COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL, AND BUSINESS PROBLEMS OF THE COAL MINING INDUSTRY

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Coordinated Programs

ONE OUTSTANDING LESSON which mechanization has impressed upon the coal industry is the inescapable necessity for complete coordination. That no part, however important, can reach its full stage of usefulness and efficiency without coordination of all the other elements which make up the sum of the whole has had repeated demonstration.

RECENT CONSIDERATION of mechanization problems, therefore, has been centered largely around this vital question. Mining methods, transportation, maintenance, safety, and topworks cleaning are now all recognized as elements which must be keyed in with the actual loading processes if the industry is to attain the full benefits of the machine.

THIS COORDINATION IDEAL, which is becoming increasingly effective in the operating department, must be carried into the larger sphere of the economic problems of the bituminous industry if the stabilization so essential to future sound financial progress is to be achieved. We must see the parts in clear relation to each other and to the whole.

MORE THAN ONE good suggestion for economic betterment has failed to win acceptance because the evangelical enthusiasm of its authors destroyed all perspective and sense of proportionate values. Mechanization was spared a similar fate only because the manufacturers were among the first to realize that their own success was wrapped up in complete coordination of the operating cycle.

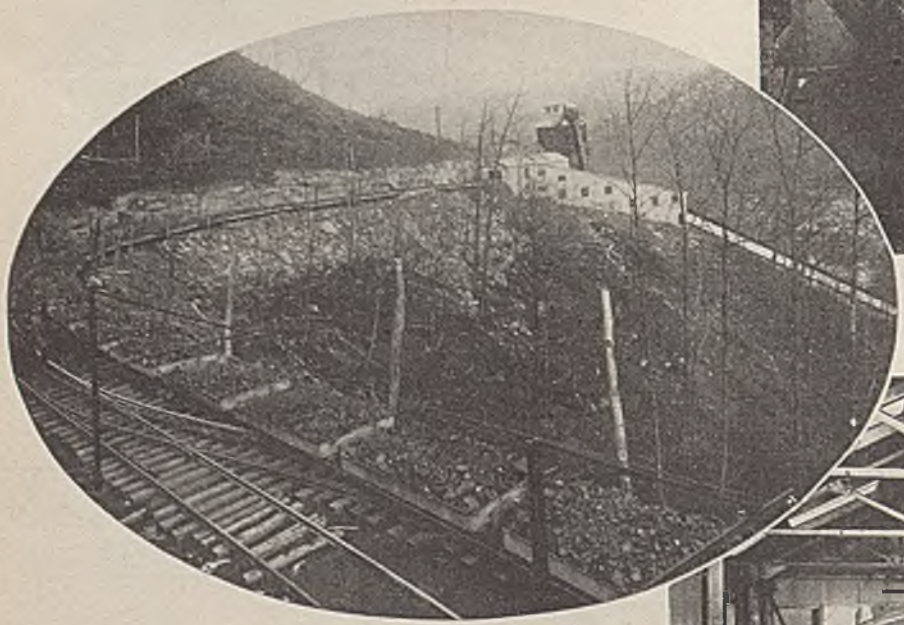
THE ECONOMIC PROBLEMS, of which the whole sweep of production is but a part, are too broad and too complex to expect, or even to hope, that there is any one answer or any one solution to them. Seekers after panaceas are doomed to disappointment: a multitude of ills cannot be cured with a single remedy.

AS IN THE CASE of mechanization, there must be painstaking analysis of the individual weaknesses present in the existing economic set-up and a clear understanding of their interrelationships. With this analysis as a basis, the industry will then be in a position to evaluate specific proposals for remedying specific ills.

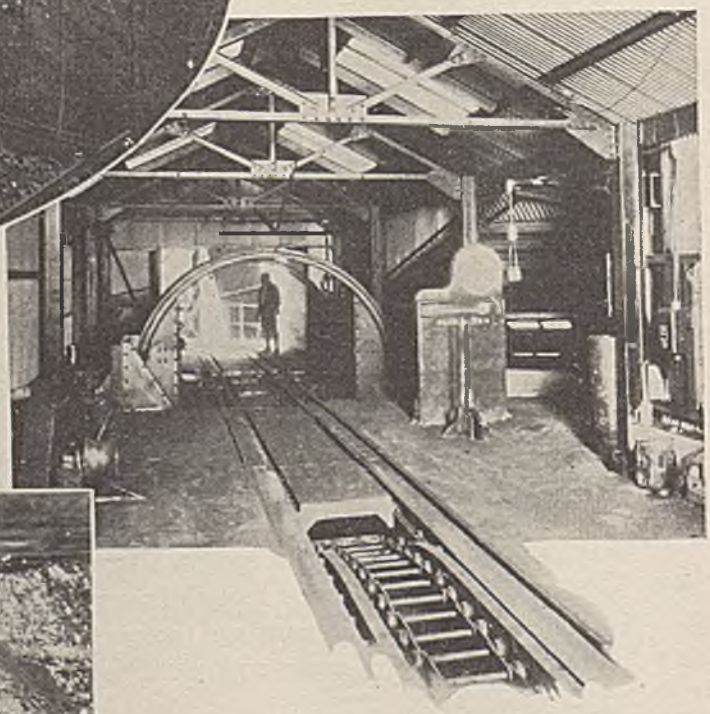
WHEN THIS has been done, the way will be open for a comprehensive coordinated program for stabilization which will not only sharply define individual objectives but will see them with equal sharpness in their relation to the program in its entirety.

The Picking Tables Empty Directly Into the Retarding Conveyor

One Man Handles Checking, Dumping, and Weighing. Talking on the Telephone at the Right Is R. H. Massey, Superintendent



Showing the New Cars and the Two-Gage Track Arrangement at a Switch



Loaded Car Feeder and Rotary Dump. Cars of 30-In. and 44-In. Gages Are Handled in This Dump

Low Cars Have Made Hand Loading Much Easier

"ECONOMICAL HAUL"

« Controls Location of New Plant Of Gauley Mountain Coal Co.

FOR several years the question, "What is an economical haul?" has engaged the attention of officials of the Gauley Mountain Coal Co., Ansted, Fayette County, W. Va. During 1929, which marked the fortieth year of operation at the Ansted tipple site, it was decided that a 21,000-ft. haul from the new territory to be developed was not "economical," so, having arranged for a 5½-mile extension up Rich Creek of the Gauley River branch of the Chesapeake & Ohio R. R., a new tipple with a capacity of 250 tons per hour was erected adjacent to this new territory in 1930. The plant itself cost $175,000, and an additional $25,000 was spent on track and equipment incidental to serving the new territory. Problems peculiar to local conditions and to the market served were controlling factors in the plant design. Machines new to the district are used for loading rock when brushing entries and for dumping this rock on the outside.

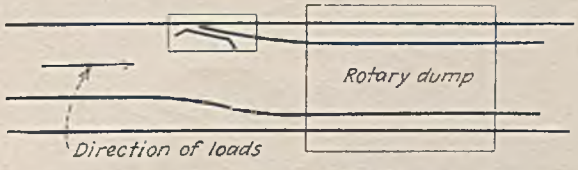
The mine is in the Ansted, or No. 2 Gas, seam and most of the output is shipped as picked mine-run devoid of slack and goes principally to the byproduct market. The slack is coked at Ansted at a plant consisting of 148 beehive ovens with a loading and screening station designed to prepare a superior foundry coke and a minus 2¼-in. coke for the domestic market. The new coal tipple was designed for the same coal utilization, so involved the installation of screens and a slack bin at the headhouse to provide facilities for reloading the slack into mine cars for hauling back to the old tipple and coking plant at Ansted.

Coal tributary to the new plant is estimated at 15,000,000 tons and the working height will vary from 36 to 50 in. Generally speaking, the coal bed pitches down 2½ per cent from the old plant toward the new location. The haul from the farthest mine workings to the old plant consists of 14,000 ft. of 2½-per cent grade against the loads and 7,000 ft. of 2½ per cent grade in favor of the loads. Considering available railroad facilities, the new plant is centrally located with respect to the remaining body of coal. Houses will not be built at the new site but a man trip will be run back and forth daily on the old haulway from Ansted.

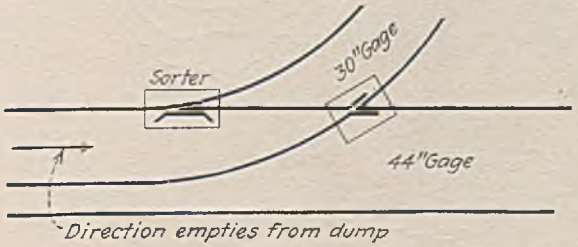
It was decided that the time was opportune for beginning to re-equip the Ansted mine with larger and lower mine cars of a track gage wider than the 30-in. gage in use. It was desired to transfer certain equipment from the Jodie mines, operated by the company on Gauley branch; therefore the same gage, 44 in., as used at one of those mines was selected. Tracks and rotary dump of the new plant had to be designed to accommodate both the old cars of 30-in. gage and the new cars of 44-in. gage. Hauling of the 30-in. gage slack cars from the new plant to Ansted will be continued indefinitely, but as the developed sections of the mine are completely worked out and as the old cars are expensive to maintain, they will be discarded in favor of new cars of 44-in. gage. After two or three years all coal will be loaded into 44-in. gage cars.

The new plant, completed last November and consisting of dump house, 200-ton slack bin, and screening and picking equipment, all at the top of the hill; retarding conveyor and railroad tipple at the bottom; is built entirely of steel and concrete and was designed, equipped, and erected by the Kanawha Manufacturing Co.

Loads are handled without uncoupling over a track scale and through a single-car rotary electric dump. From the dump hopper the coal is fed by an elevating apron-feeder onto a shaker screen, which in



Cars of 30-In. Gage Automatically Select the Center Rails of the Dump and Thus Maintain the Proper Balance



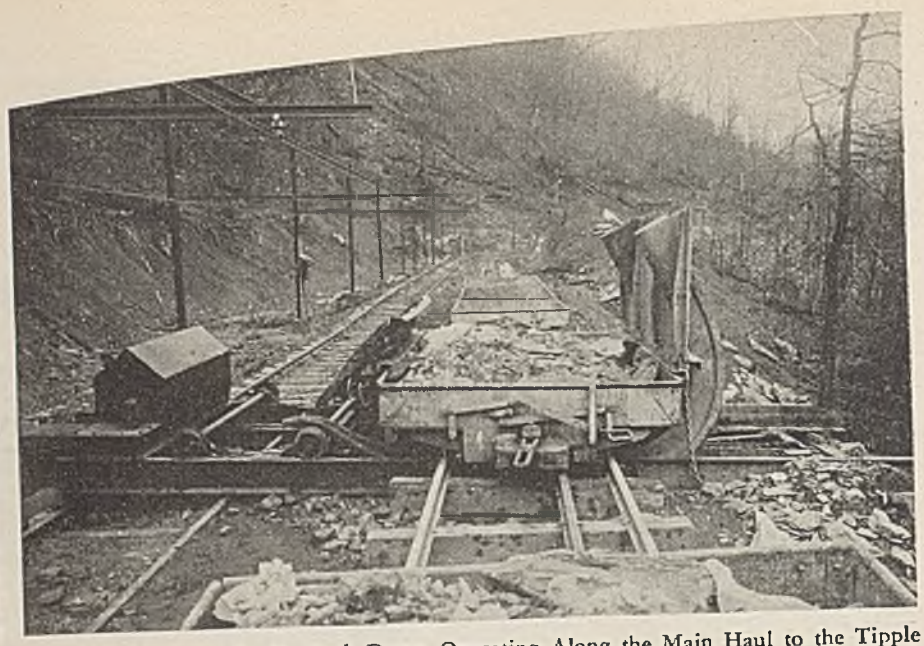
Here the 30-In. Gage Empty Cars Automatically Switch to an Individual Track

turn delivers the slack to a V-bucket conveyor and elevator leading to the storage bin, and also discharges the lump, egg, and nut sizes onto picking tables. From these tables the coal is reassembled by being discharged directly onto a flight conveyor 550 ft. long between centers and built on a pitch of approximately 25½ deg. The railroad tipple is a simple two-track structure with an apron-type loading boom for handling the mine-run and a chute for loading slack.

Equipment at the top of the hill allows for re-assembling the slack directly onto the retarding conveyor with the picked sizes or for drawing slack from the storage bin into the conveyor when it is desired to load the slack into railroad cars instead of loading it from the bin into mine cars and hauling to the old tipple and coking plant.

On an outside haul of 3,000 ft. leading to the new plant the tracks of 30-in. and 44-in. gages are combined in a three-rail track, but for obtaining proper balance in the rotary dump four rails are used adjacent to and through the rotary dump, and the two tracks are laid with a common center line. The track arrangement includes stationary devices which automatically lead the 30-in. gage cars onto the two inside rails of the dump and which at a point beyond sort the 30-in. and 44-in. gage empty cars from a three-rail track onto individual tracks of the respective gages.

