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Captive Ownership

WHEN, IN 1921, *Coal Age* selected Springdale for its First Annual Model Mining Number, the future of captive ownership was shadowed by uncertainty. Consumer purchase of mines had been so accelerated that many in the industry feared the independent commercial operation was doomed to diminishing importance. Today, the picture is much clearer and the trends of future economic development are well established.

MARKET INFLUENCES which once justified captive ownership for the production of general-purpose coal have lost much of their potency. As a result, the past decade has witnessed few notable additions to captive acreage of this fuel. But there has been, and doubtless will continue to be, an expansion in captive control of special-purpose coals.

THE REASON for this growth is obvious. Reserves of coals directly suitable for metallurgical purposes, gas and coke-making are limited. Prudence suggests, therefore, that large industrial enterprises whose basic manufacturing processes are built upon the use of these particular coals insure their future supply of these fuels by removing them from the field of commercial exploitation.

SOMETHING MORE than insurance alone, however, is demanded by progressive ownership. Captive mines are in no sense an industrial luxury. Their operation and upkeep must be conducted with the same economy as the industries which they serve. High standards of safety, care in the selection of personnel, establishment of living conditions which make so many captive mining communities stand out as industrial showplaces are insisted upon, because experience has proved such developments good business.

IF MANAGEMENT of these properties seems unusually willing to spend liberally for continuous modernization, it is only because cost studies have demonstrated that such investments will yield additional profits in lower costs and an improved product. There is no guesswork in captive-mine accounting. Costs are allocated to the last decimal and are analyzed with a thoroughness which many commercial operations might well follow.

THIS PHILOSOPHY of captive ownership and management is given practical application in the coal mines of the Youngstown Sheet & Tube Co. and its subsidiary, the Buckeye Coal Co. These operations are the subject of this, the Eleventh Annual Model Mining Number of *Coal Age*.

Dehue Headframe Looks Out Over Village in Valley

PERFORMANCE AT NEMACOLIN

+Reflects Advance Planning Of Management's Problems

THE YOUNGSTOWN Sheet & Tube Co., the largest industrial corporation in the State of Ohio, was started in 1900 by J. A. Campbell and others, with a capital of $600,000. In 1903, when operation was begun, the capital had been increased to $4,000,000 to satisfy the growing plans of the founders. Now, the capital and resources are estimated at $300,000,000.

Growth has progressed consistently and steadily. The original intention was merely to build a small sheet mill and six puddling furnaces. At present the company owns plants, ore mines, coal mines, and zinc mines in eight states. It operates seven steel plants—four in Ohio, two in Indiana, and one in Illinois. At four of these plants it operates byproduct coke ovens. Manufacturing yields about 100 different products, chief of which are pig iron, steel bloom, billets, and slabs (both bessemer and open-hearth, pipe, sheets, tin plate, conduit, bars, wire, and nails.

Fuel reserve came up as a question soon after incorporation of the company, and since has been constantly in the minds of the directors as being of importance equal to that of ore reserves, for a dependable source of fuel of superior quality is practically essential to the production of high-quality iron and steel. To this end control of its quality fuel requirements was sought and has been achieved through captive ownership of three coal mines.

Two of these mines are in Pennsylvania—one at Nemacolin, in Greene County; one at Brier Hill, in Fayette County—and the third is in West Virginia, at Dehue, in Logan County. Nemacolin and Brier Hill mines are under the name of a subsidiary, the Buckeye Coal Co., which also manages the Dehue mine, a direct holding of the parent company. In 1930, the three mines together produced 2,499,727 tons, which is approximately 50 per cent of the average annual requirements of the steel plants.

These mines produce only high-volatile byproduct coal and, to get the superior coke required for the operation of the steel plants, this fuel is mixed with a varying percentage of purchased low-volatile coal. Slack coal, of which a relatively large tonnage is consumed for steam purposes, normally is purchased. Captive coal is diverted from byproduct to steam use only in those seasons of the year when slack is not plentiful. Otherwise, no definite line is drawn between captive and commercial-market supply of fuel to the steel works. Governing the choice between the two sources of supply is the desire to give the miners at the captive plants as nearly continuous work as possible. In consequence, mine operation is planned for average requirements, extra demand being supplied by temporary increases in production or by purchases.

The Buckeye Coal Co., perhaps the most important of 38 Youngstown subsidiaries, came into being Dec. 24, 1915. It was at about this time that the consolidation by exchange of a number of already held tracts into the Nemacolin property was consummated. Aside from building six miles of railroad to this plant site, little was done until 1917, when the sinking of the slope and shaft was begun.

Of the three mines, Nemacolin alone was acquired as a virgin property. The development and construction of this plant gave the management its sole opportunity to incorporate its own ideas in every phase of mine design and operation. Brier Hill was acquired with the purchase of the Brier Hill Steel Co. in 1923, as an old mine with remaining operating life too short to justify a broad program of reconstruction. Dehue also was taken over as a going plant, as part of the Steel & Tube Co. of America, which was purchased in 1923. It has within its property lines an acreage of unmined coal sufficient for many years of full-capacity operation. For this reason many major changes

Table I—Summary of Worker Productivity at Nemacolin Mine
(Excluding men on permanent or new construction)

Year	Average Tonnage Daily	Total Tonnage for Year	Tons Per Shift Per— Loader	Inside Dayman	Man Underground	Outside Mech. and Elec. Worker	Outside Laborer	Man on Payroll*
1926.....	4987.9	1,536,281.00	21.32	14.89	8.24	99.80	118.80	7.16
1927.....	5709.4	1,571,807.35	22.39	15.64	8.50	101.90	121.50	7.37
1928.....	6327.28	1,714,692.90	23.61	17.48	9.28	119.38	131.82	8.08
1929.....	6371.68	1,808,543.15	22.28	18.63	9.29	120.22	148.18	8.15
1930.....	6965.51	1,414,000.00	22.11	20.67	9.84	116.09	151.42	8.56
Year 1931 to Date								
Month		Total Tonnage for Month						
January...	7272.73	80,000.00	22.24	20.96	9.94	129.87	158.10	8.72
February..	7350.00	73,500.00	22.83	21.55	10.19	126.72	153.12	8.89
March....	7300.00	73,000.00	22.60	21.60	10.18	128.07	178.04	8.96
April.....	7308.00	95,000.00	22.98	21.49	10.24	137.89	182.70	9.06
May.....	7125.00	114,000.00	22.55	21.14	10.05	131.94	161.93	8.83
June.....	7028.00	126,500.00	22.38	21.04	9.95	121.17	149.53	8.67

*On basis of man shifts actually worked.

Nemacolin Officials—Sitting, Left to Right: J. A. Forsythe, Master Mechanic and Chief Electrician; W. H. Gates, Superintendent; C. M. Lingle, Vice-President (Buckeye Coal Co.); A. W. Hesse, Chief Mining Engineer. Standing, Left to Right: C. H. Dodge, Safety Engineer; G. F. Bell, Chief Clerk; S. B. Guseman, General Outside Labor Foreman; A. E. Bennett Mine Foreman

have been and are being made from the original plant facilities and methods of operation at Dehue.

Nemacolin standards, methods, and practices have been largely used as guides for the reconstruction and operation of Brier Hill and Dehue mines. That being so, the management objectives and reasoning can be adequately presented by reference to Nemacolin.

So far as circumstances will allow, every new plant represents the lifelong ambition or, if you will, dream of the men in charge of its creation. In every case of careful planning, the design is characterized by certain dominant features. At Nemacolin the motifs are safety, permanence, and free operation. Of these three, safety is the major.

No matter what the problem, if it relates to mine operation, first consideration is given to safety. No matter what the cost, the decision reached must guarantee the greatest degree of safety. Evidence of this aim is readily discerned throughout the design of the plant and its operation. Having assured itself that provisions have been made for protection under normal circumstances, the management, in vital phases of operation, insists on a generous factor of safety. This is particularly true with reference to such major elements as ventilation, rock-dusting, sprinkling, transportation, timbering, and machine operation. Evidence in detail of this safety-mindedness will be found elsewhere in this issue.

Permanence of construction is carried to a degree which compares favorably with European practice. But it is applied in such a way as to reflect good business judgment rather than fixed desire not to change. A mine is unlike a factory or mill in that it cannot be completely torn apart and rebuilt. Certain features can be changed bodily and can be justified because improvements guarantee savings over and above the cost of replacement—equipment, for example. Certain other features of a mine, once evolved, cannot be changed during the life of the property. It is these that are designed for permanence.

Illustrative of this aim at permanence is the concrete arch construction at the shaft bottom, which required the pouring of 30,303 cu.yd. of concrete, and which is much like the subway tunnels in metropolitan cities; also the many miles of brick and steel roof supports on main haulageways. When the program is completed the roof over every linear foot of primary track will be permanently supported. This and other permanent construction below ground regularly employs a working crew of about one hundred men.

This policy of matching the construction with the life or service requirements is calculated not only to reduce maintenance to a minimum and effect economies in operation by freeing it of repetitive construction and consequent delays but also as equitably as possible to spread the capital charges over a number of years. During the retreat of the property the mine will have the cheapest and most uniform costs. These provisions are counter to general practice, in which large sums of money too frequently are spent futilely for maintenance that might have been avoided by an initial expenditure large enough to give permanence.

Free operation as a factor in the design of the Nemacolin mine plant expresses the characteristics of minimum effort and rush or speed in the production of a given tonnage. The objective sought was a free flow of coal to and up the hoist shaft. Equipment was chosen which could be operated at low speed for average production requirements, to the end that maintenance cost would be low and that output could be increased without taxing that equipment. Other facilities were designed accordingly, an outstanding example being the large number of headings provided in the various entry systems.

Flexibility is a synonym for free operation. Nemacolin, which seldom has exceeded its present daily production of 7,300 tons, has been designed for a maximum capacity of 1,500 tons an hour. This capacity was selected with the thought that should the future demand a high tonnage from the plant, facilities will have been provided. In this respect, the management profited from the general experience of the industry. The tendency has been to increase plant output beyond the intended capacity by inordinate speeding up, resulting in frequent breakdowns and delays, accompanied by high maintenance costs.

Nemacolin's marks of efficiency are merely indicated by an inspection of the mine and a view of its operation. Its size, its trim appearance, and the thoroughness of its methods do not combine to suggest uncommonly high productive rates for the individual workers. Intense supervision, constant deliberation in matters of safety, and ceaseless attention to details might be construed as factors which preclude the attainment of unusual productiveness. And, yet, contrary to this first impression, the records summarized in Table I give proof of genuine achievement in tons per man.

Operation is based on a system of daily clean-up, in which the loader is asked to do little other than to lay his track, load coal, and guard his safety. All other work incidental to getting the coal into the mine car, including timbering, is performed by company men. The loader is expected to set those additional posts made necessary by a change in roof conditions after the company men have left his place, but for this work he is paid extra. In order to maintain efficiency in operation, the company merely makes and keeps mining conditions right. That being done, the tonnage takes care of itself.

An analysis of the figures in the table reflects the material results of

(Turn to page 404)

NEMACOLIN MINING METHODS

+ Stress Safety, Recovery, And Productivity

NEMACOLIN mine embraces 8,400 acres of Pittsburgh-seam coal in an oblong tract which is bounded on the east by the Monongahela River, extends westerly approximately 3½ miles, and measures about 2½ miles northerly and southerly. Surface topography and shipping convenience by rail, with the possibility of river transportation in the future, dictated the selection of a plant site on the river. Moreover, this location was well suited to an advantageous layout underground, because the property is on the Lambert syncline, the major axis of which deviates but slightly from the long axis of the property. These lines run southwesterly from the river and divide the property into two approximately equal territories. On them have been projected and driven the main entries, so that grades are most favorable for haulage and drainage.

The coal-seam thickness averages 96 in. over the property. Above it is a lamination of slate and coal which makes the holding of the roof no easy task. While the thickness of this overlying roof body is generally 8 ft., it varies from place to place. No more constant are the constituent strata in this immediate roof, in which slate replaces coal or coal slate without regularity. Because of the laminated and irregular structure of the immediate roof, the 1- to 2-ft. zone directly over the coal seam proper cannot be said to be a draw-slate typical of the Pittsburgh seam. Furthermore, the slate frequently is slickensided, in which case it tends to fall bodily.

Clay seams or spars add to the task of safely holding the roof. The laminated roof body is overlaid by a fractured sandstone which ranges up to 50 ft. in thickness. It is the top of this stratum which is believed to mark the upper limit of initial falls following coal-pillar extraction.

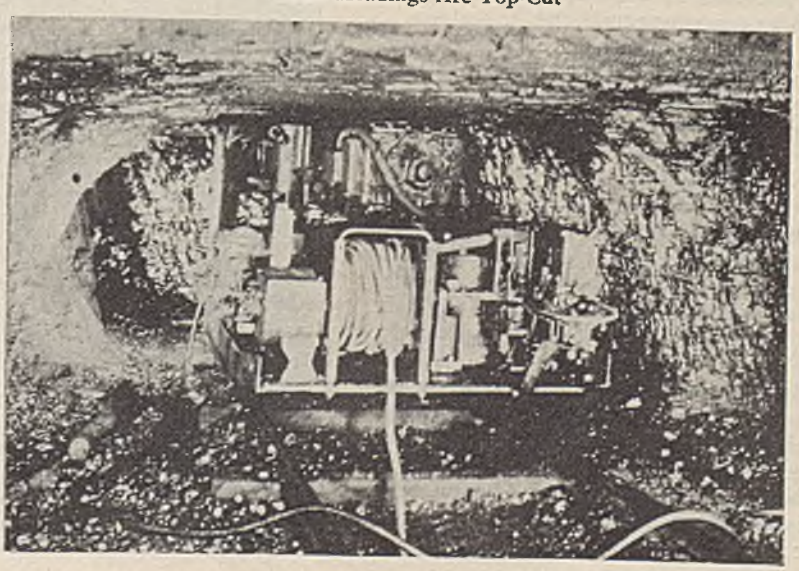
In the river valley in which the plant is situated the depth of overburden is about 250 ft. But as the hills rise abruptly, the cover rapidly increases in thickness and reaches a maximum of about 650 ft. under the hilltops. Roughly, 100 ft. above the coal seam occurs the first stratum of limestone. Boreholes 450 ft. deep show six other limestones. Together the limestones aggregate a thickness in excess of 100 ft.

Coal is mined by a concentrated block system, in which entries, rooms, and crosscuts are normally driven 12 ft. wide on 100-ft. centers; but where the roof is abnormally troublesome the width of these places may be reduced to 10 ft. The ratio of narrow places to the pillars they develop, in terms of tons recoverable, is as 30 is to 70. In the areas mined out thus far, the recovery has been 91 per cent. The loss is in roof coal, small stumps, and thin fenders left to protect the workers during extraction. Under no circumstances is the leaving of solid stumps, ribs, or blocks tolerated. Generous size barriers are left to protect important openings, they being 150 and sometimes 300 ft. wide.

The main entry, running southwest from the skip-shaft bottom, consists of fourteen headings. A barrier 150 ft. wide separates these into two groups, each of seven headings and each comprising a load and an empty haulway and manway on the intake, and four aircourses on the return. At intervals of 1,600 ft., flat entries are driven from the mains to the limits of the property. The flat entries usually consist of five openings, but sometimes seven, depending on the number of ventilation splits required and the tonnage expected from the section. Where five is the number, the flat is made up of a haulway, a companion opening for sidetrack purposes, a manway, and two returns. From and between these flat entries, and at intervals of 300 ft., butt entries (two openings) are driven, and from these, in one direction only, rooms are turned. It is the practice to drive butt entries and rooms so that they are completed but a short time before they are picked up by the retreating pillar line.

Main and flat entries are top-cut by three Goodman slabbing machines. Other places, including butt entries, are undercut by seven Jeffrey 35B and thirteen Sullivan CE shortwall machines. All of these cutting machines are government approved and equipped

Main Headings Are Top-Cut



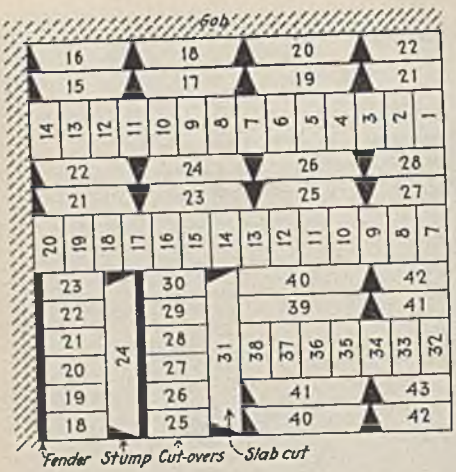


Fig. 1—Sequence of Taking Cuts in the Extraction of a Pillar

with water sprays on the cutter bars. A standard cut is 6½ ft. deep. Top-cutting permits bottom-shooting, which causes a minimum disturbance of the roof. This precaution is important in openings which must be used for many years. As butts, rooms, and other openings must stand a relatively short time, there generally is no necessity for top-cutting in these places. In all cases, however, 8 to 9 in. of roof coal is left for safety and to minimize the expense of timbering.

Practically 100 per cent of the production is machine cut. The only exception to this are the several thin fenders and small triangular stumps of coal left to protect the miners during the recovery of block pillars. These stumps are either blasted down or mined by pick.

In Fig. 1 is indicated the usual method of mining the block pillars. Recovery is made by a combination of 12-ft. wide cut-overs, and slab cuts which are taken from the former. The sequence of the cuts is indicated by numbers. Certain conditions may call for slight variations from the method outlined by the sketch. In the robbing of a single block pillar, working place is provided for the employment of three loaders on an average.

Shotholes in coal are put in with pneumatic rotary drills—Ingersoll-Rand Type BCR-430 and Type BC. Air is supplied to these drills by twelve Sullivan, Class WK39, 9x8-in. self-propelling compressors. This compressor is government approved; it delivers 150 cu.ft. of free air per minute at 100-lb. pressure and travels at a speed of 370 f.p.m. The unit has a length, width, and height over all of 11 ft. 6 in., 5 ft. 2 in., and 3 ft. 11½ in., respectively. Each compressor is equipped with a Sullivan hammer drill for holing in top and bottom. Accessibility to working places is facilitated by 400 ft. of concentric power cable and 50 ft. of air hose. A 6½-ft. hole of 2-in. diameter is drilled in coal in about 2 min.; a company rule requires that these holes be started by pick; blasting is done electrically and with permissible explosives.

Exacting timbering standards have been devised for every normal or recurring condition. These standards are strictly enforced as the minimum requirement, which must be augmented by the setting of additional timbers where conditions demand them for the sake of safety. The standards imply, though they do not definitely state, that timbers are never to be spared or wasted. Safety and coal recovery thereby are promoted. For the same reasons, the converse corollary is observed in practice; timbers are removed after they have served their purpose at the working faces. By following these regulations, the number of timbers required in the long run is lessened. The cost of timbering, for labor and material, but excluding permanent roof supports, is about 9c. a ton at Nemacolin.

In all rooms, pillar cut-overs and short butt rooms having a width in excess of 10 ft., measured at the roof, a row of posts with cap-pieces is set along one side on not more than 4½-ft. centers. Actually, the centers generally are maintained at 4 ft. The minimum small-end area of these posts is 16 sq.in. Crossbars are set where the roof is tender, as judged either by the miner or by one of the mine officials. The mine foreman or his assistant instructs the worker as to the centers on which they shall be set to maintain the roof intact. Where lagging or cribbing over crossbars is required, as few timber sets as practicable are tied together. This prevents tripping in the event that one set falls.

When places go through to the gob a crossbar or post is set near the edge of the fractured roof. Pains are taken to set these tight at roof and bottom to avoid dislodgment by falling or sliding rock. Center or safety posts are set by the miner in the cut being loaded out of every advancing working place. These are erected after the second car is loaded, or immediately if the safety of the place requires it. Once set, the safety, or center, post is not removed by the miner until additional posts or timbers have been set in this cut. The final safety posts are not removed by the loader.

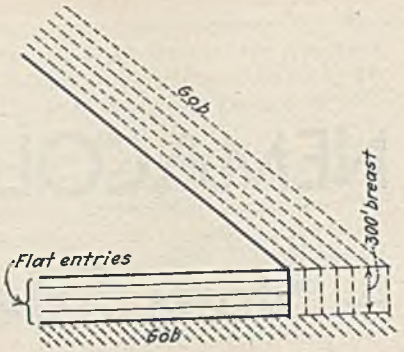
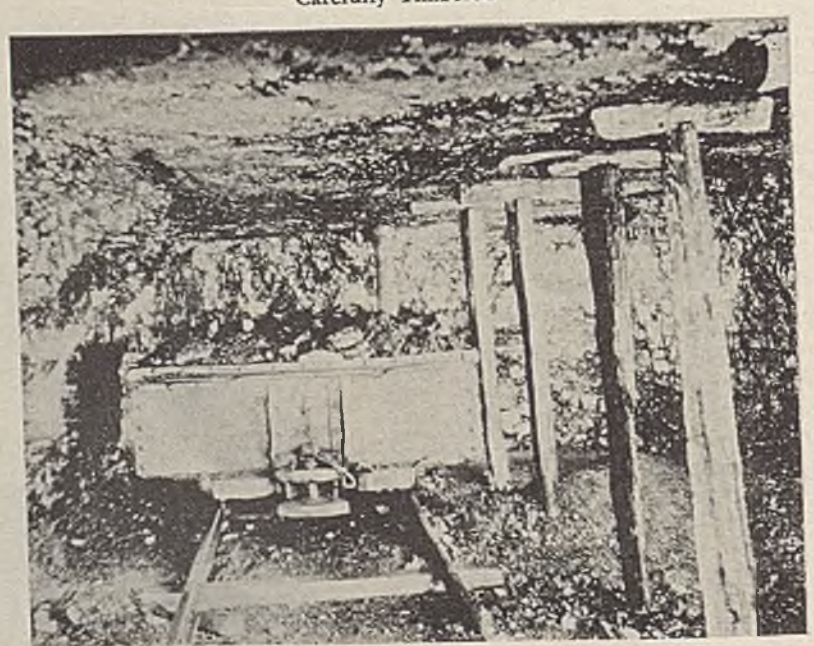


Fig. 2—When Two Gob Lines Are Closed In, the Point of the Pillar Line Is Blunted to a 300-Ft. Breast

In making slab cuts from cut-overs in pillar extraction, posts are placed on 4-ft. centers next to the face and in the wake of the cutting machine. This means that a timberman must be in the place while the slab cut is being made. As the coal is loaded from this cut a row of posts is set on the center line of the excavation. When taking a second slab cut (see Fig. 1), therefore, the cutters sometimes must remove and reset posts, one at a time, as cutting proceeds across the face.

In any haulage road, working place, or traveling way where the top coal is fractured, or the drawslate exposed, the slate is taken down or supported by

Though This Place Is Only 12 Ft. Wide, It Must Be Carefully Timbered



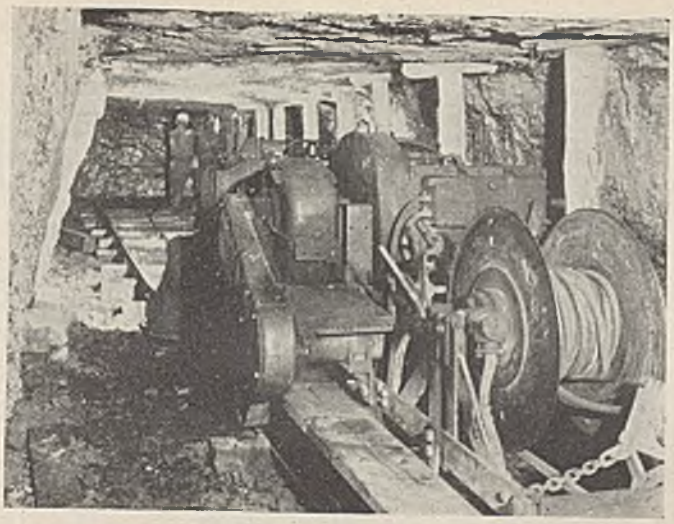
crossbars. Clay veins are timbered over their entire length for a distance at least one crossbar inby and outby the vein, even if the roof appears solid.

All crosscuts, rooms, and entries are retimbered for 200 ft. outby the fracture line. This precaution is taken because experience has shown that roof action accompanying subsidence disturbs the roof for at least this distance ahead.

Where slate or rock is taken down, or where other dangerous work of like character is performed in isolated places, at least two men are assigned to the job. Timbermen or others engaged in timbering or taking down dangerous roof are compelled to fence off and danger-post the place should they find it necessary to leave before the job is completed. Likewise, a working place is fenced off which has not been adequately timbered by the miner before leaving it at the end of the shift.

All posts are set on solid bottom, and over each is placed but one cap-piece of a width at least equal to the width of the post. The cap-piece must be 20 in. long and 3 in. thick at the smaller end. Wedges are not allowed in the fixing of this support. Where crossbars are used, they are supported under each end by standard posts, except where, in the opinion of the supervising official, added safety can be obtained by hitching the crossbar into the rib to a depth of at least 6 in. Placing of wedges between the end of leg and crossbar is not allowed, except where the wedges are small and are utilized only to fill crevices and prevent rolling of the crossbar. Larger wedges can be placed only between the crossbar and roof.

Nemacolin's success in coal recovery and freedom from accidents from roof falls is achieved by keeping a straight pillar line by orderly extraction of pillars, and by keeping the roof fracture up to the lines of pillar extraction, with no overhanging roof beam. A regulation which invariably is adhered to is that no "holing-through" cut can be made during pillar extraction until after the excavated area beyond has caved thoroughly up to the solid coal of that particular pillar.



Coal Is Drilled Pneumatically

Experience has shown that best results are obtained when the pillar line is made to extend over the workings between two adjacent flat entries. This practice limits the length of the pillar line to about 2,000 ft. In extracting a rib section which adjoins worked-out territories on its two sides, the pillar line is blunted to a 300-ft. breast at the end which subtends an acute angle. This arrangement, indicated in Fig. 2, avoids the troubles and dangers incident to the taking of coal from a sharp point on a rib section. The breast is ventilated by a separate split.

In making falls, the knocking out or cutting off of posts with ax or other hand tool is prohibited. Removal of timbers on this occasion must be done mechanically. In pillar work, only small stumps are left in place. Following the removal of track and the placing of shots for the removal of these stumps, and prior to the withdrawal of posts, reduction of backstumps by pickwork, to assist in making the fall, is not tolerated.

As great care is exercised in making falls, only experienced men are appointed rib bosses to supervise the work. In making falls in pillar workings, or in drawing timbers in other places, safety posts are set to protect the workers. Break-rows are set in the roadway at the outer edge of all pillar falls before posts and timbers are withdrawn.

Recovery of props and timbers is about 60 per cent. The roof supports are not retrieved for what savings might accrue from using the supports a second or third time, for the labor cost is scarcely met by salvage value. Safety is the prime consideration. A gathering locomotive is utilized for the purpose, with the assistance of a 50-ft. length of $\frac{3}{4}$-in. steel rope, at the end of which is a hook for making a loop about the props. Starting from the gob end, the props are taken progressively outby in threes or fours. After the posts are loosened, the hook disengages and can be pulled out without snagging, and the men go in after them only if conditions are safe for the recovery.

A 2,000-ft. pillar line gives best production results, as well as coal recovery and safety. In a normal rib section it gives 1,000 tons daily and can be adequately ventilated by two splits of air. It gives the correct quantity of work for the supervisory forces. For pillar recovery and necessary development a rib section of this size requires the service of three cutting machines, one drilling unit, and four gathering locomotives.

The force required for this 1,000-ton production is composed of 6 men on cutting, 2 drillers, 1 shotfirer and 1 shotfirer's helper, 8 haulage men, 42 loaders, 20 daymen, 2 night timbermen, and 4 bosses. In the supervisory group are

Systematic Mining Causes the Roof to Fracture and Fall on the Line of Solid Coal

Shortwall Machines Are Used in Cutting Secondary Headings and in Robbing Pillars

an assistant foreman, a pillar boss, a fireboss, and a night boss who, incidentally, makes the fireboss run for the day shift. The total number of men on the section, therefore, is 86. For further data and explanation of production efficiencies see p. 399, this issue.

Nemacolin now has but seven rib sections in operation, yet these, together with development work elsewhere, produce about 7,300 tons daily. Four of these sections are developed to peak production, two are being finished, and one is just being started.

Engineering surveying plays a major rôle in the layout, projection, and operation of the underground workings. All working places, whether they be headings, rooms, or crosscuts, are turned and driven on points established by the engineering department. Sight lines are extended every day and are shown as a continuous mark on the roof. Curves are driven to conform exactly to instructions prepared by the engineering department, as shown on a sketch which is especially prepared for the particular purpose.

In order that no confusion or mistake might be made in the identification of survey stations, the latter are entered and posted in consecutive whole numbers and not in the customary way, as 52 + 50. Each section of the mine is assigned a number series of a thousand. In consequence, no two stations can have the same number.

Another divergence from usual practice is that every heading, room and crosscut in this mine is given an identification number. Thus, in identifying a place, it might be said, "Crosscut No. 5, between Rooms Nos. 9 and 10, off Road No. 463." In this system, no two headings are assigned the same number, but, of course, rooms and crosscuts are and can be made the exception without complication.

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Performance at Nemacolin Reflects Advance Planning

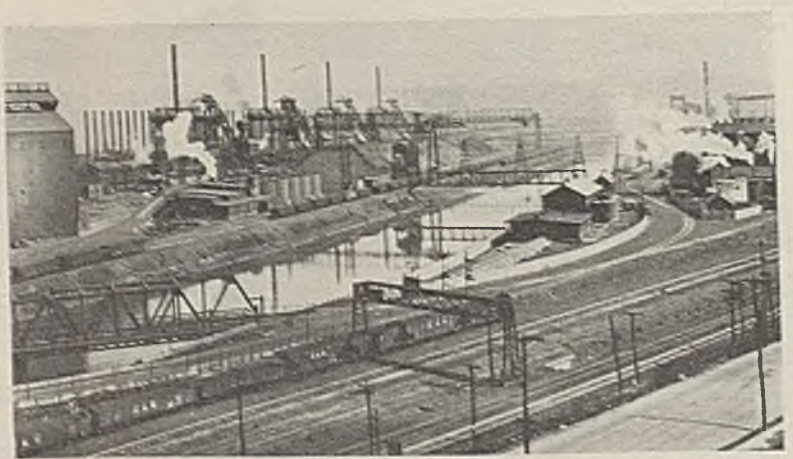
(Continued from page 400)

management's deliberate efforts to balance responsibility for production between departments and jobs. Note that the output per loader is high for each of the periods recorded. This is proof that the management's first objective has been to serve the miner at the face. That objective became an accomplished fact early in the history of the operation.

Having stabilized the tons per loader, it was possible virtually to forget about the loaders and to lay emphasis on the efficiencies of the men who serve them. As an outcome of the shift of attention there has been a marked progressive betterment of the tons per man on all the other jobs. The balance sought and now practically achieved is an equality of tons per man between the loaders on one hand and the men who serve the loaders on the other. Simultaneously, the output per man on the payroll has crept gradually upward. A sidelight on the net results is that operations are balanced and systematized to the point where the variation between the maximum and minimum daily output of any section during a month seldom exceeds 5 tons in 1,000.

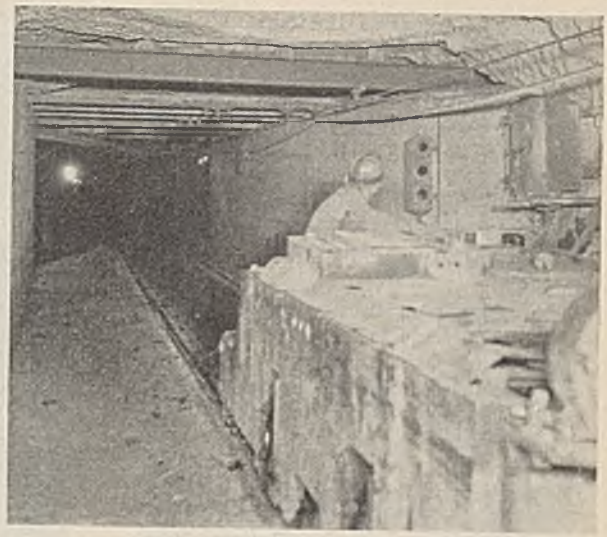
Best practices and modern methods are generally those which have been tried for long periods of time and proved successful. They are not the exclusive possession of a few companies; they are to be found in the operations of many mines, and, therefore, are not unusual. Practices and methods at Nemacolin are no exception to this fact.

Item by item, its methods and practices have a counterpart in some other mine or mines. What superiority it has attained is the result of having, on a large scale, combined best details into best methods, best methods into best systems, and best systems into best over-all operation. It is on this account that Nemacolin can be termed a mining man's mine.



Blast Furnace and Coke Plant, Campbell Works, Youngstown, Ohio

TRANSPORTATION +Speeds Production At Nemacolin



IT is only within recent days that the coal industry as a whole has come to the conclusion that underground transportation can safely be made swift moving and positive. With the realization of this possibility, perhaps the greatest obstacle to efficient production has been hurdled. In this respect the Nemacolin mine is years ahead of the industry, for the foundation of its now highly developed transportation system was laid with the opening of the mine, in 1917.

The notable productive records achieved at this mine (see p. 397, this issue) are a reflection of this transportation system, which is arranged to replace loaded cars with empty cars at the working faces with a minimum of delay to the loader. In fact, transportation is the understructure which supports the main element of the mine operation; namely, the loading of coal. Methods are based on a system of daily clean-up in which one cut is taken every operating day from every working place.

Loaders specialize on the one job for which they are primarily employed; all other work incidental to loading, except the extension of track and the setting of an occasional safety post, is done by company men. This means, of course, that time lost waiting for cars would be a direct loss to the loaders and to the company. The loader would have no fill-in jobs to perform and the company would have the same day-labor expense to bear whether the loader produced 23 tons or only 15 during the shift.

Of the fourteen headings constituting the main entry, which divides the property roughly in two, east and west, four are haulways. One empty and one load track serve the northern half of the mine and the same arrangement is provided for the southern half. The two empty haulways continue as separate tracks from the extremity of developed territory on the west to the empty storage chutes on the opposite side of the shaft, on the east. The two load tracks, however, converge at the entrance to the main shaft bottom. For permanence of construction and for facilities providing flexibility and freedom in the moving of trips to and from skip dumps, this shaft bottom is unsurpassed, it is said in mining circles. In the construction of this landing, over 30,000 cu.yd. of concrete was poured. The concrete, incidentally, was mixed on the surface and transported by pipe to location, in some instances as far as 1,600 ft.

A 25-ft. reinforced concrete arch, which is 1,405 ft. long constitutes the main body of this shaft bottom, and from it radiate a number of 10-ft. arches. The main arch accommodates three tracks, as is shown in Fig. 1. Each of the two outside tracks leads to a two-car rotary dump at the skip landing. The middle track serves as a runway for a 13-ton shunting locomotive which advances the incoming load trips to the trip feeders. This locomotive is equipped with a sliding extension arm which engages the bumper of the mine car. A similar locomotive takes care of the shunting and make-up of empties on the other side of the shaft.

A feature of the plan are the load and empty crossovers leading to the slope, at *A* and *B*, which span the main north and south tracks via bridges. Grade crossings have been largely avoided and none occurs within the compass of the shaft bottom zone.

As already mentioned in the article on mining methods, flat entries, from which room entries are turned, consist of five to seven headings, depending on section requirements. Two of these headings are reserved for transportation purposes, the one for empty and load movements within the section and the other for a sidetrack. The latter is of no standard length; that is governed by service requirements. It is moved progressively ahead in the direction of the mining advance.

Gathering hauls average about 1,200 ft. for a section in retreat and about 2,000 ft. in development. Goodman 8-ton totally inclosed cable-reel locomotives, provided with 450 ft. of concentric cable, are employed in this service. Although there are 31 of these units installed, the number in actual service depends on the production requirements from the mine. Usually four units suffice for a production of 1,000 tons from a single section.

Two terminal sidetracks are established adjacent to the main haulage, and about 2½ miles from the shaft, for the make-up of primary trips. Trips are relayed from the section sidetracks to these main sidetracks by Jeffrey 13-ton drum-controller type locomotives, of which there are eight installed for this and other use in the mine, as, for example, shunting service at the shaft bottom, in which two are utilized. Incidentally, two of these units also are used for hauling trips directly from two section sidetracks to the shaft bottom. In these cases the lengths of haul are only 1 and 1½ miles. Only when the haul grows to 2 miles is consideration given to the adoption of terminal sidetracks. From the two existing terminal sidetracks to the shaft, trips are handled by two tandem units, each made up of two 13-ton Goodman locomotives with contactor control.

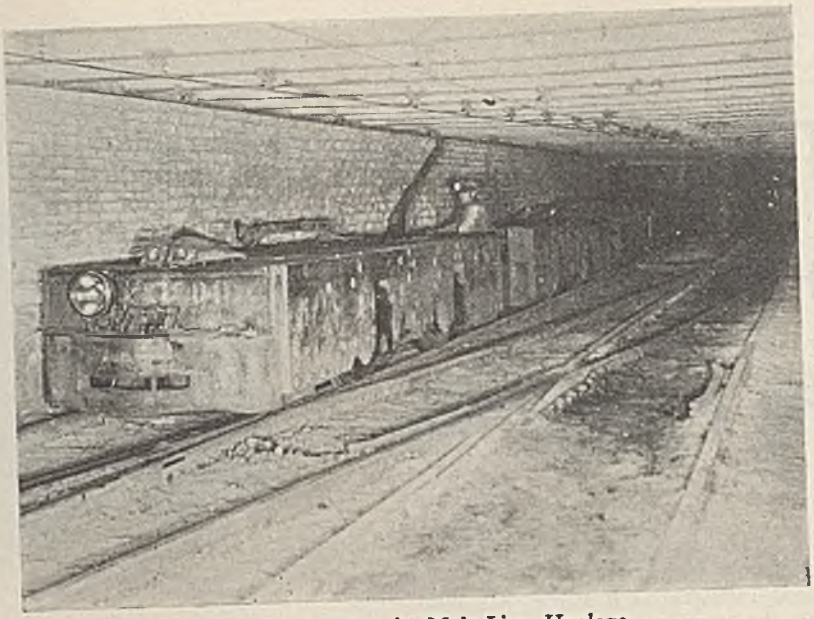
Traffic is controlled day and night by a dispatcher at the switchboard of a communication system embracing 64 telephones. A telephone is installed at every sidetrack and at other strategic points. Safety between stations is maintained through the operation of Nachod automatic block signals at important intersections, augmented by track-thrown electric switch signals at main turnouts. The failure of a signal light is considered a danger signal for the stopping of trips until permission to proceed has been obtained from the dispatcher.

Because loaded and empty trips for the most part travel over individual tracks and are controlled by signals and the telephones, the movement of trips gives the dispatcher little worry. His big problem is the correct prorating of

available empties, to the end that the clean-up may be kept uniform in the various sections of the mine. He has no control of the speed with which cars at the face are made ready for the return trip to the shaft bottom. That responsibility rests entirely with the foreman. He is, however, charged with prompt replacing of loads with empties, without which the daily clean-up system must fail.

The dispatcher uses a daily estimate of car requirements for each section in determining when, where, and how many cars should be distributed at various intervals of the day. A preliminary estimate is submitted by the firebosses, who make it up while checking the workers in their respective sections. With the dispatching sheet before him, the dispatcher knows at all times how near a section is to clean-up, and regulates distribution of empties accordingly. As his major objective is to have all sections of the mine cleaned up at about the same time, if certain sections fall behind, he sends extra empties to those sections until they have caught up with their schedules.

Man-trips are made up by the dispatcher. In the morning these trips are hauled in by the main-line locomotives. In the evening the men are brought to the bottom in smaller groups by the gathering locomotives. The gathering crews are instructed by the dispatcher to haul back to the shaft, on their way to the motor barn, as many empties as are needed to accommodate those miners who, having finished their day's work, are ready to start for the outside. There are no fixed rules for the make-up and time of departure of the shift-end man-trips. Circumstances in the working sections, the number of men ready for departure, etc., move the dispatcher in this decision. The men appreciate this unusual service and do all within their power to assist the bosses and the dispatcher in making the schedules.



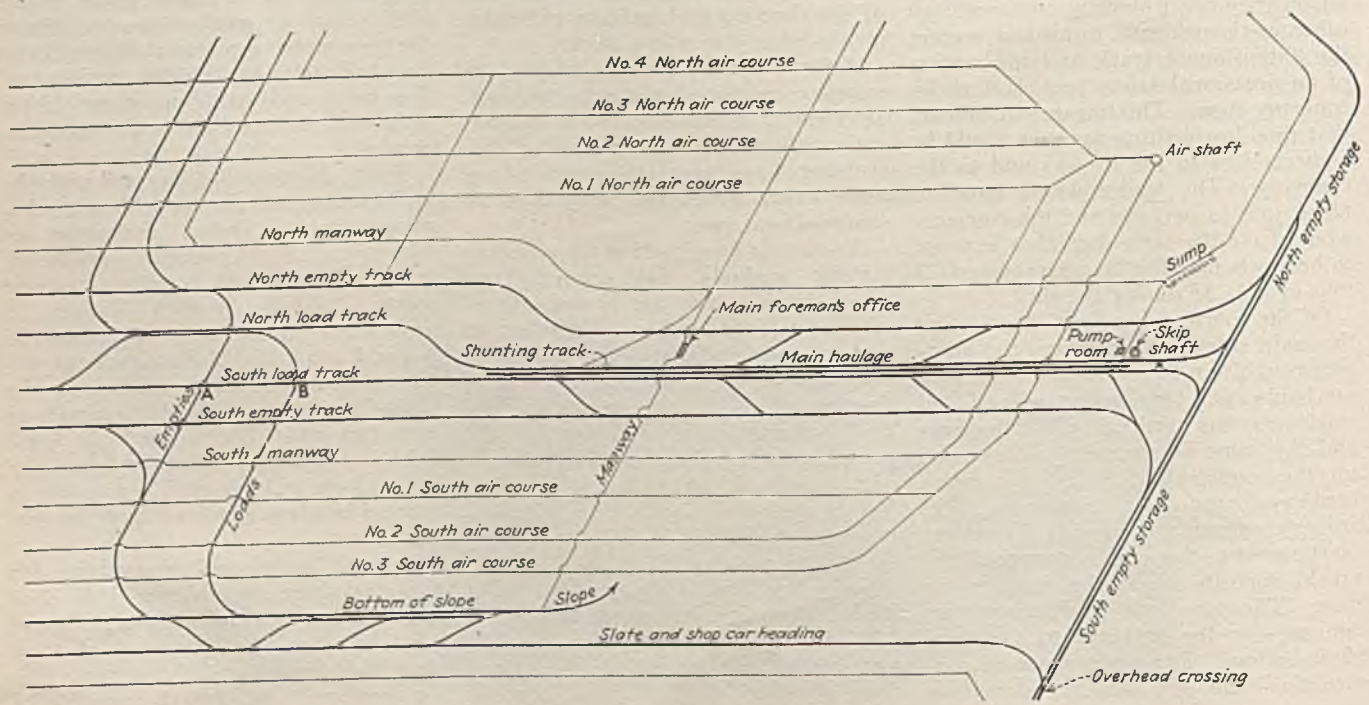
Tandem Locomotive in Main-Line Haulage

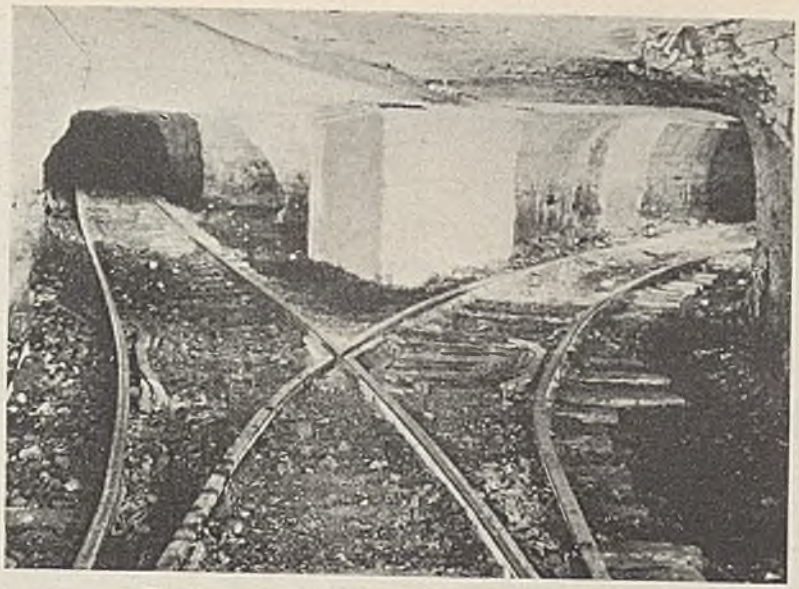
Closely regulating haulage, and being fully informed of what is going on in remote sections of the mine, the dispatcher is in a position to, and actually does, effect a saving in power cost by minimizing the influence of peak loads on transportation. His frequent contact by telephone with the haulage men enables him to move trips when others are not in motion. He may actually hold back certain trips while a particularly heavy trip is coming in. In this way the maximum is being gotten out of the telephone system.

Supplies are routed during the day. Here again the dispatcher comes into prominence by guiding their distribution in accordance with requisitions drawn up by the assistant foremen and okayed by the mine foreman. As traffic is relatively light during the off-shift, the duties of the night dispatcher largely take on those of a telephone operator. Nevertheless, like the day dispatcher, he is trained and practiced to meet any emergency. It is important to note that both dispatchers are certificated men who know intimately the problems encountered back in the mine.

While transportation is directly under the mine foreman, its details are attended to by a transportation foreman and assistant, both of whom report to the mine foreman. Among the many duties of the transportation foreman are the se-

Fig. 1—Schematic Sketch of Track Layout on Shaft Bottom





Turnouts Are Engineered, and Not Merely Laid

lection, training, and supervising of haulage personnel.

The number of mine cars in use is 1,947, of which 1,346 are of 112 cu.ft. capacity, while the remainder measure 104 cu.ft. These cars, furnished largely by the Pressed Steel Car Co., stand 36 in. above the rail on 14-in. wheels, are 11 ft. 10 in. long, 6 ft. wide, and have a wheelbase of 40 in. The sides are $\frac{3}{8}$-in. copper-bearing plate, reinforced at the top with 2½x¾-in. steel bar. One end of the car is equipped with a rigid cast-steel coupler and the other end is provided with a spring draft gear, fitted with a cast-steel coupler and follower, for overturning without uncoupling. A locking device prevents the coupling pin from falling out when the car is turned in dumping.

