COAL AGE

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When Normalcy Returns—

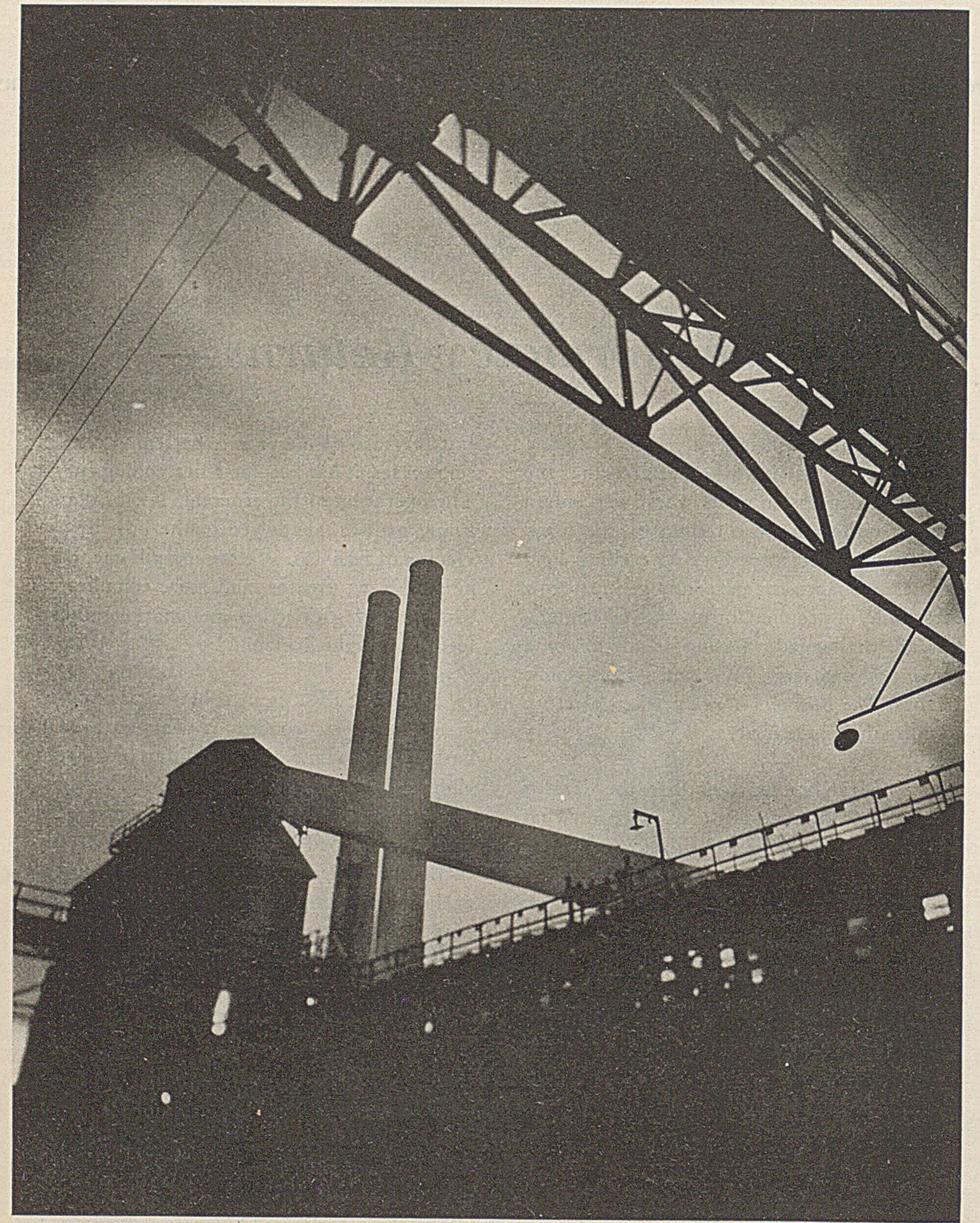
WHEN will business be normal again? Pollyannas of last fall who declared that the industrial depression at its worst was only a fleeting visitation were routed by the black jubilations of sterner seers foretelling long and lean penance for past indulgence. Now these doleful prophets of protracted flagellation are challenged. Basing its opinion on a convincing analysis of fundamental economic factors, *The Business Week* predicts a return to normalcy in October.

EVEN MORE important than the date of this return, however, is the question of what will follow the return. Disillusionment over the collapse of "the new era" which was to overturn all precedent and all economic law seems to have blinded many business men to the opportunities which the present situation offers to sound and progressive management. Weeping has been easier than working. Will the return to normalcy revive the fatuous doctrines so recently and so painfully discredited?

FOR over sixty years, business has been carried on a stream of expanding development. The natural growth of the country has created an ever-widening demand for goods. But the rate of increase is flattening out; in some cases, it has become a descending curve. The operation of the economic law of diminishing growth, shadowed in the past by the volume of business, is attaining a higher visibility. New, greater, and more complicated problems of production and market adjustment are on the horizon.

NO INDUSTRY is in a better position to meet these new conditions than coal. On business as a whole, the precipitous pitch from eight soft years of super-prosperity has produced industrial shell-shock. Coal has been denied cushioned ease for a decade. Many of the physical readjustments which industry at large now must make, coal already has made under the compulsion of necessity. To coal, for example, the law of diminishing growth is an actuality—not an economist's theory.

LEADERSHIP in coal, therefore, has an unusual opportunity to build soundly on the return to normalcy. But leadership without followers is a forlorn hope. A Moses conducting a one-man exodus cannot hold the promised land for those who tarry indefinitely in Egypt.



"Moderne"—At the Colorado Fuel & Iron Co.

STANDARDIZATION PLUS

+ Island Creek Equips All Mines With Mounted Machines and Drills

By J. H. EDWARDS

Associate Editor, Coal Age

PROBABLY no other company of comparative production — over six million tons in 1929— has gone as far in standardization of inside equipment as has the Island Creek Coal Co. at its seven operating mines in Logan County, West Virginia. But standardization does not block the adoption of new equipment which will yield an attractive return on the investment. Within the past year, 70 shortwall mining machines all of one type have been displaced by 36 track-mounted bottom cutters, and coal drills have been replaced by 17 double-spindle mounted drilling machines. Room development and track arrangement have been changed with the introduction of the new equipment.

Excellent mining conditions, including a top which as a rule requires no posting in rooms, simplifies the making of changes. The coal bed lies nearly flat and the average working height is 7 ft. A thin parting near the center of the seam breaks free from the coal and into large flat pieces, facilitating separation at the face.

Two years ago, when the operating officials became convinced that it was time to discard shortwall machines, 90-day tests of several types of mounted machines were conducted. Superintendents, foremen, maintenance men, and other officials were assigned to observe each machine in operation. As a result of weighing performance records, maintenance costs, and opinions of operatives and officials, the company selected the Goodman type 324AA bottom-cutting slabbing machine.

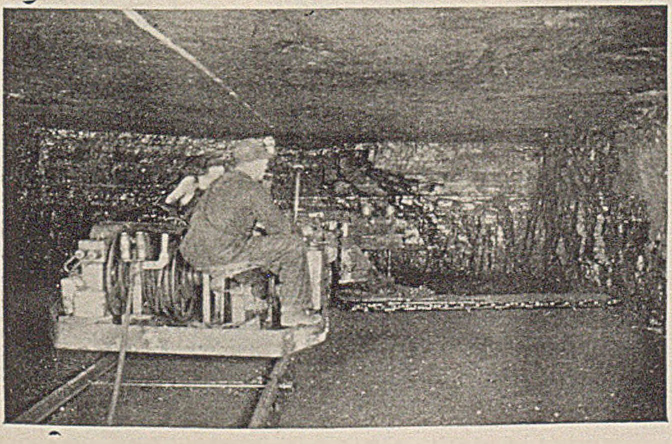
After a similar test of mounted drilling machines, the Jeffrey type 56A, which drills two holes at once, was chosen. Complete with all tools and accessories, this machine weighs 7,250 lb. It is 12 ft. 3 in. long and 62 in. wide. Some of the machines are 42 in. high and the others 50 in. The tramming speed varies from approximately 2½ miles per hour on grades to 6 miles per hour on the level.

Reduced cost of cutting, of course, was the governing factor in the decision to change to mounted mining machines. Two men in an 8-hour shift can easily cut 700 tons, as compared to 400 tons with the shortwall type. On a test, in one continuous shift of 13 hours, one of the new machines cut 46 places, or 1,400 tons. More tons are cut per place by the track-mounted machines because these machines are heavy enough to work a cutter bar that makes an average cut of 6 ft. 9 in. Because the bottom coal is quite hard, the lighter shortwall machine could not cut to this average depth.

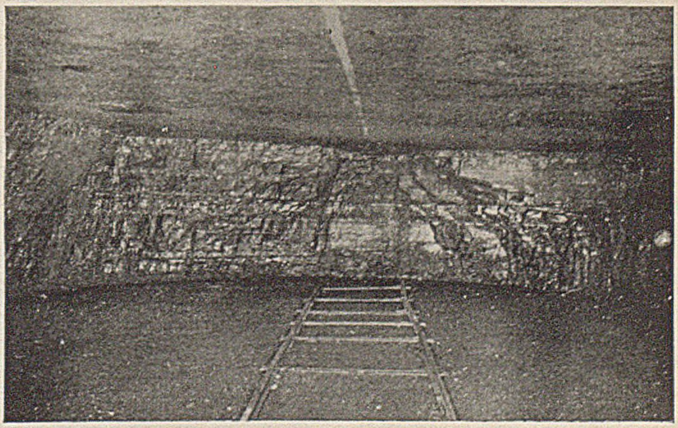
The bottom-cutting slabbing machines weigh approximately 9 tons and the tramming speed is 5 miles per hour. A motor rated 50 hp. for 1 hour drives the cutter chain and elevates the cutter arm; a second motor rated 10 hp. for 1 hour handles the tramming, feed rope, and turntable. With a 7-ft. cutter bar, the cutting radius is 13.5 ft.

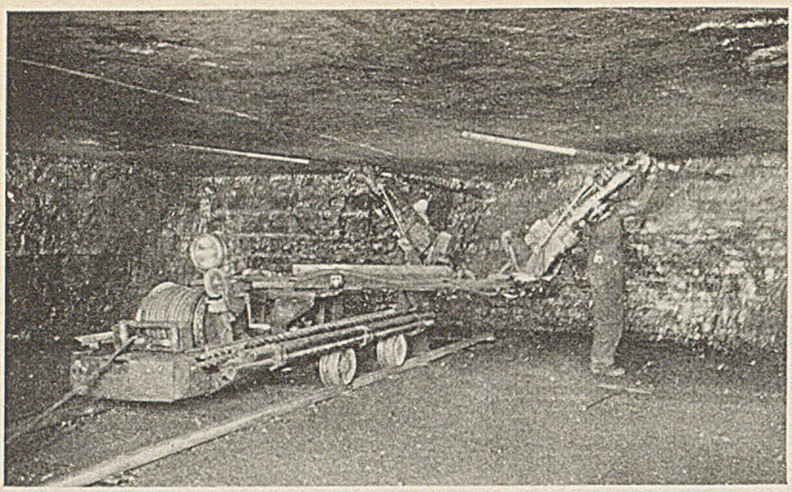
Cutting is done on the bottom and the bottom is made surprisingly smooth. This eliminates bottom scrapping, which, with the shortwall

Sumping to Cut a 27-Ft. Room Without Slabbing



The Bottom Can Be Cut "as Smooth as a Table"

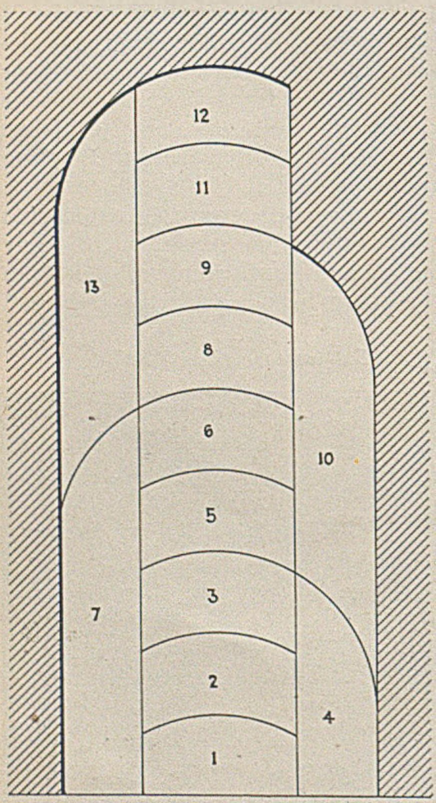




Drilling Two Holes at Once in a 27-Ft. Room

machines, averaged about 6 in. of coal. This scrapping was done with light dobie shots and by hand picks. Explosive for bottom shooting cost about 75c. per cut. Doing away with scrapping conserves the loader's time sufficiently to allow him to average 2½ tons more coal per day. It has materially reduced eye accidents and eliminates the slack that was made by the scrapping. The design of the machine allows a range of adjustment of the bottom of the kerf from a point 8 in. below the top of the rail to 7½ in. above. The combination of the swinging turntable and the swinging arm allows driving

Sequence of Cuts in Driving and Widening Room



places down to 10 ft. in width when cutting on the bottom.

Physical effort is so reduced that the men are not all tired out at the end of a shift, as they were when operating the shortwall machines. Because of the fewer machine men required on the payroll and the easier work, the company can be more selective and obtain more efficient men. Reduction in number of machine operatives has made available a number of houses for loaders.

Company officials report that installation of the machines and drills brought a reduction of 15 to 20 per cent in the slack. Several factors enter into this reduction. Elimination of bottom scrapping already has been mentioned. Coarser machine cuttings is another; more effective drilling is a third; and a change to widening rooms by slabbing, which will be discussed later, is a fourth.

Coarser cuttings than with a shortwall is attributed to the faster feed. A feed of 36 in. per minute, measured at the end of the bar when cutting an arc, is used, except in hard cutting, when it is reduced by motor control. At 36 in. the mean feed of the bar is about 30 in. Faster and more positive feed causes the bits to tear out larger pieces. The chain speed is about the same as was used on the shortwalls.

In purchasing the mounted cutters the Island Creek company specified two headlights per machine to illuminate the face during cutting. The advantage of good light is so evident that, according to one of the officials, "I do not see how we used to get along without lights for undercutting." The Goodman company made headlights standard equipment after applying them on Island Creek machines.

Special steel ties, described in a preceding issue (Coal Age, Vol. 34, p. 558) were developed for holding "balled" extension rails upon which the machines work and move at the face. Rail of 25-lb. weight is used in rooms.

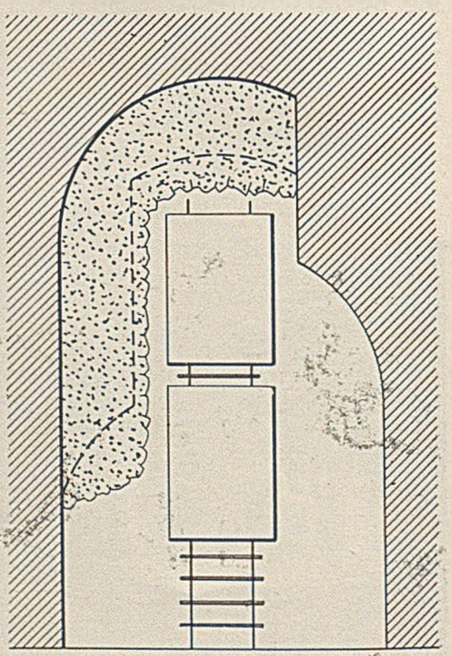
The regular practice with shortwall machines was to drive rooms 28 ft. wide. A switch was installed and the room double-tracked, allowing the placing of two cars abreast at the face. As is still the practice, sufficient development is provided so that each loader is allotted two rooms or their equivalent in working places.

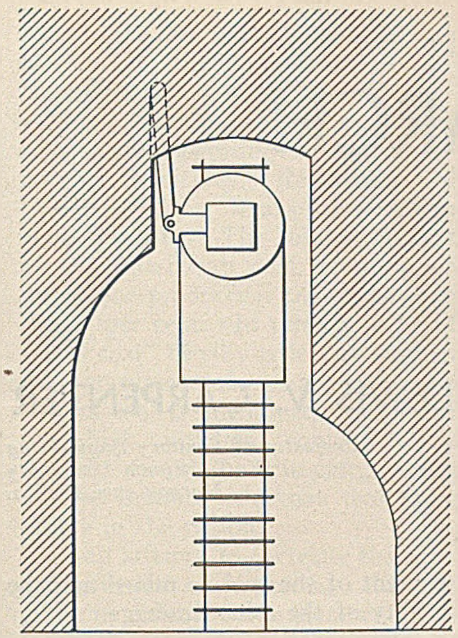
About a year before beginning to discard the shortwall machines, driving the rooms narrow with single track and widening by slabbing was tried extensively in one mine. With the track-mounted machines this method has practically replaced the double-tracked wide-room system.

The room is necked and driven 16 ft. wide for a distance of 32 ft. from the center of the heading. At this line which marks the first break-throughs in alternate rooms, the room is widened. Starting here, the advancing cuts are made 13 to 14 ft. wide, and after every fourth cut each side is slabbed back, thus making the room approximately 27 ft. The side slabs usually are cut alternately—that is, after two face cuts, the left side is slabbed and then after two more face cuts the right side is slabbed.

All machines are equipped with feed ropes and sheaves for use in cutting slabs. To start the slab the arc of the cutter bar is continued from the face cut to the right angle

Face and Slab Coal Shot Down and Two Cars Spotted





Sumping to Make a Face Cut Which Will Be Continued Into a Right-Hand Slab

position and then the machine is pulled back along the track a distance of 19.5 ft. to the end of the slab.

The track is by necessity in the center of the room. Two cars, coupled together, are spotted at the face. The front car is loaded from the face coal and the other from the slabs. Because the face or advancing cuts provide a tonnage equal to that from both slabs, loading the front car always from the face insures that slab coal always will be available for the rear car.

Spotting two cars in tandem on the single track and slabbing have several advantages over cutting wide rooms and spotting two cars by the double-track system. Loaders find it easier to load a car over the side from the slab coal. A higher percentage of lump is produced from the slabs, because the open end makes it possible to bring down the coal with a light charge of explosive. Cost of gathering is reduced by handling two cars at a time. There also is a reduction in the labor and material costs for room tracks.

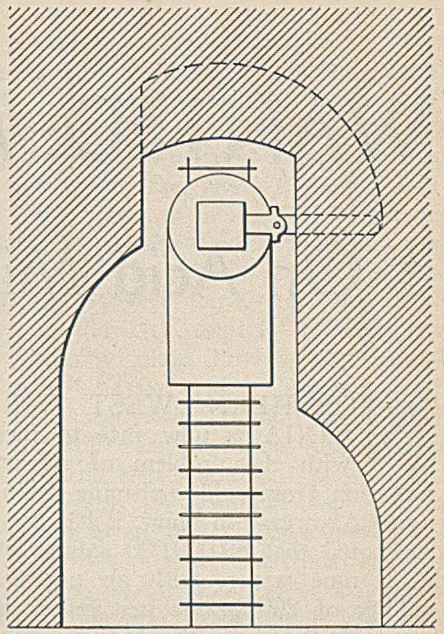
Cutting a slab on the alternate side after every second face cut is not followed invariably. If the machine men have a heavy shift, they will pass up cutting slabs in rooms where slabbed coal already is available. Again, if the shift is light, they may cut slabs ahead of schedule. The section foreman is charged with the responsibility of keeping every loader in coal and is therefore allowed to vary the sequence of slab and face cuts as he sees fit.

Previously it was mentioned that two rooms are provided for each loader. An advantage of this system is that switches do not have to be laid in rooms to provide the loader with two working places while room breakthroughs are being driven. Face work is stopped temporarily and the end of the track is turned into the breakthrough. The other room provides the second working place.

The decrease in slack credited to the new drills is believed to be due to drilling the holes close to and parallel to the roof, so that the explosive charge is all in an 8-in. top vein of soft coal which breaks up regardless. With the old post-mounted drills, the hole had to be placed in the harder body of coal below and started about 2 ft. from the top. In a 6-ft. cut, this meant an angle of about 18 deg., making it difficult to keep from drilling into the top once in a while.

Placing all of the charge at the top where it belongs has practically eliminated the hanging coal so often encountered in the old method of drilling. The face-and-slab method of driving rooms provides a flexibility in drilling schedules even greater than in cutting. If the drill men have an especially light shift, they can go so far as to drill the ribs before the slab cut has been made. Three holes are drilled in the 19.5 ft. of rib which is the average slab cut length.

Of the four mining machines in use at mine No. 22, the newest operation, three were received equipped to cut in a parting near the center of the seam instead of on the bottom. As the mine is being developed from the shaft, which is in one corner of the property, toward the main body of

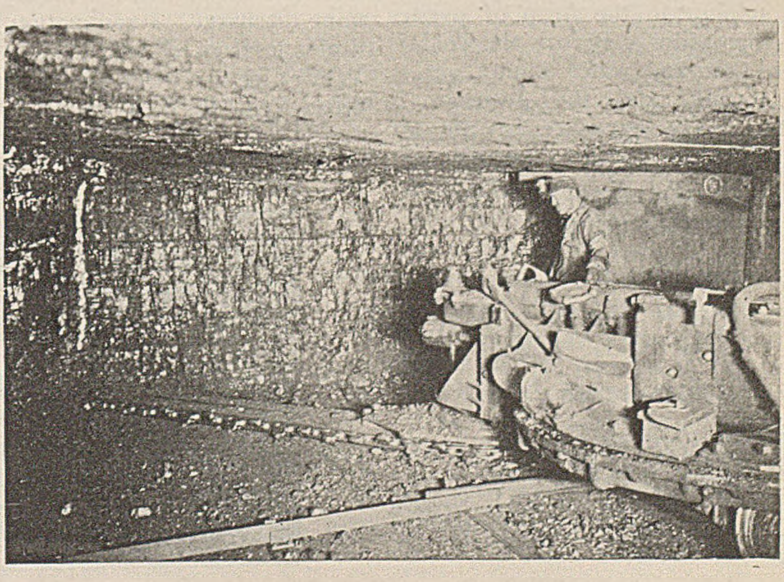


Face Cut Arc Continued to 90-Deg. and Machine Ready to Move Back Along Track and Cut the Slab

coal, the parting encountered thins to normal, so that undercutting is advisable. Two of the machines have been changed to undercutters. One will be left as a center cutter, designated as the type 124AA to finish the thick parting area.

Taking into account only the advantages that are easy to evaluate, it is estimated that the new equipment should save the first cost in less than two years' operating time. If it should happen that these new machines can be used as long as were the shortwalls—some had served approximately 20 years when discarded, but were in excellent condition, because of the thorough maintenance methods—they will have earned a handsome return.

Places Down to 10-Ft. in Width Can be Cut "on the Bottom"



WANTED: MORE RESEARCH

+ On Acid Mine Drainage

By LEWIS V. CARPENTER

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NORTHERN WEST VIRGINIA is now face to face with the problem of stream pollution from acid coal-mine drainage. As a case in point, it has been estimated that 50,000,000 gallons of acid mine water, with an average acidity of 200 grains per gallon, is emptied daily into the Monongahela River above Morgantown, W. Va. At times of low flow, this acid water makes the major streams unsuitable for either industrial, domestic, or recreational purposes, the Monongahela often having an acidity of 100 parts per million and a pH* value of 3. Yet this is the only water supply for a number of communities along the river. In addition to the endangered water supplies, fish life is rapidly disappearing.

The situation is rapidly becoming crtical and no solution seems to be forthcoming. Legislation is futile, unless it be national legislation, as it will add to the cost of mining and, under present competitive conditions, adversely affect the particular district where it is enforced. Any method of treating mine waste water installed at the present time would have to be self-supporting and no such system is now available.

Practically all of the coal seams of northern West Virginia contain iron and sulphur in the form of pyrites and marcasites. Before the coal is mined, air and water cannot get to the pyrites, and the drainage is neutral. On exposure to the air the following reaction takes place:

$$2Fe\ S_2 + 7O_2 + 2H_2O = 2FeSO_4 + 2H_2SO_4$$

This reaction continues as follows:

$$4FeSO_4 + 2H_2SO_4 + O_2 = 2Fe_2(SO_4)_3 + 2H_2O$$

As the water comes into further contact with the air, these acids oxidize to hydrates, which give the familiar brownish-yellow color to rocks in the streams that carry "sulphur" water.

Sulphur is found in coal in both the organic and inorganic state. The inorganic sulphur occurs principally in the form of pyrites and marcasites, both of which have the formula, FeS_2. Sulphate sulphur ordinarily is present as calcium sulphate (gypsum), occurring in thin white flakes along the cleavage planes. Because of the marked color contrast between the gypsum and the coal, it is very easy to overestimate the total sulphate sulphur. As a rule, freshly mined coal will contain less than 0.05 per cent of sulphate. Sulphur in coal may come from the original plant and animal substances, or hydrogen sulphide carried by percolating waters may change the iron of the iron and calcium precipitated from the ground to the sulphide of pyrites and marcasites. The organic sulphur usually is more uniformly distributed and is not thought to cause as much acid drainage as the inorganic sulphur.

Sulphur content seemingly is no criterion of the acid content of the mine discharge. Examination of the drainage from 28 mines in northern West Virginia failed to indicate any direct relation between the sulphur content of the coal as mined and the acidity of the mine drainage.

The oxidation of pyrites is a very slow process. Winchell[1] found that on treating pyrites with aerated water for one month neither the iron nor sulphur had gone into solution. It also has been found that alkaline waters decompose pyrites and marcasites to ferric oxide. All of these changes are rather slow and it is difficult to explain the rapid formation of acid waters in mines by chemical theory alone.

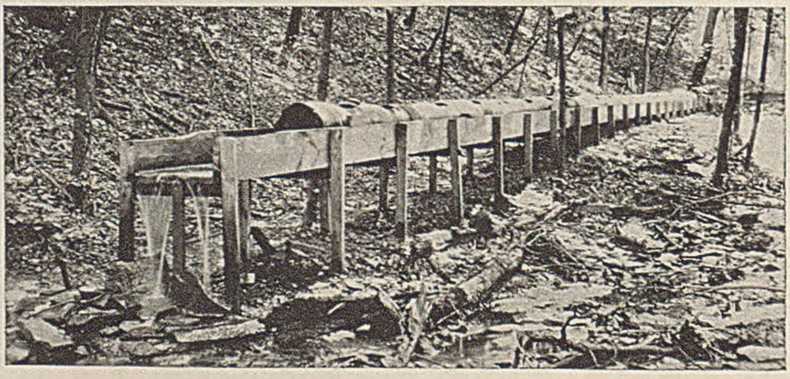
Anaerobic bacterial action by some of the sulphur-producing organisms might possibly explain some of the high acidities found in mine waste waters. Powell and Parr[2] performed a series of experiments to determine the relative oxidation of pyrites in sterile and inoculated coals. They found that at the end of 88 days the inoculated coal showed a decidedly greater increase in soluble sulphur. Much fundamental research is needed to explain finally the exact formation of acid mine water, however, as it is a well established fact that the sul-

*EDITOR'S NOTE—pH value is a number denoting the acidity or alkalinity of a solution. Solutions with a pH value of over 7 are alkaline, and those with a value lower than 7 are acid. As the values increase above 7, or decrease below 7, the solution becomes progressively more alkaline or more acid, respectively.

[1]Economic Geology; Vol. 2, p. 290 (1907).

[2]"A Study of the Forms in Which Sulphur Occurs in Coal"; Powell and Parr; Bulletin No. 111, Illinois Engineering Experiment Station.

Experimental Flume Used in Testing Culverts With Acid Mine Water



phur in the coal is not soluble enough to account for the amount of sulphates found.

Mines under discussion in this article are operating in the Pittsburgh, Sewickley, Redstone, and Upper Freeport seams of northern West Virginia. The sulphur content of the Pittsburgh coal, from which the major production comes, is from 1 to 4 per cent. In mining, 1 ft. of "head coal" usually is left to support the drawslate roof and about 5 in. of bottom coal is not mined, because of the high sulphur content. The drainage from the Pittsburgh seam usually is more acid than that from others in the region.

In an attempt to correlate the rainfall with the mine drainage the data given in Table 1 were obtained. Determinations were made on the basis of the year beginning July 1, 1928, and ending June 30, 1929. The total rainfall at Morgantown, W. Va., during that time was 38.37 in. All calculations were made on the basis of 2,860 gal. per acre per day average rainfall. The table very clearly indicates that the daily mined tonnage is not a fair criterion of the quantity of acid mine water.

Crichton[3] reports on the examination of 250 to 300 mines in Pennsylvania and finds in fairly deep mining, say 250 ft. or more, the maximum yield of mine drainage should not be expected to exceed 25 per cent of the rainfall, the estimated penetration. This value agrees remarkably well with the values obtained for mines 2, 3, 4 and 5 of the table. Mines 1 and 6 had about 50 to 60 ft. of cover and mined practically to the outcrop. In the deep mines, the quantity remains practically constant, the extreme variation from the mean being about 14 per cent. This fact is important, because of the large amount of acidity in our streams during low flow.

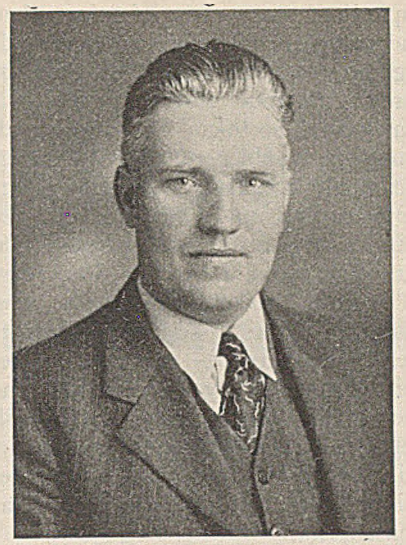
Table I—Relation Between Mine Discharge and Rainfall

Mine No.	Approximate Daily Capacity, Tons	Gallons per Day per Acre of Coal Exhausted	Per Cent of Annual Rainfall Appearing as Mine Drainage
1	1,000	1,600	55.8
2	800	820	28.7
3	200	700	24.4
4	500	750	26.2
5	1,500	700	24.4
6	400	1,100	38.5

*Table II—Partial Analysis of Some Mine Waters in Northern West Virginia**

Determination	Sample 1	Sample 2	Sample 3	Sample 4
Total residue...	13,600	69,560	5,262	32,600
Acidity.........	6,980	47,800	1,375	22,700
Sulphates.......	7,400	41,700	3,560	19,300
Total iron......	1,530	12,270	460	5,900
Calcium.........	590	412	477	682
Magnesium.....	6	13	12	20
pH value.......	2.6	1.4	2.9	2.0

*All results except pH values are in parts per million; to obtain grains per gallon, divide by 17.3.



LEWIS V. CARPENTER

The author of this article on mine waste waters brings to this study a wide experience in sanitary engineering. Born at Wheeling, W. Va., in 1895, Mr. Carpenter was graduated from West Virginia University with the degree of Bachelor of Science in Civil Engineering in 1916, and in 1925, received his master's degree from the same institution. In 1926, he was graduated from the University of Illinois with the degree of Master of Science in Sanitary Engineering. During the World War he served with the 6th and 304th Engineers and afterward spent three years in constructing waterworks and sewerage systems in the West. Since 1923, he has been teaching at West Virginia University, besides carrying on a consulting practice for various waterworks and the State Water Commission.

The acidity of the waters in this field is very high. Leitch[4,5] found a number of mines, some abandoned ones, that had drainage with an acidity of over 10,000 p.p.m. and found that the conditions of abandoned sections were usually higher than the active ones. Analyses of some mine waste waters in northern West Virginia are given in Table II.

During the past three years, three separate investigations of the effect of mine waste water have been conducted, the first of which was concerned with the effect on public water supplies in the Monongahela River basin[6]. Above the intake of the Morgantown water supply, it was estimated that 50,000,000 gallons of acid drainage was discharged daily. During the summer months, it was found that the river usually is acid and, of course, has a high iron content. Bacteria in the raw water decreases as the acidity increases and the river frequently is sterile. The water is very hard, with the result that the city expects to install a softening plant during the present year. As the acidity increases it becomes necessary to add more lime, and the water becomes more corrosive and less palatable.

During the summer of 1929 a pollution survey of the Cheat River basin[7] was made. The Cheat River is formed by the junction of Dry Fork and Shaver's Fork, about one mile below Parsons, in Tucker County, and flows practically north until it empties into the Monongahela River at Point Marion, Pa. Its entire length is 75 miles and its drainage area is 1,417 square miles. A series of surveys made during times of low flow showed that the river was acid for practically its entire length and that the stream did not have enough diluting water to neutralize the acidity of the mine water. The dissolved oxygen was never below 50 per cent saturation during the tests.

The third investigation was devoted to the effect of acid mine waters on metal-pipe culverts. In order to determine if any one of the five standard base metals used in the fabrication of galvanized, corrugated culvert pipe was superior to others when subjected to the action of highly acid mine waters, a field test installation was made, in which all metals were subjected to as nearly similar conditions as possible. The first location had to be rejected because the water was so acid that the life of the culvert was about 24 hours.

In this test, there seemed to be very little difference in the life of the base metals when subjected to the action of highly acid mine waters. Various bituminous coatings seemed to meet the requirements for protection when the coating was heavy. Several test sections of specially coated pipe were installed in pipe lines in some of the mines and it was found that whenever the coating remained intact the pipe would resist the action of the acid. If exposed, however, the metal would fail in a very short time. Prac-

[3]"Disposal of Drainage From Coal Mines"; Andrew B. Crichton, T.A.S.C.E.; Vol. 92. p. 1,332 (1928).

[4]"A Comparison of the Acidity of Waters From Some Active and Abandoned Coal Mines"; Leitch and Yant; Bureau of Mines paper No. 2895; October, 1928.

[5]"Observations on Acid Mine Drainage in Western Pennsylvania"; R. D. Leitch. Bureau of Mines paper No. 2889, September, 1928.

[6]"Pollution in the Monongahela River Basin and Its Effect on Public Water Supplies," W.V.U. Engineering Experiment Station Technical Bulletin No. 2, p. 27.

[7]"Pollution Survey of the Cheat River Basin"; Carpenter and Herndon; Bulletin of State Water Commission of West Virginia.

tically all of the mines in the region use wooden pipe for all of the drainage and the tests indicated that if metal pipe is used it is necessary to protect the metal from acid attack.

The feasibility of using various neutralizing agents for the treatment of acid mine waters was taken up in a series of laboratory experiments. Water with an acidity of 22,700 p.p.m. and a pH value of 2 was selected for the tests. The neutralizing agent was added in varying quantities until the pH value had reached 5.6. This value is high when the volume of diluting water available is appreciable, but it is about the lowest limit for the support of major fish and plant life. The quantity of sludge formed was measured, and its water content determined.

Table III—Data on the Neutralisation of 1,000 Gallons of Acid Mine Water and the Resultant Sludge

Neutralising Agent	Lb. per 1,000 Gal.	Approximate Volume of Sludge, Per Cent	Weight, Dry, Lb.
Lime (90% CaO)..	172.5	35	424
Pulverized limestone..........	434.6	35	621
Sodium hydroxide.	130.0	25	188
Calcium carbonate	161.5	40	352
Sodium carbonate.	200.0	40	194
Ammonium hydroxide.........	160.0	20	130
Sodium carbonate (80 lb.) plus lime (66.3 lb.).......	146.3	25	...
Lime (61.9 lb.) + Na OH (60 lb.).	121.9	35	183
Potassium ferrocyanide.........	142.3*	..	264
Lime (60 lb.) + potassium ferrocyanide (103.5 lb.)	163.5	..	389
Sodium cyanide...	140		188

*This quantity of potassium ferrocyanide brought the pH value to 3.0 only, as compared to 5.6 for the other processes.

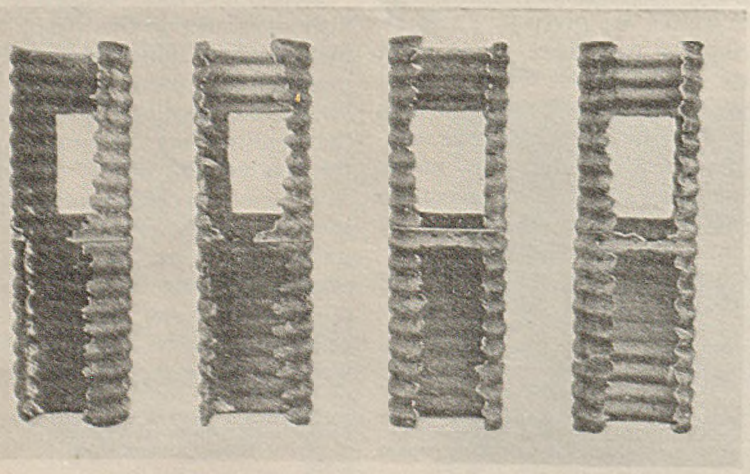
Based on the results obtained from these tests, limestone is the cheaper treatment from the standpoint of costs, principally because a cheap source of limestone is available locally. In other localities, it is probable that the lime treatment would be cheaper. Including the capitalized cost of a treating plant and sludge drying plant, and excluding any return from the sale of sludge, the total cost per 1,000 gallons would be 90c. Treatment with limestone would neutralize the water, but would not make it suitable either for domestic or industrial use, because of the resulting hardness. On the other hand, limestone does seem to remove the majority of the iron from the water. The laboratory tests clearly indicate—as many other results have already shown—that the success of treating mine waters will not be assured until some method of utilizing byproducts has been developed that will help pay the operation costs.

The H. C. Frick Coke Co. at its Calumet Mine[8] added powdered limestone to mine water and removed about 2,000 lb. of ferric oxide for each 1,500 lb. of limestone added. The settling tank sludge (about 75 per cent water) was reduced to a dry powder by splashing it against a heated steam drum. During the year 1920, the Calumet mine plant produced about six tons of ferric hydrate per day. This material is used for removing hydrogen sulphide from artificial gas and as an ingredient of a number of paints. But if all of the mines in western Pennsylvania and northern West Virginia were to produce ferric hydrate, one day's production would suffice to meet the present demand for this product for one year.

Collins[9] outlines a tentative design for a treatment plant using slaked lime in baffled sedimentation basins, with a period of retention of two hours. He suggests that the sludge be dried on beds so constructed that the leachings will not enter the stream. The dried sludge can then be buried. Such a plant would prove very costly to operate, particularly when high acidities are encountered.

[8]*Coal Age*; July 1, 1920; p. 12.
[9]"Pollution of Water Supplies by Coal Mine Drainage"; C. P. Collins; *Eng. News-Record*; Vol. 91-16, p. 638 (1923).

Samples of Culvert Pipe After Being Exposed to Acid Mine Water: Left—Pure Iron Without Copper; Right—Pure Iron With Copper



An article[10] tells of the results obtained by a Travers marl clay system for treating mine waters. This plant was built in Harrison County, West Virginia. The process consisted of adding a limy marl to the water and allowing it to settle. Details of cost and operation were not given, but the plant has since been abandoned.

A number of patents have been granted for the treatment of polluted acid waters. One of these processes[11] is based on treatment by passing the liquid waste through porous calcium carbonate and maintaining the period of contact between two and five minutes. The writer does not know of a plant of this type that has been installed on a commercial scale.

About one year ago the West Virginia Geological Survey released a press dispatch in which it announced the Kaplan-Reger process for treating mine waste waters. According to the dispatch, "it consists in adding to the sulphate waters a complex organo-metallic compound which combines with the chemical compounds of the waters and forms a blue pigment to be known as Monongahela Blue, and at the same time removes the acid." In conclusion, the dispatch states that "in the Kaplan-Reger process, the added chemicals combine completely with the chemicals in the water to form an insoluble, marketable product, leaving the water practically free from acid and mineral substances." This process has not been tried on a large scale and not enough technical data have been reported to properly interpret the possible results from the process.

In studying the situation, several facts are apparent: The acid mine waste water in northern West Virginia and western Pennsylvania is rapidly destroying all of the streams, making the water unsuitable for domestic or industrial consumption and recreational purposes; no adequate economic solution to the problem has been evolved, and none of the tried processes for treatment have proved economically feasible; much fundamental research on the origin of mine waters is needed, which might lead to some method of preventing the formation of the acid variety.

[10]West Virginia Wild Life League; March, 1928, p. 29.
[11]U. S. Patent 1,685,300 (1928).