The dump, which rotates 360 deg., is driven by a 7½-hp. high-torque squirrel-cage motor. During dumping the motor operates continuously. To rotate the dump each time, the operative pulls a hand lever which engages two friction pulleys. The dump is counterweighted, so that at the end of the revolution it travels a short distance past the stopping point and then settles back against a ratchet dog, thus providing for exact matching of the rails.



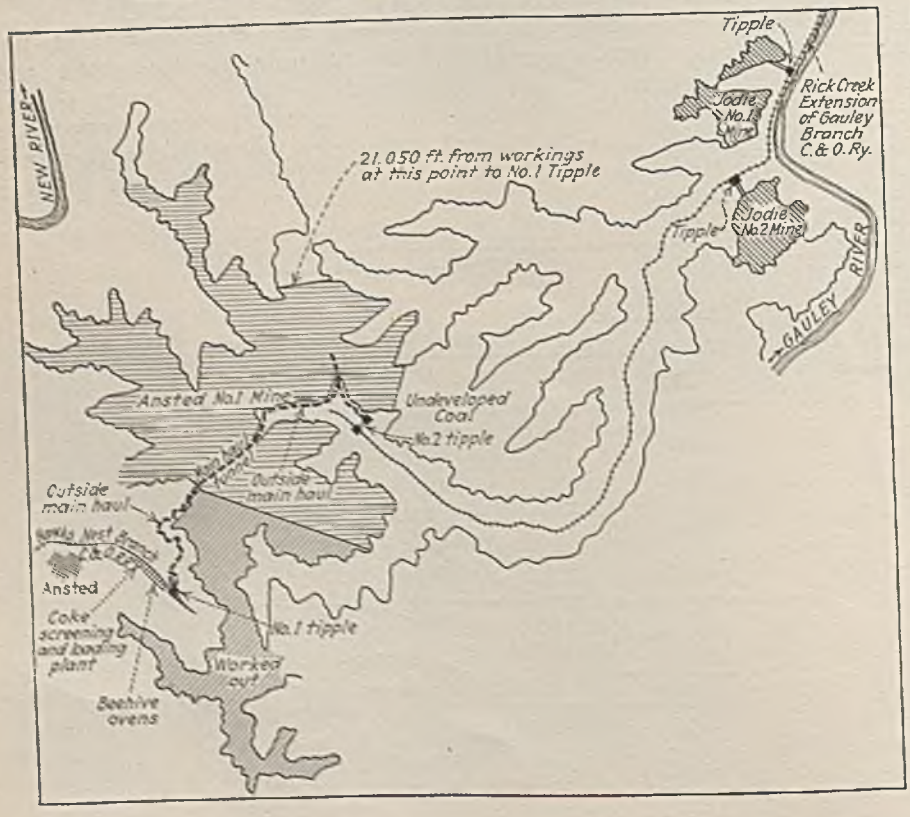
Cradle Rock Dump Operating Along the Main Haul to the Tipple

A friction drive also is used for the loaded-car feeder, which consists of two endless strands of flanged roller chain with dogs spaced one car length apart and which come up under the swivel hitchings and engage the end of the car at points on each side of the bumper. The 10-hp. motor operates continuously in one direction. The chain can be reversed by pulling the lever in the opposite direction; this action moves the center friction pulley against one of two driven pulleys that are mounted on each side with but slight contact clearance. An electric car puller of the horizontal capstan type is permanently mounted to one side of the track, midway between the feeder and dump, for moving a trip which might be left spotted somewhat short of the feeder.

The V-bucket conveyor and elevator which carries the slack from the main screen to the top of the 200-ton storage bin is driven by a 20-hp. motor connected through one of the new Falk right-angle helical bevel gear reducers. For protection against serious damage and delay in case of a break in the chains, the 550-ft. retarding conveyor has a continuous shroud or guard over the wheels of both the upper and lower runs. It is as if the wheels ran on the inside of a ship-channel section. If the conveyor should break in two, it cannot buckle and pile up at the bottom of the hill.

The screening and picking building at the top of the hill is built in steps to conform to the hillside. Foundations for the screen are set directly on native rock. In a space below the picking-table floor, a pipeless furnace

Relation of Coal Outcrop to Railroads and Plant Locations



Car in Full Dumping Position

is installed for heating the floor and tempering the picking-room atmosphere during the coldest weather. Into this same space, or room, where the furnace is located a track is installed for disposing of picking-table refuse by dump car.

From the top of the hill to the bottom the new structure is covered with galvanized copper-bearing steel and all entrances, including the track openings at each end of the dump house, are fitted with doors which can be locked. Wire-reinforced glass is used in all skylights and windows for maximum illumination.

Ten 440-volt a.c. motors totaling 98½ hp. are used in the plant. All are Allis-Chalmers high-torque, totally inclosed fan-cooled anti-friction bearing type ARZT. The drive connections comprise one Falk right-angle helical gear reducer, five Cleveland worm gear reducers, one Falk herringbone gear reducer, two flat belts, and one V-belt. The two flat belts are used on the car feeder and main shaker, and the V-belt is used on the rotary dump.

All power, light, and control wiring is in rigid conduit and was installed by the coal company. Not a single foot of wire is exposed. All starters are of magnetic across-the-line type. Control wiring to push-button stations provides sequence starting, and canceling switches are installed for temporarily permitting motors to start out of sequence when it is desired to make certain tests or inspections.

As contrasted to the old mine cars, which are 35 in. high and average 1.8 tons hand loaded, the new all-steel cars, one hundred of which have been delivered, are 23 in. high and average 3.2 tons. These cars, made by the Watt Car & Wheel Co., are of the hooded wheel and hooded axle type and are equipped with Timken bearings. All of the plate is ¼-in. copper-bearing steel. The inside measurements are 6 ft. 6 in. x 11 ft. and the level capacity is 90 cu.ft. Between the rails the road clearance is 2½ in. and at the rail, and outside of it, the body clearance is 12 in., except for several outside gusset braces. The latter clearance provides for easy access to the brakes and facilitates rerailing a wrecked car. At the average loading of 3.2 tons the car carries 1¾ lb. of coal for each pound of car weight. The ratio of live load to total weight of loaded car is 64 per cent. Actual weight of the car is 3,650 lb.

For loading rock when taking 2 to 3 ft. of top or bottom in connection with development work of territory near the new plant, a rock loader made by the Kanawha Manufacturing Co. has been in use since June, 1930. It is of the scraper type with portable truck-mounted loading chute. A Sullivan 7½-hp. double-drum electric hoist is mounted on the front end over the mouth through which the scraper travels. Two features, provision for swinging the hoist down to reduce height in traveling and a quick-detachable tailpiece, are patents of C. R. Stahl, division superintendent C.C.B. Smokeless Coal Co., Stotesbury, W. Va.

The cars of rock are dumped parallel to the tracks of a new double-track outside haul leading to the tipple. This dump, also made by the Kanawha company, consists of a car cradle which rocks to a partly inverted position when a small truck which runs on the horizontal bed frame is pulled under it by a motor-propelled chain. Operation of the dump does not interfere with normal location of the trolley wire serving the track. At present all coal going to the new plant —about 800 tons per day—is hauled directly over the dump. This is done by leaving the cradle in the dumping position and inserting short rails in the gap where the cradle rails normally rest.

Loading Rock Into the New Cars by Means of the Mounted Scraper Drive and Elevating Chute

Local officials who have been active in the planning and development of the new plant are R. H. Morris, general manager; G. E. Hoover, chief engineer; R. H. Massey, superintendent; and W. T. Dalton, master mechanic.

SAND FLOTATION PLANT

« Installed in High-Volatile Field

By JOSEPH PURSGLOVE, JR.
Engineer in Charge
Washery Construction and Operation
Pittsburgh Terminal Coal Corporation
Cleveland, Ohio

UNTIL January of this year, the use of the Chance sand-flotation process of coal cleaning was confined to the anthracite region of Pennsylvania, except for one plant in the Broad Top field, where a low-volatile coking coal is mined. This process has moved westward, and a plant is now in operation near Pittsburgh. It is significant that this first plant in high-volatile bituminous coal is of a capacity which places it in the "upper ten" of bituminous coal-cleaning installations. It is located at No. 8 mine of the Pittsburgh Terminal Coal Corporation, Coverdale, Pa., eleven miles southwest of Pittsburgh. Close to 70 per cent of the 4,500-ton daily mine production goes through the Chance cones, the rated cleaning capacity of which is 450 tons per hour.

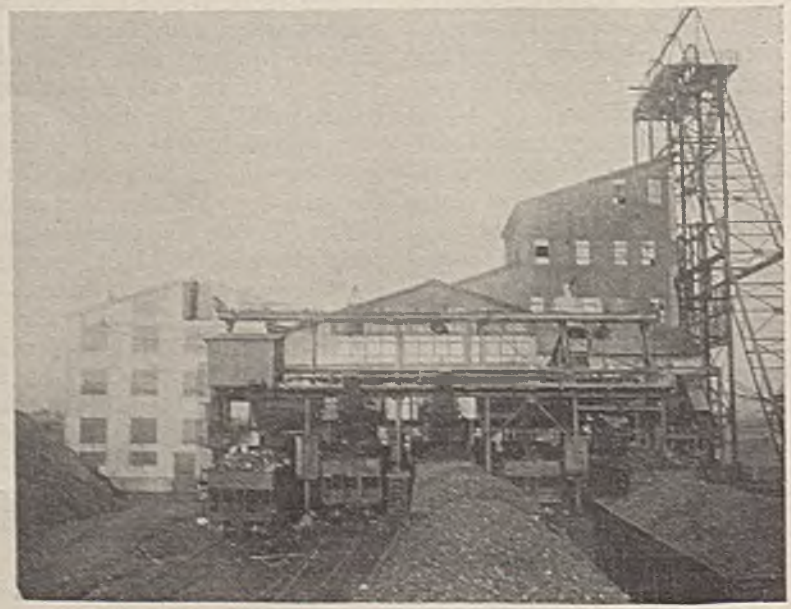
Relatively small building dimensions and a correspondingly small quantity of equipment were required, and less than a week for breaking in elapsed between the first day's operation and the attainment of efficient cleaning at full capacity. The application of full-automatic time-element power control of slate gates is an outstanding feature of the plant. All sizes from 4½ to ⅝ in. are cleaned at one operation without preliminary sizing. The slack is marketed without treatment, or in combination with washed sizes.

The coal to be cleaned comes from the Pittsburgh seam, which has at this mine an average thickness of 5 ft. 2 in. As the bed has a draw-slate top and as no coal is left to support the roof, and as, moreover, 12 to 14 in. above the bottom are two ½-in. bands of hard slate which contain much pyrite and are typical of this seam, an attempt has always been made to clean the coal at the face. All the coal is hand-loaded; consequently a portion of this slate visible to the loader is left underground. The cleaning plant is a second line of defense to insure the removal of all objectionable and removable refuse. The coal is hoisted on self-dumping cages, which carry two cars side by side.

In 1929 the tipple was completely modernized to include adequate screening and mixing facilities and loading equipment for five tracks (see Fig. 1). There are three loading booms and two belts leading to their respective loading chutes. The main screens in the tipple consist of two units, one for each cage, as seen at the bottom of Fig. 2, which was taken from a point near the dump and looking back toward a brattice-cloth partition separating the tipple from the cleaning plant. Just above the main screens are the drive shafts and the two 25-hp. motors of the two sets of Parrish-type screens used for sizing and desanding the washed coal.

The main part of the washery building, which is shown to the left of Fig. 1, is 50 ft. long, 29 ft. wide, and 50 ft. high. Its 50-ft. dimension extends in line with the main screens and the two 12-ft. Chance cones are set side by side along the 29-ft. dimension. In Fig. 3 are shown the tops of the two cones. The vertical drive shaft of the agitator of one of the cones can be seen on the right of the illustration. A 100-hp. motor located on the floor above drives the two agitators through bevel gears,

Fig. 1—The Revamped Tipple Has Five Loading Tracks and a Mixing Conveyor at the End of the Booms



and also drives two conveyors which elevate the raw coal from the tipple shakers to the cones.

Sand is stored in a one-story addition 11 ft. wide along one side of the cleaner building. The sand bin, which holds 500 tons, is shown in Fig. 4. Extending its full length is a monorail electric traveling crane of 2-ton capacity equipped with a ½-yd. Brosius grab bucket. The monorail extends out through a large door and over one of the loading tracks of the tipple. Sand is transferred directly from railroad cars to the bin by the crane, which also serves to handle sand from the storage to the make-up chute leading to the Chance system. In Fig. 4 the crane, with a bucketful of sand, is standing above the chute ready to be dumped. There is no partition between the sand-storage room and the cleaning plant proper.

Before discussing cleaning results and operation characteristics, a few pertinent details of the equipment should be outlined. In addition to the slow-speed agitators already mentioned, the only moving parts on the cones are the two interlocking slate gates at the bottom. These are operated by air cylinders supplied by an Ingersoll-Rand air compressor. Air valves controlling these gates are actuated by solenoids energized by a system of timing relays and interlocks. On earlier installations these valves and gates were manually controlled. At the No. 8 plant they are entirely automatic. Timing relays can be adjusted to empty the refuse from the cones at intervals to suit the operating condition.

