxiliary wheels together with the necessary equipment. The resulting six-wheel truck is said to be strong and rugged, and as the trailer wheels overlap the rear wheels the truck can negotiate ruts and rough ground with increased ease in steering.

Supervisory System for Centralized Control

A synchronous selector type of supervisory system which provides for the centralized control and indication, over four wires, of various types of automatic switching equipment located at outlying substations is announced by the General Electric Co. Its chief advantage is the co-ordination of any number of units under the supervision of one dispatcher, which makes the equipment suitable for both large and small power systems. The control devices at both the dispatcher's headquarters and the outlying station are

mounted on 90-in. ebony asbestos panels of uniform height so that additions to the system can readily be made.

Four advantages of the new system are listed by the manufacturer: (1) The equipment is normally at rest and is started by the dispatcher or when an automatic operation takes place at an outlying station; (2) a rapid means of control and indication is provided; (3) the operation of the controlled unit occurs simultaneously with the pressing of the master control key; (4) panel mounting simplifies installation and gives free access to all connections.

Gasoline Locomotive Uses Tractor Power

An industrial locomotive suitable for coal and clay mines, quarries and industrial plants of all kinds has been announced by the Brookville Locomotive Co., Brookville, Pa. This is a gasoline unit powered by a popular industrial



Used to Shift Railroad Cars

tractor and may be had in 5, 6, 8, 10 and 12 tons weight. A gear shift allows three speeds forward and three reverse. All four wheels are positively driven, and the gear shift allows speeds of 2, 4 and 10 miles per hour.

Improved Tourniquet Quickly Applied

Instant application and positive action are claimed for a new type of tourniquet manufactured by the Ideal Tourniquet Co., Baltimore, Md. Application requires that the loop be slipped over the limb, whereupon a pull on the cable fastens it in place with a smooth, even pressure all around. According to the manufacturers, the automatic clamp insures positive control and it may instantly be released.

Checks Hemorrhage Quickly



BIBLIOTEKA GŁÓWNA
Politechniki Śląskiej

P 375/28