SYSTEMATIZATION

+ Pays Way in Track Maintenance

By JOHN F. McCRYSTLE

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WITH electrification, underground haulage has entered a stage of increasing speed and capacity of the transportation units. To get the maximum from these units, the tracks serving them must be brought to the same plane of efficiency. The exigencies of the coal situation demand that this be accomplished with a decrease in per-ton costs. To obtain the desired results, a thorough study of existing conditions and a careful analysis of methods and material must be made. Studies of this character have been instituted by a few of the most progressive mining companies that realized that the enormity of the expenditure made on track work warranted a thorough investigation as to where this money was going.

As an outcome, tests have been conducted to find the relative life of the various types of materials and the locations to which each is best adapted, so that only such materials will be purchased as have been demonstrated to be the most economical in the long run. Investigations also were made of the methods of doing work. The methods were found to vary considerably between collieries, because a specific method would not give the same efficiency in every case.

As noted in a previous article, such investigations and studies netted one company a saving of $433,200 per year in the maintenance of underground track. In making studies of this kind, it will be found that the costs can be reduced in several ways and that, because the expenditure for labor usually is the biggest item, methods for promoting the efficiency of the track force must be considered first.

Before a more modern system of maintenance was instituted, the time of tracklayers and their helpers was distributed approximately as follows: They reported at 7 a.m. to the foreman, who told them what job to tackle first. The foreman's instructions were based on the reports of several of the transportation units, also on his own observations and the reports of the tracklayers, who were aware of places where track needed repair. Placing the spike hammer, spike bar, and other tools on their shoulders, the workers started for their destination, arriving about 7:30 a.m. When several jobs were urgent, which usually was the case where the tracks were in poor condition generally, only sufficient time was taken to make temporary repairs. Then, with a resolve to fix the track better when they had more time, the tracklayers set off for the scene of their next job.

It would then be 10:30 a.m., and after a 15- to 20-minute walk and a little rest, the tracklayers were ready to tackle job No. 2. After looking the job over, they spent considerable time collecting materials before beginning the actual work of repairs. Before much had been accomplished, they were notified that a trip was off the track on the slope.

After another 15-minute walk they were confronted by several loaded cars resting crosswise of the track, one on its side, with some coal spilled over the roadway. The first step taken was to unload enough additional coal from the turned-over car to facilitate the righting of it. Possibly the other cars of coal had to be partly unloaded before they could be rerailed with an improvised lever. Then after the cars were rerailed and pulled out of the way, the spilled coal would be shoveled off the track and a number of spikes driven to hold the rails to gage temporarily. After surveying the damage done to the track the crew would have to obtain materials for making more permanent repairs.

Assume that the derailment was caused by bad ties which allowed a rail to spread and that a latch point was badly bent by the derailed cars. The tracklayers spent, perhaps, a half hour getting a needed switch point from a place a half mile away. More time was consumed in procuring new ties. In all likelihood the remainder of the shift and possibly two or three hours of overtime was spent in repairing the tracks sufficiently to make safe the operation of haulage at normal speed the next day. The road cleaners may have spent several hours loading up the spilled coal. All went home feeling they had worked hard. The foreman in particular was pleased that he had got things moving again and managed by strenuous exertion, to keep his production at normal. Yet the actual accomplishment was that the tracklayers in ten or eleven hours renewed about fifteen ties.

To prevent the foregoing occurrences it is essential that the tracks be kept in such a state of repair that derailments due to bad tracks will be infrequent. This can be accomplished by preparing a maintenance program, by dividing up the routine work over a period, and by bringing pressure to bear to see that the work is accomplished as planned. A program of this sort can be put into execution, without too great an expenditure of time in compiling statistics, with the aid of prints of the workings and a chart similar to that shown on page 411. As the tracks are gone over—ties being renewed, aligned and surfaced, and bolts being tightened—the prints can be posted so that a glance at them will reveal the status of the work.

Frequent examinations of the track will reveal potential sources of derailments, such as a broken frog or loose switch points, which can be remedied before trouble is experienced. Material can be forwarded to the required locations before the tracklayers are sent to the jobs, allowing them to devote their entire time to the repairs. All materials which can at low cost be prepared, ready for installation, on the surface by machinery, or in the plants of the manufacturer, should be so furnished. Then the tracklayers need not do this work under adverse conditions, with the few simple tools at their disposal.

The tracklayers should be furnished with suitable tools, and frequent inspections should be made to see that these tools are kept in proper repair. Some tracklayers are always threatening to get something fixed, but never get to it. When the necessity arises for the use of a certain tool not in repair, much labor is wasted in trying to make it function. As the company pays for this labor, the tracklayers have no incentive for going out of their way to visit the blacksmith or machine shop to have the tools repaired.

On main haulages, where traffic is heavy, a great deal more can be accomplished if the general maintenance work is done after working hours. In after hours the track gang can work without interruptions or delays caused by the frequent passing of trips; and then the gang need not do the work piecemeal in order to keep the track at all times in operating condition.

THIS is not to be construed as a defense of working the regular day force three or four hours overtime. Little can be accomplished by the men when they are tired; too, their efficiency is impaired on the following day. Place a special gang on the off shift under a special foreman and hold him strictly accountable for the work. It is also essential, in order to secure greatest efficiency, that as much of the actual track work as possible be done by full-fledged trackmen. The custom of placing inexperienced men at their work results in greatly increased cost, due to the longer time required and the unsatisfactory work done.

New track installations, especially turnouts, should be carefully inspected on completion, and any oversight due to carelessness or hurry should be called to the attention of the trackmen. In this way, and in a short time, the men are taught that each job must be completed before tools are removed. It is not an uncommon occurrence for tracklayers to neglect the splicing of joints. Then, within a few months, due to the creeping of the track, the rails separate, causing the rolling stock to pound heavily. If the fault is not corrected, it becomes a potential source of derailments. Resultant repairs require considerable time, for a rail must be cut and installed to close up the space caused by the creeping.

Aside from the lower labor cost due to the greater efficiency of the track force, there is a further reduction in outlay for maintenance if material is used which has been found to give a longer life. To test various materials properly, locations for their trials should be chosen which closely approximate average conditions. If several kinds of one material are tested, they should be installed side by side for comparison. The materials should be inspected at regular intervals and a careful record kept of their relative lasting qualities and freedom from operating difficulties and repairs. If the test material is merely distributed promiscuously with a request "Let me know how you like it," on checking up, it will be found that conflicting opinions will often be received.

AS everyone knows the weight of the rail to be used is determined largely by the weight of the locomotives in use and the density of the traffic. Though rail up to and including that weighing 40 lb. per yard can be purchased at a lesser price per ton than rail over this weight, and though one ton of the lighter rail will give a greater length of track, thus reducing the capital cost, the heavier rail provides greater rigidity in proportion to its greater weight. Therefore the heavier rail will require less maintenance in aligning and surfacing. And the easier riding qualities of the track will reduce the maintenance cost on the rolling stock.

Experience has shown that, where electric locomotives weighing up to 10 tons are used, 40-lb. rail will give excellent service on secondary haulage routes with normal maintenance; it also has been proved that on main haulages, track of 60-lb. rail is warranted, because the cost of maintaining it is not unduly higher than that of lighter track. During the last few years, with the installation of locomotives weighing 20 tons and more, 80- and 90-lb. rail has been making its appearance in mine tracks. In deciding upon standards of rail weight, thought should be given to the probability, within the coming ten years, of traffic increase on every main haulage route.

ONE difficulty in connection with the electrification of haulage routes is to keep the tracks properly aligned. Due to their short wheelbase, the cars in motion are continually lurching from side to side. This lateral thrusting causes the tracks to move out of alignment until a tangent soon becomes a series of reverse curves. This distortion decreases the velocity at which trips can travel and increases the power required and the wear on the rolling stock. It shortens the life of the rail.

The wheelbase of the cars in common use was determined in days when the mule was extensively used. The ease of getting the cars around sharp curves and the facility with which a car with wheels close together could be rerailed was more important than any slight lateral movement of the cars when traveling two or three miles per hour. Because of the longer wheelbase of electric locomotives, extremely sharp curves can no longer be installed. The old custom of having five or six men rerail a car with the aid of a lever has given way to the less costly method of having the transportation crew do their own rerailing with the aid of car replacers. The lateral movement of the car ends has been extended by the gradual increase in the length of the cars to provide greater capacity, without a proportionate increase in the wheelbase.

On tangent track on slopes and planes, where the velocity of the cars makes it essential that alignment be maintained, the tendency of the tracks to move laterally can be prevented to a great extent by installing long ties at intervals, hitching them in the bottom rock of the rib on each side. This practice also aids in preventing the tracks from creeping down the incline.

The dimensions of the cross ties is determined by the weight of rolling stock, the density of traffic, the gage of track, and the ballast used. Ties of minimum length should extend approximately 10 to 12 in. outside the rail in order to prevent splitting when

TRACK WORK ACCOMPLISHED AT ____________________ COLLIERY
DURING MONTH OF ________________________ 19____

DESCRIPTION	UNIT OF MEASURE	NUMBER OF UNITS	MAN HOURS REQUIRED	MAN HOURS PER UNIT	DETAILED LOCATION
Installing Track by Track Force	Track Feet				
Installing Turnouts	Each				
Removing Track	Track Feet				
Removing Turnouts	Each				
Grading	Track Feet				
Repairing Damage Due to Derailments	Track Feet				
Repairing Turnouts	Each				
Tightening Joints	Track Feet				
Cleaning Tracks	Track Feet				
Cleaning Road Coal — Reg. Time	Track Feet				
Cleaning Road Coal — Over Time	Track Feet				
Renewing Ties	Each				
Renewing Rail	Track Feet				
Aligning, Surfacing and Gaging	Track Feet				
					LOCATION
Total Man Hours on Track Work	This Month				
	Last Month				
NORMAL MAINTENANCE					
Renewing Rail (Track Ft)					BED
Renewing Ties					
Aligning, Surfacing and Gaging Track					

Accomplishment Chart in Track Upkeep

spikes are driven into them. Any increase in tie length over the minimum usually is a good investment for the actual bearing area of a tie is measused from a point approximately 10 in. inside the rail to the end of the tie. This area rests on the section of the roadbed most thoroughly tamped. If the tie is too short or the bearing area is insufficient, the pounding of the rolling stock will cause the ends of the tie to settle, thus throwing the weight on the center of the tie.

When the track becomes center bound, the rails are thrown out of level laterally and the ties begin to break in the middle. Ties used on primary haulage roads should have a face of at least 5 in. However, a wider face is more desirable, because the narrower ties have a tendency to roll under the wave action of the rails, and do not offer sufficient area for respiking in the event of a derailment.

Tests of treated ties in underground service over a period of years have demonstrated that the economies derived more than augment the additional cost of treating. The labor cost of replacing an untreated tie usually is greater than the purchase price of the tie, and to this must be added the respective costs of unloading the ties from the standard gage cars, of storing them on the surface, and of loading and transporting them underground. An intangible operating loss, which really is chargeable to mine ties and other materials, is incurred by those delays to transportation engendered by the moving and shifting of supply cars where track facilities are limited.

Tar-creosote-treated ties, although they have demonstrated their worth on surface haulages, are not looked upon with favor for underground service, because their use is accompanied by a fire hazard and by discomfort to the workmen in handling them. A number of other preservatives are being tested in underground service and several are giving good results. On main-haulage routes with long life, the cost of commercially treated ties and the additional cost of installing plates to prevent mechanical failure of the ties were warranted.

On secondary haulage routes, where the traffic is light and track materials are subject to transfer to other locations as new areas are developed, ties should be given at least a superficial treatment by the open-tank method. Ties intended for secondary haulage roads should be sorted and the best of them thus treated when received. After seasoning, the ties can be transferred to the tank and allowed to soak, little attention being required while the ties are absorbing the preservative. The cost of this treatment is low.

During recent years, the tendency in the design of steel ties has been toward heavier sections. The largest of these appear suitable and are being tested for main haulage track, together with electric welded ties constructed from scrap rail. These ties, if interspaced between wood ties, also act as gage rods.

Turnout material should be studied with a view toward the adoption of standards. The old type of latch points is rapidly giving way to the split switch with the positive throw. The chief objection to latches is the tendency of the latch pin to loosen, causing the point to wabble and open under traffic. When this occurs in electric haulage, at least several cars become derailed before the trip can be stopped. The 5- and 7½-ft. switch points will be found to give satisfactory service at most locations. Switch points longer than 7½ ft. are not recommended in connection with rails weighing less than 60 lb. per yard. Frogs Nos. 3, 4 or 5 will give a curve of sufficient radius for most track gages and generally can be standardized as adaptable to almost all track installations. Occasionally, however, a No. 2 frog can be used at locations where the lead curve is placed in both branches of the turnout. On surface haulages, where faster trip speeds are permissible and where resistance due to rail curvature is at a minimum, No. 6 frogs should be installed, conditions permitting. Frogs having an angle flatter than that of the No. 6 are not generally suitable for use in mine tracks, as the mine-car wheel, being of small diameter and narrow tread, gives trouble at the throatway.

CAST frogs are rapidly becoming more popular than the rail type, because of their superior wearing qualities and because of the lesser tendency of the wheel flange to strike the point of the cast frog. If wheels can be standardized to permit the use of frogs with guard flanges attached, a worth-while economy can be effected in the elimination of guard rails. Furthermore, the guard flanges integral with the frog give greater protection.

Underground track ballast, which usually is mine rock—sandstone and shale—varies in size from pieces measuring 12 in. to fine sand. As the rocks are of sedimentary origin, they disintegrate quickly, under the action of water, to a clay, mud, or sand, which allows the track to give and move out of alignment. These rocks are difficult to tamp properly when they are in large pieces.

Needless to say, these rocks should not be used for ballast in wet places. Ordinary cinders furnish better drainage and are more easily tamped; also, their rate of disintegration is slow. Cinders as ballast have an objection in that some may find their way to the breaker, having been loaded out with road coal. At the breaker, their removal from prepared sizes sometimes is difficult, at least with some types of cleaning equipment. Then again, fine coal eventually becomes imbedded in the cinder ballast and impedes drainage. When the pores of the ballast are thus clogged, it is necessary to replace 8 to 12 in. of the material.

Pounding of the rolling stock at the frog increases the tendency of the supporting ties to settle and throw out of cross-level the rails extending through the turnout. This condition can be remedied to a great extent by using crushed stone to ballast that portion of the ties which supports the frog.

Where an inflow of water is to be expected in newly driven tunnels and gangways, as an area is developed, it is advisable to make provisions for a ditch while the opening is being driven. At that time the bottom rock can be lifted more readily than when track and pipe lines are in place. For adequate drainage to sub-grade, this ditch should be kept with the water level at least 4 in. below the bottom of the ties, allowance being made for the clogging effect of refuse, which collects continuously and can be removed only periodically.

CURVES should be of as large a radius as practicable and consideration should be given to the length of time that the track will be in operation and to the density of the traffic. A few dollars are saved presumably by not lifting sufficient bottom rock to install the curve exactly to elevation. Actually, the ultimate cost of this short cut will far exceed what would have been the cost of doing the job right, as this poor construction will delay transportation movements.

Super-elevation of the outer rail on curves gives a more easily negotiated track and reduces the maintenance cost. Judgment must be exercised in deciding when to depart from theoretical formulas. The good effects of super-elevation in neutralizing centrifugal force will often be offset by wear on the side bearings of the wheels and by an increase in the power required in starting a trip on the curve. In many cases it is impractical to super-elevate the outer rail of underground track curves to any degree, because of the difficulty of getting sufficient distance for run-off. But even where trip speed is slow, the outer rail on a curve should be super-elevated; otherwise, it will be driven below the level of the inner rail by the thrust of rolling stock.

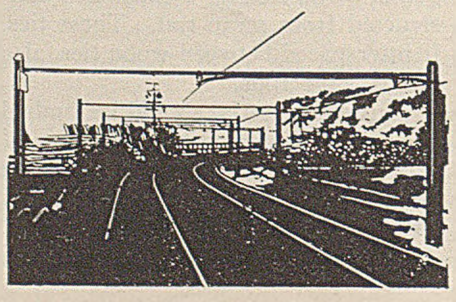
The third factor that influences low track costs is the keeping of idle track materials at a minimum. Inventories of track material reveal thousands of dollars tied up in stock kept on hand for replacement. They may reveal that the quantity of this material can be reduced appreciably by standardizing to a few sizes and types for all conditions. Incidentally, the American Mining Congress has accomplished much in this direction by its studies in standardization. Trouble and annoyance result from the purchase of two or more track parts which vary to only a slight extent. An entire turnout may have to be revamped in order to use a part which varies slightly from the part being replaced. Besides, a surplus of materials must be kept on hand.

SOME items, such as switches, are usually ordered complete, and some parts of these wear more rapidly than others. When a replacement is made, the required parts are taken from stock and the parts remaining from the broken set are placed to one side. These odd parts accumulate rapidly if frequent inspections of stock are not made and sufficient material is not ordered to complete the sets.

When several collieries are operated as a unit, the quantity of material on hand also can be reduced by keeping on hand at a centrally located colliery sufficient material to take care of contingencies. This material can be transferred quickly and will make it unnecessary for every colliery keeping materials for maximum requirements.

A close check should be kept of the track material no longer required on old haulageways, in order that it may be recovered and re-used. Means for the prompt recovery of this material are provided in an inventory. No longer, thereafter, will colliery costs be burdened with the purchase of unneeded new equipment nor will they have to absorb the loss of unused track caused by roof falls in abandoned sections.

A track inventory entails little labor and can be taken once a month by the sub-foreman while he makes his daily round. Periodically, an inventory and classification of all installed track "in use" or "out of use" should be completed by the engineering department. This general inventory will serve as a basis not only for analyzing track costs, for appraisal, and similar purposes but will be useful as a check on the figures submitted by the sub-foreman. Otherwise, a section boss might be reluctant to burden his labor costs with the expenditure required for recovering track that is out of use.



Attempts have been made to reduce the quantity of material out of use by furnishing a colliery with less new material than is requisitioned. This plan will not fully achieve its intended purpose; it works hardship on the colliery actually in need of new material and leads to expensive emergency proceedings. To substitute for the material refused by the management, track temporarily out of use may be torn out, only to be rebuilt a few weeks later when need for it arises.

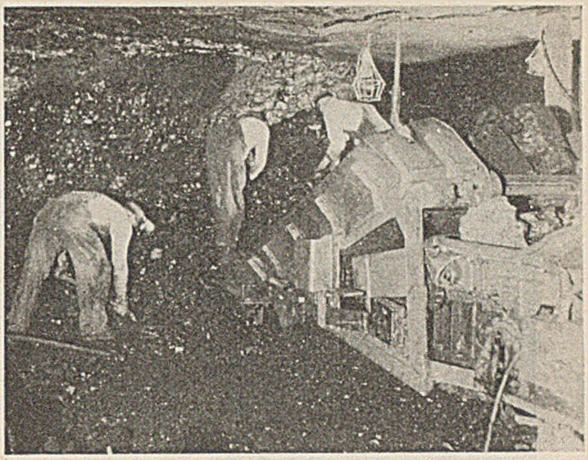
Any study of track facilities and costs should be accompanied by a concise yet comprehensive system of records. These records should give basic facts for the making of intelligent decisions by the management. Questions as to details affecting the main costs sometimes arise from a study of the records. An analysis of these details requires much tabulating and should be prepared independent of the regular monthly record only as the necessity arises.

IF detailed statements are compiled regularly, the records soon degenerate into an array of statistics, imposing but of little value. The engineer preparing the report should bear in mind that track is only one of many things engrossing the management and that time available for perusing the report is limited. The data, therefore, should be presented in a readily digested form.

Primary records from which all tabulations are deducted should be prepared by foremen, who, though efficient in handling men and getting things done, are usually sadly deficient in clerical knowledge. If the volume of the reports is greatly increased, more time will be spent in tabulation than in guiding operation. The foremen soon lose touch with the work and become more and more dependent upon their imaginations in providing data. Records then are based not on fact but on belief.

NEW SEMI-LOADER

+ Enters Mechanization Picture In Illinois Field



A Crew of Four Men Handles This Machine

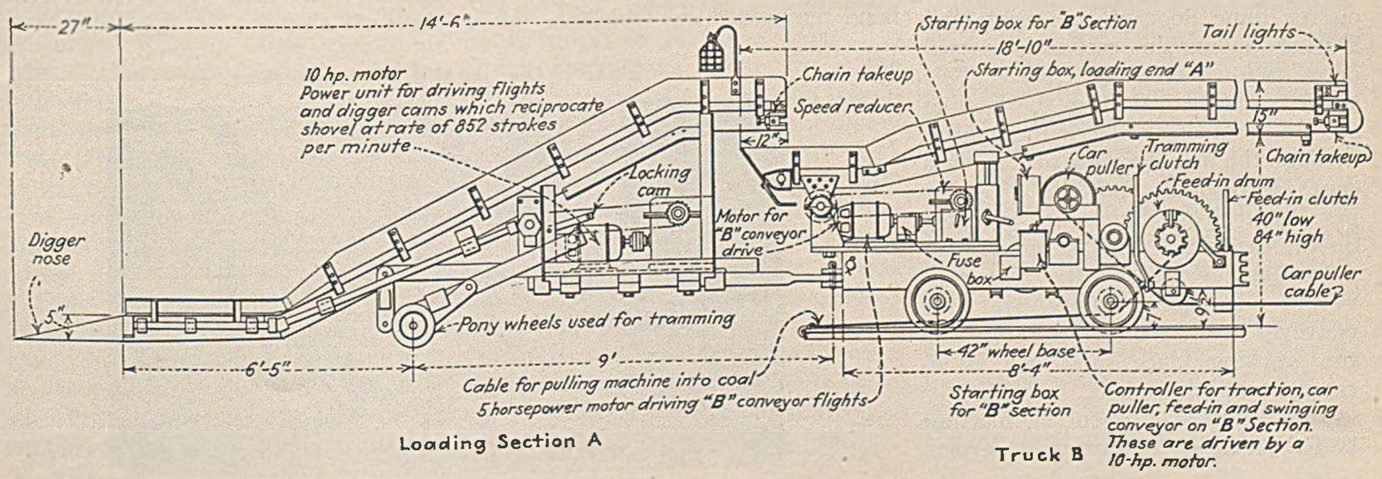
OUT of the Middle West has come a new, comparatively light-weight machine for loading coal which has features of design and functional characteristics both of the full mechanical loader and of the pit-car loader. It serves the purpose of the heavy machine type in taking 60 to 75 per cent of the loose coal, and acts in the capacity of the conveyor type in the final cleanup. Both these operations are assisted more or less by men with picks, shovels, and bars.

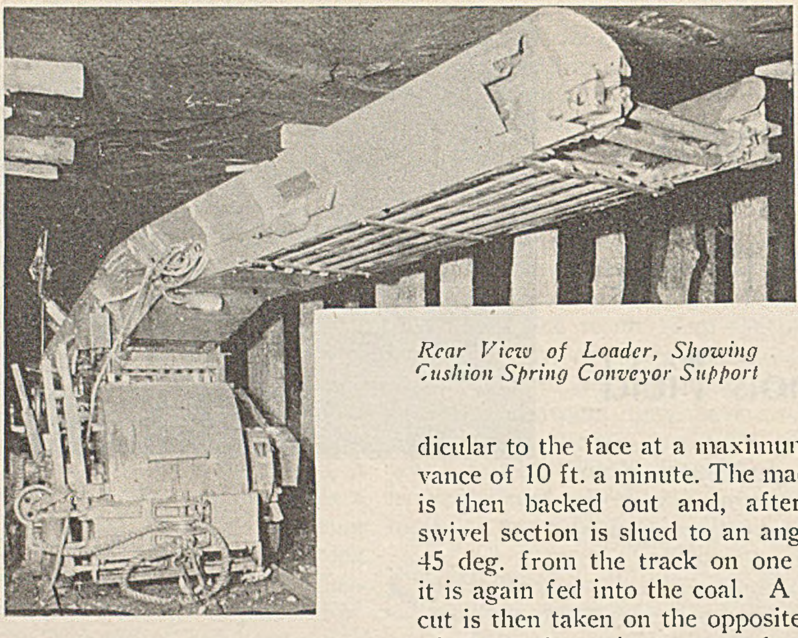
This machine, known as the Utility semi-loader, furnished by the Utility Conveyor & Mine Equipment Co., St. Louis, Mo., is available in two types, the main difference between them being that one is more fully mechanical and more flexible than the other. Eight of these machines, seven being of the simpler type, are installed in the No. 10 mine of the Indiana & Illinois Coal Corporation, at Nokomis, Ill. At the time of the editor's visit to this mine the one unit with the more fully mechanical characteristics, the later type, had just been installed, so no performance data covering its operation were available for this writing. The other seven units, the first of which was installed over a year ago, have been producing, from the time of installation to date, an average of 110 tons per machine per shift with a loading crew of four men. In recent months the average has been maintained at about 130 tons. In addition to loading, the crew attends to the shifting of cars, aided by a car-puller mechanism on the machine.

The Utility semi-loader is crowded into loose coal at the working face by two ropes which are hooked to the ends of the track rail and tightened by two power drums on the machine. These two feed-in drums are independent of each other, and so the respective cables can be spun off or taken up, as desired, to guide and balance the forward movement of the machine. As the machine moves forward the coal slides over a nose at the front end and onto the elevating conveyor. On the first-developed model, Type D, this nose is fixed with respect to the front conveyor frame. But on the later model, Type E, which will be here described in some detail, this nose is made to reciprocate by rotating cams and to dig under the coal, easing the way for the general advance of the machine. In gathering coal, therefore, this later type follows somewhat the motions of a man in loosening ice or packed snow from a sidewalk with a shovel.

As indicated in the accompanying

Schematic Sketch of Semi-Loader With Digger Nose and Swinging Boom





Rear View of Loader, Showing Cushion Spring Conveyor Support

schematic sketch, the type E loader consists of a loading element, *A*, and a truck, *B*, which are connected by a heavy swivel bar, so that *A* can be operated at an angle with respect to *B*. Truck *B* always remains on the track and incorporates the propelling mechanism and the crowding action which is used to push the loading end into the coal. On this truck is installed the power drum for moving cars. On it also are located all of the electrical controls. The conveyor over the truck, or the rear conveyor, is swung by power through a radius of 90 deg.; it is elevated by a hand crank; as it rides on cushion springs this conveyor will give downward in case a large lump of coal wedges between it and the roof.

Loaded cars are pulled to the entry by a ½-in. cable wound by the power drum and threaded through a snatch block outby the car-changing switch. Cars can be pulled away from or to the machine with this arrangement, at the rate of 411 ft. per minute.

In operative position, the swivel section, or loading element, *A*, rides on the mine floor at the front end. During moving this section is carried on a two-wheel pony truck. This truck is disengaged from the loading section by raising a toggle mechanism through the manipulation of a levered cam. Propelling speed is 4½ miles per hour. Four lamps are installed on the machine. Two lamps are recessed at the end of the rear conveyor; one lamp hangs over the conveyor transfer for illuminating the working place; and one is located under the boom.

In the first loading cut the machine is fed straight forward and perpendicular to the face at a maximum advance of 10 ft. a minute. The machine is then backed out and, after the swivel section is slued to an angle of 45 deg. from the track on one side, it is again fed into the coal. A third cut is then taken on the opposite side of the track, again at an angle of 45 deg. These three cuts usually handle 60 to 75 per cent of the coal mechanically. However, as many cuts can be taken as desired.

It is believed that the Type E loader will produce as much as 225 tons with a loading crew of four men in a shift. This figure is based on the maximum accomplishment—165 tons in a shift at the No. 10 mine—with the Type D loader, which is minus the reciprocating digger and which is equipped with a fixed rear conveyor. Also the forward feed-in and speed of the conveyors are slower on the Type D machine.

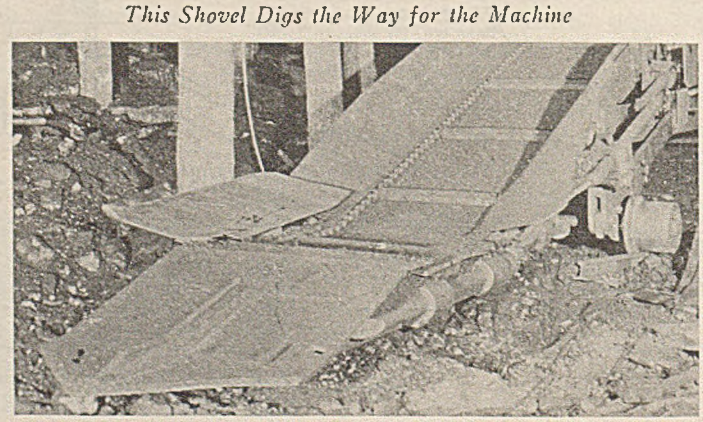
In this mine the No. 6 seam is being worked. The coal is 8 ft. thick and is divided by the customary blue band, ½ to 2½ in. thick, which occurs 14 to 20 in. above the bottom. Cutting is done on the bottom to a depth of 6 to 7 ft. and snubbing bars are inserted in the kerf. If the lower bench, including the blue band, does not fall of its own weight, it can be brought down by the driving of wedges. This bench is then pulled out from under the cut and the blue band removed, after which the upper bench is shot lightly to insure a maximum of lump coal. It is this detail of the operation that has limited the maximum production from these machines. Much of the coal remains standing after shooting and must be barred or picked down by the men.

Rooms are worked 40 ft. wide on 60-ft. centers and 250 ft. long. Six or seven rooms on each side of a double panel are driven up together. Double tracks are laid into these places and the two tracks are connected by a switch which is advanced every 75 ft. As the roof is only moderately sound, it must be closely timbered.

In all subsequent development, it is planned to drive the rooms 30 ft. wide on 50-ft. centers. In this layout only one track will be placed in a room and switches will be laid in crosscuts at 60-ft. intervals. Another proposed change is to cut the coal in an arcwall. This cut would be conformable with the sweep of the swiveled loading element on the loading machine. It would yield most coal in the middle of the room face, where the loader operates to best advantage.

Of the four men on a loading crew, one is an operative and three are stationed at the front of the machine, picking and shoveling. As the machine feeds ahead automatically, the operative also serves as a rear conveyor attendant. When a car is loaded, one of the front men goes out with that car as it is pulled to the switch. The machine operative attends to the pulling of the car. When the load has cleared the switch, the operative walks out and helps the man who preceded him to push in an empty. Meanwhile, no time is wasted, as the two men remaining at the face continue about their duties. After all the conveniently gotten coal is loaded mechanically, the machine is arranged to operate as does a pit-car loader and all four men shovel onto it in the final cleanup.

This Shovel Digs the Way for the Machine



CONQUERING WATER LEAKAGE

+ From Abandoned Gas Wells In Mine Development

By S. E. DeBERRY

Chief Engineer and General Supt., McKeesport Coal & Coke Co., McKeesport, Pa.

CREVICES and uncharted wells in a tract of land fed by quantities of stream and river water made the maintenance of a main entry in the Hubbard mine of the McKeesport (Pa.) Coal & Coke Co. almost impossible. This mine is operating in the seam known as the Thick Freeport, which is reached by two shafts, about 200 ft. deep and located 250 ft. apart; one is an escapeway and airshaft, the other one is used for hoisting.

The shafts and surface plant are located on a V-shaped piece of land where the Youghiogheny River joins Long Run. They are about 800 ft. from the river, 200 ft. from Long Run, and 1,000 ft. from the junction of the two. As they lie at the extreme end of a narrow tract of coal extending like a panhandle from the main working area, the only headings driven near the shafts are those used for haulage and ventilation.

At no point for a distance of 4,000 ft. do these headings approach within 700 ft. of the river, but they follow close to Long Run, the course of which they cross and recross underground. Though for this reason a large quantity of water entered the mine through the roofs of these openings, it was other conditions which were mainly responsible for a flood of water that, entering the mine, demanded some means of control. The shafts were located almost in the center of the McKeesport gas field, and many abandoned wells were located along the line of the headings within 2,000 ft. of the shafts.

Some difficulty was experienced in locating the entries so that they would not cut into these wells. Provision was made, however, to avoid such holes as could be located on the surface. Unfortunately, however, in many instances the drillholes had been filled and farmed over, thus erasing all marks of their location. This made heading driving hazardous. In the section of the entry which was driven to connect the shafts with the operating area no less than six of these blind wells were encountered. Little gas was found in them, but most of them produced large quantities of water, one discharging as much as 1,000 gal. per minute.

But these blind wells were not the only ones to give trouble, for even those that were 200 ft. from the entry appeared when passed to increase in some degree the volume of water to be handled. In many instances the headings, which were 12 ft. wide and driven on 50-ft. centers, passed on either side of a well, thus leaving it in the heart of a 38-ft. pillar. In such places the roof discharged large quantities of water. Sometimes the water pressure would break the roof slate and it would fall till it reached the sandrock. This done, the water would flow in greater quantity than ever.

The roof, which is a hard black slate, ranges in thickness from 2 to 7 ft. Immediately above this is the Mahoning sandstone, a solid close-grained rock as shown by the many cores taken from diamond-drill tests and as was proved in the airshaft when it was sunk through it. However, when the hoist shaft was excavated through this rock, it was found to be badly split and creviced as if by some former earth movement. Large flows of water were encountered in this rock. As is usual in shaft sinking, this was controlled by forcing portland cement grout in the crevices till the water was sealed off, a method so well known as not to need description.

To return to a consideration of the headings: In some instances the water pressure would force the roof slate down from the sandrock, but even where there was a high water pressure above the slate this did not always happen. In many places, though the roof held, the seepage of water indicated heavy hydraulic pressure. By drilling holes in this roof a flow of water was always tapped which when measured with a gage invariably showed a pressure of 55 lb. per square inch, which was exactly equivalent to a head of water from the river. Yet it did not seem to be river water, for it was salt as if it came from the bottom of the wells.

Sometimes the pressure would crack the roof and let the water flow through in quantities that would relieve the pressure without causing the roof to fall. Except where mining operations cut into a well the water always came from the roof, although, as stated, it was salt water, indicating that it had its origin in the saline waters of the oil and gas sands.

My own deductions are that, because the fireclay bottom, the coal, and the roof slate were impervious, the water from the bottom of the wells could approach the workings only through the crevices in the sandrock. A horizontal crevice formed between the rock and slate and this in places was a full inch wide. In this space, water collected.

Portland cement grouting was always used to shut off the water, but the manner of doing this varied as conditions required. Where a large flow of water issued from a well and the surface end was accessible, a well-drilling rig was set up and the well cleaned to a depth of 100 ft. below the coal. At this point a wood plug was placed, and then the well was filled with cement for a distance of 100 ft. above the coal.

Where the wells were cut by the headings, it was necessary to plug with cement both above and below the coal seam. The upper portion of the hole was easily made watertight. A large wood plug with a 1½-in. pipe through it was driven in the bottom of it. Then the grouting machine was attached to the pipe, and enough grout was forced in to fill the hole to the required height above the coal. Sometimes a hand pump was used for this purpose, as only a little grout was required.

PLUGGING the hole below the coal was a more difficult task. Usually both water and gas escaped from the hole, so that if capped it would build up a high pressure. Care had to be taken to prevent water and gas from working their way through the soft cement and producing blowers after the job was finished.

After the first attempt to close one of these openings, the procedure was as follows: When the well was first cut, the bottom opening was protected to prevent large pieces of coal or slate from falling into it and from forming a bridge, so that smaller pieces and slack might fill it to the top. It was found to be almost an impossible task to clean out this fine material to the depth necessary for the reception of the plug.

In plugging, a piece of pipe was suspended in the hole. This pipe had to be inserted in short sections, because the heading was too low for the handling of longer pipe. It was of a size that would allow all the gas and water to flow through it without producing any back pressure. A flange or some other enlargement was fastened to the lower end of this pipe. The outer diameter of this was such that it would just pass down the well with ease.

Gravel was then poured around the pipe. It lodged on the flange and filled the space between the pipe and the walls of the well to a height of about 2 ft. A like quantity of sand was then placed on this gravel. This formed a footer on which was poured the cement grout which was to fill the remaining space and make an airtight job around the pipe. Cement should not be dropped any great distance through water, so to fill this space a 2-in. pipe was extended to the sand and gravel footer and the cement mortar poured through it. As the space filled, the pipe was pulled up, and sections were taken off.

Thus the pipe was properly grouted into place, the water and gas flowing through it. After the cement

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had thoroughly hardened, a cap was screwed on the top of the pipe, and the job was complete. However, for a permanent job, the large pipe was filled with cement. To do this a ball slightly larger than the bore of the pipe was suspended a few inches below its lower end. It was fastened to a rod or small pipe which extended through the large pipe.

WHEN all was ready the ball was pulled into the lower end of the pipe to shut off the gas and water. The pipe was then filled with cement and a cap screwed on the top to prevent gas escaping through the green cement and thus causing a porous core.

An effort was made to locate the pools above the roof by drilling it before the pressure broke the rock. When a pool was thus located, grout was forced into it through the drillholes until it completely displaced the water in the crevices. This also strengthened the roof.

However, as previously mentioned, the roof sometimes caved before the pools of water were located. When this happened, grouting was not quite so simple an operation. If the roof was only slightly fractured, posts were set under it so as to keep it from falling under the additional pressure which grouting placed upon it.

Pressures ranging from 60 to 110 lb. per square inch were used in the grouting machines. Sometimes in filling these broken places, small quantities of oats or sawdust were mixed with the grout to prevent it from escaping through the crevices. When the roof was badly broken the best results were obtained by shooting down all the loose and shattered slate, thus exposing the horizontal crevices through which the water was flowing. It was not uncommon to have as much as 200 to 400 gal. per minute discharging from one of these breaks.

AFTER the loose rock was all down, vertical holes were drilled in the solid roof around the break. These usually were extended to the sandrock and in sufficient number to carry off all the water which was being made. In these, 1½-in. pipes were driven, and quick-opening valves were screwed onto them. As many as fifteen were required in some places. The valves would all be opened, and the crevices in the break would then be calked with wood wedges and burlap. This would force most of the water through the pipes. The grout machine would then be attached to one of the pipes and the grouting applied as previously explained. All the valves would be left open until cement would show in the water, and then they would be closed.

Sometimes, however, the water in a whole section was shut off by the grout fed through a single pipe. In one instance, 250 sacks of cement were thus used. In the early stages of this grouting a reciprocating pump driven by an electric motor forced the grout into place, but this was soon replaced by a grouting machine operated by compressed air.

There is no definite way of estimating how much water has been shut off by these operations and thus prevented from coming into the mine, where it would have to be pumped as long as the mine lasted. It would go far into the thousands of gallons per minute. As it is, not more than 400 gal. per minute is now being pumped from this section.

THICK BEDS IN EUROPE

+ Catch Fire When Mined; How Danger of Heating Is Averted

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IT MAY be taken almost as an axiom that, in Europe, where a coal bed is over 7 ft. thick, the coal when worked will ignite spontaneously. This liability appears to be accentuated: (1) Where roof and floor of the coal are hard and thick; (2) where coal is thick; (3) where ground is faulted; (4) where roof is formed of inferior coal and dirt bands.

In the eastern Fifeshire coal field of Scotland, two seams stand out conspicuously as having strata conditions like those classified under (1) and (2). These beds are the Dysart Main and the Lower Dysart. Sections of the seams and of the adjacent strata are shown in Figs. 1, 2, and 3. In the development of the Dysart Main, which has been worked extensively, it has been noted that the bed reaches its greatest thickness in the western part of the field and thins out to the east.

In the working of the seam the effect of this variation has been manifest, for the coal in every mine in the western, or thick, coal area has heated intensely, whereas to the east the heating has been comparatively feeble and intermittent. Two mines with a soft floor have been widely worked with no evidence of self-heating.

The original system of working the Dysart Main was the ordinary room-and-pillar method, the whole mass being extracted in four layers, or "leaves," commencing at the floor. The sequence was that of forming off pillars, then extracting them, this being followed a predetermined distance behind with the second leaf, and this order continued to the top coal. Self-heating occurred almost continuously at all stages of extraction, but was most violently active when the heavy rock roof began to crush. Pinned against the hard floor, movement caused a grinding of the soft coal mass and created conditions favorable to spontaneous combustion.

A new departure in method is shown in Fig. 4. This district was opened on the longwall system, the first face advancing in the bottom leaf. As shown, the other leaves were successively developed, but when only a small portion of the top one had been worked, heating commenced at many points. A peculiar feature of these heatings was that they occurred in the middle leaf at points in the circumference of the circle shown in Fig. 4. Though the temperature augmented slowly at first, it advanced rapidly after a few days, so that the coal began to burn with violence over the whole area. The form of the working shows that the heavy roof stratum became a beam structure and, by suddenly breaking in the center of the span, crushed the coal intensely and suddenly, causing it to heat.