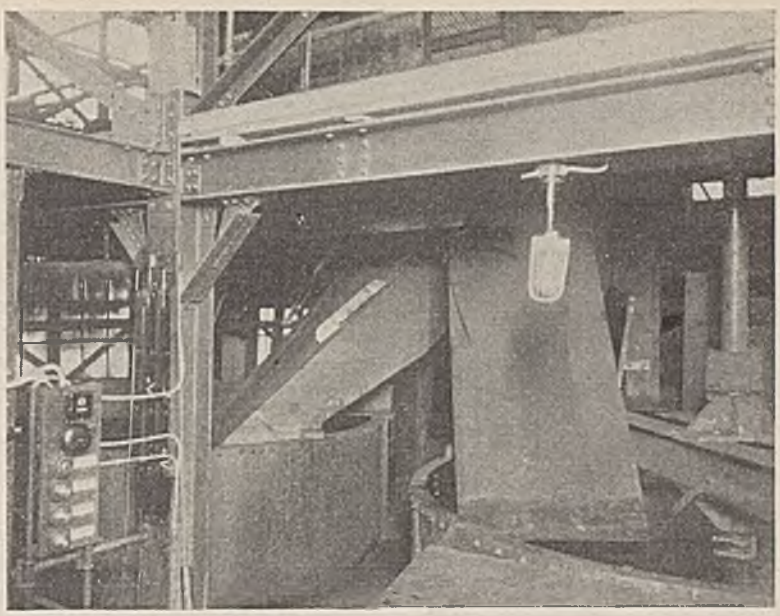


Fig. 3—Operatives' Station on a Level With Tops of Two Chance Cones

Nine motors, totaling 345 hp., drive the cleaning-plant equipment. These are 440-volt General Electric types KT and FTR, with all electric wiring in rigid conduit. The various magnetic controllers and safety switches are grouped together but not placed in a separate room. Each motor circuit is fused at a distribution panel.

Officials of the company are pleased with the thorough coal-cleaning results which are obtained and with the large capacity of the cones. Table I is typical of the efficient washing accomplished at the standard operating gravity of 1.45. The float in the refuse is consistently below 1 per cent of the refuse, which in turn is 6 per cent of the washery feed, so that the loss is less than 1.2 lb. per net ton of feed. When tests show more than 2 lb. of float per net ton of feed, the specific gravity of the medium is adjusted. The float generally consists of small pieces of coal chipped off large pieces of refuse in passing over the desanding shakers.

Ordinary float-and-sink tests of the coal were made before the building of the cleaning plant was decided upon. The gravity of the coal varies from 1.32 to 1.33. Some of the refuse is light enough to float at 1.50. Approximately 17 per cent of the mine output is under ⅜-in. size. Results indicate that it is practicable to clean down to a smaller size—perhaps to ¼-in., or even to ⅛-in. Consequently, all coal between 4½ and ¼ in. will be cleaned after the first of June.

The cost of sand is approximately $2.95 per ton delivered, and the loss approximately 2 lb. per ton of cleaned coal. Ordinarily, sand is added to the system but once a day; the crane being used to dump about three buckets of sand into the sand feet chute. A water valve is then opened, by which the sand is slowly flushed into the small sand sump.

The mine water which forms the entire supply for the plant is neutral and, therefore, requires no treatment.

Fig. 2—Main Screens in the Foreground; Drives and Hanger Boards of Desanding Screens in the Upper Background

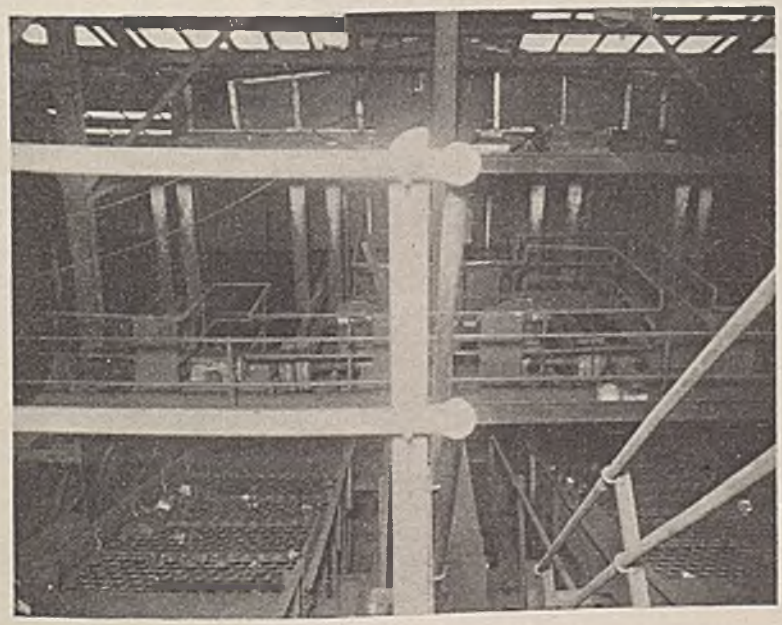


Table I—Average Analyses of Raw and Washed Coal

Size	Ash		Sulphur		Fusion	
	Raw	Washed	Raw	Washed	Raw	Washed
2×4½	6.82	4.77	1.31	1.27	2,515	2,566
1¼×2	8.18	5.48	1.43	1.19	2,471	2,629
¼×1¼	9.00	5.80	1.66	1.26	2,465	2,615

Storage is in a 90,000-gal. tank and in a storage pond located about 2,500 ft. from the tipple. It is pumped to the cleaning plant by a 25-hp. 2½-in. 250-g.p.m. centrifugal pump. City water is available in case the mine should not furnish a sufficient supply. The water consumption of the plant is 190 g.p.m.

Some water is lost with the refuse and cleaned coal, but the principal loss is through the overflow at the top of the circulation reservoir which surrounds the main sand sump, together with that discharged through a 2-in. pipe drain located in the bottom of that reservoir. A limited quantity of water is allowed to flow continuously through these drains to further assist in keeping the accumulation of sludge within the desired limits.

Make-up water enters the system by way of the last set of sprays on the clean-coal desanding screens. Adjustments for slight changes in washing gravity are made by regulating the quantity of agitation water which enters at the bottom of the Chance cone and flows upward through the separating medium.

Before the cleaning plant was put into operation eighteen pickers were employed in the tipple. This coal-cleaning force now consists of six pickers on 4½-in. lump and three day-shift washer operatives, a net saving of nine men. Two night men are employed to do the maintenance work for the entire tipple and washery, and they replace two men who were used for the same work before the washer was built. The washed coal is screened and shipped as 2x4½-in. egg, 1¼x2-in. nut, and ⅜x1¼-in. stoker. Refuse from the cleaning plant, together with rock hoisted in cars, is wasted to a dump near the shaft by a throwing larry.

Close to the preparation plant is a complete laboratory in charge of an experienced chemist, equipped to make proximate and ultimate analyses, B.t.u. and ash-fusion determinations. Test equipment includes a Burgess-Parr oxygen bomb calorimeter with illium bomb, gas-fired fusion furnace, electric furnace for volatile, and two electric muffle furnaces for the ash and sulphur burn-offs.

On a motor truck, which can be taken to any of the other mines from which samples are desired, is mounted a Sturtevant rotary crusher. On this truck a 15- to 20-lb. sample is prepared for the laboratory. There it is put through a "Chipmunk" jaw crusher, next through an Iler disk grinder, and finally pulverized to "all-through 60-mesh" in an Abbé ball mill. Finally, a sample shaker mixes the coal before analysis.

Float-and-sink tests for periodic checks of washer performance are made in a separate building near by. A mixture of carbon-tetrachloride and gasoline is used, because the former alone has a gravity of 1.61.

The original tipple, the new equipment added in 1929, and finally the Chance washer were all constructed by Heyl & Patterson, Inc., of Pittsburgh.

Fig. 4—Bin Alongside Washer Building, Equipped With Monorail Crane, Reduces Sand-Handling Labor to a Minimum

MINE WATER

« Generates Stray Currents

By C. H. MATTHEWS

Electrical Engineer
Susquehanna Collieries Co.
Wilkes-Barre, Pa.

MUCH has been written on "stray electric currents" in coal mines, but apparently no one has found the cause or fully explained the phenomenon. It is rather puzzling that such currents are found in mines where no direct-current equipment is operating, and their mysterious presence usually has been attributed to leakage from surface street-railway systems. Whenever electric blasting caps have exploded prematurely, stray currents always have been blamed, just as fires in buildings from unascertained causes have been nearly always declared to be due to defective wiring.

At one of the mines of the Susquehanna Collieries Co. stray currents gave much trouble and an effort was made to ascertain the cause. It was thought that the current might come from the mine circuits, or even from those of two adjacent collieries, but with the equipment at all three adjacent operations closed down, stray currents still continued to travel through the mines and fluctuated over a wide voltage range, with frequent reversals of polarity.

Finally, it was thought that parts of the mine might become converted into storage batteries, with the metals and coal pillars as electrodes, and the water impregnated with sulphuric acid as an electrolyte. Tests were made to determine if mine water might be instrumental in causing a galvanic action between sheet iron or bronze chutes, pipe lines, and anthracite.

At the mouth of the shaft several combinations of electrodes were immersed in the trough into which the pumps discharged. Readings were taken with a millivoltmeter having a scale running from zero to 1,000 and representing a range of voltage between zero and 48.3 millivolts.

In the first test, the plates, with their connecting strap, were taken from a lead storage battery and immersed in the water trough. The current generated was of so high a voltage that the pointer went off the scale, showing a current with a voltage in excess of 48.3 millivolts.

In the second test, the seven negative plates of the storage battery were alternated with six sheet-steel plates $8\frac{1}{2}$x$10\frac{1}{2}$x$\frac{1}{16}$ in. as the positive electrodes. The reading was 100, or 4.83 millivolts. Thereafter single plates, or single pieces of coal, were used, as will be noted. The results were as shown in the table. Test 3 is significant. With a single bronze screen plate and a single plate of sheet steel, the reading showed currents of from 38.8 to 48.3 millivolts. With a bronze plate as the positive electrode and coal as the negative electrode, current of as much as 10.9 millivolts was obtained.

Voltages Obtained by Using Various Electrodes With William Penn Mine Water as Electrolyte

ELECTRODES

1. Lead: Storage-battery plates.
   Positive, 6 plates 5x6 in.
   Negative, 7 plates 5x6 in.
2. Steel: Sheet-steel plates $8\frac{1}{2}$x$10\frac{1}{2}$x$\frac{1}{16}$ in.
3. Bronze: Screen plate 12x12 in.
4. Carbon: Coal, 10x5x3 in.
5. Copper: 4 strands of 7-strand No. 4/0 B & S bare cable, 18 in. long.
6. Cast iron: Pipe cap 3 in. diameter.

INSTRUMENT

Millivoltmeter: 0-1,000 scale.
Full scale is equivalent to 48.3 millivolts.

TESTS

1. Storage battery
   Off scale of 48.3 millivolts
   Ampere, 0.1
2. 7-plate battery—Negative
   Sheet steel—Positive
   Reading: 100, or 4.83 millivolts
3. Bronze Screen Plate—Positive
   Sheet Steel—Negative
   Reading: 800 to 1000, or 38.8 to 48.3 millivolts
4. Bronze Screen Plate—Positive
   Copper Wires—Negative
   Reading: 10, or 0.483 millivolt
5. Bronze Plate—Positive
   Coal—Negative
   Reading: 225, or 10.9 millivolts
6. Coal—Positive
   Sheet Steel—Negative
   Reading: 10, or 0.483 millivolt
7. Coal—Positive
   Cast Iron—Negative
   Reading: 10, or 0.483 millivolt
8. Sheet Steel—Positive
   Cast Iron—Negative
   Reading: 150, or 7.23 millivolts.

Our first impression was that our readings represented a potential drop due to stray currents in the water, but it was proved that the voltage readings were due to a galvanic action on the electrodes of the sulphuric acid in the water, for a greater voltage was obtained when the electrodes were close together and a reduction in voltage as the electrodes were moved farther apart. Tests show that the greater the area of the electrodes the higher the voltage, varying, of course, with the metals used for each electrode.

Coal is the positive electrode when sheet steel and cast iron are used as electrodes, but coal is negative when the other electrode is bronze or copper. This, of course, is to be expected, and it may explain why recent tests have shown that stray electric currents in the mines frequently change their direction. Tests show that stray currents may occur in all anthracite mines and that voltage readings of varying values occur when water flows over coal, sheet iron or bronze chutes, and pipes. These stray currents may either be boosted or lowered by leakage from the negative return of the direct-current haulage system. If the tracks are properly bonded and crossbonded, and if negative feeders are installed on all direct-current haulage circuits, leakage currents will be negligible and the stray currents will not be boosted to dangerous values.

(Turn to page 319)

MECHANICAL OPERATION

« Signalizes Progress At Cincinnati Convention

WHEN the American Mining Congress met at Cincinnati, May 11-15, to hold its Eighth Annual Convention of Practical Coal Mining Men and to take stock of the progress of mechanization in the year since its last meeting, it was cheered by the declaration of the U. S. Bureau of Mines to the effect that 10.5 per cent of the coal mined in 1930 was loaded in cars with mechanical aids, as against 7.1 per cent in the previous year; that is, the degree of mechanization had increased about 50 per cent.