Any track that is designed to remain in place five years or more is considered permanent track and is laid accordingly. Such track is kept advanced as close to the face as possible, and the roof above it is permanently supported. Main-entry load and empty tracks are laid with 70-lb. and 50-lb. rails, respectively. On flat entries load tracks are laid with 50-lb. rail, but empty track and sidetracks are constructed of 30-lb. steel, which weight also is used in butt entries and rooms. Altogether, about 28 miles of 70 and 50-lb. track is laid. For all tracks the standard tie center is 2 ft. Under 70- and 50-lb. steel a 6x8-in.x6-ft. oak tie is used, and under 30-lb. rail the ties are 4x6-in.x5½-ft. hardwood, mostly oak.

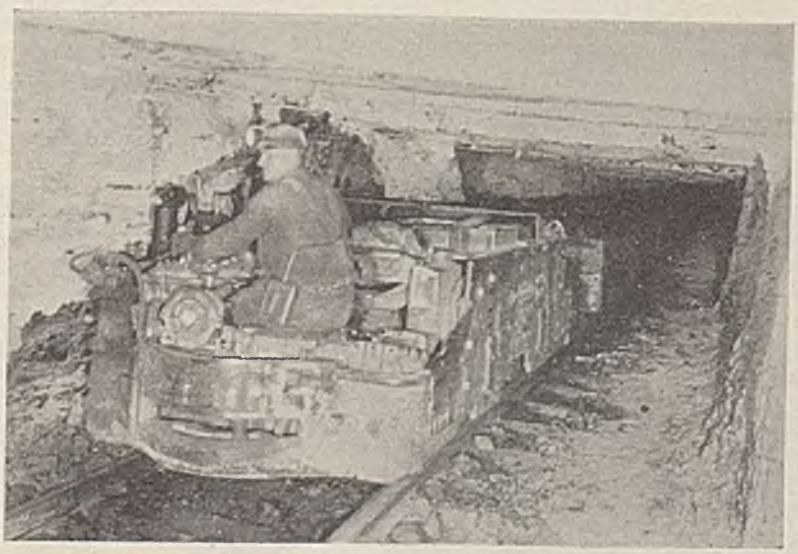
The minimum track curve is in turnouts to rooms and is on a 25-ft. radius. On sidetracks the radius is 40 ft.; on butt entries, crossovers, and turnouts it is 100 ft.; on main entries the radius is 150 and 200 ft. Few haulage headings intersect on straight angles; instead curves are driven to conform with track design.

Tracks in all places are aligned with reference to the center lines of the opening, as marked on the roof, and not with respect to the way the place is cut. On all haulage roads track is laid 1 ft. off this center line, maintaining a clearance of at least 3 ft. between mine car and rib on the one side and 1 ft. on the opposite side. These clearances are maintained on one side only through the entire length of the heading and to within 200 ft. of the working face. Whether the clearance be made on the right side or the left is decided by the engineers with the approval of the superintendent. Open ditches under the track or along the wide side of haulage roads are forbidden.

The maximum grade of track is 2 per cent and generally is in favor of the loads. In order that gradients shall be uniform, top or bottom is taken where necessary. All grades for permanent track are projected by the engineering department and must be sanctioned by the superintendent. Before main-line track is constructed, a profile of grades compatible with conditions is projected. Then levels are taken at 50-ft. stations located by spads on the rib. To each spad is attached a tag stating exactly what the track level should be at that station with reference to the spad.

All switch and frog points for turnouts of over 25-ft. radius are located by the engineering department and the trackwork is completed in conformance with standard plans. Invariably, switches are provided with parallel throws of the spring type and frogs equipped with guard rails. Frogs, guard rails, and switches are blocked to prevent the catching of feet in them.

Frogs installed in permanent track are of manganese steel. This metal makes up the entire assembly of the main crossover on the load end of the shaft bottom. This crossover was initially constructed for permanence, and thus far, after over six years of service, has shown no signs of appreciable wear. It is laid on creosoted oak ties, which are braced and butted to the sidewalls of the concrete arch, and is ballasted with granulated slag.



Totally Inclosed Cable-Reel Locomotives Do the Gathering

NEMACOLIN + Mechanically Mixes and Cleans Its Entire Output

NEMACOLIN has adopted such means of "mixing," or, as the metal miners term it, "bedding," its product and then of cleaning it that it now stands more fully equipped perhaps than any other American plant to give not only a greatly beneficiated coal but one also of uniform quality. Thus the coal which the Youngstown Sheet & Tube Co. receives from Nemacolin is as well mixed as the ore it puts in its furnaces, which is as it should be, and in addition it is mechanically cleaned.

Metal-mining costs have been greatly decreased in recent years by the fact that improved beneficiation methods have made it possible to avoid selective mining and to utilize ores that in earlier days had to be left in the ground. This has favored concentration of operations. Instead of having to spread the mines over extensive areas, driving galleries through ore too poor to pay for mining, all the ore could be taken, thus reducing development costs, maintenance, transportation, ventilation, and a number of other charges, all of which cut heavily into the profits of operation.

When the purpose for which coal is to be used is of such a character that a high-grade product is essential, low in ash and low in sulphur, the management of a mine often is confronted with the necessity of leaving coal in the ground and spreading out into areas where coal of the needed quality is obtainable. Many companies, commercial as well as those owned by industrial companies, are today letting developed properties lie idle, abandoning large mines and sections of mines because they cannot produce coal of a standard that will fit those workings to provide the markets they have to serve.

Not only are their present mines operated at a disadvantage because of this fact but their future operations are hampered also, for when they return to their abandoned workings they will find them caved and less easy to operate. Pillars will have to be skipped and fallen rock will have to be removed, all of which is expensive, as the anthracite, Connellsville, Westmoreland County, and Georges Creek regions have demonstrated.

It is true that in these the dominant reason for leaving pillars was the desire to delay or escape the cost of removing them rather than the need for selective mining, but whatever the cause the delay in final mining caused a loss in first mining, due to the operating difficulties inherent in a mine covering an immense acreage, and it involved an even greater loss in second mining for the same reason and for the additional reason that the second mining was not nearly as easy as first mining and far less easy than it would have been had it followed promptly on the heels of that work.

Nemacolin decided some time ago to make provision for removing all its pillars as it progressed and for bringing all of the coal from the mine up to the high standard of its best and of raising even the standard of the best by careful beneficiation. All the coal in the mine is essentially of one quality, but in places the binders thicken a little and a little more pyrite, microscopic and other, is found. The larger of these impurities washing can remove and the raw coal can thus be brought more nearly to that degree of purity which was characteristic of the original vegetal matter. This is a start toward a general revolution that will ultimately sweep over the whole metallurgical and gas-coal industry, as a sense of the losses resultant in partial and selective mining become more apparent.

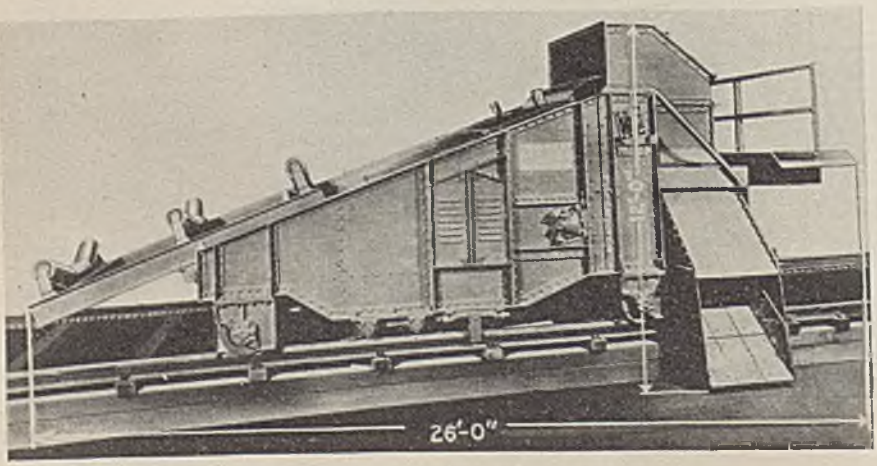
One of the first measures taken at Nemacolin was to introduce a mixing plant so as to average the coal taken from the mine. This served to make it possible to bring down the percentage of ash and sulphur of the less pure coal by mixing it with the best of the product and to bring the coal and the coke made from the coal closely to a given standard of ash and sulphur content.

As a result, the furnaceman knew always just what his coke charge contained, and he could charge the right quantity of limestone to flux the impurities which he desired to remove. With unmixed coal he sailed an uncharted sea. He naturally desired to remove all the variables he could. Sometimes with a variable product he would add more limestone than was necessary; sometimes less.

With a well-mixed coal made into a coke of standard analysis, as with a well-mixed ore, uncertainties were largely removed. The furnaceman could vary the quantities in the charge and determine the combination which gave the best results and stand by it. Predictable results followed guesses. Metal men of all kinds have been mixing their ores for years so as to get more even results in their furnaces. The mixing of coal has precisely the same effect.

Where coal has been delivered to barges for transportation on the river,

Fig. 1—Tripper Automatically Spreads Coal in 12-In. Layers for Full Length of Bin



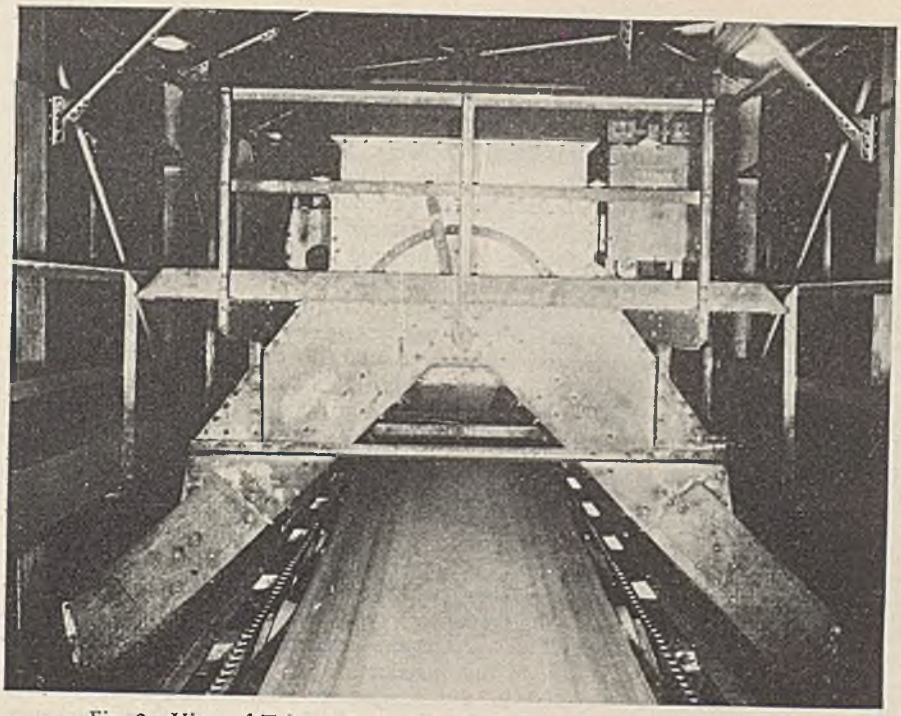


Fig. 2—View of Tripper With Belt for Conveying Coal to Be Tripped

mixing machinery—on a smaller scale, however—has for years been provided, the coal being bedded in thin layers in a bin by a tripping device on the conveyor and then dropped into barges. Thus the coal arriving in one pass of the tripper along the belt was loaded on top of the coal laid in a previous pass made in the opposite direction. In this way the bin became stratified with layers delivered at different times and coming from different car trips and, therefore, from different sections of the mine. When a barge was loaded, it received coal from various layers, making each load a sample taken from several dumpings.

But to return to Nemacolin. Now that the washer is built, the big mixer has another important and valuable function. It serves to regulate the feed to the washer and average the character of the feed that the washer has to clean, a desirable condition for successful operation. Not only is washing efficiency increased but capacity also, because the washer is all the time handling just the quantity of coal which it can properly clean and a quantity of refuse that it can dispose of. It works then at full efficiency and capacity.

The washer at Nemacolin can handle less than the bin will receive in a given time—625 tons per hour, as against the 900 tons produced by the plant—and so, by running the washer a longer period than the tipple, the former can handle the output without increase in size. If the tipple fails to deliver the coal, the washer goes on working. Conversely, if the washer should have to be closed, due to a breakage or some other cause, the tipple and mine can go on working as if nothing had happened.

This large 5,000-ton mixing bin is 29 ft. wide and 160 ft. long. Its depth at the end near the washer is 65 ft. and at the opposite end 75 ft. Along the top travels a 54-in. level distributing rubber belt with 472 ft. 6 in. centers and a carrying capacity of 1,500 tons per hour. The belt runs on heavy-duty anti-friction troughing idlers, the roll shells of which are of 8-in. diameter and mounted on Timken roller bearings, the same being true of the idlers for the return strand of the belt. The drive pulley of 48-in. diameter revolves at 40 r.p.m. and is connected with a 60-hp. 880-r.p.m. motor through a flexibly coupled herringbone gear reducer.

A tripper which discharges the coal on either side of the belt travels along it backward and forward. It is entirely automatic, self-propelling, and even self-reversing, being under electric control. The chutes from the tripper are provided with a short back chute at their lower end, so that the coal in falling forms two cones with their peaks immediately near the edge of the belt. Without this the coal would be loaded most heavily at the edges and much less deeply in the center (see Sketch (1) in Fig. 3).

As the large coal would roll down the slopes the V-depression in the center would become filled with the larger coal. When the bin, as at night, began to become empty, the lump coal having been previously drawn out, the raw-coal feed to the washer would contain an unusually large proportion of fines and the equipment to clean and dry fine coal would be unable to cope with the large quantity of that size of material.

Moreover, as the fine coal has a low percentage of ash and sulphur when washed, this misarrangement would undo much of the benefit of the careful mixing. By means of the back chutes mentioned, and the two cones which it forms, the segregation is not wholly eliminated but its effect at the bin feeders is overcome, the coarse coal being more evenly distributed.

As the tripper travels slowly along the bin, it drops a 12-in. layer of coal. When it returns it lays another 12 in. There are five pockets in the bin, and each is divided into two compartments. Each compartment has a feeder, and each feeder takes the coal from a level 12 in. above its neighbor in sequence as one approaches the washer. Thus the feeder nearer the washer is taking from layer No. 30, let us say, when the feeder at the other end is taking from layer No. 20 and intermediate feeders from intermediate layers. In this way the belt is carrying coal delivered in ten separate passes of the tripper and in exactly equal proportions.

One 5-hp. motor at 900 r.p.m. serves for each pair of feeders. The motor actuates a worm drive through a Texrope; the feeder head shafts are direct-connected to this worm drive. A clutch permits the feeders to be operated independently. The rubber-belt conveyor for the mixed coal, which is 334 ft. long between centers, is 48 in. wide and has a capacity of 750 tons per hour. It has a drive similar to the distributing conveyor, but it is provided with a solenoid brake that will prevent backward motion of the loaded belt should the power fail.

Before the end plates, or hoods, on the chutes of the tripper were provided, the balance in the size of feed was so disturbed within 30 min. after the shutting down of the tipple that the screens gave trouble. Since the end plates were

Fig. 3—Sketch Showing Tripper Spouts (1) Without End Plates to Reverse Coal Flow (2) With Such Plates. Also Piles in Bin Without and With End Plates

Fig. 4—Where Coal From Bin is Fed to Lower Strand. Gallery Looks Level but Is on a Steep Pitch

adjusted the screens have given entire satisfaction, for now no more is demanded of them than was purposed in their design. This change in the tripper chutes has saved 15 to 30 min. of delay daily.

On its way to the mixing bin, and as it leaves it, the coal is weighed by a Merrick Weightometer. After mixing, the coal goes to a Bradford breaker, which is 12 ft. in diameter and 22 ft. long, with a capacity of 750 tons per hour. This is equipped with a 4½-in. round screen, which takes out some of the slate and a large part of the tramp iron, sacks, wood, etc. The company is now introducing a large electromagnet to take out the small pieces of iron and steel which, though they do not interfere with the safety and operation of the Bradford breaker, do endanger the washery elevating and bone-crushing equipment.

The breaker is driven through a Texrope by a 150-hp. 850-r.p.m. motor, wound for 2,300 volts, 3-phase, 60-cycle current. The latter has a compensating starter. The coal, thus broken to about 4-in. diameter and less, falls on a 42x18-in. flight conveyor with flights 21 in. deep, which distributes the coal over four Tyler vibrating screens with wire meshes providing ⅞-in. square openings. Thus sized, the coal is ready for cleaning in the Rhéolaveur plant. Undersize goes to the fine-coal elevator boot and oversize to a distributing conveyor, and thence direct to two primary sealed-discharge launders, which are 48 in. wide.

Like others of this type, the Rhéolaveur sealed-discharge plant can be operated on more than one specific gravity. The slope of the launders, height of the Rhéo-box barrages, the quantity of push water used, quantity of countercurrent used, and the width of slate-gate opening determine the specific gravity of washing. The washing gravity can be raised or lowered by an increase or decrease in any of the aforesaid factors. If it be found desirable to reduce the specific gravity to wash coal that seems to need such treatment, the adjustment can be made without changing the slope of the launders.

By bucket elevators (two strands of 20-in. buckets) the refuse from both the No. 1 Rhéo-boxes is lifted to the top of the first rewash launder. The middlings, which are deposited in the No. 2 boxes of the primary launder, are lifted by a double-strand bucket elevator, with each strand 20 in. wide, and delivered to the head of the primary launder. The first box of the first rewash launder draws off a secondary refuse, which is lifted in one compartment of a double elevator, which compartment has buckets that are 28 in. wide. This secondary refuse, which has real coal values, is crushed in a Jeffrey single-roll crusher to 1½ in. and run into the top of the final sealed rewash launder.

Material from the second box in the first rewash launder is elevated in a 16-in. bucket conveyor and is fed back into the first rewash launder. On the final rewash the material that passes through the first box is elevated in 16-in. buckets on the other half of the bucket conveyor which had the 28-in. buckets.

Fed from the elevator to a trommel with holes of ⅞-in. diameter, the oversize goes to the refuse boot and the undersize to the fine-coal boot. The product from the second box of the final rewash can be fed to the final rewash, the first rewash, or the primary launders as desired, and in any proportion. The product that leaves the ends of the launders passes over three dewatering shaking screens, which are 8 ft. wide and have ⅞-in. round holes. The oversize of the screens travels on the main loading conveyor to the railroad car. Undersize goes back to the fine-coal boot.

Coal is fed out from the fine-coal bins into the *A* launder of the free-discharge plant through 48x24-in. drum-type feeders. This free-discharge plant is of the standard five-launder type. The end products of the two *A* launders and the two *B* launders is metallurgical coal. The end products of *C*, *D*, and *E* launders are sent back to the fine-coal boot as regulating product. The first two boxes of each *D* launder and the first two of each *E* launder deliver refuse.

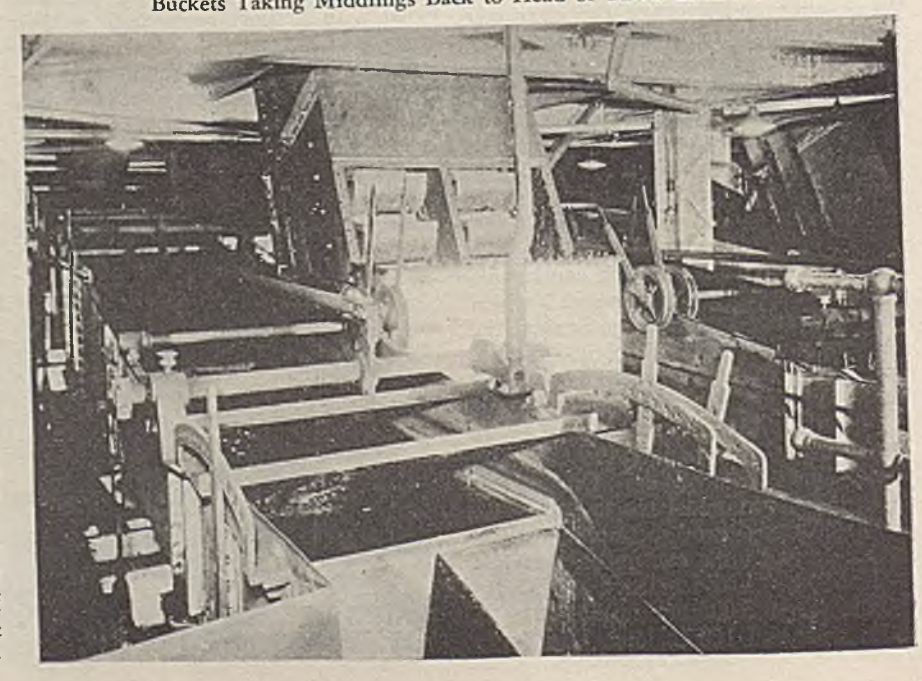
Metallurgical coal from the *A* and *B* launders passes over two dewatering shaking screens equipped with a ⅛ mm. wedge-wire jacket. Oversize from the fine-coal dewatering shaker is conveyed by a 36x10-in. flight conveyor to the upper strand of the loading conveyor, which feeds it into five Carpenter dryers, type AR-4. Only three of these dryers are normally operated on this product.

Undersize from the fine-coal screens is divided, half going to a Dorr thickener, 120 ft. in diameter, and half to the fine-coal boot, the purpose being to provide that some of the minus ⅛-mm. material will be carried over with larger material on the screens and will thus be handled without the use of the Dorr thickener, thus lightening the load on that unit.

Product from the Carpenter dryers is discharged onto the lower strand of the loading conveyor in such a way that it is mixed with the coarse coal from the dewatering screens. On this conveyor it travels to the railroad car.

Effluent from the Carpenter dryers is sent to a small elevator boot, from which it is raised on a 24-in. bucket elevator. Thence it is sent to a sixth Carpenter dryer which is equipped with ⅞-in. perforated plate. The dried product

Fig. 5—Primary Sealed-Discharge Launders With No. 2 Rhéo-box Coal Buckets Taking Middlings Back to Head of Those Launders



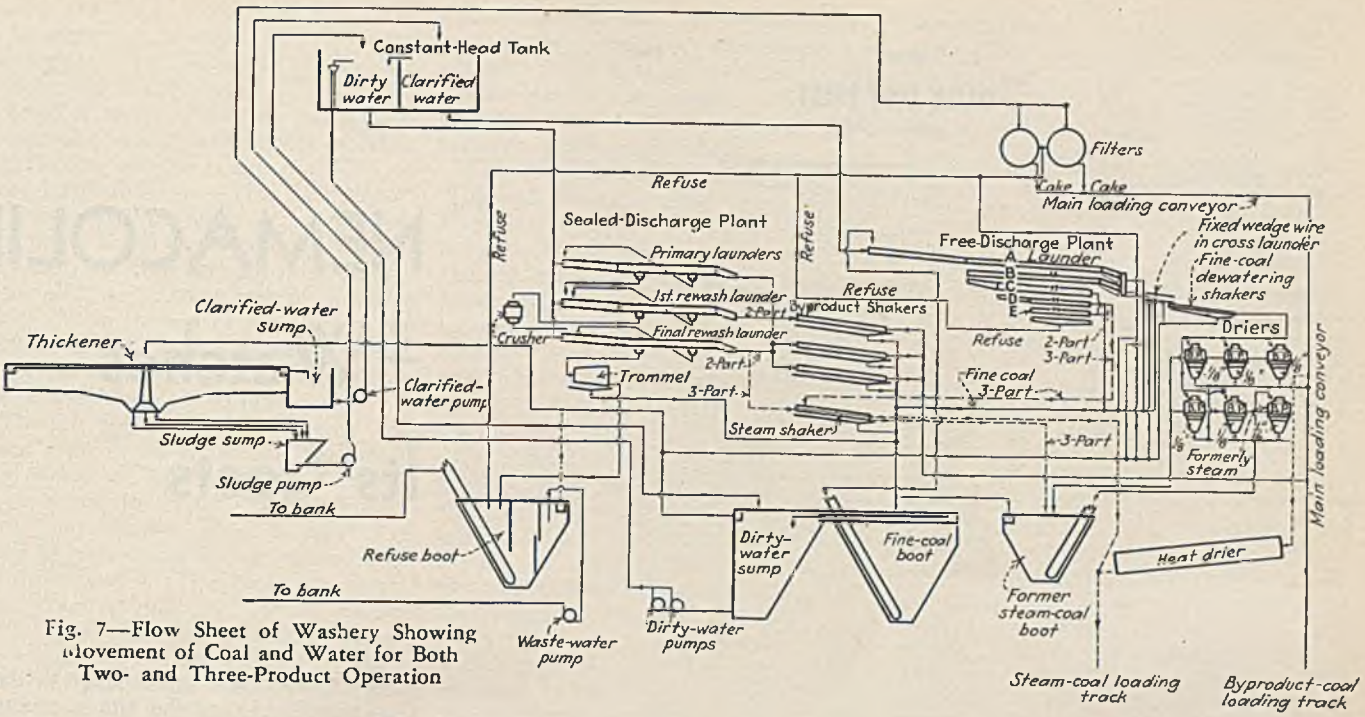


Fig. 7—Flow Sheet of Washery Showing Movement of Coal and Water for Both Two- and Three-Product Operation

from this Carpenter dryer drops to the main loading conveyor, while the effluent from that dryer recirculates to the elevator boot.

Samples of the raw coal, washed coal, and refuse are taken automatically, the sample gates being operated by air cylinders electrically controlled, and so arranged that the sample gates operate simultaneously and in synchronism with the conveyors from which they cut the sample. Samples, taken every 20 min., are brought to a central sampling station, where they are crushed and cut down to the weight desired.

About half of the total circulating water is pumped to one compartment of a constant-head tank, which supplies the water for the sealed-discharge plant and for the push current in the free-discharge plant. The other half of the circulating water passes to the Dorr thickener and the overflow of clarified water is pumped to the other compartment of the constant-head tank. This water contains only 0.01 per cent solids.

The clarified side of the constant-head tank supplies the water for the vertical currents in the free-discharge plant, and the excess from this clarified-water compartment overflows into the dirty-water compartment, providing the additional water needed for the sealed-discharge plant. The underflow from the Dorr thickener, containing 45 per cent solids, will be pumped to two American filters. The cake from these filters will be dropped to the loading conveyor to be loaded with the other metallurgical coal. The minus 48-mesh at Nemacolin is reduced 1½ per cent in ash and 0.3 per cent in sulphur by the cleaning process. Consequently, the thickener underflow can be added to the metallurgical coal without seriously raising its ash and sulphur analyses.

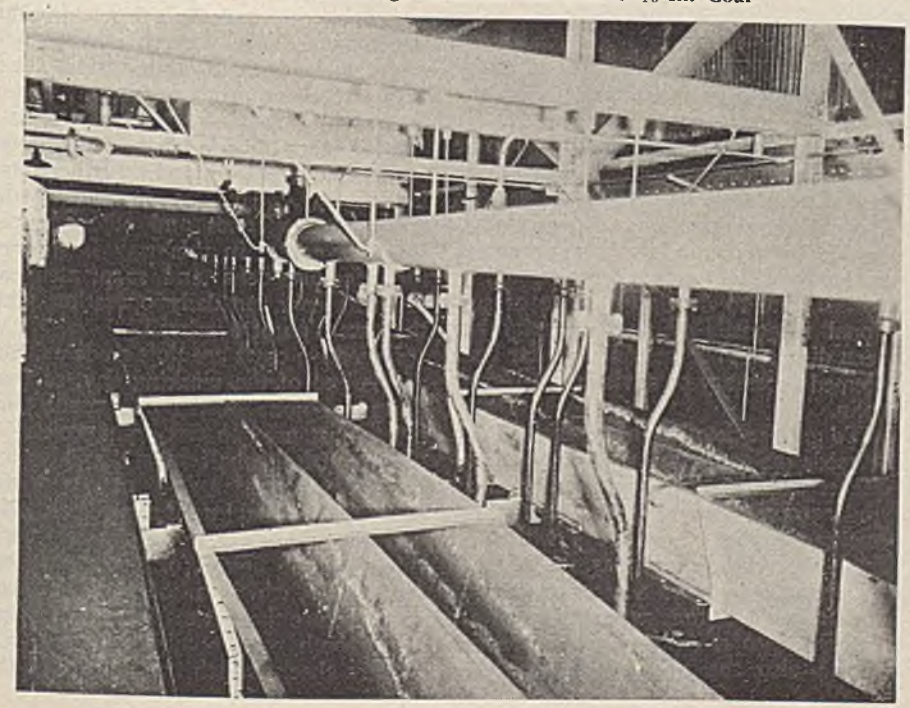
Filter effluent will be sent to the clarified water sump adjacent to the thickener, and the refuse boot will receive only refuse from the sealed- and free-discharge plants. The overflow from the refuse boot will then be about 150 gal. per min. and will flow into the thickener feed. The water supply of the washer is taken from the river, and after the filters are installed should be from 100 to 150 gal. per min.

As originally planned, the Nemacolin plant made three products: metallurgical coal, steam coal, and refuse. In order to produce a steam coal with a low water content, provision was made for drying the product in a Christie direct-heat contact dryer of 8 ft. 6 in. diameter and a length of 65 ft., equipped with a Buffalo type M exhauster fan of the Buffalo Forge Co., with Cokal stoker and a Claradge fan. A furnace burning wet coal located in the dryer building furnishes heat for the washery.

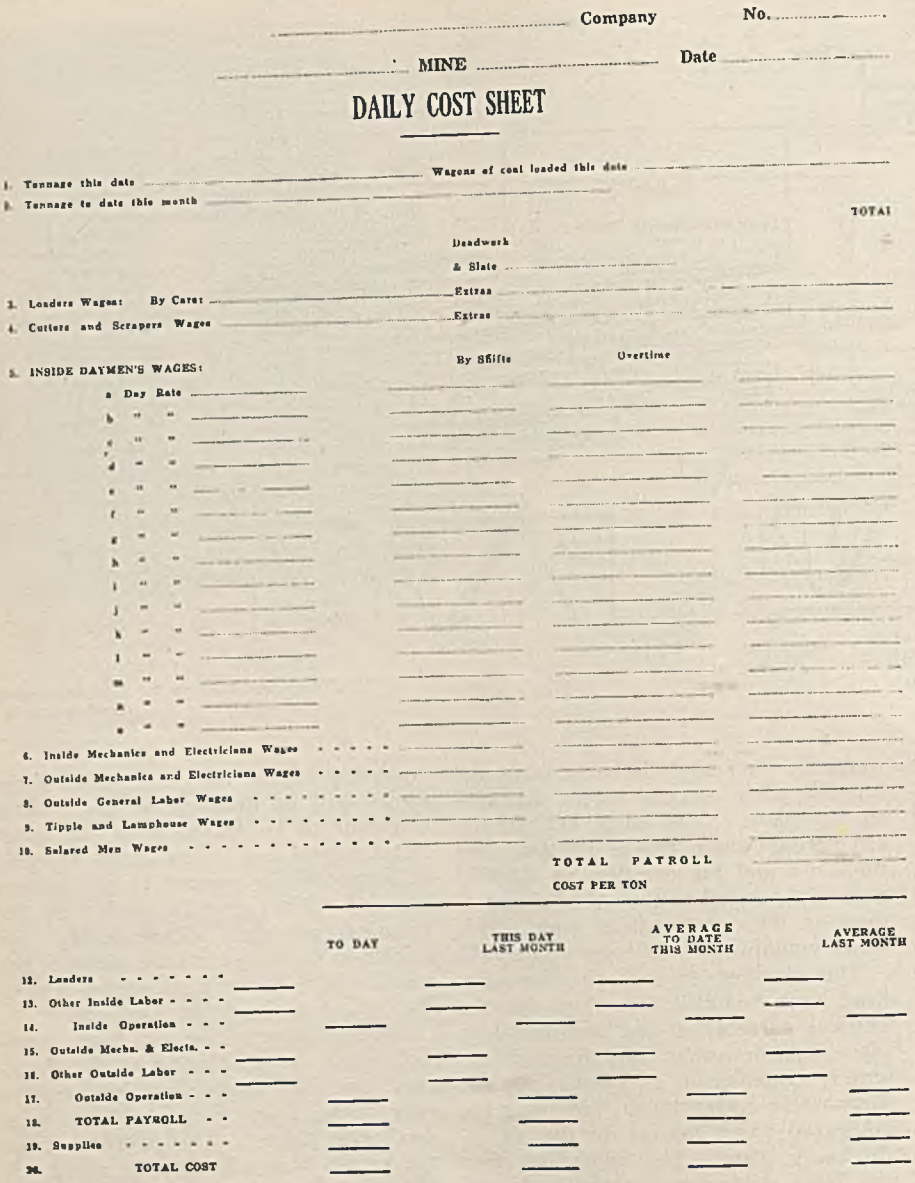
When on the three-product separation—byproduct coal, steam coal, and refuse—the minus ⅛-in. material in the steam coal could be taken out and the product would then be delivered dry enough for pulverizing at the steam plant. By mixing the minus ⅛-in. steam coal with the larger-size byproduct coal, the latter would be dry enough for charging into ovens. The fine-sized steam coal was so clean that it did not increase the impurity in the mixture.

(*Turn to page* 414)

Fig. 6—Free-Discharge Launders for Minus ⅛-In. Coal



NEMACOLIN +Watches Its Costs



Company No.

MINE Date

DAILY COST SHEET

1. Tonnage this date — Wagons of coal loaded this date
2. Tonnage to date this month

TOTAL

3. Loaders Wages: By Carat — Deadwork & Slate — Extras
4. Cutters and Scrapers Wages — Extras

5. INSIDE DAYMEN'S WAGES:

	By Shifts	Overtime	
a Day Rate			
b " "			
c " "			
d " "			
e " "			
f " "			
g " "			
h " "			
i " "			
j " "			
k " "			
l " "			
m " "			
n " "			
o " "			

6. Inside Mechanics and Electricians Wages
7. Outside Mechanics and Electricians Wages
8. Outside General Labor Wages
9. Tipple and Lamphouse Wages
10. Salaried Men Wages

TOTAL PAYROLL

COST PER TON

	TO DAY	THIS DAY LAST MONTH	AVERAGE TO DATE THIS MONTH	AVERAGE LAST MONTH
12. Loaders				
13. Other Inside Labor				
14. Inside Operation				
15. Outside Mechs. & Elects.				
16. Other Outside Labor				
17. Outside Operation				
18. TOTAL PAYROLL				
19. Supplies				
20. TOTAL COST				

Daily Cost Sheet Bringing Daily Realization of Costs of Production With Possibility of Further Savings

DETAILED cost accounting gives the management of the Buckeye Coal Co. every opportunity to note and eliminate the wastes in operation which are inherent in the coal industry as in all business and which can be avoided only by some system that enables these wastes to be detected and that furnishes information as to the relative success already attained by the several departments of the company in the elimination of such wastes.

In accounting there are two principal checks on expenditures; check by time and check by department. In the one case the comparison is made between the cost in the present day, week, month or year and some other period of time of equal duration but of earlier date. The other is a comparison of cost between one mine and another or one section of a mine and another or between one department and another. Thus far the Buckeye Coal Co. has installed only the former, by which the cost of every item of operation is compared with the same item in the previous month.

Sectionalizing of the mine so as to be able to compare contemporaneous costs of different sections, to put the various sections in competition with each other in a desire to obtain low costs, to furnish norms by which section foremen will be guided, and to develop a sense of sectional responsibility and authority has been discussed but has not thus far been deemed necessary or advisable at Nemacolin.

To get the detailed information which it needs the company employs two timekeepers, one a surface and the other an underground man. They both carry buckram-backed time books which set forth the time of each dayman, to each of whom is assigned a separate page in the book. The timekeepers' figures are entered onto a daily cost sheet which shows also the tonnage for the day, wagons loaded and the tonnage to date this month. From the tipple records are obtained the loaders' wages by cars, the wages of the cutters and scrapers, and the quantity of slate dumped. From the timekeepers' records are noted the inside daymen's wages according to their several rates, the number of shifts, and the overtime.

Other costs recorded by shifts and overtime are inside mechanics' and electricians' wages, outside mechanics' and electricians' wages, outside general labor wages, tipple and lamphouse wages, and wages of salaried men. From these the total payroll charge and the cost per ton for the day in question can be calculated and spaces are left for such entries.

Under these entries is a briefer statement on which is compared the figures for the day at issue with the same day last month, the average to date for the present month, and the average for the last month. The figures entered are wages to loaders, to other inside labor, with a total for inside operation; wages for outside mechanics and electricians, and for other outside labor, with a total for outside operation and a further total for payroll. This is followed with figures for supplies and other figures for total cost. In this way is entered for vice-president and superintendent the real cost for daily operation with the exception of overhead.

Excessive costs are thus made evident at the end of the working day, so that there are none of the unpleasant surprises that used to vex management at the end of the half month and which had to be regarded as "water over the dam" which could not be put back. No one was quite clear in the old days what might be the figure for the succeeding half month, which indeed was often half spent before the figures for the previous half month were available. This day-by-day check, which covers all but the

known overhead, leaves everyone clear as to what may be expected. From the timekeepers' figures also entries are made direct to the payroll.

Another record which the inside timekeeper fills is the daily report of labor distribution on which are noted 98 or more labor divisions. This daily report shows exactly how many were employed, how many hours they worked, and what was the rate. An account number precedes each item and is part of the form itself. With the aid of this record, the cost clerk has his labor reduced when he prepares to fill up the ledger sheet, which will be described later.

Though the surface timekeeper has noted time in his time-book, each man who works on more than one kind of work turns in under "description of work" on another form a record of what he was doing and a statement of the time worked. The master mechanic, who countersigns the report, enters, under the designation "charge account," the number of the account under which the particular service should be charged. From this, the outside timekeeper can fill out his own daily report of labor distribution, which, though it refers to fewer men than the one filled out by the inside timekeeper, has as many different classifications and accounts. The cost clerk takes this record and with it posts his ledger so as to obtain the costs per day and ultimately per month for each of the major divisions of surface labor.

Having these entered and totaled, he is ready to make his monthly summary, in which is set forth in six pages a statement of the mine operating expense, divided into 247 items. That may seem a large number of entries, especially as they are recorded for the current month, the previous month, and for the year to date, but it must be remembered that it includes not only operating labor but also repairs, together with distributive expenses which are taken from certain other summaries which, though they follow in numbered sequence the summaries described, must be filled before the first summaries can be entirely completed. These distributive expenses are listed on the form headed "Mine Overhead Expenses." They include the costs of superintendence; engineering; mine office; shipping; safety; police, fire and sanitation; hospital and medical; liability insurance; laboratory; general outside expense; stocking coal; loading coal from stockpile. These cover in all 90 items, some of which are themselves distributive expenses covering the steam, electric light, and power; shop expenses; auto truck and accessories; yard switching; and stable expenses taken from still other accounts.

Another sheet summarizes cost of labor camp, whenever there is one, and the expense of the clubhouse. Still another covers miners' houses and the motion-picture theater. A third covers the amusement hall. In the clubhouse and motion-picture and amusement hall accounts provisions are made for listing the revenues from lunches and meals; lodging; ticket sales and rentals; pool, billiards, and bowling alleys.

Another distributive account is from "General Administration and Selling Expenses" which covers the Youngstown overhead, general insurance, and general taxes. This is followed by water; steam, electric light, and power; locomotive cranes, steam shovels, and derricks; auto trucks and automobiles; and stable expense. Each of these accounts is loaded with the distributive expense rightly carried by it, and below each account is a distribution account showing what must be charged against each individual account for units of time or service; percentage of total number of units, whether of time or service; the labor; the material; supplies and expense; with total for each.

All the items listed give not only labor, materials, supplies and expense, and total in quantities and per ton but also the totals in quantity and per ton for the preceding month and for the year to date. These comprehensive summaries are used in the preparation of the cost of producing coal, which is a summation of summations. The mine operating expenses are divided into pick-mined coal; hand-mined coal; company coal; deadwork (slate disposal), general inside expense; timbering; drainage; ventilation; haulage and hoisting; mine tracks; trolley lines; main haulage; hoisting; dumping and tallying; and preparation. The last three items cover the tipple costs only and not the costs of the mixing or washing plants.

After these follow all the overhead charges, including the administrative general expenses and selling charges, payments for royalties, amortization charges for leasehold and development, depletion of coal lands, depreciation of plants and buildings, machinery and equipment, general contingency fund less inoperative expense (idle plant). To this is added mixing expense. The charges of the cleaning plant are omitted, the cleaning being treated as a separate operation for consideration by itself.

Mixing also gets separate treatment, though its expense is ultimately added to production costs. In a summary is recorded the production of mixed coal per day and per hour, the number of days operated, and the number of hours. Separate accounts are kept of the repairs to buildings; concrete mixing bins; concrete feed-bin mixers; slate bins; belt conveyors, drives, brushes, and chutes; Bradford breaker; automatic tripper; weightometers; electrical equipment; and heating equipment. The mixing plant is charged with its own superintendence; engineering; mine office; laboratory; liability insurance; general insurance; general taxes; depreciation of plant; buildings; machinery and equipment, less its inoperative expense.

Because of its greater complexity the preparation-plant account contains even more detail, though in principle the practice is the same. The record also shows the quantity of byproduct and steam coal in tons, figured at a given cost per ton with the value in dollars and cents of the coal as delivered to the cars. The following "practice data" are reported: Coal delivered from mine to cleaner; coal delivered from cleaner to cars; waste; production, cleaned coal; operation by days and hours; and tons of coal used per ton of cleaned coal.

"Monthly Distribution Sheets" are prepared for the payroll and stores. A payroll requisition sheet is made out covering amounts needed for payment of payroll, setting forth the gross amounts, the various deductions, and the net sum required. Reports are made of petty cash collections; rentals from dwellings and tenements; insurance costs, both workmen's compensation and public liability insurance; general office charges; coal used locally and sold to employees; invoiced operating expenses; clubhouse entertainment; shipment of coal to the nine various works of the company and to outside and local customers for "regular" or tipple-prepared coal, mixed coal, and cleaned coal, and finally distributive expenses charged out of operating costs such as water; electric light and power; compressed air; shop expense; yard switching; auto trucks and automobiles; stable; and stores handling.

Another form covers the forwarding of invoices to Youngstown, giving as data; works audit number; person to whom payable; voucher number; date paid; and the following credits; accounts payable; prepaid materials; freight (sight drafts) including audit number; amount paid and unpaid; and total. The debits follow with weight; unit of measure; prepaid materials; and under the distribution account number; inventories of materials and supplies (operating accounts); construction (property accounts); and other accounts.

When an appropriation is desired an "Appropriation Request" is prepared. It details, with the equipment requested, its cost, the present cost of working without it, the estimated savings to accrue from the installation of the equipment, and the accounts with the amounts to be charged in the distribution of the cost.

Forecasting has not been found necessary, because inequalities of expenditure are few and consist mainly in rock-dusting when first instituted, cleaning up fallen rock in airways, and placing steel and concrete in haulageways. The work of driving main entries, panel entries, and headings in panels cost little more one than the other, the main difference being in the cost of brattice, which in

entries has to be more permanent than in the room work.

Consequently the unbalancing of costs so common where entries are partly or wholly in rock and extremely expensive is not likely to occur. Heading driving at Nemacolin produces a good coal tonnage and does not involve yardage charges, rock haulage, rock dumping, and a long train of expense as in thin coal. Hence, there is no need to balance carefully the one against the other with the care necessary where heading work is expensive and relatively or wholly unproductive of coal and room work is far cheaper and more productive of large tonnages than heading work.

By the means adopted by the Buckeye Coal Co. the real costs of every part of the work are made clear. In the old simple distribution of expense it was assumed that certain operations cost no more than the direct labor involved in their performance, overlooking the fact that each division of operation made a draft on some other division. Additional deadwork, for instance, has its effect all along the line, inside the mine, on the rock dump, in the machine shop and in countless other directions.

These should be chased down to get the true cost, for without correct costs, judgment cannot be accurate and enlightened. The accounting department is the eye of the management; without it the most active and capable manager is basing his operation more on guesses than on facts. The cost sheet proves up the success or failure of the effort to produce the output at a profitable figure. Slackness in the accounting department leads to wrong conclusions, hasty judgments, inefficiency, imperfect supervision and excessive costs, all of which it is the part of good management to avoid.

▼ ▼

Mechanically Mixes and Cleans Output

(Continued from page 411)

As already stated, with a two-product separation, launders *C*, *D*, and *E* serve as rewash units, but with the three-product separation, launders *C* and *E* were the regulating units and launder *D* produced steam coal.

Efficiency of cleaning of the metallurgical coal can be judged by Table I.

The ash in the coal has been reduced 27.65 per cent by the washer, and the sulphur 22.74 per cent. The washed coal contains 1.01 per cent sink at 1.55 sp. gr. This sink will run 35.77 per cent ash. The raw coal has 5.22 per cent sink at that gravity which averages 57.40 per cent ash. Excluding sludge losses, the quantitative efficiency is about 99.57 per cent, this efficiency being the product of the percentage of refuse float and the percentage of refuse subtracted from 100.

The water in the metallurgical coal averages 5.2 per cent, due to the admixture of coarse and fine coal. The Carpenter dryers bring the moisture content of the fine coal down approximately to 7½ per cent. From 1 to 1½ per cent of moisture is lost in transit from Nemacolin to Youngstown.

The charge to the coke ovens consists of 80 per cent Nemacolin coal and 20 per cent Pocahontas, which latter contains about 6 per cent ash and 0.65 per cent sulphur. With selective mining carried to the limit, the coal charged to the ovens had an ash content of 8 per cent and a sulphur content of 1.09 per cent; whereas, with selective mining abandoned as a practice and the coal washed, the ash content of the oven charge fell to 6.48 per cent, and the sulphur content to 1.08 per cent. The coke produced in both cases analyzes about 0.88 per cent sulphur. The present furnace coke has 8.8 per cent ash, the domestic coke 8.7 per cent, and the breeze 10.2 per cent.

By cleaning the coal the temperatures at which the ash softens and becomes fluid have been greatly decreased. The ash of four samples of raw coal softened at an average of 2,265 deg. F. and became fluid at 2,318. On the other hand, the ash of four samples of washed byproduct coal softened at an average of 2,648 deg. F. and became fluid at 2,698.

The ash analysis is given in Table II, and it will be noted that the cleaning greatly reduced the percentages of fluxes in the mixture and increased the percentages of non-fluxing materials.

A Gauntt machine has been provided to add lime to the water when needed, but it is used only when the river is low, for the water usually is alkaline. All the larger speed reducers in the preparation plant are Nuttalls and the smaller are Jones units. The building is of steel and covered with Robertson siding. It is heated by York heat diffusers. The tipple and mixing bin were designed by Allen & Garcia and the washing installation by Koppers Rhéolaveur Co., both cooperating with the engineers of the Buckeye Coal Co. and the Youngstown Sheet & Tube Co.

Sixteen men in all are employed in the mixing and preparation plants, a preparation engineer, chemist, two samplers, a foreman, sealed-discharge operative, free-discharge operative, Carpenter-dryer operative, three Dorr thickener men, an oiler, mechanic, electrician and mixing-bin operative. The thickener men work on separate 8-hr. shifts. As the plant was designed for 600 tons an hour and as in regular operation it runs 625 to 650 tons an hour, though it has run to 675 tons, the usual running time is from 10 to 11 hr. The cost for labor must not be considered without recognition of this fact. About 7,200 tons is washed daily.