Small areas of the seam are now being worked by the old room-and-pillar method. Pillars are larger than in former workings, and hydraulic stowage has been adopted. Immediately after extraction all wastes are filled, stalls first; then, during pillar working, the space is packed in slices. For several years the coal has been mined successfully by this method.

In the eastern part of the field, where the bed is thinner (Fig. 2), longwall has been adopted. The coal is mined in two lifts, the lower being worked out first over a definite area, and the top coal being removed two or three years later by workings advancing in the same direction. Small and troublesome heatings have occurred. Such outbreaks are subdued: (1) by digging out the heated material; (2) by the application of water at high pressure. An elaborate system of piping has been installed. A column of large-diameter pipes is led to the district and pipes of smaller diameter extend from this pipe into the various roadways. At each working face, flexible hose is available to readily cool and extinguish goaf and face heatings.

The thick sandstone (Fig. 3) which forms the floor of the Dysart Main is the roof of the Lower Dysart. A peculiar feature of this latter mass of coal is the presence of low-grade cannel in the middle of the seam. In the past only a small area of this coal could be worked without the occurrence of spontaneous combustion, and all the indications pointed to the inferior cannel bands as the locus of initiation of heating.

With increasing development of the coal field a new method of working this thick coal is being tried, and Figs. 5 and 6 show a plan and section of the new system. (See paper by H. R. King, *Colliery Guardian*, March 16, 1928.) Novel features of the method adopted are: (1) Complete mechanization of extraction, insuring rapid advance of the line of face; (2) extraction of top coal first and retreat in lowest bed, leaving 10-in. coal as roof; (3) cutting off roadways at short intervals and transferring transportation to following roadways in the lower solid coal.

The middle portion, or 2-ft. layer, of the seam is to be left unworked, as the coal is of indifferent quality. Recent experience in this working has

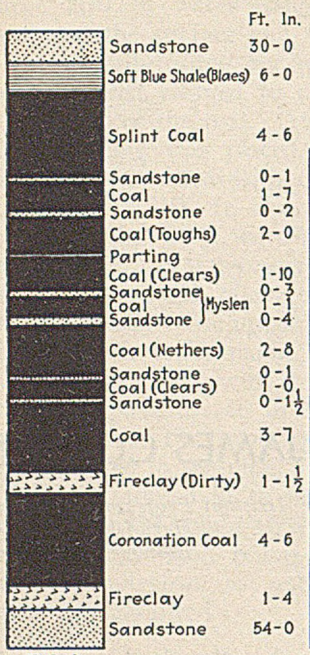


FIG. 1

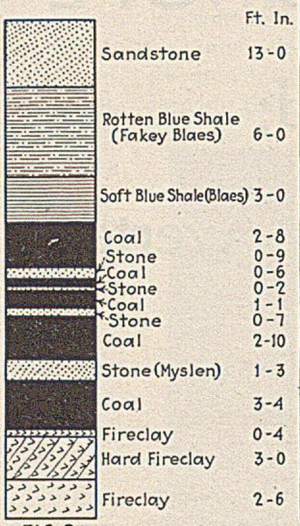


FIG. 2

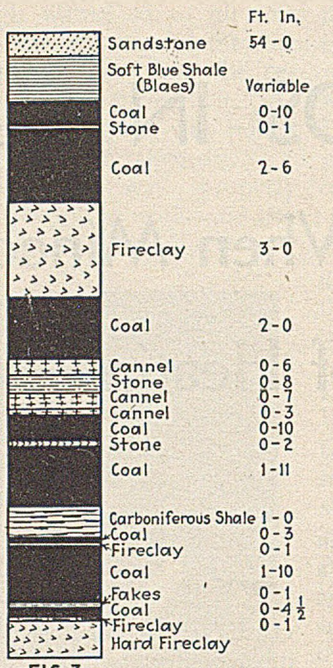


FIG. 3

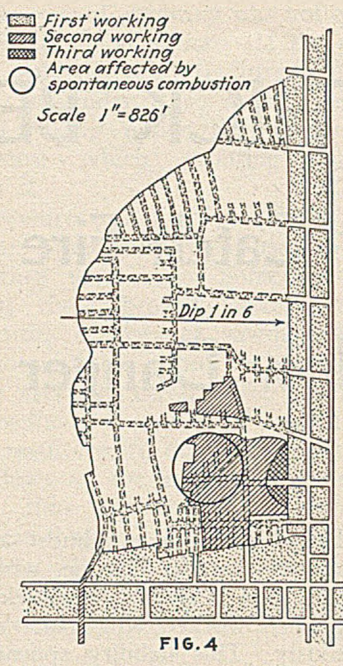


FIG. 4

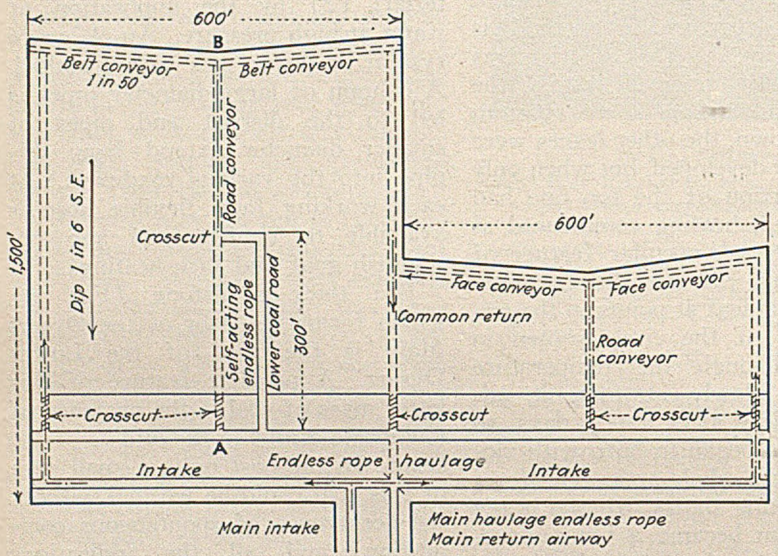


FIG. 5

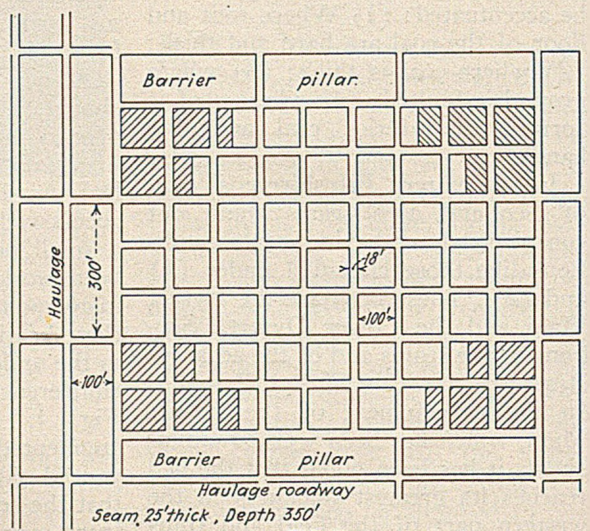


FIG. 7

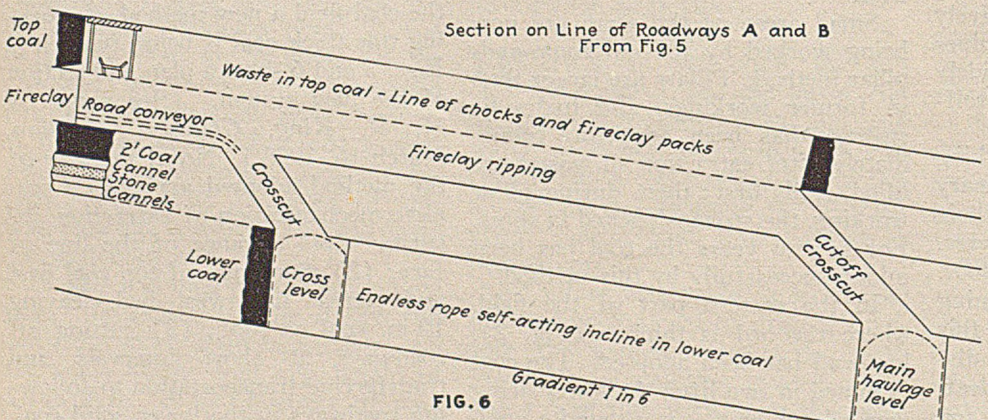


FIG. 6

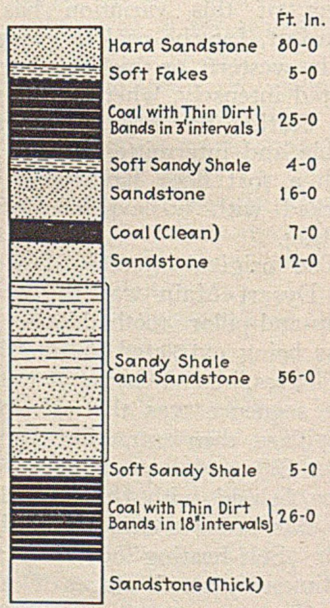


FIG. 8

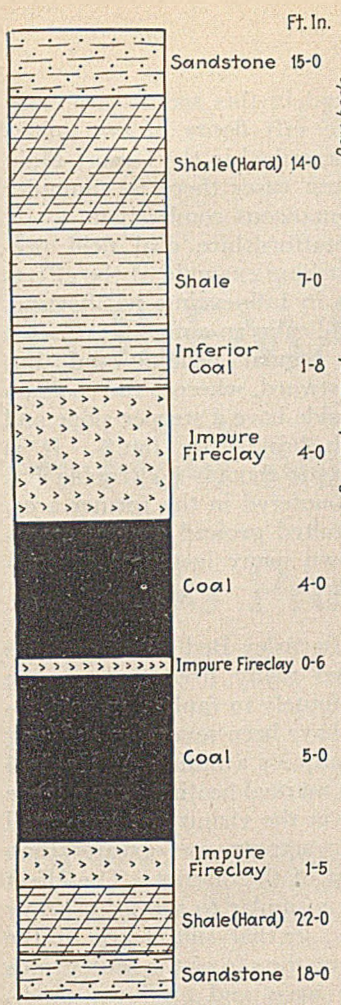


FIG. 9

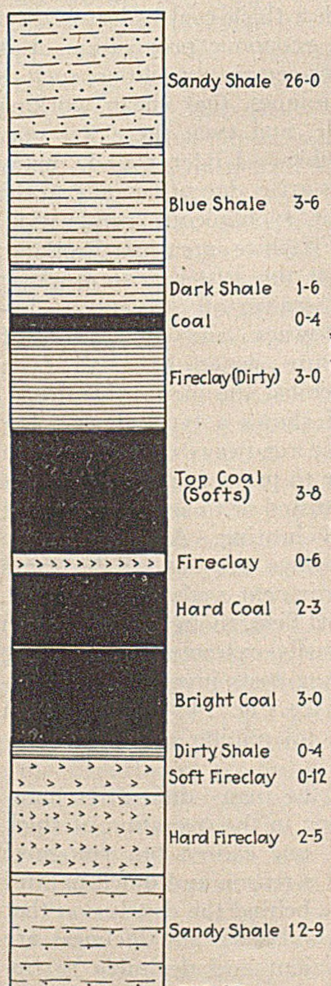


FIG. 10

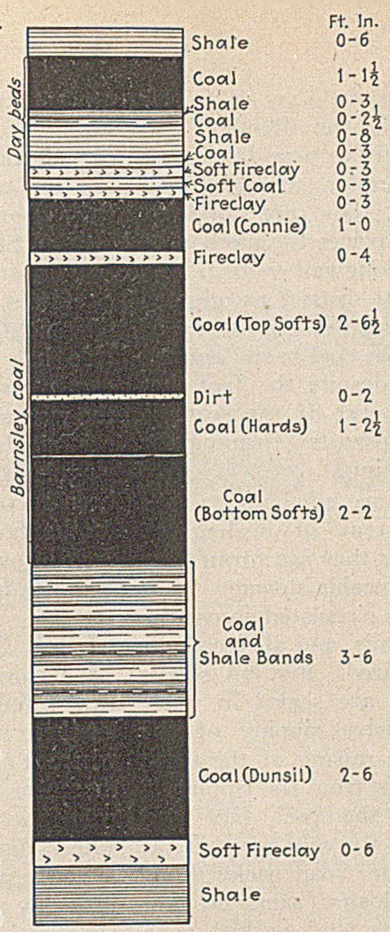


FIG. 11

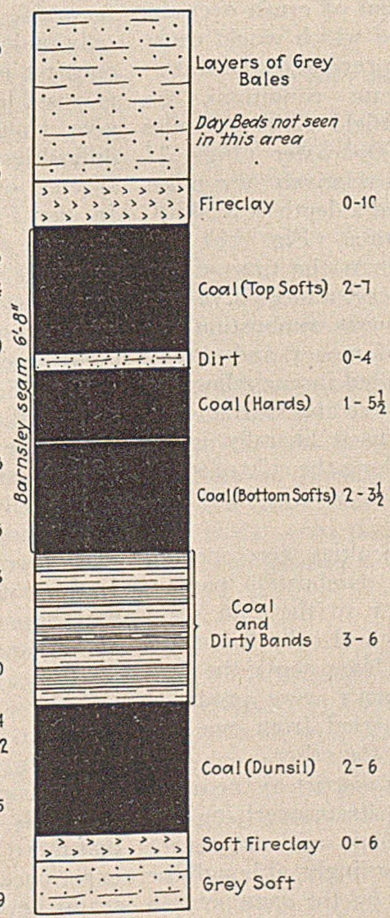


FIG. 12

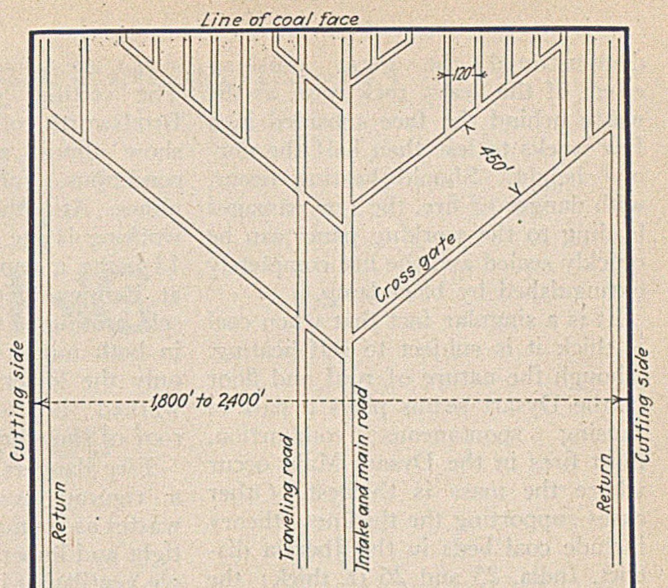


FIG. 13

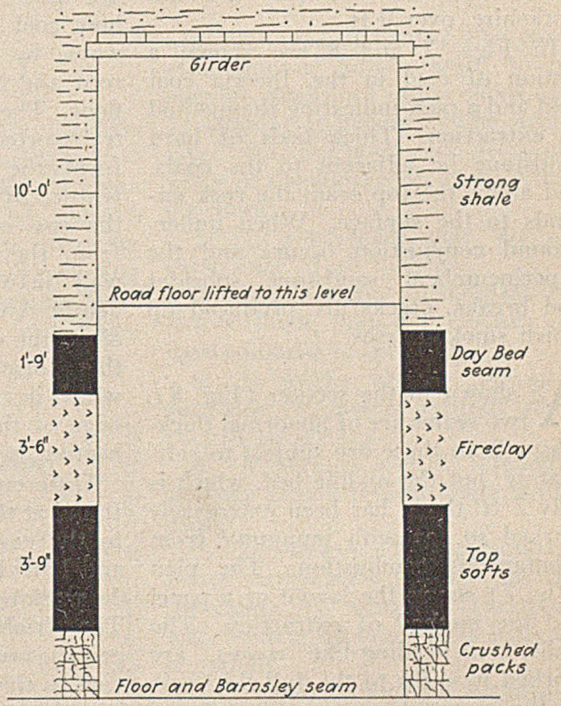


FIG. 14

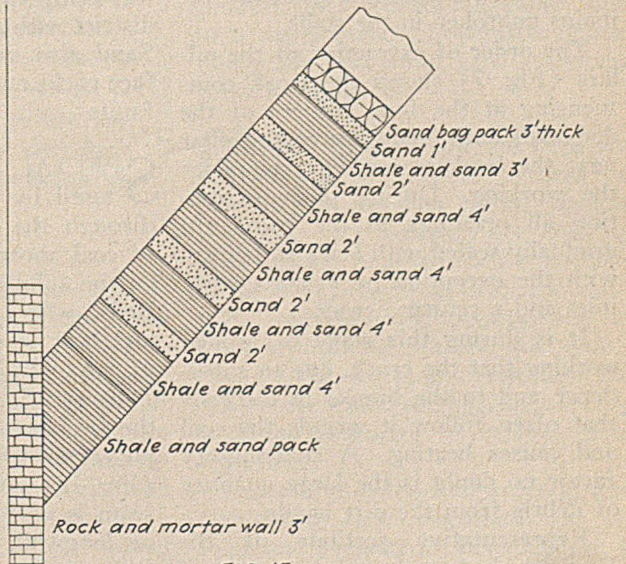


FIG. 15

demonstrated the great crushing effect of the heavy rock roof, as the waste behind the face subsided in a few weeks to less than half the normal height. Should heating occur, with danger of fire, the few passages leading to the working panel can be quickly sealed and the fire completely extinguished by blackdamp.

It is a singular fact that when coal is thick it is subject to self-heating. Though the nature of roof and floor in the Dysart seams plays a part in causing spontaneous combustion, most fires in the Dysart Main occur where the mass is thickest. Other cases supporting the thickness theory include coal beds in the Jherria district, India, 25 and 26 ft. thick; the Thick Coal of Staffordshire, England, 30 ft.; and the Barnsley Bed, South Yorkshire, over 9 ft.

In Figs. 7 and 8 are shown a section of coal in the Jherria coal field and a plan indicating the method of extraction. Thick beds of hard sandstone lie adjacent to the coals, and above the top seam the rock extends to the surface. When underground combustion occurs and the superincumbent sandstone subsides and breaks, cracks are produced up which smoke passes.

As shown in the section (Fig. 8), two seams are of abnormal thickness. Both these are subject to self-heating, but the middle bed, which is only 7 ft. thick, has been extensively worked so far with immunity from spontaneous combustion. The plan (Fig. 7) shows the layout of a panel and the method of extraction. The stalls, or heading-like rooms, are worked in slices to the full thickness of the seam. Long props are used for roof support, and as this stratum is of hard sandstone it generally remains unbroken in the stalls.

The order of extraction of the pillars (Fig. 7) shows the work commencing at the four corners of the diagonals until finally the center pillar next the haulage roadway completes the working. During pillar extraction all openings to the panel are gradually sealed with brick stoppings, with the exception of a haulageway inlet and a return airway.

It is during this stage of broken working that the crush, due to subsidence and to the breaks in the roof that often follow it, grinds the coal and causes heating. A contributory factor no doubt is the large quantity of débris from the dirt bands.

Representative sections of the Barnsley bed coal and its adjacent strata are shown in Figs. 9 to 12. The sections of the Bentley and Brodsworth collieries near Doncaster show almost similar stratigraphical conditions, for they are adjacent mines. At both places the method of working is the longwall system, Fig. 13 being a panel district as adopted at Bentley. Numerous instances of self-heating of the coal have occurred in both mines, despite the fact that only the lower part of the seam is worked, the "top softs" forming the roof of the working.

Fire dangers are combatted under a rigorous system of sealing all wastes as soon as they are formed, by tight and impermeable stowage. Ample ventilation is circulated across the long, straight walls, and all face falls are quickly cleared. Fig. 14 shows how coal strata are sealed in roadways, by extensive ripping of the roof and by the raising of the track floor. The débris from the ripping is transported to the coal face and forms the packs for roof support. A feature of all face road packwalls is the use of a loamy sand brought from the surface and packed as a wall between two lines of stone débris. A wall of sand also is rammed along the cutting sides of the panels, this forming an impermeable seal which in the event of crush over the edge of the solid which would cause heating, would prevent combustion.

Different strata conditions are found at the Hatfield colliery, 9 miles to the east of Doncaster (Figs. 11 and 12). In this relatively new mine, the workings lie at a depth of 2,546 ft. The friable strata (Fig. 11) are greatly crushed. At the time of my visit to this colliery, a large area was in active spontaneous combustion and a large outlay of money and energy was being expended in encircling the district with a stone and mortar wall. Sand also was used liberally in all face packs and along the side of small faults.

Special difficulties were encountered by the combustion passing through the floor to the thin seam of coal above and also by the crush on the splintery blaes above the Day Beds, where cracks were produced and heat was carried from one side of a roadway to the other.

In an adjacent district of the mine, the friable coaly strata overlying and underlying the main coal are absent (Fig. 12). Accordingly, although the seam is worked on the same system of longwall, there has been no instance of self-heating. The conditions found in this section are similar to the soft floors of two mines already described in the Dysart Main and in both cases there is immunity from spontaneous combustion.

The Staffordshire coal field presents a striking example of the effects of faults in influencing self-heating. This field lies in an anticline; the east side has regular bedding and dips gently eastward, whereas the coals on the west side have a steeper slope and are much broken by faults. It is singular that though no trouble has been encountered in the former area, in the faulted ground several seams have shown many instances of self-heating.

The Barnsley Bed workings have yielded many fires that can be traced definitely to faults; in particular there have been several in the long where it adjoins a fault. At Hatfield there was marked heating over a large area, but in the vicinity of two small faults the activity was greater than in the rest of the district. The effect probably is similar to that of a heavy roof rock, in that subsidence of the strata along the slip of the fault grinds the coaly mass and produces conditions promoting self-heating.

Though a thick coal bed appears a favorable economic proposition, it is only under certain conditions, such as open-pit mining, that cheap working is possible, and even there fire may give trouble. Underground, many difficulties arise, due principally to the specter of spontaneous combustion. In the Fifeshire area of Scotland, changes in the systems of working extensive sealing-off structures, hydraulic stowage, and application of high-pressure water have all been used to combat the menace of fire.

Fig. 15 shows a type of stopping built in the roadways of a district in Yorkshire to protect an area that has been exhausted or to seal a waste that is actively heating. As soon as the face roadways are cut off by cross gates, permanent seals are provided. In this coal field, though the big seam may be easily extracted, the ripping and stowage costs involved in its extraction (see Fig. 14) must be high and the total mining cost fairly expensive.

Noting the many difficulties naturally arising in the operation of thick coal beds, one cannot but recognize that there is reason and much painful experience behind the conclusion that seams beyond a certain thickness are not convenient and desirable to operate.

FOREMAN TRAINING

+ How Metal Trades Group Attacks Problem

Metals and Coal

One of the many problems common to all industry is the training of foremen so that these key men may not only be efficient in the performance of their routine duties but shall have a broad enough view of their industry to make them real co-ordinators. Inquiry among industrial and management engineers has brought flattering reports on the job the National Metal Trades Association has done in foreman training. An outline of that course, therefore, is here presented as the third of *Coal Age's* Little Journeys to Other Industries.

AMONG the industries credited with having done an outstanding job in foreman training, the record of the National Metal Trades Association is ranked high by specialists in this division of personnel work. Members of this organization have available a complete set of "lessons" for foreman-training meetings, supplemented by manuals for the use of class leaders in making the course most effective, and an outline of the fundamental aims of the course and how it should be started, addressed to the management.

The course now in use is the outgrowth of several years' study on the part of the committee on industrial education of the association. Originally developed under the chairmanship of John C. Spence, Norton Co., Worcester, Mass., and Louis Ruthenberg, Yellow Truck & Coach Manufacturing Co., Detroit, Mich., the material, which is copyrighted by the organization, was revised by the committee last year under the chairmanship of Harold S. Falk, Falk Corporation, Milwaukee, Wis., whose labors in promoting apprentice training have won national recognition. The committee was assisted in its work by Ansel R. Pearce, director of the department of industrial education of the association, and Robert J. Spence, instructor in the mechanical department of the Springfield (Mass.) Technical High School.

Systematic effort at foreman training, the association tells management, may reasonably be expected to accomplish the following objectives: Improve plant co-operation between foremen, workmen, and management; broaden the viewpoint of the foreman and stimulate his study of modern methods of handling men, material, and machinery; assist in developing dormant leadership; prepare the foreman and his crew for promotion; make the foreman a better interpreter of company policies and ideals; stimulate pride and leadership; improve the foreman's knowledge of industrial economics and prepare him to impart that knowledge effectively to the men under him; promote better human relations; acquaint the foreman with the principles of management.

As a result of its study of existing methods, the committee on industrial education recommended the conference plan as best adapted to meet average conditions in the shops of the association members. The reasons given for reaching this decision in favor of the conference plan of teaching were:

1. The conference plan "pools the experience of all foremen.

2. "It stimulates an individual desire to think, talk, and discuss problems common to the group.

3. "It works against the merely receptive or passive attitude on the part of the group.

4. "It permits a close relationship between the conference leader and the group.

5. "It furnishes a good means for better interpreting general industrial principles by bringing together a wide variety of illustrative individual situations.

6. "It affords a means for bringing into view the existence of an interdependence and identity of interests between one foreman and other foremen, and presents co-operative opportunity for promoting and developing these interests."

EARLY in the work the need for training conference leaders to conduct the foremen classes became apparent. This necessity for training men to train men led to the development of "Conference Leader's Manuals," outlining the organization of foremen-training classes, the objectives of the work, and how best the conference leader might plan and conduct the meetings to realize those objectives.

Successful methods of arousing and stimulating class discussion are set forth and evaluated. For example, it is pointed out that "the use of the case method by the leader is a very valuable and effective means of opening the discussion, but this value diminishes rapidly as the conference proceeds." On the other hand, the shift from discussion of subject matter developed by the leader to subject matter developed by the group is "one of the earmarks of a good conference."

In addition to the general instructions on conducting meetings, these manuals also include specific help on each individual lesson in the course, with a definite statement of the conference objectives and notes on how to drive them home. Many of the suggestions and analyses made are not actually embodied in the lesson texts. These conference leader's outlines have been prepared not as definite schedules which the leader must follow but as skeleton programs "which may be expanded or revised to suit particular conditions."

THE first lesson in the course is devoted to a discussion of departmental responsibilities. The objective of this lesson, the conference leader is told, is "to bring out a distinction between the major responsibilities of a foreman's job, to define clearly his supervisory and managerial responsibilities, and to lead up to a charting or listing of these responsibilities." Inasmuch as the lesson proper stresses the distinction between the foreman's supervisory, managerial, and instructional functions, the conference manual opens the way to stimulating classroom analysis by classifying several of the common duties under these three major heads.

Text material for 52 lessons, or conferences, is included in the training course proper to be studied by the foremen. After an introduction from "one foreman to another," intended to establish a basis of friendly and common approach between students and leaders, the lessons or conference outlines take up the following subjects:

1. Departmental Responsibilities.
2. Analyzing Yourself.
3. Analyzing the Job.
4. Putting the Right Employee on the Right Job.
5. Handling Employees Through Their Own Actuating Motives.
6. Having a Personal Interest in the Employees.
7. Determining Methods of Approach.
8. Maintaining a Balanced Relationship Between Employees and Management.
9. Giving the Employees a Square Deal.
10. Giving the Management a Square Deal.
11. Getting Co-operation From the Employees.
12. Maintaining Discipline.
13. Reducing Tardiness and Absenteeism.
14. Co-operating With Other Foremen and the Management.
15. Leadership.
16. Dealing With the New Employees.
17. Understudies.
18. Principles and Policies of Management.
19. Plant Organization.
20. Plant Morale.
21. Plant Layout and the Flow of Work.
22. Plant Systems.
23. Material and Supplies.
24. Record Keeping.
25. Wage Payment Methods.
26. Wage Payment Policies.
27. Planning for Production.
28. Routing.
29. Scheduling and Dispatching.
30. Job Study and Rate Setting.
31. Control of Quality.
32. Uncommon Phases of Waste Reduction.
33. Equipment Maintenance.
34. Depreciation.
35. Selecting Shop Equipment.
36. Organizing and Financing a Business.
37. Budgeting for Plant Control.
38. Cost Accounting.
39. Marketing the Product.
40. Personnel Administration.
41. Labor Turnover.
42. Selecting and Placing Employees.
43. The Foreman's Relation to the Employment Department.
44. Job Specifications (Fitting the Worker to the Work).
45. Suggestions to Foremen Who Do the Hiring and Firing.
46. Transferring and Promoting Employees.
47. Safety Work.
48. Health and Sanitation.
49. Training Employees.
50. The Foreman as a Teacher.
51. Americanization.
52. "Just Between Ourselves"—A Final Word.

In the development of the text material for the foregoing lessons, the authors, of course, were compelled to treat their subjects in more or less general terms, dealing "with broad principles rather than definite practice." Upon the conference leader, therefore, devolves the duty of illustrating those principles by specific practice which will have a direct application to the particular problems of the factory from which his class of foremen is drawn.

Not the least significant feature of the course as outlined are lessons such as Nos. 34 to 39. There was a time when the subject matter covered by that group of lessons was considered the exclusive province of the front office and some of it did not circulate widely even there. Today progressive management is realizing that the more highly departmentalized an organization may be the greater is the necessity for co-ordination and understanding by each department of the functions and the problems of all other departments if the business as a whole is to be successful.

Selling American Industry

"Much truth could be imparted to shop workers by the foreman if he had a better and more complete knowledge of the principles and methods of industry. He lives closer to the worker than any other man in the shop. Modern, highly competitive conditions and changes in the social structure demand that the foreman know much of the fundamentals of business and management. Workmen today are beginning to seek enlightment on economic subjects. They ask intelligent and searching questions. Are such normal, healthy tendencies to be encouraged and constructively developed by our foremen, or must they be exploited and perverted by unsound and irresponsible (but most plausible) propagandists?" — *Committee on Industrial Education, National Metal Trades Association.*

▼ ▼ ▼

In Error

In the article on "Mercury-Arc Rectifier Makes Bow in Anthracite Field," published in the preceding issue of *Coal Age*, pp. 359-361, it was stated, on page 361, that rotary converters will "give leading power factor on light loads." This was a typographical error. The statement should have read that the rotary converters will *not* give leading power factor on light loads.

SAFETY RECORDS

+ Are They Real or Synthetic?

Asks Illinois Mining Institute

MEMBERS of the Illinois Mining Institute disagree on what is a fair basis for comparing the relative safety of mechanical loading with hand loading. This question was paramount in the discussion at a session on safety during the annual summer meeting and boat trip of the institute on board the steamer "Cape Girardeau," which made a round trip from St. Louis to Beardstown, Ill., on the Illinois River, June 6-8. The second session of this meeting was given to consideration of mine cost accounting, preservative treatment of mine timbers, track-mounted cutters, and developments in mechanical loading.

F. F. Jorgensen, general manager, Fairmont (W. Va.) division of the Consolidation Coal Co., presided over the session on safety. That the introduction of machines has promoted safety in Illinois mines, was stated as a definite conclusion by John G. Millhouse, director, Department of Mines and Minerals of Illinois. He gave accident figures on a tonnage basis as proof of his contention. General improvement, he averred, is due to three factors: (1) reduction in the number of employees; (2) a more diligent search for safety methods; (3) real attention to the training of workers.

John E. Jones, safety engineer, Old Ben Coal Corporation, questioned whether it is well to use tonnage figures alone as a yard-stick of safety. Foreign countries base accident records on exposure data. In 1922 he prepared reports both ways. Neither method was entirely reassuring. When established in relation to tonnage, safety records may show decided improvement; but when the same data are reduced to units of exposure, the results may show no reduction in the hazards faced by the individual worker. Cloyd M. Smith, University of Illinois, believes that accidents should be quoted both ways, as each gives a different view. Records should include days worked and days idle in a given period, said John C. Quade, superintendent, Peabody Coal Co., Harrisburg, Ill.

Safety statistics covering the Valier mine are kept on both bases, added T. J. Thomas, president, Valier Coal Co. Accidents also are classified according to jobs. Improvement has been noted in every case. Accidents in machine loading have shown a decline of 21 per cent on a tonnage basis and a reduction of 12 per cent when determined by the exposure of 1,000 man-days, compared with those in hand loading. The Consolidation Coal Co. also calculates its accident records the two ways, remarked Mr. Jorgensen. It has reduced the number of accidents per million man-hours of exposure 12 to 15 per cent.

JOHN G. MILLHOUSE

Completely mechanized mines, argued J. D. Zook, president and commissioner, Illinois Coal Operators' Labor Association, should not charge all accidents, but only those caused directly by machines, to mechanization. The miner holds that machines add to the hazards of his job and Mr. Zook wants to get the facts. He asked the institute to set about the preparation of a standard form for recording accidents in mechanized mining. This suggestion was referred to the executive board, with the understanding that a committee will be appointed to consider it.

Many accidents at mechanized plants, stated C. J. Sandoe, vice-president, West Virginia Coal Co. of St. Louis, are caused by the employment of men unfamiliar with the new equipment and by improper guarding of electrical and mechanical parts. To correct these faults, he suggested close co-operation between operators and manufacturers.

W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, presented a record of accidents (see accompanying table) covering both hand loading and portable conveyor loading for six months' operation at the No. 7 mine of his company. He held significant the production of twice the tonnage with half the accidents and half the days lost, roughly, by portable conveyors, as by hand loading.

In arriving at conclusions as to which is safer, hand loading or machine loading, declared Alphonse F. Brosky, associate editor, *Coal Age*, it is necessary to consider all phases of plant operation as a unit. He believed impracticable the plan proposed for charging to mechanization only those accidents caused directly by machines. Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., said the confusion in the discussion hinged on the meaning of mechanization, which movement started some 30 years ago. It is possible to have mechanization and yet not operate loading machines. The latter are but one part of mechanization.

Harry Moses, superintendent, U. S. Fuel Co., Danville, Ill., failed to see why the accident rate for the entire plant would not serve as the desired objective. Segregation of accidents according to jobs or operations is useful, but only in particularizing hazards and speeding corrective measures. If accident classification is broken down to a fine division, records will be open to question. These arguments also received the support of Mr. Millhouse. "If we are to have more, or fewer, accidents with mechanized mining, the industry wants to know it," concluded Mr. Moses.

Introduction of mechanical methods, suggested M. M. Leighton, chief, Illinois Geological Survey, might conceivably add to the list of more

Thomas T. Brewster

hazardous jobs, even though it reduces the number of employees. This possibility makes it imperative to put accident figures on a comprehensive basis.

Operators have it within their power to make mining safer by machines than by hand methods, remarked Dan Harrington, chief engineer, safety division, U. S. Bureau of Mines. The machines themselves will not eliminate accidents. In a paper on safety, he charged that the mining industry in the United States is three times as bad as the average of 27 major industries in frequency of accidents and four times as bad in severity of accidents. The 1929 frequency rates of the component branches of the mining industry place anthracite at 99.68, bituminous at 69.25, metal at 52.19, and nonmetal at 31.10. In the matter of accident severity in mining for 1929, anthracite is rated at 10.87, bituminous at 11.69, metal at 5.99, and non-metal at 8.15. These data were taken from the 1930 edition of Industrial Accident Statistics, issued by the National Safety Council.

Coal men have become so accustomed to data indicating lack of safety in mines that the majority have become fatalists. Some insist that available data are incomplete, inexact, and do not give mining a "square deal." Apologists claim progress, stating that there were 4.89 deaths in 1913 and only 3.78 deaths in 1928 per million tons of coal mined. As against these fatality figures, based on tonnage, records show that the number of deaths per thousand 300-day workers was 4.46 in 1912, 470 in 1913, 4.50 in 1926, 4.43 in 1927, and 4.60 in 1928, proving that the risk to the individual coal miner was greater in 1928 than in any other of the years quoted except 1913.

That certain coal companies have been able to maintain good safety records is sufficient proof that mines can be operated safely, *if and when the mining people wish to make the occupation safe.* Mr. Harrington quoted the records of a number of companies that have achieved very real accomplishments in safety. Many of these records have appeared in recent issues of *Coal Age.*

It is to be hoped, he continued, that statistics will soon be gathered on all coal-mine accidents and not on fatalities alone, in accordance with the long-standing practice in metal mining. A hopeful sign is a definite movement in many localities to prevent all accidents, but more particularly lost-time accidents, in coal mines. One company in Pennsylvania worked 17 months and produced over 1,000,000 tons with an exposure of over 1,200,000 man-hours without a time-lost accident.

A worthy example has been offered the coal industry by the Portland Cement Association. In 1923 this organization offered a valuable trophy for permanent possession to any entire cement plant which would operate a full calendar year without a lost-time accident. It was thought that none of the 105 entrants would reach the goal, but hope was held that accidents at least would be materially reduced. Surprisingly, 1 plant of 105 qualified in 1924; 2 of 118 in 1925; 2 of 124 in 1926; 10 of 136 in 1927; 17 of 136 in 1928; and 27 of 153 in 1929, or nearly one plant in every five.

At some intensive mechanized mining plants fairly adequate attention has been given to safety, but these cases are the exception. To date the influence of mechanization has been more a deterrent than an aid to safety.

Said Mr. Harrington: "The use of non-permissible electrical equipment at or near coal mine faces or places which are likely to be gassy or dusty is little short of criminal. The numerous relaxations in ventilation to accommodate various types of mechanical contrivances, with simultaneous adoption of electric cap lamps to overcome the ill effects of ventilation deficiencies, are becoming little short of scandalous. In recent years, approximately 75 per cent of our mine explosions have been gas or dust ignitions caused by open-type electrical equipment in mines which use closed lights." In the discussion which followed his paper, Mr. Harrington made it understood that the closed lamp played no part in any one of these explosions.

Results of recent experiments by the U. S. Bureau of Mines to determine the volumetric quantity of an explosive mixture of methane and air needed to cause an explosion of coal dust were given by Mr. Harrington. An atmosphere of 100 cu.ft. including but 6 cu.ft. of methane, when ignited, caused explosions of coal dust in some of the tests. Ignition of 150 cu.ft. of this same mixture invariably caused an explosion of coal dust.

At the second session, with Mr. Zook and W. J. Jenkins taking turns in the chair, Mr. Leighton read a paper on cost accounting prepared by T. T. Brewster, president, Mt. Olive & Staunton Coal Co., who was not in attendance. Prices at which bituminous coal has been offered for some time warrant the suspicion that cost of production is no longer deemed of importance and that cost

Accident Record, Portable Conveyor Vs. Hand Loading, No. 7 Mine, Consolidated Coal Co. of St. Louis

Month	Tons Produced — Portable Conveyor	Tons Produced — Hand Loading	Conveyor Accidents — No.	Conveyor Accidents — Days Lost	Tons per Accident — Conveyor	Tons per Accident — Hand Loading	Hand Loading Accidents — No.	Hand Loading Accidents — Days Lost
September (1929)	24,266	10,384	7	79	3,466	865	12	210
October	19,363	8,725	6	86	3,227	2,181	4	74
November	13,275	6,955	2	31	6,637	1,391	5	58
December	22,275	11,198	6	108	3,712	933	12	167
January	23,379	12,197	3	23	7,793	1,016	12	82
February	14,865	8,102	2	15	7,432	900	9	32
Total	117,463	57,561	26	342	.....	.....	54	625

A. R. Joyce

accounting has become a forgotten science. It is because operating charges have been allowed to absorb the producer's capital or have been imposed on creditors that the credit of the industry is low and coal securities have poor standing. Cost sheets might usefully disclose the cost of doing each thing in dollars and cents; they are especially helpful to the practical man when they show the man-days or the man-hours spent on a job.

In a paper on treated timbers for mines, A. R. Joyce, vice-president, Joyce-Watkins Co.. Chicago, cited the experiences of railroads as an index of what might be accomplished by the coal industry in cost reduction by the use of treated timbers. The five leading railroads in Illinois territory use treated ties and thereby have effected an estimated saving of nearly $16,000,000. A relatively greater saving would be effected by the mines, where the life of untreated timbers is less than on the railroads and the cost of replacement is higher.

Mr. Thomas remarked that in a four-year study of the subject his company was astonished at the short life of untreated ties. It replaced untreated ties with three carloads of treated ties, and not one of the latter has had to be replaced after four years of service. From now on all center props in the aircourse of the Valier mine will be treated. He hopes thereby to effect a substantial saving; 50 to 60 per cent in labor alone. Rooms are worked out in 92 days and untreated ties are reclaimed and used an average of four times. He is going to try treated ties in this service and hopes to get seven or eight uses from each.