As the year 1930 had not been as fortunate a year as the preceding, owing to business depression, the gain in "mechanized mining"—that is, loading into cars by mechanical means—was only 23.7 per cent, or 8,962,000 tons. Hand loading fell off 17 per cent and total tonnage 13 per cent. So the gain in mechanized mining is one made in face of a severe depression.

Mobile loading machine production gained 22.2 per cent; scraper-loader production, 6.3 per cent; duckbills' and other self-loading conveyors' production 13.6 per cent; pit-car loader production 27.3 per cent; and output of other hand-loaded conveyors, 26.5 per cent. Alabama, Pennsylvania, and Montana made the greatest advances—120.6, 66.2, and 57.5 per cent, respectively. Illinois gained 24.9 per cent and West Virginia declined 16.4 per cent, but these are in tonnages mechanically loaded, not in percentages of tonnages so loaded. Were they calculated in ratios of percentages, the showing, wherever favorable, would be still more favorable, and would also be favorable perhaps even where unfavorable when computed in the other manner.

Of the 23,213,000 tons loaded by machine, 86.5 per cent was loaded by mobile loading machines, 7.1 per cent by scraper loaders, and 6.4 per cent by duckbills and other self-loading conveyors. Of the 25,098,000 tons handled by conveyors, 5.9 per cent was loaded by duckbills and other self-loading conveyors, 76 per cent by pit-car loaders, and 18.1 per cent by other hand-loaded conveyors.

Eliminating duplications, 46,824,000 tons was loaded mechanically, 42.9 per cent by mobile loading machines, 3.5 by scrapers, 40.7 by pit-car loaders, and 12.9 by conveyors, including duckbills. The figures represent, of course, actual tonnage and not the tonnage capacity of the loaders installed.

Charles C. Whaley, Myers-Whaley Co., Knoxville, Tenn., was elected chairman of the Manufacturers' Division of the Congress; F. L. Maple, John A. Roebling's Sons Co., Trenton, N. J., was made honorary chairman. The vice-chairmen elected were Ralph C. Becker, McGraw-Hill Catalog & Directory Co., New York City; J. T. Ryan, Mine Safety Appliances Co., Pittsburgh, Pa.; and George R. Delamater, W. S. Tyler Co., Cleveland, Ohio. P. H. Grunagle, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and Mr. Ryan were re-elected on the board to serve three years. Mr. Delamater and B. G. Shotton, Hendrick Mfg. Co., Pittsburgh, Pa., new members of the board were elected for a like period. J. C. Wilson, Ohio Brass Co., Mansfield, Ohio, was added to the board for a two-year term.

A dinner with entertainment was held on the evening of May 14, at which C. B. Huntress, executive director, National Coal Association, Washington, D. C., presided.

Management Makes or Mars Machines

"TOO MANY MEN," said R. L. Ireland, Jr., vice-president and general manager, Hanna Coal Co., Cleveland, Ohio, discussing the paper by F. C. Thomas, manager of mines, Koppers Coal Co., Pittsburgh, Pa., on "Trends Toward Better Management" which opened the technical sessions May 11, "purchase a machine, give it a dinner pail, and expect it to perform."

Basing his conclusions on his own observations and returns from a questionnaire addressed to 25 large companies scattered representatively through the United States, Mr. Thomas found that most organizations were looking to their own staffs to fill vacancies, though men might be sought elsewhere if the necessity of some change in methods of operation demanded some new form of experience. Technical men, he said, were given preference in filling the higher positions. The loyalty of the employees was definitely sought. Efficiency engineers *per se* apparently were not in demand, companies preferring to seek services of that kind from among their own personnel.

T. R. Johns, general manager, Bethlehem Mines Corporation, Johnstown, Pa., declared that low cost could best be obtained by sustaining competition between operating units. By comparing the numbers of men employed for certain specific purposes in any given section and the costs of their service, the costs between units might be brought nearer equalization than is generally supposed by those who had not made a definite move toward such comparisons.

Mr. Ireland said that on reading Mr. Thomas' paper it became clear how far the old-fashioned management of our elders had departed. No longer are the details of operating kept locked under the lid of the manager's rolltop desk.

Everybody presents his ideas, and when delegates visit from mine to mine the lid is off. "We get," he said, "ten ideas for every one we give out. Such interchange of ideas pays big dividends in the education of mine officials.

"Mine managements can no longer be left to their own devices. They must be duly trained. All the old methods that suited hand-loading and mule haulage must be given up. We must not try to make new machinery fit into old conditions. All men must now be treated just as only monthly men were treated in the past. They are all to be held to efficient, painstaking service. No man can be treated as a mere check number, to produce whatever tonnage is to be credited to him, without care as to what that tonnage might be or how it was loaded out."

It was his definite conviction that accidents need not accompany operation. "There was," he said, "no reason for accidents in a coal mine. Not only are operating methods discussed at company meetings but an open book is kept as to production costs, for one man is just as much interested in the financial success of the company as another."

In the opinion of Paul Weir, vice-president in charge of operations, Bell & Zoller Coal & Mining Co., Centralia, Ill., selection and training of understudies is an important function of management. The young college student does not appear to learn human nature. He becomes in his term of training altogether too technical minded. It had been said that one could not well define what the nature of training at college should be. He thought it perfectly clear that men should be trained in a willingness to work, in a readiness to persevere in the study of detail, and in a disposition to tackle matters that are not wholly technical.

W. D. Brennan, president, Utah Fuel Co., Salt Lake City, Utah, in a paper read by G. C. Davis, general manager, Stag Canyon branch, Phelps Dodge Corporation, Dawson, N. M., was not in favor of safety inspection as usually advocated. Safety was a principle, not for delegation to a few but to all the employees. Mr. Brennan had been able in 1930 to cut to one-fourth the accident rate of 1929, when the Utah Fuel Co. mines had been under other control.

B. H. McCrackin, maintenance engineer, Consolidation Coal Co., Fairmont, W. Va., presented a paper on the "Budgeting of Repair Costs." "Repair-after-breakdown" systems had been replaced by "preventive repair" and inspection, he declared. Repairmen were now inspectors, for inspection was cheaper than repair. One might try to save the labor cost of inspection, but in the end one, in consequence, had to face heavy labor charges for repair, heavier charges for material to replace and repair damage, lower efficiency, and loss of time and tonnage.

Inspection to prevent breakdown had these advantages over repairs made merely to mitigate the effects of breakdown: (1) It practically eradicated failures of equipment, with their consequent tonnage losses and disruptions of schedule; (2) it permitted repair costs to be budgeted within reasonable limits; (3) it reduced the cost of maintenance, for keeping equipment in condition is less expensive than rebuilding; (4) it made it possible to schedule repair work and to determine the dates for periodic overhauling; (5) it developed a better class of repairmen and made them more keen to observe the indications and the reasons for failure; and (6) it made it possible to check each inspector's work.

He stated that each gathering locomotive should be apportioned two hours of inspection for every 24 hr. of work and every main locomotive 1½ hr. for the same length of time, dependent on the gradients and the conditions of work. Cutters should receive the same length of time as gathering locomotives.

Harry N. Taylor, chairman of the board, United Electric Coal Cos., New York City, who presided, said that if the harmonious relations initiated by an agreement between capital and labor in 1898 had been maintained, conditions in the industry today might be better. They were even now not nearly so distressing and chaotic as in the years just prior to 1898, which brought about the agreement with the union.

How to Achieve Safety

PROMULGATION of a set of rules so that the employees may know what is wanted is the first step in maintaining safety discipline, declared Thomas G. Fear, general manager of operations, Consolidation Coal Co., Fairmont, W. Va., in opening the discussion of safe operating practices

Charles C. Whaley

at the second session of the convention on May 11. But these rules, he emphasized, must not contain provisions which cannot be enforced and the penalties for infractions of the rules must be uniformly applied to all employees.

Mr. Fear outlined the practice of his company, which has a set of safety rules covering the 47 mines operating in ten seams and four states. A warning is given for first offense, two days' suspension for the second, a suspension of ten days for the third, and discharge for the fourth. If, in the judgment of a mine superintendent, a flagrant violation was intentional, even a first offender may be discharged. A card index record of offenses is kept for a twelve months' period and then the record is cleared.

Contending that it is much easier to maintain discipline among satisfied workers, and that a fair method of payment promotes satisfaction, John H. Richards, chief engineer, Wheeling & Lake Erie Coal Mining Co., St. Clairsville, Ohio, described the graduated day-rate basis payment plan installed by his company. Men are required to spend the full eight hours at the face. Time studies were made to determine a base tonnage and pay rate. The daily tonnage average for a loader determines his day rate for the next pay. During a recent period $5.80 was the average day rate for all of the loaders. The system reduced costs 18 per cent and brought about improved discipline.

I. N. Bayliss, assistant superintendent, Union Pacific Coal Co., Rock Springs, Wyo., said that each man of the supervisory force of that company is given a copy of a code of standards and each employee is given a copy of a set of rules and regulations. Use of the standards dates from 1927 and use of the regulations dates from 1929. These form the basis for discipline.

"Persons who form regulations should also be amenable to discipline," agreed Milton H. Fies, vice-president, De Bardeleben Coal Corporation, Birmingham, Ala., in a prepared discussion read by W. M. Lacey, general superintendent, eastern division, Sipsey, Ala. "Industry is going to weed out the sluggish thinker, and when it does, accidents are going to be reduced," was the opinion expressed in presenting "for thoughtful consideration" the suggestion that an intelligence test be applied to eliminate certain men who would be better fitted to obtain employment in a less hazardous industry.

Edgar C. Weichel, assistant general manager, Hudson Coal Co., Scranton, Pa., said that the value of a rule should not be based on its enforcibility but rather on its merit. He has found that a very good way to discipline a first offender is to make him stop work immediately and send him home for the rest of the day. He mentioned the case of a man who was recently tendered a dinner honoring him for having worked 59 years without loss of time from accident. Asked how he had made such a record the man replied that he always listened carefully to instructions and followed them explicitly.

Mr. Lacey said the practice with his company for a first offense is to warn the man and give him a pink ticket the record of which is filed in the office. For the second offense he is given a layoff of three to ten days, as the superintendent or general superintendent see fit, and for the third offense within a year he is discharged. In certain cases —for instance, if a man has a large family—he may possibly be rehired after a layoff of three to six months. For any serious offense, the foreman or superintendent may discharge a man.

In reply to a query by G. C. Davis, general manager, Stag Canyon branch, Phelps Dodge Corporation, Dawson, N. M., as to how common is the practice of paying bonuses to foremen, P. C. Thomas, vice-president Koppers Coal Co., Pittsburgh, Pa., and Chas. W. Connor, superintendent of mines, American Rolling Mill Co., Nellis, W. Va., both volunteered that such is the practice of their respective companies. Mr. Davis then stated that his company had found the bonus not entirely adequate. After a penalty was added to the system, a distinct improvement was noted.

Mr. Connor, in a paper on "Safety Program at Armco," outlined the practices which have been successful at the Nellis mine and enumerated the results accomplished. This program, started in 1926, was initiated as an extension of safety work that had yielded good results at the steel plants of the company. High executives of the company had been thoroughly sold on safety long before the program was started at the newly acquired mine.

At the beginning of the campaign, it was decided that the work must be done in a way to impress the employees that the officials were in earnest and that safety was to be a permanent part of the mining program. Accordingly a survey was made and every potential hazard corrected by the company before the men were requested to join in the movement. In the meantime the men had naturally absorbed some of the safety spirit. The Nellis Armco Association, primarily a sickness and death benefit organization, afforded an ideal means of contact between management and employees in promoting the safety work. Reduction in compensation rate from $4.20 per hundred dollars of payroll to $1.88, the lowest now in effect in West Virginia, speaks for the results obtained. This item alone is saving $12,000 per year. During 1930 the severity rate was 0.91 and the frequency rate 12.65.

Early in the safety work it was observed that "when a job was done right from the operating standpoint, it was also a safe job." Therefore, operating and safety problems were attacked as one and efforts directed along the lines of selection and placement, education, training, supervision, and discipline.

Education includes foreman-manager training for the supervisory force and job training for the men. Practically every operating job has been standardized in the way found to be best from the standpoints of safety, efficiency, and cost. Responsibility for discipline has been placed entirely with the section foreman. Efforts have been concentrated on securing foremen of the proper caliber. Mr. Connor concluded by saying, "There is no job at Nellis mine at which a man has to get hurt."

The coal industry, declared P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mt. Hope, W. Va., who presided at the Monday afternoon session, has seen worse times than those through which it is now passing. There is no reason why the industry should not stage a comeback at the proper time. He urged, therefore, that the operators do nothing now which would return to plague them in the future.

Safe operating practices were again considered at a session held on the afternoon of May 13, presided over by A. C. Callen, professor of mining, University of Illinois. The first speaker at this session, R. M. Lambie, chief, West Virginia Department of Mines, prefaced his formal paper on "The Cost of Mine Accidents" by telling of the "amazing record of progress and efficiency" made by the Norfolk & Western Ry., where the casualties per billion ton-miles decreased from 296.52 in 1912 to 35.16 in 1929.