Table I—Float-and-Sink Test on Raw Coal and Analysis of Metallurgical Product

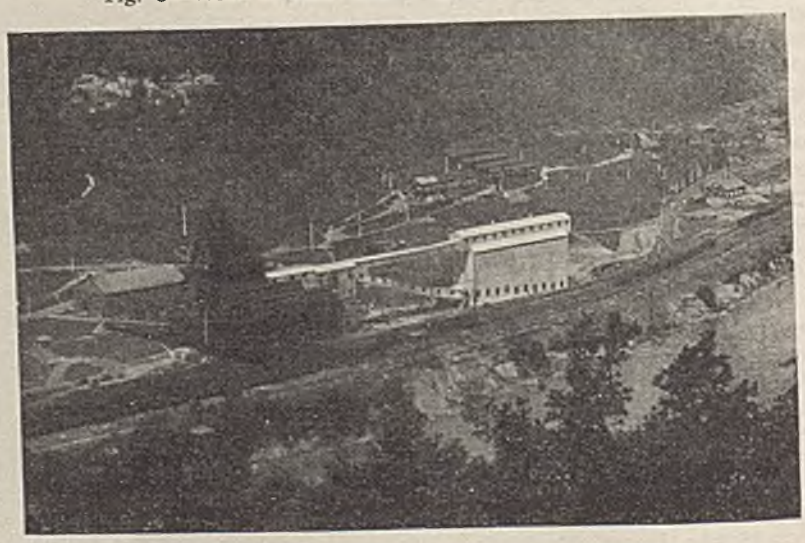
(Specific Gravity of Test, 1.55)

	Raw Coal Float		Metallurgical Coal	
	Ash	Sulphur	Ash	Sulphur
Six months, 1930..	6.71	1.20	6.84	1.19
January, 1931.....	6.73	1.19	6.96	1.20
February, 1931.....	6.73	1.17	6.79	1.20
March, 1931.....	6.61	1.22	6.54	1.20
April, 1931.....	6.70	1.18	6.66	1.22

Table II—Ash Analyses

	Raw Coal		Byproduct Coal	
	Per Cent Coal	Per Cent Ash	Per Cent Coal	Per Cent Ash
Total ash.....	9.2	100.0	6.08	100.0
Iron.....	1.02	11.09	0.40	6.58
Si_2	3.78	41.09	2.82	46.38
Al_2 $_3$.....	2.74	29.78	2.15	35.36
Ca).....	0.66	7.17	0.24	3.95
MgO.....	0.60	6.52	0.34	5.59

Fig. 8—View of Plant Including Mixer and Washery



BRIER HILL

+ An Old Mine, but Efficient

AN EXAMPLE of a mine that in the past has been worked on the room system, with pillars left for future generations to withdraw if they could, Brier Hill is an exhibit of what can be done despite the immense difficulties which such a system involves. It is no small feat that Brier Hill should have produced in 1930 no less than 546,000 tons, at an average daily output of 2,000 tons. This year the mine, because of diminished demand, has been producing 1,500 tons daily. At this recent rate the life of the mine will scarcely exceed eight years.

In some regions the recovery of the pillar coal in a mine might be an easy matter and large tonnages would be obtained without any effort of management. But a mine in the Pittsburgh seam, with rooms driven many years ago and left with pillars intact, presents a difficult problem, which even the 92-in. of coal at Brier Hill cannot measurably decrease. Falls in the abandoned rooms and headings invariably extend in this mine to the top of the roof coal, which is about a foot thick and lies directly over the drawslate, causing a fall of 4 or 5 ft. of material. In many cases the falls extend many feet higher.

Brier Hill was acquired as a going concern in 1923, but the company immediately electrified it and prepared it for more efficient operation. When the mine was taken over it was completely developed in a layout typical of the Connellsville region. The main entry consisted of four headings from which flat entries, with their tributary room or butt entries, were turned. Rooms were 14 ft. wide on 80-to 90-ft. centers and 300 ft. long. The former owner had left a sizable coal area on line with the main entry and a few branching territories, almost all of which had been first-mined. The unworked coal is being left in place till later, because it protects the roadways; guards against a possible squeeze; and because leaving it makes it possible to work wholly on the retreat. In consequence of the former method of working, little solid coal remained, and the pillars, only partially extracted, were flanked largely by openings that had partly or completely caved. This coal is now being mined on a full retreat.

Conditions encountered below ground are much like those in the remining of the "Big," or Pittsburgh, Bed in the Georges Creek region of Maryland. However, there is one striking difference: At Brier Hill the coal lies, where the hills are highest, at the greater depth of 1,000 ft., and at no less than 650 ft. over the entire field, whereas in the Georges Creek region the cover rarely exceeds 200 ft. Despite these

J. N. Hedding
Superintendent, Brier Hill Mine

obstacles, the property is valuable to the company because it yields a high-quality metallurgical coal.

Comparisons of this plant with the Big Bed mines of Maryland can be broadened to include mining methods also. Timbering methods are strikingly alike, and in each case little progress is made without a generous utilization of lagging and forepoling. In neither instance can the recovery of pillars in the caved areas follow a standard plan. Mining methods must be made largely to order with each variation of conditions. In some places the falls in the rooms and headings have been loaded into cars and brought to the surface for disposal; but in others, pillars have been skipped or split; in yet others, places have been driven through the pillars so as to shorten the length of room roadway that had to be kept in condition; again in other areas pillars have been slabbed. At times it is found necessary to drive tunnels through caved ground to reach standing coal.

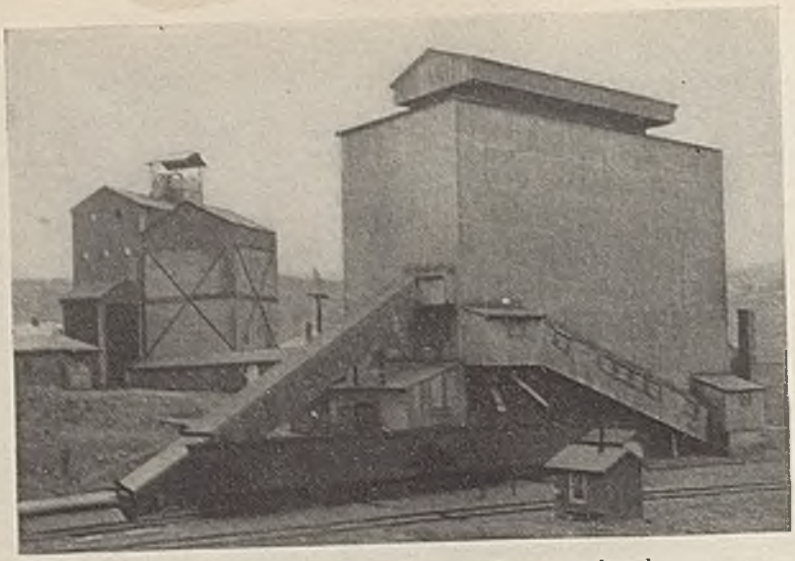
So also, as in the Big Bed, it has been found that the abandoned rooms were not accurately mapped before they were allowed to cave. That underground conditions are unfavorable to operations is indicated by the fact that only 30 per cent of the coal is machine-mined.

The average daily output of the loaders is about 10 tons. They timber their places where conditions are favorable; otherwise, company men erect the roof supports.

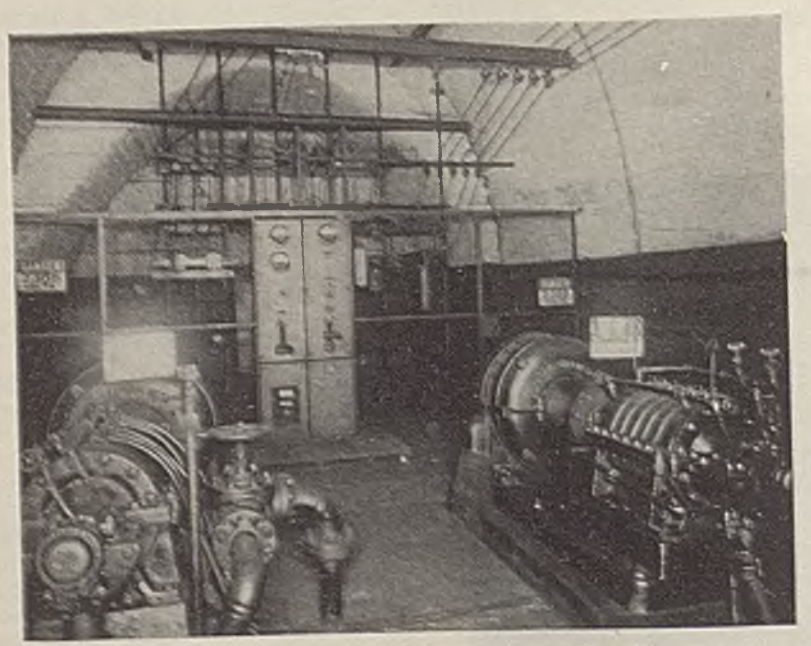
As already said, soon after the acquisition of the Brier Hill property, in 1922, plans were made for the electrification of the plant with purchased power, thus replacing the inefficient steam plant then in operation. This work was completed in 1924. An electric hoist was installed to replace the steam unit; a new motor-driven fan was erected in lieu of a steam-driven unit; and the compressed-air mine locomotives were displaced by trolley locomotives, changes resulting in greater efficiency and decreased upkeep cost.

Only one bituminous mine in the eastern part of the United States has a deeper shaft than that at Brier Hill, which latter measures 654 ft. from ground landing to coal, the total lift of the car hoist being 715 ft. That deeper shaft is at St. Michael, Pa., at the mine of the Maryland Coal Co. of Pennsylvania. The hoist at Brier Hill is of Nordberg construction, has a stepped drum 7 to 13 ft. in diameter, and is powered by a General Electric 600-hp. 2,300-volt slipring induction motor with magnetic control and grid resistance. It is equipped with Lilly control having a man-hoisting attachment. The hoisting cycle is 30 sec., including the stop for caging. The hoisting ropes are of $1\frac{3}{8}$-in. diameter.

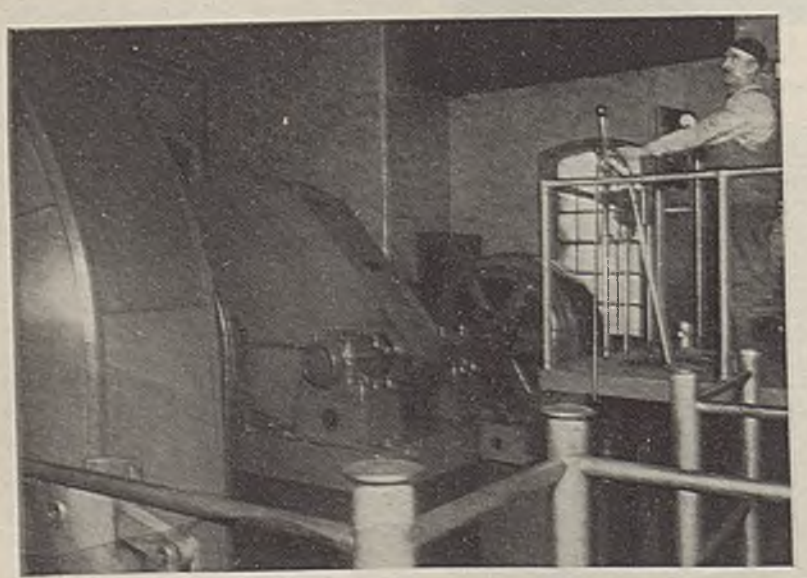
Last year, with the operating schedule averaging about 2,000 tons per day and five days per week, the total purchased-power requirement of the mine was 4.73 kw.-hr. per ton of coal mined. This included the Peale-Davis cleaning plant, which consumed 1.25 kw.-hr. per ton of coal treated. Electrical requirements



Brier Hill Preparation Plant in Foreground and Hoisting Shaft in Rear



Installed at Shaft Bottom in 1924 When Mine Was Electrified



Hoisting Coal From Second Deepest Bituminous Coal Mine Shaft in Eastern Part of United States

inside the mine are not large, because stock is used to gather the coal and only a small percentage of the coal is undercut by machine. The 15-min. maximum demand of the plant averages approximately 800 kw.

One substation, located on the surface near the hoisting shaft, furnishes all the direct-current power, which at this mine is 550 volts. The conversion is by two 200-kw. synchronous motor-generator sets with manual control. In the substation building is housed a standby power unit consisting of a 300-hp. 8-cylinder Sterling gasoline engine directly connected to a 125-kva., 2,300-volt generator. This engine can be used to drive the mine fan at normal speed in case of failure of line power. It is started once a week, in order to make sure that it is in condition at all times for immediate operation.

Four Deming gathering pumps and two high-head pumps located in a permanent station close to the bottom of the hoisting shaft keep the mine free from water. The latter are Allis-Chalmers 6-stage 300-g.p.m. bronze units driven by 125-hp. 2,300-volt induction motors. The control is manual and the pumps are primed by the water contained in the column line. As standby units are kept two Allis-Chalmers pumps of 200-gal.-per-min. capacity. A 200-gal. per-min. Barrett-Haentjens pump removes the water from the shaft sump.

All the water is pumped at night on the off-peak power rate. Whenever coal is being hoisted during on-peak hours, the main pumps are shut down. Water for sprinkling lines is provided by a field pump.

Section switches on the 550-volt trolley system are mounted in brick vaults along the rib. In each vault there is a manual-reclose overload circuit breaker and a safety switch in series. In order to keep "close tab" on all wastes, the fan, town, mine, hoist, cleaning plant, and each motor-generator are separately metered.

All the coal mined at Brier Hill is cleaned on Peale-Davis tables, made by the Clearfield Manufacturing Co., but installed by the Buckeye Coal Co. The coal is dumped into a 300-ton bin and is fed to a 30-in. rubber-belt conveyor by a Webster Manufacturing Co. feed. This belt has a capacity of 225 tons per hour and delivers the coal into a Pennsylvania 50-hp. single-roll crusher, which reduces it to 2-in. coal and under, after which it is delivered by a 36-in. rubber-belt feeder to the primary table, which is reciprocated back and forth 145 times per minute by a 30-hp. motor run at 900 r.p.m. and connected to the table through a Reeves speed reducer with Texrope drives from motor to speed reducer and from speed reducer to table. As the table weighed 30 tons, it was only after some experimentation that a suitable drive was found. The-

(Turn to page 433)

HOW GAS IS CONTROLLED

+At Buckeye Mines

TO SOLVE the problem of ventilating adequately a large mine which liberates gas and has traveled back several miles underground, and to achieve that end without resorting to an excessive water gage and a high power bill, Nemacolin has introduced a duplicate system of ventilation. A separate fan ventilates the more remote half of the present workings, drawing the air through a shaft 3 miles from the tipple and exhausting through another compartment in the same shaft. The nearer half of the mine is supplied with air from openings near the river, which air is exhausted through a shaft not far from the main shaft and the material slope.

Independently operated, the two fans have entirely distinct ventilating systems; they are neither in parallel nor in series; each is as independent from the other as if it were operating on an entirely separate mine, the two parts of the mine being cut off from each other by air locks in the haulageways and by stoppings in the other headings.

Of Jeffrey forward-blade sirocco type, each fan is capable of providing the mine with 400,000 cu.ft. of air per minute at 5-in. water gage, if the resistance to circulating that quantity of air should require that pressure. Just at present the combined flow of air is 676,000 cu.ft. Both fans are of 14-ft. diameter and 6 ft. in width and are operated exhausting. With an exhaust fan no pressure in excess of atmospheric is built up in the high places of the mine. Consequently gas will be some time in coming out into the roadways should the fan stop or the pressure fall, due to a drop in barometric pressure. For this reason, with an exhaust fan, mine conditions are measurably safer in times of low barometer or when there is a derangement of the ventilating systems or a stoppage of the fan. The flow of air in that case would be inward toward the worked-out areas rather than outward, the increasing pressure driving the air and gas away from the roadways.

A mine with a heavy cover is largely sealed from above. No gas can escape from the workings to the surface, even though the pressure system be used. Similarly with the exhaust system no gas can enter from the surface should gas lines break, for the roof is too dense for the gas to pass through it. A shallow mine with many large breaks might quite conceivably favor a pressure system, but the suction system has been approved by most authorities for deeper seams. Certainly at this mine, with every part of it at depth, there could be no advantage in a plenum system.

It is said that at one place, where the coal has been removed and the surface had subsided, a well that had been driven short of the coal bed continued to furnish water, showing how waterproof and by analogy, doubtless gasproof also the measures are.

Air drawn in by No. 1 fan enters the mine by many channels—the main hoisting shaft, from which the man-elevator compartment and skip compartment are sealed off; the material slope; and an airshaft 179 ft. deep sunk not far from the Monongahela River at a point 1¼ miles up that stream—that is, south of the main shaft. The last-mentioned opening receives about 75,000 cu.ft. of air per minute. It was sunk to lighten the load on this particularly long split. To get enough air down the First South Flat, which this shaft ventilates, it would have been necessary to put regulators on the short splits; this would have given the whole mine a resistance that would have reduced the entire air flow or greatly increased the cost of power if the air flow were maintained.

A shaft solved this difficulty satisfactorily. The needs of long splits cripple the ventilating system of an entire mine and a secondary source of intake air may frequently be the best way of meeting the problem.

At Nemacolin, the main air current enters the mine by seven parallel intake headings and, after removing the gas at the face, returns by seven parallel return headings, the headings in the center of the entry system being intakes and the outer headings returns. Formerly the four headings in the center of the entry system were all tracked for haulage, but with the driving of the B Mains, only two of these were used for haulageways. On each side of the four headings forming the original track system are manways, and outside of these are airways for the return. With such a liberal provision for intake and return headings no wonder that a large volume of air was passed into the mine at a relatively low resistance. No. 1 fan is at present circulating 394,000 cu.ft. of air per minute at a 4-in. water gage.

No. 2 fan takes care of all ventilation beyond and including the Fourth South Flats and even some of the ventilation of what would have normally been an extension of the Third South Flats but was established as an offshoot of the Fourth South Flats. No. 2 fan is located on level, almost unwooded ground beyond the top of the ridge paralleling the Monongahela River and where the general slope inclines toward the west. A two-compartment shaft, 347 ft. deep, lined with concrete was sunk at this point by the Johnson Construction Co., the cross partition being of paving brick and 13 in. thick. The construction, therefore, is strong and fireproof. The shaft has two semicircular ends with an interior radius of 7 ft., the distance between the centers of the two semicircles being 11 ft. 6 in. making the larger interior diameter of the shaft 25 ft. 6 in. and the smaller 14 ft.

Air velocities of 1,800 ft. per min. are reached in this shaft. In the No. 1 airshaft, which incidentally is 243 ft. deep, the velocity is only 1,200 ft. per min. partly because that shaft is only one of several intakes. As the distance the air travels at these velocities, which are high but not unusually high for shafts, is short, the resistance is not greatly increased thereby. At No. 2 fan shaft the air goes down one compartment and, after circulating through the workings, travels up the other. No. 2 fan gives 282,000 cu.ft. of air per minute at 2.7-in. water gage. Though the bottom of the shaft is flat with a covered sump at its foot, the edges of the roof where they intersect with the headings have been carefully rounded so as to decrease turbulence as far as possible.

It may be added incidentally that the partition in No. 2 airshaft is arched slightly so as to increase its bearing on the walls of the shaft and thereby to give it greater strength and longer life. Headings come into the shaft on all

sides at an angle of 45 deg. to the direction of the butts and faces. A steel ladder is erected in one of the compartments of the shaft. This is of the safety-back type—that is, it has steel-plate rings at short distances forming a semicircular guard around the traveling side of the ladder so as to protect the climber from the possibility of falling down the shaft. To further aid him in his long climb, landings are provided at 20-ft. vertical intervals, which landings are in the form of gratings through which the air passes.

Although coal is left to support the roof, heavy falls have occurred in some of the roadways and airways. The former have in general been protected by steel and brick, but the airways have not. Falls accordingly have made it at times necessary to raise the ventilating pressure. For this reason tracks are laid in the airways, and the rock which has fallen is hauled out in mine cars by horses. Though the air in the returns has a low percentage of gas, animal haulage is used in order to render safety doubly sure. In a few cases to obtain temporary relief the rock was spread out and not removed, but the general, and almost invariable, practice has been not to level the rock at all but to remove it once and for all to the slate bank on the surface.

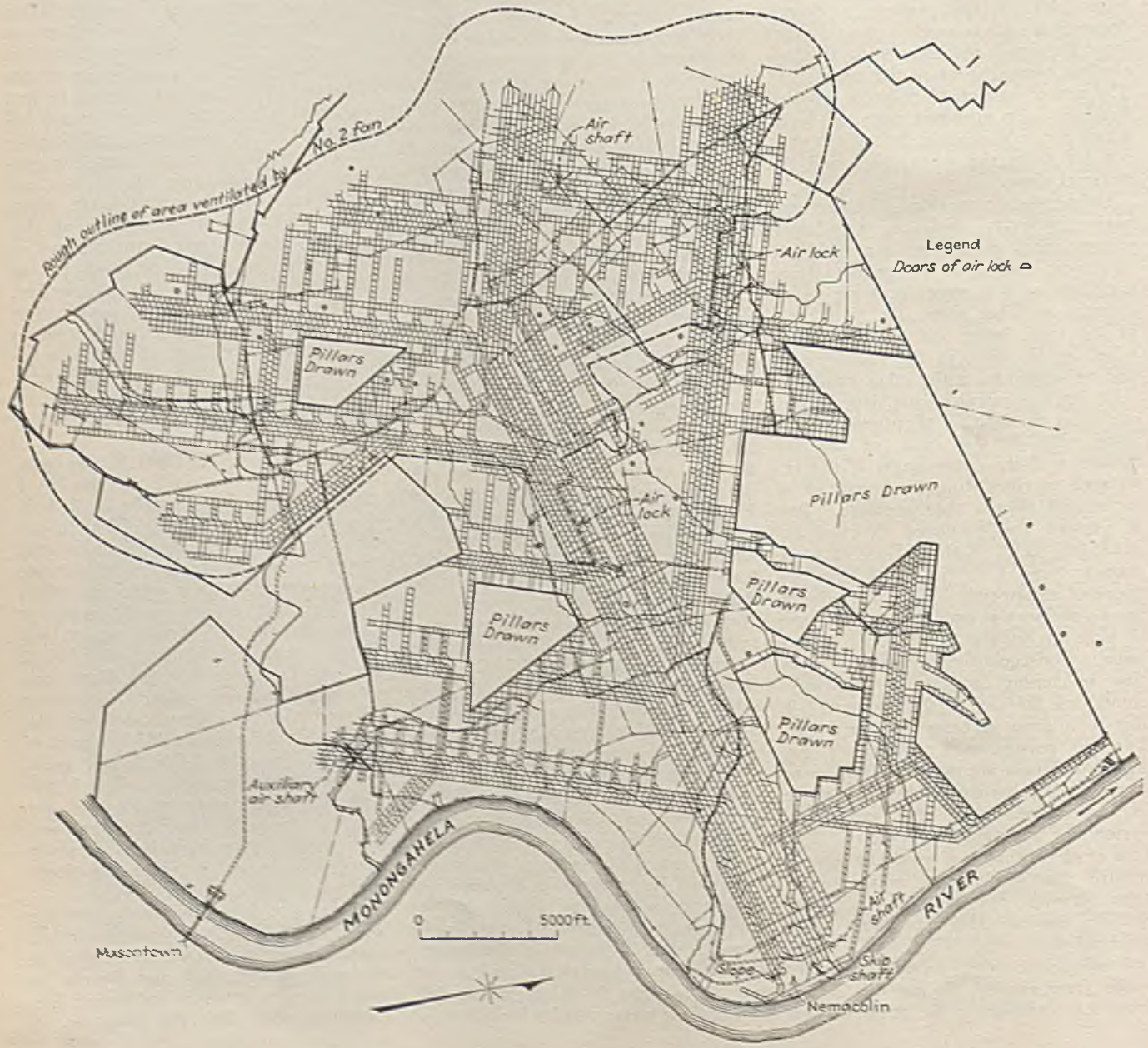
No headings have been freed of fallen rock solely because it was there to be removed, for resistance to the air current is not always undesirable. It is to be condemned only when it prevents the desired quantity of air from reaching the working face. In every case the cleaning has been done because a shortage of air seemed likely to be experienced in a short time, due to the condition of the heading.

Otherwise the management might have gone to tremendous cost and inconvenience to clean up an entry only to find that if regulators were not placed in it, that entry would take away air that rightly belonged to some other entry having a greater resistance. Regulators are just as objectionable as falls of rock. They waste as much power, and so rock falls are not cleaned up until the need becomes apparent or may be anticipated, due to further extensions or to an increase in the quantity of gas emitted by the workings.

When more air is needed or will be needed, prompt action is taken. When one split is cleaned it may take air from another and then the cleaning of the other split is an indicated measure, for with all the splits cleaned which need cleaning a minimum power bill is obtained. When cleaned an effort is made to have the roadways of no less than 70 sq.ft. in area. This is not difficult, as they are driven 12 ft. wide.

Formerly all the coal was undercut, and falls of roof were more frequent

Fig. 1—Nemacolin With Its Intakes, Returns, and Airlocks



than today, because the coal is now cut near the roof, which is thus protected from the violence of shots. The floor of the airways gives no trouble. A layer on the surface swells and, held at the ends by the pillars, bends upward enough to become drummy, but the clay does not soften and lift in quantity, nor does it squeeze out from under the pillars.

Formerly all permanent stoppings were made of single brick with a pilaster of brick in the center to give the necessary stiffness, the bottom being notched into the floor, ribs, and roof (see Fig. 2). Today, permanent stoppings on the main entries are of double brick without any pilaster and similarly notched into all points of contact. Cement mortar is used to make the edges of the stopping tight on all four sides. As the intake headings are grouped together, as also are the returns, it is not necessary to build as many stoppings as the number of headings might appear to indicate. With several airways side by side with the air traveling in the same direction and no stoppings in the crosscuts between them, the air travel is not greatly impeded by a single fall, as it can find always not one detour but two around the restricted airway and can utilize all parts of the airway except that short section between adjacent crosscuts in which the fall has occurred. All of which is a happy thought for anyone who is responsible for the safety of the men below ground. In a case like this, life does not hang by a single thread. A roof fall in a heading, even if it blocks the entire airway, affects the passage of air but little.

Though all permanent stoppings are built of incombustible material, temporary stoppings are frequently made of boards and props spiked together so as to exclude air, but sometimes brick laid in lime mortar is used for that purpose, and all joints are made as airtight as possible.

Quantity of air supplied is regulated always by air analyses of the split. Rarely are there as many men in any one split as the law permits. Rules provide that the last crosscut of every pair of headings, whether working or idle, must have at least 20,000 cu.ft. of air passing through it and also that at least 2,000 cu.ft. of air per minute must travel behind the line brattice in every working place and the area provided for the travel of the air must not be less than 12 sq.ft., or 2 ft. wide where the roadway is 6 ft. high. On room headings the air currents are so checked with canvas curtains that the air will be caused to circulate to the face of the rooms. A curtain is hung at not less than every seventh room and one is placed between the last two rooms or headings.

No more than one crosscut is permitted to be made inby an open crosscut and, wherever possible, crosscuts are turned only on the side opposite

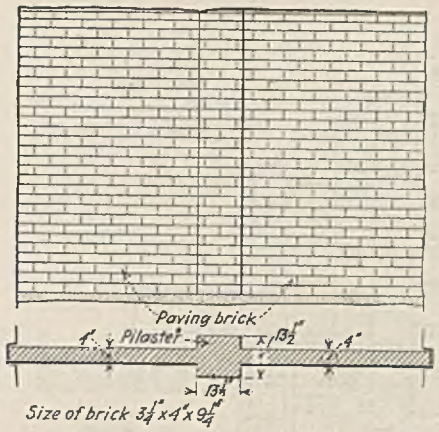
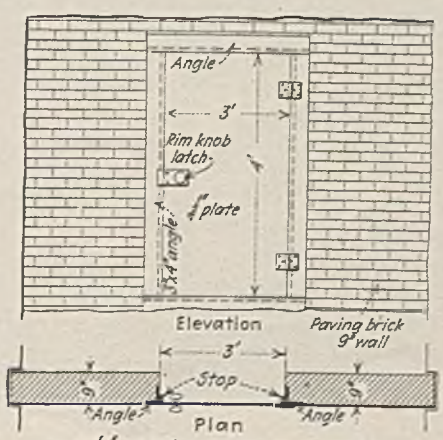


Fig. 2—Standard for Pilastered Stoppings

from that on which the line brattice is placed. When a crosscut has to be turned on the line-brattice side of the heading, the brattice must not be tacked up nor removed for the purpose of cutting, drilling, or loading coal, thus providing that a continuous flow of air shall be conducted past this crosscut to the working face. However, the face may be stopped at the inby edge of such a crosscut and this crosscut turned between the brattice and the idle face. When this crosscut has been driven a distance that will suffice to clear the machine, the face may be started again, but the brattice must then be extended inby this crosscut.

Wherever doors and not temporary stoppings are used for controlling the ventilating current they are placed in such a manner that the air will be locked and the opening of either one of them will not short-circuit the air current. Wherever it is not practicable to lock the air in this manner, doors nevertheless shall be hung in pairs so that in case of breakage of one door the emergency door can be closed immediately. Regulations require that the door shall be left open only long enough to clear locomotives or trips passing in either direction and shall be closed immediately thereafter. Damage to doors, brattices, or stoppings and all obstructions in the air passages must be reported to the nearest official.

Fig. 3—Standard for Stopping With Steel Door



Door to be ¼"x36"x72" steel plate attached to frame by 4"x4" extra-heavy L.P. Butts riveted to both door and frame. Frame to be made of angles riveted together to form jambs, head and sill. Stop strip to be ¼"x3¼" bar riveted to entire frame

Doors, even those of this temporary character, are hung so as to close of their own accord and remain closed. There is but one specification for all doors except those on the four main air locks, which are of a center-opening type. Consequently these temporary doors are well designed and well constructed, giving a maximum protection to the men at the working face. Few, if any, mines have rules as drastic as those at Nemacolin in relation to the locking of the air in the working face so as to make certain that the air will not be short-circuited. Fig. 4 shows the method by which the air is being regulated in the B Mains.

Samples of air for analysis are taken at points 10 in. below the roof and not nearer than 4 ft. from the face. If at such a point the percentage of gas is as much as 2½, the place is vacated immediately until better ventilation is established. All places in a split are vacated if over 1½ per cent of gas is found in the return. On the main return the percentage of explosive gas is kept below 0.5. Improvements in ventilation are set on foot as soon as that limit is reached. These are the rules recommended by the Safety Board of the U. S. Bureau of Mines. Any variations from it are in the direction of making the requirements more drastic.

Where air locks are placed between two ventilating systems there is a dead space which is replenished with air only when the doors are opened and even then only in a measure. Gas might collect slowly, therefore, if the roof or ribs of the roadway were emitting gas. This would find its way to the high places in the air lock. With that contingency in view, 2-in. pipes are run from these high places to the return airway so that the gas is sucked away as fast as it forms.

In other high places, such as falls along the roadway, gas is likely to lurk unswept by the air current and at such points if gas is found to collect, 2-in. bleeder pipes are placed to carry the gas over to the return.

Tests of the quality of the air are being made with the Linde Air Products Co.'s methane indicator, the Burrell Junior Portable apparatus being used occasionally as a check. As a further check, samples are taken frequently in Mine Safety Appliances Co.'s copper containers and tested in the laboratory, and some samples have been sent to the U. S. Bureau of Mines for independent analyses. All check tests seem to show that the methane indicators are giving a reliable report on the quantity of methane in the mine air and doing it with a minimum expenditure of time and effort on the part of the observer.

American Mine Door Co.'s automatic doors have been placed in duplicate on

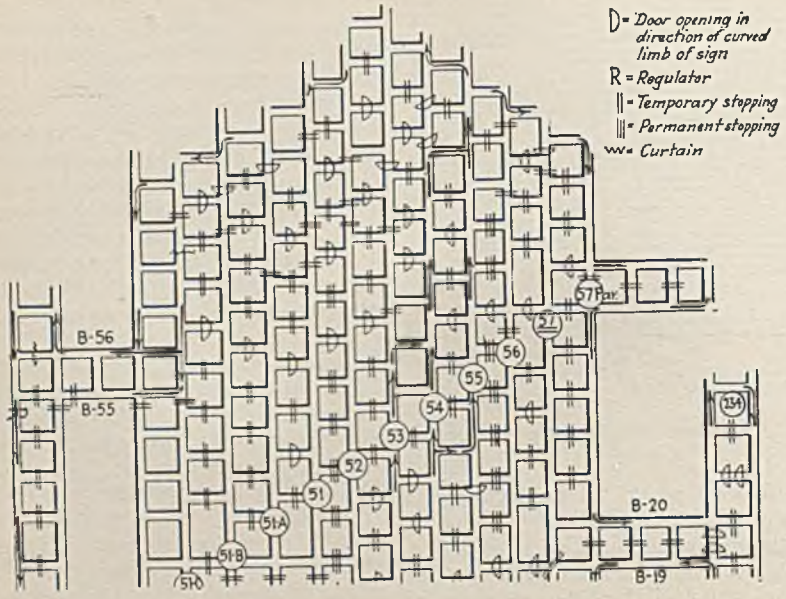


Fig. 4—Method of Air Locking Face on Advance

two roads in the load and empty haulageways of the main headings to form the air lock already described. In the B Mains the doors are at present operated by hand, but a change will be made later. The miners do not pass through these haulageway doors, but travel around them by a side door set in the rib of the main roadway.

In the driving of narrow work the cars are air-locked to the face, double doors being erected to prevent any suspension of ventilation, however temporary. Bleeder headings are arranged all around the panel workings so that the gas is removed as completely as possible.

Unless air is sweeping over the tops of the goaf, the gas in its high points can bleed off only when the depth of gas stratum descends to the bleeder level. At the points of the goaf, falls are being made for the first time. The roof does not break as promptly there as it does where the falls are mere extensions of caves already obtained. Accordingly they come at long intervals and when they come they make more gas than those further along the pillar line, where the gas is liberated almost before the roof falls. The ventilating current also has traveled several hundred feet along the pillar line before coming to the points of the goaf or what will eventually become goaf by the falling of the rock. Consequently the air has a higher gas content at that point than at any other.

It is important, therefore, to give the points of the goaf the best of ventilation and one not so much along the pillar line as over the goaf. This is done by temporarily stopping the bleeders near and beyond the point of the goaf, thus compelling the air that sweeps the pillar faces to pass over and ventilate the goaf thoroughly.

Gas wells have been drilled over the property of the Buckeye Coal Co. Every care is taken to watch gas wells as they are drilled and when they are being plugged prior to abandonment to see that they are tightly sealed against the coal seam. Care is taken to provide that the grout poured for sealing is not so placed that the sand will segregate from the cement. Some samples of grout taken from wells have been found to have no cementing material whatever and to have neither strength nor resistance to permeation.

Where holes have been plugged and show no gas at the surface, an opening is driven through the coal pillar in the mine surrounding the hole and the coal is removed around the casing. When the only men in the mine are those working on the well, a hole of about ¼-in. diameter is drilled in the casing and the pressure of gas noted. If no gas is found the pillar is removed and the roof caved after sealing the hole with cement. Of all holes drilled a complete record is made by the company and kept on file.

By reason of strict discipline, careful planning, a general will to achieve maximum safety, and hearty cooperation on the part of everybody from vice-president to miner, this mine has been able to maintain a remarkable record in its freedom from gas burns and explosions.

Fig. 5—No. 2 Fan and Airshaft

ELECTRICITY + Shoulders the Load At Nemacolin

Fig. 1—Starting No. 2 Substation by Dialing a Code From No. 1

NEMACOLIN, a completely electrified shaft mine producing 7,300 tons per day from gassy territory and equipped with a cleaning plant, has much to interest men concerned with the installation and operation of power and mechanical equipment. Safety, efficiency, and reliability have been consistently the governing factors since the mine was opened.

Electrical energy is purchased from the West Penn Power Co., at 25,000 volts, under schedule "J," in which the demand charge is based on a 15-min. kilovolt-ampere basis, and certain hours —at present 4:30 p.m. to 7:30 a.m.— are designated as off-peak hours. The average rate, including demand charge, approximates 1¼c. per kw.hr.

The coal company owns three miles of 25,000-volt transmission line and has three transformer stations. One located near the hoisting shaft has three 1,000-kva. 25,000-2,300-volt transformers and three 666-kva. 25,000-440-volt transformers. At each of two outlying direct-current substations—No. 2, located 1½ miles from the hoisting shaft, and No. 3, located 3 miles from the shaft—three 666-kva. transformers are installed.

None of the three direct-current substations is within the mine. In all there are five 300-kw. 275-volt General Electric synchronous motor-generator sets. Substation No. 1, at the hoisting shaft, contains two units with manual control. No. 2 contains two units with full-automatic control and an automatic equalizer, and No. 3 contains one unit, also with full-automatic control.

No. 2 substation was installed in 1924 and has operated ever since that time without an attendant. In 1928 it was equipped for remote control and remote metering from the operating desk in No. 1 substation. By dialing certain numbers on a telephone the station is started or stopped, operations are checked, and the meters at the operating desk switched to indicate the current being delivered by either machine. Code signals which indicate switch positions and other operating conditions are sent back to the loud speaker at the operator's desk. This No. 2 substation can also be started from a station located in the interior of the mine near the bottom of a borehole by which current enters.

One of the departures from common practice at this mine is the location of power boreholes within substation buildings rather than at some convenient near-by point. In No. 2 the borehole is directly back of the switchboard and in No. 3 it is close to the side wall and almost in line with the back of the board. The latter location, which is that of the latest installation, is preferred because it leaves the available floor space less encumbered than it would otherwise be. The borehole in No. 2 substation is 437 ft. deep and contains two 1,000,000-circ.mil. armored positive feeders, two bare negative feeders of the same size, and a multi-conductor telephone and control cable.

Coal is hoisted through a skip shaft equipped for a potential capacity of 1,500 tons per hour. The hoist is a Nordberg unit equipped with cylindro-conical drum and is powered by a General Electric 1,400-hp. d.c. motor which is supplied from a 1,100-hp.-1,000-kw. flywheel motor generator. The skip capacity is 15 tons, the total lift 396 ft., and the maximum capacity is 100 skips per hour. Power input to the motor-generator averages 0.47 kw.-hr. per ton of coal hoisted.

The facilities for hoisting men embody two unusual features. The men are carried on a double-deck elevator cage on which the hoist operative also rides, and although this hoist motor is of but 175-hp. capacity it also is supplied from an individual flywheel motor generator. The 5,000-lb. flywheel stores sufficient energy to take the elevator cage to the top or bottom or even to make a round trip in case of line power failure. This elevator operates in a compartment of the skip shaft.

At the head of a slope near the main

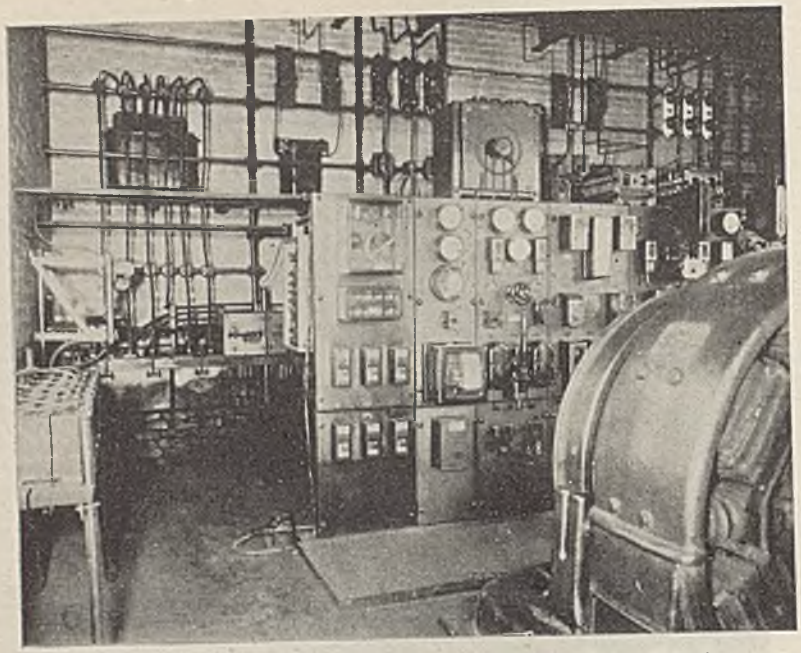


Fig. 2—No. 2 Substation, Located 1½ Miles From the Plant, Has Operated Since 1924 Without an Attendant. The Panel at the Left Carries the Remote-Metering and Remote-Control Apparatus

shaft is another hoist powered with a 400-hp. slipring induction motor. Mine refuse, mine material, and machinery are transported in this slope. An upper deck in the slope provides an emergency manway.

Connected motor load in the tipple, the storage-and-mixing bin. Rhéolaveur washing plant, and coal-drying plant totals 1,650 hp. The largest of these units, a 150-hp. motor, is used to drive a Bradford breaker. In the tipple and mixing plant the motors are General Electric inclosed, fan-cooled, induction units. Those above 50 hp. are operated by 2,300-volt current and those below are actuated by 220-volt.

Allis-Chalmers 440-volt drip-proof induction motors drive the cleaning plant. All power and light wiring is in rigid conduit and the magnetic controllers are grouped in a separate room where there is a distribution board carrying a 440-volt fused knife switch in each motor circuit. Control circuits are arranged for sequence starting and lights are provided at the control station to indicate when units are in operation. Near each motor is mounted a stop button and a non-fused safety switch.

Starting and stopping of the main belt which conveys coal from the skip dump bin to the storage and mixing plant is controlled automatically by the lowering or raising of an arm which rides on the surface of the coal in the skip bin. When the coal reaches a certain level, the main belt, the tripper in the top of the storage bin, and finally the main belt feeder start in sequence and continue in operation until hoisting stops long enough to allow the coal level in the skip dump bin to drop to a predetermined point.

All buildings are lighted with 220-volt lamps; consequently no lamps are stolen for use in homes. Benjamin dustproof reflectors fitted with shockproof sockets are used in the preparation plant. Though all reflectors are of one size, 100-watt, 150-watt, and 200-watt lamps are used in them, depending on the location and light desired.

Synchronous motors are used only on the substation motor generators. No static or synchronous condensers are employed. Before the washing plant was built a leading power factor was maintained. The additional induction motor load brought the power factor down to an average of 97.5 per cent lagging.

Except for four speed reducers of Falk and Jones types, Texrope motor drives are employed throughout the preparation plant. Alexander Bros. "Tentacular" belts without idlers are used on three of the mine-fan motors and a Farrell Birmingham herringbone gear reducer is used on the fourth.

Each fan is equipped with two motors, arranged one on each side and connected through special quick-shift couplings. Only one motor is used at a time, the other serving as a spare. No. 1 fan, located near the plant, has two 400-hp. slipring motors.

Standby power for operating No. 1 fan is assured by a gasoline engine generating unit located in No. 1 substation at the plant. This unit consists of a 280-kva. 2,300-volt generator driven by two 300-hp. Sterling engines.

Fan No. 2, installed in 1929 at a new airshaft 3 miles from the plant, has a 200-hp. motor on one side and a 400-hp. on the other. Both are slipring motors with magnetic controllers having operating resistances for 20-per cent speed reduction. Tentacular belts are used on both of these motors. At present the 200-hp. unit is driving the fan. All bearings are protected by thermostats.

In the room with 200-hp. motor is a 565-hp. Sterling "Viking II" gasoline engine direct-connected to a 380-kva. 2,300-volt generator. This engine, which is an 8-cylinder 1,200 r.p.m. unit with four carburetors and quadruple ignition, is run for a few minutes once a week to insure its being in condition for quick starting in case of line power failure. As mentioned before, an attendant is kept at this fan.

The two fans consume a total of approximately 350,000 kw.-hr. per month. Power requirements for the mine, including outside plant and house lighting, total about 7 kw.-hr. per ton for months of full working time.

At the main plant no overhead conductors are tolerated. All wires and cables of the distribution system are contained in ducts consisting of tile set in concrete. Third rail is used along tracks under and near the tipple for two 160-275-volt d.c. slate larries. These are equipped, however, for three methods of current collection. A few hundred feet from the tipple a change is made to trolley and pantograph, and on the dump, where the maintenance of trolley poles and wires would be difficult, a connection is made to trailing cable which is left lying along the track. Each larry is equipped with an additional

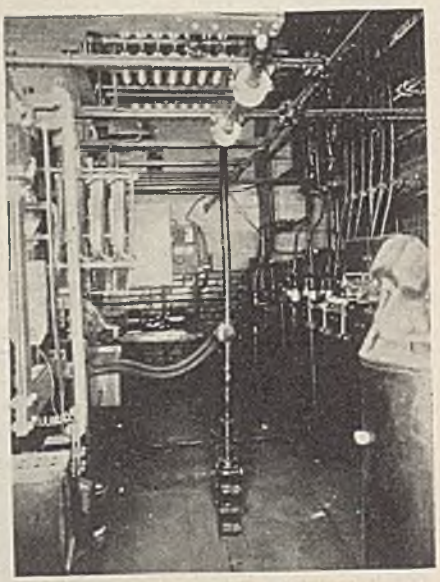


Fig. 3—Borehole Cable Suspension in No. 2 Substation

30-hp. motor for driving the conveyor of the unloading boom.

Passing to equipment inside of the mine, that at the bottom of the skip shaft commands first attention. Side by side on two loaded tracks are two Link-Belt two-car rotary motor-driven dumps which can be used separately or both at the same time. These are driven by d.c. motors with automatic controls for slowdown by dynamic braking and final stopping by magnetic brake. The dumps were changed from compressed air to electric drive five years ago to save power and simplify the control.

Car hauls on the loaded tracks are driven by 150-hp. General Electric

2,300-volt type HI inclosed slipring induction motors, the magnetic controllers of which are located on the surface in the hoist house, because the inevitable arcs of the primary air brakes make the location of that equipment underground undesirable.

The gates which measure coal into the skip leading pockets are driven by a.c. motors which are controlled automatically by switches geared to the drum shaft of the skip hoist. Originally the switches were located in the shatt and were engaged directly by the skips. Maintenance troubles from ice and falling coal prompted the change. The skip-loading gates proper are opened mechanically by the descending skips and closed by gravity.

Main-haulage equipment consists of two Goodman tandem locomotives each consisting of two 13-ton units with contactor control and magnetic reversers, one Goodman 13-ton with contactor control, eight Jeffrey 13-ton with drum control, and two Jeffrey 10-ton also with drum control. Two of the 13-ton locomotives are equipped with shunting arms and are confined to switching service on the bottom.