If tie plates are used, he believes it may be possible to get a life of twenty years from treated ties in main haul roads. But Mr. Joyce took issue with him on the necessity for tie plates. A sound short-leaf yellow pine tie with a 7-in. face, under a 60-lb. rail, will stand a compression load perpendicular to the grain of 14,280 lb. per square inch, which is far in excess of any wheel load encountered underground. Mr. Thomas replied that there is, nevertheless, considerable mechanical wear on the ties. Impact is a factor. If the tie plate adds but one year to the life of a tie, the additional investment will be justified.

Mr. Jorgensen agreed with Mr. Thomas on this point. Even a 10-ton locomotive causes mechanical wear on an unplated treated tie and the Consolidation Coal Co. uses tie plates.

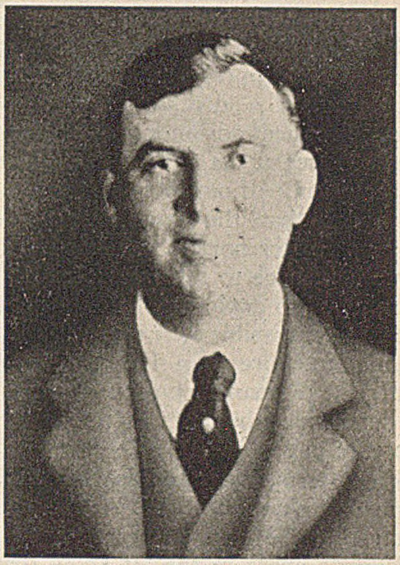
Preservative treatment has been a study of the Madison Coal Corporation for eight years, commented James Anderson, safety engineer. His company uses many treated ties and treats all permanent roof supports. Lumber that goes into the construction of mine cars and building exteriors is dipped in creosote.

A paper on track cutting machines, by W. C. Argust, division superintendent. Peabody Coal Co., was read by Mr. Quade in the absence, due to illness, of the former. James Powell, superintendent, Superior Coal Co., Gillespie, Ill., told of some of his experiences with track-mounted cutters. When kerfs were made at the bottom, the machine would cut about 600 tons a shift. The difficulty there was that the machine cut faster than a man could shovel away the bugdust. When an attempt was made to rake out the blue band, after first cutting in coal directly beneath it, refuse and coal cuttings could not be separated. The band did not come out in large pieces but crumbled. It was impossible to gob the dirty cuttings, because they constituted a fire hazard. Cutting above the band increased the capacity of the machine to 900 tons a shift, but the operation created a difficult shooting problem. Cutting in one horizon has its disadvantages as compared with another.

Track-mounted machines lend safety to cutting, according to Mr. Jorgensen. They operate faster and therefore expose the operatives to danger fewer hours for a unit of production than the shortwall machine. If a cutter bar is too long, it becomes distorted during the cutting operation, and for this reason his company favors a bar no longer than 8 ft. He said the maintenance cost on the combination kerfing and shearing machine was slightly higher than for undercutters in the Consolidation mines.

On the other hand, John R. Foster, superintendent, New Orient mine, found that repairs on the combination were less than those on a shortwall in his mine. It takes the drillers about fifteen minutes to clear away the bugdust for the placing of bottom holes in a face which is cut above the floor, it was said.

A brief résumé of development in mechanical loading was made by Glenn B. Southward, mechanization engineer, American Mining Congress. Of the coal now produced by Illinois, only about one-third is loaded by hand. The question no longer is how fast can a machine load coal but how



W. C. Argust

fast can the operating forces prepare it. Three methods for speeding up the car change have been suggested: (1) by a crane; (2) by an auxiliary hopper; and (3) by a portable belt conveyor.

J. W. Stedelin, vice-president, Marion County Coal Co., believes success in mechanical loading requires a dreamer, with a practical coal man as his safety valve. "Too many of us have been resting on our oars," he added. Mr. Brosky wondered how far management should go in the reduction of time to change cars behind a loading machine. Not all of this time is actually lost to the loader. The lull gives opportunity for maneuvering the machine, for gathering strewn coal, for inspecting and lubricating the machine, for fixing track, for examining roof, and for setting posts. A furious rate of loading intensifies hazards.

Approved List of PERMISSIBLE EXPLOSIVES + Reissued by Bureau of Mines

IN order that the user of explosives may be assisted in selecting an explosive to meet a specific requirement, the U. S. Bureau of Mines now classifies permissible explosives in two ways, as follows: (1) On the basis of the volume of poisonous gases produced by 680 grams (1½ lb.) of the explosive, and (2) on the basis of the characteristic ingredient of each explosive.

Most of the permissible explosives, even when properly and completely detonated in a drillhole in a coal mine, produce poisonous gases, but they produce at the same time a much larger volume of non-poisonous gases. In order that the poisonous gases may not under normal conditions become a menace to the lives or health of miners, no explosive is now or can become permissible if it evolves upon detonation more than 158 liters (5½ cu.ft.) of permanent poisonous gases, as determined by tests in the Bichel pressure gage.

Field tests of an explosive made under extreme conditions for the production of the greatest percentage of poisonous gases in the air show that in a narrow entry, with no ventilation at or near the face, a 1½-lb. charge of an explosive, which gave 158 liters of poisonous gas in gage tests, produced 0.18 per cent of carbon monoxide (the only poisonous gas present) in the air when the sample was taken two minutes after the shot. Another sample of the air taken two minutes later contained 0.08 per cent of carbon monoxide.

It is therefore evident that where ventilation is not active, as in a closed entry, miners or shotfirers should not return to the face until at least five minutes after a shot. At all working faces that are difficult to ventilate, explosives of Class A or Class B should be used, preferably those of Class A.

The classification on the basis of the volume of poisonous gases produced by 680 grams (1½ lb.) of the explosive is thus listed by the Bureau:

Class A, those explosives from which the volume of poisonous gases produced is not more than 53 liters.

Class B, those explosives from which the volume of poisonous gases is more than 53 liters but less than 106 liters, inclusive.

Class C, those explosives in which the volume of poisonous gases is more than 106 liters but less than 158 liters, inclusive.

Explosives are classified in accordance with their characteristic ingredients, as follows:

Class 1, Ammonium Nitrate Explosives—All explosives in which the characteristic ingredient is ammonium nitrate. This class is divided into two subclasses. Subclass *a* includes every ammonium nitrate explosive that contains a sensitizer that is in itself an explosive. Subclass *b* includes every ammonium nitrate explosive that contains a sensitizer that is not in itself an explosive.

Ammonium nitrate explosives when fresh and properly detonated are well adapted for use in mines that are not unusually wet. They are not suitable for use in wet mines, for if the contents of a cartridge of ammonium nitrate explosive is exposed for only a few hours to the damp atmosphere, the explosive may so deteriorate as to fail to detonate completely.

Redipping cartridges of ammonium nitrate explosives aids in protecting the contents against moisture, or moist air, and the cartridges should be so stored and handled as to preserve the efficacy of the paraffinlike coating. The explosives should be

Permissible Explosives as of June 30, 1930

Tested under Schedule 17A*

Brand	Class Designation Basis: Volume Poisonous Gases	Class Designation Basis: Characteristic Ingredient	Weight of 1¼x8 in. Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation in 1¼-In. Diameter Cartridge: Ft. per Second	Rate of Detonation: Meters per Sec.	Manufacturer†
Apache Coal Powder A	B	1a	137	1¼	222	11,710	3,570	1
Apache Coal Powder B	B	1a	158	1¼	241	8,200	2,500	1
Apache Coal Powder D, L. F.	A	1a	160	1¼	235	10,820	3,300	1
Apache Coal Powder E, L. F.	A	1a	162	1½	230	11,250	3,430	1
Apache Coal Powder F, L. F.	A	1a	160	1¼	225	11,090	3,380	1
Apache Coal Powder H, L. F.	A	1a	164	1¼	229	10,920	3,330	1
Apache Coal Powder S	B	1a	181	1¼	303	5,710	1,740	1
Austin Red Diamond No. 1-D, L. F.	A	1a	147	⅞	225	12,430	3,790	3
Austin Red Diamond No. 2-A, L. F.	A	1a	175	⅞	252	10,760	3,280	3
Austin Red Diamond No. 6-A, L. F.	A	1a	176	⅞	220	13,610	4,150	3
Austin Red Diamond No. 8, L. F.	A	1a	169	⅞	217	8,230	2,510	3
Austin Red Diamond No. 9, L. F.	A	1a	134	⅞	223	6,330	1,930	3
Austin Red Diamond No. 9A, L. F.	A	1a	142	⅞	208	7,510	2,290	3
Austin Red Diamond No. 10, L. F.	B	1a	124	⅞	248	8,070	2,460	3
Austin Red Diamond No. 12, L. F.	B	1a	99	⅞	242	9,120	2,780	3
Austin Red Diamond A, L. F.	B	1a	165	1¼	214	11,680	3,560	3
Austin Red Diamond F, L. F.	B	1a	142	1¼	207	8,460	2,580	3
Austin Red Diamond G, L. F.	A	1a	162	1¼	237	6,760	2,060	3
Austin Red Diamond T S	B	1a	130	1¼	223	7,050	2,150	3
Austin Red Diamond U L	B	1a	114	1½	240	8,460	2,580	3
Big Red No. 1	B	1a	171	⅞	240	7,250	2,210	5
Big Red No. 7	A	1a	186	⅞	227	10,000	3,050	5
Big Red No. 8	B	1a	124	⅞	207	9,640	2,940	5
Black Diamond No. 3-A	C	4	156	1½	294	11,150	3,400	9
Black Diamond No. 5	A	1a	180	⅞	288	6,040	1,840	9
Black Diamond No. 5, L. F.	A	1a	175	⅞	222	8,590	2,620	9
Black Diamond No. 7	A	1a	183	⅞	214	10,730	3,270	9
Black Diamond No. 11	B	1a	123	⅞	228	8,860	2,700	9
Black Diamond No. 12	C	1a	106	⅞	234	7,810	2,380	9
Black Diamond No. 15	A	1a	160	⅞	217	6,560	2,000	9
Black Diamond No. 17	A	1a	172	⅞	222	10,790	3,290	9
Carbonite No. 5	C	4	175	⅞	304	10,140	3,090	4
Carbonite No. 6	C	4	175	⅞	345	7,480	2,280	4
Carbonite No. 7	C	4	150	⅞	334	7,450	2,270	4
Coalite A, L. F.	A	1a	166	⅞	204	11,580	3,530	2–7
Coalite B, L. F.	B	1a	138	⅞	205	11,380	3,470	2–7
Coalite C, L. F.	A	1a	168	⅞	215	12,200	3,720	2–7
Coalite D, L. F.	A	1a	154	⅞	214	12,070	3,680	2–7
Coalite E, L. F.	A	1a	168	⅞	237	6,230	1,900	2–7
Coalite F, L. F.	B	1a	180	⅞	362	4,620	1,410	2–7
Coalite G, L. F.	A	1a	152	⅞	218	7,970	2,430	2–7
Coalite H, L. F.	A	1a	180	1	260	6,360	1,940	2–7
Coalite K, L. F.	B	1a	101	1¼	224	9,380	2,860	2
Coalite M, L. F.	B	1a	124	⅞	207	9,640	2,940	2–7
Coalite S, L. F.	B	1a	138	1	213	7,710	2,350	2–7
Coalite T, L. F.	A	1a	139	⅞	224	5,970	1,820	2–7
Coalite Y	B	1a	164	⅞	235	10,300	3,140	2–7
Coalite No. 4, L. F.	B	4	150	⅞	307	7,810	2,380	2–7
Collier C, L. F.	A	1a	141	⅞	217	11,970	3,650	8
Collier X, L. F. 2	A	1a	165	⅞	228	9,970	3,040	8
Duobel No. 2, L. F.	A	1a	143	⅞	209	9,970	3,040	4
Duobel No. 3, L. F.	B	1a	110	⅞	227	10,040	3,060	4
Duobel, L. F.	A	1a	147	⅞	225	12,430	3,790	4
EP-28	A	1a	116	⅞	220	10,170	3,100	8
General 1	A	1a	168	⅞	208	10,660	3,250	4
General 6-X	A	1a	194	1¼	220	10,500	3,200	4
Genite A	A	1a	163	⅞	223	11,100	3,384	6
Genite B	B	1a	141	1	217	11,120	3,390	6

Abstracted from U. S. Bureau of Mines Report of Investigations 3025.

obtained in a fresh condition and purchased in such quantities as will permit their prompt use. Experience at the Pittsburgh Experiment Station of the Bureau of Mines shows that ammonium nitrate explosives will usually detonate completely after storage for six months in a well-ventilated magazine.

Class 2, Hydrated Explosives—All explosives in which salts containing water of crystallization are the characteristic ingredients. The explosives of this class are somewhat similar in composition to the ordinary low-grade dynamites, except that one or more salts containing water of crystallization are added to reduce the flame temperature. They are easily detonated, and most of them can be used successfully in damp places.

Class 3, Organic Nitrate Explosives—All explosives in which the characteristic ingredient is an organic nitrate other than nitroglycerin. The permissibles now listed under Class 3 are nitrostarch explosives.

Class 4, Nitroglycerin Explosives—All explosives in which the characteristic ingredient is nitroglycerin. These explosives contain free water or an excess of carbon, which is added to reduce the flame temperature. A few explosives of this class contain salts, or an unusually low percentage of nitroglycerin, that reduce the strength and shattering effect of the explosives on detonation. Nitroglycerin explosives have the advantages of detonating easily and of not being readily affected by moisture.

Class 5, Ammonium Perchlorate Explosives—All explosives in which the characteristic ingredient is ammonium perchlorate.

Class 6, Gelatin Explosives—All explosives in which the nitroglycerin is gelatinized with nitrocotton. Explosives of this class have been grouped together at the end of the list because these explosives have been specially designed for blasting rock in coal mines, although under certain conditions they have been found suitable for shooting coal also.

Under Schedule 20, the Bureau has issued approvals covering permissible conditions of charging the Cardox blasting device. These permissible conditions cover thickness of the disk, weight of heater ingredient, and weight of carbon dioxide charge. This explosive falls within Class A.

The complete active lists of permissible explosives and blasting devices tested prior to June 30, 1930, are shown in the accompanying tables.

Permissible Explosives as of June 30, 1930—Continued

Genite C	C	1a	104	1 1/4	226	8,500	2,590	6
Genite F	B	1a	143	1	211	8,080	2,490	6
Genite M	B	1a	124	1	223	9,220	2,810	6
Grasselli L C, L. F	A	1a	160	7/8	216	5,940	1,810	4
Grasselli 2 L. F	B	1a	142	7/8	221	10,860	3,310	4
Grasselli 5 L. F	A	1a	156	7/8	223	7,680	2,340	4
Grasselli 6 L. F	A	1a	162	7/8	218	9,220	2,810	4
Grasselli 7 L. F	A	1a	131	7/8	217	8,000	2,440	4
Grasselli 10, L. F	B	1a	124	7/8	221	8,270	2,520	4
Hercoal C	A	1a	116	7/8	220	10,170	3,100	8
Hercoal D	B	1a	98	1	237	8,890	2,710	8
Hercoal F	B	1a	92	7/8	231	9,120	2,780	8
Hercules Coal Powder 2	A	1a	186	1 1/8	212	9,280	2,830	8
Mine-ite No. 5-D	A	1a	161	7/8	241	8,720	2,660	4
Mine-ite No. 6-D	B	1a	169	7/8	224	8,100	2,470	4
Miners Friend No. 1	B	1a	167	7/8	223	11,580	3,530	2
Miners Friend No. 2	B	1a	166	7/8	242	10,330	3,150	2
Miners Friend No. 4, L. F	B	1a	166	7/8	249	9,970	3,040	2
Miners Friend No. 6, L. F	B	1a	166	7/8	224	10,890	3,320	2
Monobel No. 1, L. F	A	1a	176	7/8	231	12,860	3,920	4
Monobel No. 2, L. F	A	1a	175	7/8	252	10,760	3,280	4
Monobel No. 4, L. F	A	1a	175	7/8	252	10,760	3,280	4
Monobel No. 5, L. F	A	1a	170	7/8	249	6,400	1,950	4
Monobel No. 6, L. F	A	1a	176	7/8	220	13,610	4,150	4
Monobel No. 8, L. F	A	1a	169	7/8	217	8,230	2,510	4
Monobel No. 9, L. F	A	1a	134	7/8	223	6,330	1,930	4
Monobel No. 9-A, L. F	A	1a	142	7/8	208	7,510	2,290	4
Monobel No. 10, L. F	B	1a	124	7/8	248	8,070	2,460	4
Monobel No. 11, L. F	A	1a	123	7/8	222	9,050	2,760	4
Monobel No. 12, L. F	B	1a	99	7/8	242	9,120	2,780	4
Peerless No. 1	B	1a	148	3/4	217	11,050	3,370	10
Peerless No. 2	A	1a	164	7/8	212	8,400	2,560	10
Peerless No. 4	A	1a	152	1 1/8	220	6,560	2,000	10
Peerless No. 6	A	1a	153	1 1/8	222	6,530	1,990	10
Peerless No. 8, L. F	B	1a	126	1 1/8	223	9,220	2,810	10
Peerless No. 10, L. F	B	1a	130	1 1/8	222	9,680	2,950	10
Red H. B, L. F	A	1a	155	7/8	213	12,140	3,700	8
Red H. C, L. F	A	1a	168	7/8	216	5,870	1,790	8
Red H. D, L. F	A	1a	150	7/8	214	7,740	2,360	8
Red H. F, L. F	A	1a	130	1	210	7,450	2,270	8
Red H. No. 1	B	1a	167	1 1/4	216	11,710	3,570	8
Red H. No. 4	B	1a	164	7/8	248	8,990	2,740	8
Red H. No. 4-A, L. F	B	1a	170	7/8	227	9,350	2,850	8
Red H. No. 5	B	1a	170	1	267	6,760	2,060	8
Red H. No. 6	B	1a	162	7/8	218	10,360	3,160	8
Tristate Special No. 1	B	1a	130	1 1/8	223	7,050	2,150	12
Trojan Coal Powder M-2	A	3	178	1	232	10,660	3,250	11
Trojan Coal Powder M-3	A	3	184	1	229	12,000	3,660	11
Trojan Coal Powder M-5	A	3	188	1	230	12,790	3,900	11
Trojan Coal Powder M-6	A	3	190	1	242	11,810	3,600	11
Trojan Coal Powder P-1	B	3	154	1 1/4	224	9,380	2,860	11
Trojan Coal Powder P-2	B	3	174	1	226	12,890	3,930	11
Trojan Coal Powder P-3	B	3	176	1	230	13,280	4,050	11
Unilite No. 1	B	1a	114	1 1/4	240	8,460	2,580	12
Unilite No. 2	B	1a	103	1 1/4	244	8,100	2,470	12
Union A, L. F	B	1a	165	1 1/8	214	11,680	3,560	12
Union B, L. F	B	1a	162	1 1/8	248	10,270	3,130	12
Union D, L. F	A	1a	163	7/8	223	11,090	3,380	12
Union F, L. F	B	1a	142	1 1/8	207	8,460	2,580	12
Union G, L. F	A	1a	162	1 1/8	237	6,760	2,060	12
Union H, L. F	B	1a	147	1 1/8	217	8,430	2,570	12

Gelatin Permissible Explosives

Rates of Detonation May Vary Between 2,000 and 5,000 Meters per Second.

Coal-Gel No. 1	A	6	224	1 1/2	267	8,430	2,570	12
Coal-Gel No. 2	A	6	226	1 1/8	273	10,400	3,170	12
Gel-Coalite X, L. F	A	6	239	7/8	253	9,610	2,930	2
Gel-Coalite Z, L. F	A	6	226	7/8	237	16,600	5,060	2–7
Gelite 1 L. F	A	6	248	1 1/2	255	8,330	2,540	4
Gelobel, L. F	A	6	236	7/8	259	15,250	4,650	4
Gelobel No. 3, L. F	A	6	247	1	259	7,770	2,370	4
Hercogel	A	6	241	1	257	8,690	2,650	8

*These explosives are permissible only when used in accord with the requirements set forth in Schedule 17A, approved April 1, 1926, and when used with electric detonators of not less efficiency than No. 6.

†1 Apache Powder Co. 2 Atlas Powder Co. 3 Austin Powder Co. 4 E. I. duPont de Nemours & Co. 5 Equitable Powder Manufacturing Co. and Egyptian Powder Co. 6 General Explosives Corporation. 7 Giant Powder Co. (Con.). 8 Hercules Powder Co. 9 Illinois Powder Manufacturing Co. 10 Peerless Explosives Co. 11 Trojan Powder Co. 12 Union Explosives Co.

Permissible Blasting Devices as of June 30, 1930

Tested under Schedule 20*

	Thickness of Steel Disk		Maximum Weight of Heater	Permissible[2] Carbon Dioxide Charge			
				Minimum		Maximum	
Cardox Models A and AA†	Mm.	In.	Ingredient[1], Grams	Grams	Pounds	Grams	Pounds
Minimum for sodium chlorate or potassium perchlorate heater	3.2	1/8	200	1,135	2 1/2	1,930	4 1/4
	4.8	3/16	200	1,360	3	1,930	4 1/4
Maximum for potassium perchlorate heater	6.4	1/4	200	1,515	3 1/3	1,930	4 1/4
Maximum for sodium chlorate heater	7.9	5/16	200	1,135	2 1/2[3]	1,930	4 1/4
Cardox Model G†							
Minimum	3.2	1/8	140	908	2	1,250	2 3/4
	4.8	3/16	140	908	2	1,250	2 3/4
	6.4	1/4[4]	160	1,020	2 1/4	1,250	2 3/4
Maximum	7.9	5/16[4]	160	1,135	2 1/2	1,250	2 3/4

[1] Tolerance: plus or minus 5 per cent.
[2] Tolerance: plus or minus 10 per cent.
[3] This weight of charge to be used only with a 200-gram heater.
[4] For sodium chlorate heater only.

Model A shell is 98.1 cm. long and 10.0 cm. in diameter; Model AA is 90.8 cm. in length and 10.0 in diameter; Model G, 80.6 cm. in length and 7.6 cm. in diameter.

*These blasting devices are permissible only when used in accord with the provisions of Schedule 20 and fired by a permissible-type blasting unit. The rear cap of Model A must always be in place after the shell is charged to prevent accidental firing. The rear cap of Model AA must always be in place and the slide cover outside the cap must be over the hole to prevent accidental firing prior to insertion of terminal plug. The slide covers of Model G at the rear end of the shell must always be in place over the holes after the shell is charged to prevent accidental firing prior to insertion of terminal plug.

†Manufactured by Safety Mining Co.

Coal Age

Sydney A. Hale, *Editor*

New York, July, 1930

May common sense rule

IN THE PAST the wage conferences of anthracite operators and their employees have been long and at times embittered. Today the conferees meet recognizing and admitting the economic need for speedy conciliation. Both parties know that in the case of an open breach the very appearance of victory will be denied to them. The outcome would not be even like that at Asculum, where Pyrrhus, in the moment of triumph, declared "One more such victory and we are lost." Rather it would result in a draw in which incalculable losses would be sustained without any semblance of advantage to either party. Those who would gain would be the rivals of the anthracite industry—the producers of substitute fuels and the makers of equipment suitable to the burning of such substitutes. This situation would seem to take any revision of basic wage scales out of the arena of practical consideration during the present negotiations.

But there are some evils that need correction and some conditions that have been modified in a somewhat bungling way in the past which might well be reviewed to the profit of all. These, it is true, have become deeply encysted in the contract by earlier decisions and venerable precedent, but the admonition "to agree with thy adversary whiles thou art in the way with him" should prevent any stickling for the precise revision of these matters, at least at this juncture. As John Milton declared to Lord General Cromwell: "Peace hath her victories no less renown'd than war."

Mechanize your market

FREQUENTLY the true significance of one fact does not appear until some other fact, seemingly quite unrelated, is brought into focus with the first. Wildwood, according to its sponsors, was "conceived in order to convert an unprofitable coal investment into one capable of producing substantial returns under present adverse conditions." At the Purdue Conference a Chicago heating contractor reported that he had not installed a coal plant in a new residence in three years. Independently, each statement is interesting; considered collectively, their significance reflects a problem of paramount importance to every operator.

Mechanization of mine operation in and of itself cannot convert unprofitable coal investments into profit-yielding ones, for there must also be a market that will absorb the coal at a profitable price. The coal operator who concerns himself only with production problems is definitely courting trouble and possible disaster.

The same type of engineering genius that made Wildwood a reality has already produced many machines and appliances that help to mechanize the market for coal. In the industrial and commercial fields, mechanically operated stokers, blowers, conveyors, have proved their effectiveness in creating and maintaining markets. Similar mechanical appliances are available for installation in residences. The dust and dirt factor, which has served as one of the most formidable weapons of salesmen of equipment for burning competitive fuels, can be virtually eliminated by spray treatment of coal. Ashes could be made practically dustless by installation of an inexpensive spray in the ashpit.

Already many coal dealers have shown a desire to help toward mechanization of markets by introducing these devices and processes in their local territories. However, the operator must expect to assume responsibility for the major share of promotional and educational activities, if substantial progress is to be made. Mechanization of production can gain its full reward only if mechanization of markets goes hand in hand with it. A nationwide, co-ordinated campaign, in which all branches of the industry participate, could do much toward bringing about that greater mechanization of markets, through which the coal industry must build for its future.

No man's land

SINCE the days of the Fuel Administration, the field of coal distribution mapped out at that time has been overgrown again with the weeds of ignorance, unrecorded changes, and moss-covered statistics. A few paths are still cut through the brush and tangled grasses, but, for the most part, the field has reverted to no man's land. Some clearing up, however, now is promised through the agency of the Bureau of the Census. By its present canvass the Bureau hopes to be able to publish figures covering consumption of fuels by kinds and industries and the marketing channels through which the fuel moves in each county and in each city of over 10,000 population.

The publication of such data will furnish a working basis for some badly needed studies in distribution. Too long have the economies won by the engineers working in the field of production been wiped out by inefficient, because unintelligent, merchandising. Absence of live, dependable national coal-distribution surveys has contributed materially to, where it has not actually fathered, this unintelligent marketing. The more fact can be substituted for guess and tradition the brighter will be the prospects for a sane, sound sales policy in bituminous coal.

Not what we have, but what we use

WITH ANY FUEL the prime necessities are that it shall be capable of giving heat and that the equipment by which it is burned shall be capable of taking that heat away and using it effectively. Unfortunately, this latter principle is not generally understood. If hydrogen be the fuel burned, 3.6 per cent of the heat is radiant and of value in heating the surfaces which are "looking at the fire." The other 96.4 per cent is likely to go up the stack unless some means be found for arresting the heat by flues and passes.

Carbon has good radiant quality. That is why carbureted gas gives so much heat despite the fact that it has adulterants like oxygen, carbon dioxide, and nitrogen. But more radiant heat is given if any kind of combustible gas is allowed to play upon artificial coals of clay or asbestos.

Most of the heat given by a coal fire is of a radiative character. This radiance occurs mainly below the level of the top of the coal, for the surface of the fuel bed usually consists of unignited fuel. The convective heat in the household furnace hardly is used at all, though the exposed steel pipe flue used with room stoves has great heating qualities. In the giving of heat the ash takes an important part. Heated by the fuel till it glows, it has the same effect as the stones which the Indians of this country used in early days to radiate the heat of a wood fire.

This means that a furnace must be equipped to make the most use of the kind of heat which a fuel will furnish. It is not sufficient to rely on the calorific value of the fuel. One must be sure that the conditions of heat reception are in a measure as effective as is attained in the calorimeter by which the heat is measured.

Byproducts of rock-dusting

NOW that rock-dusting has come to stay, doubtless a number of uses will be found for it besides that of extinguishing mine explosions, and of stemming and safeguarding shots. Prominent among these will be fighting fire. A rock-dusting machine can advance on a small fire and coat the ribs with inert dust till the fire goes out, and it can do this without destroying the roof, as the vapor from water would do, and without generating the highly combustible hydrogen or in any large degree, the poisonous, though less combustible, carbon monoxide. In short, by putting rock dust on a fire the generation of water gas is avoided.

Rock dust not only acts as a fire-fighting tool but protects the mine against the possibility of fire. It whitens and, therefore, lightens the roadways; it protects the ribs and roof against deterioration, and by filling up crevices in the coal reduces air leakage between headings. Electrical fires can be subdued by it with less injury to the equipment than by sand. It is quite probable that, sprinkled on such mine ribs as are subject to spontaneous combustion, it will greatly reduce that tendency. Moreover, if limestone dust is used, it has some effect, however inadequate, in the neutralization of the acid waters. Its effect on the transmission of fungus growths from timber to timber and on the development of the spores should they reach the timber is a matter that has not been investigated.

George S. Rice, chief engineer, U. S. Bureau of Mines, first to advocate the use of rock dust in this country, builded better than he knew. Coal men are only just beginning to learn what rock dust will do. Probably its introduction would have been delayed long, if not forever, had it served only these minor uses, but once installed its byproducts have become manifest.

Real or synthetic?

WHETHER accidents should be recorded on the basis of tons produced or in terms of units of worker exposure is again the question. Doubt as to the exact influence of mechanization upon safety in mining reopened this old argument at the summer meeting of the Illinois Mining Institute.

That mechanization opens the way to greater safety is patent; that machine processes have proved less dangerous than hand methods, however, does not necessarily follow. On more than one occasion accident records on a tonnage basis have been exhibited as proof that machine loading means greater security than hand loading. Unfortunately, not all of these records would show increased safety from machines if the data were reconstructed on the basis of worker exposure.

Machines might be installed to double the productivity of the mine worker and cut in half the number of men required for a fixed tonnage. But if accidents are reduced only one-third thereby, is the safety record improved? Applied to the individual, the readjustment would make his job more hazardous. On the other hand, society would benefit, because fewer men would be injured in the winning of its fuel requirements. But the benefit in the latter case would not be as great as it seemed at first glance, for the men dismissed from the mines might face accident hazards in other industries.

Both contentions seem beside the main issue. As neither basis is all-sufficient to reflect the safety influence of mechanization, accurate comparisons cannot be made on one basis to the exclusion of the other. To accept only one is to envelop mechanization with a false sense of security and prepare the way for wholesale occurrence of accidents. To accept the other alone is to foster a danger complex which would serve to retard the introduction of machines.

NOTES

. . . from Across the Sea

GERMANS have always been active in the effort to improve their depleted lands by the use of plant foods and stimulants. Their extensive use of the great body of Stassfurt salts might be instanced as an example. Then also, in less measure, their application of coal with lime to land as a fertilizer might be mentioned.

After all, in view of the low protein content of their wheat, it seems that they would do well to use some such material as coal, for the other fertilizers they are using do not provide a source of that most important constituent of plant life, protein. As a result it is necessary to import foreign wheat rich in protein if good bread is to be made. The British at Rothhampsted have conclusively proved that in order to obtain consistent crops the land must be fed with vegetal or animal residues.

At Riedel, Essen, the Germans are using coal in a new way for agricultural purposes. Unfortunately, it is one that wastes what protein the coal may have and merely stimulates growth.

It has long been believed that, as vegetation gets most of its carbon from the 0.03 per cent, more or less, of carbon dioxide present in the air, an effective way to promote the growth of vegetation would be by increasing this percentage. Some have declared that this is just what manure does, emits carbon dioxide and envelopes the growing plant in an atmosphere relatively rich in that gas. If not one of the chief, it is at least one of the counts in favor of manure as a fertilizer.

In any event, the Boyce Thompson Institute of Plant Research at Yonkers, N. Y., has tried increasing the carbon dioxide percentage and found it quite effective in a conservatory. Would the use of carbon dioxide in the open air be feasible or would the gas be uselessly dissipated? The Germans believe not, and are flooding large farm and vineyard areas with the gas from combustion, the fuel being coke with a low percentage of sulphur, according to the Berlin correspondent of *Chemical and Metallurgical Engineering*.

Two scrubbing towers are provided, where the gases are cooled by showering them with water and where they are passed over limestone to remove acid, tar, and dust. What precautions are taken to exclude sulphur dioxide and carbon monoxide is not stated, though it is the crux of the matter. The gas is brought to the point desired by a locomotive ventilator, which sucks in the gases and discharges them over the field, adding its own gases to those which it draws from the mains.

It is evident that the preliminary stages in the development have been passed, because permanent gas mains of cement have been laid in the fields below plowing depth, with connections protruding about 2 ft. When weather conditions favor, the various fruits are gassed in the morning and afternoon for a few hours, and the results are noticeable in both quality and quantity. Hedges and ridges are used to break the winds that might sweep the carbon dioxide away. The pipes, it seems, might also be used advantageously in certain seasons to furnish smoke as a screen against frost.

OF COURSE, where the volume of vegetal substance is so greatly increased by artificial means, it is necessary to feed the plant with nitrogen and other fertilizing material to accord with the greater losses which the lands sustain by such generous cropping.

One of the big possibilities of the coal industry would seem to be a hook-up with agriculture. Research appears likely to give, in that direction, at least as much return as in any other. So many of the forms of inquiry labeled coal research seem only distantly related to the progress of the industry. They merely replace one fuel by another or they effect a reduction in the quantity of coal used, which is hardly what coal investigators would usually seek to attain. Though in the United States agriculture is a waning industry, it is so because the product is uncertain and inadequate. Better methods where conditions favor might change the entire picture.

Animated probably by the German efforts to sell coke-oven gas, a Departmental Committee on Area Gas Supply was appointed last year to study the possibilities of distributing and selling such gas in Great Britain. The byproduct-coke men may have courage to go ahead now that the department has advocated the project as a public good.

The committee agrees that an elaborate gas network system would not pay in the Midlands. Even a limited network in Lancashire and West Yorkshire would not be profitable. But the committee has recommended a network of 73½ miles in the South Yorkshire district tying up Sheffield, Rotherham, and Barnsley, to say nothing of the smaller towns. This network would distribute gas from nineteen coke-oven plants that now is being bled to the atmosphere and burned or used under boilers. The plant would be designed to take 80,000,000 cu.ft. of gas per day with the flow of gas uniform during the 24 hours.

It is proposed that the gas be purified at the ovens before being delivered to the pipe net. Compressors also would be placed at the mines. The pressure to be used would vary from 2.7 to 8.2 lb. per square inch when the mains were carrying up to 40,000,000 cu.ft. per day and from 4 to 22 lb. when working at a capacity of 80,000,000 cu.ft. per day.

In the distribution of Ruhr coke-oven gas in Germany, according to Dr. Alfred Pott, general director, Ruhrgas Aktiengesellschaft Essen am der Ruhr, the pressures used are 45 to 90 lb. per square inch. It is probable that in England, as in Germany, consideration has been given to the earth subsidences due to mining, which would not be a factor in non-mining regions. In the United States, artificial pressures between 450 and 500 lb. per square inch are used for transportation of natural gas. Here it seems permissible to urge that the pressures in the projected South Yorkshire line be stepped up a little and the pipes made smaller. With a broken gas line, the danger is in the volume of gas rather than in its pressure.

PIPES of medium-weight steel from 6 to 30 in. diameter, covered with Hessian cloth and bitumen, would be used to distribute the gas. The mains would be laid under high roads with 3 ft. of cover. It is thought that the cost of distribution, excluding compression, would vary from 2.69 cents per 1,000 cu.ft., or 0.52 cent per therm of 100,000 B.t.u., with a volume of 40,000,000 cu.ft., to 1.34 cents per cubic foot, or 0.26 cent per therm, with a volume of 80,000,000 cu.ft. per day. The suggested price is 4.05 cents per 1,000 cu.ft., which at 520 B.t.u. per cubic foot would be 0.78 cent per therm.

Fuel calls attention to the experiments of Franz Fischer, which show that strong, dense cokes can be obtained from coals which (apparently because of the high oxygen content) do not naturally coke. With such pressures the tar content is reduced to one-third or one-quarter of that normally produced, the pressure seeming to hinder physically the distillation of the tar, which consequently decomposes, giving the needed carbon residue for binding the coke. If the destruction of the tar is reduced by sweeping out the retort with a stream of nitrogen the coke is deteriorated.

It is not necessary to compress the gases; that desired end is attained merely by restricting the escape of the coal gas. On cooling the compressed gas, the light oil condenses as a liquid and can be removed. By washing with water, the carbon dioxide can be dissolved. These conditions of operation make the scrubbing of the gas an easy process. Before distribution the high-pressure gas may be liquefied partially by expansion to atmospheric pressure and so fractionated into its component gases. Thus hydrogen for hydrogenation or olefines for synthetic reactions could be prepared.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

Mining Methods in West Virginia, by C. E. Lawall, Ivan A. Given, and H. G. Kennedy. Research Bulletin No. 4, Engineering Experiment Station, West Virginia University, Morgantown, W. Va. 230 pp., 7½x10½ in.; paper.

West Virginia coal mining men, and the coal industry in general, will welcome this close and complete study of West Virginia's mining methods made in the most painstaking manner by Messrs. Lawall, Given, and Kennedy. The book differentiates in Chapter I between mining methods and layout. May the reviewer be pardoned for protesting against the definition of "mining methods" as "equipment, haulage, loading, mining of coal, breaking down the coal face, control of roof, drainage and pumping, ventilation, safety, and kindred items." Most of these are integral parts of layout, and such as are not, are not mining methods but operating methods. It might be permissible, if a new language were in process of making, to describe the functions above listed as mining methods, but they are not now so described, and it is too late to make the language over, certainly not for so small an occasion. The book is quite largely about "layout," and for that reason "mining methods" suits it well as a description. It has some information also about operating methods, equipment, and haulage, but in the main it describes mining methods and does it well.

West Virginia has a number of different systems of operation, more than is generally recognized, and mechanization has served to bring them prominently to the fore. The book ties them neatly together and also gives data regarding car turnover—namely, the number of times each car is loaded in the course of the day, the maximum figure being 3.19 as an average for eight mines in the Winding Gulf field.

The accompanying table, which gives the average performance by seams, is drawn from many parts of the book.

Efficiency Records of West Virginia Coal Mines

Name of Seam	Number of Mines	Average Thickness, Inches	Average Car Capacity, Tons	Car Turnover	Daily Tonnage per Loader	Daily Tonnage per Man, All Inside Men	Daily Tonnage per Main Haulage Unit	Daily Tonnage per Mining Machine	Daily Tonnage per Gathering Locomotive	Daily Tonnage per Animal
Pocahontas Field										
No. 3 Pocahontas.......	47	66.75	2.99	0.91	11.82	6.58	353.7	294.1	119.4	31.3
No. 4 Pocahontas.......	12	72.00	3.02	1.23	14.79	7.60	349.5	240.7	113.3	40.6
Tug River Field										
Sewell..................	15	39.5	1.47	1.15	7.80	5.74	212.3	110.1	89.1	....
No. 3 Pocahontas.......	11	55.3	2.28	1.76	11.80	5.48	465.3	184.2	107.0	....
War Creek or Beckley...	12	50.1	2.18	1.11	10.55	6.26	326.1	193.4	94.0	30.0
Welch...................	9	38.8	1.40	1.64	8.55	4.69	186.0	215.0	95.0	....
Other seams............	9	53.1	2.84	1.67	11.79	7.98	658.1	544.0	189.1	24.0
Williamson Field										
Thacker................	15	49.3	2.02	1.65	13.68	8.45	418.5	147.3	117.2	10.8
Pond Creek............	7	54.5	1.78	2.06	14.36	....	247.0	173.0	130.5	....
Alma..................	5	56.0	2.24	1.68	13.23	....	357.0	213.0	85.0	9.4
Winifrede..............	7	55.3	2.22	1.39	13.99	8.62	445.0	149.0	108.0	13.0
Eagle..................	6	66.5	2.49	0.97	13.71	....	218.0	133.0	47.5	5.0
Logan Field										
Island Creek...........	22	72.0	2.53	1.61	17.22	9.49	936.2	333.7	257.0	76.3
Chilton................	11	62.0	2.13	....	11.24	7.21	536.6	224.1	136.2	32.5
Winding Gulf Field										
Beckley................	20	62.5	2.28	1.65	12.58	6.84	484.0	260.0	106.5	38.5
No. 3 Pocahontas.......	8	49.0	2.00	3.19	14.39	7.46	612.0	221.4	112.0	25.0
No. 4 Pocahontas.......	5	46.0	2.01	2.40	14.29	6.58	406.0	238.0	99.1	....
New River Field										
Sewell..................	39	49.0	2.52	1.06	9.14	4.81	265.9	165.4	88.1	22.8
Beckley................	6	61.0	2.41	1.87	9.33	5.03	508.7	382.7	133.8	....
Fire Creek.............	7	39.0	1.71	1.01	6.03	....	101.5	131.7	46.5	....
Kanawha Field										
Winifrede..............	16	72.0	2.36	1.25	11.31	6.88	464.0	176.2	111.2	21.4
No. 2 Gas..............	11	53.0	1.84	1.55	10.47	7.19	419.2	166.7	128.2	24.2
Eagle..................	7	65.0	2.46	1.48	9.78	5.13	442.6	164.4	106.9	21.5
Coalburg...............	7	55.0	1.86	1.52	8.22	5.29	404.4	112.1	145.8	22.5
No. 5 Block............	5	74.0	2.50	1.44	11.80	6.73	433.2	235.8	169.2	....
Other seams............	5	59.0	1.95	1.30	8.95	4.91	430.6	131.5	107.5	18.2
Greenbrier Field										
Sewell..................	7	(7)62.5	(6)2.33	(6)1.84	(7)12.13	(2)7.76	(7)506.6	(6)250.0	(5)116.8	(1)38.7
Elkins Field										
Kittanning.............	9	51.0	2.00	2.23	10.37	6.46	287.0	297.0	117.5	58.6
Pittsburgh.............	5	100.5	2.50	1.56	10.86	....	800.0	320.0	175.0	67.7
Other seams............	3	59.0	1.70	2.50	9.21	5.99	241.0	175.0	135.0	42.8
Panhandle Field										
No. 8 Pittsburgh........	8	59.0	1.79	2.20	8.57	6.50	373.0	171.6	189.3	80.2
Fairmont Field										
Pittsburgh.............	38	90.5	2.68	1.54	11.54	6.61	518.5	176.0	141.0	64.5
Sewickley..............	24	65.0	2.45	1.78	11.06	8.96	785.0	190.0	279.0	61.3
Upper Freeport.........	3	56.7	1.50	2.91	9.33	7.27	.....	175.0	.....	53.1

The figures in parentheses relative to the Greenbrier field show the number of mines used in the calculation of the various records, the number of mines being in each case on the left of the figure to which it refers, thus the daily average tonnage per animal is based on the figures from one mine only, (1) being to the left of the record 38.7.