Pennsylvania bituminous accident-cost data compiled by Rush N. Hosler, superintendent, Pennsylvania Compensation Rating Bureau, said Mr. Lambie, showed payments in excess of $25,000,000, or 3.6c. per ton, for medical service and compensation during 1924-29. In West Virginia, during the ten-year period 1921-1930, the direct cost in compensation for subscribers to the state compensation fund was approximately 2½c. per ton and during recent years has been about 3c. per ton. Applying the "Heinrich and Hosler" formula for computing the indirect cost, Mr. Lambie placed the total cost to coal mine employees and employers in excess of $100,000,000 for the ten-year period, or 8c. per ton.

Individual companies which have installed well-organized safety departments, continued Mr. Lambie, have been able to effect marked reductions in direct cost of accidents. Records going back one to five years, are indicated in brief as follows: $50,000 per year down to $16,000; 4.5c. per ton down to 3c.; 5c. down to 3.6c.; $24,480 per year down to $12,000.

"I venture to say," said Mr. Lambie, "that any company that will set aside a sum equal to one-third of its yearly compensation costs and organize a safety department and place it in charge of a man who knows accident prevention, who is sincere in his work and can visualize, comprehend, and analyze conditions that are likely to cause accidents, and who is able to instruct and discipline men, will at the end of three years have cut its compensation costs in half."

In the discussion following, E. B. Agee, superintendent, Dehue (W. Va.) mine of the Youngstown Sheet & Tube Co., detailed the marked improvements in accident prevention made during the last two or three years at that mine, in which gas and difficult drawslate are inherent hazards. Compensation paid employees was $28,000 in 1928, $11,900 in 1930, and will be $2,500 in 1931. Two fatal and 162 lost-time accidents occurred in 1928, no fatal and 57 lost-time in 1930, and only one lost-time accident to date in 1931. The frequency and severity rates in 1928 were 185.34 and 21.73, and in 1931 these stand at 7.11 and 0.803. "We feel that the mine management is entirely responsible in one way or another for at least 90 per cent of all the fatal and lost-time accidents that occur in and around the mines," concluded Mr. Agee.

Mr. Fear also submitted a few comparisons to show that safety is a paying proposition for the Consolidation Coal Co. Last year, $248,000 less was paid out in compensation than in a recent previous year. He has set the goal at a 1c. per ton compensation cost in 1932. They have now so "saturated" the employees with safety that, in one division at least, every employee encountering an official or other visitor that enters the mine, warns him to "be careful and don't get hurt."

"Safety and Mechanical Mining," a paper by W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, St. Louis, Mo., dealt with the subject from the standpoint of the executive and included figures showing the experience of his company, which in 1927 operated by hand loading exclusively, in the latter half of 1928 won most of the tonnage by hand shoveling onto conveyors, but in 1929 handled the largest part of the coal with mechanical loaders. Only mechanical loaders were used in 1930. The tons per compensable accident for the years 1927 to 1930 are as follows: 4,101, 3,919, 4,855, and 7,930, respectively. From a status of 700 working places and six supervising officers the mine has been changed to 197 working places and ten supervisors.

"As mechanization increases, accidents decrease," was the emphatic conclusion of William Roy, safety director, Hanna Coal Co., Cleveland, Ohio, who offered statistics indicating the marked

decrease in accidents upon introduction of mechanization in the Hanna mines.

"In all my years of experience I have had more trouble with bosses than with miners," said F. B. Dunbar, general superintendent, Mather collieries, Pickands, Mather & Co., Mather, Pa., in presenting his paper, "Safety at the Face." He advocated education of bosses and indorsed a statement of Alex McCanch, Pennsylvania bituminous district mine inspector, that "discipline must be maintained regardless of cost of production."

"I don't think a safety inspector or a mine inspector amounts to much unless the boss amounts to something." "My idea of discipline is to send the man home for the day—hit his pocketbook and you will make him think." It was suggested that the shotfirers, who visit the working places one to several times per day and have an opportunity to observe hazards, should be enlisted to a greater extent in the safety work. Coal inspectors also have many opportunities to observe hazards.

Mr. Dunbar described the "Keep Safe" cards which are furnished to the men and on which the foreman "writes up" the man by recording the violations on the card. The man's record is posted monthly and, if a record becomes glaringly bad, the man is discharged. Each foreman carries a "Potential Hazard" card (see *Coal Age*, Vol. 36, p. 243-246) and at the end of each day checks the hazard records on the cards.

J. W. Paul, U. S. Bureau of Mines, Pittsburgh, Pa., pointed out that Mr. Dunbar had followed through the steps of realization, regulation, instruction, discipline, supervision, and accident recording. In his remarks Dr. J. J. Rutledge, chief engineer, Maryland Bureau of Mines, stated that responsibility at the face should be shared equally with the foreman. He indorsed a recent statement of James Dalrymple, state inspector, Colorado, that the time element of setting posts is equally as important as the proper spacing regulations.

Comparative figures for accidents with hand-loading, conveyors, and scoops were given by A. L. Hunt, general superintendent, Pennsylvania Coal & Coke Corporation, Cresson, Pa., in a paper on "Safety With Conveyors." On Dec. 31, 1930, 3,189,966 tons had been loaded with conveyors and scoops (scraper loaders) by his company without a fatal accident, with one permanent disability, and without a partial permanent disability. For the three methods, the records are:

	Hand-Loading	Conveyors	Scoops
Non-compensable accidents	272	137	21
Per cent of non-compensable accidents	63	32	5
Tons of coal mined per non-compensable accident	4,176	5,101	7,999
Compensable accidents	122	60	5
Per cent of compensable accidents	64	31	5
Tons of coal mined per compensable accident	9,311	11,648	18,663

T. F. McCarthy, assistant general superintendent, Clearfield Bituminous Coal Corporation, Indiana, Pa., which operates conveyors in the same field as Mr. Hunt's company, said his experience has been somewhat the same. During 1930, the tons loaded per compensable accident was 11,847 for hand-loading, 9,630 for conveyors, and 3,339 for scrapers. Although the frequency rate was 254 on conveyors and 142 on hand-loading, the severity rate was 7.70 for conveyors and 24 for hand-loading.

Slides were used by W. P. Vance, general superintendent, Butler Consolidated Coal Co., Butler, Pa., to illustrate his paper, "Safety With Electrical Equipment," which dealt principally with methods employed at the Wildwood mine. Operations at the mine were described in detail in the May, 1930, issue of *Coal Age*. The physical aspects of safety at the plant are treated at length elsewhere in this issue (pp. 310-312) by G. N. McLellan, safety engineer of the company. Other details of the safety program at Wildwood were covered in the preceding issue (*Coal Age*, May, 1931, p. 243).

All recognized measures are taken to guard and protect electrical equipment, Mr. Vance declared. All buses and disconnect switches in the permanent underground substation have been housed in Transite boxes, and steel compartments have been constructed for the junction boxes of the 2,300-volt cables which are carried in trenches along the roadway. The boxes are on the bottom and in niches back in the rib, so that the doors are flush with the rib line.

Nine definite rules, comprising a set of regulations for maintenance of electrical equipment at the face, have been promulgated at Wildwood. These apply to the repairmen, machine operators, foreman, and others inside employees who may be concerned with the electrical equipment. If equipment is properly installed and maintained, coal can be mined mechanically "practically without accidents." Mr. Vance declared that those accidents which have been experienced at Wildwood could have been avoided, and that electrical equipment in itself does not increase the hazards.

With hand-loading, said A. J. Ruffini, efficiency engineer, Wheeling Township Coal Mining Co., Adena, Ohio, the cost in the Adena mine per $100 of payroll was $3.28 and the Ohio base rate was $4.50. With mechanical loading, the cost is $2.63, which is 51 per cent under the present Ohio base rate of $5.50. The frequency rate increased considerably with the introduction of mechanical loading, but the severity rate dropped. "Electric burns due to cable failures added to the hazards," said Mr. Ruffini.

C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky., declared that supervision in the mines is lax and that written instead of verbal orders should be given to govern important operations. Eyesight, hearing, and mentality of the men should be examined.

"Since we put into practice the use of written orders, put foremen in charge to direct work, and began thorough examinations, we are almost ashamed to tell of the improvement," said F. R. Vinton, general superintendent, Rochester & Pittsburgh Coal Co., Indiana, Pa. He has found that discipline is more often necessary with officials than with the men. New practices have cut the fatalities 80 per cent.

Mr. Bayliss remarked that the accidents with mechanical loading are "favorable on tonnage, but do not look so good on the man-shift basis."

Machines Revolutionize Layout

MINING systems used to be laid out so as merely to protect advancing operation. M. D. Cooper, division general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa., in a paper read by P. C. Thomas, vice-president, Koppers Coal Co., Pittsburgh, at the Tuesday morning session, presided over by R. L. Ireland, Jr., vice-president, Hanna Coal Co., Cleveland, Ohio, declared that one of the revolutionary changes in layout, observable in all of the new work in Pennsylvania, is an effort to provide not only for safety in first mining but for such a safety in retreat that it will be possible to recover all the coal from the seam without the pillars being crushed or stumps being left. Modern mining provides such adequate pillars that in the final clean-up the blocks of coal will be large enough to be removed safely.

Mr. Cooper's paper described five systems. With the Mullen all-machine plan of mining, a development of the system known as the concentration method, the face advances 120 ft. a month as measured parallel to the face headings. Only about 24 per cent of the coal is taken in first mining, leaving 76 per cent for retreat. About 95 per cent of the coal is finally recovered. Track machines with 9-ft. cutter bars are used for development. These undercut and shear the coal in all rooms and chutes to a depth of 8½ ft. On the pillars the same cutters are used, but they undermine the coal only 8 ft. and for lengths of 15 ft. At first these cuts are made along the face, so as to reduce the length of the pillar, and this continues until the length is about equal to the other dimension. Thereafter, cutovers are made along the goaf, both in the direction of the face and in the direction of the butt, until the pillar is entirely withdrawn. Ninety per cent of the cribs are recovered, 80 per cent of the crossbars, and 45 per cent of the posts.

Another method described was a room method where the depth of the coal was 100 ft. or less. Rooms are

31 ft. wide and set at 36-ft. centers, leaving only 5 ft. for pillars which are not recovered. The rooms widen squarely 20 ft. from the heading, and the center and sight line of the room is over the left rail of the room track. The widening on the left-hand side is kept 16 ft. behind the face of the room, leaving a pillar 13 ft. 6 in. x 16 ft., so as to provide material to be filled into the mine cars behind the front car which is placed near the face. The rooms proceed 240 ft. after which they are discarded. Rooms are driven from both back and main headings and come within 20 ft. of meeting one another. The rooms on being advanced are kept with their faces *en échelon*. Though the room pillars are small, the barrier pillar of the main entry is made 210 ft. wide. Another system described was that at Wildwood, Pa. (*Coal Age*, Vol. 35, pp. 243-6).

Two mechanical mining layouts were pictured by I. D. Marsh, manager, Alcoa Ore Co., Belleville, Ill., in his address on "Mining Systems in Indiana and Illinois Adapted to Mechanical Loading." In one, where the seam was about 6 ft. thick and the cover 80 to 120 ft., the coal was divided up by a two-heading entry system into 100x200-ft. solid blocks with the 200-ft. length parallel to the boundary line. That done, a cut 180 ft. long was made along the 200-ft. side of a block near the boundary, leaving 20 ft. of an offset in the rib at one end of the pillar. Track laid along the working face was connected with the tracks at either end of the pillar.

Another attack on this face was made on the completion of the first, but this consisted not of a continuous cut but of a series of five cuts, each 28 ft. long, separated by four spaces, 10 ft. wide, which were left without cutting, the cuts and spaces aggregating 180 ft. Then after the coal was shot down and loaded out, another cut was made behind this, and it was made continuous by cutting back of the 10-ft. projections in the rib front. After this had been loaded out, another cut was made along the full working face. The track was lifted and moved over to the face side of the square pillars; then these 10-ft. pillars were shot away. However, the roof would fall only when drilled and shot.

Another method in the same mine resembled the counter-heading system so common in the anthracite region. Here, however, conditions favored the driving of a straighter heading than usually is possible in the disturbed coal of the anthracite field. Between the two entries, which were protected by 100-ft. barrier pillars and were 1,800 ft. apart, rooms paralleling them were driven from a cross road connecting the two entries.

Every 320 ft. in these rooms, special crosscuts were driven so as to form a continuous counter-heading from entry to entry. The coal from the room faces was hauled to this counter-entry, which was a single roadway, and thence was transported to the particular entry which provided the more favorable gradient. The rooms were 25 to 28 ft. wide with 60-ft. centers. They moved forward in line like a company of soldiers, all the same distance ahead of the last counter-heading, except that one entry and the eight rooms adjacent to it were kept 320 ft. ahead, so as to arrange that the main partings might be close to the counter-heading. The bottom was weak and the roof, though strong on first being exposed, soon became weak also, so that rooms could not be used for roadways if time was allowed to lapse after their construction. These rooms are now 1,500 ft. long and it is purposed to extend them another 2,000 ft.