Thirty-one Goodman 8-ton flameproof cable-reel locomotives, four Jeffrey 7-ton permissible battery locomotives and two 6-ton Goodman units of the same general type make up the coal-gathering fleet. Twenty of the former are of the high-speed type with drum control and eleven are low-speed with contactor control. All are equipped with roller-bearing journals and with 450 ft. of two-conductor concentric No. 2 rubber cable. Fused nips are used and the standard filling is 300-amp. for the high speed and 200-amp. for the low speed. The rubber cable has a $\frac{3}{64}$-in. rubber wall between conductors instead of the standard $\frac{5}{64}$-in. thickness. A battery locomotive is kept continuously on charge and coupled to a fire truck. K. W. Battery Co. lead batteries are used in all three of the locomotives. A 36-ton Porter and a 75-ton Baldwin steam locomotive are used for handling cars under the tipple.

Fig. 5—On Different Sections of Track the Slate Larries Operate From Third Rail, Pantograph, and Trailing Cable

Coal-cutting equipment consists of thirteen Sullivan type CE shortwall machines, seven Jeffrey type 35 BB shortwalls, and three Goodman type 124 EJ top-cutting slabbing machines. The latter are used for entry work where it is important to leave the top coal undisturbed if possible.

Twelve 30-hp. Sullivan portable compressors furnish air for drilling coal and rock. Air-motor rotary drills are used to drill coal.

Twenty-three 100-gal. Deming and two Yough pumps equipped with 5-hp. motors constitute the principal item of gathering pump equipment. Twenty-two of the motors are General Electric open-type and two are Westinghouse flameproof type. There are three Boyts-Porter 100-gal. pumps, two equipped for constant speed and one with a variable-speed. Reliance motor having field rheostat. Completing the gathering equipment are two 50-gal. Boyts-Porter pumps with dustproof and moisture-proof Reliance 5-hp. motors, both equipped with variable-speed field rheostat control. Two Deming Triplex 147-gal. pumps complete the water-gathering equipment.

Variable speed has proved advantageous for gathering pumps and is favored for new equipment. When the pumps are operated at the lowest speed with which the water can be handled the maintenance is materially less than when the pumps are driven for a shorter time at maximum speed. The first of the Reliance-equipped variable-speed pumps was installed three years ago, and it has operated without any cost for maintenance.

For lifting water from mine to the surface, two DeLaval pumps with motors each of 125 hp. deliver 800 gal. per minute. Two Barrett-Haentjens pumps with a 60-hp. motor raise 325 gal. per minute to the surface through boreholes. Two Deming pumps with motors of 30 hp. each relay 220 gal. per minute from gathering units to the main sump.

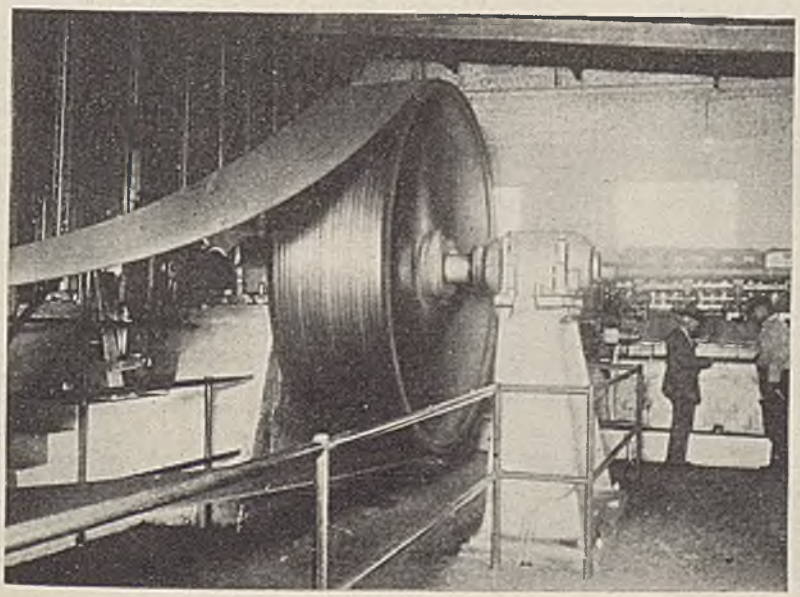
Mine distribution circuits comprise approximately 67 miles of trolley wire and 15 miles of 500,000- and 1,000,000-circ.mil feeder cable. About half of the trolley wire is 6/0 and the remainder 4/0. Practically every branch circuit is protected by an automatic reclosing circuit breaker. There are 46 "Columbus" breakers, and 7 General Electric, and these have a capacity of 600, 900, 1,200, and 1,500 amp. All these breakers are equipped for stub-end and multiple-feed service.

Each breaker is in an open-front brick vault set back in the rib and is in series with a safety switch mounted in the same vault. The three substations are tied together by the mine circuits. Practically all of the feeders from the main circuits are stub-ended rather than tied in with other feeders to form loops. Electric weld bonds are used on all 50- to 70-lb. rail, and pin-driven bonds on 30-lb. rail.

The haulageways on the main shaft bottom are brilliantly lighted, but no attempt has been made to illuminate the haulways throughout their entire length. Lights at switches, crossings, safety stations, etc., consist of 50-watt 275-volt lamps in weatherproof sockets without reflectors. Wires for lighting circuit

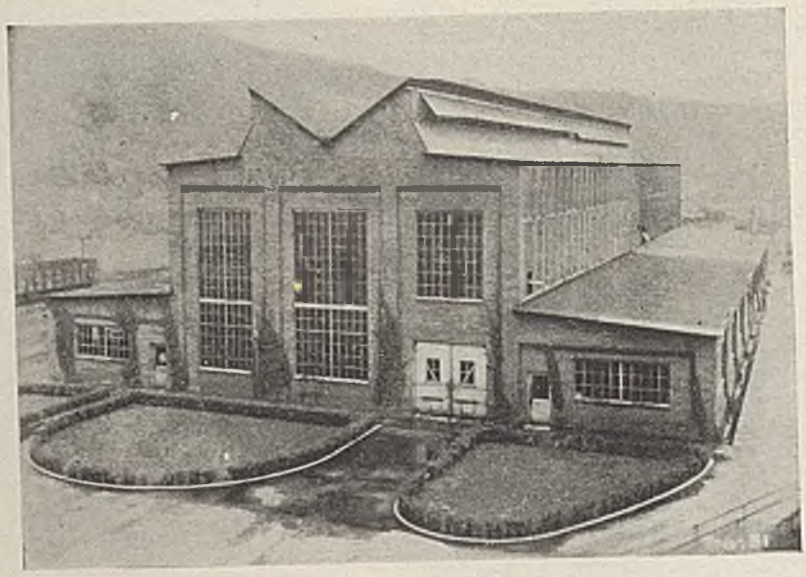
(Turn to page 426)

Fig. 4—The 565-Hp. Gasoline Engine Generator Unit in the Background Provides Standby Power for This No. 2 Fan Drive



MAINTENANCE

+ Keynote of Nemacolin's Safety, Efficiency, and Tonnage



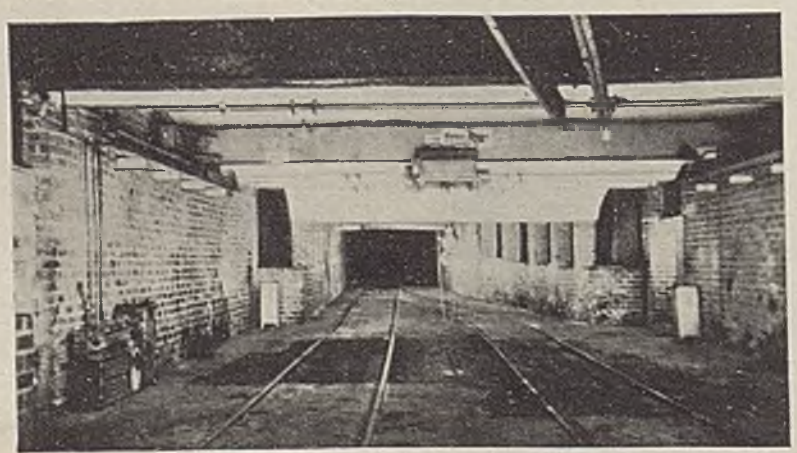
Main Shop as Recently Extended

INSPECTION, lubrication, and the proper handling of machinery in the mines of the Buckeye Coal Co. receive that proper consideration and care which are needed if steady and efficient operation is to be attained. Furthermore, all the machinery purchased is carefully selected for qualities likely to assure a long term of service. The entire mechanical force is directed by an official at Nemacolin who combines the duties of chief electrician and master mechanic.

Maintenance is centered at a shop building on the surface where the chief electrician and master mechanic has an office and the services of a clerk. Here unit parts or assemblies of equipment are repaired and here also inside equipment that needs overhauling is brought, being hoisted out of the mine through a slope which is provided both for that purpose and for carrying material into the mine and also as an emergency manway. Twenty-two hundred feet from the bottom of the skip shaft and 600 ft. from the slope is a motor barn equipped with two pits where locomotives are greased and inspected, and locomotives and mining machines treated to repairs of heavy or intermediate class.

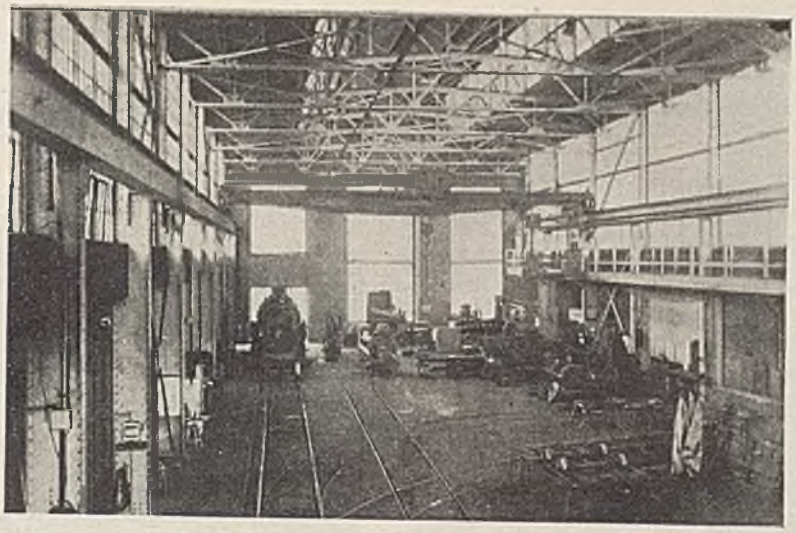
Immediately under the chief electrician and master mechanic are a shop foreman, outside electrical repair foreman and wireman, preparation-plant foreman, underground locomotive-repair foreman, and an underground wire foreman. The latter is often termed locally the mine electrician. Mining-machine repairs are supervised by a machine boss who reports directly to the mine foreman and whose force generally consists of four men working principally at night. In the underground repair of mining machines, the chief electrician and master mechanic acts as a consultant, dealing with the machine boss through the mine foreman.

Underground Locomotive Barn Equipped With Two Track Pits and an Electric Crane



Twenty-six men ordinarily constitute the shop force; in detail they consist of three blacksmiths; one mining-machine bit sharpener; six mine-car repairmen; one man repairing and dispensing shop and mine tools; one lathe man; one shaper man and general mechanic; one drill-press operator; four repairmen on general work such as locomotives, mining machines, and pumps: one welder; two plumbers; three riggers and general repairmen; two men who are dispatched through the plant to make general repairs; and two men who wind armatures and work on electrical details.

The underground locomotive repair foreman has a force of five men whose shifts are so staggered that the force is distributed over the entire 24 hr. of the day. The shop foreman supervises the



Mine Cars in Main Shop for Repair

maintenance of two electrically driven slate larries and of a steam locomotive for switching railroad cars. The remainder of the force under the chief electrician and master mechanic is divided as follows: Three slate-car operatives, a yard switching crew consisting of four men, one grip man and yard car-haul operative, three substation attendants, three fan attendants, three hoisting engineers, three man-cage operatives, and one auto-truck repairman.

All mine cars are greased and repaired in the main shop above ground, and at no other place. Cars are greased only when they are brought into the shop for repairs. According to the card record which is kept of the greasing and repairs of each individual car some have operated as long as two years between shoppings and therefore between greasings. The cars are of composite steel-and-wood construction and the weight is approximately 4,500 lb. Part of them are of 112-cu.ft. capacity and the rest of 104-cu.ft.

Dimensions of the shop building are 105x180 ft., and the center bay, which is equipped with a 10-ton crane, is 50 ft. wide. In the building a separate room is provided for the man who repairs and handles all classes of hand tools. The mine tools with which he is concerned include hand saws, sledges, tamping sticks, rotary air coal drills, coal augers, drills, taps and dies.

A separate room also is provided for rewinding electrical equipment. For five or six years it has been the practice on all direct-current motors to use coils made from asbestos-insulated wire. Mine-locomotive tires are turned in a special tire lathe without annealing. Recently, however, an automatic electric welding head was purchased and a driving stand arranged for the trucks. The mechanics are now familiarizing themselves with the equipment, and it is contemplated that before long all tires will be filled by electric welding.

In the shop office an individual card record of each item of equipment is kept as a part of the maintenance program. Another record, consisting of individual 8x11-in. loose-leaf sheets that include purchase order, cost, and valuation data, is on file in the accounting and engineering offices. A company plate, of dimensions about 1x2 in. and carrying a serial number, is attached to each piece of equipment for identification. It serves also as an indication that the machine has been duly placed on the record.

Hoisting ropes are inspected daily, which practice is in compliance with the Pennsylvania mining law. As an added safety precaution the rope of the man hoist is renewed two years after its installation, even though it may still appear to be in safe operating condition. By changing the skip-hoist rope from a 6x19 standard to a 6x25 pre-formed rope, the rope cost per ton has been reduced approximately 30 per cent. Details are given in the accompanying table. Ropes of $1\frac{7}{8}$ in. diameter are used; the total lift is 396 ft. and the coal hoisted per skip is 15 tons.

Direct-current substations, three in number and all located on the outside, are inspected once a week. Two of the three are equipped with full-automatic control and one operates without an attendant. In contrast to the usual practice, the two substations located at points distant from the main plant are not equipped with air compressors for blowing out the machines. Synchronous motor-generators are used.

Mention has already been made of the underground mining-machine repair crew. The cleaning, inspection, and repair crew for locomotives includes five men in addition to the boss, and, as stated previously, its members are staggered over the 24-hr. period. At the end of every shift each locomotive is inspected and its defects are recorded on a report form. What repairs are needed are made without further delay.

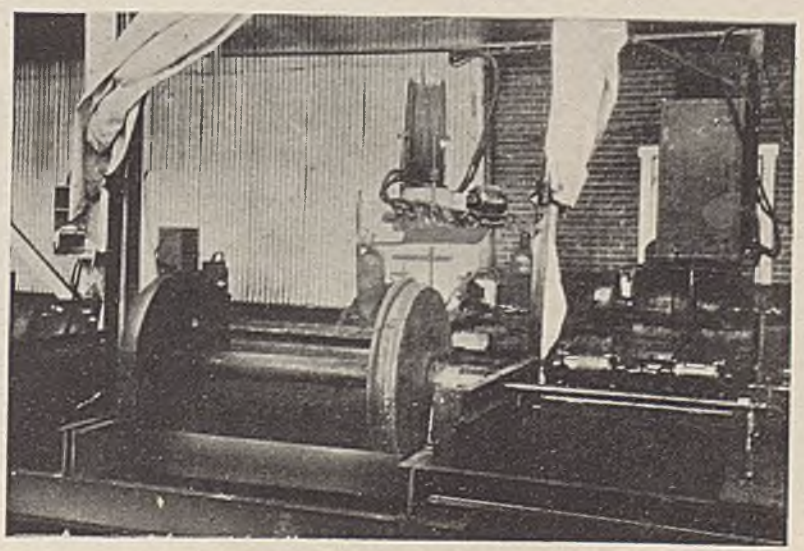
Adjacent to the underground motor barn is a supply room equipped with steel bins in which a few repair parts of each type are kept, thus avoiding the delays that would occur if parts had to be obtained from the main supply house on top. To avoid clerical expense, parts are charged out when they are taken underground. The repair crew at the motor barn provides for the lubrication of practically all parts that need such service. However, each motorman carries a supply of oil for lubricating trolley wheels, axle bearings, etc. Cans of 1-gal. capacity are used, but only about a quart of oil is put into them for each shift.

The general force of inside electrical maintenance men usually consists of

Record of Successive $1\frac{7}{8}$-In. Ropes Used on Skip Hoist

Description	Tons Hoisted	Rope Cost Cents Per Ton
6x19	859,387	.00104
6x19	873,029	.00098
6x19	828,215	.00107
6x19	826,611	.00104
6x19	936,653	.00093
6x19	942,322	.00087
6x25 pre-formed	1,539,152	.00071
6x25 pre-formed	1,532,019	.00067

Automatic Welding Head Filling a Tire



four night wiremen, two day wiremen, two men on track bonding, one telephone repairman, two men on telephone and general wiring, and one pump inspector and repairman. These are in addition to the wire foreman and his assistants.

Bonds are given a visual inspection once a month. Electrically welded bonds are used on permanent track and pin-driven bonds on 30-lb. temporary track. The assistant wire foreman carries a portable voltmeter with him and makes voltage tests whenever his inspection or supervision duties take him in that part of the mine. If he finds the d.c. voltage below 220 at any point he seeks a remedy. If no circuit trouble is found, copper is added to correct the condition. A voltage of 275 is carried at substation switchboards. The wiremen do not use the motor barn as headquarters but have a shop about 350 ft. away.

All mining machines, cable-reel locomotives, and portable air compressors have trailing cables of one size and specification. Each cable is a No. 2 concentric conductor with all-rubber insulation and is standard, except that the wall thickness between conductors is $\frac{3}{64}$ in. instead of $\frac{4}{64}$ in. When breaks occur during the day they are carefully spliced with cable splicers and rubber tape, but all such splices are remade on the following off-shift so that the rubber insulation can be vulcanized.

At Nemacolin safety is always a first consideration in determining maintenance methods. Next comes the factor of eliminating operating delays as far as possible. A policy of nipping trouble in the bud, of doing a thorough job of repairing, and of taking drastic action even to redesigning certain parts of equipment to eliminate a repetition of trouble, has so reduced equipment delays that they form an insignificant factor in the coal production cost.

▼ ▼

Electricity Shoulders the Load At Nemacolin

(*Continued from page* 423)

are attached to trolley and rail by special clamps. Edison electric cap lamps are used exclusively, and Nemacolin has 1095 of these.

Sixty-four telephones are used within the mine. Their circuits are in lead cable protected by wood ducts which are sunk in covered trenches excavated in the mine floor. Through sections where the mine bottom is wet the lead cable is paralleled by, and connected at frequent intervals to, a 500,000-circ. mil. copper cable, which in turn is connected in parallel to the rail. On each side of the water hole the lead sheath of the telephone cable is cut away for a few inches of length and the wires are protected by paraffin or compound. These precautions were found to be necessary to protect the lead sheath from electrolysis.

Main-haulage crossings are protected by Nachod automatic signals which normally show yellow. If all is clear an approaching locomotive gets a green signal and the other approaches are given a red signal.

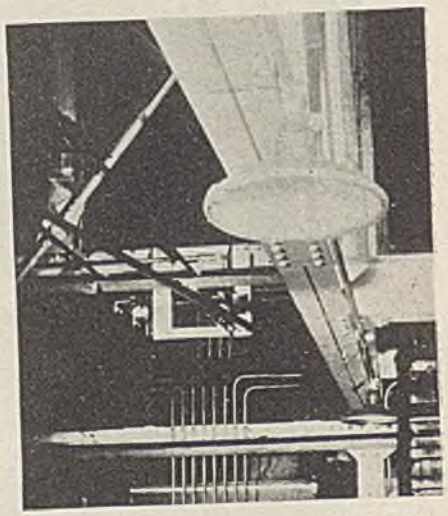
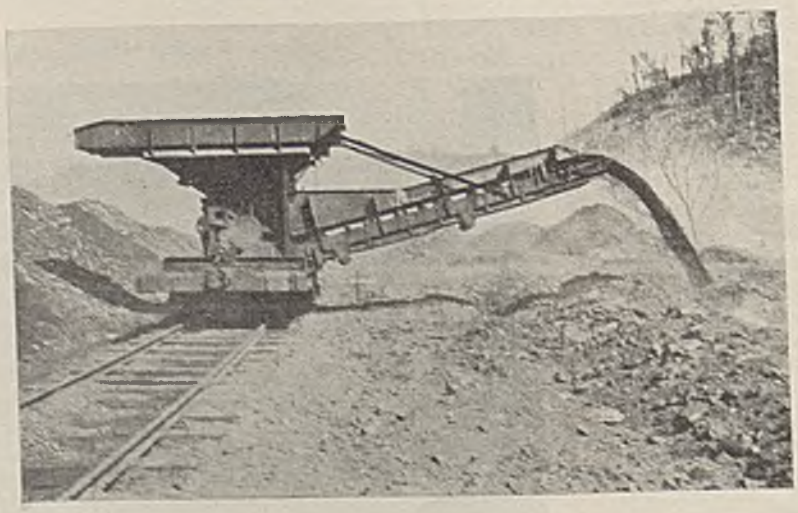


Fig. 7—Dustproof Reflectors Are Used in the Preparation Plant

Easy grades, high coal, and effective use of large copper result in a relatively low direct-current power consumption. The average is approximately 2.4 kw-hr. per ton, including the direct current used by the rotary dump motor and the two refuse larries. This power is metered on the input side of the conversion units and thus includes all substation losses.

All phases considered, the electrical and mechanical practices at Nemacolin represent a distinct advance over those at the average large mine, even though Nemacolin has been operating for many years.

Fig. 6—Discharging Refuse on the Spoil Bank



SAFETY + Everybody's Job At Nemacolin

NEMACOLIN has been one of the leading operations of the country in the recent race toward no-accident operation. In 1930 the frequency rate was 68 per cent lower than in 1929, and the severity rate 48 per cent lower. In the lowering of accident rates, detection and prompt elimination of physical hazards have played an equally prominent part with education and improved operating discipline.

Nemacolin is outstanding in the precautions provided against the propagation of flame by coal dust. At the date of writing it is one of only five mines which, in the State of Pennsylvania, have been granted a compensation-insurance rate reduction of 10c. per $100 of payroll as being completely rock-dusted mines. Among the requirements which the Compensation Rating and Inspection Bureau demands of those seeking this preferred classification are: That rock-dusting be maintained to within three cuts of the face; that the percentage of inert material in composite samples from top, ribs, and bottom exceed 55 per cent; and that, in the absence of such rock-dusting, sections not working be protected by approved barriers carrying 100 lb. or more of rock dust per square foot of entry section, provided that, on resumption of the operation of these sections, rock dust be applied to within 20 ft. of the face.

The menace of coal dust at Nemacolin is combated at the face, which is its principal source. Water lines of not less than 1-in. diameter are carried to every working place in the mine. On the surface at four locations near pump-discharge boreholes are installed pairs of 10,000-gal. tanks which retain, after overflow, a total of 80,000 gal. of mine water for sprinkling.

Pressures of 80 to 100 lb. are available at the face. Every mining machine crew and every working place is equipped with a 50-ft. water hose. No coal may be cut without provision being made to spray water continuously on the cutter chain, and to this end all cutting machines are provided with hose connections. The wet or dry condition of the cuttings in the morning is noted as a check on the fidelity with which the rule is being obeyed. The shotfirer is permitted to shoot the coal only when the place is in a damp condition. Failing to find it properly dampened, he delays shooting until the place has been adequately sprinkled.

The loader wets the fallen coal and the face with the hose before starting to load, and at the same time may wet the top, ribs, and bottom for 15 to 20 ft. back of the face. As the coal is loosened and dry surfaces become exposed, he uses the hose again, and finally wets the load down thoroughly before it leaves the place. Coal dust is nowhere in evidence either on the road bottoms or in the gobs. Between fifty and sixty thousand dollars is invested in hose, pipe lines, and tanks of the sprinkling system. Well water is supplied to the sprinkling system whenever sufficient mine water is not available. The floor of the roadways is never sprinkled. Water dripping from cars, however, keeps the bottom somewhat damp. In all about 30 gal. of water is used for sprinkling underground for every ton of coal produced. It may be noted that the mine water in Nemacolin is alkaline.

Apparently in this mine the percentage of rock dust on the floor, ribs, and roof is reduced more by falls of rock and coal, and by high air velocity than by coal-dust dilution. Each month at least fifty dust samples are taken and analyzed, and each day every section foreman makes out a report indicating locations which should be dusted or re-dusted. The rock-dust machine crews also make daily reports showing locations dusted, quantity of rock dust used, and number of feet of heading thus protected.

Entries averaging 70 sq.ft. cross-section are given a coating of 10 lb. per linear foot. The equipment consists of two M.S.A. low-pressure machines and one M.S.A. high-pressure aircourse machine. As much as 800 ft. of 4-in. rubber hose reinforced with spring wire is used on the high-pressure duster. A crew working with a low-pressure machine on one occasion applied 1,700 80-lb. sacks of dust in a single shift.

During 1930, 7,500 tons of rock dust, 98 per cent of which was calcium carbonate, was distributed in the mine, and the over-all cost of this dusting was between 4 and 4½c. per ton of coal hoisted. The sprinkling cost per ton totaled approximately the same figure. One isolated section of the mine is protected by V-trough barriers.

The wearing of self-rescuers and approved glass-type goggles is compulsory for all except men engaged in transportation work. The latter are exempt chiefly because the wearing of goggles is believed to restrict the angle of vision and thus expose brakemen to a hazard that overbalances the advantage of reduced eye risk. All men except brakemen are urged to wear safety-toe shoes, and about 50 per cent of the men are now using footgear of this type.

Fire-fighting equipment underground includes a 700-gal. truck. An air pressure of 135 lb. per square inch is maintained above the water in two tanks which this truck carries. It is kept coupled to a storage-battery locomotive that is continually on charge. At pumps, safety stations, and intersections there are in all 85 2½-gal. soda-and-acid ex-

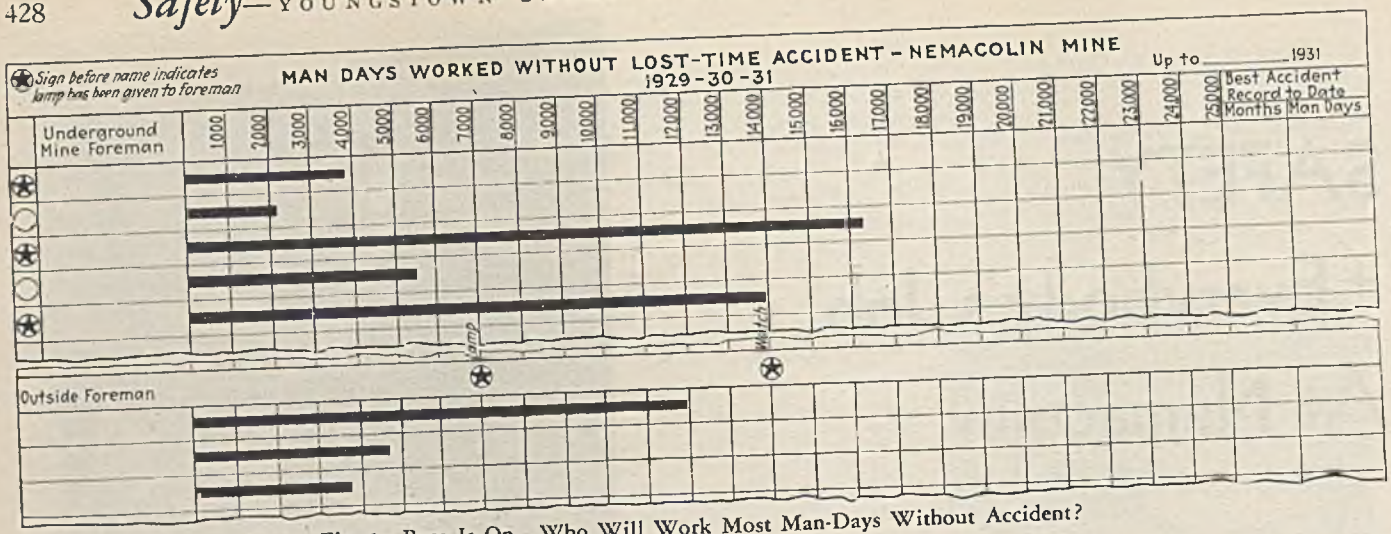


Fig. 1—Race Is On. Who Will Work Most Man-Days Without Accident?

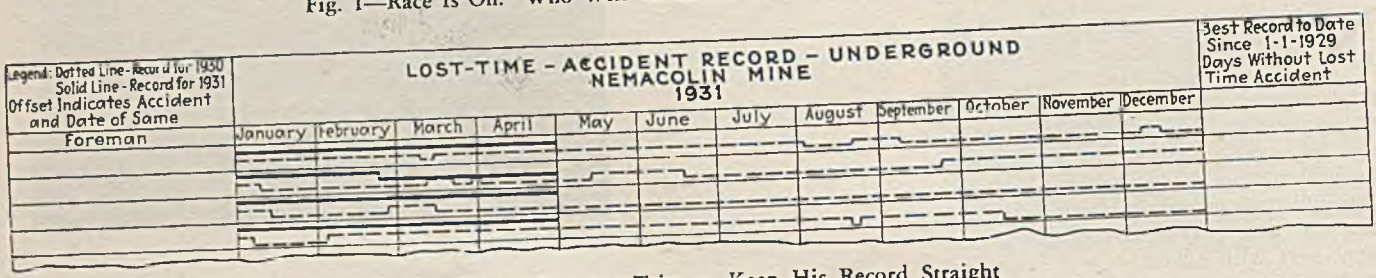


Fig. 2—Every Foreman Tries to Keep His Record Straight

tinguishers. Each locomotive, mining machine, and air compressor is equipped with a 1-qt. carbon-tetrachloride extinguisher. At least four 80-lb. sacks of rock dust are kept at each mine door, safety station, and pump. Not less than twenty sacks are kept at each main intersection.

A book of "Safety Rules and Regulations" has been prepared. It contains many specific provisions for increasing the safety of the operations. One outstanding regulation in this rule book is that "ropes used for hoisting cages which raise or lower men may in no case be kept in service over two years, even though apparently still safe." Reference is made to other rules elsewhere in these articles; see pp. 402-403 and pp. 405-407.

All gathering is done by flameproof cable-reel locomotives, and the coal is cut with permissible machines powered through trailing cables. Shotholes are drilled with air-motor rotary drills supplied from portable compressors. Practically every branch of the 250-volt feeder system is protected with an automatic reclosing circuit breaker.

Though every man in the organization is taught that promotion of safety is one of his duties, one official, a safety engineer, has no other responsibility. He promotes and supervises safety organizations, heads the first-aid and mine-rescue work, does some of the mine-inspection work himself, takes a part in the digesting and filling of accident records, and makes reports.

The top safety organization is a central safety committee consisting of the superintendent, chief mining engineer, mine foreman, master mechanic and chief electrician, outside general foreman, engineer in charge of preparation plant, and safety engineer. This body meets for a whole afternoon once a month. It considers safety suggestions, deals with violations, and recommends improved practices.

Once a month, underground and outside officials hold separate safety meetings. For each of the eight sections underground there is a safety committee consisting of one loader, one dayman, and one transportation man. On the inside there is an "extra safety committee" of three daymen which reports once a month, sending copies to the foreman, mine foreman, safety engineer, and superintendent.

When a foreman corrects a hazard or violation of the rules, he makes a corresponding notation on the report, which latter he gives to the mine foreman. Before making the report, the committee usually calls the attention of the foreman to the complaint, which consequently is almost always corrected before the written report comes into

Table I—Comparison of Lost-Time Accidents, 1930, by Nationality

Nationality	Total Employees	Total Accidents	Per Cent of Accidents by Nationality
Turkish	8	2	25.0
Granish	6	1	16.7
Italian	39	5	12.8
Horwat	43	5	9.1
Austrian	55	5	8.7
Spanish	23	2	7.95
American*	439	35	6.1
Polish	98	6	3.7
Slavish	188	7	3.3
Russian	30	1	....
Hungarian	29	0	....
German	21	0	....
Serbian	20	0	....
Lithuanian	10	0	....
Roumanian	8	0	....
Ukranian	3	0	....
French	2	0	....
Bulgarian	2	0	....
Bohemian	2	0	....
Finlander	1	0	....
Negro	1	0	....
Totals	1,029	69	

*Includes Canadian 1, British 1, Welsh 1, Irish 5, Scotch 5.

Table II—Comparison of Lost-Time Accidents, 1930, by Occupation—Underground

Period in Years	Loaders: Number of Employees	Loaders: Number of Accidents	Loaders: Accident Percentage	Transportation: Number of Employees	Transportation: Number of Accidents	Transportation: Accident Percentage	Inside Daymen: Number of Employees	Inside Daymen: Number of Accidents	Inside Daymen: Accident Percentage	Cutters: Number of Employees	Cutters: Number of Accidents	Cutters: Accident Percentage	Drillers: Number of Employees	Drillers: Number of Accidents	Drillers: Accident Percentage	Totals: Number of Employees	Totals: Number of Accidents	Totals: Accident Percentage
18–20	10	0	0	1	0	0	19	2	10	0	0	0	0	0	0	30	2	7
21–25	18	2	11	22	4	18	40	2	5	1	0	0	0	0	0	81	8	10
26–30	44	4	9	41	5	12	39	0	0	5	1	20	1	0	0	130	10	8
31–35	83	7	8	17	2	12	37	3	8	8	2	25	6	0	0	151	14	9
36–40	99	9	10	12	2	17	51	1	2	16	0	0	4	0	0	182	12	7
41–45	69	4	6	6	0	0	52	1	2	7	0	0	5	1	20	139	6	4
46–50	28	3	11	2	0	0	35	0	0	5	0	0	0	0	0	70	3	4
51–55	8	3	37	1	1	100	14	0	0	0	0	0	0	0	0	23	4	17
56–60	2	0	0	0	0	0	10	2	20	0	0	0	0	0	0	12	2	27
61–65	1	0	0	0	0	0	3	1	33	0	0	0	0	0	0	4	1	25
66–70	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0
Totals*	362	32	9	102	14	14	302	11	4	42	3	7	16	1	6	824	62	7.5
Man-shifts		70,234			22,150			66,353			8,011			3,273			174,361	
Days lost†		608			430			288			21			38			1,385	
Accident rate‡		0.0087			.0194			.0043			.0026			.0116			.0079	

*Accident rate computed by dividing number of men hurt by number of men employed.
†Exclusive of two fatal accidents.
‡Accident rate computed by dividing days lost due to accidents by days worked per department.
Fatals: 1 loader, aged 24, and 1 mason tender, aged 21 years, omitted to prevent distortion of table.

the hands of the foreman. The surface plant has a similar "extra safety committee" consisting of three workmen. The safety engineer himself makes a weekly report to the superintendent regarding the conditions he has found in the places he has visited during the week.

Management procedure after an accident plays an important part in preventing other accidents of a similar character. Every minor accident, even though the victim suffers no loss of time thereby, is investigated by the safety engineer and foreman. Serious or fatal accidents are even more closely studied. An immediate inspection at the scene is made by the superintendent, chief mining engineer, safety engineer, mine foreman, both assistant general mine foremen; a number of engineers accompany the party to gather and record details.

At the close of the shift during which a serious accident has occurred, another meeting is held at the scene of its occurrence. At this meeting the mine foreman, the day and night assistant mine foremen, the safety engineer, and the section foreman of the injured man are present to discuss the accident and make recommendations.

Finally, the safety engineer makes a report to the higher officials placing responsibility on management, men, or natural hazards. Serious or fatal accidents on the outside are handled in the same manner, though, in the making of the inquiry, of course, no inside officials are present.

No bonuses are paid to foremen for good safety records, but when any foreman operates for 7,000 man-shifts without a lost-time accident he is presented with a silver-plated flame safety lamp with his name and record engraved upon it. After he has passed 14,000 consecutive man-shifts without a lost-time accident he is given a watch. Two foreman are now eligible for the latter award. Eight have received the silver lamps. Outside foremen are included in this schedule.

Fig. 4—Mine Rescue Equipment in Basement of Lamphouse Building

On Jan. 1, 1930, an individual safety-record card was adopted. This card, which measures 3⅜ x 7⅜ in. and contains spaces in which holes can be punched to record the type and date of any infraction, is given to each loader and dayman on the first working day of each half month. The cards are placed in the time-clock punch-card rack, and the men are required to carry these with them when on duty. Foremen or other officials, noting an infraction of the safety code, demand the man's card and punch it in the space provided for such infraction.

At the end of the shift, the workman leaves the card in the punch rack for collection. A detailed record is made of the infractions as indicated by the punch holes, and copies of this record are furnished to the mine foreman and superintendent. The permanent record is filed in the office of the safety engineer. Every workman has the right to protest to the next higher official against any punch mark that may have been made on his card. The system is working so well that in the last half of April, only 17 of the 850 men had their cards punched. The safety engineer keeps a card record of each man's infractions, injuries, and general safety record. Layoff or discharge awaits the man whose record, as evidenced by the punch marks, is not good.

Within two months of accepting work with the company every new employee is given first-aid training. Thus 100 per cent of the men have received such instruction, a condition established at the mine in June, 1929, and carefully maintained ever since. At least six men in each department, or a total of about 150 men, are kept in active first-aid training.

A study and classification of the accidents in 1930 at Nemacolin brought out several interesting facts. The weighted occupational hazards were in these ratios: Transportation men, 14; inside daymen, 11; loaders, 9; cutters, 7; drillers, 6; general outside labor, 6; mechanical and electrical employees, 4; and employees in preparation plant, 0. Employees between the ages of 40 and 50 were the least liable to injury and those over 50 the most liable. Employees of Latin-American extraction were the most liable to injury and the northern European races, including German, the least liable. American native-born English speaking employees were in the middle ground.

Only 2.2 per cent of those first-aid men who are kept in constant training were injured as compared to an average of 6.7 per cent for all workmen at the plant. These first-aid men are between 22 and 40 years old and were picked by their foremen on the basis of intelligence, age, aptitude for the work, and ability to speak and understand English.

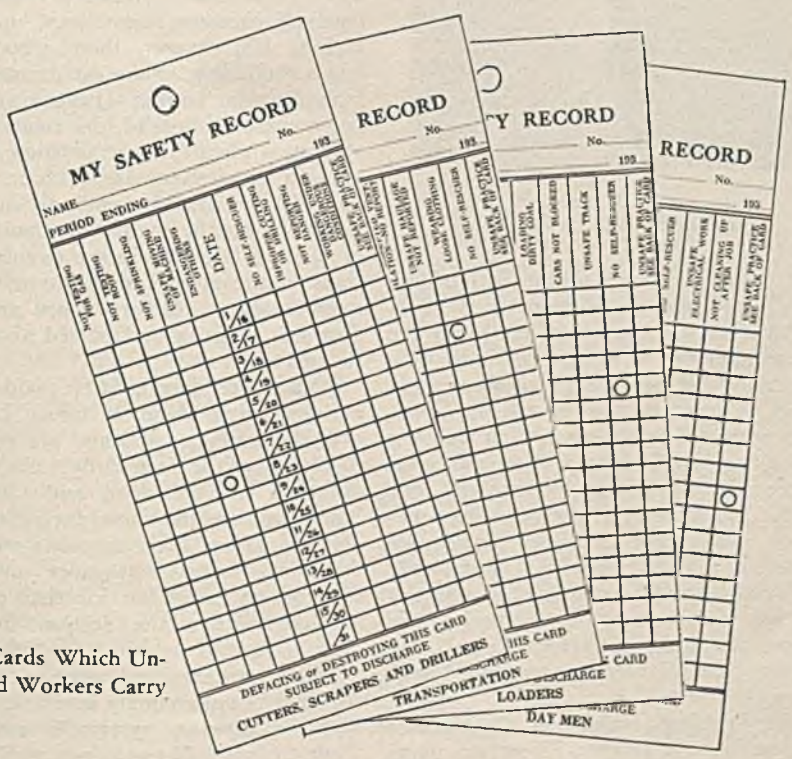


Fig. 3—Cards Which Underground Workers Carry

YOUNGSTOWN + Has Made a New Mine Of Dehue

AT DEHUE, in Logan County, W. Va., the Youngstown Sheet & Tube Co. operates a mine which attracts interest by reason of a program now under way and almost completed, of re-equipping with modern cars and permissible electrical equipment, and by reason also of the recent great improvement in its former accident record. This record, for some years, due, in part at least, to unfavorable conditions, presented a baffling problem.

The mine is located on a 4,400-acre leasehold of Eagle coal, which, in the areas worked to date, has a thickness ranging from 40 to 77 in. and an average thickness of 55 in. Speaking generally, the top consists of 4 to 18 in. of drawslate, but in a few places it is a solid sandstone. Approximately 40 per cent of the present production of 2,500 tons per day comes from pillars. As a rule, in rooms the drawslate is supported by props topped with either caps or crossbars. Near the top of the seam is a 6-in. stratum of laminated coal much of which is cast aside at the face. Locally also a 2- to 3-in. streak of bone is found. Though the mine is only slightly gassy, and then only in places under development, it is operated with closed lights.

Coal is hoisted up a 96-ft. shaft located at that corner of the property to which favorable haulage gradients can be obtained. The property was opened in 1917 by the Rum Creek Collieries & By-Products Co., and is known as the first shaft mine in Logan County. In 1920 it was purchased by the Steel & Tube Co. of America, which company was absorbed by the Youngstown Sheet & Tube Co. in 1923. At Dehue mine was early installed a standby Wisconsin gasoline-engine-generator Allis-Chalmers, unit, the first multi-cylinder high-speed direct-connected unit to be erected for fan drive; further reference will be made to this unit later.

All coal is loaded by hand, and the tipple is equipped with picking tables but not with mechanical cleaning. Refuse is taken to the rock dump and there deposited by an American Steel & Wire aerial tram of the double-bucket non-continuous type.

Two years ago a program of modernization was prepared; the work thus started was completed in 1930. Wood mine cars were replaced by 616 Enterprise steel cars equipped with Timken bearings. These cars have a capacity of 83.6 cu.ft. and carry an average coal load of 2.5 tons. Their over-all dimensions are 72 in. wide, 140¾ in. long, and 30½ in. high above rail. The cars are of the lift-endgate type, and their wheel diameter is 14 in.

E. B. Agee
Superintendent, Dehue Mine

All electrical equipment used inby the main haulage is being replaced with machinery of permissible or flameproof type. There are now in use six Goodman permissible bottom-cutting slabbing machines, ten Goodman 8-ton cable-reel flameproof gathering locomotives, one M.S.A. permissible rock-dusting machine, and three Sullivan permissible portable air compressors. Equipment for main haulage consists of the following trolley locomotives: two 13-ton Goodman with contactor control, one 13-ton General Electric, and one 10-ton General Electric.

For raising water to the surface Dehue has one Barrett-Haentjens pump with a capacity of 1,150 gal. per min., actuated by a 75-hp. General Electric motor; two Harris pumps of 800-gal. per min. capacity, driven by 40-hp. motors; and one Yough pump with a 7½-hp. motor and a capacity of 160 gal. per min. A smaller 20-gal. per min. Barrett-Haentjens pump also is provided for the shaft sump. Water is gathered by eleven Fairmont pumps of 50-gal. per min. capacity, seven of which have 2-hp. motors and four 3-hp. motors. Five Deming pumps of twice these capacities are actuated by 5-hp. motors.

Approximately 650 tons of steel beams, comprising sections ranging from 5-in. H-beams to 24-in. I-beams, are used to protect from caving the main bottom and the haulage entries. However, for eight years or more, 5-in. H-beam crossbars set on 12x12-in. brick piers have been regarded as standard entry construction. For more temporary work the same size of H-beam is used, but it is set on wood posts.

Tracks of main haulways are laid with 60-lb. rail; those in butt entries with 40-lb.; and rooms with 30-lb. Five hundred tons of 60-lb. rail is in use. In rooms steel ties are used exclusively, because they speed up track laying, last longer than wood, and lower the height of the car as measured from the mine bottom. Jumper switches are not used. Instead, the room face is stopped while a crosscut is being driven.

Main entries consist of four, eight, or twelve parallel headings, and all stoppings on the mains are constructed of 4½-in. brick. There are twenty overcasts in the mine and no doors on the main haulage. Where doors are used they are in pairs and placed about 300 ft. apart.

Rooms are driven 16 ft. wide, each cut producing about 16 tons. Loaders drill the coal by hand and are required to clean up the face daily. Shotfirers, eight in number, load and tamp the holes, and fire the shots during the day shift. Loaders make up their own clay dummies, using newspaper or sheet blasting paper. Clay for that purpose is delivered to the section in mine cars.

Pillars are worked open-ended, and the coal is undercut by machine. Here also the clean-up system is employed. Four to seven 2½-ton cars are filled for

Reclosing Circuit Breaker Protected by Brick Vault

every cut across the pillar. The most extended pillar line is approximately 1,200 ft. long. Props on pillar lines are pulled at night and consequently nearly all of the pillar falls occur on the off-shift. Fifteen to twenty feet of rock falls near the standing props when a row of props is removed, but falls of the higher strata follow within the same off-shift. So far as can be observed with a flashlight, the breaks occur in uniform steps of unusual regularity.

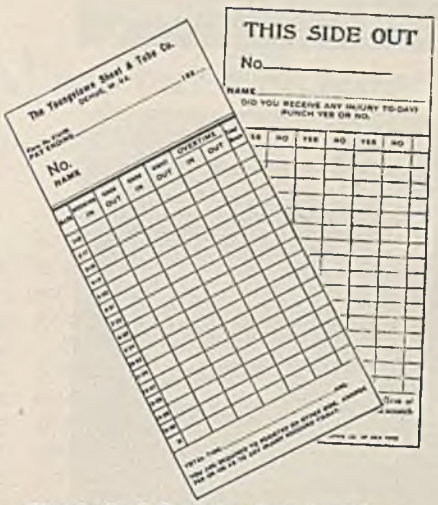
Last year a saving of nearly 5c. per post was made by buying smaller posts. Split props of triangular cross section, that is, 5 in. long on each of three sides, are now standard. Formerly many heavy, round posts were used. Though there was some difficulty in persuading the pillar men that smaller posts were adequate, they were ultimately introduced, and the mine foreman states that he is convinced that such posts are large enough to furnish ample protection.

An appreciable saving was effected by bringing timber into the mine during the day instead of at night. Formerly, the timber-and-material crew working at night consisted of six men. Four of these high-rate men were cut off and two low-rate outside men added. The two men load the timbers into cars which are let down a material slope near the hoisting shaft. Two men working in the mine at night deliver crossbars and transfer materials.

Efficiencies of the mine are as follows: per loader, 19 tons; per dayman, 22.4 tons; per man on payroll, including salaried men inside and out, 8.29 tons; per mining machine, 375 tons. The quantity of coal shot down by 1 lb. of explosive averages 7.42 tons.