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"The Cost of Living in the United States 1914-1929." M. Ada Beney, National Industrial Conference Board, New York. 190 pp., 6x9½; cloth. Price, $2.50.

Probably no factor in our economic life has such general importance as the cost of living. The compilation of changes in the cost of living is by no means a simple problem. Many questions must be decided before a scientific index is finally available which will be indicative of the changes that occur. The present volume describes the several phases of living costs studied, discusses the numerous problems involved, and gives an account of various studies illustrative of the different types of measurements.

Of the major items for which wage earners have spent their money during the last fifteen years, the rise of prices of clothing has been the most outstanding. Food follows closely after, though since 1920 food prices have been consistently below the general price level. Fuel and light, rents, and most items for which the wage earner's family expends a large part of its budget have been decreasing during the past five or six years. But other important items, such as household furnishings, candy, etc., have increased during the same period. However, the total cost of living has been growing less and less since the end of 1925. With occasional interruptions the cost of living has dropped from 68 per cent above that of July, 1914, to 61 per cent above.

R. M. Davis.

Publications Received

Some Phases of the Relative Responsibility of Management and Workers for Accidents in Mines, by D. Harrington. Bureau of Mines, Washington, D. C. R.I. 2,993; 17 pp.

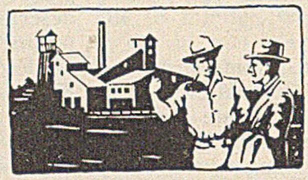
Electrical Blasting Practice at Some Coal Mines in the State of Washington, by S. H. Ash. Bureau of Mines, Washington, D. C. I. C. 6,264; 9 pp.

Safety Achievements of a Pennsylvania Bituminous Coal Mine and of a Coal Mine Superintendent, by Francis Feehan. Bureau of Mines, Washington, D. C. I. C. 6,258; 12 pp.

Effect of Sealing on Acidity of Mine Drainage, by R. D. Leitch, W. P. Yant, and R. R. Sayers. Bureau of Mines, Washington, D. C. R. I. 2,994; 11 pp.

Performance Tests for Trailing Cables, by L. C. Ilsley. Bureau of Mines, Washington, D. C. I. C. 6,263; 2 pp.

THE BOSSES TALK IT OVER



Idle-Day Work—
Can It Be Made to Pay?

"MAY I speak to you for a few minutes, Mac?" asked the super as he glanced up from his desk and saw his foreman pass the door.

"Certainly, Jim. What's causing friction in your thinking machine this evening?"

"The Old Man has been hauling me over the coals again," smiled Jim wryly. "When he hits hardest, it's about costs, you know."

"Why I thought everything was rosy now that we have the cost down to the big boss' figures for the days we run."

"That's right, Mac; we've been doing even a little better than his figures on the days we work, but that doesn't mean anything unless the cost on idle days is low in proportion. The trouble is, you work a big crew on idle days, and that shoots the average cost sky high. You'll have to cut down the idle-day work somehow, Mac."

WHAT DO YOU THINK?

1. *How do you control your cost on idle days?*
2. *Do you assign any men to dead work on idle days?*
3. *If not, how do you manage to keep up your extra work?*
4. *How do you satisfy your best men when you cannot give them steady work?*
5. *Can discipline be made as rigid below ground on idle days as on work days?*

All superintendents, foremen, electrical and mechanical men are urged to discuss the questions on page 432. Acceptable letters will be paid for ►►►►

Specialization of Mining Jobs May Lower Worker Efficiency

JOB ANALYSIS has great virtue in one direction chiefly, and that is in showing how the duties of individual workers can be intensified. By this I do not mean to suggest that the labors of a job should be heaped more heavily on the shoulders of a workman. Successful planning and execution seldom have that result. By intensification of duties I mean the elimination of idle periods and of wasted effort so that a man can do in four hours by systematic procedure that which he now accomplishes in eight hours by dilatory working.

That, however, is but one view of the working picture. It has been demonstrated time after time that many jobs in mining are seen only in the abstract by the management. If a man happens to be experienced as a brattice man and is hired as such, so long as he remains at the plant he is likely to be expected to devote all of his time to that one job alone. And the same disposition governs other jobs. Specialization may be the key to efficiency in industry generally, but it may be overdone.

The mining of coal involves many odd jobs which must be attended to promptly if the general operation is to function smoothly. As these jobs occur here and there over a wide area, it is virtually impossible to get the most from the worker's time without doubling up duties. Job specialization in mining causes a man to cover too much territory to handle work of the one class. If he could be trained as a utility worker to take care of two or three of the simpler job processes, he would accomplish more in a day, jobs would be attended to more promptly, and fewer men would be required.

Much of the success in plant management enjoyed by the Ford Motor Co. is said to be attributable to the combining of two or more simple operations into one. So carefully are these jobs combined that to the casual observer they appear to be but one operation. Job analysis of this sort might be applied profitably to coal mining.

Pittsburgh, Pa. J. A. D.

Particular Jobs Need Analysis

MR. MOOREHEAD has the right idea, but unquestionably his analytical procedure cannot be applied as a general proposition. If a job analysis is to be successful, it must be carried out on the spot. In making a survey of the kind he suggests, I would propose that the problems be divided into two classes: those of a general operating nature and those applying to peculiar conditions in a particular mine. It is these latter types of problems which give the most difficulty and which are overlooked and ignored by the management.

I have often found that unusual problems are more quickly realized by the miner working at the coal face than by those in charge of the plant. The practical miner can lend much help in overcoming an operating difficulty, for usually he has a solution which, though it be in the rough, can be smoothed out by his superiors.

Analytical thought should be useful in training the miners for their jobs. Even the skilled miners lack knowledge of details which would enable them to perform their jobs entirely satisfactorily. Both the management and men will get the most out of these talks if the latter are encouraged to ask questions on any point they do not understand. W. E. WARNER.

London, England.

Mine Workers Are Attracted To a Stable Organization

THE CURSE of wanderlust continues in some miners today. Seemingly, they never count the cost to themselves in wages nor the hardships on their families in breaking home ties and gypsying around the country. A few days ago one of the leading steel companies in the South made a list of employees who have been in its service for five years or more. Out of 150 miners whose records were examined, only about 15 were eligible, though the mine at which they worked operated more than the average number of days per year and has generally good living conditions. It costs real money to hire and train workers. The appearance of new faces at an operation is the signal of advancing costs and less safety. New men, naturally, are much more susceptible to accidents than older employees.

I can see no good reason for not employing roving miners when the demand for coal is greater than the tonnage that can be produced with the men already employed. Many of the transient miners have a wealth of experience under various conditions which make them a valuable adjunct to any organization. Some foremen, in an effort to hold the new workers, give them the best places. That is unfair to the older men who have stuck on the job through good and bad. Another consideration in this connection is the payment of equal wage rates for a particular job. Don't think that the miners will not find out if you pay a higher rate to certain men. This does not mean that compensation should not be paid to those who are working in places where conditions are difficult. Unjust variations in wage rates will disrupt an organization more than any other factor.

Mac can be helped by the company in building up a strong labor force by providing attractive homes and facilities for the education and entertainment of these people. As commonplace as this may sound, a coal company benefits a great deal by providing grounds to the miner for raising a garden. If a man plants a garden he will not move while it is growing. What is more, it grows during the dull season in the coal market when miners work interruptedly. One of the best advertisements a coal company can have is that it has on its payroll a large number of men who have been in its service for ten or fifteen years.

Altoona, Ala. JOHN JONES.

Day-Work Losses

Not long ago a general superintendent was heard to say: "Our company recently investigated its schedules of day work and was shocked by the inefficiencies found. A careful analysis of the situation resulted in corrective measures which cut many cents from the cost of producing a ton of coal." Day work, especially that conducted when the mine is not producing coal, has always been a deep-grown root of high production cost. The problem will be discussed in these pages next month. Send in your letter on the subject today.

A Coal Inspector Must Use An Iron Fist Gloved in Velvet

I AM in sympathy with C. E. Montgomery, Edwight, W. Va., in his allegation that the dirtiest coal is most likely to come from loaders who produce the largest tonnage. Pardon me, Mr. Montgomery, do you know these loaders who are guilty of the complaint? Are you acquainted with their working places and, from your personal observations, have you found them trying to steal coal by placing slate in the car? If so, you should investigate each case to satisfy yourself and to meet the confidence placed in you. For many years I have watched men in all branches of mining, and have had differences even to the point of fighting. I found that it didn't pay, so I changed my tactics and used diplomacy. I have found that only by following this procedure is it possible to insure clean coal. All else equal, try it. R. W. LIGHTBURN.

Nemacolin, Pa.

Men Must Earn the Right To Regular Employment

WE keep a roll of men whose jobs are permanent. Casual hands are taken on when needed, but no man is put on the permanent roll until he has been employed and given satisfaction for at least two years. The two years may be totaled up from several periods of casual employment when running time is broken. Promotion from the temporary to the permanent roll is governed by seniority status in employment.

This method has been found to prevent disputes or charges of favoritism. By this means, there is no difficulty in getting and keeping a supply of good men. Every new worker is given the encouragement of promotion to the permanent roll if he gives satisfaction and continues in the company's service for the requisite period. If a man leaves the company and does not give sufficiently good reason for his action he is not taken on again. It is permissible to hire transient miners whenever there is a sudden demand for coal and the existing labor force is inadequate. Some miners are tramps because they have not succeeded in finding a job where working and living conditions are satisfactory.

W. E. WARNER.

London, England

Good Living Conditions Are a Real Incentive

IT doesn't require any great amount of skill to diagnose that dreaded malady, labor turnover, from which coal-mine operations are suffering. The actual cost of training a workman for a particular job may be $100—sometimes more, sometimes less, depending upon the operation. That investment must be made over and over again each time an old employee leaves the plant and a new man is substituted in his place.

To eliminate or reduce this unreasonable operating expense, living conditions around the camp should be of the very best, for the first-class miner demands them. Regardless of other advantages, he will not stay if deprived of them. I have known a good many first-class miners who stayed at an operation when they might have earned higher wages elsewhere, simply because they wanted their families to enjoy the best of living conditions.

Most miners have an inclination to trade at the company store, and the treatment they receive there plays an important part in holding them or driving them away. The miner's wife who spends her husband's check in the company store is entitled to the same courtesy as the wife of the banker who cashes it. Too frequently the clerk is afflicted with the "take-it-or-leave-it" attitude, which causes men and their families to leave a community, when otherwise they would have stayed. This applies particularly to colored employees, and for this failing the company pays. And how!

It is in the company office that the employee transacts business with his employer, and there also he should receive courteous treatment. When the worker orders rail, timber, and other materials, they should be sent to him as promptly as possible. Selection in the personnel of a mine plant, and measures taken to retain the best workers, have much to do with operating safely. If workmen are needed, no mistake is made in hiring the passers-by, provided they meet your requirements, as the majority of men have good reason for leaving the service of their previous employer. Finally, if a man and his family can be satisfied over a period of six months, the likelihood is that he will remain with you for many years.

MELL. E. TRAMMELL.

Altoona, Ala.

Don't Overlook Importance Of Holding Worker's Confidence

TO THE section boss, labor turnover is a nightmare. It is he who must show the new men their places and must train them to work according to the company's rules. How he hates to see the trained man leave his section, to be replaced by a newcomer who may or may not respond to his teaching!

Acting as assistant mine foreman for a number of years, I have learned a number of successful methods of holding men. A little bit of fellowship will

Publications Received

The Principles of Coal Property Valuation, by A. W. Hesse. Pp. 183, illustrated; price $3 net. John Wiley & Sons, Inc., New York City. This book is in three parts: Part I, Virgin Coal Lands; Part II, Operating Properties; and Part III, Appraisals and Valuations.

Geology and Mineral Resources of the Alexis Quadrangle, by Harold R. Wanless. Department of Registration and Education, State Geological Survey, Urbana, Ill. Bulletin No. 57; 230 pp., illustrated.

Influence of Washing Coal on Coke Properties and on Gas and By-Product Yields, by A. C. Fieldner. Bureau of Mines, Washington, D. C. R. I. 3,020; 13 pp., illustrated.

New Brunswick—Its Natural Resources and Development, by L. O. Thomas, Natural Resources Intelligence Service, Department of the Interior, Ottawa, Canada. Pp. 167, illustrated.

Suggested Safety Rules for Installing and Using Electrical Equipment in Coal Mines, by L. C. Ilsley and Charles M. Means. Bureau of Mines, Washington, D. C. I. C. 6,269; 22 pp.

Steel Pit Props, by T. Ashley, S. M. Dixon, and M. A. Hogan. Safety in Mines Research Board. Paper No. 58; 56 pp., illustrated; price, 1s. net. H. M. Stationery Office, Adastral House, Kingsway W.C.2, London, England. Results of a survey made by the authors, supplemented by laboratory tests. Sketches of the props and load-shortening curves for the yielding types, together with plans illustrating the systems of roof support by steel props adopted at a number of collieries, are included.

Recent Patents

Mine-Railroad Track; 1,755,462. Jacob Steinberg, Brooklyn, N. Y. April 22, 1930.

Beam-Handling Apparatus for Coal Mining and Other Operations; 1,755,738. K. Klepadlo and A. Gratkowski, Scranton, Pa. April 22, 1920.

Hoist; 1,755,840. Clyde P. Ross, Chicago. April 22, 1930.

Cutter Bar for Coal-Cutting Machines; 1,756,450. William C. Black, Dudley, England, assignor to Matthew S. Moore, Brussels, Belgium. April 29, 1930.

Loading Machine; 1,753,246. Norton A. Newdick, Columbus, Ohio, assignor to the Coloder Co., Columbus, Ohio. April 8, 1930.

Car-Dumper Clamp; 1,753,456. Arthur F. Case, Cleveland, Ohio, assignor to the Wellman-Seaver-Morgan Co., Cleveland, Ohio. April 8, 1930.

Re-enforced Mine Tie; 1,753,534. Justus J. Ross, Huntington, W. Va. April 8, 1930.

Screening Machine; 1,753,630. Arthur D. Vickerman, Pueblo, Colo. April 8, 1930.

Loading Machine; 1,754,276. Nils D. Levin, Columbus, Ohio, assignor to the Jeffrey Mfg. Co., Columbus, Ohio. April 8, 1930.

Apparatus for Pulverized Fuel Burning; 1,754,277. Edwin Lundgren, Frederick, Md., assignor to International Combustion Engineering Corporation, New York City. April 15, 1930.

Coal Cutter; 1,754,304. Herbert A. Buehler, Chicago, assignor to Goodman Mfg. Co., Chicago, Ill. April 15, 1930.

Mining Machine; 1,754,329. Frank A. Lindgren, Western Springs, Ill., assignor to Goodman Mfg. Co., Chicago, Ill. April 15, 1930.

Apparatus for Inverting Mine Cars; 1,754,395. John T. Morris, Glen Morrison, W. Va. April 15, 1930.

Eyepiece for Gas-Protective Masks; 1,754,419. Alexander B. Dräger, deceased, Lubeck, Germany, assignor to Heinrich O. Dräger, Lubeck, Germany. April 15, 1930.

Conveyor System for Mines; 1,748,301. Edward S. McKinlay, Denver, Colo., assignor to McKinlay Mining & Loading Machine Co., Denver, Colo. Feb. 25, 1930.

Method of Treating Coal and Product Thereof; 1,748,335. Eliot Farley and Nathaniel R. Landon, Mount Kisco, N. Y., assignors to Delaware, Lackawanna & Western Coal Co., New York City. Feb. 25, 1930.

Chain-Conveyor Link; 1,748,334. John L. Evans, Scranton, Pa. Feb. 25, 1930.

Operating Mechanism for Mine Doors; 1,748,447. Albert J. Gurney, Canton, Ohio, assignor to American Mine Door Co., Canton, Ohio. Feb. 25, 1930.

Mine Door; 1,748,448. Albert J. Gurney, Canton, Ohio, assignor to American Mine Door Co., Canton, Ohio. Feb. 25, 1930.

Coal Washing Apparatus; 1,748,569. Merrill Hibbard, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Feb. 25, 1930.

help a lot. Go out of your way to tell your men the easiest and safest way to do their jobs. Listen to their complaints; they sometimes want to tell you of their home troubles. Consider their problems confidential; tell them what you would do under similar circumstances. If you have failed to pay a man all of the wages he should have gotten, let him know it was a mistake on your part when he calls your attention to it. In plain words, don't lose his confidence. Be yourself at all times, and don't try to make your men think you are king. Be candid with them, telling them when they do wrong and when they do right. They will respect you for that.

You can usually tell the floater by his barrage of words. He will keep up a constant chatter while you are escorting him to his prospective place. If, during the walk in his company, you decide he is not the man you want, show him an abnormal place, and the chances are he will leave you right then. If, in spite of the discouragement of difficult working conditions, he goes to work, he is likely to make a good man. When men are scarce, it is permissible to hire and try any able-bodied man that comes along, provided, of course, there is no legal or moral barrier against him.

Midway, Pa. W. J. LYKE.

Trade Literature

Steelbuilt Coal Preparation Machinery. Pennsylvania Crusher Co., Philadelphia, Pa. Bulletin 1,015; folder showing steel-built breakers, crushers, hammermills for coal pulverizing, etc.

Menzies Hydro-Separators and Rands Power-Driven Rotary Car Dumpers are two folders recently issued by Roberts & Schaefer Co., Chicago, Ill.; the former Bulletin 127, illustrates and describes single, double and triple units of hydro-separators and the latter, Bulletin No. 128, covers the special features and operation of the Rands power-driven rotary car dumpers.

Chevenard Industrial Thermal Analysers and Differential Dilatometers. R. Y. Ferner Co., Washington, D. C. Catalog D-1; 12 pp., illustrated. Describes construction of the apparatus, specifications, uses, etc.

Motor-Generator sets for Converting Alternating Current to Direct Current. Reliance Electric & Engineering Co., Cleveland, Ohio. Bulletin No. 500; 7 pp., illustrated.

Properties of Haynes Stellite. Haynes Stellite Co., Kokomo, Ind. Pp. 30; illustrated. Covers a general description, explanation of red hardness, uses, physical and chemical properties of these alloys.

Morse Silent Chain Drives. Morse Chain Co., Ithaca, N. Y. Bulletin No. 38 is a new data book of 104 pp., illustrated, containing information of the design, installing and maintaining of these drives, with prices, etc.

Floodlights and Industrial Lighting Units. Crouse-Hinds Co., Syracuse, N. Y. Catalog 312; 52 pp., illustrated. Describes their various uses, prices, etc.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: Type DW Resistors, for Mine and Industrial-Haulage Locomotives; GEA-1142A. Hand Starting Compensators, CR1034-K17, K22 and K37, Dead Front Cabinet Type; GEA-570B. Type WD-200A Arc Welder—Belt, Motor or Gas-engine Drive; GEA-874E. Type WD-300A Arc Welder—Belt, Motor or Gas-engine Drive, GEA-875E. Type WD-400A Arc Welder—Belt or Motor Drive. These are all 4-pp. folders, illustrated.

Synchronous Motors; General Electric Co., Schenectady, N. Y.: GEA-1191; 85 pp., illustrated. Briefly outlines the numerous forms of synchronous motors produced by this company and shows their various applications.

Cutting Day Labor Costs in Bituminous Mines is the title of a 6-pp., illustrated bulletin issued by the Ingersoll-Rand Co., New York City, describing the various uses of its paving breakers.

◄◄◄ LETTERS to the Editor

Why Not Seek Government Co-Operation?

The coal industry is one of many today that needs help. When 2,411 coal corporations out of 3,784 report a total net loss in five years of $329,-713,741, something is seriously wrong. Any solution by the industry is difficult, because of lack of control of the more than 200,000,000 acres of coal land in the United States potentially ready to break the market the moment the market is stabilized.

Government is a scheme by which we relinquish certain rights, to more fully enjoy certain others. Order comes only through restraint, preferably self-restraint. Railroads and other public-service corporations, and more recently the oil industry, have found it possible with the aid of certain government restrictions to operate profitably.

Would it not be wise for the coal industry to give serious consideration to some form of governmental co-operation that might prevent the opening of new coal mines, except on shown need, as was done in war time, and possibly to allocate production tonnage to the several fields in accordance with market needs? This may not sound so good, but neither does one-third of the billion dollars loss in five years.

As a basis of such control, it might be necessary to proclaim all mineral resources invested with public interest. That is not a new point of view. Undoubtedly the drift of thought is toward government co-operation. Would it not be well for the coal industry to study this matter philosophically and instead of simply making a protest against everything proposed, to propose something itself that will adequately meet the needs of the industry?

GEO. H. ASHLEY,
State Geologist.

Helping the Old Timers

It seems to me that the owners of mines and factories should adopt some scheme to retire men worn out from hard work. When a man reaches old age—not necessarily in point of years, for some are old at 45, while others are young at 60—why not provide a way to enable him to spend his remaining years in comfort with a fair degree of independence?

Truck farms, fruit orchards, cattle and chicken raising suggest an opportunity which would enable these men to pay for their keep. The company could aid them by organizing an old-age club. Call it the Clover Club, if you will. Have men approaching the limit of usefulness in industry join the club and contribute so much a month by check-off from their pay.

With the fund the club could buy up small patches of farm land and erect homes on them. It could sell these to the old men on a partial-payment plan and otherwise finance them in getting started. The funds the men have already contributed would be credited to their account and serve as first payment. Charge them no interest and let them make payment according to their ability. The company might arrange to handle the sale of produce and livestock for the ex-workers turned farmers.

The plan would give more work to younger men and lessen the problem of unemployment. I see no reason why this plan could not be worked if it were carefully thought out and executed.

Milburn, W. Va. R. C. MITCHELL

Too Much Light

Among the editorials in the March issue of *Coal Age*, under the heading of "Niepozwalam," you raise the interesting point as to how many of the accidents besetting the mine worker can be traced to bad light and poor eyesight. A sojourn among those who have spent many years in mines with only the dim light of a not always clean Clanny safety lamp will prove that poor eyesight almost always follows eyestrain from poor light. And that accidents will follow is almost inevitable. But what of bad eyesight from too strong light? My attention was drawn to this the other day on seeing a miner trying to drill out an obstruction in the burner of his carbide lamp, and pushing the lamp drill anywhere but where it was supposed to go.

"Eyes bad?" I asked. He answered that prior to working on these blankety-blank loading machines he had as good eyesight as anyone. But now—he shrugged his shoulders. I asked how long he had worked on the loading machine. He said: "One year." This set me to asking questions.

The machines in use in this mine are the four-men type, and were outfitted with a light pole on which was suspended a 750 candlepower globe. This, I understand, is not part of the machine's original equipment, but was the management's idea of suggesting the best in illumination. This terrific glare was later changed to 500 candlepower lamps, which are now in use throughout the mine. But this is too strong, and the harm will still be bad enough to be serious in time.

This suggests a problem of sufficient importance for discussion in your columns. It certainly is up to date enough. And if out of this discussion a lamp of sufficient strength and compatible with safety and health is suggested, I believe *Coal Age* will be living up to the traditions already established through its progressive policy for the betterment of the industry. ALEXANDER BENNETT.

Panama, Ill.

OPERATING IDEAS

From PRODUCTION, ELECTRICAL And MECHANICAL MEN

Spotting Trip for Weighing and Dumping In Rotary Is Made Automatic

A ROTARY DUMP and a car feeder, both powered by electric motors and equipped so that the stopping is automatic for car weighing and dumping, have been installed at the Keystone mine of the Houston Collieries Co., located in McDowell County, W. Va.,

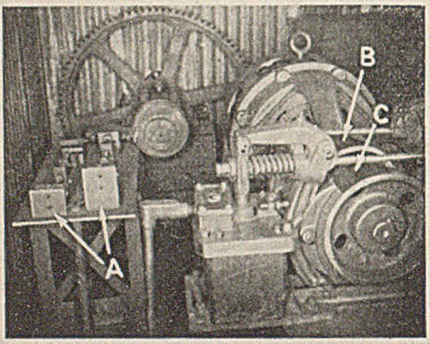


Fig. 1—Twin Brakes and Limit Switches of Drive

and owned by the Koppers Coal Co. One man, taking checks and supervising the dumping, is able to handle cars at the rate of four per minute up to the point where he must wait for the tipple to take the coal.

The cars have been equipped with swivel couplings allowing the dump to turn a complete revolution each time and always in the same direction. The limit switches, *A* in Fig. 1, open the controller of the 20-hp. dump motor and set the magnetic brakes on the drums *B* and *C* to stop the dump at the correct point at the end of the revolution. One brake, which goes on before the other, has a light adjustment to slow the dump, and the other has a tight adjustment for making the final stop.

A 40-hp. motor which drives a car feeder that extends three car lengths back from the dump on the loaded side, has the same arrangement of limit switches and twin brakes. Each time this feeder stops the trip automatically in the correct position for dumping a car and for automatic weighing of the second car back. The three cars next to the dump are spaced so that the center one, which is on the scale, has slack in the hitchings.

Two dogs set in opposite directions form a pair that make positive engagement with a projection on the car bottom. As indicated by Fig. 2, these sets of dogs are spaced a car length apart on the chain. The exact spacing is such as to provide the proper slack for weighing. About 75 ft. back of this feeder is a booster feeder 30 ft. long having manual control. It is used only to engage the end of a trip with the main feeder.

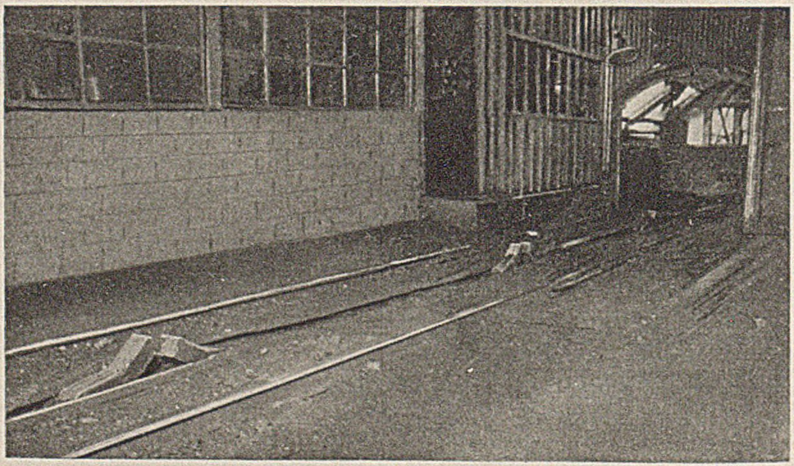
The operative handles the dumping in the following sequence: After glancing into the bin and seeing that there is room for another carload of coal, he pushes a button which starts the dump rotating. While the dumping is taking place he steps over and lifts the check of the next car that is to go onto the scale. After seeing that the dump has stopped at the proper point, he pushes the button that starts the feeder, which in turn advances another load into the dump and stops it there.

Due to variations in the car loading and to other conditions such as temperature changes that affect friction, the dump does not always stop at exactly the correct point. In that case the operative quickly inches it to the right position by momentarily pushing a "Forward" or "Reverse" button. At times he must take a similar action in adjusting the feeder to a correct position for the dumping.

The track scale has an automatic weighing and recording attachment operated by a trip that is forced down by the car wheel. A weighman receives the car checks from a chute, and from these and the tape he posts the weigh sheet in the usual manner.

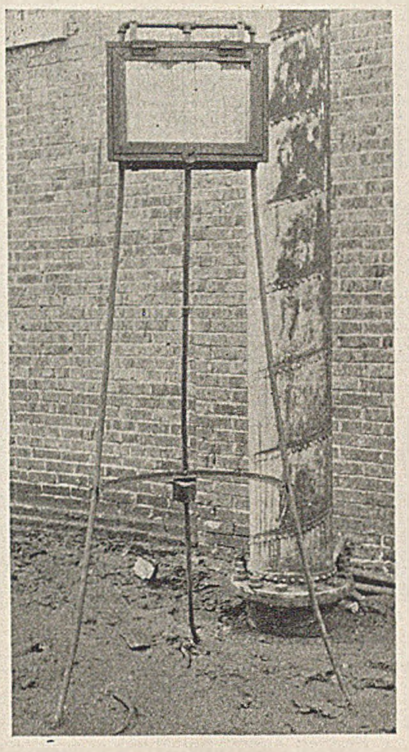
The rotary dump and car feeder were furnished by the Pittsburgh Coal Washer Co.

Fig. 2—Showing Spacing of Dogs on Automatic Feeder. The Center One Is in Position Which Spots a Car on the Scale



Portable Safety Board Catches the Eye

There are those engaged in the education and training of miners in safety who assert that originality in the



"What Is the Message Today?" Asks the Miner

presentation of safety messages is a big factor in the results of any campaign or program. These men say that "sameness" breeds disregard and that consequently a different safety message should be posted at the plant every day; that the position of posting should be frequently changed. This scheme naturally calls for a portable safety board.

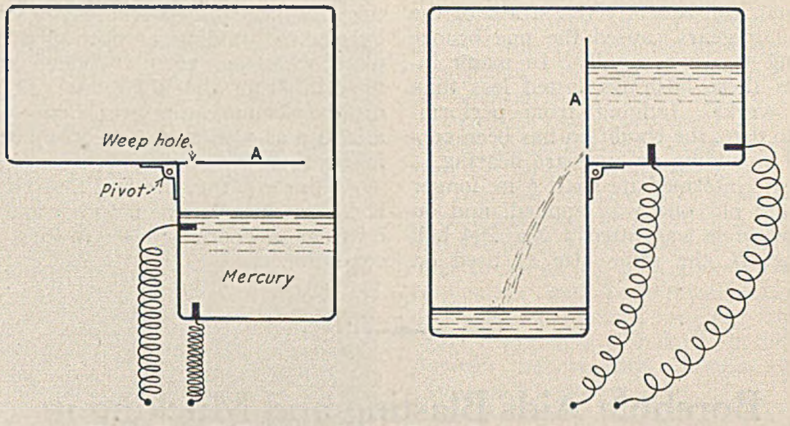
In the accompanying photograph is shown a portable bulletin board for the posting of safety messages used by the Old Ben Coal Corporation, operating in Illinois. Being constructed of pipes and angles, the stand is extremely light and can be moved readily by one man. The display window is large enough to accommodate only one safety placard.

—◆—

Designs Timing Relay for Door Supervision

Positive means of automatically cutting off electric power and of sounding an alarm in case a door in a gassy mine remains open more than a predetermined time is receiving the attention of an increasing number of mine officials and others interested in safety. M. H. Hall, general superintendent, Yukon (W. Va.) mine of the Yukon Pocahontas Coal Co., has proposed several types of time delay relays for attachment to the door and which will serve to open a breaker control or alarm circuit.

One which he deems promising but which cannot be made at a mine shop for a trial is shown in the accompanying illustration. It consists of a hermetically sealed glass box or tube of "L" shape. A glass partition, *A*, extends from the inside corner, or pivot, of the "L" nearly across the tube or box. Through the partition at a point near the pivot is a small hole through which the mercury can run slowly if the box is tipped. When all of the mercury has run to the other part of the tube, the circuit is broken. The time delay, in breaking the circuit after the tube is rotated 90 deg. by action of opening the door, depends upon the size of the weep hole. Upon closure of the door, which action returns the tube to normal position, the mercury quickly runs over the partition and into the bottom chamber, thus restoring the control circuit.



"Door-Closed" Position, Left; "Door-Open" Position, Right

Breaking the control circuit would cause opening of the breaker feeding the section affected, and thus remove that possible source of gas ignition. With more elaborate control wiring, alarms can be sounded. The time element prevents opening of the breaker with normal opening and closing of the door. In proposing this device, Mr. Hall has kept in mind three requisites: normally, the circuit should be closed; contact making and breaking should be by the most positive means available; and the timing element should depend on gravity, an unfailing force.

For some time one door in the Yukon mine has been equipped with an oil dashpot type of timing relay which is connected to cut off power from the section affected.

Turn the Crank

A story is told of a practical minded professor of mechanical engineering whose inventive skill, pressed for the inspiration of fresh mechanical thought, led him to develop an idea machine. The device consisted merely of a boxed crank and roll which turned out slips of paper in twos. He would insert a number of slips into the machine, first writing a different mechanical or geometric term on each. Then he would shuffle the pieces and turn the crank. Out of the machine came unusual combinations of words, several of which led to real inventions. One was the spherical gear. These pages are your idea machine. Help make it function by sending in your ideas. Each published idea will be paid for at the minimum rate of $5.

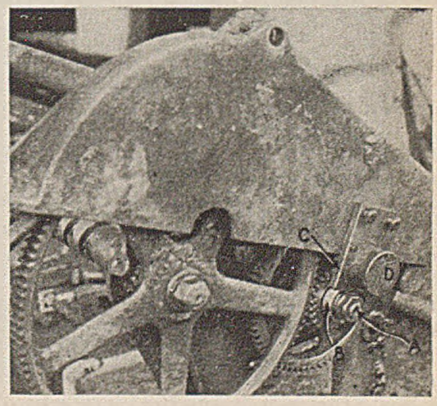
—◆—

Reel Trouble Corrected by Adding Ball Bearings

Several locomotives of the Lillybrook Coal Co., Lillybrook, W. Va., are equipped with the old type YR2 cable reels. On these, J. L. Chambers, chief electrician, has made a slight change which appears to have eliminated trouble and expense.

The intermediate shaft, *A* in the

Gear Case Raised From Normal Position



illustration, had no bearing at the outside end, consequently the strain of the overhung gears caused the one bronze bushing to wear rapidly. In many instances these bushings lasted less than three weeks. Judging from performance to date, the condition has been corrected by adding an outboard bearing.

A new intermediate shaft ½ in. longer than the old one was applied, and on the end of it was fitted a No. 204 ball bearing, *B*, the same size as used on the pinion end of a Cy-21 reel armature. A bearing housing, *C*, was built by electric welding a short tube into a plate which in turn is bolted to the upper half of the gear case. *D* is an ordinary compression grease cup serving as a cap as well as for a convenience in lubricating the bearing.

At this writing, the reel first changed had been in use five months, and both bearings appeared to be in first class condition.

Borehole Aids Blasting and Mucking in Sinking Airshaft Through Rock

WERE it not for the difficulties and expense encountered in the sinking of a shaft, mine ventilation suffering from a want of intake openings from the outside would likely be improved at the time of necessity in most cases. A convenient method of shaft sinking which incorporates a number of working features heretofore not utilized on this job was developed and used by the Elk Horn Coal Corporation, in putting down a ventilation opening at two of its mines in eastern Kentucky. Details of this work are contained in the April issue of the *Du Pont Explosives Service Bulletin.*

In each of these mines the workings are under heavy cover for the most part, but in eroded areas the cover in places is comparatively thin. As being amenable to shaft-sinking, the idea was conceived of putting down a 12-in. borehole with a well drill, in a ravine where the cover is only 95 ft. thick, and using this hole

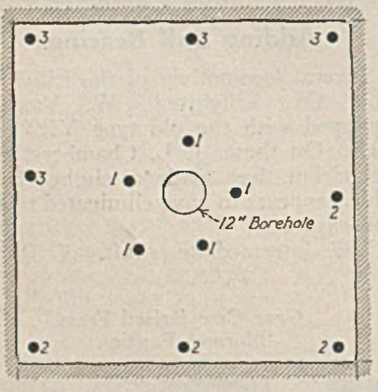


Fig. 1—Placement of Shotholes

for drawing off blasted rock and water to the underground workings beneath. The hole was cased with a 12-in. wrought-iron pipe through the loose surface ground. It was located so as to reach the coal seam on the track center of a mine entry, and facilities were provided for dropping the blasted material through the borehole directly into mine cars in a trip.

Only two men comprised the working crew. The loose earth was shoveled into the casing, which was cut shorter by an acetylene torch as shaft sinking progressed through this soft material. Then this portion of the shaft was timbered. For the displacement of the

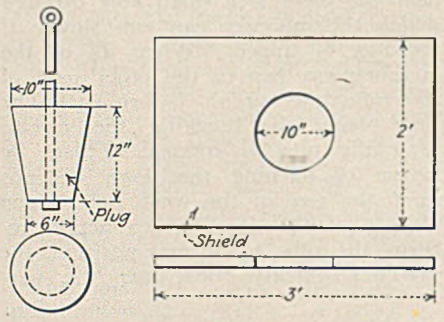


Fig. 2—Plug and Shield Used to Prevent Clogging of Borehole

rock by blasting a small portable air compressor, a jackhammer drill, bars, and a blasting machine were provided. Blasting was done by the use of 40 per cent dynamite, detonated electrically. Shotholes, drilled to a depth of 4 to 5 ft., were positioned in the sequence indi-

Total Cost of Sinking Shaft at Mine No. 327

Size of shaft	10x10 ft.		
In clear of timbers	8x 8 ft.		
Strata penetrated			
Surface soil	21 ft.		
Shale	39 ft.		
Sandstone	5 ft.		
Slate	30 ft.		
Depth of shaft	95 ft.		
Labor—including engineering			$3,149.90
Drilling			475.00
One 95-ft., 12-in. hole @$3.50		332.50	
One 95-ft., $5\frac{3}{16}$-in. hole@1.50		142.50	
Lumber			483.70
Explosives			158.18
Teaming, tools and other supplies			229.41
Total cost			$4,496.19

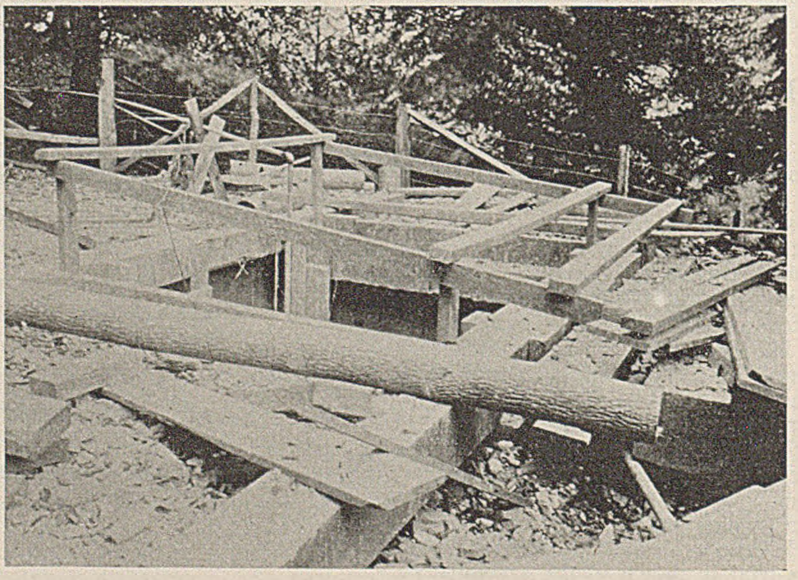
Total Cost of Sinking Shaft at Mine No. 379

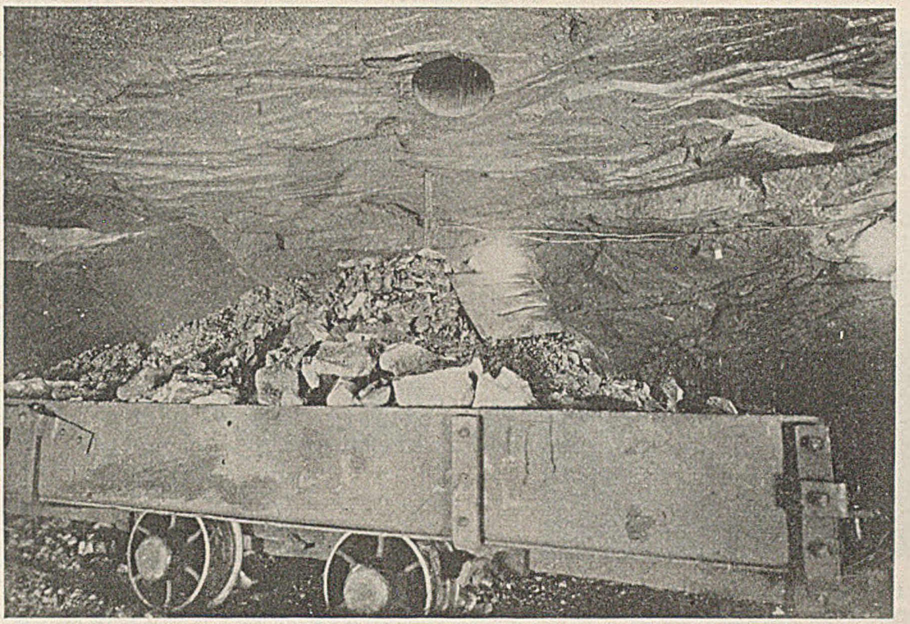
Size of shaft	10x10 ft.		
In clear of timbers	8x 8 ft.		
Strata penetrated			
Surface soil	21 ft.		
Sandstone	73 ft.		
Depth of shaft	94 ft.		
Labor—Including engineering			$2,536.42
Drilling			470.00
One 94-ft., 12-in. hole @$3.50		329.00	
One 94-ft., 6-in. hole @ 1.50		141.00	
Lumber			454.09
Explosives			202.14
Teaming, tools and other supplies			672.13
Total cost			$4,334.78

cated in Fig. 1. The breaker holes are indicated by the numeral *1*; the second group of holes to be blasted, by the numeral *2;* and the third group, by the numeral *3*. Five cartridges were charged into each of the breaker holes, and four into each of the remaining holes. After each shot the broken rock was shoveled down the hole, most of it being broken sufficiently to permit of disposal in this fashion without further reduction in size. Oversizes were broken down by a sledge.