In the absence of G. A. Schultz, general superintendent, Liberty Fuel Co., Latuda, Utah, his address on Utah mining systems was read by G. A. Murphy, general superintendent, Spring Canyon Coal Co., Spring Canyon, Utah. The thick coal of Utah, Mr. Schultz explained, was overlaid by 1,000 to 3,000 ft. of sandstones in beds 20 to 500 ft. thick. Coal dust lodges on the high ledges in the rooms and makes a dangerous condition. Loading machines have generally failed when used for recovering pillars, many men being injured and much coal being lost; consequently few mines now attempt it. The V-system was introduced at one mine with 45-deg. pillar faces, the faces advancing up the dip, but after the first major cave, control of the roof was completely lost.

Pillars have been recovered by scrapers, but this was in coal under 5 ft. thick. In one mine with coal 7 to 9 ft. thick, pillar coal has been removed by loading machines. In order to get steady running, the pillars are attacked only during winter months, when business enables the mine to work with regularity. Butt-offs are driven 6 to 8 ft. off the end of the pillar, leaving 6 or 8 ft. of coal adjacent to the goaf of the previous room, in order to hold back the fallen roof. Most of the butt-off pillar is removed by machine, with the aid, however, of some hand mining.

In one mine 500-ft. rooms are driven on the strike, 32 ft. wide on 84-ft. centers. A low shovel takes out the lower 8 ft. of coal. When the rooms have reached their assigned length, the 16 ft. of top coal remaining is shot down and loaded with high shovels. Then a skip, 7 ft. deep, is taken off the upper side of the room, leaving a 45-ft. pillar, which is lost. The cover is from 900 to 1,500 ft. thick.

G. A. Nettels, general superintendent, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., discussing "Strip Mining in the Southwest," stated that at some strip pits the overburden removed was 24 times as thick as the coal seam recovered. He referred also to experiments made by W. H. Stewart, general superintendent, Central Indiana Coal Co., Linton, Ind., with a machine to drill into the highwall horizontally instead of vertically, also to the use of a narrow bucket, 16 in. wide, on a small revolving shovel for removing horsebacks. A description of the methods used appeared in the preceding issue of *Coal Age* (Vol. 36, p. 227). Other recent references to the methods of stripping in the Southwest may be found in Vol. 25, pp. 477-479 and pp. 524-526.

Mechanical Mining in Thick Seams

PHASES of mechanical mining in thick seams were presented in four papers at the afternoon session, May 12. The first paper, "Semi-Automatic Lubrication of Mechanical Loaders," prepared and read in brief by A. J. Ruffini, efficiency engineer, Wheeling Township Coal Mining Co., Adena, Ohio, described the construction and use of a truck-mounted pressure greasing and oiling machine assembled by the coal company at a total cost of $625. It carries a 78-gal. capacity tank for grease and another of the same capacity for oil. Other equipment on the truck includes an electrically driven lubrication gun capable of delivering grease at 3,300 lb. pressure and a small air compressor which automatically maintains 80 lb. air pressure on each tank.

A lubrication crew equipped with a locomotive hooked to the greasing machine makes the rounds of the sections and lubricates the loading machines during a 3½-hr. interval between the two 8-hr. shifts. Nine to ten minutes is the actual time required to grease a loading machine having 32 Alemite connections, seven gear cases, two armature bearing cups, and a hydraulic tank. Meters in the oil and grease lines on the lubricating machine are read after the greasing of each loading machine and a record is kept of the quantities of lubricant used.

Oil and grease are transmitted from barrels into the greasing machine tanks by air pressure. A high-pressure rubber hose was found to be superior to braided metal hose for the portable connections between greasing machine and loading machine. The metal hose soon leaked, due to damage from kinking.

Mr. Ruffini said the use of the greasing machine has reduced the maintenance cost of the loading machines practically 25 per cent and reduced the quantity of oil and grease by 40 per cent. He does not recall experiencing a burned bearing since the greasing machine was put into use. Positive action in greasing each connection is one of the advantages.

John R. Foster, superintendent, New Orient mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., said that somewhat the same system of greasing for mechanical loaders has been adopted at New Orient mine, resulting in a 15 to 20 per cent saving

n grease, in fewer delays, and a reduction in repair cost. In this case the truck tank capacity is three barrels. It was observed that 1 to 2 gal. of grease remained in barrels taken into the mine for charging the tanks. To eliminate this loss, grease was purchased in tank cars and transferred at the mine into barrels which are used only for taking the grease inside. This was found objectionable, because of dirt getting into the empty barrels, so a storage tank having a capacity slightly greater than a railroad tank car was installed. Transfer by air pressure from tank car to storage tank is effected in 2 to 3 hrs.

Overcoming the apparent handicap of using 2,100-lb. capacity mine cars in connection with mechanical loading was described in a paper by C. J. Sandoe, vice-president, Perry Coal Co., which operates the Taylor mine near O'Fallon, Ill. Rooms are driven 60 ft. wide without necks and the track is carried up along one rib, and continuously on around parallel to the face and back to the entry along the other rib.

The coal is 7 ft. thick and the physical conditions are excellent for mechanical loading. Rooms are driven both ways from a three-heading entry serving a modified panel system. Track is laid in all three headings. That in the center remains as a permanent haulage, but that in the two outside entries is taken up as the rooms are completed.

Trips of four to six cars are handled to and from the face by mules. Three drivers are required to handle the cars over the 700 to 1,400-ft. distance from loading machine to parting. An average of 346 cars and 360 tons was cited as the daily production for one machine for a week of six working days.

W. D. Ingle, vice-president, Ingle Coal Co., Oakland City, Ind., presented a discussion prepared by David Ingle, Sr., president of the Ingle company. Their experience covers three mines using Joy loaders, haulage by mules and locomotives and direct and indirect loading into the cars. In the last mine the indirect loading by means of a storage car between loading machine and mine car was abandoned in favor of the direct method.

Cars in the first mine were of 1¾ tons capacity; those in the second, 2½ tons; and in the third, 4 tons. So far, even with the large cars, they have not been able to beat the record cited by Mr. Sandoe. Mr. Ingle stated that to speed up haulage a car transfer was tried, but apparently it could not be built strong enough to handle their large cars. Referring again to Mr. Sandoe's system, he said that the only disadvantage he could see was that one 60-ft. room would require more timbering than two 30-ft. rooms.

Mechanization at the Carbon Fuel Co., Carbon, W. Va., was described in a paper by C. A. Cabell, president, and read by L. N. Thomas, vice-president. This dealt with the completely mechanized mine equipped with a Peale-Davis cleaning plant described in a recent issue of COAL AGE (Vol. 36, pp.

119-122). Two types of loaders are now in use in the mine, the No. 4 Myers-Whaley Automat and the 5 BU Joy. When the mine was operated on hand-loading, the yield was 5½ tons per man shift. For the first quarter of this year the yield was 7.7 tons. Here Mr. Thomas explained that 13.5 tons of material is handled per man shift. Eighteen to 24 in. of slate parting between two benches is loaded out before the coal is shot.

"Mechanical Loading at the Little Betty Mining Corporation," by P. L. Donic, vice-president, Linton, Ind., described the use of the light-weight Jeffrey 44-C loading machines in the Little Betty mine, where pit-car loaders were formerly used to advantage, with the exception that they caused dissatisfaction among the men. It was stated that the consistent average per loading machine is 104 cars, or 156 tons per shift. Cars have a capacity of but 1½ tons and are, therefore, shifted by hand. In 223 days' operation, two machines loaded 75,000 tons and the supply cost for the machines was $782.65. The coal is 6 ft. thick and the rooms are driven 26 ft. wide and 200 ft. deep on 34-ft. centers.

Anthracite Research to the Fore

UNDER the tutelage of E. H. Suender, vice-president, Madeira, Hill & Co., Frackville, Pa., anthracite development problems were discussed at the morning session May 13. C. A. Connell, acting executive director, Anthracite Institute, Philadelphia, Pa., declared that research was not new to anthracite operating concerns, but most of it had hitherto been performed in the field, whether as to preparation—where breakers were the laboratories—as to combustion—where boiler houses were used in making the tests—or as to many other phases, where the studies were made in the private laboratories of the companies.

Prof. H. G. Turner, director of university research for the anthracite industry, Lehigh University, Bethlehem, Pa., has discovered that small-sized anthracite is being used for filtration purposes in over 100 water purification plants, and he is studying the relative value of this filtration material as compared with sand-and-gravel mixtures. It has been found the more efficient agency of the two in the removal of bacteria. He will endeavor also to ascertain the relative ability of anthracite and other filters to remove odors, colors, and turbidity.

In the ceramic laboratory at Pennsylvania State College, tests are being made of the shale below anthracite beds. Pulverized, mixed with water, pugged, heat-treated and dried, it is found to have greater compressive strength than concrete. Will it serve for mine props and construction? Will the cement works give place to coal-shale plants? A large pottery concern is arranging to make tests on its own behalf. At the Primos Laboratory, 76 anthracite-burning devices have been tested, some approved, some are being developed by the staff at the expense of the manufacturer, and some have been returned for redesign.

Paul Sterling, mechanical engineer, Lehigh Valley Coal Co., Wilkes-Barre, Pa., suggested the use of anthracite for malt filtration, and W. H. Lesser, mechanical engineer, Penn Anthracite Mining Co., Scranton, Pa., said that leading activities of the institute were inducing industrial consumers and apartment-house owners to use rice anthracite instead of undertaking to substitute bituminous coal, and advocating to coal-yard owners the value of the telephone call in stimulating anthracite sales, especially in summer.

"Results of Present Anthracite Roll Practice" was the topic discussed by Mr. Sterling in an address. He declared that the diameter of rolls made little difference in the sizes of the coal obtained by crushing. It had been thought that the larger the roll, the less the percentage of domestic coal that will be converted into fine sizes, but there seems no evidence that this is true. With smooth rolls, the "angle of nip" with which the rolls approach each other may be important, but not where the breaking is done by teeth. Mr. Sterling said that he had tested rolls of all diameters, from 18 to 54 in., and had come to the conclusion that a 36-in. roll body would give just about as high an efficiency as any other, and would be helpful in promoting standardization of equipment. Roll teeth, if part of a segment roll, could be changed promptly when rapidly changing markets demanded it.

Though diameter makes little difference, peripheral speed is most important. Tests show that 250 ft. per min. is a reasonably efficient speed as compared with the speed of 900 ft. per min. so generally in use prior to 1910. Mr. Sterling defined efficiency as the percentage of all sizes above pea made in crushing the size fed to the roll. Thus if lump is fed to a roll and 25 per cent steamboat, 33 per cent broken, 13 per

cent egg, 9.5 per cent stove, and 9 per cent nut results, then the efficiency is the sum of these percentages, or 89.5 per cent.

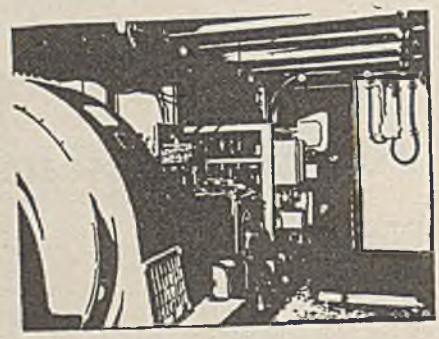
John C. Haddock, president, Haddock Mining Co., Wilkes-Barre, Pa., wanted to know if roll technique varied with the coal bed. Mr. Sterling said that Eckley B. Coxe had found a considerable difference in the breakage characteristics of the different beds, but whether it would pay to recognize these differences in practice he could not say. B. H. Stockett, general superintendent, Weston Dodson & Co., Inc., Bethlehem, Pa., asked about the choice of teeth. Mr. Sterling replied that all teeth gave good service so long as they were sharp. It was highly important to see that they were replaced when they were no longer in that condition. The Johnson teeth remained sharp longer than some others. It was important that the rolls should be kept far enough apart that they would break the coal with their teeth and not by the roll body.

E. P. Humphrey, supervisor of preparation, Lehigh Navigation Coal Co., Lansford, Pa., then delivered an address on "Preparation of Anthracite Fines," dividing his subject into equipment for the settlement of the fines and equipment for the cleaning of them when separated. With a rectangular tank and a double-strand conveyor, at Alliance colliery, his company was separating 35 tons per hour and obtaining a product with 55 per cent of water. With a Dorr thickener, at Greenwood colliery, that same company separated 40.8 tons per hour and the product had 73 per cent of water. This thickener had a diameter of only 14 ft. 6 in. In the first instance the overflow consisted of 6.67 per cent solids and in the second of 2.25 per cent. The loss was mostly in the almost microscopic sizes; in one case 88.5 per cent passed through a 200-mesh screen, and in the other, 48.7 per cent.