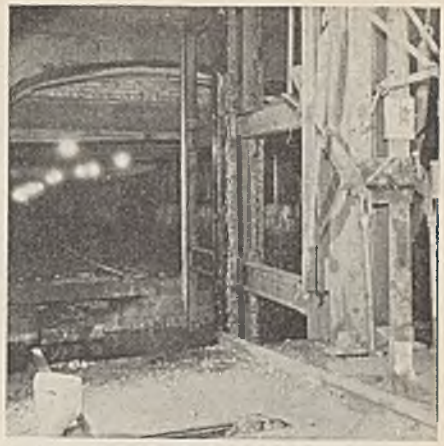
To indicate briefly the vast improvement which has been made in the accident record of the mine, 1928 is compared with 1930, although 1931 promises to show a proportionate yearly improvement. The compensation paid to employees was reduced from $28,180, or 4.6c. per ton, in 1928 to $12,044 or 2.4c. in 1930. There were 2 fatal and 160 lost-time accidents in 1928, with no fatal and but 57 lost-time accidents in 1930. Frequency and severity rates were, respectively, 185 and 21 in 1928, and 65 and 3 in 1930. At the end of the first six months of 1931 the frequency rate was 4.44 and the severity rate 0.772. Table I details the records for each of the four years.

The safety organization, which is patterned after that functioning at Nemacolin, is headed by a safety engineer who reports directly to the superintendent. Every employee is required to attend one of the two safety club meetings held every month. A central safety committee, composed of the superintendent, safety engineer, mine foreman, chief electrician, outside foreman, section foreman, firebosses, and motor bosses, meets once a month to discuss and make recommendations regarding accidents, safety suggestions, safety policies, safety equipment, and physical condition of plant.



Punch Card for Men Entering Mine

As at Nemacolin, every employee is required to punch a time clock which marks on his time card the time of entering and leaving the mine. On this card by writing the words "Yes" or "No" he records whether he suffered any accident during the shift. An investigation is made of each lost-time accident, at which the responsibility for the casualty is placed where it belongs and disciplinary action prescribed when deemed necessary. Only men who upon examination are found to be physically fit are employed. A fully equipped emergency hospital and doctor's office are maintained. Every section of the mine has its own first-aid station.



Pre-opening Device Speeds Caging

Mine-rescue training classes in first aid and bulletin boards combine with the safety club to promote safety education. Perhaps the most important factors in accident reduction have been the establishment of rigid operating discipline and the enforcement of a set of safety rules covering each occupation.

Dehue mine is completely electrified, being operated by purchased power. Direct current at 275 volts is supplied from three outside substations. One, located in a room of the hoist house, consists of a type HCC 200-kw. synchronous converter with manual control; another, located about one mile from the hoisting shaft, contains a 300-kw. synchronous motor-generator set with full-automatic control, and a third, situated approximately 2½ miles from the shaft, has a type HCC synchronous converter with full-automatic control. All of the machines are of General Electric manufacture.

All three substations are tied together on the inside of the mine by a 1,000,000-circ.mil feeder circuit. Automatic reclosing circuit breakers are used in each substation and inside the mine on

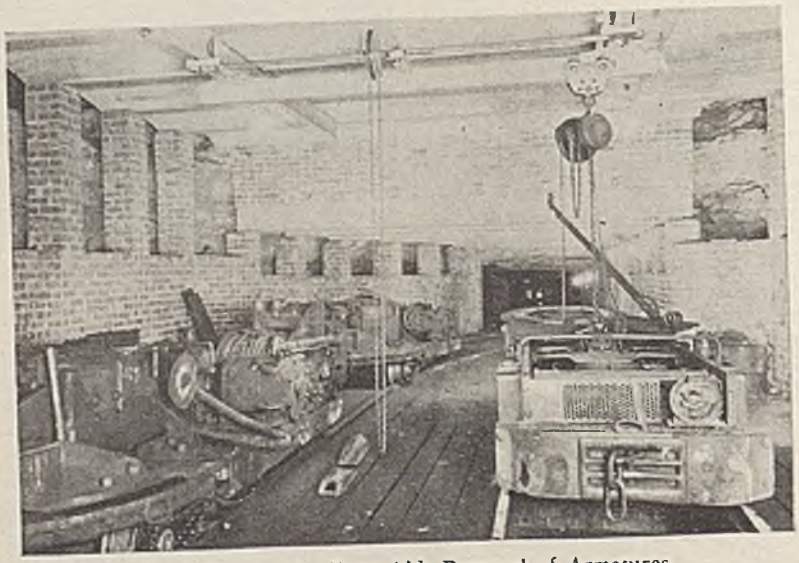
Comparative Yearly Cost of Mine Accidents at Dehue Mine Jan. 1, 1927, Up to and Including June 30, 1931

	1928	1929	1930	1931
Annual production	606,269.10	624,154.20	543,270.30	156,490.05
Compensation paid employees:				
Total	$28,180.00	$15,449.00	$12,044.98	$1,087.82*
Per ton	0.046	0.025	0.024	0.007
Safety maintenance costs:				
Total	$2,231.02	$2,791.12	$2,979.78	$1,546.38
Per ton	0.004	0.004	0.005	0.010
Number of accidents:				
Fatal	2	2	0	0
Lost-time	160	148	57	1
Number of days lost	18,985	24,836	2,583	174
Frequency rate	185.34	173.00	65.43	4.44
Severity rate	21.73	28.64	2.96	0.772

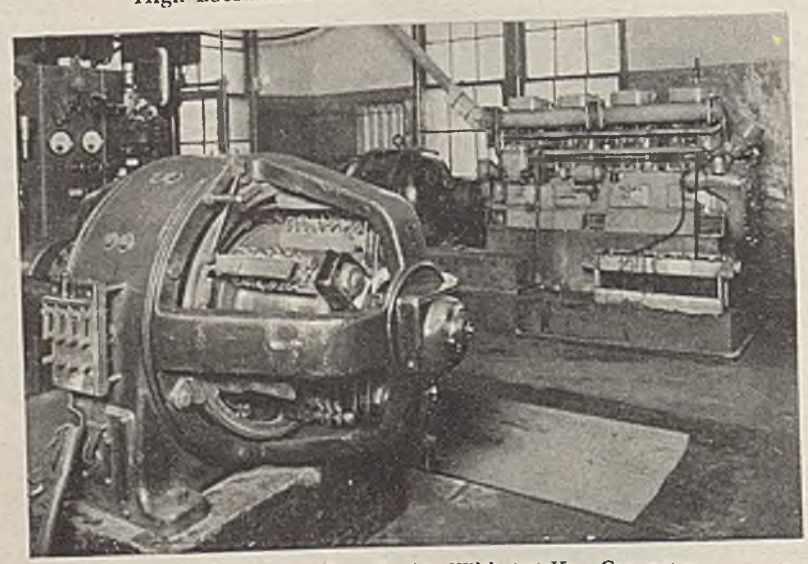
*Of this amount, $381.72 is compensation paid for the one lost-time accident occurring in 1931; balance $706.10 is increased disability awards on accidents occurring during previous years.

the section feeders. The third substation feeds through a 265-ft. borehole in which is suspended a 1,000,000-circ.mil armored positive, a bare copper negative of the same size, and an armored ten-conductor control and telephone cable. The substation unit is started and stopped from a pushbutton control station located in the mine 600 ft. from the bottom of the borehole.

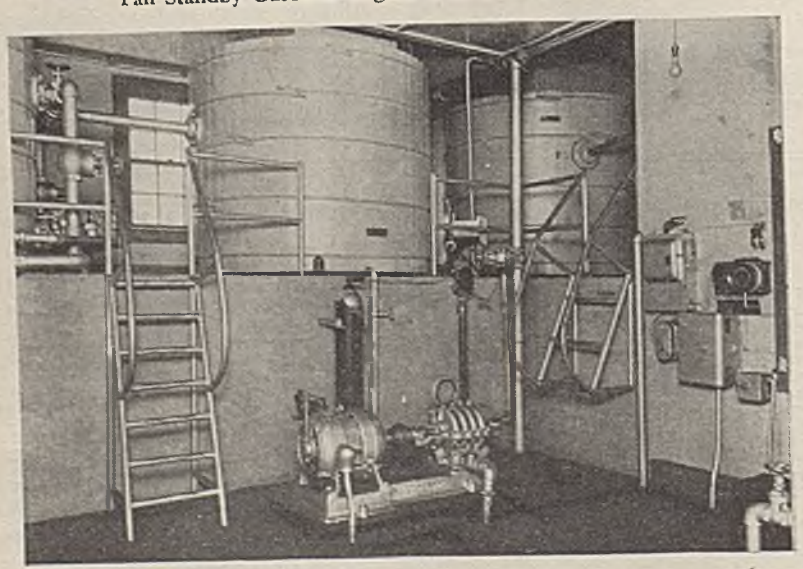
The coal hoist is a Vulcan unit, equipped with 250-hp. 2,300-volt slipring General Electric induction motor with grid resistance magnetic control.



High Locomotive Barn Aids Removal of Armatures



Fan Standby Gasoline Engine With 200-Kw. Converter



Filter Plant With Raw-Water Tank in Rear

The caging equipment has been provided with a Fort Pitt pre-opening device to speed hoisting. The best record of the hoist now stands at 1,102 cars of coal and rock in 9 hr., with a fotal lost time of 17 min.

The mine fan is located at an airshaft about 3,500 ft. from the hoisting shaft. It is a Robinson double-inlet fan, 4 ft. wide and 7 ft. in diameter. Formerly driven by a 100-hp. 600-r.p.m. G.E. slipring motor with variable speed control, it is now actuated by a 100-hp. 600-r.p.m. synchronous motor of the same manufacture, the purpose being to improve power factor. The motor is connected to the fan by a flat belt on 20-ft. pulley centers. At present the fan is being operated at 220 r.p.m. and is delivering approximately 127,000 cu.ft. at 1.2-in. water gage.

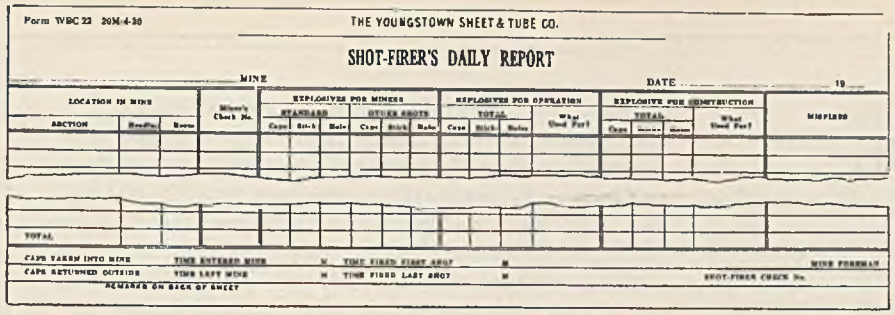
In the building which houses No. 1 substation and the hoist is a 300-hp. Sterling gasoline engine, direct-connected to a 125-kva. 2,300-volt generator, which unit is a standby for operating the mine fan. The six-cylinder Wisconsin engine, direct-connected to a 150-amp. 240-volt a.c. generator, which was installed as a standby for the first fan, now displaced by a newer fan, acts as a standby for operation of 220-volt pump motors at the bottom of the hoisting shaft.

The power circuits feeding the substations, the fan, a.c. mine pumps, hoist, tipple, etc., are separately metered, as also the lighting in every house and company building. Nearly all the employees live in company-owned houses.

Water for domestic use is aerated, filtered, and treated in a plant furnished by the American Water Softener Co. The raw-water supply is pumped from the mine to a 13,000-gal. wooden tank on a hill-side near the treating plant. It runs by gravity to the plant and thence trickles down over charcoal-filled trays into sediment tanks. After passing through a sand-and-gravel filter, it is pumped into a steel tank. Air is trapped in the top of this tank, and its pressure maintains the water head on the domestic feed line. The water is chlorinated as it is pumped into the steel tank.

This water plant is entirely automatic in operation. Floats in the sediment tanks control the inflow from the raw-water tank and a pressure switch starts and stops a 300-gal. pump delivering to the steel tank and thence to the mains.

Thus far no mention has been made of equipment maintenance, which at Dehue is considered an important phase of safe and efficient operation. Organization comes first. The chief electrician is held responsible for inspection, maintenance, and repair of all equipment inside and outside of the mine. The four electricians making up the inside repair crew report directly to the chief. Two of the men work during the day and two at night. The inside locomotive barn has a modern equip-



Form WBC 22 20M-4-30 THE YOUNGSTOWN SHEET & TUBE CO.

SHOT-FIRER'S DAILY REPORT

MINE DATE 19

LOCATION IN MINE			Miner's Check No.	EXPLOSIVES FOR MINERS						EXPLOSIVES FOR OPERATION				EXPLOSIVES FOR CONSTRUCTION				MISFIRES
				STANDARD			OTHER SHOTS			TOTAL			What Used For?	TOTAL			What Used For?	
SECTION	Headings	Room		Caps	Sticks	Holes	Caps	Sticks	Holes	Caps	Sticks	Holes		Caps				
TOTAL																		

CAPS TAKEN INTO MINE TIME ENTERED MINE M TIME FIRED FIRST SHOT M MINE FOREMAN

CAPS RETURNED OUTSIDE TIME LEFT MINE M TIME FIRED LAST SHOT M SHOT-FIRER CHECK No.

REMARKS ON BACK OF SHEET

Shotfirer Has to Keep Close Track of His Shots

ment of pits and crane and, in contrast to so many others, has sufficient height to afford convenient operation of the crane in lifting a motor out of a locomotive.

Mining machines are given regular weekly inspections, and locomotives are inspected both daily and weekly, the latter inspection, of course, being much the more thorough. As in all other phases of the mine operation, form reports are used to cover the inspections and repairs made.

Mining-machine bits are sharpened with a Sullivan roller sharpener after they are brought to the desired temperature by a Diamond oil-burning automatic heater. These units are in a shop devoted to blacksmith work and car repair located near the hoist house and separate from the machine shop.

The inside telephone and dispatching system is one of the few in this country in which the circuits are buried in the mine floor. The protection of the conductors against water and electrolysis is such as to make the installation the latest practice in reliability. The system was patterned after that at Nemacolin, but recently the lead cables have been buried in half-round fiber duct filled with bituminous compound. This conduit with a treated plank laid on top is buried in a shallow trench beside the track. Mechanical and electrolytic protection is provided for the lead cable. As no iron or steel is present, corrosion is avoided.

Modernized by the Youngstown Sheet & Tube Co. and operated according to practices assuring maximum safety and efficiency, Dehue mine stands as one of the model operations of Logan County.

▼ ▼ ▼

Brier Hill an Old Mine, but Efficient

(Continued from page 416)

length of the table originally was 65 ft., but it was found to give better results after its length was reduced to 45 ft.

Refuse from the priming table comes off in two chutes to a cross collecting conveyor, which carries it to a recirculating conveyor—a 36-in. flight conveyor—which in turn carries it to a hopper, where it is fed to the retreatment table, which is driven by a 15-hp. motor running at 900 r.p.m. Here again a Reeves speed reducer has been installed with Texropes at either end. The number of complete reciprocations per minute is 160. The refuse from the re-treatment table is taken by a Link-belt single-chain flight conveyor to the track leading to the slate dump and loaded into railroad-construction dump cars. The motors are controlled by pushbuttons so interlocked as to provide proper sequence. The primary fan is driven by a 125-hp. synchronous motor actuated by 2,200-volt a.c. current. The fan for the re-treatment table takes a 30-hp. motor. All the smaller motors are run on 220-volt a.c. current. The clean-coal belt, which is 28 in. wide, is run by a 15-hp. motor. It has a capacity of 200 tons per hour, and when the mine was producing 2,000 tons daily, it took care of that tonnage. Coal is left on the table at all times, the machinery being started with the table full.

Experience at this plant has shown that a little water in the coal is rather helpful than harmful. No water is used on the cutter bar of the mining machines where such machines are used, which is not everywhere, for much coal is undercut by hand. The coal usually is dry, as the mine does not make much water. However, the coal is all sprinkled at the shaft bottom.

The ash in the raw coal is 9.2 per cent. This is reduced by the table to 8 per cent. At the gravity of cleaning, the percentage of ash should be 7.2. The coal, however, is rid of all that high-gravity coal that spoils coke by its failure to expand with the coke mass, of which it must form a part. The smaller impurities that form a part of the coal do not form lines of cleavage, as do the larger masses of impurity. The coal as it comes from the mine has some pieces of drawslate and some partings. The separation of these from the coal greatly improves the product. Only 2½ per cent of the entire feed is rejected, and though 20 per cent of the reject is coal, the loss of coal in the refuse runs only 0.5 per cent of the entire output. The sulphur is reduced from 1.24 per cent to 1.11 per cent. Of the refuse, 55 per cent is ash. The specific gravity of operation is 1.60.

A chemist watches the product, making frequent float-and-sink and analytical tests. A Sturtevant crusher reduces the sample to ¼ in. After it is thus crushed, it goes to a pulverizer. Care is taken to watch the percentage of ash in the raw coal, with the purpose of seeing that the coal is being carefully prepared in the rooms.

Village of Dehue With Office and Commissary on Left and Theater on Right in Foreground

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, AUGUST, 1931

Political wage-making

MONTH-END REPORTS from Washington indicate that the second attempt of Secretaries Lamont and Doak to line up bituminous operators for a joint conference with representatives of the United Mine Workers will be no more successful than the first official trial of early July. For the future of stabilization in the industry—and even for the future of organized labor in the industry—this probably is fortunate. When the offices of any government administration are invoked to bring together two groups, one of which has no immediate desire to join with the other, there is a suggestion of pressure which cannot be avoided. Agreements made under duress are born for disaster.

Desperate as is the present condition of the United Mine Workers, it would be still more desperate if it were temporarily restored to power as the result of contracts for which the other party to the agreement had no real wish. When Mr. Lewis and his associates seek to use Washington to force unwilling employers into relationships they disdain, the union strengthens resistance to its program and risks losing a war to win a skirmish. It is far better, both for the union and for the industry, to have contractual relations renewed because operators are convinced—as apparently a number have been in northern West Virginia and western Pennsylvania—that reestablishment of union control is economically desirable.

How human are fans?

WHEN an individual is overburdened with the performance of many functions, it often happens that, when he is relieved of one duty, he will not perform the others any better than before. Fans, too, are that way.

A fan was delivering a certain quantity of air at a certain water gage, but one split failed to receive all the air it needed. On an idle day, just to satisfy the idea that fans were not human but mechanical contraptions which when relieved of one job would do the others better, an idle split was shut off to see if the split that needed air would take up all or at least a part of the allotment of the split that was closed. The fan was run just as before, giving the regular pressure and volume.

Alas! the split got no more air than before—and, after all, why should it? The pressure was no greater than that which was available and had availed to drive the former quantity of air along the split; the resistance also was no less. True, there was more air under pressure when the idle split was shut off, but this air just backed out again and was churned by the fan. If it had not been for that it would have wandered over the green fields. Given a definite pressure and a resistance, a certain quantity of air will go through a split—no more, no less. If the fan creates the pressure, being able to do so because it can give the volume that will permit that pressure to build up, then the split does the rest. So, it happened that the air which the split was unwilling to take, finding it was not wanted, tried to stroll out, much as a man with too little on his hands will drift off to the golf links. Unfortunately, to do so it had to try conclusions with the fan blades and was driven back into the mine.

If—

IF UNIONIZATION again is to be accepted by any large part of the bituminous field as a major approach to stabilization, then it becomes both the right and the duty of the operators to demand that reestablishment of contractual relations with the United Mine Workers shall be upon a basis which gives effective guarantees against a repetition of the conditions which provoked the ruptures of 1920-27. To proceed upon any other basis would be only to invite a recurrence of the situation in which the industry finds itself today.

First and foremost, there must be effective guarantees against the interruptions which in the past have made a farce of many agreements. That there have been and will be honest differences of opinion on contract interpretation and on contract application to conditions not specifically in view when the agreement was framed must be expected. That these conditions, however, should justify either strikes or lockouts must be emphatically denied if contracts are to have any real value. That the union itself recognizes this is evident in the penalty clauses in the new northern West Virginia agreements.

But the guarantees should also look beyond existing contracts. The damaging effects of periodic suspensions pending the negotiations of new agreements are too well known to require exposition. Work should be continued if an interim occurs between the expiration of an old and the signing of a new agreement, and the negotiations ought to be further safeguarded by a flat provision for arbitral decision if, after a reasonable period of negotiations, the direct representatives of the employers and the employees are unable to agree upon the terms of a new contract. Such a provision, it should be noted, is no more binding upon labor than it is upon capital.

Stabilization presupposes a fixed wage scale for a definite period of time. The longer the period, the greater the opportunities for long-term planning and for efficient management to regularize employment and operating conditions. Nevertheless, in the light of past experience, it would be folly to fail to recognize that rigidity, in the face of the imposition of competitive handicaps from without, metamorphoses stabilization into stagnation as deadly to labor as to capital. Some machinery, therefore, should be set up in any new contracts which may be made to forestall such a development before destruction has had full sway.

Finally, any agreement should preserve for management those rights which properly belong to management, including discipline, and should assure the hearty cooperation of labor in the introduction of new methods and new machinery designed to increase productivity and insure the maintenance of the highest wage scales and individual annual earnings which competitive conditions will allow. With such guarantees honestly made and honestly observed by both parties to the contract, a reestablishment of the United Mine Workers to the position of dominance it held prior to 1920 would offer tangible promise of genuine economic betterment to the industry; without them, there would be nothing in prospect but a repetition of another dreary cycle of power-drunk unionism following managerial disorganization and weakness.

Water acidification on the decrease?

MUCH has been said and written asserting that as every new coal mine is opened in those areas where mine water is acid, the rivers and streams will grow more and more acid as time passes. But in arriving at any such conclusion certain corrective influences have been overlooked. True, the outcome is none too clear, yet it is not well to view the future through rays undeflected by these extremely valid considerations.

When the first mines were opened, the coal was loaded with a fork and in some cases turned over with a rake prior to loading. All the fine coal was left behind. In such mines, when reopened, piles of slack a foot deep can be found covered with the yellow slime of basic ferric hydrate. The mine waters are highly acidic, and well they may be, for, as the pillars are still standing, air can assist the water to attack the pyrite.

Today, however, the slack is not left and the pillars are removed. So there is less pyrite to be leached and less air to assist in the leaching of what might still be present. Unfortunately, a new cause for acidification has arisen. Demands for clean coal have made it necessary to leave large piles of low-quality coal and bone underground, or to waste it on the surface, which, when it is used as ballast, leaches along the railroad tracks, and when it is piled in dumps, discharges acid water with every rain. However, these surface dumps usually catch fire and pollute the air instead of acidifying the rivers. Floor coal and roof coal, being left in large masses, are not speedily leached, and even when they are left, the exclusion of air, by effective caving and accompanying water retention, causes them to contribute but little acid.

With the completion of caving the water table will rise to the limestone and the water travel along channels established in that alkaline rock, contributing to the neutralizing of the waters entering the rivers. In this connection it may be noted that mining that has promoted acidification has also, by diverting water from its lime-rock channels, decreased the alkalizing influences that preceded it.

Loading machines in underground mines and strip pits, by taking the coal without selection, have greatly increased the quantity of pyritic material brought to the surface, though bottom coal sometimes is left in strip pits and both top and bottom coal are often left when coal is loaded underground by loading machines. As the impure coal brought to the surface usually burns before much sulphur is leached from it, the more modern method of mining reduces water acidification. With stripping, now that most of the high-lying coal has been removed that can be uncovered, except in the anthracite region, the bottom of the pit nearly always is wet to a depth at least equal to the thickness of the coal. In consequence, any coal left is not leached of its pyrite.

Another factor in the problem is the growing importance of shaft and slope mining, for a shaft or slope mine is no sooner abandoned than it is sealed by flooding. Even where recovery is partial, whether the pillars stand or are crushed, the result is the same, for sulphuric acid ceases to be a product of the abandoned shaft or slope.

For all these reasons the acidification of rivers in mining regions will not progress as steadily as in the past, and may even retrogress with the passage of time.

A commendable strike

STRIKES AND LOCKOUTS are Hogarthian strokes in the industrial picture which generally draw little admiration from the critics of American business. Recently, however, the country was treated to the spectacle of a strike which merits whole-hearted approval. The scene was the Southwest and the strikers were the producers of oil, who shut down their wells because competition had depressed prices to ruinous levels. There are many bituminous coal companies that might emulate such a strike with immediate profit to themselves and ultimate benefit to the entire industry. Continued long-time operation at prices which eat into the dwindling substance of the past and hypothecate all reasonable hopes of future profit is without economic or ethical justification.

NOTES

. . . from Across the Sea

DETAILS that have come to hand regarding the petrographic or taxic separation of coal into vitrain, durain, and fusain give a clearer idea of what that system of preparation involves than the brief description which these notes contained in the issue of June. According to an article appearing in the *Journal of the Institute of Fuel*, of Great Britain, the coal is fed into a mill of the cross-section shown in Fig. 1. It passes through a chute onto a rapidly revolving breaker, which throws it violently against breaker plates. It then slides down over a screen and falls onto revolving arms, which flail it in passing. As these arms are hinged and are kept in place only by that attachment and by the centrifugal force imparted by rapid revolution, the blow they strike, though forceful, is nevertheless elastic. The coal is thrown against breaker plates and broken again. The finely broken vitrain and fusain go through the screens, and the more resistant durain continues to take its punishment on one ring of revolving arms after another. Air carries away the light fusain through a port in the side of the outer envelope of the elastic percussion mill. The mesh of the screens described is 2 to 4 mm. (0.08 to 0.016 in.) wide. In consequence, what is obtained is a mere dust of vitrain. According to an illustration designated "Coal Petrographic Tree," 1,000 lb. of raw coal makes 580 lb. of vitrain, 270 lb. of durain, 70 lb. of fusain, and 80 lb. of refuse.

But these are by no means pure products. The "vitrain" fraction is 79.5 per cent vitrain, 18 per cent durain, 1.5 per cent fusain, and 1.0 per cent refuse. Its ash percentage is 4.5 and its volatile content 33 per cent, whereas the washed coal before taxic separation had 6 per cent of ash and 31 per cent of volatile. The true content of vitrain in the washed coal before taxic separation was 65 per cent, and after taxic separation was still only 79.5 per cent and not 100 per cent; so, after all, the efficiency of the separation is not high.

Similarly the "durain" fraction, so called, consists of 35 per cent vitrain, 62 per cent durain, 1.5 per cent fusain, and 1.5 per cent refuse. The durain has undergone a greater concentration than the vitrain, even though the percentage of durain in the durain fraction is not as large as the percentage of vitrain in the vitrain fraction. The 29 per cent in the washed coal has become 62 per cent, a considerable gain. The ash, which in the washed coal was 6 per cent, has become 5 per cent in the durain fraction and 4.5 per cent in the vitrain fraction. Apparently, therefore, the effect of separation is to remove more of the ash from the coal, though it had already lost 6 per cent from washing.

The fusain percentage in the washed coal, which was 4 per cent, is raised to 30 per cent in the so-called "fusain" fraction. This "fusain" has 56 per cent of vitrain, 10 per cent of durain, 30 per cent of fusain and 4 per cent of refuse, but the ash is 13 per cent and the volatile 21 per cent. What particularly pleases the coke man is that coke from the vitrain fraction is dense, that from the whole washed coal is coarse and less hard, and that from the durain fraction friable. The durain evidently is harmful to the coking quality, though not so harmful as fusain.

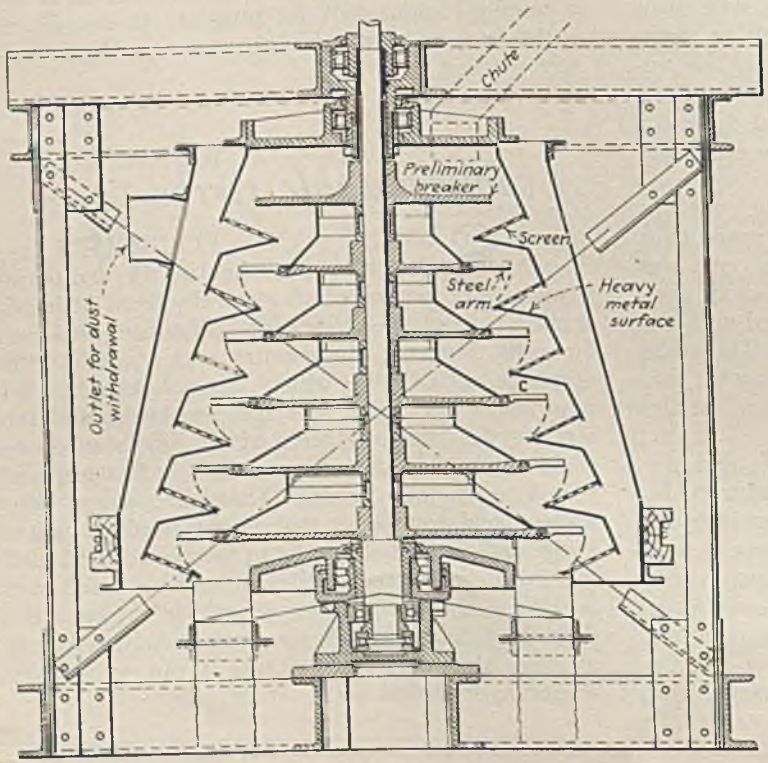
Apparently with this system the washed coal has received a further cleaning, due to the fine crushing and aspiration, which, being done without admixture of water, does not involve any expenditure for filtering or drying. American engineers will say that provided the clarain can be separated from the vitrain by this process and provided the separation of clarain is desirable and profitable, the big problem will be what to do with the clarain fraction, which will be so fine that about all that can be done with it is to feed it on a stoker or pulverize it further for use in a pulverized-coal furnace. The fusain fraction might be used to heat the bathhouse and other buildings, but for the clarain fraction a nobler purpose must be found. Durain, it is said, is found only rarely in American coals.

The Germans declare that there is more vitrain in the more highly developed coal than in the more primitive coals—that is, vitrain is more plentiful in coals of higher rank. According to that view vitrain is the outcome of carbonization and does not arise from a difference in the original material of the bed, as Reinhardt Thiessen would assert. To put it in other words, coal vitrifies, so to speak, with "carbonization," as we express it, or with "inkohlung," as the Germans would say. But this is starting an argument, which perhaps will not be much bettered by saying that perhaps there is truth in both the theories. In the Ruhr, anthraxylon, or what looks to the naked eye quite like it, is more

Petrographic Analyses of Ruhr Coals; Carbonization Progresses From Left to Right

English	German	Gas Flame Coals Per Cent	Gas Coals Per Cent	Fat Coals Per Cent	Lean Coals Per Cent
Vitrain	Glanzkohle (Vitrit)	50–75	65–78	72–90	80–90
Durain	Mattkohle (Durit)	15–35	17–30	7–18	5–10
Fusain	Faserkohle (Fusit)	2–7	2–5	2–4	2–4
Refuse	Mineral	1–12	2–10	1–6	1–4
Pyrite	Pyrit	0.3–3	0.3–1.5	0.3–2	0.3–2

Fig. 1—Elastic Percussive Crusher for Differential Breakage of Coal of Variant Physical Strength



common in coals of high rank than in coals of low rank.

In any event, the Germans give the accompanying table to show how vitrain increases with carbonization.

Only the first two lines, vitrain and durain, show a definite trend—upward in the first instance, downward in the other—but perhaps, as suggested, the increased quantity in higher-rank coals of the material which is termed "vitrain" is merely in a similacrum of anthraxylon and not in the thing itself; that is, it may be vitrain but is it really anthraxylon?

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Soviet Foreign Trade—Menace or Promise, by J. M. Budish and Samuel S. Shipman, Economic Division, Amtorg Trading Corporation. Horace Liveright, Inc., New York City. 276 pp., cloth. Price, $2.50.

Why Recognize Russia? by Louis Fischer. Jonathan Cape and Harrison Smith, New York City. 298 pp., cloth. Price, $2.

Labor and Coal, by Anna Rochester. International Publishers, New York City. 255 pp., cloth. Price, $2.

Recent months have witnessed such an outpouring of books on Soviet Russia and Russian-American trade and political relations or lack of them that the bystander can hardly be blamed if he sometimes wonders whether the outpouring is an evidence of a quickening interest in the subject or whether the volumes are put forth to quicken interest. Soviet-American relations have a dual appeal to the coal industry in this country: in the first place, many of the technicians laboring to modernize the Russian coal industry are American engineers; in the second place, there has been a direct clash of commercial interest growing out of the importation of Russian anthracite into the United States.

In "Soviet Foreign Trade—Menace or Promise," the authors call upon President Hoover to give the accolade of high respectability to foreign commerce and then seek to develop the premise that the trade relations between the two countries are complementary rather than competitive. "American imports from the Soviet Union," they say, "consist almost entirely of raw materials and foodstuffs which this country has to import in large quantities every year. In practically no case do they compete with American industry." And where they do, the authors argue, the imports are so small anyway that they can have no effect upon American production. That certain imports are produced by forced or convict labor is denied. Dumping, too, cannot be laid at Moscow's door, say Messrs. Budish and Shipman. "From whatever angle considered," they insist, "Soviet foreign trade has been an increasingly helpful and stabilizing factor in world commerce" and the menace comes from those who would hamper its normal development and jeopardize Soviet-American relations.

Mr. Fischer is no new laborer in the vineyard of authorship of tomes on Russian affairs. He already has a two-volume work on "The Soviets in World Affairs" to his credit. His present effort is presented by the publishers as a full exposition of the arguments for and against recognition. The volume includes chapters on the diplomatic relations between the United States and Russia, the legal aspects of recognition, Russian debts to this country and Communist propaganda.

Although the publishers say that the author makes no plea for recognition, but merely insists that so vital an issue as the Russian question cannot be ignored, this denial is hardly in keeping with the tone of the concluding chapter, in which Mr. Fischer insists that the present policy of non-recognition cannot endure indefinitely. He even suggests a number of ways in which the question might be brought to a fresh head, including a world wheat conference—held since his book was written without bringing recognition. If this government, he says, were seeking an opportunity to recognize Russia, it would not be difficult to find one. "Further delay," he concludes, "only makes it harder for somebody else and postpones the benefits that must come from normal and peaceful relations between the most powerful, most progressive and wealthiest nations on earth."

There is little in Miss Rochester's book which refers directly to the Russian scene, but the work is so dominated by ideas given fresh currency by the great social experiment inaugurated by Lenin and now carried on by the lesser saints of the Marxian hierarchy that the volume properly belong in the group of tracts which stem from the Soviet ideology. The book is one of a series dedicated "to the militant workers who, in the face of overwhelming obstacles, are carrying on the fight against the strongly organized forces of the capitalist class."

Subtle toilers in the field of propaganda disarm suspicion with a show of conceding something praiseworthy either in accomplishment or in motives to those they seek to undermine. But not Miss Rochester! Her work belongs to the old school of melodrama where the hero is a living compendium of all that is good and admirable and the villain the embodiment of all that is vicious without even a gray streak to relieve the wicked black. Capitalism in the coal industry, she says, has proceeded in planless ruthlessness. The unrelieved violence of her attack makes even her statistical hits lose their effectiveness.

Nowhere is this violence more evident than in the chapters devoted to the United Mine Workers and its past and present leadership; motives and actions are viciously assailed as a prelude to a paean of praise for the National Miners' Union—the "class conscious" organization which, Miss Rochester would have us believe, is the workers' hope for the future. Diatribe is a poor substitute for dialectics; the manifest prejudice and partisanship in the author's approach to her subject rob her presentation of persuasiveness—except for those who do not permit facts to interfere with opinions.

S. A. H.

Electricity Applied to Coal Mining. Maryland Bureau of Mines, Baltimore, Md. 123 pp., 6x9 in. Price, $1.50.

This work, the product of successive revisions by J. W. Easter, Charles M. Means, and Graham Bright of a pamphlet prepared originally by R. C. Fleming, associate vocational mining instructor, is an excellent textbook for coal-mine officials and electricians who have not had technical electrical training. Electrical engineers who wish to acquaint themselves with the practical applications of electricity to coal mining also will find much of value in the volume.

Following an introductory chapter setting forth the advantages and disadvantages of the types of power used in coal mines, there are nine chapters dealing with the theory of magnetism, generation of electricity, types of motors, and power transmission. Practical applications of electrical equipment to each class of coal-mining service are discussed in the last nine chapters, which include sections taking up the latest developments in loading-machine and conveyor equipment and coal-preparation machinery.

Practical aspects and applications of regenerative braking with a.c. motors deserve more space than is allotted. It is unfortunate that the volume also fails to include a practical non-technical explanation of power factor. On the other hand, the book does embody a thorough comparison of the advantages and disadvantages of motor-generator and converter substations which is free from the bias so often noticeable among electrical engineers discussing the subject.

J. H. EDWARDS.

THE BOSSES TALK IT OVER

NOTEBOOK KEEPING—

Will It Help the Foreman?

"What now, Jim?" inquired Mac of the super, in answer to a summons.

"You know, Mac, I have been keeping notebooks on my job for years, and I often wonder how you and your assistants manage to get along without them. Why, man, they are the biggest help I have. Important details are recorded and this leaves my mind free for absorbing principles and relations. I refer to the notebooks at some time or other every day to refresh my memory on certain information as a guide to my thinking on the problems that come up."

"We do keep notebooks, Jim; all of us do."

"That may be, but they are not the kind I have in mind. I'm thinking more along the lines of entering notes which are useful not for one day or a week, but notes that record your experience—cost of doing jobs, time required for them, such items as concrete mix specifications for a particular job, etc. You can't keep all that in your head."

WHAT DO YOU THINK?

1. Do you keep a notebook of the kind the super recommends?

2. What information do you record?

3. How do you use it?

4. Will the keeping of a notebook interfere with the duties at hand?

All superintendents, foremen, electrical and mechanical men are urged to disscuss the questions on page 438. Acceptable letters will paid for ▶▶▶▶

Coal Mine Ventilation— Scientific and Otherwise

The Law of Charles and Boyle's Law are duck soup to the engineering student who has his eyes on the boots of a superintendent. Radiation, convection, and expansion he hurdles with easy grace. Atkinson, he knows, did not invent face powder. Mining instruments respond readily to his touch. In short, the student approaches his vocation prepared to give a good account of himself.

Later, he finds that many of his attainments are more or less excess baggage. His hopeful vision of a perfect ventilation fades before tangible limitations, for without instruments even an expert craftsman is very much at a disadvantage. He acquires an elastic perspective which smoothly accords with customary procedure and succumbs to time-honored, if short-sighted, precedent. Let us call this the evolution of the more or less modern mine superintendent.

It may be a matter of viewpoint, of course, but here briefly is how two succeeding mine superintendents faced their problem, on the strength of which each hoped to reach those heights attained by great men. Both started from scratch; it was their first venture in mine superintending. Both had a reputation to make.

Super No. 2 succeeded Super No. 1 at a gassy mine—that is, gassy enough to keep everyone on the alert, yet rendering open lights permissible in the eyes of the law. Airways were long and tortuous. Overcasts were few and wheezed lustily. The main haulage roads were liberally dotted with doors that taxed the energies of a resolute person to open, under which the wind soughed and moaned. With the main workings a bare mile from the bottom, and with a force fan delivering 100,000 cu.ft. of air at the bottom of the downcast, the consumption of brattice cloth per month for use in the rooms to offset the firedamp menace was amazing.

But Super No. 1 worried little about that, for a reputation in his lexicon meant a low cost sheet. He was investing no money to correct the blunders of another, if he considered them such at all. So he patched up the old doors and built new doors as his development continued and swung back in his swivel chair telling the whole wide world about his wonderful low cost sheet. The airways expanded and so did the short-circuits and leaks, and the delivered volume of air at the face was fast becoming inadequate. Finally, upon the urgent recommendation of the mine inspector, forwarded to the head office, a larger fan was installed, delivering 150,000 cu.ft. per min. The water gage was perilously close to 4 in. Stingily built stoppings in worked-out subentries begot fires in remote corners that never were effectively sealed, and were an everlasting source of expense and harassment. Then an uninvited visitor arrived.

Super No. 2 had no illusions as he took hold, but he started without a quibble. He buckled up his sleeves and squared his chin and walled off an enormously expensive fire area by rearranging his airways. He built splendid overcasts at strategic points. He had conveyor loading machines in more than one aircourse, at the same time removing mountains of rock which was dumped into the flats for an hour each morning before a car of coal was dumped. And this for months on end, though he could scarcely refrain from squinting down the track for an uninvited visitor.

A crew of trustworthy men maintain the aircourses. Six miles of tangent-ridden, tortuous aircourse was eliminated entirely. The volume of air at the face was uncomfortable and the fan slowed down to allow 100,000 cu.ft. at the foot of the downcast. The water-gage now reads rather less than 2 in. in the fan house. The only instruments in use are the anemometer and shank's mare tramping through the renovated airways.

Here we have ventilation control with a vengeance. But the cost has been considerable; so Super No. 2 never knows when he too will be invited on an extended vacation. Then enters Super No. 3 to gather the grapes which should be harvested by this courageous, far-seeing, able executive.

Without the aid of intricate instruments this ventilation control is scarcely scientific, yet who would be uncharitable enough to call it rule-of-thumb?

ALEXANDER BENNETT.
Panama, Ill.

Discipline, and Not a Bonus, Will Best Promote Safety

I do not approve of bonus money for mine foremen and assistant mine foremen as an incentive to safety. Officials should be disciplined as well as the miners, and then there need be very little worry about the outcome of safety endeavors.

I have known it to happen, where bonus money was paid, that, in order to get their bonus, the foremen would try to prevent injured men from applying for compensation. If a foreman has made a good record for a month or a year, and the company chooses to reward him for it, there can be no real objection; yet nothing is gained. Discipline rather than bonus payment is what is needed. J. W. WALLACE.
Hellier, Ky.

The Bonus Principle Is Right But Its Application Is Wrong

I agree with the principle of safety bonuses for foremen, but I think that a monthly period is too short to judge accomplishments. It should be at least a year. The foreman who shows an improvement in the cost of safety in his section over the previous year might well be rewarded financially. But if the contest is to be fair, the workers under the foreman must be taken into consideration.

Some conditions are more dangerous than others, and accidents consequently will be more likely to occur despite the efforts of the foreman. That is why the only just plan is to compare the results of one year with those of the previous year. It is clear that if the cost in a certain department is $5,000 one year and only $3,000 the following year, the company might well share the saving with the foreman. In making the award, accidents which cannot be avoided should not be counted in; also the avoidance of accidents which can be traced to the installation of improved machinery should not be credited to the foreman.

W. E. WARNER.
Garden City, England.

Jim's Plan Better Than Dad's; Promotion Is Best Incentive

I am wondering, like Jim, whether a bonus would promote safety, or whether the foremen would be interested in the bonus instead of their jobs. Section foremen should be rewarded for establishing high standards of safety by promotion according to merit. If a section foreman is going to remain a section foreman all his life he is either dead timber or his superior is playing football with a good man. Either way his job is no longer interesting; it is only a job. Hope of promotion to higher prestige and responsibility is sufficient incentive. If the section foremen interpret intelligently and practically Article 4 of the Pennsylvania bituminous mining law they will have

very few lost-time or compensable accidents.

If I were forced to accept either plan I would prefer Jim's, because by Dad's plan a man would eventually set himself a standard beyond which he would have no reason to go. I would say, promote each man according to his ability regardless of age or length of service with the company, giving him a fair and equal chance to prove his worth. T. J. Lewis.

Ernest, Pa.

Apply Bonus to Production; Not to Safety Performance

I wonder at such a discussion; the idea of giving mine foremen a bonus to do their work right! Regardless of pay, they should carry out their duties to the best of their ability with safety the first and last consideration. Demote the mine foremen who will not become safety-minded without the incentive of a bonus.

It is my firm opinion that our compensation laws are directly responsible for many of our accidents. Through rascality or ignorance, certain individuals take advantage of weaknesses in these laws. It is my opinion, too, that mine inspection departments are not as diligent and efficient as they might be, chiefly because compensation is comparatively small. But, as I said before, the amount of pay should not be the measure of safety endeavor. I often think that compensation insurance companies rely too much on mine inspection departments to do their duty; that, on the other hand, the inspection departments think "Well, if it suits the compensation insurance company, just let it go; they pay the bill." Actually, however, the party that foots the bill is the public, both financially and by share in the misery caused by accidents.

The only place for a bonus, to my mind, is in cases similar to the following: If a mine normally produces 3,000 tons a day economically and efficiently, and by extraordinary and enthusiastic effort a higher production is established without increasing the fixed charges, then a bonus is justified as a reward for the higher efficiency. W. H. Luxton.

Linton, Ind.

Getting Ahead

This is the sketch of a man in the industry who rose to great heights from a humble beginning. Call him Jim, if you will—but whatever his name, he is flesh and blood and knew what he was about. His youth was spent in an isolated mining camp in the time when good schools were unknown to sparsely settled regions. More, his people were poor, so he considered himself lucky when he finished the grade school. Then he went to work, not only on a job, but on himself and his mental advancement. Today, though still in his middle thirties, he holds down one of the most important operating jobs in the industry. How did he do it? Well, to use his own words, he "concentrated on a mastery of correct principles governing conduct, men, management, and engineering." To him small details were beneath his notice, as the job for someone whom he could hire. In this department each month are published pages of principles governing mining. Can you afford to miss this opportunity? Read the problems here discussed and participate in the discussions. Send in your letter today.

Recent Patents

Process of Cleaning Coal; 1,801,254. Ray W. Arms, Chicago, assignor to Roberts & Schaefer Co., Chicago. April 21, 1931.

Dust-Collecting System for Coal-Handling Plants; 1,801,255. Ray W. Arms, Chicago, assignor to Roberts & Schaefer Co., Chicago. April 21, 1931.

Coal Cutter; 1,802,084. F. A. Lindgren, Western Springs, Ill., assignor to Goodman Mfg. Co., Chicago. April 21, 1931.

Mine Ventilating Tubing; 1,802,414. W. H. Evans, Bridgeport, Conn., assignor to E. I. duPont de Nemours & Co., Wilmington, Del. April 28, 1931.

Miner's Tool; 1,802,515. Joseph Kaiser, Augusta, Wis. April 28, 1931.

Mine Car; 1,803,376. Leopold Almquist, Jersey City, N. J., assignor to American Car & Foundry Co., New York City. May 5, 1931.

Mine Car; 1,803,392. W. V. Johnson, Bloomsburg, Pa., assignor to American Car & Foundry Co., New York City. May 5, 1931.

Blasting Mechanism; 1,803,501. D. Ferrell and A. W. Helmholtz, Harrisburg, Ill., assignors to Safety Mining Co., Chicago. May 5, 1931.

Mine Car; 1,797,644. R. L. Edgar, Barnesville, Ohio, assignor to Watt Car & Wheel Co., Barnesville, Ohio. March 24, 1931.