In order to prevent clogging of the hole by sizes too large to pass through it, a plug and a shield, shown in Fig. 2, were devised. The plug was suspended in the borehole at a level slightly below the bottom of the shotholes before the

Collar of Shaft Showing Timbering





Loading Mine Car Through Borehole

five breaker shots were fired. After the blasting of these holes, this plug was drawn up through the broken rock to clear the opening. Then the shield, having an opening 10-in. in diameter, was placed over the hole to prevent clogging during subsequent operations.

The installation of a large electric lamp near the bottom of the hole, to one side of the track, provided a way by which the men in the shaft knew when to cease filling, for the removal of a loaded mine car and the spotting of an empty one. So long as any one mine car was not completely filled, rays from the electric lamp projected across the bottom of the borehole and the light was seen by the men from above.

From the standpoint of blasting, the borehole served the purpose of cut shots and provided a free space for the center hole to break to, and also provided a convenient and economical means of disposing of the rock removed from the shaft. Not only did it drain the shaft during the sinking process but it eliminated hoisting.

As to the cost, George W. Hay, general manager, has furnished data to *Coal Age* on the sinking of two shafts by the method described above. These are presented in the two accompanying tables. In connection with the work, Mr. Hay writes as follows:

"The two shafts were started about the same time and finished one week apart. The plan used was identical in each case. One shaft was sunk on contract and the other on a day-labor basis. Though both were approximately the same depth, the nature of the strata was somewhat different. It is remarkable that the two costs are so close."

Annealing Found Best Practice Even With Special Tire Lathe

TIRE TURNING without annealing, as practiced by one large company, was described in the March issue of *Coal Age*, page 185. A contrast to this practice is that in the central shop of the New River Co., Macdonald, W. Va., where tires are annealed before turning, even though the equipment is a heavy-duty tire lathe instead of an engine lathe, as in the other instance.

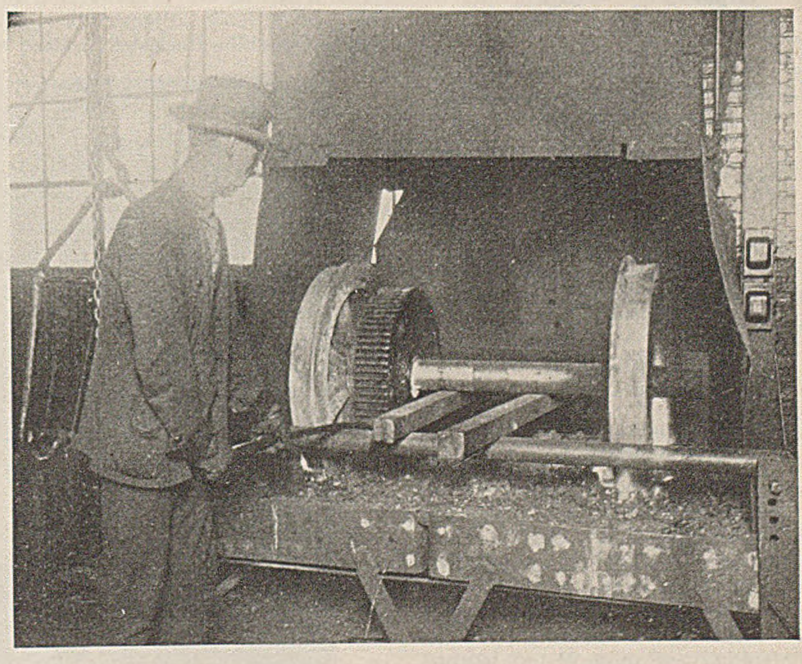
Annealing is done in a double-fire forge and requires the constant attention of one man. He turns the truck by engaging the gear teeth with a pinch bar. He does not rotate the truck constantly, but turns it so as to move the tires about a foot each time after the sections in the fire have come to a cherry red. Including preparation for building the forge fires, it takes $1\frac{1}{2}$ hours to anneal the first pair, but succeeding pairs are annealed in one hour each.

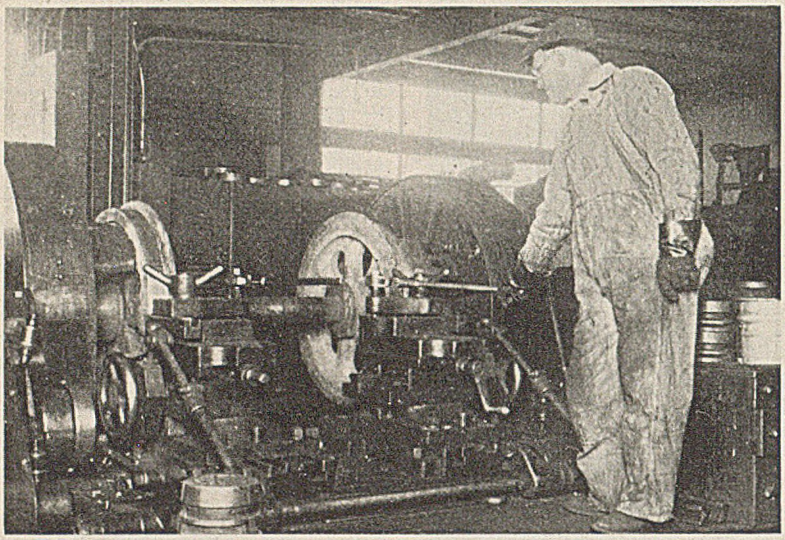
Certain companies have reported loose wheel centers caused by annealing tires without removing from the centers. This trouble has not been experienced by the New River Co. Instead, the shop men are of the opinion that the annealing tends to make it rather difficult to press a wheel off the axle. They do report that the annealing has in several instances broken a spoke, but that one broken spoke in a wheel has never caused a failure.

Turning without annealing was tried a number of times in the New River Co. shop; first, when an engine lathe was used, and again after the special tire lathe was purchased. About eight hours was required to turn a pair, and a finishing tool taking the entire contour of the tire could not be used. Many hard spots, some "as large as a half dollar," were encountered in each tire. Burning these out with an acetylene torch and chiseling was tried, but proved unsuccessful. Grinding, which at least one company now finds successful, was not tried.

Annealing in a coal forge, which

When the Sections in the Fires Reach a Cherry Red the Truck is Rotated About 30 Deg.





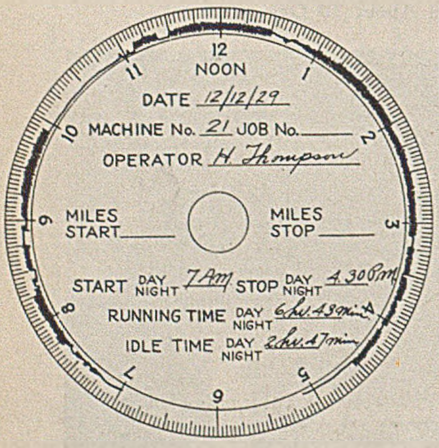
Dogs Engage the Outside Edges and Both Tires Are Turned at Once. A Finishing Tool Assures Proper Contour

usually is the only readily applicable method available for use at the isolated plant, and generally the practice at a coal mine, is not so convenient a method as heating by gas. Time is required to build a fire and to position the tire to heat all of it.

Although the annealing forge is hooded and ventilated, the fumes which escape into the shop building make it objectionable. Recently natural gas has become available in the town, and it is the intention to use it as fuel for annealing. In this case, the burner will be a ring that will heat the entire periphery at once, thus reducing the time required.

Vibration Recorder Checks Performance of Gathering Locomotive Batteries

FOR engineering comparisons of battery gathering locomotives, the performance records should include actual operating time per shift as well as the number of cars gathered and ampere-

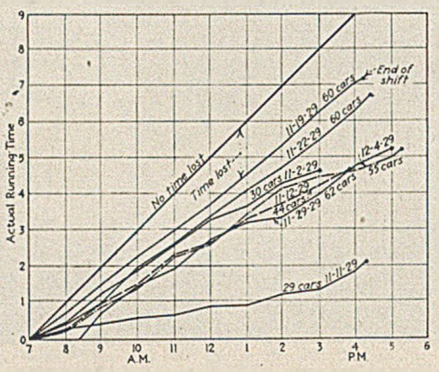


Time Performance of a Battery Locomotive

hours used. At mines operated by the Koppers Coal Co., B. F. Grimm, electrical engineer, makes use of Sattler recorders to obtain time-movement data.

The accompanying halftone shows one of these instruments screwed to the controller case of a 9½-ton battery gathering locomotive at Keystone, W. Va. The recorder is but 6 in. in diameter and is well suited in construction to the rough usage. It contains a pendulum-actuated stylus and a clock mechanism for driving a circular wax-covered chart which is 5 in. in diameter. Vibration of the locomotive swings the pendulum and records this movement as a polar graph. The door catch is a positive lock which prevents tampering.

The locomotives are not permanently equipped with recorders, but instead the instruments are shifted from one locomotive to another as the need arises.

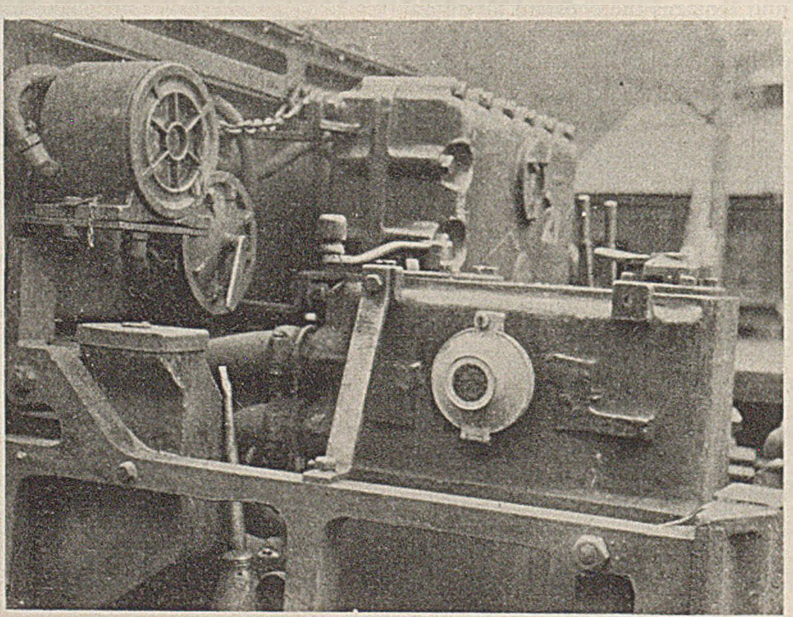


Graphs Should Lie Close to 45-Deg. Line and the Broken Line Extensions Should Not Droop

This recorder is made by the Durant Manufacturing Co., of Milwaukee.

On the chart reproduced herewith are curves of total accumulated working time up to each hour of the day. The locomotive carrying the Sattler recorder on "11-29-29" was the most efficient from the standpoint of cars gathered per unit of working time. This would indicate sidetracks close to the working places, an especially important requisite for battery gathering. From the standpoint of work time, the performance "11-19-29" is the most efficient, but the sidetrack distance must have been greater or possibly the speed slower, for fewer cars were gathered than in the case of curve "11-29-29."

Time-Operation Recorder Fastened to Controller of Permissible Battery Locomotive



AMONG THE MANUFACTURERS

LINK-BELT Co., Chicago, has placed on the market a line of cast chains made of Promal, a metal produced by a new method of processing malleable iron. Laboratory and field tests extending over three years show that this material has a much higher average yield point, increased ultimate strength, and greater Brinell hardness, as well as a lower average elongation than ordinary malleable iron or mild cast steel. The new metal is designed to provide long life for drive and conveyor chains operating under heavy loads or abrasive conditions.

•

JOHN E. CHIQUOINE, formerly of the industrial engineering division of E. I. duPont de Nemours & Co., Inc., Wilmington, Del., has joined the sales staff of the Blaw-Knox Co., Pittsburgh, Pa., and will specialize in equipment for the chemical and process industries. WILLIAM E. BALLIET has been made manager of the Birmingham (Ala.) office of the company, vice P. V. Kelly, and JOSEPH RILEY has been made assistant manager of the district. Blaw-Knox International Corporation is the new name of the export organization of the company, which was formerly known as Milliken Bros.-Blaw-Knox Corporation.

•

NATIONAL CARBIDE SALES CORPORATION, New York City, has removed its executive offices to the Lincoln Building.

•

STEPHENS-ADAMSON MFG. Co., Aurora, Ill., has removed its New York City office to 50 Church St.

•

PHOENIX MFG. Co., Joliet, Ill., has purchased the East Chicago plant and business of the Graver Tank & Mfg. Corporation.

FRANCIS A. EMMONS, sales manager, Foote Bros. Gear & Machine Co., Chicago, has been elected vice-president in charge of sales and advertising, gear division.

•

PULVERIZED FUEL EQUIPMENT Co., Chicago, has appointed the following district sales representatives: E. L. Sullivan, Oliver Building, Pittsburgh, Pa., and H. P. Rogers & Co., Cleveland, Ohio.

•

GIUSEPPE FACCIOLI has retired as engineer and associate manager of the Pittsfield works of the General Electric Co., Schenectady, N. Y., because of ill health, and has assumed the position of consulting engineer.

•

W. L. LEWIS, formerly assistant comptroller of the Bethlehem Steel Co., Bethlehem, Pa., has been elected vice-president, secretary, and treasurer of the Chicago Pneumatic Tool Co., New York City, vice J. G. Grimshaw, resigned.

•

INDEPENDENT PNEUMATIC TOOL Co., Chicago, has purchased the Cochise Rock Drill Mfg. Co., Los Angeles, Calif., which will be operated as a unit without change in personnel or methods.

•

C. J. ZEIGLER has been appointed manager of the Jacksonville (Fla.) office of the Simplex Wire & Cable Co., Boston, Mass., vice MISS F. H. PETTEE, who has been transferred to the main office in Boston.

•

PREST-O-LITE Co., INC., New York City, has opened a new plant for the manufacture of dissolved acetylene at 1240 Stewart Ave., S. W., Atlanta, Ga. The old plant in that city will be discontinued.

AMERICAN ARCH Co., INC., New York City, has removed its main offices to the Lincoln Building.

•

BROWN INSTRUMENT Co., Philadelphia, Pa., has consolidated its Chicago sales office and Midwestern factory branch in new quarters at 155 East Superior St.

•

CHARLES R. POLLARD, of the home office of the Alexander Milburn Co., Baltimore, Md., has been made Chicago district representative of the company.

•

S. O. MAXWELL, assistant manager, has been promoted to manager of the New York City office of the Terry Steam Turbine Co., Hartford, Conn.

•

LESLIE C. WHITNEY, research chemist, has joined the mill organization of the Copperweld Steel Co., Glassport, Pa., as supervisor of a new testing laboratory.

•

C. D. McCORMICK, assistant advertising manager, C. F. Pease Co., Chicago, has been made advertising manager, succeeding W. EARLE PASHLEY, now second vice-president and assistant sales manager.

•

W. J. SAVAGE, formerly sales and advertising manager for the Heltzel Steel & Iron Co., Warren, Ohio, has been appointed manager of sales for the Brown Clutch Co., Sandusky, Ohio.

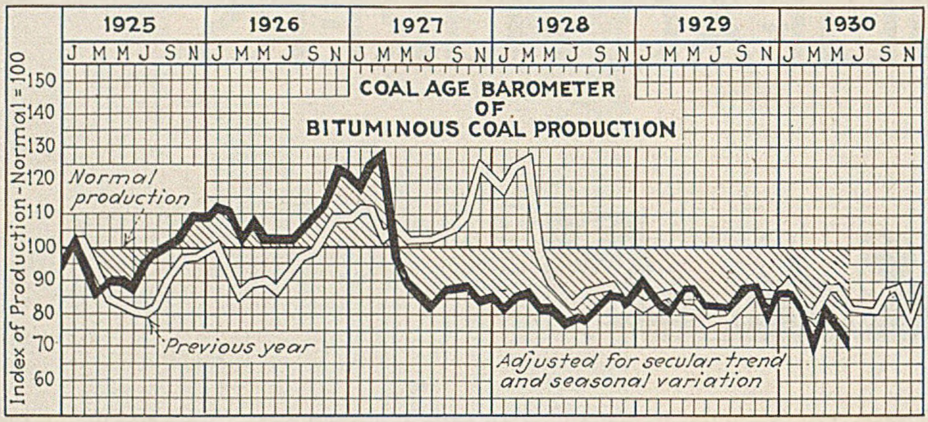
•

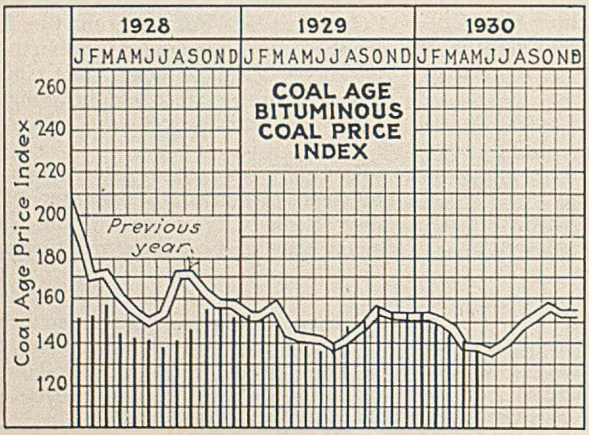
PAGE GOLSAN, formerly vice-president of the Great Western Portland Cement Co., Kansas City, Mo., has been appointed manager of the new business department of Ford, Bacon & Davis, Inc., New York City.

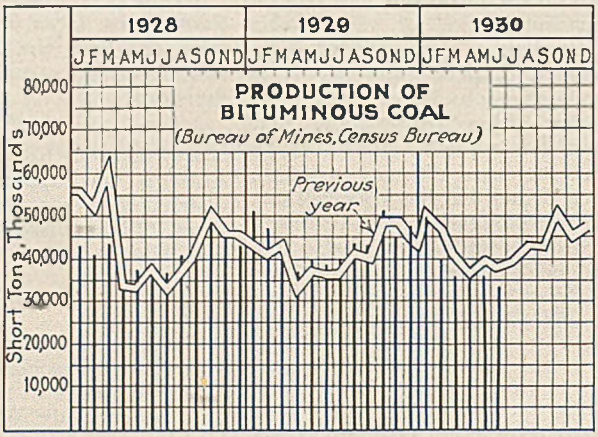
•

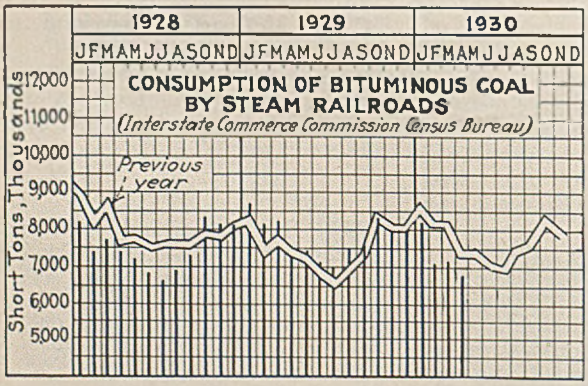
LINK-BELT Co., Chicago, has added to its crane and shovel division the following dealer representatives: W-D-M Equipment Co., Columbia, S. C.; Myer & Cunningham, New York City; Barzee Equipment Co., Syracuse, N. Y.; S. G. Hawkins Co., Houston, Texas; Lewis-Patten Co., San Antonio, Texas; and West-Virginia-Kentucky Hardware & Supply Co., Huntington, W. Va.

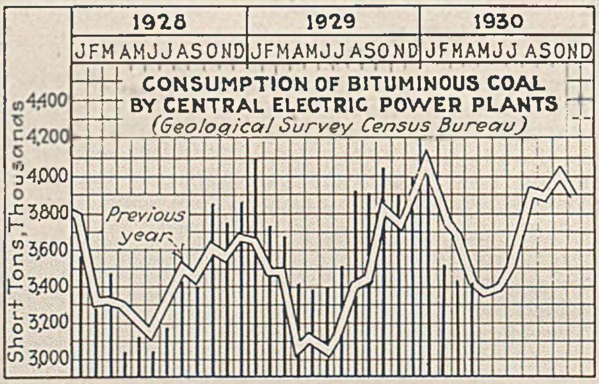
Indicators of Activities in the Coal Industry

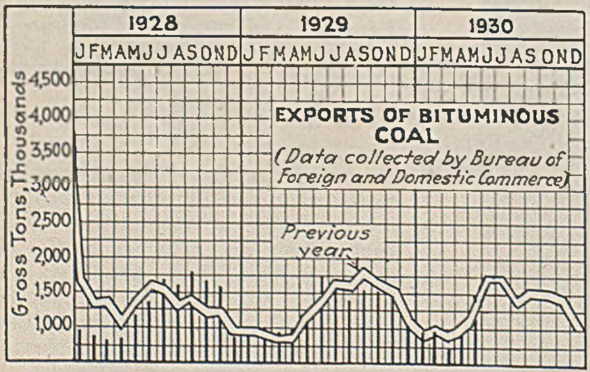


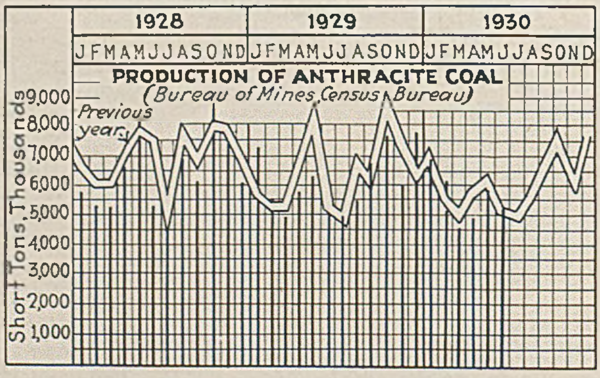












MARKETS in Review

WITH the monotony of light demand unrelieved by any activity worthy of note, the bituminous coal markets of the country went through another dull month in June. Business depression was blamed for the slowness in steam coals, while hot weather and poor credit conditions hampered domestic sales in most of the marketing centers. Even material price concessions failed to interest the consumer to the point of filing orders for the future. Stocking continued to languish and only a desultory interest was taken in contracting.

Shipments of coal and coke, according to the forecast of the Shippers' Regional Advisory Boards, are expected to decline 5.4 per cent in the third quarter of this year. Actual car loadings in the third quarter of last year were 2,410,372, as compared to the estimate of 2,280,511 cars for the third quarter of 1930. This compares with a projected decrease of 6.5 per cent in the car loadings of all commodities, including coal and coke.

June production of bituminous coal is estimated by the U. S. Bureau of Mines at 33,683,000 net tons, a decrease of 2,271,000 tons from the May production and 1,897,000 tons from the output in June, 1929. Anthracite production is estimated at 5,202,000 net tons for June. This compares with 5,947,000 tons in May and 5,069,000 tons in June, 1929.

Coal Age Index of spot bituminous prices (preliminary) was: 137, June 7; 138, June 14; 140, June 21; and 137, June 28. The corresponding weighted average prices were: $1.66, June 7; $1.67, June 14; $1.69, June 21; and $1.66, June 28. Revised Index figures for May were: 140, May 3; 138, May 10; 136, May 17; and 139, May 24 and 31. Corresponding weighted average prices were: $1.69, May 3; $1.67, May 10; $1.65, May 17; and $1.68, May 24 and 31. The monthly Index for May was 138⅗, as compared to the unrevised figure of 138 for June.

Dumpings at the lower lake ports continued in slightly higher volume than for the corresponding season last year. Total dumpings for the season to June 30 were 13,814,312 tons, which included 445,927 tons of bunker fuel. The total for the same period in 1929 was 13,592,392 tons, which included 501,405 tons of bunker coal.

Light demand in the anthracite markets of the country was reflected in curtailed production, which brought in its train some shortage of the smaller sizes. Of the latter, buckwheat showed the most activity. Domestic consumers failed to manifest any interest in the larger sizes, thus causing dealers to restrict their buying to current requirements and neglect replenishment of their yard stocks.

POOR credit, resulting from industrial depression and unemployment, continued to hamper improvement in the Chicago market in June. Industrial inactivity, especially, was reflected in a steam-coal consumption which kept always a step behind production, even though the latter was sharply curtailed. Slack from Illinois, Indiana, western Kentucky, and Eastern mines was hard to get, yet it was hard to sell. Secondary grades of slack from Illinois, Indiana, and western Kentucky were quoted at $2.45@$2.75, delivered at Chicago. Good grades from western Kentucky sold at 60c. Southern Illinois producers held their good grade fairly firm at $1.60@$1.85, but a scarcity of orders led some of the smaller companies to look for business at $1.15@$1.25.

Domestic prices were softer as a whole, with the exception of smokeless prepared sizes and Eastern high-volatile premium grades, which were held up by the scarcity of intermediate sizes, rather than any real demand. Secondary grades were offered at ridiculous prices, high-volatile operators having railroad egg contracts quoting 4-in. lump at $1.30 and slack at 80c. Lump and egg from western Kentucky mines sold at $1.25@$1.50, while in Indiana and Illinois, domestic business practically ceased, the producers devoting their efforts to the steam trade.

The St. Louis market was unusually quiet in June. Lagging business combined with some losses to natural gas, agitation for smoke abatement and propaganda for fuel oil and coke resulted in a subnormal tonnage movement and exceptionally low prices for screenings. Retailers have quite generally signed the agency form of contract with producers in the Standard, Mt. Olive, and southern Illinois fields, but domestic business is not expected to show any signs of life until the first of August.

DOCK operators at the Head of the Lakes were busy preparing for the future during the month of June. Receipts of coal at the Duluth and Superior docks are estimated to have reached the May aggregate of 2,289,125 tons, of which 2,132,657 tons was bituminous and 107,939 tons was anthracite. July receipts are expected to show a drop from the June total, as most of the larger consumers have covered their needs and are awaiting trade developments. Dock operators saw encouraging signs in sales reports showing orders from a constantly widening territory, and in sales of large tonnages for fall shipment. Shipments from the docks so far have fallen short of the totals for the corresponding period last season. Improvement is expected later, however,

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

		Week Ended							
		June 7, 1930		June 14, 1930		June 21, 1930		June 28, 1930	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	....	$8.15	....	$8.15	....	$8.15	....	$8.15
Broken	Philadelphia	....	....	....	....	....	....	....	....
Egg	New York	$8.00@$8.20	8.20	$8.00@$8.20	8.20	$8.00@$8.20	8.20	$8.20	$8.20
Egg	Philadelphia	8.45	8.20	8.45	8.20	8.45	8.20	8.45	8.20
Egg	Chicago*	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23
Stove	New York	8.45@ 8.70	8.70	8.45@ 8.70	8.70	8.45@ 8.70	8.70	8.45@ 8.70	8.70
Stove	Philadelphia	8.95	8.70	8.95	8.70	8.95	8.70	8.95	8.70
Stove	Chicago*	7.68	7.68	7.68	7.68	7.68	7.68	7.68	7.68
Chestnut	New York	7.95@ 8.20	8.20	7.95@ 8.20	8.20	7.95@ 8.20	8.20	7.95@ 8.20	8.20
Chestnut	Philadelphia	8.45	8.20	8.45	8.20	8.45	8.20	8.45	8.20
Chestnut	Chicago*	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23
Pea	New York	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Pea	Philadelphia	4.75	4.55	4.75	4.55	4.75	4.55	4.75	4.55
Pea	Chicago*	3.93	3.93	3.93	3.93	3.93	3.93	3.93	3.93
Buckwheat	New York	2.90@ 3.00	3.00†	2.90@ 3.00	3.00†	3.00	3.00†	3.00	3.00†
Buckwheat	Philadelphia	3.25	3.00	3.25	3.00	3.25	3.00	3.25	3.00
Rice	New York	1.60@ 1.85	2.00	1.50@ 1.85	2.00	1.60@ 1.85	2.00	1.60@ 1.85	2.00
Rice	Philadelphia	2.10	2.00	2.10	2.00	2.10	2.00	2.10	2.00
Barley	New York	1.25@ 1.50	1.50	1.15@ 1.40	1.50	1.15@ 1.40	1.50	1.15@ 1.40	1.50
Barley	Philadelphia	1.60	1.50	1.60	1.50	1.60	1.50	1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.50 (D. L. & W.)

when large industrial consumers and power companies come into the market for tonnages. May circular prices were maintained in June, with a discount of 25c. on Pocahontas, Kentucky, Youghiogheny, and splint coals prevailing.

Continued dullness featured the Southwestern market in June. A few Arkansas mines ran half time, but most of the deep-shaft operations were closed, with little prospect of reopening until about the middle of July. Summer orders were disappointingly light. Strip pits continued to supply the bulk of the demand, with crushed mine-run going as screenings at $1.85.

CONDITIONS in the Colorado market in June were slightly worse than in May, with little prospect of improvement until fall. Production for the five months ending with May showed a material decrease, attributable in part to the inroads of gas and oil in the section reached by Colorado producers. Ruling prices for June were: bituminous lump, $4.75; nut, $4.50; chestnut, $3.25; steam sizes, $1.50; Crested Butte anthracite furnace, egg, and large base-burner, $8.65; small base-burner (1¼x¼ in.), $6.65; lignite lump, $4.25; Rock Springs-Kemmerer 7-in. lump, $4.25; 3-in. lump, nut, and grate, $3.75; steam sizes, $1.40.

Louisville found June to be a dull month, though the trade looked for a revival after July 4. Price advances, coupled with hot weather, drove thoughts of buying out of the heads of householders, with the result that retailers sharply curtailed takings of domestic sizes. Steam contracting ran considerably behind the total for previous years, consumers preferring to resort to the spot market. Lake business also fell off as compared to previous years, operators reporting that mines north of the Ohio River were cutting into the eastern Kentucky tonnage materially.

With the close of June, one of the worst months in several years in the Cincinnati coal trade passed into history. A slight increase in inquiries was reported by a few firms, but the actual spot turnover was about at its lowest ebb. Conditions in the Cincinnati market were reflected in the number of cars passing east and west through the gateways. The average for the first week of the month was 11,500 cars, which dropped to 9,856 in the week ended June 28, nearly 3,000 cars less than the total in the same week last year.

CREDIT was not all that it should have been during the month. It was hard enough to sell tonnage, but still harder to collect for it. No price fluctuations were noticeable over the month, largely because they were already down to bedrock. Nor was there much disposition to make cuts, the trade being of the opinion that such tactics resulted in no material benefit and, in addition, placed a club in the buyers' hands. Large sizes of smokeless coals were held firmly at circular prices for the first time in months. "In-between" sizes were hard to move and mine-run was not favored with any great attention, the spread in price being an indication of relative quality, rather than an effort to create business by lower values. Steel and industrial plants took all the slack available, thus stabilizing the market in this size.

Trade in high-volatile domestic coal was the lightest in some years. Scarcity of slack was the one saving grace in the situation, and was the means of holding the general average of prices to a fair level. Retail business dropped to subnormal levels in June, due to the large amount of coal taken the last of May, when summer prices went into effect.

No appreciable increase in the volume of domestic or steam business was discernible in the Columbus market in June, except that a slight increase in demand for smokeless lump brought the price up to that of egg at the end of the month. High-volatile stocking was at a low ebb in June, and the steam trade showed little change. Screenings from the splint and Kentucky fields maintained their firm position, and Ohio grades were well supported. Ohio-mined coal, particularly that from the Hocking field, enjoyed a larger participation in the lake business.

Business in the Cleveland market continued at a low ebb in June. Production was mostly applied to earlier sales and contracts. Consumers were indifferent to diminishing reserves, and showed no tendency toward replenishment in the immediate future. Shipments to upper Lake ports continued in good volume, though No. 8 commercial mines failed to participate in the movement to any great extent, most of the tonnage being captive or originating in West Virginia and Pennsylvania.

Easing prices featured the Pittsburgh market in June. Railroad and industrial buying was lower than in any of the preceding months of the year, and the outlook for July, it is reported, is not bright. Along with concessions in lump prices, there developed a softness in slack, the only firm item in the list heretofore. Decrease in shipments of this size to the Lakes resulted in the price dropping 10c. to $1, with some sales at 80c.

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

	Market	Week Ended			
LOW-VOLATILE, EASTERN	Market Quoted	June 7, 1930	June 14, 1930	June 21, 1930	June 28, 1930
Smokeless lump	Chicago	$2.50@$2.85	$2.50@$2.85	$2.50@$2.85	$2.50@$3.00
Smokeless egg	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00	2.50@ 3.25
Smokeless stove	Chicago	2.00@ 2.50	2.00@ 2.50	2.00@ 2.50	2.25@ 2.50
Smokeless pea	Chicago	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25
Smokeless mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless slack	Chicago	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Smokeless lump	Cincinnati	2.50@ 2.75	2.50	2.50@ 2.75	2.50
Smokeless egg	Cincinnati	2.75@ 3.00	2.75	2.75	2.75
Smokeless stove	Cincinnati	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50
Smokeless nut	Cincinnati	1.90	1.90	1.90	1.90
Smokeless mine-run	Cincinnati	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	1.75@ 2.00
Smokeless slack	Cincinnati	1.35@ 1.40	1.35@ 1.45	1.35@ 1.45	1.35@ 1.45
*Smokeless nut-and-slack	Boston	3.90@ 4.10	3.90@ 4.00	3.85@ 4.00	3.85@ 3.95
*Smokeless mine-run	Boston	3.90@ 4.10	3.90@ 4.00	3.85@ 4.00	3.85@ 3.95
Clearfield mine-run	Boston	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Clearfield mine-run	New York	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Cambria mine-run	Boston	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Somerset mine-run	Boston	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85
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@ 2.50	2.30@ 2.50	2.30@ 2.50	2.30@ 2.50
Pool 9 (Super low-vol.)	New York	1.85@ 2.10	1.85@ 2.10	1.85@ 2.10	1.85@ 2.10
Pool 9 (Super low-vol.)	Philadelphia	1.60@ 2.00	1.60@ 2.00	1.60@ 2.00	1.60@ 2.00
Pool 10 (h. gr. low-vol.)	New York	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 10 (h. gr. low-vol.)	Philadelphia	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Pool 11 (low-vol.)	New York	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Pool 11 (low-vol.)	Philadelphia	1.40@ 1.55	1.40@ 1.55	1.40@ 1.55	1.40@ 1.55
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.10@$1.25	$1.10@$1.25	$1.10@$1.25	$1.10@$1.25
Pool 54-64 (gas and st.)	Philadelphia	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15
Pittsburgh sc'd gas	Pittsburgh	1.75@ 2.00	1.75@ 1.95	1.75@ 1.90	1.75@ 1.90
Pittsburgh gas mine-run	Pittsburgh	1.60@ 1.70	1.60@ 1.70	1.60@ 1.70	1.60@ 1.70
Pittsburgh mine-run	Pittsburgh	1.40@ 1.65	1.40@ 1.60	1.30@ 1.60	1.30@ 1.60
Pittsburgh slack	Pittsburgh	1.00@ 1.25	1.00@ 1.15	1.00@ 1.10	.90@ 1.10
Connellsville coking coal	Pittsburgh	1.50	1.50	1.50	1.50
Westmoreland lump	Philadelphia	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25
Westmoreland egg	Philadelphia	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80
Westmoreland ¾-in. lump	Philadelphia	1.80@ 1.90	1.80@ 1.90	1.80@ 1.90	1.80@ 1.90
Westmoreland mine-run	Philadelphia	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Westmoreland slack	Philadelphia	1.10@ 1.20	1.10@ 1.20	1.10@ 1.20	1.10@ 1.20
Fairmont lump	Fairmont	1.50@ 2.00	1.50@ 1.90	1.40@ 1.75	1.40@ 1.75
Fairmont egg	Fairmont	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.40@ 1.55
Fairmont ¾-in. lump	Fairmont	1.10@ 1.50	1.15@ 1.50	1.10@ 1.50	1.10@ 1.50
Fairmont mine-run	Fairmont	1.00@ 1.20	1.00@ 1.25	1.05@ 1.30	1.00@ 1.20
Fairmont slack	Fairmont	.90@ 1.00	.85@ 1.00	.90@ 1.00	.90@ 1.00
Kanawha lump	Cincinnati	1.60@ 2.00	1.65@ 2.00	1.60@ 2.00	1.65@ 2.00
Kanawha egg	Cincinnati	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Kanawha nut-and-slack	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Kanawha mine-run (gas)	Cincinnati	1.50@ 1.60	1.45@ 1.55	1.50@ 1.60	1.45@ 1.60
Kanawha mine-run (st.)	Cincinnati	1.15@ 1.35	1.00@ 1.25	.90@ 1.15	.90@ 1.10
Williamson (W. Va.) lump	Cincinnati	1.60@ 2.00	1.60@ 2.00	1.60@ 2.00	1.60@ 2.00
Williamson (W. Va.) egg	Cincinnati	1.40@ 1.60	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
Williamson (W. Va.) nut-and-slack	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Williamson (W. Va.) mine-run (gas)	Cincinnati	1.40@ 1.60	1.45@ 1.60	1.40@ 1.60	1.40@ 1.60
Williamson (W. Va.) mine-run (st.)	Cincinnati	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
Logan (W. Va.) lump	Cincinnati	1.55@ 1.75	1.50@ 1.75	1.55@ 1.70	1.60@ 1.75
Logan (W. Va.) egg	Cincinnati	1.35@ 1.50	1.40@ 1.55	1.35@ 1.50	1.35@ 1.55
Logan (W. Va.) nut-and-slack	Cincinnati	1.00@ 1.15	.90@ 1.10	.90@ 1.15	.90@ 1.10
Logan (W. Va.) mine-run	Cincinnati	1.25@ 1.40	1.25@ 1.40	1.15@ 1.35	1.15@ 1.35
Logan (W. Va.) slack	Cincinnati	.90@ 1.10	.90@ 1.15	.90@ 1.10	.90@ 1.00
Hocking (Ohio) lump	Columbus	2.00@ 2.15	2.00@ 2.15	2.00@ 2.15	2.00@ 2.15
Hocking (Ohio) nut-and-slack	Columbus	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Hocking (Ohio) mine-run	Columbus	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Pitts. No. 8 (Ohio) lump	Cleveland	1.40@ 1.60	1.45@ 1.65	1.40@ 1.70	1.30@ 1.70
Pitts. No. 8 (Ohio) ¾-in. lump	Cleveland	1.40@ 1.45	1.40@ 1.45	1.40@ 1.45	1.40@ 1.45
Pitts. No. 8 (Ohio) mine-run	Cleveland	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.40@ 1.60
Pitts. No. 8 (Ohio) slack	Cleveland	.85@ .90	.85@ .90	.85@ .90	.78@ .90

*Gross tons, f.o.b. vessels, Hampton Roads.