The Glen Alden Coal Co., at Loomis, has an 85-ft. diameter Dorr thickener which recovers all but the very finest of the solids; in its overflow only 0.403 per cent is solid material, 98.6 per cent, or practically all of it, being of a size that a 200-mesh screen will not hold. This extremely fine material has a large percentage of ash. The minus 200-mesh feed at Greenwood colliery shows 36.91 per cent ash; the coal from the tables, 32.40 per cent; and the refuse from those same tables, 51.60 per cent. The effective work is done on the plus 8-mesh coal, which, being received with 15.63 per cent ash, is cleaned to 6.75 per cent and gives a refuse of 53.74 per cent ash. Mr. Sterling asked whether mixtures of flats and cubes make cleaning difficult, but Mr. Humphrey replied that of larger importance was the presence of extreme fines.

Slowness in driving rock tunnels was an expensive luxury, declared Russell L. Suender, Hill & Suender, contracting engineers, Frackville, Pa., in an address on "Speeding up Rock Work in Anthracite Mines." Mr. Suender declared that rock work for developing new areas should be delayed until about to be needed, and then crowded rapidly forward. With the old-type hand jumper, the progress made was from 25 to 30 ft. per month. The tendency today in thick beds is to drive coal gangways only where those gangways are to be robbed back and abandoned within the life of the original gangway timber; say, three or five years.

In Mr. Suender's opinion, the contractor within reasonable limits should furnish all equipment and supplies and undertake the entire job as an operation independent of the mines. The operator too often hampers the contractor by his poor service, whereas, if the contractor is "on his own," he has to find his own service and makes it to suit his needs. The operator pays for all the



unnecessary burdens he has in the past needlessly placed on the contractor, as well as for the inherent difficulties confronting the latter.

Mr. Suender said that, with Hoar and Myers-Whaley shovels, the speed of tunneling had been increased to 300 and 400 ft. per month. He understood from other contractors and operators that Sullivan scrapers and Butler shovels are doing equally well. To get the results, the face must be advanced two rounds per day. The three-shift basis was used on the three-mile Glen Alden tunnel, but it is not so economical as the two-shift basis, for with the latter the cuts may be made longer and breaking-in holes can be fired, if necessary, more than once.

Heavily pitching rock slopes, hand-mucked, can hardly be advanced more than 4 ft. per day, but with machine mucking, 6- or 7-ft. advances can be made. With plenty of air at 80-lb. pressure, with electric haulage, turnouts at not over 750 ft., good air, care and supervision, shots ready for use when drilling is completed, equipment in repair, 525 ft. of 8x12-ft. hard-rock tunnel can be driven per month working 24 hr. per day.

Mr. Stockett said that unfairness to contractors had increased costs. Contractors had been given bad service and had been asked for too many favors. Weston, Dodson & Co., Inc. forecast its rock work and put aside so much for every ton of coal mined, and so it always had money available to do the required work. Work should not, however, be crowded too much, or it will clutter the mine roads and dumps with rock cars and reduce production.

In discussion, R. L. Suender said that a mucking machine should be provided for any rock gangway that had to be driven more than 600 ft. Mr. Lesser remarked that 525 ft. appeared to be slow progress as compared to that made in the Moffat Tunnel in Colorado, where 1,000 to 1,200 ft. was excavated per month. Mr. Suender replied that the large size of that tunnel favored the use of larger and more powerful machinery, and accordingly speeded progress.

In a discussion on mechanical mining in anthracite, E. C. Weichel, assistant general manager, Hudson Coal Co., Scranton, Pa., reported that ten to fifteen shaking conveyors were being added every month by his company. The company has 160 scrapers and was buying more. In the high coal, with conveyors, refuse could be cleaned. Jacks are being used at Carbondale and Oliphant. In all, five longwalls have been opened. The longwall was advanced 90 ft. before the first break. The jacks were 26 in. high and had 4-in. blocks on top and beneath them. Mr. Weichel said that the company had never lost a longwall face with steel jacks, but had lost a face every hundred feet with wood props. They undercut for a depth of 6½ ft. and had four rows of jacks, two of which were removed each night. Steel jacks had broken before the first break relieved this weight. At Birdseye, eleven jacks had been crushed.

High Tonnage With Low Headroom

THIN COAL SEAMS, which used to be so difficult to work, have now their advantages over thicker coal that greatly counterbalance their disadvantages, said J. S. McKeever, general superintendent, Kanawha & Hocking Coal & Coke Co., Longacre, W. Va., chairman of the meeting on Thursday morning, May 14. In the opinion of T. F. McCarthy, assistant general superintendent, Clearfield Bituminous Coal Corporation, Indiana, Pa., both scrapers and conveyors have their appropriate places in thin-seam mining. With conveyors, coal can be cleaned at the face. Scrapers in some mines dig into the soft clay, and if the coal is fragile, they are likely to break it. These facts in places give conveyors advantages that make their use preferable.

Time studies were made in a double-room system with conveyors and it was found that of the whole time of operation, the start occupied 0.1 per cent; loading, 40.4 per cent; cutting, 8.8;

drilling, 3.7; making shots, 1; tamping 1.6; moving conveyors, 2.8; timbering, 3.4; cleaning undercut, 4.7; changing bits on machine, 1.4; shooting, 2.6; waiting on cars, 4.7; eating, 3.6; idle, 2.8; repairs, 7.3; greasing and oiling, 1.4; moving machine, 0.3; power off, 1; and miscellaneous, 8.4 per cent. As only 40.4 per cent is actual loading time and only about 50 per cent of the time is actually productive, effort is being made to eliminate the time losses as far as possible to secure the maximum tonnage.

With the double-room system, in which the coal is brought from one room to the next through the pillar by means of the conveyor, and face conveyors are placed at each face, with a room conveyor bringing the coal down the room to a loading boom at the room neck, the face being 45 ft. wide, each man will average 15 tons a shift, including in the number of men the man at the entry who loads cars. There are advantages also in the long-face block system. Wherever it is feasible, it offers maximum safety and maximum production.

E. J. Jenks, mining engineer, Rochester & Pittsburgh Coal Co., Indiana, Pa., took issue with Mr. McCarthy; he prefers the old room-and-pillar system. He does not like to introduce at one and the same time a new system and new machinery. Roof control assumes with these new plans such an element of uncertainty that attention which should be directed to the machinery is diverted to the roof. As the pillar work is less productive than the room work when machinery is introduced, it behooves the management to widen the rooms and reduce the pillar thickness as far as possible. His company is using duckbills and reciprocating conveyors in headings, and is progressing 400 ft. a month in mines where 100 ft. a month was formerly considered good practice. The duckbills load either rock or coal and the work in the latter is never allowed to get more than two cuts ahead of the work in the former. Reciprocating conveyors are not much of a success on gradients of 2 per cent against the load, but on such gradients the scraper works well, said Mr. Jenks. In the return entry the scraper is used. The coarser impurities in the coal should be removed at the face and here the conveyor has the advantage.

With machine loading, mine-car hazards are removed, but, unfortunately, the machinery has to be started by men who cannot see what they have started, so the men who work around such machinery must be taught to keep clear of the scoop or the conveyor. Mining machines, of course, give a lower return in coal cut, because it is necessary to keep them in one place. The quality of coal also is likely to decrease when mechanical aids are put in. If success is to be obtained, keep hand-loading as far as possible from machine loading.

J. A. Long, general manager, Woodward Iron Co., Woodward, Ala., could not agree with the last dictum, but Mr. Jenks, thus questioned, merely strengthened his statement. Mixing methods of loading doubles trouble, said Mr. Jenks, due largely to the difficulties in arranging the car turn. Roads become congested and, if the mines cannot be made 100 per cent machine loading operations, then hand-loading should be confined to sections apart from the areas given over to machine loading. When machine loading is first introduced, the best men are taken for that work, said Mr. Jenks, but after several units have been added, the less adaptable and the less energetic men have to be taken. Labor turnover seems to be relatively high; trained crews are likely to leave when they begin to be experienced.

In reply to a question, Mr. Jenks

said that, with a five-conveyor outfit, three repairmen were needed, but these men also took care of incidental equipment, such as pumps. Coal could be cleaned at the head of the duckbill just as well as when it was being loaded by hand. So far the Rochester & Pittsburgh Coal Co. has not experimented with steel jacks. E. C. Weichel, assistant general manager, Hudson Coal Co., Scranton, Pa., remarked that at the mines of his company, steel jacks showed an advantage over wood posts of 31c. per ton of coal mined; that is, wood costs 38c. per ton of output and steel jacks only 7c. Mr. McCarthy said that in the V-system, the half of the face from the goaf down gave the most trouble; sometimes the entire face was lost.

J. B. Rogers, general manager, Stonega Coke & Coal Co., Big Stone Gap, Va., described the long-face experiments his company had made. He entitled his paper "Long-Face Conveyor Mining at Derby No. 3 Mine, Stonega Coke & Coal Co." Substantially this was a face 800 ft. long between two double entries with the working lane in front of the face protected by lines of steel jacks. The cover at the start was only about 250 ft. thick and when the experiment ceased, it was approximately 600 ft. in thickness. In the duration of the experiment the face advanced 1,050 ft. The first real fall was obtained after the face had progressed 300 ft. When the wall had advanced 200 ft., a large number of 4-ft. holes were drilled parallel to the wall and these were all shot at one time. They broke a trench in the roof but did not, as was intended, cause a general fall.

Steel jacks were lost in the course of mining the longwall, either by collapse or by being driven into the bottom. The operation was so unpromising that decision was made to leave a 150-ft. pillar and then start rooms, driving them up narrow and slabbing them out to 105 ft. Pillars 50 ft. wide are left between rooms. Of course, rooms are started on both entries so as to meet in the middle of the 800-ft. panel. They are driven with the aid of a light conveyor which, afterward, when the slabbing commences, is replaced by a heavier one.

Surveys made over the continuous longwall area showed that the entire hill had subsided, but no direct evidences of fracture could be found. Nevertheless, the disappearance of water in some of the deep ravines made it evident that the rock did not subside without a degree of fracturing. The roof above the coal is a particularly strong sandstone and about 35 ft. thick. Above that there are some clays and the Rhoda coal, 5½ ft. thick, but not at this point merchantable. Over these were other sandstones, thick and massive, making the roof unusually resistant to fracture.

C. C. Hagenbuch, mining engineer, Consolidation Coal Co., Fairmont, W. Va., read a paper on "Conveyors in Thin-Seam Mining." He, as did others, stressed the importance of fitting the method of operation to the multifarious conditions to be met. He described two drag-scraper methods of operation with twin rooms and said that where the coal is 46 in. thick, the average obtained per man is between 14 and 15 tons daily, including the moving of conveyors between set-ups. On single shifts, about 19 tons per man has been produced.

Ridley Warren, Newcastle-on-Tyne, England, spoke briefly on Northumberland mining conditions and methods of mining, saying that the Northumberland coal was prepared for the domestic market and that the endeavor was to preserve as much of the larger sizes as possible.

S. F. Follansbee, chief engineer, Koppers Coal Co., Pittsburgh, Pa., discussed "Successful Handling of Mine Refuse." Mr. Follansbee presented the probable costs of equipment for handling refuse which have been embodied in the accompanying table.

Probable Cost of Equipping Plant For Refuse Disposal

Drag chain and trough, 100 ft. long	$1,500
Side-hill dump (less cost of track to dump)	$3,000 to 4,000
Ten-ton larry (less track)	5,000
Refuse car with hoist	5,000
Two-bucket aerial tram, 1,700 ft. span, 60 tons per hour, 15 deg. upgrade, 40-hp. motor	19,000
Single-bucket tram, 100-hp. motor	16,000
Continuous bucket, automatic dis-Potching, aerial tram, 10-hp. motor, 1,000 ft. span on a 25-deg. slope to top of ridge and 1,600 ft. span across valley to top of next ridge; capacity 75 tons per hour	50,000

How to Speed Up Productivity

IMPROVEMENT in the operation of coal-cutting machines for larger production and in the use and treatment of machine bits for greater service was the principal theme of the afternoon session May 14 on "Recent Developments in Mining Practice." Supplementing the discussion of the use of cutting machines and bits, speakers and delegates delved into problems of drilling and blasting, and into the possible economies resulting from the use of treated ties in coal mines. C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky., presided.

Cutting, drilling, and blasting to produce the maximum quantity of lump coal with mechanical loading was the subject of a paper by G. C. McFadden, assistant vice-president, Peabody Coal Co., Chicago, which was read and amplified by Carl Lee, electrical engineer of the company. Attainment of the maximum percentage of lump is limited, however, by the desirability of obtaining the largest tonnage per loader, with the result there is a continual search for a compromise between more lump and greater productivity.

Mr. McFadden remarked that the shortwall machine is rapidly yielding place to track-mounted types. The latter proved to be successful in the Peabody mines, but a number of features were added to a late machine to increase the speed of handling, and consequently the production. To cut down the number of tools and accessories to be handled, only two jack pipes, one keg of sharp bits, one keg of dull bits, and an oil can are carried. Four changes of feed or of swing of the cutter bar were incorporated to allow the maximum feed to be used in starting and finishing the cut, with other adjustments as the intermediate cutting becomes harder. Power-driven lifting, lowering, and tilting of the cutter bar enable changes to be made in the level of cutting without slowing down the cutter chain or feed. Sand boxes were added to assist in tramming on grades.