Shaker Screen; 1,798,433. E. L. Rigdon, Barlow, Ore., and J. S. Risley, Milwaukie Ore., assignors to Clyde Equipment Co., Portland, Ore. March 31, 1931.

Flotation Apparatus; 1,798,452. W. A. Butchart, Joplin, Mo. March 31, 1931.

Coal-Washing Apparatus; 1,800,701. C. F. Richards, White Haven, Pa., assignor to Wilmot Engineering Co., Hazleton, Pa. April 14, 1931.

Charging Rack for Miners' Lamps; 1,800,918. Grant Wheat, Marlboro, Mass., assignor to Koehler Mfg. Co., Marlboro, Mass. April 14, 1931.

Mine-Car Bumper; 1,800,932. G. E. Edmunds, Columbus, Ohio, assignor to Bonney-Floyd Co., Columbus, Ohio. April 14, 1931.

Blasting Cap; 1,800,954. H. E. Nash and L. W. Babcock, Kenvil, N. J., assignors to Hercules Powder Co., Wilmington, Del. April 14, 1931.

Publications Received

Some Experimental Data on the Influence of Dry and Wet Cleaning on Coke Properties and on Gas and Byproduct Yields of Pittsburgh and Mary Lee Coals, by A. C. Fieldner. R. I. 3,114; 9 pp., illustrated. Bureau of Mines, Washington, D. C.

Significance of Solvent Analysis as Applied to Coal, by E. B. Kester. I. C. 6,486; 17 pp. Bureau of Mines, Washington, D. C.

Haulage Accidents in Coal Mines. Report of the Haulage Committee of the Safety in Mines Research Board. Paper No. 66; 20 pp. Price, 6d. net. H. M. Stationery Office, Adastral House, Kingsway, W. C. 2, London, England. Contains a brief analysis of the causes of accidents over a number of years.

Use of Parallel Connections for Electric Blasting in Tunnels and Drifts, by Charles S. Hurter. Illustrated leaflet issued by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Separation and Size Distribution of Microscopic Particles—An Air Analyzer for Fine Powders, by Paul S. Roller. Technical paper 490; 46 pp., illustrated. Price, 20c. Bureau of Mines, Washington, D. C.

Trade Literature

Power Equipment. Combustion Engineering Corporation, New York City, has issued Catalog SG-1, 20 pp., illustrated, describing its Combustion Steam Generator, including over-all dimensions of 8 sizes of steam generators.

Bearings. Bulletin S-349, illustrated folder issued by Wagner Electric Corporation, St. Louis, Mo., on Steel-Backed Babbit-Lined Bearings, discusses the problem of bearing seizure in electric motors, etc.

Pipe. "Toncan Iron Pipe for Permanence" is the title of a 64-pp., illustrated bulletin, A.I.A. File No. 29B8, issued by Republic Steel Corporation, Massillon, Ohio. Results of pipe tests at coal mines are included.

Fittings. Carrick Engineering Co., Chicago, in an illustrated folder, describes the purpose of Stiff-Arm Fittings in providing means for connecting controlled devices to regulating units.

Piping and Valves. Bulletin No. 44, illustrated, 48 pp., published by Semet-Solvay Engineering Corporation, New York City, includes tables of standards, offers suggestions for planning of new piping, and shows diagrams of operating arrangements for grate valves.

Steels. "Agathon Alloy Steels" is the title of a 132-pp., illustrated book issued by Republic Steel Corporation. This, the third edition, contains augmented and revised data and also some additional information.

Pipe. American Rolling Mill Co., Middletown, Ohio, has issued a 40-pp. illustrated handbook on Armco Spiral Welded Pipe covering a range of diameters from 6 to 24 in.

Crushers—Pulverizers—Feeders. C. O. Bartlett & Snow Co., Cleveland, Ohio—Bulletin 68; 46 pp., illustrated. Gives capacities, power requirements, and dimensions of single-roll, two-roll and four-roll crushers; general data and dimensions on Cyclo pulverizers, ball mills, rotary crushers, automatic single plunger feeders, reciprocating plate feeders, revolving table feeders, cutting feeders, etc.

Hoist. Electric Double Drum for Slushing. Ingersoll-Rand Co., New York City—Form 1,860; 23 pp., illustrating and describing Size 215 hoist and range of applications.

Valves, Milliken. For handling boiler blow-off, gasoline, oil, chemicals, etc. American Car & Foundry Co., Detroit, Mich.—Catalog No. 1; 24 pp., illustrated.

Scraper, Cable Power for Storage of Coal. Atlas Conveyor Co., Philadelphia, Pa.—8 pp., illustrated; includes a chart for the selection of the proper size equipment with the required horsepower.

Rails and Track Equipment. L. B. Foster Co., Pittsburgh, Pa.—Pp. 124, illustrated. Among the equipment covered are angle bars, splice bars, tie plates, bolts and nuts, spikes, frogs, switches, etc.

Feed Water Regulation. Northern Equipment Co., Erie, Pa.—Pp. 16, illustrated. Covers the standard Copes equipment for controlling boiler feed water.

Stoker Unit. Combustion Engineering Corporation, New York City—Folder illustrating and describing the three models in which this unit is built.

Electric Arc Welding. Hobart Brothers Co., Troy, Ohio—80 pp., illustrated; price, $1. The first 46 pages presents complete practical information for welding various metals and shapes. Includes operating instructions for Hobart "Constant Arc" welder and illustrated examples setting forth the possibilities of arc welding. Also describes the several types of Hobart welding machines.

LETTERS ...to the Editor

Russia Has Fewer Accidents Than Has Been Reported

In a recent article in the *Saturday Evening Post* there appeared the statement, supposedly on the authority of an American mining engineer, that the fatalities in Russian coal mines were 1,000 per 1,000,000 tons of coal produced, and that there were 13,000 major accidents per 1,000,000 tons produced. The article further states that the American mining laws are the strictest in the world.

The above statements have caused considerable comment in mining circles, and in the interest of accuracy, I submit that the actual records are 3,010 major accidents per 1,000,000 tons produced and 13 fatal accidents.

During the year of 1929 in the anthracite field of Pennsylvania there were 484 fatal accidents on 65,000,000 tons produced and 2,351 major non-fatal accidents, representing approximately 7½ fatalities per 1,000,000 tons and 40 major non-fatal accidents per 1,000,000 tons produced.

On this basis, it would appear that the fatal accident record in Russia is about twice as great as in the Pennsylvania anthracite field. I have no way of comparing the major non-fatalities, because in Russia all accidents are reported, while in Pennsylvania only those major accidents are reported in which a man is absent for 60 days or more.

There is a definite reason for the accident record in Russia in that there is a great lack of skilled personnel to direct the workers, due essentially to the tremendous increase in the production of coal. It has not been possible to train officials rapidly enough to keep pace with the demand of the Five Year Plan, under which coal production has been increased from a low of 8,500,000 tons in 1920 to 48,000,000 tons in 1929, with 130,000,000 tons proposed in the year 1933.

Such a program must inevitably exact tolls while experience is being gained, but accidents are not due to lack of strict mining laws, as the article referred to suggests. As a matter of fact, every mining engineer who has had experience in the United States, Canada, Great Britain, or the European continent is immediately impressed with the superiority of foreign mining laws to those of any of our states. A comparison can be made in ventilation, hoisting practice, haulage, or the responsibility of the executives to the workmen under their charge, and in every case, I am sorry to say, our requirements are much less stringent than those of other countries.

JAMES H. PIERCE,
Vice-President,
Stuart, James & Cooke, Inc.
New York City.

* * *

Fewer But Better Stoppings Would Aid Ventilation

It would be interesting to discover by what method the 60-ft. interval between crosscuts ordinarily allowed by the Illinois mining law was reached. Why not 30 ft., 50 ft., or 100 ft.? Who would make the assertion that air circulates in quantities even approximately compatible with the terms of most state mining laws at a point 50 ft., or 40 ft., or even 30 ft. inside the last breakthrough without some temporary aid—by brattice windshoot or the like? The fact that a small body of gas at the face on an entry, at a point, say, 40 ft. ahead of the last crosscut, will remain practically unchanged (even where no feeder is perceptible) six hours after the mine examiner has found it, which may be sixteen hours after the entry has been shot down, is evidence that the law of diffusion has little or no salutory effect ahead of the aircourse.

Modern mining practice has promoted vast improvement in ventilation measures during the last decade. The old makeshift canvas windshoot has been displaced by the portable electric fan and, where brattice cloth is used at all, the erected framework to which the canvas is attached is designed to render admirable service.

There are approximately 25 crosscuts in the average 28-room sub-entry which the present mining law of Illinois makes obligatory. The material for the stoppings usually consists of third-rate shiplap boards which usually leak like a sieve, making the quantity of air reaching the working places much less than the conditions warrant. In spite of the short interval between the breakthroughs they have been no more effective than the temporary measures employed to boost the air to the face, certainly no more so than a greater interval would be under similar conditions. When the rooms are being developed these breakthroughs become a positive detriment and never-ending source of trouble and expense until the last pound of coal is on its way to the tipple.

With the aid of modern methods of conducting air to the face of the workings, why not the suggestion that these strictures be removed and that instead of 60 ft. being the interval between crosscuts, the distance be increased to 200 ft.? Fireproof material could then be used, which hitched into the rib and floor in a workmanlike manner would eliminate entirely a difficult problem for miner and operator alike.

It may be pertinently pointed out that the cost usually is the deciding factor in the choice of material for these stoppings. Even though the cost of concrete blocks be treble that now being expended on flimsy shiplap boards, it would be an economy for the company and an untold advantage to the miner at the face in assuring a steady and dependable flow of fresh air at all times into the working places, where it is vitally needed.

ALEXANDER BENNETT.
Panama, Ill.

* * *

Indorses Walter Buss' Plan For Fixing Coal Prices

In the December, 1930, issue (Vol. 35, p. 727) you published a letter written by Walter Buss recommending a solution for some of the ills the coal industry is heir to. The idea he set forth is logical, right, and reasonable, and should provoke no serious objections from any of the several classes it would affect.

In the first place, it is admitted by the majority of coal operators that slack is sold at a loss, and the profits must be made up from the different sizes of lump. If it is lawful for a commission to fix a valuation on a public utility property and then fix a rate the public must pay for service in order that they be allowed to make a fixed percentage on their investment, then how much fairer it must be to have some legislature stop the waste of a national resource and at the same time the jungle competition that has pauperized the soft-coal industry!

There is no earthly reason that one person should expect to buy coal below price of production and another have to pay the extra price above production to make up this loss. It is neither equitable nor fair. With the great number of coal operators and their self-centered interests in their own particular properties I do not think they will help themselves much even if concessions of the Sherman law are granted.

In Vincennes the public commission appraised the city water works and allows the water company 7 per cent on its appraised investment. This makes a rate of $1.60 a month minimum, but the company is asking a two-dollar rate. If it is fair for the utilities to make a profit on their investment through laws, then why is it not fair to handle the coal industry the same way?

Vincennes, Ind. THOMAS JAMES.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Roof on Main Haulageways Is Supported By Brick and Steel Construction

NEMACOLIN has perhaps gone further than any other coal mine in the United States toward the protection of workers from injury by falls of roof on main haulage roads. In so doing, the management at the same time is protecting operations by avoiding haulage delays. This protection is being provided by permanent construction in a program which is aimed to hold the roof securely in place over every linear foot of main track. Permanent construction involves the use of steel beams, brick, and concrete, to the exclusion of all other materials.

It is not to be expected that these supports must in every case resist heavy loading, since the entries are comparatively narrow and flanked by wide pillars on either side. But the roof is of such variable nature that it gives no assurance of maximum or minimum weight. In consequence the supports are invariably constructed of comparatively great strength, on the assumption that they may or will be heavily loaded. The variable roof is an 8-ft. lamination of coal and slate, over which is a poor sandstone. The laminated body is frequently weakened by clay seams.

Already many miles of haulageway has been safeguarded by permanent roof supports. Up until the last day of 1930, over 24,000 lin. ft. of heading, including turnouts, had been protected by brick and H-beams alone. In addition to this 7,230 lin. ft. of heading is held by concrete arches and 8,325 lin. ft. by gunite. The objective here is to direct attention to the brick and steel-beam construction.

Wide variation in conditions preclude a fit-all standard of construction and necessitates the adoption of several designs. However, all plans have one important feature in common; the erection of a wall on both sides of the heading as a preventive of roof dislodgment following derailment of rolling stock.

Entries are driven to a maximum width of 12 ft. Whatever the construc-

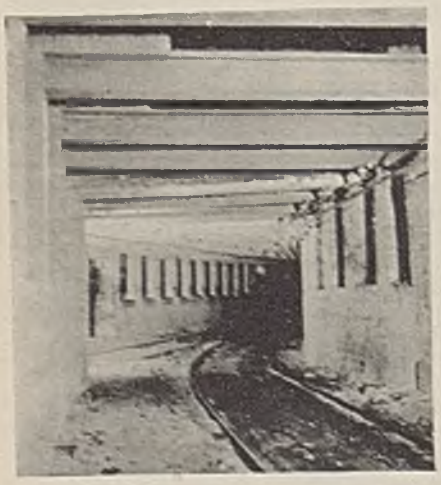


Fig. 1—Under Relatively Low Roof, H-Beams Are Placed on Pilasters

Fig. 2—Arches Need Not Be Fully Semicircular When Solidly Buttressed Against Both Ribs. This Is an Example of Arch Work Under Fairly High Roof

Fig. 3—Under Moderately High Roof an Abbreviated Arch Is All That Is Required

Operating Ideas from PRODUCTION, ELECTRICAL *and* MECHANICAL MEN

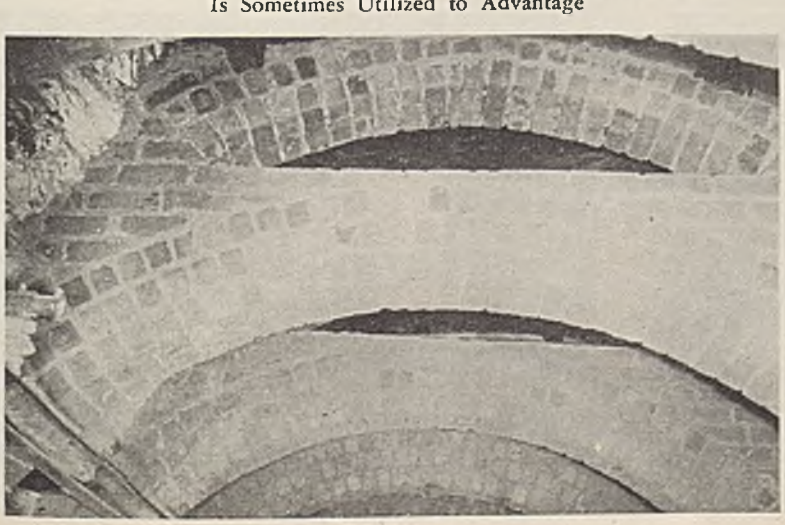
tion, the support must measure a minimum of 10 ft. wide and 6 ft. 10 in. high. Brick pilasters, 12 in. square, are erected on 3-ft. centers, and the space between is filled by a single-course brick curtain wall to a height of 3½ ft. On the pilasters, which generally are carried close to the height of the seam, are erected the cross members that hold the roof. The beams used are exclusively of 8-in. H-section. In earlier construction a 6-in. H-section member was tried, but this proved less satisfactory than the larger section. Eight-inch brick are used, laid in mortar of 1:2 mix.

Where the roof is not abnormally high, the design shown in Fig. 1 is adopted. Pilasters built close to the rib are bridged in pairs by H-beams which fit snugly to the rib on each end. What space remains between the beam and roof is closed by brick and mortar. Clay seams running crosswise of the heading are further supported by 6-in. H-beams, which are placed longitudinally, as stringers, against the roof.

Arches play a prominent part in the construction. They serve a particularly useful purpose in the erection of high supports in wide places, as in the passing of a crosscut where the pilasters cannot be buttressed against a rib. In this case a semicircular arch must be utilized to avoid side thrust. But arches of various degrees of curvature are used elsewhere as well, the chief stipulation being high roof. The masons have become so adept in arch construction that the cost is no more than that expended in following other plans which utilize more material. Several of these variations are illustrated in Figs. 2, 3, and 4.

Track rails are viewed as suitable for one purpose only, that for which they are manufactured. Their use for supporting roof is held questionable because they become crystallized in spots by initial use in haulage. The placing of wooden supports, even though they be timber sets, is considered no more than a temporary measure serving until such time as they can be replaced by more durable materials.

Fig. 4—In Abnormally High Places an Arch Upon an Arch Is Sometimes Utilized to Advantage



Extension Reel Preferred For Bin Lighting

To design a handy and adequate illumination system for warehouse bins, when these latter are spaced by aisles sufficiently narrow to save footsteps and floor space, is an inherently difficult problem. Obviously, if the bins are more than a few inches deep the light must be projected into them almost from the horizontal. A properly shaded lamp in each bin would afford the best illumination, but according to present standards the installation cost would be prohibitive. Apparently the next choice is a portable lamp on an extension cord.

The accompanying illustration shows the cable reel extension cord method as used in the warehouse at Nemacolin.

Any Bin Can Be Flooded With Light

The reel is mounted on a beam above the center aisle, making the portable lamp available in the cross aisle toward either side of the room. General lighting is supplied by porcelain enameled reflector units which are also suspended above the center aisle.

Harvesting Ideas

Again, *Coal Age* brings to its readers, in these pages, a collection of operating ideas devised and in use at the plants of one organization, the Youngstown Sheet & Tube Co., with its subsidiary, the Buckeye Coal Co. That in this case, as in every model mining issue, the harvest of ideas is rich definitely proves the great value attached to these short cuts in mine operation. The solutions of problems here presented will apply to many other plants. That is why readers are repeatedly urged to follow this department closely and to contribute ideas when the opportunity arises. Each accepted contribution will be paid for, the minimum rate being $5.

Floor Gratings Arranged to Form Ideal Pit Cover

As ordinarily constructed, covers and railings of a locomotive repair pit are a nuisance. A close approach to the ideal is in use in the main shop at Nemacolin. This locomotive pit is shown in the accompanying illustrations.

The stairway and entire pit are covered with sections of floor grating. The 12x30-in. sections over the stairway are alternately hinged to the two sides and when opened the two halves together with a chain attached permanently at one end form a complete railing or guard. The rail or bar tying the sections of one side together is welded to the bottom side of the sections in one case, and to the top side in the other case. Thus the two sides when down present a flat surface.

Between rails of the pit the sections are supported in horizontal guides and can be pushed toward one end to make an opening for access under the locomotive. Half of the sections are on guides mounted at one level and the other half on guides at a level just enough below so that these latter sections can slide under the other. The sections flooring the portions outside the rails must be raised and placed to one side to afford access here.

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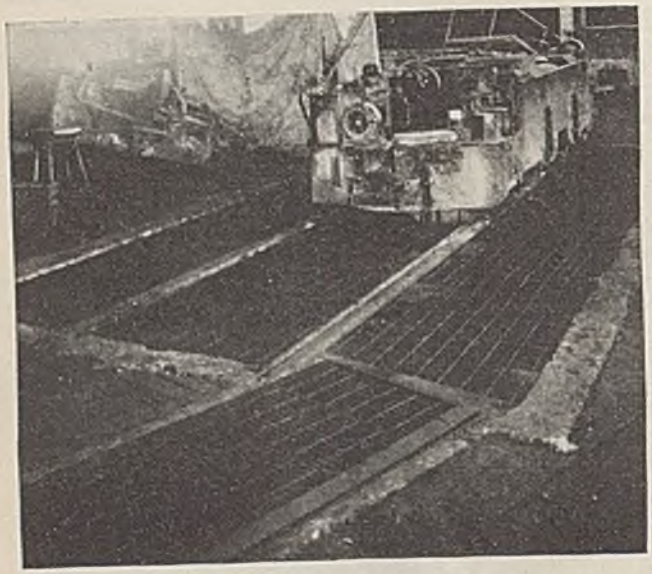
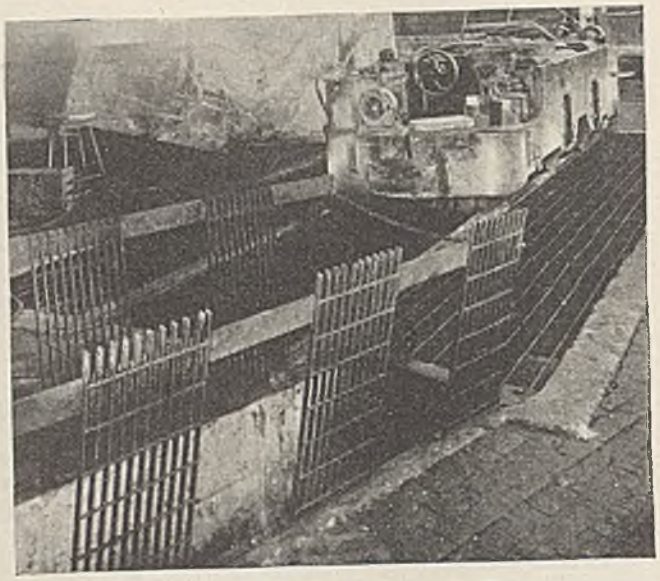


Gratings Cover Locomotive Pit and Stairway



Stairway Cover Raised Forms Railing

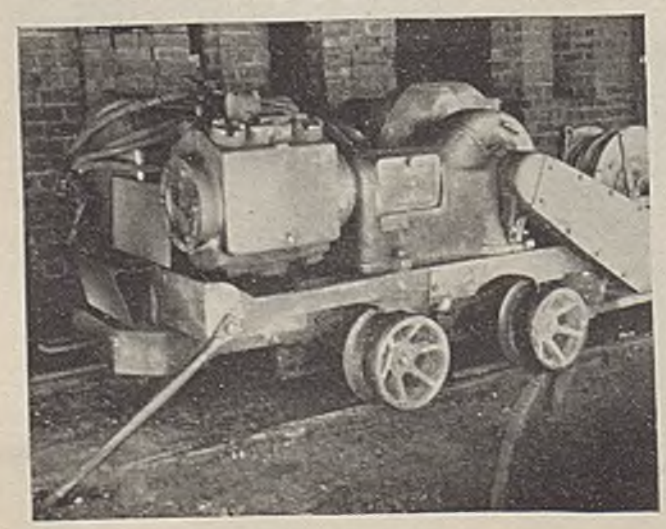
When the pit is not in use all parts are covered and there are no railings in the way. The portion under the locomotive is not opened until after the locomotive has been placed on the pit in the position for repair. A man enters by the stairway and from below slides the floor sections that are under the locomotive, toward the ends of the pit.

Use of grating for floor allows the entrance of light from above and provides an opportunity for circulation of air.

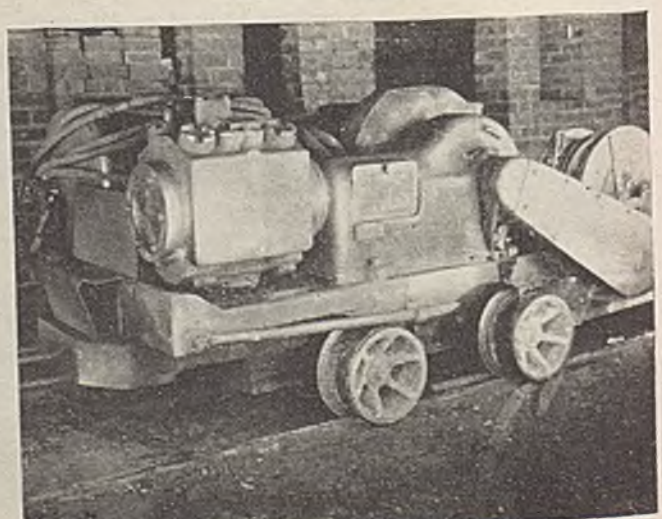
Pivoted Sprag on Compressor Is Proof Against Runaway

Vibration complicates the safe blocking of a compressor by customary methods. A solution to this problem was found at Nemacolin by the use of a sprag permanently pinned to the truck of the compressor. The two photographs show this sprag in operative and inoperative position.

Safety Sprag Lowered



Safety Sprag Raised



Use Found for Pantograph On Refuse Larries

As much of the trackage over which the slate larries operate at Nemacolin is constructed for temporary use only, it was found difficult to keep the trolley wire in proper alignment for the trolley wheel. Replacement of the trolley pole and wheel with a pantograph topped with a wide contact shoe eliminated the trouble.

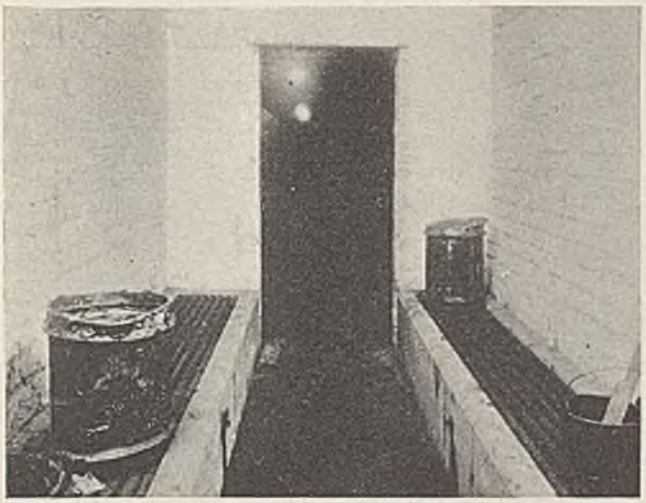
Wire Alignment Is Not So Important With This Contact Arrangement

Copper was first tried in the shoe, but was so soft that the wire soon cut grooves which destroyed the purpose of the design. Substitution of tempered steel solved this problem. The line voltage is 250 d.c.

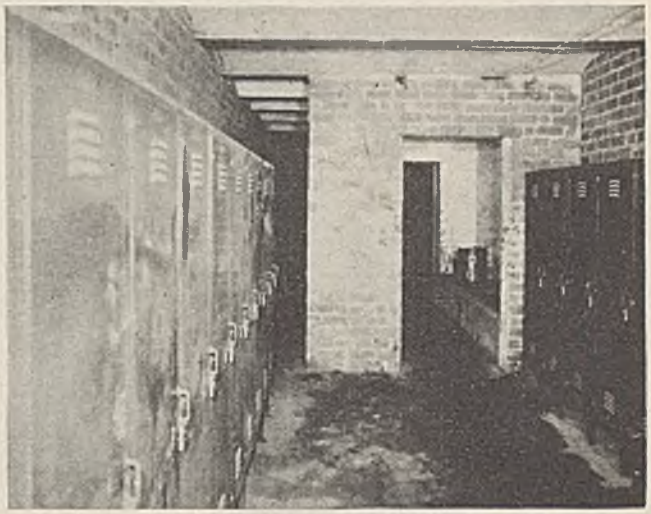
Oil Drips From Cans Into Tanks Instead of on Floor

There is no end to the difficulty met in keeping the floor clean where grease and oil are transferred or poured from one container to another. The left-hand illustration shows the arrangement in Nemacolin mine for getting around this aggravation. A special room is provided for the daily filling of the 1-gal. cans used by the motormen. While being filled the cans are set on top of a grating of 1¼-in. pipes on 1½-in. centers which covers a concrete tank or sump. Capped pipes are provided for draining the sumps when they become filled.

Operating Ideas from PRODUCTION, ELECTRICAL *and* MECHANICAL MEN



Supply Cans on the Filling Racks



Looking From the Locker Room Into Filling Room

Adjacent to the can-filling room is a room containing individual lockers for each motorman and for each rock-dusting crew. These lockers are shown in the right-hand illustration. The filling room appears in the background. At the end of the shift the motormen deposit their oil cans and other tools in the lockers. A night man who is provided with a master key removes the oil cans, fills them and replaces them in the lockers. Only about 1 qt. of oil is allotted per can. The oil is taken into the mine in 5-gal. containers.

Double Boards Make Safer Guards for Curves

Wooden guards for trolley wire are a hazard to the motormen unless properly designed and supported. In Nemacolin mine the ¾-in. boards used for guards are doubled on the curves to add strength and minimize the chance of a whole board, or a piece split from it, falling in the path of the motorman.

This construction is shown in the accompanying illustration. The two boards are lapped and securely nailed together, and the two sides are supported by straps placed over the hanger and turned up over the bottom edge of the board. Stock size boards, ¾x6 are used for all guards excepting where the top is low, in which case ¾x4 boards are used.

Chart Posted on Wall Tells Size of Lamps to Use

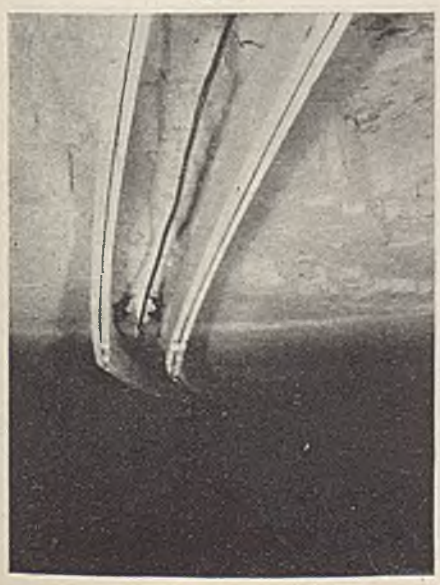
For control of the size of lamps to be used in making replacements each surface building, or separate room where necessary, at Nemacolin mine is supplied with its own chart specifying the lamp wattages recommended for each purpose.

The chart is posted on the wall and consists of a blueprint measuring 14x20 in., on which the lamp wattages for ceiling, extension and wall lights are marked by hand with black ink. This system makes a saving in lamp and power cost by forestalling the use of large lamps in places where much smaller lamps are entirely adequate.

Spads Hidden by Rock Dust Spotted by Cloth Tags

Rock-dusting plays an important rôle in the protection and safety of the Nemacolin mine. As the standard followed fixes the minimum of incombustible dust on headings at 55 per cent, the ribs and roof accordingly must be kept heavily coated with rock dust. This practice would work to the disadvantage of the survey corps in finding sight spads and station markers were it not for an idea which fixes their location: cloth tags are tied to the spads. These hang down beneath the rock-dust roof coating and are readily discernible to the eye.

This Durable Construction Avoids Hanging "Spears"

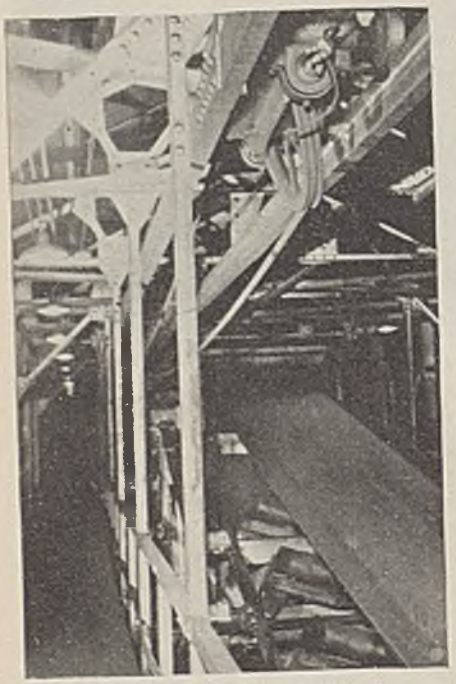


Lamp Wattages Are Filled In to Suit the Building

Operating Ideas from PRODUCTION, ELECTRICAL *and* MECHANICAL MEN

Cable Take-up Provides Feed For Automatic Tripper

Presence of coal dust made it necessary to devise a non-arcing power collecting or distributing device for the belt tripper in the top of the storage and mixing bin at Nemacolin. Instead of using trolley wires or contact rails a "trailing" cable is employed, which, by a pulley and weight arrangement, is kept suspended in the air instead of dragging over a supporting surface.

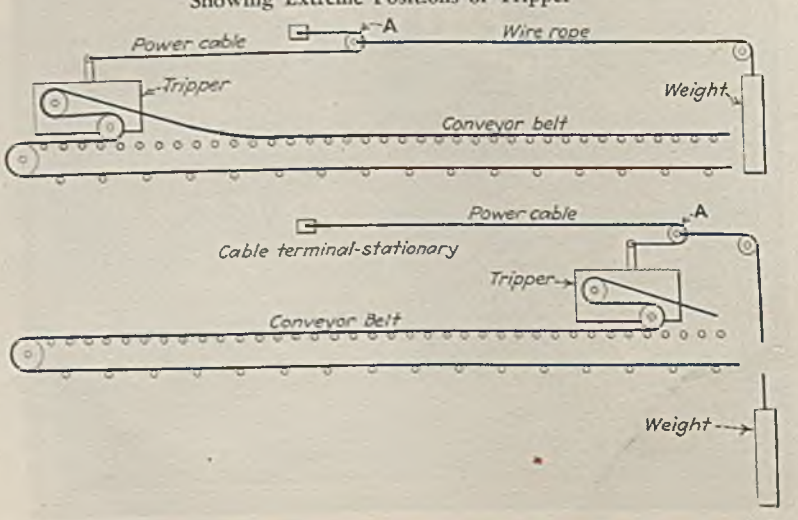


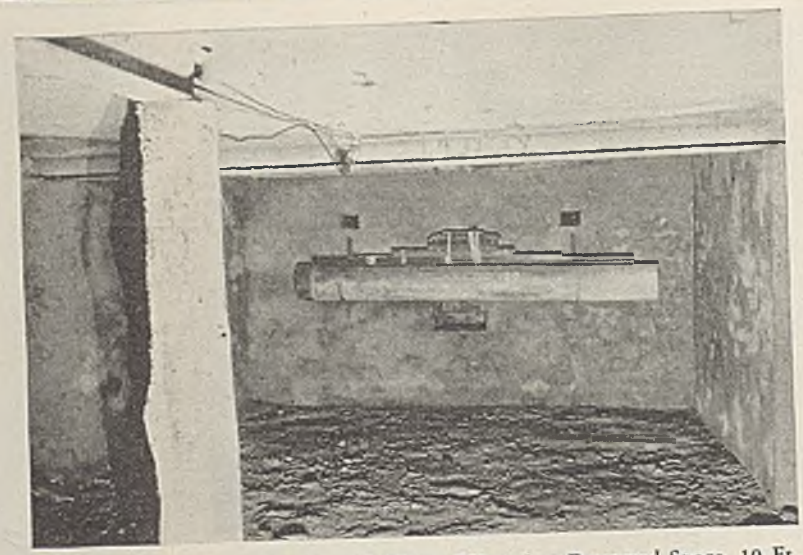
No Arcing Involved in Feeding This Traveling Tripper

Driven by a 220-volt a.c. motor, this tripper moves slowly along the length of the bin and reverses automatically at each end. The sketch shows the tripper at the two extreme positions. Power cable pulley *A* is mounted on a trolley which rides on a pair of light rails. A weighted wire rope keeps a uniform tension on the trolley and holds the sag in the power cable to less than a foot for the maximum span of 80 ft.

The cable, which is a 3-conductor, has all-rubber insulation. Instead of the tripper traction depending on friction between the wheels and carrying rails, the travel is made positive by means of a stationary chain over which sprockets of the tripper travels. The trolley carrying the power cable sheave can be seen at the top right-hand corner of the illustration.

Showing Extreme Positions of Tripper





This Typical First-Aid Station in Dehue Mine, Is a Protected Space, 10 Ft. Wide and 6 Ft. Deep. It Is Located in a Breakthrough. Stretcher and Splints Are Hung on the Back Wall.

Concealed Padlock Adopted For First-Aid Cabinets

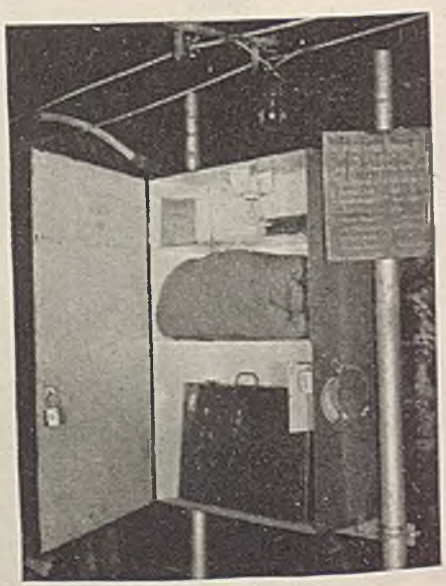
Locking first-aid cabinets by a method which insures against their being entered except when necessary, and yet without undue delay, was finally solved at Nemacolin mine as shown in the accompanying illustration. The "key under glass" method was found unsatisfactory because the cabinets are not under surveillance and were too easily entered.

A padlock is used and its normal position is on the inside of the cabinet, where it cannot be tampered with easily. Access for inserting the key in the lock and unlatching it is gained through a round handhole which normally is covered by a pivoted plate. A partition back of the lock space prevents reaching any of the cabinet equipment through the hole.

A small bulletin board mounted beside the cabinet gives the names and positions of eight men who have keys. On the list are the day assistant, night assistant, fireboss, rib boss, pumper, two motormen, and the shotfirer.

A 50-watt lamp mounted in the top of the steel cabinet and kept burning continuously furnishes enough heat to keep the contents dry. The equipment includes a wool blanket, rubber blanket, M.S.A. first-aid kit, short splints, and heat pads.

Cabinet Opened for Inspection



Operating Ideas from PRODUCTION, ELECTRICAL *and* MECHANICAL MEN

Damage to Padlocks Avoided By Inside Mounting

Padlocks on supply rooms underground are often broken or damaged by men who feel the act is justified in an emergency. They, of course, save time by not having to have the door opened by an authorized attendant or official; but the practice is poor business and disrupts discipline.

The accompanying illustration, from a photograph taken with the camera

Door Padlocked on Inside

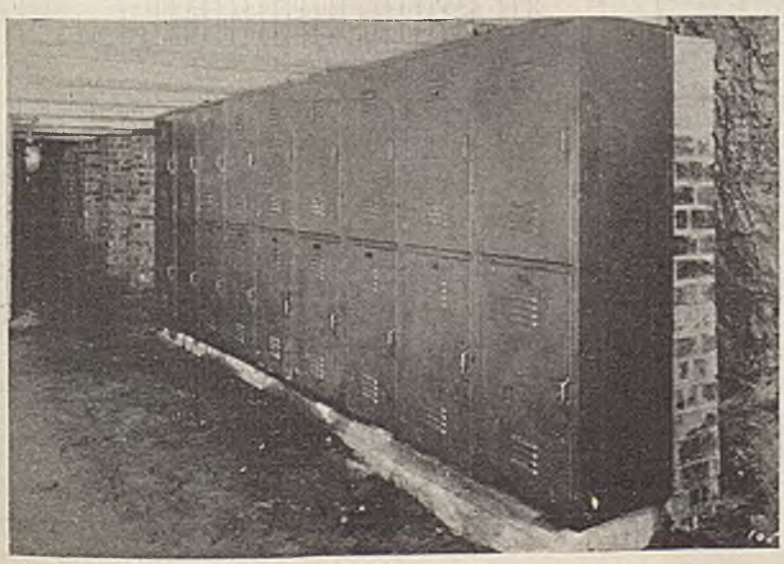
mounted inside the supply room in Dehue mine of the Youngstown Sheet & Tube Co., shows how the lock is mounted to discourage "breaking in." No difficulty is experienced in reaching through the hole and releasing the lock with one hand.

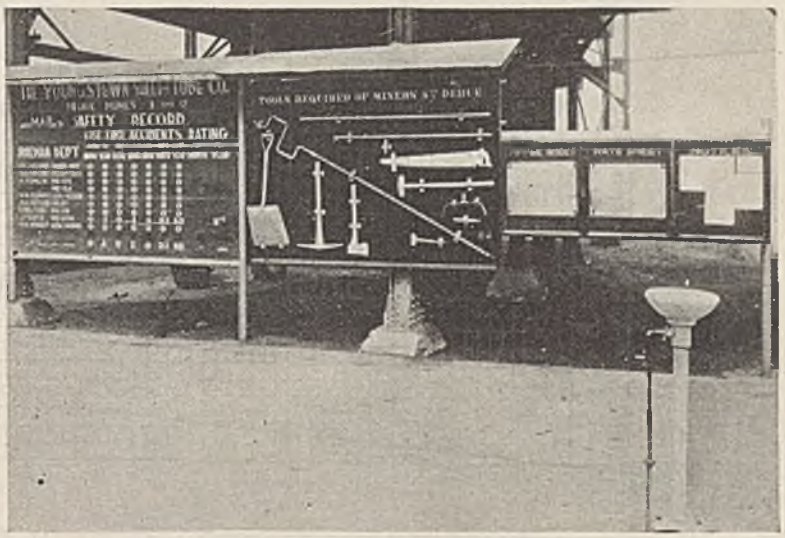
Steel Lockers Find Favor For Use Inside

One of the causes of inefficiency in mines is the lack of proper facilities for storing oil cans and tools used by equipment operatives. The disgust of a workman who, upon entering the mine in the morning, finds that some of his equipment has been borrowed or stolen, lasts during the whole day. Steel lockers are finding rapid adoption inside the mines to obviate the trouble.

In the accompanying illustration is shown the eighteen steel lockers used by the motormen in the Dehue mine of the Youngstown Sheet & Tube Co. The space in each locker is 30 in. high, 18 in. wide, and 18 in. deep. Unlike wooden lockers, the steel type eliminates fire risk, is easier to keep clean, and discourages tampering.

Motormen's Lockers Promote Efficiency and Satisfaction





Drinking Fountain and Display Boards at Dehue

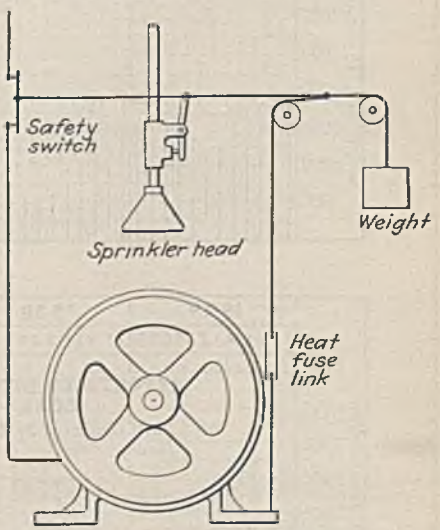
Tools Required by Miner Displayed on Board

Before a loader can go to work in the Dehue mine he must be equipped with tools to correspond with all those displayed on a board at the lamp house near the portal of the manway slope. When every man starts with a complete set there is less theft of tools in the mine. Requiring each man to have a saw is an effective safety measure. The complete set of tools costs approximately $20.

As indicated by the illustration, the tool board is mounted between the accident-record board and the mine bulletin board. The sanitary drinking fountain in front of the display is an incentive for a man to linger a moment and spend time contemplating the accident record.

Fire Would Open Switch And Start Sprinkler

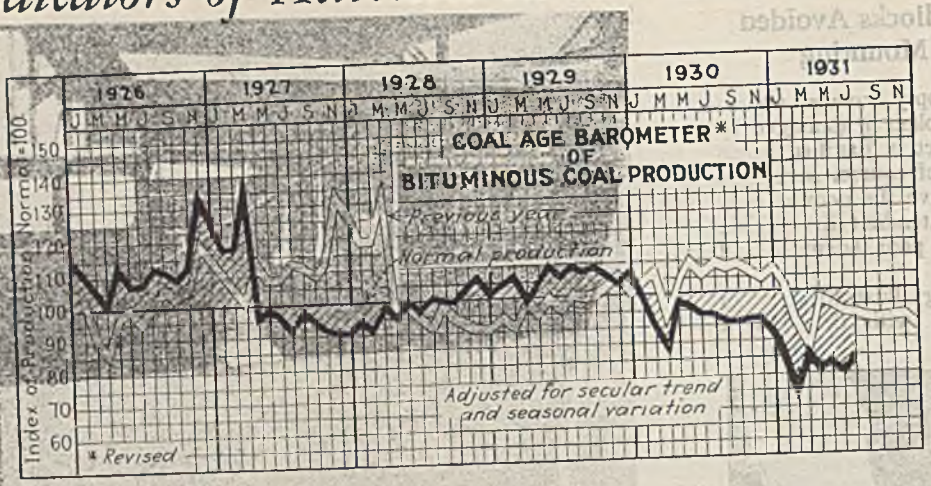
In Nemacolin mine, at two semi-permanent pumps which are not protected by brick rooms, the d.c. motors are fitted with automatic fire protection. Referring to the schematic diagram, excessive heat in the vicinity of the

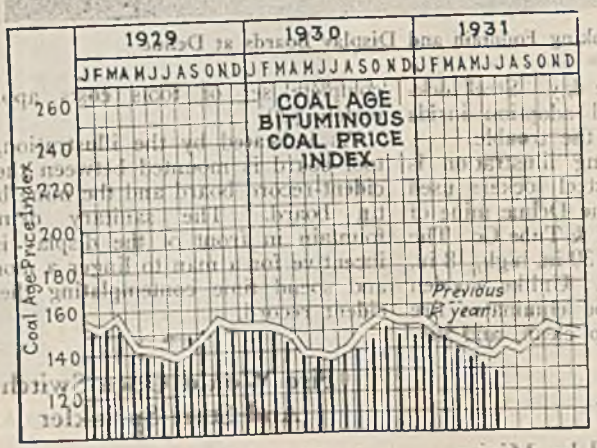


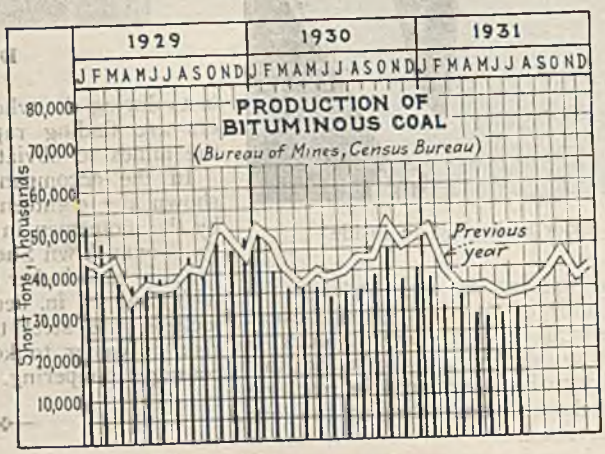
Scheme of Pump Motor Fire Protection

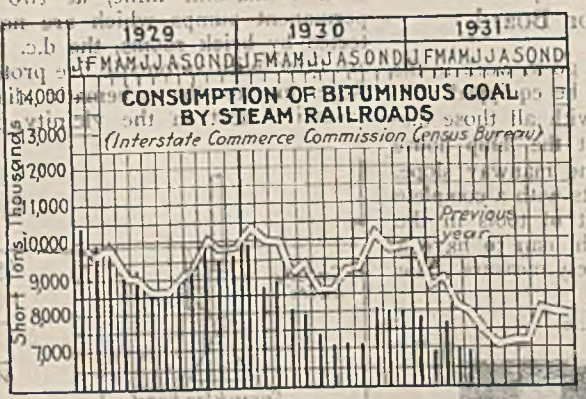
motor fuses a link in a rope supporting a weight. Dropping of the weight opens a safety switch in the motor circuit and at the same time opens a water valve which sprinkles the motor and an area around it.