Continued dullness marked the northern West Virginia market in June, with some of the season's lowest prices recorded. However, summer adjustments, depleted stockpiles and conditions in general seem to presage an increase in business. Contracting was in abeyance in June and the mines ran only two or three days a week. Railroad traffic men, on the contrary, report that they are preparing to handle more Lake coal from Fairmont, and the operating companies expect revival this month.

Conditions in the central Pennsylvania market showed little change in the month of June, as compared with the preceding months. Demand was light, and buying for stocks practically absent. Prices were maintained at about the prevailing levels in preceding months, quotations at the last of the month being as follows: Pool 1, $2.30@$2.55; Pool 71, $2.10@$2.25; Pool 9, $1.85@$2.10; Pool 11, $1.40@$1.60.

Steady accumulations in the month of June depressed the price of steam coal in the New England market, and producers were placed in the position of forcing tonnage on reluctant buyers. Quotations on Navy Standard smokeless mine-run, f.o.b. vessel, Hampton Roads, were $3.80@$3.90, though a few choice coals commanded $4@$4.10. All-rail tonnage from central Pennsylvania was at a minimum throughout the month, due to the pressure of tidewater accumulations. Little prospect of betterment is in view until September.

INDUSTRIAL depression, poor crop prospects, and bad credit conditions hampered the domestic trade in Birmingham in June. No increase in the present light demand is expected until fall. New prices went into effect July 1, as follows: Big Seam lump and egg, $2.05; nut, $1.95; Carbon Hill lump and egg, $2.30; nut, $1.90@$2.30; Cahaba lump, $3.60@$4.35; nut, $2.55@$3.20; Black Creek lump, $4@$4.25; nut, $3.20; Corona lump and egg, $2.95; nut, $2.55; Aldrich lump and egg, $5.35; nut, $3.20; Dogwood lump, $5.10; Straven lump, $4.35, and nut, $2.95. The steam-coal market failed to rally from the depression prevailing for some weeks. Quotations were unchanged from the following: mine-run, $1.60@$2.25; washed, $1.50@$2.25; slack, $1.25@$1.50.

Business in the New York market failed to expand during June. Buying was limited to current needs, and consumption was affected by the depressed level of general business, as well as the usual seasonal trend. One unsatisfactory feature was the failure of some buyers to take their full contract quotas, partly because of part-time operation of their plants. Mine-run prices did not recede from their low levels, but slack lost some of its strength. The supply was increased by the production of lump coal for shipment to the Lakes and inland, while demand barely held its own. Byproduct requirements went off because of summer dullness in domestic coke and recession in iron and steel.

Continued dullness featured the Philadelphia market in June. Consumers refused to lay in supplies until forced to do so, though some activity was manifested in the filling of contracts for public buildings. Prices were not altogether firm, though they ran along with few changes from the preceding month.

Lack of demand for stove and chestnut sizes in the New York anthracite market in June caused operators to curtail production to the point where a moderate shortage in egg, pea, and buckwheat sizes developed. Rice and barley were sluggish, with independent tonnage available at 25c@35c. below the circular. Many domestic consumers refused to have their bins filled unless long-term credits were arranged, and as the retailers were inclined to restrict outstanding accounts, deliveries often were deferred. Slow movement from the yards was reflected in the wholesale market, since dealers bought only for replacement and showed no desire to augment their stocks.

Light demand in the Philadelphia anthracite market brought in its train reduced operating schedules, although all sizes were easily obtained in June. Domestic demand lagged, despite all efforts to stimulate it, and dealers in Philadelphia bent their efforts toward inducing consumers to stock up for the winter—with indifferent success. As a result of the general lag in sales, retail stocks were very low. Price advances of 10c. per ton on egg, stove, and nut were made on June 1. Steam sizes moved fairly well during the month, with buckwheat most in demand.

Exports of coal in the month of May, the latest for which figures are available, were as follows: bituminous, 1,488,241 gross tons, against 857,806 tons last month and 1,401,885 tons in May, 1929; anthracite, 185,517 tons, compared to 122,918 tons in April and 246,409 tons in May, 1929; coke, 77,876 gross tons, against 83,246 tons in the same month last year.

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

	Market	Week Ended			
MIDDLE WEST	Quoted	June 7, 1930	June 14, 1930	June 21, 1930	June 28, 1930
Franklin (Ill.) lump	Chicago	$2.55	$2.55	$2.55	$2.55
Franklin (Ill.) egg	Chicago	2.45@ 2.55	2.45@ 2.55	2.45@ 2.55	2.45@ 2.55
Franklin (Ill.) mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin (Ill.) screenings	Chicago	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85
Central Ill. lump	Chicago	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Central Ill. egg	Chicago	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Central Ill. mine-run	Chicago	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Central Ill. screenings	Chicago	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.00@ 1.25
Ind. 4th Vein lump	Chicago	2.25@ 2.30	2.25@ 2.30	2.40@ 2.50	2.40@ 2.50
Ind. 4th Vein egg	Chicago	2.25@ 2.30	2.25@ 2.30	2.25@ 2.30	2.25@ 2.30
Ind. 4th Vein mine-run	Chicago	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10
Ind. 4th Vein screenings	Chicago	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Ind. 5th Vein lump	Chicago	2.00@ 2.10	2.00@ 2.10	2.00@ 2.10	2.00@ 2.10
Ind. 5th Vein egg	Chicago	1.80@ 1.90	1.80@ 1.90	1.80@ 1.90	1.80@ 1.90
Ind. 5th Vein mine-run	Chicago	1.30@ 1.65	1.30@ 1.65	1.30@ 1.65	1.30@ 1.65
Ind. 5th Vein screenings	Chicago	.90@ 1.00	.85@ 1.15	.85@ 1.15	.85@ 1.15
Mt. Olive (Ill.) lump	St. Louis	2.00	2.00	2.00	2.00
Mt. Olive (Ill.) egg	St. Louis	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Mt. Olive (Ill.) mine-run	St. Louis	1.65	1.65	1.65	1.65
Mt. Olive (Ill.) screenings	St. Louis	.90@ 1.10	.90@ 1.10	.80@ 1.00	.80@ 1.00
Standard (Ill.) lump	St. Louis	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80
Standard (Ill.) egg	St. Louis	1.65	1.65	1.65@ 1.75	1.65@ 1.75
Standard (Ill.) mine-run	St. Louis	1.55	1.55	1.55	1.55
Standard (Ill.) screenings	St. Louis	.80@ 1.00	.80@ 1.00	.70@ .90	.70@ .90
West Ky. lump	Louisville	1.25@ 1.50	1.25@ 1.50	1.35@ 1.50	1.35@ 1.50
West Ky. egg	Louisville	1.25@ 1.50	1.25@ 1.50	1.35@ 1.50	1.35@ 1.50
West Ky. mine-run	Louisville	.85@ 1.25	.85@ 1.25	.85@ 1.25	.85@ 1.25
West Ky. slack	Louisville	.65@ .80	.65@ .85	.60@ .85	.70@ .85
West Ky. lump	Chicago	1.25@ 1.35	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
West Ky. egg	Chicago	1.25@ 1.35	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
West Ky. slack	Chicago	.65@ .80	.60@ .70	.60@ .70	.60@ .70
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$2.05	$2.05	$2.05	$2.05
Big Seam mine-run	Birmingham	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Harlan (Ky.) block	Chicago	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25
Harlan (Ky.) egg	Chicago	1.50@ 1.85	1.50@ 1.85	1.50@ 1.85	1.50@ 1.85
Harlan (Ky.) slack	Chicago	.90@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25
Harlan (Ky.) block	Louisville	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Harlan (Ky.) egg	Louisville	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Harlan (Ky.) nut-and-slack	Louisville	....	....	....	....
Harlan (Ky.) mine-run	Louisville	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Harlan (Ky.) block	Cincinnati	1.90@ 2.10	1.85@ 2.00	1.85@ 2.10	1.80@ 2.20
Harlan (Ky.) egg	Cincinnati	1.40@ 1.60	1.35@ 1.60	1.35@ 1.60	1.40@ 1.60
Harlan (Ky.) nut-and-slack	Cincinnati	1.10@ 1.40	1.10@ 1.35	1.10@ 1.35	1.10@ 1.25
Harlan (Ky.) mine-run	Cincinnati	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60
Hazard (Ky.) block	Chicago	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00
Hazard (Ky.) egg	Chicago	1.65@ 1.85	1.65@ 1.85	1.65@ 1.85	1.65@ 1.85
Hazard (Ky.) slack	Chicago	.85@ 1.15	.85@ 1.15	.85@ 1.15	85@ 1.15
Hazard (Ky.) block	Louisville	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Hazard (Ky.) egg	Louisville	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Hazard (Ky.) nut	Louisville	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Hazard (Ky.) mine-run	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Hazard (Ky.) block	Cincinnati	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Hazard (Ky.) egg	Cincinnati	1.35@ 1.60	1.35@ 1.60	1.40@ 1.60	1.40@ 1.60
Hazard (Ky.) nut-and-slack	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Hazard (Ky.) mine-run	Cincinnati	1.15@ 1.35	1.15@ 1.35	1.15@ 1.40	1.15@ 1.35
Elkhorn (Ky.) block	Chicago	1.85@ 2.50	1.85@ 2.50	1.85@ 2.50	1.85@ 2.50
Elkhorn (Ky.) egg	Chicago	1.50@ 2.15	1.50@ 2.15	1.50@ 2.15	1.50@ 2.15
Elkhorn (Ky.) slack	Chicago	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65
Elkhorn (Ky.) block	Louisville	1.75@ 2.00	1.75@ 2.10	1.75@ 2.25	1.75@ 2.25
Elkhorn (Ky.) egg	Louisville	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Elkhorn (Ky.) nut-and-slack	Louisville	....	....	....	....
Elkhorn (Ky.) mine-run	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Elkhorn (Ky.) block	Cincinnati	1.75@ 2.75	1.75@ 2.75	1.75@ 2.75	1.75@ 2.75
Elkhorn (Ky.) egg	Cincinnati	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
Elkhorn (Ky.) nut-and-slack	Cincinnati	1.00@ 1.50	1.00@ 1.50	1.10@ 1.40	1.00@ 1.35
Elkhorn (Ky.) mine-run	Cincinnati	1.15@ 1.60	1.15@ 1.60	1.15@ 1.60	1.15@ 1.60
Kansas shaft lump	Kansas City	3.50	3.50	3.50	3.50
Kansas strip lump	Kansas City	2.50	2.50	2.50	2.50
Kansas mine-run	Kansas City	2.50	2.50	2.50	2.50
Kansas screenings	Kansas City	1.85	1.85	1.85	1.85

WORD from the FIELD

Coal and Heating Industries Complete Organization

WITH the object of serving the public more efficiently by promoting heating satisfaction with solid fuels, the committee of representatives of the coal and heating industries authorized at Chicago, May 8 (*Coal Age*, June, 1929, p. 392), completed its permanent organization at a meeting at the Union League Club, Chicago, June 17. Committee of Ten—Coal and Heating Industries, was chosen as the official name of the organization, which is composed of the following: National Coal Association—H. A. Glover, general manager of sales, Consolidation Coal Co., New York City; Anthracite Institute—Carlyle M. Terry, manager, Anthracite Coal Service, Chicago; American Wholesale Coal Association—L. H. Dayhoff, president, Republic Coal & Coke Co., Chicago; National Retail Coal Merchants' Association—Richard Miller, Miller & Baker, Chicago; National Warm Air Heating Association—E. B. Langenburg, president, Langenburg Mfg. Co., St. Louis, Mo.; Heating and Piping Contractors' National Association—H. M. Hart, L. H. Prentice Co., Chicago; Institute of Boiler and Radiator Manufacturers—Homer R. Linn, American Radiator Co., Chicago; National Sheet Metal Contractors' Association—Geo. Harms, secretary, F. Meyer & Bro. Co., Peoria, Ill.; Midwest Stoker Association— H. H. Kurtz, branch manager, Iron Fireman Mfg. Co., Chicago, and Accessories (Control and Service), Lorin W. Smith, Jr., Minneapolis Honeywell Regulator Co., Minneapolis, Minn. Mr. Glover, Mr. Langenburg, Mr. Harms, and Mr. Smith were elected chairman, vice-chairman, treasurer, and secretary, respectively, to serve for one year.

Activities of the committee, which is to meet four times a year, will be limited to the formulation of plans, recommendations, and suggestions to the industries represented by it, as well as the formulation of plans for furthering the objects of the committee. The committee agreed that the following policy should be submitted to the organizations it represents for their approval and action: "The entire policy of the committee and the co-operation of the ten industries shall be in the interest of better service and satisfaction to the public in the use of solid fuels; that the several industries advocate and plan co-operative service to the public by personal contact between their representative members in any locality"; that "each industry shall confine itself to the solving of its own problems and the marketing of its own goods without indulging in unfair criticism of the other allied industries," and that each industry shall "establish standards (if already not in existence) by which its product and practice may be judged."

Cash Discounts Opposed

Coal operators of the country apparently are unanimous in opposing cash discounts to dealers, the National Coal Association reports. In response to a suggestion by the association that members express their views on the question, numerous replies were received, all in complete unanimity on the subject.

Business Upturn Indicated

"The business tide has reached its ebb in the past two weeks," *The Business Week* of July 2 asserts, "and is beginning to turn, very slowly and tentatively, in face of a strong current of peevish, superficial, and premature pessimism. There will be no noticeable changes for a few weeks," but progress will be slow and irregular until the end of July. "The rise of the business curve thereafter will be rapid" and "by October it will be back to normal."

Eight solid facts pointing to the upturn are set forth in the July 9 issue. These are: rapidly expanding bank credit; increasing reserves of idle money; low stocks in the national larder; well sustained public purchasing power; prospects of an increase in farm income; well maintained imports of raw materials; a slight upturn in home building, and a favorable outlook for automobile production and sales.

Monitor to Open Mine

The Monitor Coal & Coke Co., Wilkinson, W. Va., has awarded a contract for the opening of a new mine on the outskirts of Logan, W. Va., to the Pete Minotti Construction Co., which has already started work on the project.

Standard Depreciation Rates Cause Protest

Protest against the promulgation of standard rates of depreciation of coal-mining equipment has been made to Robert H. Lucas, Commissioner of Internal Revenue, by the National Coal Association. The main argument presented in support of the association's stand was that coal mines are operated and coal-mine equipment is used under varying conditions, resulting in corresponding varying rates of depreciation, and that a standard rate would mean little in practice and would be likely to work hardship in individual cases.

Clarification of a recent memorandum issued by the general counsel of the Bureau of Internal Revenue also has been requested by the National Coal Association. Dealing with the method of treating advance royalty payments, the memorandum attempted to explain the method of charging payments made by companies operating under a lease providing for a minimum yearly payment, as well as a rate per ton, in years when the royalty based on the tonnage rate was less than the minimum payment required.

Frick Buys Coal Company

Properties of the Washington Coal & Coke Co., near Star Junction, Pa., have been sold to the H. C. Frick Coke Corporation for a price reported to be $3,000,000. Possession passed to the new owners June 14. Included in the deal are approximately 1,500 acres of unmined coal, 2,000 acres of surface, houses for 600 employees, and 800 coke ovens at the two mines of the company.

U.M.W. Votes Financial Support

The sum of $1,000 for the support of the Indiana Coal Trade Bureau, formed last year to promote the sale of Indiana coal, has been voted by District 11, United Mine Workers. Jonas Waffle, Terre Haute, Ind., manager of the association, appeared before the board and consulted with it as to the future of the bureau. Representatives of the operators will meet with Governor Harry Leslie to discuss their continued support and to what extent they will contribute.

Northern Operators Present Their Side In Lake Cargo Rate Case

CHARACTERIZED by the refusal of Northern producers to state just what their demands for a spread between the Pittsburgh district rate, now $1.46, and the rate from Southern districts, now $1.81, are, hearings on the Lake cargo coal case were begun in Washington, D. C., June 16, before Examiner C. M. Bardwell, of the Interstate Commerce Commission. Complainants in the case are the Ohio and the Western Pennsylvania Lake Cargo Coal Rate committees. The present case marks another phase in the struggle which began with the hearing of the Boileau complaint in 1911 and 1912.

A. B. McElvany, coal traffic manager for the western Pennsylvania operators, was the first witness to tell what he thought the differential between the districts should be. Charles E. Elmquist, representing Minnesota interveners and Northwestern consumers, backed the demand for this information made by J. V. Norman, of Southern counsel. August G. Gutheim, attorney for the Pennsylvania operators, objected to Mr. Norman's demand, because, he asserted, in an undue prejudice case, the task of removing it lay with the Commission.

W. E. Tytus, president, Sunday Creek Coal Co., presented foundation material for the Ohio complainants, who have a rate from the controlling district, Pittsburgh No. 8, 3c. under Pittsburgh, or 38c. under the Southern fields. Mr. Tytus asserted that Ohio is not getting a fair share of the Lake trade, but refused to admit, under cross-examination, that Ohio coal was inferior to Southern coal. He said, however, that labor troubles made it difficult for the Ohioans to do business as long as they operated under the Jacksonville pact and other arrangements with the union.

In answer to a question as to why the complainants could not keep pace with some of the competitors under a greater differential than existed in 1913, Mr. Tytus asserted that Southern mines could ship to many markets which Ohio could not reach. With other markets for their coal, Southern operators could use Lake ports as a dumping ground. H. L. Findley, vice-president, Youghiogheny & Ohio Coal Co., with mines in the Pittsburgh, Pittsburgh No. 8, and Kanawha fields, testified for the part of Ohio not covered by Mr. Tytus.

Studies showing the result of applying the principles used in making scales for other commodities to Lake cargo coal rates were presented by C. B. Ackerman, a rate analyst, of Chicago, who appeared in behalf of the Ohio complainants. He used scales prescribed by the Interstate Commerce Commission on grape juice, live poulty, fresh meats, cement, sand, gravel, and other commodities to show, among other things, to what extent the Commission had gone to scales in disposing of rate complaints. In addition, he showed the rates that would result from the application of the rates now in effect on Lake cargo coal to shipments between other points. Specific examples, resulting in a wide range of rates, were offered. More than 50 exhibits were put into the record.

J. D. A. Morrow, president, Pittsburgh Coal Co., testified that in 1929 his company produced between 13,000,000 and 14,000,000 tons of coal, considerably more than in any year prior to the mechanization of its mines and preparation plants. In the years of improvement of the mechanical equipment of the company, a corresponding improvement in labor conditions was shown, the scale being about one-third lower than the Jacksonville scale and 15 per cent less than five years ago. The Pittsburgh district was still at a disadvantage in comparison with the Southern districts, Mr. Morrow contended, because the rate structure did not reflect the geographic advantage of the district.

Mr. Morrow, in answer to cross-examination by M. Carter Hall, attorney for the Chesapeake & Ohio R.R., said that he did not know the prices at which Southern operators sold their coal, but that he once figured on a 400,000-ton order, but gave it up when he learned that the Southerners were offering coal at $1.40. His price, he said was $2.05, and the freight differential was 35c. Among the disadvantages of the Pittsburgh district, Mr. Morrow contended, were drawslate, high taxes, cost of coal lands, and living conditions in the district. As for the latter, the Pittsburgh Coal Co. must compete with captive mines and other industries paying higher wages, with the result that the company could have used 10 per cent more men last year than it could secure. In conclusion, he said he could not separate the disadvantages under which the Pittsburgh district labored, and for that reason insisted on including the freight rate.

The initial hearing was completed at Washington, June 19, with the cross-examination of Mr. Morrow by Mr. Elmquist. Mr. Morrow admitted that if the present differential of 35c. were increased, his company expected to market more coal. Southern operators will present their case at the continuation of the hearing at Chicago, Oct. 6.

Northwest Rates Lowered

A downward revision of rates on soft coal from mines in Illinois and Indiana to a number of destinations in southern Wisconsin has been ordered by the Interstate Commerce Commission, effective not later than Sept. 20. Rates to other destinations in Wisconsin and Minnesota and Wisconsin were found not unreasonable. Complainants, the Illinois Coal Traffic Bureau, alleged that the rates from Illinois mines, except those in the Belleville group, to all destinations in Wisconsin and Minnesota were unreasonable and, as compared to rates from ports on the west banks of Lake Superior and Lake Michigan, unduly prejudicial. The relationship between the rates, it was asserted, permitted the distribution of relatively too much coal from the docks. This allegation brought in a long list of interveners, the fight being essentially between the Illinois and Indiana operators on one side and the Lake dock distributors and their supporters on the other.

First-Aid Meets Held

With the beginning of the summer season, annual district and company first-aid meets claimed their share of attention throughout the coal fields of the country. On June 4, a team from Gray, Pa., won the annual first-aid contest of the Pennsylvania division, Consolidation Coal Co., held at Acosta, Pa., with a score of 97 per cent. The Acosta team finished second, with a mark of 96.125 per cent.

The first annual first-aid meet of the Pennsylvania Coal & Coke Corporation was held at Cresson, Pa., June 13, under the direction of J. J. Forbes, of the U. S. Bureau of Mines. Twenty teams competed, and 700 people attended the contest. Ehrenfeld No. 3 team won first place, with Sides No. 55 team second. Both teams will represent the company at the state meet, to be held at Ebensburg, Pa., July 5.

Scoring a total of 795 points out of a possible 800, the Toller mine team, Colorado champions in 1929, won the 20th annual first-aid meet of the Colorado Fuel & Iron Co., held at Walsen, Colo., June 14. Members of the winning team were: Dave Mathieson (captain), August Wiesenhorn, W. J. Kerr, James Montgomery, Joe P. Voss, and Matthew Gold.

Four thousand people were present on the 11th annual safety day of the New River Co., held at Scarbro, W. Va., June 15. First place was won by the MacDonald machine shop team with a perfect score of 200 points. Prizes were awarded by R. M. Lambie, chief of the West Virginia Department of Mines.

Mine No. 251, Coalwood, W. Va., carried off the honors for the second consecutive year at the annual Pocahontas division safety meet of the Consolidation Coal Co., held at Coalwood, June 20. Team No. 6, Mine No. 251, was awarded first prize in the white division, while first honors in the colored division were taken by Team No. 28, of the same mine, for the second consecutive year.

The team representing the Johnstown (Pa.) division of the Bethlehem Mines Corporation won first place in the 16th annual safety meet of the company, held at Bethlehem, Pa., June 21. Teams from the five divisions of the company competed.

Twenty-eight teams competed in the first-aid contests held on the occasion of the second annual safety day sponsored by the Operators' Association of the Williamson Field, held at Williamson, W. Va., June 21. First prize was won by Team No. 1 of the Portsmouth By-Product Coke Co., Edgarton, W. Va., comprising John Maynard (captain), William White, Robert Jones, Emmitt Dotson, Charles Parkes, Roy Foster, and Edward Thornburg (substitute). Second prize went to the outside team of the Howard Collieries, Chattaroy, W. Va., while third honors were carried off by Team No. 1 of the Vulcan Collieries Co., Vulcan, W. Va.

Over 5,000 people attended the annual sectional safety meet held at Beckley, W. Va., July 4, under the auspices of the West Virginia Department of Mines and the Fayette County Coal Mining Institute. Fifty-five teams, including seventeen colored teams, participated in the first-aid contest. Winners were as follows: white teams—Scarbro mine, New River Co., Scarbro, W. Va., 800 points; second, McAlpin Coal Co. team, MacAlpin, W. Va., 798 points; third, Smokeless Helen mine team, C. C. B. Smokeless Coal Co., Stotesbury, W. Va.; colored teams—first, Whipple mine team, New River Co., Whipple, W. Va.; second, Concho mine team, Rock Lick Smokeless Coal Co., Concho, W. Va.; third, Kay Moor mine team, New River & Pocahontas Consolidated Coal Co., Kay Moor, W. Va.

The first inter-plant safety demonstration of the Koppers Coal Co. was held at Montgomery, W. Va., June 28, with 28 teams from West Virginia, Pennsylvania, and Kentucky competing in the first-aid contests. First, second and third places, respectively, in the competition open to white adults, were taken by teams from Wharton and Keystone, W. Va., and Melcroft, Pa. In the negro adults contest, first place went to the Elkridge (W. Va.) team. Second and third prizes were won by teams from Powellton and Keystone, W. Va., respectively.

Anthracite Wage Parley Opens

Representatives of the anthracite operators and miners met at the offices of the Anthracite Institute, New York City, June 30, to begin negotiations for a new wage contract to replace the present agreement, which expires Aug. 31. Miners' representatives were pledged to negotiate on the basis of no reduction in wages; equal division of working time; protection of qualified seniority; abolition of the individual contract system; discontinuance of the system of replacing employees with monthly men in slack times; a convenient method for the collection of union dues; elimination of abuses, and improved working conditions.

On the operators' committee were W. W. Inglis, Scranton, Pa., president, Glen Alden Coal Co.; Richard F. Grant, New York City, president, Lehigh Valley Coal Corporation; A. J. Maloney, Philadelphia, Pa., president, Philadelphia & Reading Coal & Iron Co.; Michael Gallagher, New York City, president, Pittston Co.; E. H. Suender, Frackville, Pa., vice-president of the anthracite subsidiaries of Madeira, Hill & Co., and J. B. Warriner, Philadelphia, Pa., president, Lehigh Navigation Coal Co. Miners' representatives were: John L. Lewis, Phillip Murray and Thomas Kennedy, Indianapolis, Ind., president, vice-president and secretary-treasurer, respectively, United Mine Workers; John Boylan, Scranton, Pa., president, District 1; Michael Hartneady, Hazleton, Pa., president, District 7, and Martin Brennan, Shamokin, Pa., president, District 9.

Both operators and miners professed themselves to be anxious to avoid a repetition of the disastrous strike of 1926, and entered into negotiations on that basis. Preliminary discussion was confined to general economic questions pertaining to the anthracite industry.

Closely antedating the wage conference, the general grievance committee of the Pittston Co. called a strike at all collieries of the company on June 23 as a protest against unequal working time. Part of the company's 14,000 miners went out, though quite a number remained at work. The strike, which was in violation of the working agreement, was ended when the grievance committee rescinded its order after a meeting June 30. A strike of 1,400 miners at the Reliance and Alaska collieries of the Philadelphia & Reading Coal & Iron Co. was ended when the Stone & Webster Engineering Co., engaged in the construction of the company's central breakers, agreed to allow its workers to go under control of the miners' union.

Following the action of the Consolidation Coal Co. in reducing wages in the Fairmont field, Van A. Bittner, Fairmont, W. Va., chief representative of the United Mine Workers, issued a statement on June 23 declaring that the miners of northern West Virginia, through the international union, had decided on a policy of resisting further wage cuts. In addition, he announced that the program included bringing all wages up to the highest standard being paid in the field. Early in July, the United Mine Workers and the National Miners' Union clashed over the responsibility for a strike called at the Brock mine of the Continental Coal Co., in the Scotts Run region, near Cassville, W. Va., which was followed by a strike at the Sands mine, Rivesville, Marion County, W. Va. The walkout followed a wage reduction of 5 to 10 per cent. Under the new scale, loaders were cut 4c. a ton to 30c. and cutters were reduced from 5c. to 4c. a ton.

Permissible Plate Issued

One approval of permissible equipment was issued by the U. S. Bureau of Mines in May, as follows:

Sullivan Machinery Co., Type CR-3 shortwall mining machine; 30-hp. motor, 220-440 volts, a.c.; Approvals 191 and 191A; May 21.

In the Pittsburgh region, several of the smaller commercial companies promulgated wage cuts last month. The outstanding example was that of a fairly large operation near McKeesport, Pa., which reduced its scale 10 per cent. Competitive pressure and low prices were assigned as the reasons. Work was being resumed at some of the western Kentucky mines, where strikes have been in progress since last Spring, at the end of last month. The Diamond Coal Co., and the Duvin Coal Co., Providence, Ky., and the Space Coal Co., Madisonville, Ky., resumed operation after long shutdowns.

Nova Scotia Engineers Meet

Profitable operation of coal mines was the keynote of the 38th annual meeting of the Mining Society of Nova Scotia, held at Antigonish, N. S., June 20 and 21. The upkeep of machinery and the mechanical preparation of coal took up the major part of the discussion.

At the annual election, the following officers were chosen for the coming year: president, T. L. McCall, Sydney Mines, N. S., chief mining engineer, British Empire Steel Corporation; first vice-president, M. Dwyer, Sydney Mines, managing director, Indian Cove Coal Co.; second vice-president, J. C. Nicholson, Sydney Mines, general superintendent of coal mines, British Empire Steel Corporation, and secretary-treasurer, S. C. Mifflen, Glace Bay, N. S., office engineer, Dominion Coal Co.

The principal feature of the meeting was the discussion provoked by a trilogy of papers on "The Selection, Purchase, and Maintenance of Mechanical Equipment for Mines," presented, respectively, by K. H. Marsh, chief engineer; D. S. Hines, general purchasing agent, and W. L. Stuewe, mechanical superintendent, all of the British Empire Steel Corporation, Sydney Mines, N. S.

Keeping abreast of mechanization without resort to unconventional types, choice of equipment adaptable to changing conditions, and simplicity and sturdiness were given as the cardinal principles in the selection of equipment. Clear specifications as to duty required and, if possible, time to get favorable terms and delivery were pointed out as primary aids to proper purchasing. In maintenance, it was asserted, the keynote is cleanliness and proper lubrication.

Selection and care of pit horses was discussed by Dr. D. McIsaac, Glace Bay, veterinary surgeon, Dominion Coal Co. A. McEachern, Glace Bay, chief inspector, Dominion company, presented a collection of late information of interest to safety and ventilating engineers in his paper on "Air and Mine Gases." A résumé of present practice in the preparation of coal in Nova Scotia was given by W. L. Hunter, Glace Bay, chief mechanical engineer, Dominion Coal Co. Mr. Hunter went into the future possibilities of dry cleaning in the province.

Union Pacific Old Timers Celebrate At Sixth Annual Meeting

HERALDED by brass bands and skirling pipes, members of the Union Pacific Coal Co. Old Timers' Association, on June 14, marched gaily through the streets of Rock Springs, Wyo., as the climax to the sixth annual celebration of the organization. On the preceding day, employees of the coal company took part in the annual first-aid field day, devoted to the interests of safety in the mine and in the home.

Winners in the competition on June 13 were: men's teams—first, Tono (Wash.) team of the Washington Union Coal Co.; second, and third, respectively, Rock Springs (Wyo.) No. 8 team and Superior (Wyo.) No. 1 team; senior girls' teams—first, second, and third, respectively, Winton, Hanna, and Reliance, Wyo.; junior girls' teams—first, second, and third, respectively, Hanna, Superior, and Winton, Wyo.; boys' teams—first, second, and third, respectively, Hanna, Rock Springs, and Winton, Wyo. In the evening, a banquet was given for the boys' and girls' teams, which was attended by the Tono team and officials of the company. Awards were made to the winners by Eugene McAuliffe, president of the Union Pacific Coal Co.

At the annual business meeting, Chris Johnson, 45 years with the company, was elected president of the Old Timers.

At the banquet, presided over by Dr. Oliver Chambers, Rock Springs, an Old Timer himself, talks were made by the Rev. McMurdo Brown, Salt Lake City, Utah, and Mr. McAuliffe. Reviewing the growth of the association, Mr. McAuliffe said that "The public press carries much comment on the problems confronting men over 40, men over 50 and, may I say, workingmen in general. There is at present a definitely bad situation as regards lack of employment and the inability to even obtain recognition when past middle age in many industries, not only in the United States but in many other countries.

"When business is stagnant, as it is at present," Mr. McAuliffe added, "with employers of good reputation compelled to close down or reduce forces, much hardship is experienced by middle-aged men, not so much because they are middle-aged but because of the fact that the years have brought them families, responsibilities, and obligations which the younger man has not, as yet, assumed." The expense of tearing a household up by the roots when employment fails sometimes reaches appalling proportions, and "the management of our properties has tried to keep just these conditions in mind. At times we have wondered whether we were not giving more thought and worry to keeping our people in employment than were the men themselves." But here the Old Timers have been of inestimable help by their loyalty to the company. Through their years of experience, they can do much toward "influencing the young men to give thought to the things that make for safety of life and limb, security of employment, and better citizenship."

Axel Johnson, the only candidate this year, was presented with a 40-year pin by Mr. McAuliffe.

World Power Conference Meets

Economic in character, the sessions of the Second World Power Conference, held in Berlin, Germany, June 16-26, took as a central theme the problems arising from the distribution and utilization of power. On this and closely related subjects, over 400 papers were contributed by engineers and economists of 47 nations. At a meeting of the International Executive Council, held on June 12, O. C. Merrill, Washington, D. C., chairman of the American committee, formally invited the conference to hold its third plenary meeting in the United States in 1936. The invitation was accepted.

Five men identified with the American coal industry contributed papers to the conference and joined in the discussions, and several other Americans in affiliated industries gave the benefit of their thought and experience to the assembled delegates. In the session on the "Costs and Comparative Efficiency of Different Types of Energy From the Consumers' Point of View," Howard N. Eavenson, Pittsburgh, Pa., and Graham E. Bright discussed "Compressed Air vs. Electricity in the Coal Mines of America."

In the session on the "Production, Preparation, and Commerce of Solid Fuels," Scott Turner, Washington, D. C., Director, U. S. Bureau of Mines, Washington, D. C., read a paper on "Mining Bituminous Coal by Stripping Methods." "Statistical Studies of Progress in Fuel Efficiency" was contributed by F. G. Tryon, U. S. Bureau of Mines, Washington, D. C.

Percentage Depletion Question Comes to the Front

Following the organization of a group of non-ferrous metal mine owners in the West to urge upon Congress the desirability of establishing for the mining industry a depletion rate based upon percentage of income of 33 per cent, rather than upon the prevailing method of an allowance of a fixed amount per ton of mineral produced, Representative Hawley (Ore.), chairman of the Joint Committee on Internal Revenue Taxation, made announcement early this month of hearings to be held next December on mine depletion. He said that the committee had instructed its staff to make a study of the question of depletion in mines and that it also had requested the Treasury Department to furnish whatever information it had on the subject.

The question was discussed at a meeting of members of the National Coal Association with F. A. Fontyn, chairman of the cost accounting section of the Market Research Institute of the association, held in Philadelphia, Pa., early in July. A meeting of this committee is scheduled for early Fall, at which time recommendations to the government relations committee of the association will be made. The interim will be spent in formulating plans, to be based on the opinion of the industry at large.

Oil and Gas Combated

Operation of Heat Service, Inc., Kansas City, Mo., organized to engage in the sale and distribution of fuel and fuel-burning equipment and the furnishing of a complete heating and engineering service, has proved to be an effective weapon in combating the inroads of gas and oil. Aside from the sale of stokers and other appliances, Heat Service is engaged in supplying a complete heating service to apartments and other buildings, wherein mechanical stokers are installed, all coal is furnished, ashes are removed, and firing supervision is given at a cost generally no more than the fuel cost when burning hand-fired, sized coal or oil or gas.

Tono Team, Winners of First Place in the Men's First-Aid Contest. Wm. Hann, General Manager, Washington Union Coal Co., Stands in the Center

Purchasing Agents Discuss Coal Buying

Approval of the appointment of a joint committee made up of representatives of the National Association of Purchasing Agents and the National Coal Association to draw up a code of fair practices that would apply to relationships between buyer and seller was one of the features of the coal session held during the fifteenth annual convention of the purchasing agents' association at Chicago, June 16-19. This action resulted from a suggestion by C. B. Huntress, executive secretary, National Coal Association, and tentative plans call for a meeting of the committee at the annual convention of the National Coal Association at Detroit, Mich., Oct. 15-17.

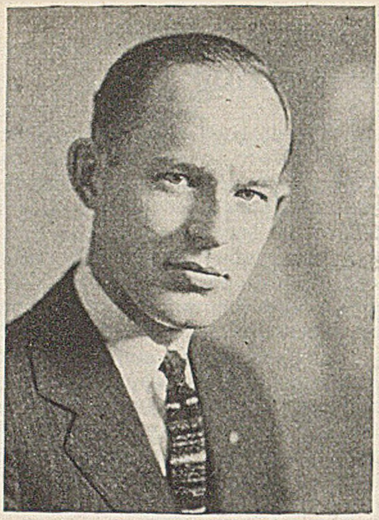
In addition to Mr. Huntress' remarks, H. J. Rose, assistant director of research, Koppers Co., Pittsburgh, Pa., spoke on "Coal Selection and Classification," and a paper by E. G. Bailey, president, Fuller Lehigh Co., New York City, on "The Purchase of Coal for Pulverizing and Burning," was read in Mr. Bailey's absence by Dr. D. S. Jacobus, advisory engineer, Babcock & Wilcox Co., New York City. T. W. Harris, Jr., division purchasing agent, E. I. duPont de Nemours & Co., Inc., Wilmington, Del., presided.

In his annual report as chairman of the fuel committee of the purchasing agents' association, Mr. Harris recommended that the past policy of co-operation with the National Coal Association be continued "toward the further advancement of the coal industry and assistance to buyers of coal" and expressed the hope that "litigation and misunderstanding would be minimized in the purchase of coal through the use of the standard coal contract" adopted last year by the two organizations.

Russian Coal Embargo Asked

A redrafted bill, drawn up after a conference with Treasury officials, was offered in the House Committee on Ways and Means, June 17, by Representative Brumm, Minersville, Pa., to ban importations of Soviet anthracite. The new proposal provides that after its passage "anthracite coal mined, produced, or manufactured, wholly or in part, by convict labor, by conscripted labor, or indentured labor under penal sanctions, or by any other form of labor which is exacted from any person under the menace of a penalty for its nonperformance and for which the person does not offer himself voluntarily, shall not be entitled to entry."

The committee, after consideration of Representative Brumm's proposal, decided to take no action on the matter, for the reason that it would be unwise to report to the House any amendments to the new tariff law, which went into effect June 17. It is expected that the ban will be taken up at the next session of Congress, in December. As a basis for possible future action, the committee has requested the departments of State, Commerce, Treasury, and Labor, as well as the Tariff Commission, to investigate and report on Soviet imports.



Milton E. Robinson, Jr.

Genial president of the National Retail Coal Merchants' Association, was elected to his third term with that organization at the conclusion of the annual convention, held at Asbury Park, N. J., June 5-7.

Coal Men Appointed

Four coal men have been appointed by the Chamber of Commerce of the United States to a committee to deal with problems arising in the field of natural resources production, as follows: Col. W. M. Wiley, Sharples, W. Va., vice-president, Boone County Coal Corporation; Geo. J. Anderson, New York City, president, Consolidation Coal Co.; Wm. V. Hodges, Denver, Colo., a director of the Colorado Fuel & Iron Co., and W. M. Ritter, Columbus, Ohio, chairman of the board, Red Jacket Consolidated Coal & Coke Co. Colonel Wiley, who is a member of the committee on civic improvement, also was elected vice-president, with jurisdiction over the Southeastern Section of the United States, on June 27.

Working Forces Curtailed

Reorganization of the operating personnel of the Wise Coal & Coke Co., Dorchester, Va., on July 1, resulted in a reduction of 60 per cent in the working force. Six days of work a week will be provided for the remaining men. Loss of railroad fuel contracts, which in the past have absorbed about 50 per cent of the production, was given as the reason for the move.

Beginning July 1, the Wilder (Va.) operation of the Clinchfield Coal Corporation was closed down for an indefinite period, depending upon an advance in coal prices. A thousand men were temporarily thrown out of jobs, though some of the older employees were transferred to other mines of the company. Remaining workers and their families will be allowed to stay in the company houses until Sept. 1 without paying rent, light, or coal bills.

Cambria Exposition Attracts Coal-Mining Men

Coal mining men and industrialists in central Pennsylvania bent their footsteps toward Ebensburg, Pa., June 30-July 5, where the annual Cambria County Fair and Exposition held sway. Features of the meet were an exhibition of mining machinery and the annual Pennsylvania state first-aid meet. The Central Pennsylvania Coal Producers' Association seized the opportunity for holding its summer meeting on July 5, during the course of the exposition, and members fought out the question of golf supremacy among themselves.