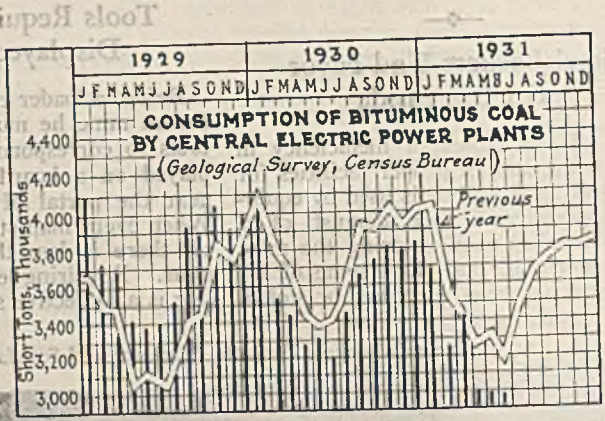
Indicators of Activities in the Coal Industry

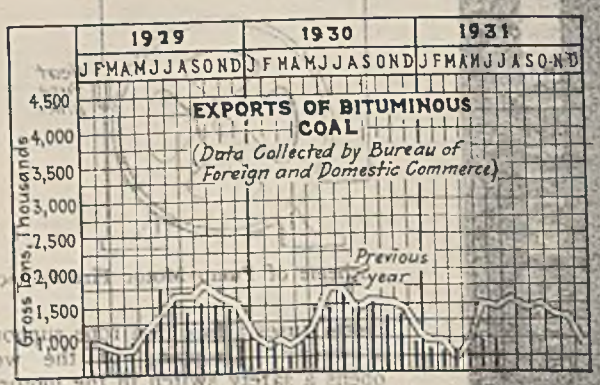


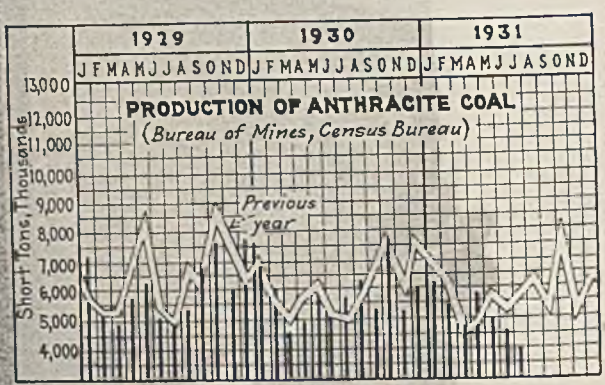












MARKETS in Review

THE bituminous coal markets of the country continued to fight their way through the doldrums of seasonal slackness, business depression, and consumer indifference in July. Demand for domestic sizes, in general, was slow, though a few marketing centers reported slight increases in activity as the month wore on. Industrial sales continued in their slump of some months. Slack and screenings prices receded somewhat from their fairly strong position at the end of June under the pressure of slight increases in production to fill domestic orders and the refusal of consumers to take normal tonnage. Demand for both steam coal and domestic coal for storage lagged far behind the same months in previous years.

While anthracite production registered a material decrease in July, a slight revival in summer demand resulted in a material increase in the demand for egg, buckwheat, and rice, and, to a lesser extent for stove. Chestnut, however, was a drug on the market. Pea and barley, though in free supply, were absorbed without too great difficulty. Prices were fairly firm, with concessions by independent operators running less than usual.

July production of bituminous coal is estimated by the U. S. Bureau of Mines at 29,653,000 net tons, an increase of 468,000 tons over the June production of 29,185,000 tons, and a decline of 5,062,000 tons from the July, 1930, output of 34,715,000 tons. Anthracite production is estimated at 3,948,000 net tons. This compares with 4,544,000 tons in the preceding month and 5,557,000 tons in July, 1930.

Coal Age Index of spot bituminous prices (preliminary) was: 131, July 4; 129, July 11; 131, July 18; and 130, July 25. Corresponding weighted average prices were: $1.59, July 4; $1.56, July 11; $1.58, July 18; and $1.57, July 25. Revised Index figures for June were: 130, June 6; and 129, June 13, 20, and 27. Corresponding weighted average prices were: $1.57, June 6; and $1.56, June 13, 20, and 27. The monthly Index for June was 129¼, as compared with the unrevised figure of 130¼ for July.

Shipments to the lower Lake ports rose in July to more than 80 per cent of the rate in the same month in 1930. For the season to July 27, dumpings were as follows: cargo, 12,355,141 tons; fuel, 397,037 tons; total, 12,752,178 tons. In the same period in 1930, dumpings were: cargo, 18,244,553 tons; fuel, 632,554 tons; total, 18,877,107 tons.

A SLIGHT improvement in the demand for domestic sizes was noticeable in the Chicago market in July, but the movement was by no means up to the expectations of the trade. Announcement of higher prices for August brought some increase in orders for southern Illinois lump and egg. Demand for central Illinois and Indiana varieties, however, was at a standstill, with many producers, driven by necessity, shipping prepared coal on industrial contracts. Western Kentucky lump so improved its position at the end of the month that quotations jumped 15@25c. to a top of $1.25.

With the increased production of prepared sizes, screenings from the Middle Western fields weakened, and producers quite frequently found themselves with "no-bill" cars of this size on their hands.

EASTERN coals failed to fare any better than the Middle Western varieties. Prices on the better high-volatile sizes advanced slightly as the month wore on, but the increase was due to weakness in the slack situation rather than to any real demand. Block was slow at $1.50@$1.75, and egg was hard to move at $1.25@$1.50. Slack could be had at 60c. up.

In the smokeless list, lump and egg went for $3@$3.50. Stove was steady at $2.50@$2.75, but nut was weak at $1.25 up. Slack was sacrificed from time to time at 40c. up, and the slow movement of this size caused some restriction in production. Movement of smokeless mine-run was extremely disappointing.

The St. Louis coal market continued to drift along in July. Both steam and domestic sizes were slow, and truck haulers continued to make things very

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

		Week Ended							
		July 4, 1931		July 11, 1931		July 18, 1931		July 25, 1931	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York		$7.10		$7.10		$7.10		$7.10
Broken	Philadelphia	$7.10@$7.35	7.10	$7.10@$7.35	7.10	$7.10@$7.35	7.10	$7.10@$7.35	7.10
Egg	New York	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35
Egg	Philadelphia	7.35@ 7.60	7.35	7.35@ 7.60	7.35	7.35@ 7.60	7.35	7.35@ 7.60	7.35
Egg	Chicago	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35
Stove	New York	7.50@ 7.60	7.60	7.35@ 7.60	7.60	7.35@ 7.60	7.60	7.35@ 7.60	7.35
Stove	Philadelphia	7.60@ 7.85	7.60	7.60@ 7.85	7.60	7.60@ 7.85	7.60	7.60@ 7.85	7.60
Stove	Chicago	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60
Chestnut	New York	7.35@ 7.60	7.60	7.25@ 7.60	7.60	7.25@ 7.60	7.60	7.00@ 7.60	7.60
Chestnut	Philadelphia	7.60@ 7.85	7.60	7.60@ 7.85	7.60	7.60@ 7.85	7.60	7.60@ 7.85	7.60
Chestnut	Chicago	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60
Pea	New York	5.10@ 5.35	5.35	5.00@ 5.35	5.35	5.15@ 5.35	5.35	5.15@ 5.35	5.35
Pea	Philadelphia	5.35@ 5.60	5.35	5.35@ 5.60	5.35	5.35@ 5.60	5.35	5.35@ 5.60	5.35
Pea	Chicago	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35
Buckwheat	New York	3.10@ 3.25	3.25†	3.15@ 3.25	3.25†	3.15@ 3.25	3.25†	3.25	3.25†
Buckwheat	Philadelphia	3.25@ 3.50	3.25	3.25@ 3.50	3.25	3.25@ 3.50	3.25	3.25@ 3.50	3.25
Buckwheat	Chicago	3.25@ 3.75	3.25	3.25@ 3.75	3.25	3.25@ 3.75	3.25	3.25@ 3.75	3.25
Rice	New York	1.75@ 1.85	1.85	1.75@ 1.85	1.85	1.70@ 1.85	1.85	1.75@ 1.85	1.85
Rice	Philadelphia	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Rice	Chicago	1.85@ 2.35	1.85	1.85@ 2.35	1.85	1.85@ 2.35	1.85	1.85@ 2.35	1.85
Barley	New York	.90@ 1.25	1.40	.90@ 1.25	1.40	.90@ 1.25	1.40	.90@ 1.25	1.40
Barley	Philadelphia	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40

† Domestic buckwheat, $3.70 (D. L. & W.)

uncomfortable for both the mines in the Inner Group and retailers with yard investments.

July proved to be a more than usually dull month in the Southwest. Practically all the Oklahoma mines were down, and only a few operations were running in Arkansas, despite some accumulation of summer storage orders. Production was largely from shovels in Missouri and Kansas. Kansas domestic sizes went through the month without change in prices, but distress sales of screenings were reported at as low as 75c. Arkansas semi-anthracite quotations were unsettled, ranging from $2.75 to $3.75 for lump and nut, as compared with the list price of $3.50. Spadra (Ark.) anthracite prices were announced for the first time this season, as follows: grate and egg, $4.75; No. 4, $5.75; and nut, $4.50.

Extremely slow demand put a damper on activities in the market at the Head of the Lakes in July. June shipments from the docks totaled 9,403 cars, against 12,380 cars in June, 1930, and shipments in July of this year are not expected to exceed greatly the total in the previous month. Receipts of bituminous coal, anthracite, and coke at the Duluth-Superior docks for the season to July 1 were 1,852,083 tons, against 4,308,039 tons in the same period in 1930. Soft coal receipts decreased 2,455,956 tons; anthracite receipts dropped 71,857 tons; and coke receipts declined 26,616 tons.

July failed to bring any relief to the Colorado market. Domestic demand faltered, and retailers refused to place any orders for storage coal, in spite of strong price inducements. Steam sizes also suffered as a result of the continued slump in industrial activity.

Some improvement, spotty in character, was noticeable in the Louisville market in July. In addition to slight increases in Lake shipments, takings on state and municipal contracts rose slightly, and railroad buying bettered itself a trifle. Utility and industrial demand, however, continued light. A few retailers put in a busy month, but others found business slow. Producers endeavored to advance prices during July, but the existing demand was not sufficient to support increases, with the result that quotations stood at the previous low figures.

Both quotations and tonnage movement in July proved extremely disappointing to the Cincinnati trade. Lake buyers were inclined to stand off, and high-volatile producers who were unable to dispose of coal in that quarter were tempted to undersell the market, with disastrous effects on the price structure. Retailers refused to display any great interest in coal, and the industrial demand continued in its slump of some months.

Smokeless domestic prices were the one bright spot in the otherwise unrelieved dullness, but the rise in quotations was due to the absence of a market for slack rather than to any real demand. An advance of 25c. in lump, egg, and stove contract prices was announced for August, but the increase was applied to spot sales in the middle of July. Standard slack, after holding firm until July 1, took the downward path, and some sales were made at 75c., the lowest price recorded in years.

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

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended July 4, 1931	July 11, 1931	July 18, 1931	July 25, 1931
Smokeless lump	Chicago	$2.50@$3.00	$2.50@$3.00	$2.50@$3.00	$2.50@$3.00
Smokeless egg	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.25	2.50@ 3.25
Smokeless stove	Chicago	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75
Smokeless nut	Chicago	2.00@ 2.50	2.00@ 2.50	2.00@ 2.50	2.00@ 2.50
Smokeless pea	Chicago	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
Smokeless mine-run	Chicago	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Smokeless slack	Chicago	.50@ 1.10	.50@ 1.10	.50@ 1.10	.50@ 1.10
Smokeless lump	Cincinnati	2.50@ 2.75	2.50@ 2.75	2.50@ 3.00	2.75@ 3.00
Smokeless egg	Cincinnati	2.75@ 3.00	2.75@ 3.25	2.75@ 3.25	3.00@ 3.25
Smokeless stove	Cincinnati	2.25@ 2.50	2.25@ 2.50	2.25@ 2.75	2.25@ 2.75
Smokeless nut	Cincinnati	1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50
Smokeless mine-run	Cincinnati	1.65@ 1.75	1.65@ 1.75	1.60@ 1.75	1.60@ 1.75
Smokeless slack	Cincinnati	1.00@ 1.25	.90@ 1.15	.75@ 1.10	.75@ 1.10
*Smokeless mine-run	Boston	4.00@ 4.10	4.10@ 4.20	4.00@ 4.10	4.00@ 4.10
*Smokeless nut-and-slack	Boston	3.00@ 3.15	3.10@ 3.20	3.10@ 3.20	3.10@ 3.20
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	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Cambria mine-run	Boston	1.80@ 2.10	1.80@ 2.10	1.80@ 2.10	1.80@ 2.10
Somerset mine-run	Boston	1.60@ 1.90	1.60@ 1.90	1.60@ 1.90	1.60@ 1.90
Pool 1 (Navy Standard)	New York	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	1.90@ 2.25
Pool 1 (Navy Standard)	Philadelphia	1.90@ 2.30	1.90@ 2.30	1.90@ 2.30	1.90@ 2.30
Pool 9 (super low-vol.)	New York	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.80
Pool 9 (super low-vol.)	Philadelphia	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Pool 10 (h. gr. low-vol.)	New York	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60
Pool 10 (h. gr. low-vol.)	Philadelphia	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Pool 11 (low-vol.)	New York	1.35@ 1.45	1.35@ 1.45	1.35@ 1.45	1.35@ 1.45
Pool 11 (low-vol.)	Philadelphia	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.00@$1.10	$1.00@$1.10	$0.95@$1.10	$0.95@$1.10
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	1.70@ 1.80	1.70@ 1.80	1.70@ 1.75	1.60@ 1.70
Pittsburgh steam lump	Pittsburgh	1.60@ 1.80	1.60@ 1.80	1.60@ 1.75	1.50@ 1.70
Pittsburgh egg	Pittsburgh	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Pittsburgh gas mine-run	Pittsburgh	1.45@ 1.60	1.45@ 1.60	1.45@ 1.55	1.40@ 1.50
Pittsburgh steam mine-run	Pittsburgh	1.30@ 1.60	1.30@ 1.60	1.30@ 1.55	1.25@ 1.45
Pittsburgh gas slack	Pittsburgh	1.00@ 1.25	1.00@ 1.25	1.00@ 1.20	1.00@ 1.10
Pittsburgh steam slack	Pittsburgh	1.00@ 1.25	.90@ 1.15	.90@ 1.10	.80@ 1.00
Connellsville coking coal	Pittsburgh	1.25@ 1.65	1.25@ 1.65	1.25@ 1.60	1.25@ 1.60
Westmoreland lump	Philadelphia	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Westmoreland ¾-in. lump	Philadelphia	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Westmoreland egg	Philadelphia	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65
Westmoreland mine-run	Philadelphia	1.55@ 1.70	1.55@ 1.70	1.55@ 1.70	1.55@ 1.70
Westmoreland slack	Philadelphia	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15
Fairmont lump	Fairmont	1.20@ 1.45	1.20@ 1.45	1.20@ 1.45	1.20@ 1.45
Fairmont ¾-in. lump	Fairmont	1.05@ 1.25	1.05@ 1.25	1.05@ 1.30	1.05@ 1.30
Fairmont egg	Fairmont	1.10@ 1.30	1.10@ 1.30	1.15@ 1.35	1.15@ 1.35
Fairmont mine-run	Fairmont	1.00@ 1.20	1.00@ 1.20	1.05@ 1.25	1.05@ 1.25
Fairmont slack	Fairmont	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00
Kanawha lump	Cincinnati	1.25@ 1.75	1.25@ 1.75	1.25@ 1.60	1.15@ 1.60
Kanawha egg	Cincinnati	1.15@ 1.50	1.15@ 1.50	1.10@ 1.50	1.10@ 1.50
Kanawha mine-run (gas)	Cincinnati	1.35@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
Kanawha mine-run (st.)	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	.90@ 1.25
Kanawha nut-and-slack	Cincinnati	.75@ 1.00	.75@ 1.00	.65@ .90	.65@ .90
Williamson (W. Va.) lump	Cincinnati	1.25@ 1.75	1.25@ 1.75	1.15@ 1.75	1.15@ 1.65
Williamson (W. Va.) egg	Cincinnati	1.15@ 1.50	1.10@ 1.50	1.10@ 1.50	1.10@ 1.50
Williamson (W.Va.) mine-run (gas)	Cincinnati	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
Williamson (W.Va.) mine-run (st.)	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Williamson (W.Va.) nut-and-slack	Cincinnati	.60@ .90	.60@ .90	.60@ .85	.60@ .85
Logan (W.Va.) lump	Cincinnati	1.15@ 1.60	1.10@ 1.60	1.10@ 1.50	1.10@ 1.50
Logan (W.Va.) egg	Cincinnati	1.10@ 1.35	1.00@ 1.30	1.00@ 1.30	1.10@ 1.35
Logan (W.Va.) mine-run	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	.90@ 1.25
Logan (W.Va.) nut-and-slack	Cincinnati	.60@ .90	.50@ .90	.50@ .90	.50@ .75
Logan (W.Va.) slack	Cincinnati	.50@ .75	.50@ .75	.50@ .75	.50@ .75
Hocking (Ohio) lump	Columbus	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Hocking (Ohio) egg	Columbus	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Hocking (Ohio) mine-run	Columbus	1.35@ 1.45	1.35@ 1.45	1.35@ 1.45	1.35@ 1.45
Hocking (Ohio) nut-and-slack	Columbus	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00

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

HIGH-VOLATILE coals, except premium varieties, were completely in the dumps. Lump, egg, and mine-run all were sold under $1 at times, as against $2.50@$3 for premium lump and $1.75@$2.25 for premium egg. Slack, which started off the month with a fair amount of strength, weakened at the end.

A slight increase in the movement of domestic sizes and a fairly steady demand for steam grades were promising factors in the Columbus market in July, though the improvement was not great in any department. Domestic quotations were maintained at previous levels, except for an increase in smokeless lump and egg prices at the end of the month. Screenings and other steam grades moved without great difficulty, though Lake business proved to be a disappointment to most producers.

In spite of difficulties with labor, production in the Pittsburgh district at the end of July reached the best level of any period since striking began. The resulting oversupply, however, caused a general break in prices. In some quarters it was thought that the excess tonnage resulted from the desire of the producers to give as much employment as possible and thus cut down employee dissatisfaction. Shipments to the Lakes showed a slight increase in July, but industrial and railroad demand was slow, and the domestic market was stagnant. Demand for Connellsville coking coal was light, reflecting the efforts of byproduct interests to hold coke output at a minimum.

With demand at a low ebb, the

northern West Virginia market experienced a very quiet month in July. Industrial users bought only for current needs—already below normal—and railroads were extremely reluctant in placing fuel orders. Companies with their own docks were the only ones to get any great share of the Lake business. Prices were a little stronger in July than in June, perhaps due to continuance of the strike. Production, however, was well up to normal figures.

THE central Pennsylvania trade marked time in July. Production was low and prices showed no change from those prevailing at the end of June.

Except for a few relieving features, dullness in the New England market continued in July. Buying was quiet, though some purchasers of winter coal took small tonnages. Abundant supplies of water also had a bearing on the light demand, and kept users from adding to stocks. First grades of Pocahontas and New River mine-run were quoted at $4@$4.10, f.o.b. vessels, Hampton Roads, at the end of the month, while seconds went at $3.85@$3.95. Nut-and-slack was slow, selling on the piers at $3.10@$3.20. Activity in all-rail coals from central Pennsylvania was largely confined to specialties, though a fair amount of tonnage for domestic use was moved.

Quietness ruled the New York market in July. Industrial consumption tended to sag as summer schedules were adopted and, although stocks were admittedly light, few consumers made any attempt to augment them, preferring to continue on a hand-to-mouth basis until later in the season. Labor troubles were less a market factor as the month wore on, with the result that quotations became more irregular. Even high-volatile slack was easier, owing to larger shipments of lump to the Lakes and the closing down of a number of cement mills. Prices on high-volatile coals from the Northern fields held at about the June levels, with little spot business reported. Contract buyers cut already low takings still further in July.

The Philadelphia market failed to get out of the doldrums in July. Current demand for coal was low and buyers refused to consider any additions to stockpiles.

There was little buying of any grade of coal in the Birmingham market in July, and producers frequently found themselves with "no-bill" cars of both domestic and steam sizes on their hands. Dealers, either with or without stocks, refused to buy until consumers begin to show interest, while demand for industrial and bunkering use slumped still further. Domestic prices announced for August are as follows: Cahaba lump and egg, $2.85@$4.05; nut, $2.90@$3.10; Black Creek lump and egg, $3.35@$3.60; nut, $2.90; Corona lump and egg, $2.50; nut, $2.25; Carbon Hill lump and egg, $2.15; nut, $2@$2.15; Big Seam lump, egg, and nut, $2; Montevallo-Aldrich lump, $4.55; egg, $4.30; nut, $2.90; Dogwood lump, $4.55; egg, $4.30; Straven lump, $3.85; egg, $3.60; nut, $2.65. Keen competition disturbed steam prices in July, and considerable shading of quotations was reported. Quotations were: Big Seam mine-run, $1.60@$1.75; washed, $1.25@$1.50; Cahaba screenings, minus 3-in., $1.65@$1.85; minus 1-in., $1.10@$1.25; Black Creek screenings, minus 1½-in., $1.75@$2.

A fairly good summer demand, coupled with curtailments in production through inability to move other sizes, resulted in a minor boom in egg, buckwheat, and rice in the New York anthracite market in July. Independents found it unnecessary to offer much in the way of price inducements to move buckwheat and rice, while egg was firm at the circular quotation over the whole of the month. Chestnut, however, was offered at 50c.@$1 below the company price. Material price concessions also were made on stove and pea by independents, though the cuts were not as great as on chestnut. The strength in buckwheat and rice was partly attributable to the fact that some apartment house owners decided to call off the buyers' strike inaugurated with the announcement of increases in the spring, as well as to the fact that deliveries on public contracts were larger.

Except for some activity in certain sizes, dullness pervaded the Philadelphia anthracite market in July. Chestnut moved the best of the domestic coals. Egg and stove were in fair demand, but the call for pea was light. Steam coals enjoyed a fairly free movement, largely because curtailed production reduced the supply. Buckwheat was particularly sought, as numerous dealers were storing supplies against the future. Such tonnages of rice and barley as were produced were absorbed without difficulty. Prices were generally firm, with concessions in the minority.

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

	Market	Week Ended—			
MIDDLE WEST	Quoted	July 4, 1931	July 11, 1931	July 18, 1931	July 25, 1931
Franklin (Ill.) lump	Chicago	$2.60	$2.60	$2.60	$2.60
Franklin (Ill.) egg	Chicago	2.40@ 2.50	2.40@ 2.50	2.40@ 2.50	2.40@ 2.50
Franklin (Ill.) mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin (Ill.) screenings	Chicago	1.10@ 1.75	1.10@ 1.75	1.10@ 1.75	1.10@ 1.60
Central Ill. lump	Chicago	1.75@ 1.90	1.75@ 1.90	1.50@ 1.90	1.50@ 1.90
Central Ill. egg	Chicago	1.75@ 1.90	1.75@ 1.90	1.50@ 1.90	1.50@ 1.90
Central Ill. mine-run	Chicago	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80
Central Ill. screenings	Chicago	.60@ 1.00	.60@ 1.00	.60@ 1.00	.60@ 1.00
Ind. 4th Vein lump	Chicago	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50
Ind. 4th Vein egg	Chicago	2.00@ 2.50	2.00@ 2.50	2.00@ 2.50	2.00@ 2.50
Ind. 4th Vein mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Ind. 4th Vein screenings	Chicago	1.00@ 1.40	1.00@ 1.40	1.00@ 1.40	1.00@ 1.40
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	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Ind. 5th Vein mine-run	Chicago	1.20@ 1.75	1.20@ 1.75	1.20@ 1.75	1.20@ 1.75
Ind. 5th Vein screenings	Chicago	.55@ .90	.55@ .90	.55@ .90	.55@ .90
Mt. Olive (Ill.) lump	St. Louis	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Mt. Olive (Ill.) egg	St. Louis	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60
Mt. Olive (Ill.) mine-run	St. Louis	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50
Mt. Olive (Ill.) screenings	St. Louis	.90@ 1.25	.80@ 1.15	.80@ 1.15	.80@ 1.15
Standard (Ill.) lump	St. Louis	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60
Standard (Ill.) egg	St. Louis	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
Standard (Ill.) mine-run	St. Louis	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Standard (Ill.) screenings	St. Louis	.80@ 1.10	.70@ 1.00	.70@ 1.00	.70@ 1.00
West Ky. lump	Louisville	1.15@ 1.40	1.15@ 1.40	1.15@ 1.25	1.15@ 1.25
West Ky. egg	Louisville	1.15@ 1.40	1.15@ 1.40	1.15@ 1.25	1.15@ 1.25
West Ky. nut	Louisville	1.15@ 1.40	1.15@ 1.25	1.00@ 1.15	1.00@ 1.15
West Ky. mine-run	Louisville	.85@ 1.00	.85@ 1.00	.85@ 1.00	.85@ 1.00
West Ky. screenings	Louisville	.60@ .75	.60@ .75	.50@ .65	.60@ .75
West Ky. lump	Chicago	.90@ 1.15	.90@ 1.15	.90@ 1.15	.90@ 1.15
West Ky. egg	Chicago	.90@ 1.15	.90@ 1.15	.90@ 1.15	.90@ 1.15
West Ky. nut	Chicago	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
West Ky. screenings	Chicago	.50@ .75	.65@ .75	.65@ .75	.65@ .75
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$1.90	$1.90	$1.90	$1.90
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	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Harlan (Ky.) egg	Chicago	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Harlan (Ky.) slack	Chicago	.85@ 1.10	.85@ 1.10	.85@ 1.10	.85@ 1.10
Harlan (Ky.) block	Louisville	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
Harlan (Ky.) egg	Louisville	1.40@ 1.70	1.40@ 1.70	1.40@ 1.60	1.40@ 1.60
Harlan (Ky.) mine-run	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Harlan (Ky.) nut-and-slack	Louisville	.70@ 1.00	.70@ 1.00	.65@ 1.00	.60@ 1.00
Harlan (Ky.) block	Cincinnati	1.25@ 2.25	1.25@ 2.25	1.25@ 2.25	1.25@ 2.25
Harlan (Ky.) egg	Cincinnati	1.10@ 1.75	1.10@ 1.75	1.10@ 1.75	1.10@ 1.75
Harlan (Ky.) mine-run	Cincinnati	1.10@ 1.30	1.10@ 1.30	1.10@ 1.35	1.00@ 1.35
Harlan (Ky.) nut-and-slack	Cincinnati	.60@ .90	.60@ .90	.60@ .85	.60@ .85
Hazard (Ky.) block	Chicago	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75
Hazard (Ky.) egg	Chicago	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Hazard (Ky.) slack	Chicago	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00
Hazard (Ky.) block	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.35@ 1.50
Hazard (Ky.) egg	Louisville	1.15@ 1.25	1.15@ 1.25	1.15@ 1.25	1.15@ 1.25
Hazard (Ky.) mine-run	Louisville	1.15@ 1.35	1.15@ 1.25	1.15@ 1.25	1.15@ 1.25
Hazard (Ky.) nut-and-slack	Louisville	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Hazard (Ky.) block	Cincinnati	1.10@ 1.65	1.10@ 1.65	1.00@ 1.65	1.00@ 1.60
Hazard (Ky.) egg	Cincinnati	1.10@ 1.40	1.00@ 1.40	1.00@ 1.40	1.00@ 1.40
Hazard (Ky.) mine-run	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	.90@ 1.25
Hazard (Ky.) nut-and-slack	Cincinnati	.60@ .90	.60@ .85	.60@ .85	.60@ .85
Elkhorn (Ky.) block	Chicago	1.50@ 1.85	1.50@ 1.85	1.50@ 1.85	1.50@ 1.85
Elkhorn (Ky.) egg	Chicago	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Elkhorn (Ky.) slack	Chicago	.90@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25
Elkhorn (Ky.) block	Louisville	1.25@ 2.00	1.25@ 2.00	1.25@ 2.00	1.25@ 2.00
Elkhorn (Ky.) egg	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Elkhorn (Ky.) mine-run	Louisville	1.25@ 1.50	1.25@ 1.50	1.10@ 1.25	1.10@ 1.25
Elkhorn (Ky.) nut-and-slack	Louisville	.70@ 1.00	.70@ 1.00	.65@ 1.00	.65@ 1.00
Elkhorn (Ky.) block	Cincinnati	1.25@ 2.75	1.25@ 2.75	1.15@ 2.75	1.10@ 2.75
Elkhorn (Ky.) egg	Cincinnati	1.15@ 1.60	1.15@ 1.75	1.10@ 1.75	1.10@ 1.75
Elkhorn (Ky.) mine-run	Cincinnati	1.00@ 1.60	1.00@ 1.60	1.00@ 1.60	1.00@ 1.60
Elkhorn (Ky.) nut-and-slack	Cincinnati	.75@ .90	.65@ .90	.60@ .85	.60@ .85
Kansas shaft lump	Kansas City	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25
Kansas strip lump	Kansas City	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Kansas mine-run	Kansas City	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Kansas screenings	Kansas City	.75@ 1.50	.85@ 1.50	.85@ 1.50	.85@ 1.50

WORD from the FIELD

Anthracite Recaptures Markets From Rival Fuels

Anthracite Service, the combustion-engineering organization of the anthracite industry, won markets with an annual consuming capacity of 107,417 tons of coal from competitive fuels in the quarter ended June 30. The report of Anthracite Service for the quarter shows that the tonnage won was divided up as follows: industrial and commercial, 61,032 tons; residential, 14,137; and new buildings, 32,248 tons. Fuels in competition with anthracite included Russian and Welsh anthracite, gas, oil, coke, and bituminous coal. Fuel oil during the period lost 47,507 of the total of 107,417 tons to anthracite, more than half of which was in the field of commercial and industrial buildings and institutions.

Southwest Code Revised

Revisions in the trade practice code of operators in Kansas and Missouri, adopted on Nov. 19, 1930, were completed by the Federal Trade Commission and accepted by the operators in July. Comparison of the present form of the code with the original form reveals that the commission was guided in its revisions by recent court decisions implying that the Commission had jurisdiction only when condemned practices adversely affect competitors. The only exception was in the method of dealing with practices specifically condemned by anti-combination laws, in which case the provisions of the Clayton Act itself have been incorporated in the code.

The phrase, "the tendency to injuriously affect the business of competitors," or its equivalent, limits the condemnation of: misrepresentation regarding quality of product; defamation of competitors; imitation of trademarks; inducing breach of contracts; secret bribing of employees of a common carrier; and secret bribing of competitors' employees or customers. The limitation, "tend to create a monopoly or to unreasonably restrain trade," taken from Section 5 of the Clayton Act, is attached to: condemnation of selling goods below cost; price discrimination; paying of secret rebates; and shipment of goods on consignment. Five rules are retained in Group 2 as "accepted as expressions of the trade." These respectively condemn repudiation of contracts and insertion of misleading statements in contract, and approve the independent publication and circulation by each member of its own price lists, including terms of sale; the arbitration of trade disputes; and the maintenance of a committee on trade practices.

General Brice P. Disque

Former United States cavalryman, foreign trader, organizer of the lumber industry of the Pacific Northwest, and financial and investment adviser, has been made executive director of the Anthracite Institute, New York City. During his twenty years of military service, General Disque took part in the Philippine insurrection and the World War, receiving the Distinguished Service Medal and several foreign decorations. Following his resignation from the army in 1919, he became president of the foreign trading house of G. Amsinck & Co., New York City, and later organized and directed the interests of the lumber industry in the Pacific Northwest. More recently, General Disque has been engaged in the financial and investment business in New York.

Virginia Safety Institute

Formation of a single central safety institute, to hold monthly meetings in Norton, Va., was recommended by the safety committee of the Virginia Coal Operators' Association in July. Plans for the formation of the institute are now being drawn up, and will be presented to the National Coal Association for approval. John C. Kennedy, safety engineer for the national association, was active in forming the institute.

Activity in Plant Construction Reaches New High in July

Measured in capacity in tons per hour, activity in the installation of new preparation plants in July was the greatest of any month since January, 1929, when *Coal Age* began regular publication of new contracts. The twelve projects for the preparation of coal under way or contracted for last month had a total capacity well in excess of 3,000 tons per hour, which is considerably above the high in any previous month for which reports have been received. Details for each installation reported in July of this year are as follows:

Boone County Coal Corporation, Boone No. 2 mine, Monclo, W. Va.; contract closed with the Link-Belt Co. for installation of refuse disposal equipment. Preparation plant refuse will travel underground, where it will be dumped over a rotary dump into a bin and combined with the mine rock. From the rock bin, balanced skips will raise the refuse to a second rock bin, from which it will be wasted by larry. Capacity of the installation is 100 tons per hour; to be completed Sept. 1.

Clemens Coal Co., Minden, Mo.; contract closed with the Pittsburg Boiler & Machine Co. for all-steel, four-track tipple, equipped with main coal conveyor, shaker screens, boney and rock conveyors, three loading booms, and crushers; capacity, 400 tons per hour.

Grant Hood & Son Coal Co., Pomeroy, Ohio, will build a river tipple to be used largely for bunkering purposes. Storage capacity will be 150 tons, and practically all the coal loaded will be mine-run.

Haddock Mining Co., Candlemas breaker, Silverbrook, Pa.; contract closed with the Chance Coal Cleaner for installation of one 18-ft. Chance cone for washing all sizes from egg to buckwheat, inclusive; capacity, 225 gross tons per hour of shipped product; to be completed by Oct. 1.

Monitor Coal & Coke Co., Wilkinson, W. Va.; contract closed with the Link-Belt Co. for five-track, all-steel tipple for installation at the new mine of the company in the Eagle seam. Coal and rock will be brought out of the mine slope on a belt conveyor. Six sizes will be produced in the tipple, which will have a capacity of 400 tons per hour. The plant is to be completed Sept. 1.

Penn Anthracite Mining Co.,

Scranton, Pa.; contract closed with the Chance Coal Cleaner for installation of four 8-ft. rectangular-top Chance cones in the Von Storch breaker for preparing rice and barley sizes at the rate of 120 gross tons per hour of shipped product. An amount of No. 4 buckwheat as yet undetermined also will be washed in the installation, which will include four 75-ton overhead bins for loading railroad cars.

PITTSBURGH TERMINAL COAL CORPORATION, Avella, Pa.; construction of a Chance cleaning plant with a capacity of 600 tons per hour under way to serve the No. 9 operation of the company and any one or all of seven other mines in the vicinity. Six sizes will by produced, as follows: ¼-in. slack; 1¼x1- and 1x2-in. nut; 2x4- and 4x6-in. egg; and 6-in. lump. Plant is to be in operation Sept. 15.

POND CREEK POCAHONTAS CO., Bartley, W. Va.; contract closed with the Link-Belt Co. for a mine slope belt conveyor, six-track steel tipple, and Simon-Carves washer for installation at the new No. 4 mine of the company, which is to be in operation April 1, 1932. Capacity of the tipple is 350 tons per hour, and capacity of the Simon-Carves washer is 150 tons per hour.

POWHATAN MINING CO., Powhatan Point, Ohio; construction of a new Chance cleaning plant to serve the Powhatan mine of the company under way. Capacity of the plant is 600 tons per hour, and it is to be completed Sept. 15. Six sizes will be produced, as follows: ¼-in. slack; 1¼x1- and 1x2-in. nut; 2x4- and 4x6-in. egg; and 6-in. lump.

SUNSHINE COAL CO., Centerville, Iowa; contract closed with the Pittsburg Boiler & Machine Co. for all-steel shaft tipple equipped with shaker screens, mixing conveyor, crusher, and box-car loader; capacity, 100 tons per hour.

SUNSHINE COAL CO., Centerville, Iowa; contract closed with the Pittsburg Boiler & Machine Co. for shaker screen, mixing conveyor, and box-car loader for installation in existing structure; capacity, 100 tons per hour.

WINIFREDE COLLIERIES, Winifrede, W. Va.; contract closed with the Kanawha Mfg. Co. for changing two-track tipple to a four-track installation. Additional shaker screens and other equipment will be added to increase the capacity 125 tons per hour.

STITH COAL CO., Bon Air Shaft, America, Ala.; Montgomery Coal Washer & Mfg. Co. now engaged in erecting a washery containing four Montgomery jigs; capacity, 1,000 tons per day; to be completed Oct. 1.

Inland Steel Buys Breakers

The Inland Steel Co. has closed a contract with the Automatic Reclosing Circuit Breaker Co. for complete sectionalizing circuit breaker equipment for installation at its Wheelwright (Ky.) mines. Ten breakers are included in the list of equipment.

Washington Doubts Conference Benefit; Gesture Aids Lewis With U.M.W.

BY PAUL WOOTON
Washington Correspondent

THAT the United States will put its faith in the normal operation of economic pressure to eliminate excess capacity in the business of producing coal is made practically certain by developments in Washington during the past month. In fact, the coal-producing industry already has traveled a long distance in that direction and has accomplished a great deal of the liquidation that would be done any way under any scheme.

The real policy of the administration is to let coal alone. Germany tried to apply the cartel system to coal. The British passed special legislation setting up a group marketing scheme. Results in those instances were such that the United States is not likely to adopt either one of them. There is no reason to believe that there will be any deviation from the path of allowing the situation to cure itself.

John L. Lewis, president United Mine Workers, was in a tight place. Membership had dwindled sharply; rival union was making material headway. He was in a position where he had to demonstrate that he still wields influence in Washington. He requested President Hoover to call a joint conference of operators and mine workers. The President was requested particularly to issue the call himself and not delegate it to members of his Cabinet. While the President declined to depart from custom and referred the request to the Secretaries of Commerce and of Labor, Mr. Lewis was in a position to emphasize to the rank and file of the organization that even the President would not have enough influence to bring about a joint conference. The leaders doubtless had no delusions in that connection and, of course, the conference would be justified from their standpoint, as it would provide a platform where their grievances could be heard by the nation. Another of the inspirations for the conferences came from Washington. It was only the desperate head of the trade union making a show of doing something.

President Hoover is well aware of the fact that the coal industry is in a difficult position. He realizes, however, that there is nothing that the federal government can do about it. It was necessary, however, for him not to be responsible for the vetoing of such a conference as Mr. Lewis proposed. At the President's request the producers of approximately 25 per cent of the total soft-coal tonnage were communicated with by telephone. In those conversations only one operator thought a joint conference would accomplish any good purpose. Despite the lack of encouragement received, the Secretary of Commerce, nevertheless, called a conference of what he regarded as representative operators. The result of that conference as well as one between Secretary Doak and labor leaders is outlined in the following letter which was sent by Secretaries Lamont and Doak to more than 150 operators:

As soon as it could be arranged, an informal meeting was called in the Commerce Department with a group of operators, in which representation from the principal producing districts was sought for a discussion of this proposal. Some of the operators attending expressed the view that the coal industry was no worse off, relatively, than other industries at the present time, and a majority of them declared that nothing could be gained by a nationwide joint conference of operators and miners. A minority of operators considered that progress could be made by such a conference.

A few days later a similar meeting was held in the Department of Labor with Mr. Lewis and members of the executive committee of the United Mine Workers. The point was raised in this session that, at the meeting with the operators the previous week, the industry was not effectively represented. It was asserted that by a representative conference of both operators and miners much could be done to stabilize wages and improve conditions generally within the industry, and it was further asserted that operators would willingly attend such a conference.

As it is our desire to assist in any workable and practical plan which might offer to contribute substantially to a solution of the difficulties in the coal industry, this letter is being sent to a representative number of operators located in the more important producing districts in the country for the purpose of presenting this specific inquiry: "At a convenient time in

Stabilization Plan Offered

Formation of a new competitive field to consist of western Pennsylvania, eastern Ohio, and the northern Panhandle, Morgantown, Fairmont, and Kanawha regions in West Virginia is one of the principal features of a plan for stabilizing the steam coal industry in those areas proposed on July 8 by bankers and business men in the Wheeling (W. Va.) district. While affirming belief in private ownership, the plan is drawn up on the premise that the states must supply the necessary leadership at the present time.

Under the provisions of the plan, administration would lie in the hands of a tribunal appointed by the governors of the respective states, preferably composed of the heads of the three state universities. This tribunal would act to organize the operators into a unit, ascertain the potential consumption, and regulate production and selling prices to assure fair wages to the miners and an adequate return to the operators. When the plan is well under way, it is suggested that the college presidents be succeeded by state commissioners appointed by the operators.

Anthracite Prices at New York, Effective Aug. 1, 1931 *

	Broken (Grate)	Egg (Furnace)	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
Delaware, Lackawanna & Western Coal Co.	$7.30	$7.55	$7.80	$7.80	$5.55	$3.25[1]	$1.85[2]	$1.40
Philadelphia & Reading Coal & Iron Co.	7.30	7.55	7.80	7.80	5.55	3.25[3]	1.85[4]	1.40
Lehigh Valley Coal Sales Co.	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
Lehigh Navigation Coal Co.	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
Hudson Coal Co.[5]	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
M. A. Hanna Co.	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
Dickson & Eddy	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
Madeira, Hill & Co.	7.30	7.55	7.80	7.80	5.55	3.25	1.85	1.40
Payne Coal Co.								
General Coal Co.:								
Raven Run, Maryd. Westwood		7.55	7.80	7.80	5.55	3.25	1.85	1.40
Hazle Brook		7.80	8.05	8.05	5.80	3.50	2.05	1.60
Midvalley		7.70	7.95	7.95	5.70	3.40	2.00	1.60
Cross Creek		7.65	7.90	7.90	5.65	3.25	1.85	1.40
Fuel Service Co.:								
Beaver Meadow, Kingston, Westwood		7.55	7.80	7.80	5.55	3.25	1.85	1.40
Jeddo		8.05	8.30	8.30	6.45	3.50	2.00	1.50
Highland		7.90	8.15	8.15	6.45	3.55	2.10	1.50
Cross Creek		7.65	7.90	7.90	5.65	3.25	1.85	1.40

[1] Domestic buckwheat, $3.70. [2] Stoker rice, $2.30. [3] Stoker buckwheat, $3.75. [4] Stoker rice, $2.35. [5] Birdseye, $1.50. * Terms, 30 days net. Discounts are allowed as follows for payment within 15 days of shipment: broken, egg, stove, and chestnut, 20c.; pea, 15c.; buckwheat, 10c.; rice, barley and birdseye, 5c.

the near future will you be willing to attend a representative, joint conference of operators and miners for the purposes stated? In your judgment would such a conference bring about the results outlined by Mr. Lewis?"

As a result of Mr. Lewis' charge that the operators who attended the meeting with Secretary Lamont were not representative, Secretary Doak asked Mr. Lewis to furnish a list of operators whom he would consider representative. This resulted in a list of 125 names. When a small proportion of the operators named on that list accepted the invitation Mr. Lewis submitted a supplemental list. This list consisted of operators in Ohio, Indiana, Illinois, and Iowa. Most of the acceptances were from operators in union districts. As they are operating under contracts, it was felt that those operators could not contribute a great deal to the conference.

The operators named in the original list of 125 were:

Alabama—M. W. Bush, Alabama By-Products Corporation; C. F. DeBardeleben, Alabama Fuel & Iron Co.; Herbert C. Rydding, Tennessee Coal, Iron & Railroad Co.

Arkansas, Kansas, Missouri and Oklahoma—Joseph Clemens, Clemens Coal Co.; W. L. A. Johnson, Southwestern Interstate Coal Operators' Association; Wm. Jones, Rock Island Improvement Co.; Charles Keith, Central Coal & Coke Co.; J. G. Puterbaugh, McAlester Fuel Co.; George J. L. Wulff, Western Coal & Mining Co.

Colorado and New Mexico—L. S. Cates, Phelps-Dodge Corporation; B. W. Snodgrass, Victor-American Fuel Co.; Miss Josephine Roche, Rocky Mountain Fuel Co.; Arthur Roeder, Colorado Fuel & Iron Co.; J. Van Houten, St. Louis, Rocky Mountain & Pacific Co.

Illinois and Indiana—H. Bell, Bell & Zoller Coal & Mining Co.; D. W. Buchanan, Old Ben Coal Corporation; Carl Elshoff, Citizens "B" Coal Co.; George B. Harrington, Chicago, Wilmington & Franklin Coal Co.; C. T. Hayden, O'Gara Coal Co.; H. E. Howard, Binkley Mining Co.; Samuel Insull, Jr., Peabody Coal Co.; W. J. Jenkins, Consolidated Coal Co. of St. Louis; George C. Moore, Electric Shovel Coal Co.; P. H. Penna, Templeton Coal Co.; R. H. Sherwood, Central Indiana Coal Co.; Homer B. Talley, Coal Bluff Mining Co.; H. H. Taylor, Franklin County Coal Co.; H. N. Taylor, United Electric Coal Cos.

Indiana—See under "Illinois."

Iowa—George Heaps, Jr., Rex Fuel Co.; A. E. Hollingsworth, Central Iowa Fuel Co.; Robert E. Lee, Consolidated Indiana Coal Co.

Kansas—See under "Arkansas."

Kentucky (Eastern) and Tennessee—W. H. Barthold, Utilities Coal Corporation; S. L. Bastin, Elkhorn Coal Co.; E. L. Douglass, Brier Hill Collieries; John P. Gorman, John P. Gorman Coal Co.; V. N. Hacker, Pruden Coal & Coke Co.; Joseph E. Johnson, Hazard Coal Exchange; E. C. Mahan, Southern Coal & Coke Co.; H. F. Perkins, Wisconsin Steel Co.; R. C. Tway, R. C. Tway Coal Co.

Kentucky (Western)—W. W. Bridges, Black Diamond Coal & Mining Co.; W. G. Duncan, W. G. Duncan Coal Co.; Justin Potter, Williams Coal Co.; C. F. Richardson, West Kentucky Coal Co.

Maryland—A. B. Stewart, Davis Coal & Coke Co.

Michigan—Charles Coryell, Robert Gage Coal Co.

Missouri—See under "Arkansas."

Montana—H. S. Hopka, Roundup Coal Mining Co.; F. W. C. Whyte, Anaconda Copper Mining Co.

New Mexico—See under "Colorado."

Ohio—W. P. Cayton, Rail & River Coal Co.; Wm. Emery, Jr., Cambridge Collieries Co.; Fred Essex, Essex Coal Co.; R. L. Ireland, Jr., Wheeling & Lake Erie Coal Mining Co.; W. H. Haskins, Central Ohio Coal Operators' Association; Edward Johnson, Lorain Coal & Dock Co.; George M. Jones, Ohio Collieries Co.; J. C. Nelms, Ohio & Pennsylvania Coal Co.; E. M. Poston, New York Coal Co.; Wm. Rigby, Sr., Akron Coal Co.; S. H. Robbins, Youghiogheny & Ohio Coal Co.; George K. Smith, Sunday Creek Coal Co.; Whitney Warner, Warner Collieries Co.

Oklahoma—See under "Arkansas."

Pennsylvania (Central and Coke Fields)—C. G. Berwind, Berwind-White Coal Mining Co.; Harry F. Bovard, Keystone Coal & Coke Co.; J. R. Caseley, Buffalo & Susquehanna Coal Co.; B. M. Clark, Rochester & Pittsburgh Coal Co.; A. B. Crichton, Johnstown Coal & Coke Co.; Michael Gallagher, Northwestern Mining & Exchange Co.; F. E. Herriman, Clearfield Bituminous Coal Corporation; J. H. Hillman, Hillman Coal & Coke Co.; John H. Jamison, Jamison Coal & Coke Co.; E. B. Leisenring, Westmoreland Coal Co.; R. H. Moore, W. H. Hughes & Co.; Thomas H. Moses, H. C. Frick Coke Co.; Rembrandt Peale, Peale, Peacock & Kerr; J. W. Searles, Pennsylvania Coal & Coke Corporation; J. H. Weaver, J. H. Weaver & Co.; J. Wm. Wetter, Madeira, Hill & Co.; F. H. Wigton, Morrisdale Coal Co.; J. P. Williams, Jr., Koppers Coal Co.

Pennsylvania (Western)—C. A. Buck, Bethlehem Mines Corporation; J. B. Ford, Ford Collieries Co.; T. M. Girdler, Republic Steel Corporation; J. G. Hoffstot, Lincoln Gas Coal Co.; John H. Jones, Consumers' Mining Co.; Wm. Larimer Jones, Vesta Coal Co.; F. S. Love, Union Collieries Co.; J. H. Sanford, Chartiers Creek Coal Co.; J. T. M. Stoneroad, Carnegie Coal Corporation; F. E. Taplin, Pittsburgh Terminal Coal Corporation; W. G. Warden, Pittsburgh Coal Co.

Tennessee—See under "Kentucky (Eastern)."

Utah—W. D. Brennan, Utah Fuel Co.; N. W. Rice, United States Fuel Co.

Virginia—C. E. Bockus, Clinchfield Coal Corporation; J. L. Kemmerer, Wise Coal & Coke Co.; H. W. Morgan, Great Valley Anthracite Co.; John E. Newton, Virginia Iron, Coal & Coke Co.; R. H. Knode, Stonega Coke & Coal Co.

Washington—C. C. Anderson, Northwestern Improvement Co.; N. D. Moore, Pacific Coast Coal Co.

West Virginia (Northern and Panhandle)—G. J. Anderson, R. C. Hill, and J. D. Rockefeller, Jr., Consolidation Coal Co.; R. M. Hite, Virginia & Pittsburgh Coal Co.; Wm. McKay, New England Fuel & Transportation Co.; M. J. McQuade, Ben Franklin Coal Co.; J. A. Paisley, Valley Camp Coal Co.; Joseph Pursglove, Pursglove Mining Co.; E. H. Reppert, Reppert Coal Co.; H. W. Showalter, Continental Coal Co.

West Virginia (Southern)—E. J. Berwind, New River & Pocahontas Consolidated Coal Co.; W. H. Coolidge, Island Creek Coal Co.; W. H. Cunningham, Truax-Traer Coal Co.; Irvin Davis, Hatfield-Campbell Creek Coal Co.; R. H. Gross, New River Co.; Charles R. Hook, American Rolling Mill Co.; James Elwood Jones, Pocahontas Fuel Co.; John Laing, Wyatt Coal Co.; W. M. Pryor, Red Jacket Consolidated Coal & Coke Co.; I. M. Scott, Wheeling Steel Corporation; Garner Williams, Cabin Creek Consolidated Coal Co.; Leigh Willard, Kingston-Pocahontas Coal Co.

Wyoming—E. M. Bottomley, Sheridan-Wyoming Coal Co.; Eugene McAuliffe, Union Pacific Coal Co.; Charles Shuler, Colony Coal Co.

The supplemental list covered the following operators:

Illinois—V. M. Henderson, Gillespie Coal Co.; W. K. Kavanaugh, Southern Coal, Coke & Mining Co.; O. L. Lumaghi, St. Louis Coal Co.; H. J. Meehan, Cosgrove-Meehan Coal Co. of Illinois; Rice Miller, Hillsboro Coal Co.; H. F. Pixley, Breese-Trenton Mining Co.; Glen A. Shafer, Pana Coal Co.; H. A. Solomon, Panther Creek Mines.

Indiana—Walter Bledsoe, Walter Bledsoe & Co.; J. T. Connery, Miami Coal Co.; W. J. Freeman, Glen Ayr Coal Co.; Arch Grossman, United Collieries Co.; J. R. Henderson, Francisco Coal Co.; David Ingle, Ingle Coal Co.; H. B. Lee, Maumee Collieries Co.; Fred S. McConnell, Enos Coal Mining Co.; Henry P. Smith, Ebbw Vale Coal Co.

Iowa—W. R. Carney, Scandia Coal Co.; H. M. Havner, Pershing Coal Co.; Owen McConville, McConville Coal Co.; H. M. Poole, Norwood-White Coal Co.

Michigan—George C. Eastwood, Consolidated Coal Co.

Ohio—H. C. Allread, Hocking Valley Mining Co.; Alva Bradley, United States Coal Co.; Fred G. Lamb, Short Creek Coal Co.; W. J. McFarlin, National Coal Co.; J. F. Mellott, Schick Co-operative Coal Co.; J. L. Murphy, Manhattan Coal Co.

West Virginia (Northern)—John L. Hatfield, Rosedale Coal Co.

Mr. Lewis passed the buck to the government. The government in turn has passed the buck back to Mr. Lewis. There is a feeling that Mr. Lewis will now make another move, but just what it is no one seems to be able to say.

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Temple Not a Monopoly

A Federal Trade Commission mandate requiring the Temple Coal Co., Scranton, Pa., to divest itself of operations in Luzerne and Lackawanna counties or its smaller East Bear Ridge Colliery in Schuylkill County, on the ground that the combination was a violation of the Clayton Act, was set aside July 9 by the U. S. Circuit Court of Appeals, Philadelphia, Pa.

The action was instituted against the Temple Coal Co. after it had acquired the East Bear Ridge Colliery Co., the Commission contending that as the coal from East Bear Ridge and Temple mines was sold through brokers to practically the same customers, the merger tended to create a monopoly and lessen competition. The Court held that the respective selling agents for both groups of mines are still in competition, and that the evidence failed to show any violation of the anti-trust laws. Even if there had been a lessening in competition, the Court remarked, the comparative smallness of the East Bear Ridge operations made it inconsequential.

Colorado Fuel & Iron Joins Wage Cutters; Eastern Strikes Fail to Curb Production

ABANDONING its previous stand against wage cuts (*Coal Age*, June, 1931, p. 359), the Colorado Fuel & Iron Co., "forced to such action by competitive conditions and the general situation in the coal industry," filed notice with the Colorado Industrial Commission on July 30 of intention to reduce its basic wage scale from $6.52 to $5.25. This action followed the filing of similar notices by the Victor-American Fuel Co. and the Moffat, McNeil, Hayden, and Keystone coal companies on July 29. The Clayton, Empire, Pryor, and Dick companies, the Bluff Springs Leasing Co., and the Palisade Coal Lease Co. also filed notices earlier in July, bringing the total since the first of May up to one-half the companies operating in the state. Measured in terms of production, however, considerably more than half the output of the state is controlled by the companies filing notices.

Hearings were held by the Industrial Commission at different points during the month, with special emphasis on the method of obtaining signatures where employees voluntarily agreed to cuts without the formal notice of 30 days. At the conclusion of the Bluff Springs Leasing Co. inquiry, one of the several held, the Commission, on Aug. 4, ordered the company to retain its old scale. The Commission has no power to enforce such an order, however.

After a series of violent incidents, which included an attack on a meeting of the United Mine Workers at Canonsburg by adherents of the National Miners' Union on July 19 and several assaults on employees of various nonunion mines, strike activities died down in the Pittsburgh district at the end of July. Production increased to the highest point since trouble began in the field, reflecting the desire of the operators to give as much work as possible and thus lessen dissatisfaction.

Six hundred delegates, said to represent miners in Alabama, eastern Kentucky, West Virginia, Pennsylvania, eastern Ohio, and southern Illinois, attended the "national united front conference" of the National Miners' Union which opened in Pittsburgh, Pa., July 15. The conference went on record in favor of a general increase in wages, free unemployment insurance, the six-hour day without reduction in pay, employment of checkweighmen, establishment of union conditions, and abolition of the check-off. It set up a "miners' unity committee of action" to supervise the expansion of the activities of the National Miners' Union to all the coal districts of the country. To accomplish this purpose, the conference recommended the formation of minority groups in the United Mine Workers and the West Virginia Miners' Union and approved plans to initiate new strikes wherever possible.

Attempts of the National Miners' Union to extend its activities to the Connellsville field met with little success. In central Pennsylvania, the organization, in accordance with the plans drawn up at the conference, held a series of meetings to capitalize on such unrest as was present. Representatives of the United Mine Workers were active in the field, and were reported to have obtained a number of recruits among the miners.

Trouble at the mines of the Helvetia Coal Mining Co., during the course of which Yatesboro No. 5, Nu Mine, Pa., was made the target of several miners' marches, caused the company to apply for injunctions in Armstrong and Indiana counties to curb interference with its operations and resulted in a sharp interchange of telegrams between Governor Gifford Pinchot and B. M. Clark, president of the company. Governor Pinchot, on July 31, wired Mr. Clark that he had been informed that the Helvetia company proposed to evict 67 miners for joining the United Mine Workers and demanding a checkweighman. Mr. Clark retorted that the Governor had been misinformed and that steps had been taken to evict sixteen employees, not for affiliation with the union but because of active participation in "unlawful and riotous conduct" since June 29.

Conditions in northern West Virginia were generally quiet in July. Approximately 30 mines were still affected by stoppages at the end of the month, but no violence was reported. The Thermal No. 40 mine of the Rachel Gas Coal Co., Rachel, signed an agreement after its employees struck for recognition of the United Mine Workers and the right to employ checkweighmen. Under the terms of the contract, the miners took a wage cut of approximately 25 per cent. The Reynolds Coal Co. also signed with the union in July. Reports from union headquarters in Fairmont indicated that the union would not insist on calling the 60-day conferences provided for in the standard agreement in the absence of any marked change in wage scales in non-union mines or major fluctuation in coal prices.

Clashes continued to disturb the West Virginia Panhandle and eastern Ohio in July, where the National Miners' Union has been active. In addition to minor disturbances throughout the month, William Simon, a member of the National Miners' Union, was killed on July 20 when pickets attempted to halt men leaving the Gaylord No. 1 mine of the Sauters Coal Co., Martins Ferry, Ohio. The Costanzo Coal Co., Wheeling, W. Va., a few days earlier invoked an injunction granted its predecessor in 1923 to prevent interference with the operation of its mines. Rifle fire scattered 50 miners at the mine of the Standard Mining Co., near Wellsburg, W. Va., July 22, and resulted in the arrest of 76 others, eighteen of whom were held.

A committee of the Wheeling City Council, appointed to discuss the differences between striking employees and the Elm Grove Mining Co. of Ohio, Elm Grove, W. Va., which has been attempting to operate its mines with imported labor, was refused admittance to the plant on July 20.

The strike called by Frank Keeney, president of the West Virginia Miners' Union, while partially effective, failed to reduce production materially in the Kanawha field in July. Violence increased as the month advanced. Two strikers, who had returned to work at the Raymond City Coal Co. mine, Raymond City, were shot from ambush and killed on July 20. The Amelia Coal Co., Blakely; Kellys Creek Colliery Co., Ward; Hugheston Gas Coal Co., and the Cabin Creek Consolidated Coal Co., Kayford, proceeded with eviction of strikers, though the attempts of the Kellys Creek Company were hampered by injunctions and appeals.

The return of quiet in eastern Kentucky resulted in the removal of the last of the National Guard from Harlan County on July 18. Troops in Bell County were withdrawn the following week. The National Miners' Union, however, opened up headquarters at Wallins Creek and embarked on a recruiting campaign. Subterranean rumblings also were heard in the Southern Appalachian field, where both the Communists and the I. W. W. apparently were active. The United Mine Workers

Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in June, as follows:

(1) Mayor & Coulson, Ltd.; Type VT (12x9) belt conveyor; 15-hp., motor, 440 volts, a.c.; Approval 224A; June 19.
(2) Edison Storage Battery Co.; Edison Model J lamp; Approval 24; June 22.

Eleven trailing cables for use with permissible mining machines have been tested by the Bureau under the provisions of Schedule 2C and placed in the "specially recommended" class. The list on July 1 was as follows:

BM-1. "Hazacord" No. 2 twin cable, 19x7 stranding.
BM-2. "Hazacord" No. 3 twin cable, 19x7 stranding.
BM-3. "Hazacord" No. 4 twin cable, 19x7 stranding.
BM-4. Rome "Super-Service" No. 3 twin cable, 7x19 stranding.
BM-5. Rome "Super-Service" No. 2 twin cable, 7x19 stranding.
BM-6. Rome "Super-Service" No. 4 twin cable, 7x19 stranding.
BM-7. Rome "Super-Service" No. 4 twin cable, 7x7 stranding.
BM-8. "Okocord" No. 2 twin cable, 19x7 stranding.
BM-9. "Tirex" No. 2 twin cable, 7x19 stranding.
BM-10. "Tirex" No. 3 twin cable, 7x19 stranding.
BM-11. "Tirex" No. 4 twin cable, 7x19 stranding.

seemingly was making no move to rehabilitate itself in the district, though three companies signed contracts in July. These were: Davidson Coal Mining Co., Davidson, Tenn.; Fentress Coal & Coke Co., Wilder; and the Brier Hill Collieries, Crawford.

A state-wide "rank-and-file" convention of miners in District 12 opened in Belleville, Ill., July 6, under the leadership of Ray Edmundson. Bitter opposition to the present officers of District 12, as well as the international officers of the United Mine Workers, characterized the meeting. The convention closed on July 17, but opposition to its activities began even before that. Many local unions recalled their delegates during the progress of the meeting, and later developments brought still further repudiations of the "rank-and-file" movement, which found its chief supporters in southern Illinois. The National Miners' Union failed to get control of the convention, as it had planned, and as a result held meetings at Belleville later in the month to win over members of either the "rank and file" or the regular factions.

Employees at the Orient mines of the Chicago, Wilmington & Franklin Coal Co., who struck two months ago over alleged inequalities in working time, returned to work on Aug. 6 after threats of expulsion by President John L. Lewis. The two locals had previously refused his invitation to attend a conference at Indianapolis, Ind., to settle the difficulties, and on July 26 had howled him down when he attempted to speak at a meeting at West Frankfort for the same purpose.

Two non-union mines in Indiana were dynamited in July, and three others signed wage agreements with District 11 of the United Mine Workers. After kidnapping the watchman at the Kintz mine of the Atlac Coal Co., Riley, a gang of men blasted the engine room and tipple, completely closing the shaft. The substation and hoist house at the Somerville Coal Co. mine, Somerville, Ind., was dynamited on July 20 and completely destroyed. The three companies which signed contracts are: O. C. Coal Co., Liberty Mine, Oakland City; Lower Vein Coal Co., Lower Vein mine, Terre Haute; and the Queen Coal & Mining Co., Queen No. 4, Jasonville.

Fights and tear-gas explosions punctuated the initial sessions of the biennial convention of District 1 of the United Mine Workers, which opened at Scranton, Pa., July 20. The chief cause of the trouble was the opposition of the adherents of Thomas Maloney to President John Boylan who defeated Maloney in the last election. But opposition to Boylan did not die out with the closing of the convention. The general grievance committee of the Glen Alden Coal Co. miners sponsored a meeting in Wilkes-Barre, Pa., Aug. 1, at which delegates discussed the calling of a tri-district convention to unseat Boylan. The majority of those present were in favor of a rump convention in District 1, but action was deferred. The National Miners' Union made its initial bid for the favor of the anthracite miners at a meeting in Olyphant, Pa., the last of July.

Threats of a general strike of Pittston Co. employees collapsed on July 22 when nine of the thirteen locals voted against the stoppage on the ground that the present slack time was not propitious. Two locals in the Panther Creek Valley region, on July 22, rejected the proposal of the Lehigh Navigation Coal Co. for a six-hour day at the Summit Hill stripping to give employment to 60 additional men.

Edward J. Mehren

Vice-president of the McGraw-Hill Publishing Co., Inc., since 1918, has been elected president of the Portland Cement Association, and will devote his full time to the new position. Mr. Mehren received a civil engineering degree from the University of Illinois in 1906, and immediately thereafter started his professional career as a member of an engineering party in the employ of the Milwaukee & Puget Sound Ry. In 1907 he joined the staff of The Engineering Record *as associate editor, and later held, in succession, the following positions: secretary and manager, the Emerson Co., efficiency engineers; editor,* The Engineering Record; *editor,* Engineering News-Record; *vice-president, chairman of the editorial board, and editorial director of the McGraw-Hill Publishing Co.; and resident vice-president for the McGraw-Hill company at Chicago.*

Coal Rates Reduced

Following representations by Colorado and Wyoming operators that rates to Middle Western consuming territory must be reduced to allow competition with Arkansas and Oklahoma mines, where rates recently were reduced, seven railroads operating in the former states, on July 20, voluntarily agreed to material reductions, to become effective, in the absence of protest, on Aug. 1. From Walsenburg to points in Nebraska east to and including Grand Island the rate was reduced from $4.85 to $4. From Walsenburg to Salina, Kan., the rate was reduced from $4.60 to $4.10. Differentials were retained.

Anti-Trust Law Change Favored By A.F.L. Head

Amendment of the anti-trust laws to permit consolidation of coal companies, thorough-going unionization of miners, and recognition of collective bargaining were advocated by William Green, president, American Federation of Labor, in an interview given the United Press on July 11. Legalization of holding companies in the coal industry would enable the operators to close down unprofitable mines, he asserted, and while he recognized that this would result in additional temporary hardship to many miners, it would be better in the long run. Closing down uneconomic operations would force miners to seek other jobs.

Relaxation of the anti-trust laws should be accompanied by federal licensing and inspection of coal companies to prevent monopolistic price control. Mr. Green was of the opinion that complete unionization and collective bargaining would put a stop to underselling based on wage cutting.

Carolina Wins Contest

Carolina Mine 86, in the West Virginia division of the Consolidation Coal Co., made a clean sweep in the all-division first-aid contest, held at Fairmont, W. Va., July 11, by winning first honors in both the adult and junior competition. Second and third places in the adult class were taken by teams representing the Pennsylvania and Maryland divisions, respectively. Members of the winning adult team were: H. T. Kelly (captain), Joe Reardon, William Bazuk, Harry Ringer, R. L. Stalnaker, and Tony Larry.

Committee of Ten Elects

All officers of the Committee of Ten—Coal and Heating Industries have been reelected for the ensuing year, as follows: chairman, H. A. Glover, general sales manager, Consolidation Coal Co., New York City, representing the National Coal Association; vice-chairman, E. B. Langenberg, president, E. B. Langenberg Engineering Co., St. Louis, Mo., representing the National Warm Air Heating Association; treasurer, H. H. Kurtz, manager, Chicago, branch, Iron Fireman Mfg. Co., Chicago, representing the Stoker Manufacturers' Association and the Midwest Stoker Association; secretary, Lorin W. Smith, Jr., Goshen, Ind., sales promotion specialist for coal heating appliances and accessories.

J. H. Walker, Detroit Edison Co., Detroit, Mich., has been designated by the American Society of Heating & Ventilating Engineers as the representative of that organization on the Committee of Ten. R. V. Frost, Frost Research Laboratories, Norristown, Pa., has been designated as the alternate of Mr. Walker on the committee.

Butler Consolidated Coal Co. In Receivership

The Butler Consolidated Coal Co., Butler, Pa., went into the hands of a receiver on July 21. The petition was filed by the Union Trust Co. as trustee for the bondholders, after the company was said to have defaulted on two interest payments. Martin A. Rieber, Butler, Pa., an attorney, was appointed receiver with authority to continue operations. Plans for reorganizing the company are under way, Charles F. Hosford, Jr., president, told the court at the time the receiver was appointed.

Mines Make Safety Records

Springdale mine of the Allegheny-Pittsburgh Coal Co., Parnassus, Pa., which employs an average working force of 500, has mined 1,785,978 tons of bituminous coal over a period of two and one-half years without a fatal accident. This mine several years ago received a Joseph A. Holmes Safety Association certificate of honor for working five consecutive years without a fatal accident and six consecutive months without a single lost-time accident.

Beech Bottom mine of the Windsor Power House Coal Co., Windsor Heights, W. Va., which has 450 employees, was operated from Dec. 4, 1930, to June 3, 1931, with but one minor lost-time accident. During this time 274,073 tons of coal was produced. The date of June 3 is the time at which the figures were compiled, and, according to advices, does not mean the termination of the record by an accident.

Both companies are subsidiaries of the West Penn Power Co., Pittsburgh, Pa. C. E. Reynolds is superintendent at the Springdale mine, and E. S. Wade is superintendent at the Beech Bottom operation.

Dehue Holds Safety Banquet

Employees at the Dehue (W. Va.) mine were tendered a banquet by the Youngstown Sheet & Tube Co. last month in recognition of the fact that they had completed a six-month working period without a lost-time accident in or around the operation. R. M. Lambie, Charleston, W. Va., chief of the West Virginia Department of Mines, was the speaker of the evening.

Lignite on Free List

Lignite coal has been placed on the free list by Canada, according to an announcement made in Ottawa last month. The budget proposals presented to Parliament on June 1 provided for the application of a duty of 40c. per net ton on anthracite and lignite coal entering Canada under the general tariff, which applies to imports from the United States. Anthracite and lignite before June 1 were on the free list.

Explosives Approved

Two additions to the active list of permissible explosives were made by the U. S. Bureau of Mines in July as follows:

1. Burton Explosives, Inc., Burton 12, L.F.; volume of poisonous gases, between 53 and 106 liters, inclusive; characteristic ingredient, ammonium nitrate with explosive sensitizer; weight of 1¼x8-in. cartridge, 102 grams; smallest permissible diameter, ⅝ in.; unit deflective charge, 221 grams; rate of detonation, 9,450 ft. per sec.

2. Atlas Powder Co., Gel-Coalite W, L. F.; volume of poisonous gases, less than 53 liters; characteristic ingredient, nitroglycerin gelatinized with nitrocotton; weight of 1¼x8-in. cartridge, 189 grams; smallest permissible diameter, ⅝ in.; unit deflective charge, 227 grams; rate of detonation, 12,530 ft. per sec.

Dee Heads Wyoming Group

L. T. Dee, president of the Ideal Coal Co., Ogden, Utah, was reelected president of the Southern Wyoming Coal Operators' Association at the annual meeting, held in Rock Springs, Wyo., last month. Other officers elected were: vice-president, Forrest Richardson, vice-president, Megeath Coal Co., Omaha, Neb.; treasurer, V. J. Facinelli, director, Rock Springs Fuel Co., Rock Springs; secretary, L. W. Mitchell, Rock Springs (reelected). The new board of directors is composed of the following: Messrs. Dee and Richardson; A. N. Fancher, vice-president, Colony Coal Co., Denver, Colo.; R. Y. Gibson, general manager, Lion Coal Co., Rock Springs; and T. C. Russell, general manager, Diamond Coal & Coke Co., Butte, Mont. Messrs. Dee, Fancher, and Gibson, compose the executive committee.

Elk Horn in Receivership

The Elk Horn Coal Corporation, New York City, operating eight mines at Fleming and Wayland, Ky., with a daily capacity of 8,850 tons, went into receivership Aug. 1. Extraordinary conditions in both coal and money markets were given as the reasons for the losses which forced the step. C. W. Watson, Fairmont, W. Va., chairman of the board of the company, was appointed receiver. He announced that operations would be continued and that $250,000 would be borrowed to maintain plants and equipment.

Coming Meetings

International Railway Fuel Association; annual meeting, Sept. 15 and 16, Hotel Sherman, Chicago.

Coal Division, American Institute of Mining and Metallurgical Engineers; Oct. 9-10, Bluefield, W. Va.

National Safety Council; annual meeting, Oct. 12-16, Stevens Hotel, Chicago.

International Conference on Bituminous Coal; Nov. 16-21, Pittsburgh, Pa.

Safety Committee Appointed

A safety committee to represent the Operators' Association of the Williamson Field was named last month by George Dunglinson, Jr., Bluefield, W. Va., president of the association. Members of the committee are: J. T. Morris, general manager, Borderland Coal Corporation, Borderland, W. Va.; O. W. Evans, general superintendent, Pond Creek Colliery Co., Leckieville, Ky.; George Baker, general manager, Tierney Mining Co., Stone, Ky.; H. L. Eaton, general superintendent, Red Jacket Consolidated Coal & Coke Co., Red Jacket, W. Va.; and C. A. Hamill, assistant general manager, Sycamore Coal Co., Cinderella, W. Va.

Missouri Properties Sold

Acting for an unrevealed principal, Henry Kaltenback, St. Louis, Mo., bought the properties of the Northern Central Coal Co. in Randolph, Macon, and Howard counties, Missouri, for $118,000 at a public sale held at Macon, Mo., July 30. Included in the Northern Central holdings were 1,000 acres of coal lands in fee and coal and mineral rights in an additional 40,000 acres. The Randolph County properties brought $115,000, while those in Macon and Howard counties went for $1,000 and $2,000, respectively.

Natural Gas Sales Decline

Sales of natural gas by companies representing 90 per cent of the public utility distribution in the country totaled 54,742,695,000 cu.ft. in May, according to the American Gas Association, a decline of 4.5 per cent from the distribution in May, 1930. Domestic and commercial sales expanded markedly in May this year, which tended to offset to a considerable extent the continuing decline in industrial takings.

Pipe line projects completed, under way, or proposed in July were as follows:

Texas Panhandle to Chicago; Continental Construction Co's. 950-mile, 24-in. line completed Aug. 1, and is expected to begin commercial delivery of gas in Chicago on Sept. 15.

Texas Panhandle to Indianapolis, Ind.; Panhandle Eastern Pipeline Co's. 1,250-mile, 24-in. line with a capacity of 130,000,000 cu.ft. daily completed to the Mississippi River on July 15 and put in operation.

Memphis to Jackson, Tenn.; 105-mile line of the Memphis Natural Gas Co. to be completed to Covington Aug. 15, and to Jackson Sept. 15.

Tioga County, Pennsylvania, to Syracuse, N. Y.; construction started on the 110-mile, 20-in. line of the Lycoming Natural Gas Co.

Tioga County, Pennsylvania, to Williamsport, Pa.; construction started on the 60-mile, 14-in. line of the Susquehanna Gas Co.

Tioga County, Pennsylvania, and Steuben County, New York, to Paterson, N. J.; Columbia Gas & Electric Corporation testing out old oil line to transport natural gas for industrial use.

Mayville, Ky., through West Virginia, Virginia, and Maryland to Coatesville, Pa.; 467-mile, 22-in. line of the Columbia Gas & Electric Corporation to be completed Oct. 1.

Glenrock, Wyo., to Alliance and other towns in Nebraska; North Central Gas Co's. extension, to cost $6,000,000, scheduled for completion by Sept. 1.

Retailers Oppose Coal Rate Rise

The National Retail Coal Merchants' Association, after a poll of its members, directors, and officials, has decided to oppose the request of the railroads of the country for a general increase of 15 per cent in freight rates, according to an announcement by Milton E. Robinson, Jr., president of the association, made on July 17. The chairman of the association's transportation committee was instructed to file an appearance before the Interstate Commerce Commission, and the committee announced arrangements for a meeting at which plans for presenting the protest would be completed.

Both the railroads and their supporters in the application for an increase concluded submission of their evidence much sooner than was expected, with the result that the Commission advanced the date for beginning the additional sessions at which protestants will be heard from Aug. 31 to Aug. 4. Final hearings will take place at Chicago on Aug. 31. Printed briefs must be filed within ten days after the conclusion of the final hearing.

During the initial hearing at Washington, D. C., which ended on July 21, Roy S. Kern, chairman of the coal, iron, and coke committee of the Central Freight Association railroads, read into the record a plan for increasing the rates on coal and coke while preserving existing differentials. The base rate westbound from the Crescent and Ohio fields will be the Inner Crescent rate. Pittsburgh and Kanawha districts will be basing points on eastbound traffic. Lake cargo rates will be increased 15 per cent over the weighted average of $1.71 for the 1930 season. Clearfield will be the base rate on Trunk Line, New England and Canadian business. Rates from Clearfield, Cumberland-Piedmont and Meyersdale groups will be advanced 15c. per gross ton over rates from the Pocahontas-New River field to Hampton Roads.

All track delivery rates on anthracite will be advanced 15 per cent. Rates on anthracite coal to upper New York Harbor ports for transshipment to boats will be advanced 15 per cent, and the amount of the increase in cents will be added to the rates to the lower ports. To Philadelphia and Baltimore for destinations outside the Capes, the rates will be advanced 15 per cent, while rates for delivery inside the Capes will be advanced the same amount in cents as the track delivery rates.

Producers in the central Pennsylvania, Meyersdale, and Cumberland-Piedmont districts intervened in the case on July 28 and, while reserving the right to prosecute their complaint against track delivery and tidewater transshipment rates to the east (*Coal Age*, June, 1930, p. 397), asked leave to present exhibits showing the probable effect of such increase on coal sales in their natural market.

Operators' associations in Virginia, southern West Virginia, eastern Kentucky, and the Southern Appalachian field have joined forces as a property owners' committee to oppose the rate increase. Ohio, Illinois, and Indiana interests, it is reported, will offer opposition to the increase when hearings are held in Chicago.

Central Plant Completed

Preliminary testing and adjustment of the new central cleaning plant of the West Kentucky Coal Co., located at Grand Rivers, Ky., is well under way and the company expects that it will be in regular operation on 2x0-in. coal late in August. The plant will be able to receive coal from any of the mines in western Kentucky on the Illinois Central R.R., and the distance from the various operations which it is expected that the plant will serve varies from 65 to 90 miles. Cleaning will be done on American pneumatic separators, as follows: 2x0-in. coal, 100 tons per hour; ¾x0-in. re-treatment, 70 tons per hour; ¼x0-in. re-treatment, 30 tons per hour.

Safety Men Appointed

Clyde G. Brehm, formerly assistant general superintendent and safety director of the Oliver & Snyder Steel Co., has been appointed supervisor of safety and compensation for the Susquehanna Collieries Co. and the Lytle Coal Co., with headquarters at Wilkes-Barre, Pa. Safety inspectors for the different divisions have been named by Mr. Brehm as follows: Wyoming division, Elmer K. Spangler; Shamokin division, Stanley Gulba; Lykens division, John Noel; Lytle and William Penn divisions, Geo. H. Kienzle.

Moore Heads Pacific Coast

N. D. Moore, vice-president in charge of operations, has been elected president of the Pacific Coast Coal Co., Seattle, Wash., and also of its affiliates in the Northwest, succeeding E. C. Ward, who is retiring after holding the presidency since 1916. Mr. Moore, who started with the Pacific Coast Co. 32 years ago as an assistant in the engineering department, also becomes vice-president and general manager of the parent organization, the Pacific Coast Co., New York City. G. W. Mertens and D. S. Hanley, department heads in Seattle, have been made vice-presidents of the Pacific Coast Coal Co. and other operating subsidiaries on the coast.

Coalton Mine Sold

The Coalton (Ill.) mine, formerly owned by the Illinois Coal Corporation, has been sold to the Gano Moore Coal Co., Inc., Philadelphia, Pa., by the Lincoln Coal Corporation. The mine employs about 800 men, and was closed down early in July. The new owner plans to reopen at an early date.

Illinois Committee Appointed For Coal Investigation

Nine members of a mining investigation committee created a short time ago by an act of the Illinois Legislature have been appointed by Governor Louis L. Emmerson. Representatives of the coal operators are: George C. McFadden, assistant vice-president in charge of operations, Peabody Coal Co., Chicago; John E. Jones, safety engineer, Old Ben Coal Corporation, West Frankfort; and R. B. Mitchell, vice-president, Cosgrove-Meehan Coal Co. of Illinois, Chicago. Miners on the committee are: Guy Young and Fox Hughes, Herrin; and Irvine S. Strain, Collinsville. Non-mining members are: I. M. Bilderback, Champaign; Harry Stotler, Herrin; and Robert R. Thomas, East St. Louis. The committee will study methods of promoting safety and conserving the state's coal reserves.

Personal Notes

DANIEL HOWARD, 83, has resigned his position as president and general superintendent of the Fairmont Big Vein Coal Co., operating a mine at Clarksburg, W. Va. Mr. Howard's activities in the coal industry in northern West Virginia began more than 30 years ago.

CARL SCHOLZ, Charleston, W. Va., has been appointed consulting engineer to the Elk River Coal & Lumber Co., with mines at Widen, W. Va.

ELLERY B. GORDON, Washington, D. C., has been made acting head of the statistical section, coal division, U. S. Bureau of Mines. F. G. TRYON, head of the section, has been assigned for three months to the President's Research Committee on Social Trends. Mr. Gordon was at one time executive secretary of the National Retail Coal Merchants' Association and a member of the staff of the U. S. Coal Commission.

T. J. O'BRIEN, Denver, Colo., has been made vice-president and sales manager of the Kemmerer Coal Co., Gunn-Quealy Coal Co., and Pinnacle-Kemmerer Coal Co., with mines in Colorado and Wyoming. Mr. O'Brien was formerly general sales manager for the Kemmerer company.

A. J. MOORSHEAD, prominent in coal-mining affairs in Illinois for more than 50 years, resigned as president and general manager of the Madison Coal Corporation on Aug. 1, and will make his home in Los Angeles, Calif. Mr. Moorshead, previously active in the organization and management of railroad properties, became head of the Mt. Olive Coal & Coke Co. in 1886. As railroad and coal company consolidations took place in the succeeding fourteen years, the scope of Mr. Moorshead's activities widened until he became head of the coal properties that in 1900 were affiliated with the Illinois Central R.R.

British Coal Merger Proposed

Organization of 1,000 collieries in Great Britain into six units, each to operate in its own field, is proposed by Sir Ernest Gower's coal mines reorganization committee, appointed by the government in 1930. The plan was offered to the owners on Aug. 3 as a basis of discussion and, if adopted, would close down several hundred uneconomic mines and throw an estimated total of 100,000 miners out of work. Each of the six units would be controlled by a central directorate, which would supervise production, set prices, and regulate transportation, research, financing, and policies. In the opinion of the committee, only the adoption of such a sweeping scheme will end present unrestricted competition and enable the industry to cope with foreign rivals.

Obituary

THEODORE LEGENDRE, 65, part owner and general manager of the Vinegar Hill Coal Co., was killed at the mine at Lenzburg, Ill., on July 14, when he fell across the tracks in front of a trip of cars.

WILLIAM S. NORTON, 56, general manager of the Alden Coal Co., an anthracite property, died at his home at Alden Station, Pa., July 19. Mr. Norton has been associated with the company for 30 years, and was a director of the Nanticoke National Bank and the Susquehanna Lumber Co.

EDWARD H. SANBORN, secretary-treasurer of the New River & Pocahontas Consolidated Coal & Coke Co., died of heart trouble at the Jefferson Hospital, Philadelphia, Pa., July 18. Mr. Sanborn, who was 68, became associated with the Berwind-White organization early in life after holding positions as reporter on the Philadelphia *Record* and member of the staff of the National Association of Manufacturers.

WILLIAM J. CHAPMAN, president of the Chapman Coal Mining Co., died in the Union Memorial Hospital, Baltimore, Md., in July, after an illness of several months. Mr. Chapman was engaged in the operation of mines at Barton, Md., for more than 50 years.

L. BRECKENRIDGE MUSGROVE, 74, coal-mine owner and Walker County civic and industrial leader, died at his home in Jasper, Ala., July 4, from a heart attack. Prior to his retirement a little over a year ago, Mr. Musgrove was president of the Deepwater Black Creek Coal Co.

Industrial Notes

RALPH M. HOFFMAN, for eight years manager of the Seattle (Wash.) office of the Pacific division of the Link-Belt Co., has been appointed vice-president and sales manager of the division, with headquarters at San Francisco, Calif. Mr. Hoffman succeeds HAROLD M. CLARK, who retired after 30 years with the company and its subsidiaries.

T. J. PACE, since 1926 director of sales for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been made assistant to Vice-President J. S. Tritle, and will have charge of general market planning and research analysis. M. B. LAMBERT has been advanced to sales manager in charge of the transportation department; O. F. STROMAN has been advanced from motor apparatus manager to sales manager in charge of the industrial department.

OHIO BRASS CO., Mansfield, Ohio, has removed its Cleveland (Ohio) office to 540 Terminal Tower.

ALLIS-CHALMERS CO., Milwaukee, Wis., has acquired the principal assets of the American Brown Boveri Co., Inc., and the capital stock of the Condit Electrical Mfg. Co., Boston, Mass., thus adding electric railway apparatus, mercury arc rectifiers, blowers, electric furnaces, oil circuit breakers, and similar equipment to its line.

THE BROWN-FAYRO CO., Johnstown, Pa., has opened a branch office at 311 Park Drive, Charleston, W. Va., in charge of O. B. CLARK, formerly industrial sales representative for the Westinghouse Electric & Mfg. Co.

STEDMAN'S FOUNDRY & MACHINE WORKS, Aurora, Ill., has appointed the following sales representatives for its line of crushers, grinders, and pulverizers: Goggin & Mills, 407 South Dearborn St., Chicago; Louis Mardaga, 710 Park Building, Pittsburgh, Pa.; J. Y. Riffe, 811 Peoples Bank Building, Charleston, W. Va.; S. D. Calloway, 3029 Roanoke Road, Kansas City, Mo.; and Brown, Fraser & Co., Ltd., Vancouver, B. C.

FOLLOWING centralization of the control and management of the Ceramic Machinery Co., Columbia Machine Tool Co., and Long & Allstatter Co., all of Hamilton, Ohio, the companies have entered the coal-mining field and will manufacture Oldroyd loading and cutting machines for the Oldroyd Machine Co., Cincinnati, Ohio.

King Coal's Calendar for July

July 3—Philip Snowden, Chancellor of the Exchequer, introduces a new bill into the British House of Commons to avert the danger of a national stoppage in the coal fields of Great Britain. Miners and owners had previously failed to agree on questions of wages and hours, and the new bill provides for the continuance of the 7½-hour day and existing wage scales for one year beginning July 9.

July 6—Frank Keeney, Charleston, W. Va., president of the West Virginia miners' union, calls a strike in the Kanawha field.

July 6—"Rank and file" convention of District 12 miners opens at Belleville, Ill., to consider plans for the formation of a new union.

July 8—A group of bankers and business men in the Ohio Valley propose a plan for stabilizing the coal industry in the Tri-State district by the establishment of a governing tribunal with dictatorial powers and the formation of a new competitive field to include the Morgantown, Fairmont, Kanawha, and northern Panhandle districts of West Virginia; western Pennsylvania; and eastern Ohio.

July 8—Soviet authorities issue an edict calling for the rejuvenation of coal mining in the Donetz Basin. Production is to be increased by mechanization of the mines, improvement of the workers' living conditions, and furtherance of cultural and technical educational activities among the miners. The decree demands that 56,000,000 metric tons of coal be produced in the coming year, a material advance over the total of last year. Fifteen new mines are to be opened and standard dwellings constructed for 250,000 men.

July 9—Fifteen bituminous coal men tell the Secretaries of Labor and Commerce at a meeting in Washington, D. C., that little good could be accomplished by a joint conference between operators and the United Mine Workers at the present time. Doubt also was expressed that the administration could do anything to improve the situation in the bituminous industry.

July 10 — Delegates attending the "rank and file" convention of District 12 miners, at Belleville, Ill., adopt a resolution expressing opposition to the present international officers of the United Mine Workers and the policies of the officers of District 12, and vote to refuse recognition of the United Mine Workers so long as either group remains in authority.

July 13 — Representatives of the United Mine Workers and the Secretaries of Commerce and Labor begin a series of conferences to consider the request of the miners that President Hoover call a general conference.

July 14 — The "rank and file" convention of District 12 miners' at Belleville, Ill., votes to stop payment of dues to both the district and national unions of the United Mine Workers with the object of forcing the present officials out. Convention also votes to call an international conference of the "rank and file" at which representatives of all local unions throughout the country, regardless of their previous affiliations, will meet to form a new international miners' union.

July 15—Six hundred delegates from western and central Pennsylvania, eastern Ohio, northern West Virginia, eastern Kentucky, Illinois, and the Pennsylvania anthracite field attend the opening session of the "national united front conference" called by the National Miners' Union, Pittsburgh, Pa., to consider plans for national action to force acceptance of the platform of the organization.

July 22 — Departments of Commerce and Labor send a joint letter to 125 bituminous coal operators asking them if they would be willing to attend a conference of operators and miners to discuss problems in the industry.

Coal-Mine Fatality Rate Declines in June; Death Total Also Is Lower

FATAL accidents chargeable to the coal-mining industry in the United States in June, 1931, numbered 88, according to information received by the U. S. Bureau of Mines from state mine inspectors. This was a reduction of 24 from the previous month and of 39 from the number reported in June, 1930. The fluctuation in the production of coal was not as pronounced as that of the accidents. In June of the present year, 33,729,000 tons was mined, as compared with 33,319,000 tons in May, 1931, and 38,866,000 tons in June, 1930. The death rate per million tons of coal mined in June, 1931, was 2.61; for May, 1931, it was 3.36; and for June, 1930, it was 3.27.

Considering bituminous mines alone, the June fatality rate was lower than for June a year ago and also for the preceding month of May. The rate was 2.30 per million tons, as compared with 3.00 for last June and 2.61 for May, 1931. There were 67 men killed at bituminous mines in June of the present year, which was 34 less than in the same month last year and 7 less than in May. There was 29,185,000 tons of bituminous coal mined in June, 1931, as compared with 33,714,000 tons in June, 1930, and 28,314,000 tons in May, 1931.

In the anthracite mines of Pennsylvania, there were 21 deaths during June of the present year, and 4,544,000 tons of coal was produced, indicating a fatality rate of 4.62, as compared with 38 deaths and a rate of 7.59 in May, 1931, when the production was 5,005,000 tons. In June a year ago, 26 men lost their lives in mining 5,152,000 tons of coal, resulting in a death rate of 5.05.

During the six-month period from January to June, 1931, there were 730 deaths in all coal mines in the United States, and during the same period 221,339,000 tons of coal was produced. Reports for the corresponding six months in 1930 showed 1,004 deaths and a production of 264,224,000 tons. Based on these figures, the fatality rate for 1931 was 3.30, a slight reduction from the rate of 3.80 shown for the 1930 period. Considering bituminous and anthracite mines separately, the rate for bituminous mines was 2.73 for the first half of 1931, based on 519 deaths and 189,797,000 tons, as compared with 790 fatalities, 230,634,000 tons, and a rate of 3.43 for the first six months of 1930. The death rate at anthracite mines for the 1931 period was 6.69, with 211 deaths and 31,542,000 tons; that for 1930 was 6.37, based on 214 deaths and 33,590,000 tons.

No major disaster—in which five or more lives were lost—occurred in June. Three such disasters in January and one in May caused a total of 46 deaths. From January to June, 1930, 7 major disasters occurred, with the loss of 88 lives. Based exclusively on these major disasters, the death rates were 0.208 and 0.333, for 1931 and 1930, respectively. The major disasters thus far in 1931 occurred at the rate of 1.81 separate disasters (as distinguished from the number of deaths resulting from the disaster) for each hundred million tons of coal mined, as compared with 2.65 for the corresponding period of 1930.

Comparative fatality rates for the first six months of 1931 and 1930 are as follows:

Cause	1930 Fatalities	1930 Rate	Jan.-June, 1930 Fatalities	Jan.-June, 1930 Rate	Jan.-June, 1931 Fatalities	Jan.-June, 1931 Rate
All causes	2,014	3.793	1,004	3.800	730	3.298
Falls of roof and coal	1,067	2.009	544	2.059	407	1.839
Haulage	303	.571	163	.617	127	.574
Gas or dust explosions:						
Local explosions	61	.115	39	.147	10	.045
Major explosions	214	.403	85	.322	46	.208
Explosives	78	.147	34	.129	24	.108
Electricity	76	.143	38	.144	25	.113
Miscellaneous	215	.405	101	.382	91	.411

Dividends Total $4,700,000

Dividends paid by coal companies in June amounted to $4,712,082, according to the Standard Statistics Co., New York City. Total cash dividend payments made by domestic corporations in June were $412,327,778.

Coal-Mine Fatalities During June, 1931, by Causes and States

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

State	Underground: Falls of roof (coal, rock, etc.)	Underground: Falls of face or pillar coal	Underground: Mine cars and locomotives	Underground: Explosions of gas or coal dust	Underground: Explosives	Underground: Suffocation from mine gases	Underground: Electricity	Underground: Animals	Underground: Mining machines	Underground: Mine fires (burned, suffocated, etc.)	Underground: Other causes	Underground: Total	Shaft: Falling down shafts or slopes	Shaft: Objects falling down shafts or slopes	Shaft: Cage, skip, or bucket	Shaft: Other causes	Shaft: Total	Surface: Mine cars and mine locomotives	Surface: Electricity	Surface: Machinery	Surface: Boiler explosions or bursting steam pipes	Surface: Railway cars and locomotives	Surface: Other causes	Surface: Total	Total by States: 1931	Total by States: 1930
Alabama	1		1									2													2	4
Alaska																									0	0
Arkansas			1	1								2													2	1
Colorado																									0	1
Illinois	2		1				1					3													3	10
Indiana			1									2													2	0
Iowa																									0	0
Kansas																									0	1
Kentucky	4		2									6													6	6
Maryland																									0	1
Michigan																									0	0
Missouri																									0	0
Montana																									0	0
New Mexico																									0	0
North Dakota																									0	0
Ohio	3				1							4													4	4
Oklahoma							1					1													1	0
Pennsylvania (bituminous)	5	1							1		1	8											1	1	9	27
South Dakota																									0	0
Tennessee																									0	2
Texas																									0	0
Utah																									0	1
Virginia																									0	6
Washington		1										1													1	1
West Virginia	16	5	10	2			1		1			35	1				1	1					1	2	37	27
Wyoming																									0	4
Total (bituminous)	31	7	16	3	1		3		2		1	64	1				1	1					1	2	67	101
Pennsylvania (anthracite)	7	3	3	1	2						3	19	1				1		1					1	21	26
Total, June, 1931	38	10	19	4	3		3		2		4	83	2				2	1	1				1	3	88	
Total, June, 1930	70	12	17	5	3		5		3		5	120						2	2			1	2	7		127