Among the exhibitors of coal-mining equipment were: Paul R. Hay Co., Irwin Foundry & Mine Car Co., Timken Roller Bearing Co., Colonial Supply Co., Leetonia Tool Co., Gellatly & Co., Ohio Brass Co., Harbison-Walker Refractories Co., Hercules Powder Co., Westinghouse Electric & Mfg. Co., Flood City Brass & Electric Co., Lorain Steel Co., Penn Machine Co., Brown-Fayro Co., Bethlehem Steel Co., General Electric Co., and Koppers-Rhéolaveur Co.

Forty teams competed in the annual first-aid meet held July 5, under the auspices of the Pennsylvania Department of Mines. First place was won by a team of the Pittsburgh Coal Co., Pittsburgh. Second honors were carried off by a team of the Bethlehem Mines Corporation, Johnstown. Third in the competition was the Springdale team of the Allegheny Pittsburgh Coal Co.

Senate Receives Adverse Report On Anti-Injunction Bill

The Shipstead anti-injunction bill has been adversely reported out of the Senate Judiciary Committee. In the majority report of the committee it was argued that the bill attempts to operate in a field that belongs to the states, and that certain provisions in the bill are unconstitutional. The majority also opposed it on the ground of its possible effect on the anti-trust laws, the Clayton Act, and contempt of court rules. Minority members of the committee, in their report, poi ted out that both parties had pledged themselves to remedy the present defects in the procedure in granting injunctions in labor controversies, and called attention to the opportunities existing for large employees to dictate conditions of employment.

Virginia Operators Elect

R. S. Graham, Dorchester, Va., vice-president, Wise Coal & Coke Co., was elected president of the Virginia Coal Operators' Association at the June meeting, to serve during the coming year. Other officers chosen at the meeting were: vice-president, J. L. Osler, Blackwood, Va., vice-president, Blackwood Coal & Coke Co., and secretary, C. B. Neel, Norton, Va. (re-elected).

Personal Notes

Dr. Homer J. Lowry, at present research chemist with the Bell Telephone Laboratories, will be head of the newly formed coal research laboratory of the Carnegie Institute of Technology, Pittsburgh, Pa.

John L. Collins, formerly assistant manager of sales of the M. A. Hanna Co., Cleveland, Ohio, has been appointed vice-president and sales manager of the Anchor Coal Co., Cleveland.

Floyd B. Hobart, chemical engineer in plant experimental and standardization work for the Atlantic Refining Co., has been made fuel chemist of the fuel research group of the Battelle Memorial Institute, Columbus, Ohio.

Harry M. Johnstone, Carbon Hill, Ala., formerly superintendent for the Galloway Coal Co., has been appointed associate mine inspector for Alabama.

Scott Turner, Washington, D. C., Director, U. S. Bureau of Mines, received on June 23 the honorary degree of Doctor of Engineering from his Alma Mater, the University of Michigan. A few days before, Mr. Turner, received the honorary degree of Doctor of Science from the Colorado School of Mines.

Charles F. Grumm, mining engineer, Susquehanna Collieries Co., Wilkes-Barre, Pa., has been made assistant superintendent of the William Penn colliery, with headquarters at Shaft, Pa.

Joseph B. McGinnis, formerly superintendent for the Cosgrove-Meehan Coal Co., Marion, Ill., has been appointed superintendent of the Locust Gap colliery of the Philadelphia & Reading Coal & Iron Co., and will make his home in Mt. Carmel, Pa. Mr. McGinnis was originally in the employ of the Lehigh Valley Coal Co., and saw service also in western Pennsylvania and Kentucky.

R. E. Barr, formerly sales manager of the Knox Consolidated Coal Co., of Indiana, has been made manager of the Chicago district sales office of the Consolidation Coal Co.

W. L. Doolittle, for several years assistant construction engineer of the Consolidation Coal Co., Fairmont, W. Va., has been made construction engineer, vice E. E. Landahl, resigned. Mr. Doolittle has been in the employ of the Consolidation company 27 years.

Obituary

Edward E. Jones, 48, superintendent, Lion Coal Co., Wattis, Utah, died at the Price Hospital, Salt Lake City, Utah, June 20, from injuries received from a fall of rock. Mr. Jones had been in his last position for about a year, and prior to that time was engaged by a number of operating companies in Utah.

Walter Moore, Birmingham, Ala., president of the Pratt Fuel Co., died June 25 at Johns Hopkins Hospital, Baltimore, Md., following an operation. In addition to his coal-mining affiliations, Mr. Moore was active in politics in his native state, and served as a national Democratic committeeman for six years.

Coming Meetings

Thirteenth Annual Conference on Human Relations in Industry at Silver Bay on Lake George, N. Y., Aug. 27-31.

Coal Division of the American Institute of Mining and Metallurgical Engineers, Sept. 11-13, at the William Penn Hotel, Pittsburgh, Pa

International First-Aid and Mine Rescue Contest, Sept. 16-18 at Jefferson County Armory, Louisville, Ky.

National Safety Council; annual Safety Congress, Sept. 29 to Oct. 4, inclusive, at Pittsburgh, Pa.

National Coal Association; annual meeting, Oct. 15-17, at Book-Cadillac Hotel, Detroit, Mich.

Southern Appalachian Coal Operators' Association; annual meeting, Nov. 20, Knoxville, Tenn.

Trade Body Allows Industries To Approve Code Changes

Opportunity for industries to pass on changes made in trade-practice rules is afforded by a resolution adopted by the Federal Trade Commission, providing that: "After the Commission has passed upon the rules submitted by any trade-practice conference of any industry, the industry be notified of the action of the Commission and be given 30 days within which to file in writing any objection to changes or rejections by the Commission; and that the Commission in the meantime give no publicity to its action on the industries' rules."

The action of the Commission carries out the idea embodied in a resolution adopted at a conference of representatives of industries which had had trade-practice conferences with the Commission, and assures the industries an opportunity of being heard before any public announcement is made as to changes made in the codes submitted.

Wyoming Operators Elect

At the annual meeting of the Southern Wyoming Coal Operators' Association, held at Rock Springs, Wyo., June 10, P. J. Quealy, Kemmerer, Wyo., president, Kemmerer Coal Co., was elected president for the coming year. Other officers chosen were: vice-president, L. T. Dee, Ogden, Utah, president, Ideal Coal Co., and executive secretary, L. W. Mitchell, Rock Springs, Wyo.

Eastbound Rate Hearing Set

The Interstate Commerce Commission has announced that complainant's testimony in Docket 23430, the Central Pennsylvania Coal Producers' Association eastbound rate case (*Coal Age*, June, 1930, p. 397) will be heard at Washington, D. C., Sept. 8, before examiner C. H. Peck. Defendants in the case will present their side on Nov. 3.

King Coal's Calendar for June

June 1—Work is resumed at collieries in northern New South Wales, Australia, after settlement of a strike called as a protest against wage cuts in October of last year.

June 4—Labor Government victorious in rejecting changes made in the British Coal Mines Bill by the House of Lords. Provisions for a district levy to stimulate export trade and for a statutory commission to compel amalgamations were restored to the bill by the Laborites.

June 16—Hearing of the complaints of the Ohio and western Pennsylvania Lake cargo coal rate committees begins in Washington, D. C., before Examiner C. M. Bardwell, of the Interstate Commerce Commission. Northern operators presented their side of the case, and the hearing was adjourned June 20, to be resumed in Chicago, Oct. 6, when Southern operators will be heard.

June 17—Joint committee of representatives of the coal and heating industries completes permanent organization at a meeting in Chicago. Committee of Ten—Coal and Heating Industries was chosen as the name of the organization, whose object is to serve the public more efficiently by promoting heating satisfaction. H. A. Glover, general manager of sales, Consolidation Coal Co., New York City, was elected the first chairman.

June 18—Mine explosion in the Artemovsk district, U.S.S.R., kills 35 miners and injures 29 others, nine seriously.

June 21—People of the mining village of Cumberland, Wyo., and officials of the Union Pacific Coal Co. celebrate the closing of mines after 30 years of operation. Employees will be transferred to other mines in the Rock Springs (Wyo.) field.

June 24—Western States Heating Federation, with headquarters in Salt Lake City, Utah, formed by Utah coal interests to further the use of coal in the Western States.

June 26—Hearing held at New York City before the Coal & Coke Committee, Trunk Line Territory; Coal, Coke & Iron Committee, Central Freight Association Territory, and the New England Freight Association, to consider a proposal that only one change in destination may be made under the reconsignment and diversion rules.

June 28—Proposal for a 7¾-hr. day in European coal mines fails to pass the third reading at the convention for limiting hours of work, held at the International Labor Office of the League of Nations, Geneva, Switzerland. German delegates objected to an overtime clause in the proposed agreement, and gained enough support from other countries to kill the measure.

June 30—Representatives of the anthracite miners and operators meet at the offices of the Anthracite Institute, New York City, to begin negotiations for a new wage contract to replace the one expiring Aug. 31 of this year.

Industrial Coal Reserves Rise To 27 Days' Supply

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on June 1 were 29,824,000 net tons, according to the monthly report of the National Association of Purchasing Agents, Inc. This figure is equivalent to 27 days' supply, based on the May consumption of 34,685,000 tons. Although stocks are 1,458,000 tons lower than on the same date a year ago, the number of days' supply on hand is one day higher, due to the fact that the consumption of coal in industries is 7 per cent lower than a year ago. The association reports that it expects production during the summer months to continue about the same as the May figure of approximately 36,000,000 tons.

Days' Supply of Bituminous Coal in Various U. S. Industries

Byproduct coke.....	21	Railroads..........	20
Electric utilities.....	49	Steel mills.........	33
Coal-gas plants......	43	Other industries....	27
Average total bituminous stocks throughout the United States......			26

Estimates of Output, Consumption and Stocks, in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
May, 1929......	46,480,000	37,298,000	33,468,000
June...........	42,969,000	34,485,000	31,282,000
July...........	45,635,000	35,040,000	31,415,000
August.........	49,843,000	34,886,000	32,712,000
September......	51,307,000	35,960,000	34,289,000
October........	59,567,000	39,482,000	36,107,000
November......	51,719,000	38,747,000	37,313,000
December......	53,858,000	38,581,000	37,512,000
January, 1930...	56,816,000	38,512,000	39,007,000
February.......	45,712,000	35,195,000	37,078,000
March.........	40,324,000	37,083,000	36,554,000
April..........	40,776,000	36,230,000	31,535,000
May...........	41,901,000	34,685,000	30,700,000
June 1.........	....	....	29,824,000

Western Heating Federation Formed in Utah

Organization of the Western States Heating Federation, a non-profit corporation with headquarters in Salt Lake City, Utah, has been completed by Utah coal interests in an effort to further the use of coal in the Western states. Membership in the organization is to consist of "persons, firms, or corporations engaged in the production and/or distribution of coal, coal-burning equipment, appliances, or accessories, or engaged in the designing of heating plants or plans or the designing and/or installation of coal-burning equipment, appliances, or accessories."

Objects and purposes of the federation are as follows: "to instill in its members an intimate and intelligent appreciation of the problems incident to the production of coal and the manufacture of coal-burning equipment and appliances, and the sale and distribution to the public of coal and coal-burning equipment and appliances; to be informed of the public's heating needs and to devise methods for the full and efficient satisfaction of that demand; to encourage the offering for public purchase of coal and coal-burning equipment and appliances of proper standards for efficient service; to discourage misrepresentation and exert every effort to protect the public against misrepresentation; by studied publicity to awaken in the public a more nearly accurate conception of the multitude of uses coal may be made to serve in the home and in business and industry at the lowest cost commensurate with sound business principles, and generally, by co-operative effort, educational and otherwise, to assist its members to a realization of their individual duty to the public, and to direct ways and means for the performance thereof."

Earnings and Employment Decrease in April

Employment in coal mining—anthracite and bituminous coal combined—decreased 2.6 per cent in April as compared with March, and payroll totals decreased 5.1 per cent, according to the monthly *Labor Review* of the U. S. Department of Labor. The 1,489 mines reporting had in April 300,075 employees whose earnings in one week were $7,070,817. In anthracite mining in April there was an increase of 1.8 per cent in employment, as compared to March, and a decrease of 4.5 per cent in payroll totals. Employment in April, 1930, was 16.5 per cent lower than in April, 1929, and payroll totals were 15.1 per cent smaller.

Employment in bituminous mining decreased 4.3 per cent in April, as compared to March, and payroll totals were 5.4 per cent lower, according to reports from 1,336 mines, in which there were in April 213,258 employees, whose combined earnings in one week were $4,658,778. Employment in April, 1930, was 5.8 per cent lower than in April, 1929, and payroll totals were 8.4 per cent smaller.

Anthracite Shipments Increase

Anthracite shipments in May, 1930, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., were 4,750,368 gross tons, an increase of 1,087,721 tons over the preceding month but a decrease of 66,966 tons from the total for May, 1929. Shipments by originating carriers for the month of May, 1930, as compared with the preceding month of April, and with May, 1929, were as follows:

	May, 1930	April, 1930	May, 1929
Reading.............	948,406	800,244	796,622
Lehigh Valley........	824,997	534,960	784,753
Central R.R. of N. J...	452,568	339,543	395,235
Del., Lack. & Western	718,898	586,827	901,538
Delaware & Hudson..	656,786	532,444	668,819
Pennsylvania........	446,334	355,014	420,374
Erie................	400,809	293,197	497,782
N. Y., Ontario & West.	80,942	73,425	89,207
Lehigh & New England	220,628	146,993	263,004
	4,750,368	3,662,647	4,817,334

British Merger Proposed

A merger of the Wigan Coal & Iron Co., Pearson & Knowles Coal & Iron Co., Moss Hall Coal Co., Rylands Brothers, Wigan Junction Colliery, and the Partington Steel & Iron Co., to be capitalized at $36,000,000, has been proposed in Great Britain. The objects of the merger are to facilitate the raising of additional capital and to eliminate duplication in production and selling costs. Under the terms of the proposal a holding company, to be known as the Wigan Coal Corporation, Ltd., will handle the coal business of the companies, and another holding company, the Lancashire Steel Corporation, Ltd., will take over their iron and steel affairs. Coal resources of the companies are estimated at 350,000,000 long tons, and of the sixteen collieries operated by them, fifteen are in Lancashire and one is in Nottinghamshire.

Employment and Payrolls in Identical Bituminous Coal Mines In March and April, 1930

		Number on Payroll			Payroll in One Week		
	Mines	March, 1930	April, 1930	Per Cent Change	March, 1930	April, 1930	Per Cent Change
Middle Atlantic...........	400	66,027	65,397	—1.0	$1,522,767	$1,500,653	—1.5
East North Central........	176	33,646	30,131	—10.4	773,043	618,825	—19.9
West North Central........	62	6,005	5,489	—8.6	122,473	113,105	—7.6
South Atlantic............	326	53,195	51,840	—2.5	1,132,486	1,147,187	+1.3
East South Central........	214	44,653	42,626	—4.5	849,794	841,224	—1.0
West South Central........	34	2,378	2,039	—14.3	55,630	44,276	—20.4
Mountain................	115	15,656	14,441	—7.8	432,753	356,296	—17.7
Pacific..................	9	1,377	1,295	—6.0	37,153	37,212	+0.1
All divisions............	1,366	222,937	213,258	—4.3	$4,926,103	$4,658,778	—5.4

Per Cent Change in Each Line of Employment, March and April, 1930

		Employment			Payroll in One Week		
	Establishments	March, 1930	April, 1930	Per Cent Change	March, 1930	April, 1930	Per Cent Change
Manufacturing............	13,449	3,307,664	3,287,293	—0.8[1]	$88,882,863	$88,301,626	—1.1[1]
Coal mining.............	1,489	308,237	300,075	—2.6	7,452,833	7,070,817	—5.1
Anthracite.............	153	85,300	86,817	+1.8	2,526,730	2,412,039	—4.5
Bituminous.............	1,336	222,937	213,258	—4.3	4,926,103	4,658,778	—5.4
Metalliferous mining.......	348	58,205	57,148	—1.8	1,749,794	1,701,855	—2.7
Quarrying and non-metallic mining..............	749	36,356	38,293	+5.3	926,094	989,236	+6.8
Crude petroleum production	124	8,403	8,170	—2.8	301,102	285,449	—5.2
Public utilities...........	10,047	712,672	714,832	+0.3	21,753,002	21,666,154	—0.4
Trade..................	8,875	303,373	311,685	+2.7	7,830,839	7,911,457	+1.0
Wholesale..............	2,068	66,471	66,176	—0.4	2,124,308	2,085,773	—1.8
Retail.................	6,807	236,902	245,509	+3.6	5,706,001	5,835,684	+2.1
Hotels..................	1,909	159,953	156,498	—2.2	2,790,925[2]	2,682,144[2]	—3.9
Canning and preserving.....	463	21,121	31,804	+50.6	383,926	549,161	+43.0
Total.................	37,453	4,915,984	4,905,798	—0.2	$132,071,448	$131,157,899	—0.7

[1]Weighted per cent of change for the 54 manufacturing industries; the remaining per cents of change, including total, are unweighted. [2] Cash payments only.

Fatality Rate From Coal-Mine Accidents Recedes Further in May

Accidents in coal mines in the United States in May, 1930, caused the death of 138 men, according to information received from state mine inspectors by the U. S. Bureau of Mines. Of this number, 107 deaths occurred in bituminous mines in various states and the remaining 31 were in the anthracite mines of Pennsylvania. The death rate per million tons of coal produced during the month was 3.29, based on an output of 41,901,000 tons of coal; that for bituminous mines alone was 2.98, with a production of 35,954,000 tons; and for anthracite mines a death rate of 5.21 was shown, based on a production of 5,947,000 tons.

The number of deaths and the death rates per million tons produced in May indicated a better record than that for the preceding month of April. As compared with May, 1929, the record for May of the present year showed practically no change in the death rates, because, though the number of fatalities was reduced, the production of coal also fell off in the same proportion, with the result that the death rates were about the same as in May last year. The rates for May, 1929, were 2.97 for bituminous mines, based on 121 fatalities and 40,706,000 tons of coal; 5.23 for anthracite, based on 33 deaths and 6,308,000 tons; and 3.28 for the entire industry, with 154 deaths and 47,014,000 tons.

Reports for the first five months of 1930 show a total of 857 deaths from accidents in coal mines, as compared with 853 for the same period of 1929. The production of coal from January to May, 1930, was 225,529,000 tons, resulting in a death rate of 3.80 per million tons of coal mined; that for the same months in 1929 was 249,796,000 tons, with a death rate of 3.41. The death rate for bituminous mines alone for the 1930 period was 3.42, based on 674 deaths and 196,920,000 tons, and that for anthracite was 6.40, with 183 fatalities and 28,609,000 tons. For the same period in 1929 the rate for bituminous mines was 3.06, with a production of 217,996,000 tons and 668 deaths; for anthracite mines it was 5.82, with a production of 31,800,000 tons and 185 deaths.

There were no major disasters during May—that is, there was no disaster in which five or more lives were lost—but there were seven major disasters during the preceding months of 1930 which caused the death of 88 men. From January to May, 1929, there were three major disasters which caused 70 deaths. Based exclusively on these disasters the death rates per million tons were 0.390 for the present year and 0.280 for the corresponding months of 1929.

Comparing the accident record for the period January to May, 1930, with the same months of 1929, a reduction is noted in the fatality rate for haulage, but increased rates are shown for the other principal causes of accidents. The comparative rates for the five-month period are as follows:

Cause	Year 1929	Jan.-May, 1929	Jan.-May, 1930
All causes	3.581	3.415	3.800
Falls of roof and coal	1.934	1.778	1.977
Haulage	.675	.705	.643
Gas or dust explosions:			
Local explosions	.082	.072	.151
Major explosions	.238	276	.377
Explosives	.145	.124	.138
Electricity	.133	.112	.146
Miscellaneous	.374	.348	.368

Tax Decision Is Favorable To the Coal Industry

Locomotives, mining machines, mine cars, monitors, and steel rails purchased and installed in a fully developed mine in order to maintain production are allowed to be expensed in reporting income for federal taxation in a decision rendered by the U. S. Circuit Court of Appeals, Fourth District, in the Marsh Fork Coal Co. case. Decision of the Board of Tax Appeals which, following its earlier decision in the Union Colliery Co. case, has disallowed all these costs as expenses, holding that the purchase of such equipment is a capital expenditure, was reversed. It is expected that the Marsh Fork decision will be of greater importance than the favorable action in the Roden Coal Co. case, because of the class of items involved.

Coal Mine Fatalities During May, 1930, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned, suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1930	1929
Alabama	2						1					3													3	16
Alaska																									0	0
Arkansas																									0	1
Colorado			2				1					3													3	2
Illinois	8		2									10			1		1								11	6
Indiana																									0	1
Iowa	1											1													1	1
Kansas																									0	1
Kentucky	8		2				2					12											2	2	14	13
Maryland	1											1													1	1
Michigan																									0	0
Missouri	1											1													1	0
Montana																									0	2
New Mexico							1					1													1	0
North Dakota						1						1											1	1	2	0
Ohio	3		4		1							8													8	6
Oklahoma	1											1													1	0
Pennsylvania (bituminous)	14	4	9	3	1							31													31	30
South Dakota																									0	0
Tennessee	3											3													3	2
Texas																									0	0
Utah																									0	2
Virginia					1							1													1	3
Washington																									0	0
West Virginia	12	4	7									23				1	1						1	1	25	32
Wyoming			1									1													1	2
Total (bituminous)	54	8	27	3	3	1	5					101			1	1	2						4	4	107	121
Pennsylvania (anthracite)	11	4	2	1	1	2					4	25							2			1	3	6	31	33
Total, May, 1930	65	12	29	4	4	3	5				4	126			1	1	2		2			1	7	10	138	
Total, May, 1929	64	9	40	12	4	1	9		3		2	144	2				2	1	1	3	1		2	8		154

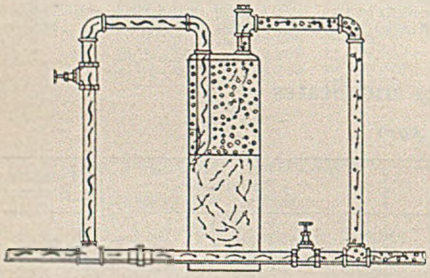
WHAT'S NEW

IN COAL-MINING EQUIPMENT

Anti-Freeze System Offered For Air-Tool Use

For the prevention of freezing in compressed-air lines and at the exhaust of compressed air tools, the Sullivan Machinery Co., Chicago, offers "Tanner-tanks" and "Tannergas." The machine consists of a tank and bypass piping connected into the air line near the point of use. The tank contains a liquid which forms a gas on combination with the compressed air in the top of the tank. This gas is carried into the air lines, and is the active agent which prevents freezing at the tools.

According to the Sullivan company, use of the system peps up tools in warm weather, prevents freezing at 40 deg. below zero, and ends the nuisance of fires and the dripping of alcohol into the line. Other features stressed by the company are: harmlessness; non-explosibility; lack of odor; lack of effect on lubricant, hose, gaskets, or metal; cheapness; and ease of installation in present equipment without material change.



"Tannergas" System

Engineers of the Sullivan company also have designed a new roller-bearing sheave or tail block for use in scraper loading or slushing operations. These sheaves, built in 8-, 10-, and 12-in. diameters, are said to stand up under severe service without causing delays due to jamming or splintering of the wire rope, wear on the bearings, and undue binding and friction of the pulley against the side plates. Unusually heavy construction is claimed. The sheave is made of manganese steel; the side plates are electric steel castings; the swivel hook is of drop-forged alloy steel; Hyatt roller bearings supporting the sheave revolve on a hardened steel shaft of large diameter, which serves as a reservoir for the lubricant; the sheave is recessed into the side plates, preventing the possibility of jamming, as well as undue wear on the rope; snatch-block construction in the sheaves permits the block to be readily opened by removing a pin; and the opening at the top of the sheave will permit a square knot in the rope to pass through without binding. Lubrication is by means of grease-gun fittings. These sheaves are rated at a maximum capacity of 6,000 lb. for the 8-in., 10,000 lb. for the 10-in., and 140,000 lb. for the 12-in., the company says.

Leveling Instrument Designed

An improved type of dumpy level for "third order" leveling, said to have great precision, has been designed by R. L. Atkinson, U. S. Geological Survey, Washington, D. C. With its tripod, the instrument is said to weigh 4 oz. less than the 20-in. wye level and 8 lb. less than the prism level. Reflector and prism have been so designed that the position of the bubble may be observed while the rod is read without moving away from the eyepiece. When the bubble is centered, its two ends are seen through the prism apparently in coincidence, allowing, it is declared, more accurate centering and reducing the chances of error inherent in the usual comparison of positions, separately, of the two ends of the bubble on a scale marked on the vial.

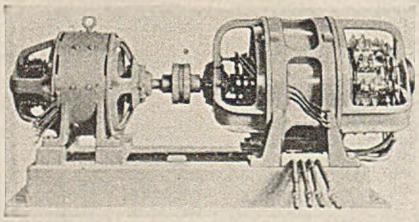
Telescope barrel, level-vial holder, and parts connecting them are of stainless steel, with the result that all of these parts will have the same small coefficient of expansion. The level-vial axis lies in nearly the same horizontal plane as the line of collimation, said to be the best condition for minimizing the effect of expansion and contraction of the parts. Other features cited by the maker are: low height; three-screw leveling head with wide spread; unusually large leveling screws; replaceable micrometer screw bushing; well-proportioned sleeve bearing for front bearing of the telescope, instead of a pair of pivots and cups; internal focus, removing the focus slide from exposure to dust and moisture; two eyepieces for different telescope powers; magnification of 32 diameters; level-vial curvature of 20 sec. for $\frac{1}{10}$ in., and provision for increasing the sensitivity by substituting a higher power eyepiece and a more sensitive level vial.

Device Governs Blowing-Down Of Boilers

To eliminate doubt and uncertainty as to boiler concentration and to govern the blowing-down process, the Elgin Softener Corporation, Chicago, offers the "Concentrometer." This instrument, it is declared, shows boiler concentration at a glance, directly in grains per U. S. gallon. It consists of a combination hydrometer, calibrated for every 10 grains in a range of 0 to 500, and a thermometer reading from 80 to 100 deg. F. In use, about a quart of water from the water-column line is obtained after blowing out all the stagnant water, placed in the sample jar, and allowed to cool. The "Concentrometer" is then lowered into the sample and allowed to find its own level. When the water sample has cooled to 90 deg. F., the concentration in grains is read directly. It is then possible, the company states, to compare all boiler waters upon the same basis, and govern the blowing down accordingly. Concentration may be obtained in a few minutes, the company maintains.

Frequency Converters Offered

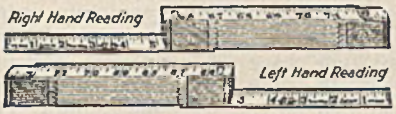
Reliance Electric & Engineering Co., Cleveland, Ohio, has developed special frequency converters for obtaining frequencies different from those furnished by the power companies. These machines are built for operation on either two- or three-phase current, and are said to provide an economical method of obtaining single-phase, two-phase, or three-phase current at any low frequency, especially, for example, three to fifteen cycles. They may be used, the company explains, to obtain variations in speed with squirrel-cage induction motors and either higher or lower than ordinary speeds obtained from induction motors operating on a standard frequency.



Reliance Frequency Converter

Folding Wood Rule Measures Right or Left

Savings in time and elimination of errors are claims made for the "Two Way—Red End" folding wood rule made by the Lufkin Rule Co., Saginaw, Mich. On one side of the rule, figures run from left to right, and on the other side, from right to left. Right hand is the natural direction for much common measuring, the company says, and left hand is the most convenient when the rule is held in the left hand with pencil or saw in the right. Figures are right

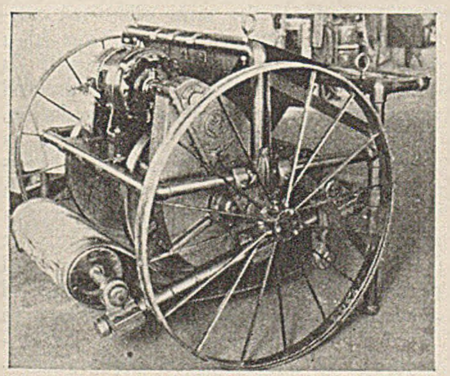


Lufkin "Two Way—Red End" Folding Wood Rule

side up to the user in many measuring operations where heretofore they have been reversed. Thus, the company declares, convenience is served and chance for error minimized. Also, the rule, it is said, has inside or flat markings on both sides, so that the portion being used lies flat on the work, and the sixteenths are on the upper instead of the lower edge, where they will be closest to the work being measured. The new rule may be obtained in 4-, 5- and 6-ft. lengths.

Heavy-Duty Box-Car Loader Is Portable

Application of centrifugal force, the Stephens-Adamson Co., Aurora, Ill., says, enables the new, heavy-duty, box-car loader developed by this company, to throw bulk material to the farthest corner of a box car. The machine, it is



Stephens-Adamson Heavy-Duty Portable Box Car Loader

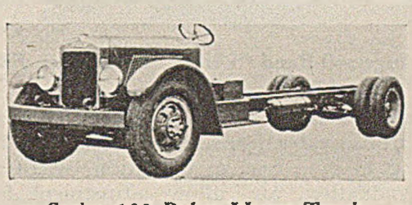
declared, is light enough to be handled by one man, and has a capacity of 350 tons per hour—sufficient to fill 4 to 7 cars per hour. In operation, the machine is wheeled into the car, material is fed into the hopper and the stream thrown from the loader is directed to one end of the car. No further attention is needed, it is asserted, except to swing the machine around to fill the other end.

The loader consists of a short endless belt, 30 in. wide, driven at a speed of 2,000 ft. per minute. The carrying surface of the belt travels in a concave curve, and is held in position by two disks, which touch the belt at the outer edge. A loading hopper feeds the material between the disks, where it meets the belt traveling in a downward direction. As the load follows the curve, centrifugal force causes it to cling to the high-speed belt. Thus, it is asserted, in a travel of less than 2 ft. the material attains nearly the speed of the belt and is thrown a distance of nearly 40 ft.

The present machine will handle, according to the manufacturer, material containing lumps as large as 6 in., and can be set to pile to any height up to 9 ft. above the floor. A Westinghouse, totally inclosed motor is used on the machine. High-speed, double-row, self-aligning, SKF ball bearings with dust-tight seals and Alemite lubrication are standard equipment. The Morse silent-chain drive is inclosed in an oil-tight housing.

Motor Trucks Are Low

Series 100, a new model motor truck developed by the Relay Motors Corporation, Lima, Ohio, is said to be safer to handle and easier to load,

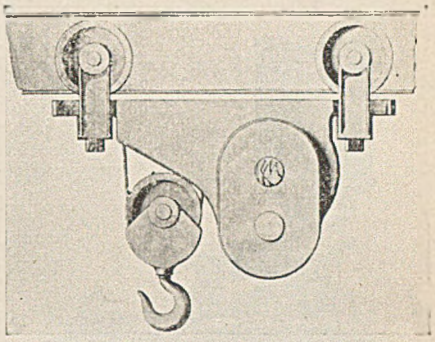


Series 100 Relay Motor Truck

because of its extreme low height, which is 28½ in. from the top of the loaded frame to the ground. Designed for heavy-duty service, the machine is powered with a 6-cylinder, 100-hp. motor, with an S.A.E. rating of 45.9. It is equipped with air brakes and has five speeds forward and two in reverse.

Electric Hoist Said to Be Small and Light

The hoist and crane division of Robbins & Myers, Inc., Springfield, Ohio, has developed the new "Bantam" electric hoist, which the company says is the smallest, lightest, and most powerful hoist for its size and weight on the market today. Features noted by the company are: light weight—130 lb. complete with trolley, 110 lb. without trolley; small size—over-all dimensions, 18x24x14 in.; speedy operation—30 ft. per minute; 500-lb. capacity; specially designed motor protected against dust and moisture; simple and positive lubrication system, aluminum finish for protection against exposure; and sturdy construction throughout.



"Bantam" Electric Hoist

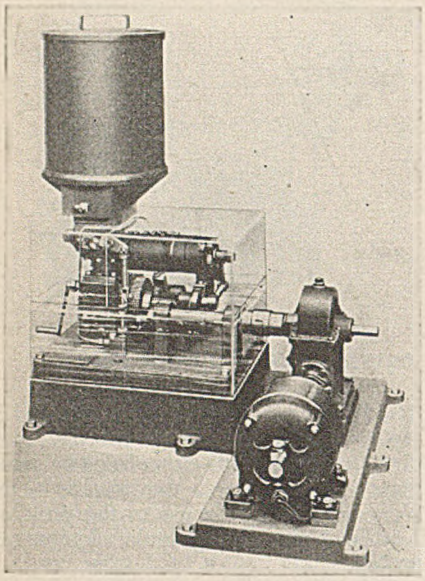
The "Bantam" hoist is manufactured in styles suitable for use on alternating or direct current, with either rope or push-button control, and the frame is designed to permit the use of the standard I-beam trolley or any make of monorail trolley.

The hoist and crane division also has brought out the new "Ace" trolley in plain and geared types, with a capacity range of ½ to 20 tons. New features, according to the company, are: heavy ribbed steel frame capable of taking heavy overloads without distortion; chilled and crowned trolley wheels, annealed to insure uniformity; combination of eight Timken and four Hyatt roller bearings to provide for all combinations of radial and thrust loads and eliminate guide roller friction when the trolley is used on monorail beams; vertical guide rollers to bear against I-beam flange on curves, permitting use of trolley on small-radius curves; safety lugs and wheel guards to prevent trolley falling in event of wheel failure; adjustability to seven I-beam sizes in the smaller sizes; axle studs drilled for Zerk Alemite lubrication, and aluminum finish for protection against exposure.

Pump Handles Heavy Grease

For pumping heavy mill grease mechanically, the Hills-McCanna Co., Chicago, offers the new Anderson mill-type grease pump. Features noted by the company are: simplicity; sturdy construction; ability to withstand high pressures, with the elimination of air, hydraulic, or spring pressures; positive feed, insuring a measured quantity of lubricant to every bearing; reduction in quantity of grease required; removal of the hazard of hand feeding; accuracy against any pressure; and ability to handle any grease yet developed.

Grease is introduced into the feeding system by a displacement pump, which in turn actuates a positive mechanical valve. The valve is opened on the suction stroke and closed prior to the discharge stroke. A distributor head with the requisite number of leads is connected to the discharge side of the pump. The indexing of the head is secured by a ratchet attachment, which indexes on the suction stroke



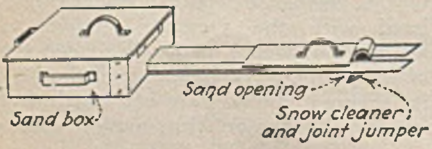
Phantom View, Anderson Mill-Type Grease Pump

and remains fixed on the discharge stroke, after which it indexes the next lead in order. Other points brought out by the company are: steam heating element for handling heavy greases in cold weather; 50-lb. capacity; foreign matter in the grease removed by a screen in the grease hopper; stroke adjustment regulates quantity of grease delivered and driving speed adjustment governs the delivery cycle; and inclosed construction. Regular models with four, six, eight, ten, and twelve feeds per unit and special models with feeds to the number of 24 are obtainable. For more than 24 feeds, two units may be connected with a common driving mechanism.

Rail Sander Said to Work On Snowy Track

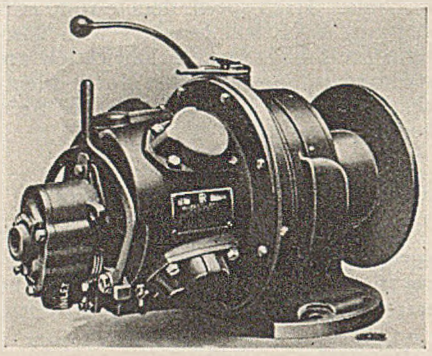
Ability to sand rails of any size is claimed for the Williams "Nu-Way" rail sander, manufactured by Steve Williams, Sugarite, N. M. Among the features detailed by the maker are the following: sand container with capacity for 800 to 1,000 ft. of rail; one-piece construction of heavy galvanized iron; sand box and chute fully inclosed as protection against wet sand—will not clog; ability to sand perfectly rails covered with 10 in. of snow without removing it from the rail, and ability without skipping or missing joints up to 4 in. in width. The entire length of the sander is 40 in., and its weight is 8 lb. empty.

Williams "Nu-Way" Rail Sander



Portable Compressed-Air Hoist Has 2,000-lb. Capacity

The Ingersoll-Rand Co., New York City, has introduced a new "Utility" portable air hoist with a capacity of 2,000 lb., for use in mine and construction work. Light weight is one of the features stressed by the company, as is the ease of mounting on a post, timber, or steel column in any convenient location. The hoist employs a radial, 4-cylinder, counterbalanced, reciprocating-piston-type air motor, which is reversible. Construction features pointed out by the manufacturer are: interchangeable cylinders and renewable wearing parts; machine-generated, spur-type, reduction gears between motor and drum, housed to exclude dust and operating in a bath of semi-fluid grease;



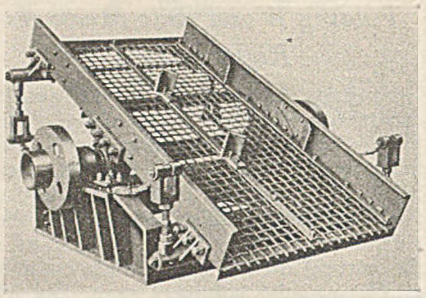
Ingersoll-Rand "Utility" Hoist, Size ER

ball and roller bearings; tapered bronze throttle valve fitted onto a bronze bushing to give ease of operation, sensitive graduation, and allow adjustment for wear; positive-jaw clutch, operated by a lever located conveniently near the top of the hoist and made to lock automatically when the clutch is engaged or disengaged; bank-type brake wrapped around the drum at its largest diameter, and dirt- and dust-proof motor case.

Screens Grade Coal

Necessary flexibility for meeting any set of operating conditions where the material graded ranges from $\frac{1}{4}$ to 4 in. in size is said to be incorporated in the new "Heaviduty" screens announced by Huron Industries, Inc., Alpena, Mich., for grading coal, coke, and other coarse material. Exceptional capacity and sturdiness have been built into the equipment, it is claimed. Single- or double-deck models, with screen frames 3x6, 4x8, or 5x10 ft. to accommodate any type of screen cloth or plate may be obtained.

Operation of the screen, the company says, is based on a positive circular-path movement, which is transmitted mechanically to the screen frame, so that all points on the screening surface are actuated in the same plane, the movement being perpendicular to the flow of the material at the highest point



Huron Industries "Heaviduty" Screen

of the "throw," to produce thorough screening action and maximum output.

Construction details are as follows: box-type base of semi-steel castings; large-diameter, eccentric drive shaft mounted on oversize, heavy-duty, Timken roller bearings, inclosed by annular-groove and labyrinth seals to retain the lubricant and exclude dirt and moisture; two flywheels with adjustable counterweights to balance the rotating mechanism and prevent the transmission of vibration to the base; special ship-channel side plates to stiffen the screen frame, which is stabilized by four cantilever leaf springs equipped with adjustable shackles for changing the angle of inclination of the frame. A pulley for a flat belt or one for a multiple-strand V-belt can be used on either end of the drive shaft, and a bracket for mounting the motor can be attached to the base.

Welding Electrode Announced For Stainless Steel

For welding the commonly called "18-8 stainless steels," the Lincoln Electric Co., Cleveland, announces the new "Stainweld A" welding electrode. By its use, the company claims, welds can be made of the same chemical content as the metal itself, resulting in a dense, ductile weld. This result is obtained by welding in a protected atmosphere, thus eliminating oxidation. The rod is of the same composition as the metal and the manufacturer says that it is coated with a material which the heat of welding causes to form a gaseous envelope around the arc. It is used with reversed polarity and permits, it is claimed, the making of a weld that is just as impervious to corrosion as the metal it joins. "Stainweld A" is obtainable in three sizes—$\frac{1}{8}$, $\frac{5}{32}$ and $\frac{3}{16}$ in.—in the regulation length of 14 in.

The Lincoln company also has developed a new welding rod for use on light-gage material, known as "Lightweld." It can be used, the company says, on 16-, 18-, 20-, or 22-gage metal in making lap, butt, or corner welds. It is designed for use with a manual carbon arc in horizontal, vertical, or overhead work at 30 to 60 amp., direct current. The diameter of the rod is $\frac{1}{16}$ in., and its length is 30 in.