Cutting was originally done at the bottom to provide a smooth surface for loading machines. In that position, however, cutting was the hardest of any part of the seam; also, cutting on the bottom left the problem of removing a band from the coal. Cutting was next done just below the band, a second sweep being made in the band itself, the bits pulling out the dirt. This resulted in a mixture of the dirt band with the fines, and the cutting position was moved to just above a second small band, known as the steel band. The bands are loaded with the coal and removed at the tipple.

Drilling resolved itself into placing of the holes for the best results. To shoot up the bottom bench and leave a smooth bottom for the machines, it was necessary to drill one row of holes so that the back of the holes would reach the bottom or penetrate slightly into the fireclay. On the bottom, boulders and sulphur streaks often furnished difficult cutting. The heaviest drill motors and posts available were installed, and stand up fairly well. The strain, however, is transmitted to the drill heads and cutters, and tests are being made to lengthen the cutting time and reduce the cost of sharpening. Cutters tipped with hardened surfaces were tried, and the four-pointed molefoot was found to give the best satisfaction. To facilitate drilling, light push cars are used for transportation.

In blasting, four to six holes are drilled in the bottom bench, the two outside ones gripping slightly into the corners to bring out the coal and square up the place. Four shots are used to bring down the top bench. The order of shooting is: two center lower holes, two outside lower holes, two center top holes, two outside top holes.

Mr. Lee remarked that the average production of the cutting machine referred to in the paper was 1,100 tons per 8-hr. shift in cutting not of the best. Changing of bits, he remarked, required from one-sixteenth to one-eighth of the working time. The machine regularly cuts coal for four Joy loading machines.

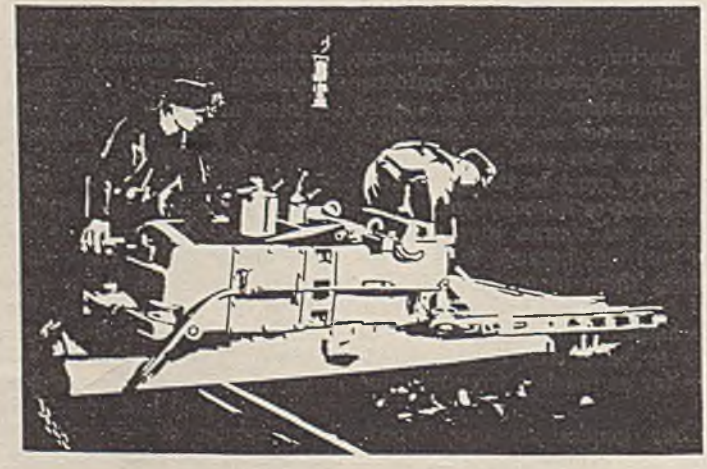
Savings from the use of improved bits on undercutting machines more than overbalance the cost of the additional material and labor in their production, was the conclusion arrived at in a paper on "Treating Machine Bits," by H. H. Taylor, Jr., mining engineer, Franklin County Coal Co., Chicago. Bit steel, he remarked, is about the only item that is bought by the coal company, and the bit is the particular part of the cutting unit that requires more time to repair and replace.

Consideration of machine capacities brought the importance of sharp bits to the attention of the Franklin County company. Resistance to abrasion was the quality most desired, as bits were known to become red hot in hard cutting, with the result that ordinary steel wore away rapidly. After various experiments, application of a hard alloy to the bit point was decided on. In preliminary tests, a number of bits were sharpened and a thin coating of alloy was applied to the flat top of the point, extending back about ½ in. One machine was selected in a section where cutting conditions and power were uniform and both the standard and treated bits were tried out on succeeding shifts. The results showed that less time was required for setting bits, sumping in and out, making more time available for actual cutting. There also was a distinct saving in the quantity of power required per square foot of undercut, and the quantity of extreme fines in the bug dust was less with the treated bits.

Results of the preliminary test showed that the savings in sharpening labor and in the quantity of new steel necessary overbalanced the extra labor and material necessary to prepare the special bits. Consequently, every machine in the mine was equipped with the treated bits. In the period Dec. 16, 1930-April 1, 1931, each bit sent below accounted for 3 tons of coal, against only 1 ton for the old bits. With the new bits, resharpening could be done 35 times before the bit was discarded, as against 28 times for the old type, while under the old system each bit had to be reheated every time it was sharpened, as compared to 20 to 25 per cent of the time with the treated bits.

Including all factors, the total savings with the new bits was 15 per cent, Mr. Taylor asserted, divided up as follows: cutting labor, 9 per cent; machine repairs, 36 per cent; oil, no change; power, 21 per cent; bits, no change; and machine investment, not considered. In addition to other factors, Mr. Taylor remarked, floating dust was decreased with machines using the treated bits.

Experience with mining machine bits at the No. 15 mine of the Old Ben Coal Corporation was detailed by R. L. Adams, mining engineer, Christopher, Ill., in a paper read by Thomas L. Garwood, safety engineer, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill. Bits tipped with "Blackor" have been tested on all the cutting machines in the mine for the past nine months. Production at No. 15 is about 4,000 tons per day, and in the last three months, after a standard method of applying the "Blackor" to the bits had been developed, the ratio of the tonnage cut by the treated bits to that of the untreated bits was found to be 6 to 1. Among other things, the



maintenance cost has been reduced 1c. per ton, and other savings in time, power (under certain conditions), and safety have been made. Mr. Adams was of the opinion that the cost of special equipment for treating bits was too high for use by individual mines, and he made the suggestion that central bit stations be established.

The service life of ties and their annual cost largely determines track economy, and in turn has an important bearing on the cost of producing coal, declared D. D. Dodge, general superintendent, W. J. Rainey, Inc., Uniontown, Pa., in a paper on "The Economy of Creosoted Ties in Coal Mines." White-oak ties originally were used in the maintenance and construction of the company's haulage roads for most of the 50 years of the company's operation. But as the supply of this timber decreased, increasing cost drove the company to the use of other oaks and hardwoods. It soon became evident that the life of the latter was unsatisfactory, as compared to that of white-oak ties. Where track was laid in a dry, well-ventilated entry, life of the mixed hardwood ties was found to be several years.

In wet places, away from the incoming air, however, decay caused the failure of some ties in eighteen months' time.

An open dipping tank was installed at the Allison mine in 1915, and was used for several years, though the difficulty of controlling results finally forced its abandonment. Use of purchased timber treated by standard pressure-vacuum processes was begun in 1929. Mr. Dodge cited the experience of the railroads with creosoted ties, and declared that his company expected to save in excess of $500 per mile of main-line track per year when all ties and switch ties are creosoted. The company now has on an average 20 miles of this class of track in service, making the total expected saving $10,000 per year.

Cleaning—A Necessary Part Of Mechanization

RAW PRODUCT from the coal mine is of no value unless it is presented in acceptable form. Beneficiation is a direct outcome of mechanization. A few years ago it was merely an afterthought; today it is an accepted part of the mechanization program, said Charles Enzian, chief engineer, Consolidation Coal Co., Fairmont, W. Va., in opening the session on "Recent Developments in Coal Cleaning," Friday, May 15. Though the production of clean coal was the main purpose of coal cleaning, an equally important result was uniformity of product, as a consumer can adapt himself to a standard fuel and knows just what to expect; complaints are less frequent, for the same reason.

In the absence of R. M. Shepherd, president, Allegheny River Mining Co., Kittanning, Pa., Fred Norman, chief engineer, read Mr. Shepherd's paper on the air-sand plant of his company. Sand used was well dried and of such fineness that it would pass through a 12-mesh screen. The air at a pressure of 12-in. water gage is blown through a porous stone slab and, on reaching the sand above it, converts it into a close semblance of a liquid in which the coal floats and refuse descends. Coal is drawn off the top over a roller, desanded on a screen designed for that purpose, and goes to the bin. It is arranged that some of the heavier coal shall go with the refuse, and this coal, with some of the sand and all the refuse, is elevated so that it goes to a secondary table for recleaning. Refuse from this table is desanded and goes to the refuse bin. Thus nearly all the sand is recovered, only 3 lb. per ton of clean coal being lost, and much of that, Mr. Norman believed, could be retained by stopping leaks.

All the air must be filtered, or dust will fill the pores of the stone slab. The air should be heated, said Mr. Norman, so that it will dry the sand, which, normally dry, tends to become wet, due to the receipt of wet coal from the mine. The sand could, of course, be dried, and that has been the practice, but hot dry air will remove its moisture quite effectively. If the sand is wet, it will adhere to the coal, spoiling the product and causing sand loss.

Mr. Shepherd put the cost of cleaning at 6.42c. per ton of clean coal. So far only nut and pea sizes are cleaned. To Mr. Enzian's inquiry, Mr. Norman replied that the air was not recirculated. F. F. Jorgensen, district manager, West Virginia division, Consolidation Coal Co., Fairmont, W. Va., asked why the pea with an ash content of 9.01 per cent after cleaning was not rendered as clean as the nut, which has an ash content of 5.48 per cent. Thomas Fraser, preparation engineer, Hydrotator Co., Hazleton, Pa., answered that the nut was cleaned on the 6-ft. table and the pea on the 4-ft. table and that the former gave the better separation; the smaller table being somewhat overloaded with refuse, though so far the work on the finer sizes has not attained the excellence of that with the larger sizes.

Questioned as to the largest sizes cleaned, Mr. Fraser said that no attempt had been made to clean larger sizes than 3 in., because the slate gate was built too low for any larger refuse. Mr. Fraser added that the smaller size tested has been $\frac{1}{8}$ in., and that he had no record of the ash and sulphur in the refuse. The Freeport was a cleaner coal than the Kittanning, but the latter could be cleaned more markedly than the former. Both seams are cleaned indiscriminately at this Cadogan cleaning plant.

E. H. Shriver, superintendent in charge of special construction, Koppers Coal Co., Powellton, W. Va., discussed "Washing Practice at Nellis Mines" of the American Rolling Mill Co., Boone County, West Virginia. The plant is a Rhéolaveur installation. As the impurity in the coal was quite low, it was thought that there would not be enough middlings to get the desired stratification and to wash the product without loss. Consequently the refuse from the picking table was crushed and sent to the washer. Experience seems to show, however, that this is not necessary, for enough refuse is obtainable from the sizes being washed.

At first, the intention was to wash only the coal below 4 in., but now all coal below 4½ in. goes to the launders for cleaning. There are both sealed-discharge launders for the coal above $\frac{5}{8}$ in. and free-discharge launders for the finer coal. The fine coal is dewatered by 48-mesh wedge-wire screens and by Carpenter dryers. Dryers of the same design are used also for the $\frac{5}{8}$x$\frac{3}{4}$-in. coal. Four men operate the plant, not including in that number the control personnel, the chemist, and the coal sampler. The average percentages for all nut and slack coal shipped to Middletown, Ohio, ran 7.32 per cent for ash, 5.43 per cent for moisture, and 0.86 per cent for sulphur.

The American Rolling Mill Co.'s combustion department has stated that if the nut and slack were reduced from an average of 13 per cent to an average of 8 per cent, there would be a saving of 36c. per ton in the cost of boiler fuel. It is said that this figure has been greatly exceeded and that the use of one bank of boilers has been discontinued. Saving in the gas producers probably has been 15c. per ton. The fusion temperature of the ash has been raised from 2,700 to 2,900 deg. All this has been obtained with a power cost of 1.59 kw. hr. per ton, but this has been with about 65 per cent of full operation; with

steady running time, the power cost would be greatly reduced.

J. R. Campbell, Koppers-Rhéolaveur Corporation, Pittsburgh, Pa., asked if the 4½-in. coal was being used for metallurgical purposes. This Mr. Shriver confirmed, saying that this lump coal was found acceptable probably because of its purity and freedom from high-gravity refuse, rather than because of any intrinsic ability to make unusually high grade coke.

Charles Gottschalk, vice-president, Big Vein Coal Co., Evansville, Ind., described the new washing plant of that company now in the process of construction. The requirements were that the coal should be received either wet or dry, but that the washer must deliver dry coal and that the fine coal must receive thorough treatment. The larger coal to be washed, running between 2 in. and ¼ in., is to be cleaned in a five-cell Hydro-Separator which will clean not only the coal of that size in the mine-run but all coal of larger size rejected on the picking table. This will be fed through the Hydro-Separator units after crushing to 2 in. and under. The fine coal, temporarily set at ¼ in. and under, will be cleaned on four Deister-Overstrom diagonal-deck tables and dried on a wedge-wire screen, and in a Carpenter dryer.

Arrangements will be made for mixing the coal as desired before shipment. The hand-picked coal will be merchanted as 2x4-in. coal and 4-in. lump. The cells of the Hydro-Separator form a twin tandem unit with a fifth cell to take care of the secondary refuse from the second of the tandem units, the primary refuse of the first cells of the tandem units being wasted. The coal being cleaned comes from the Fifth Vein of Indiana and has sulphur inclusions which the plant should eliminate without that large percentage loss of good coal which is incurred when cleaning is done by hand.

Joseph Pursglove, Jr., mining engineer, Pittsburgh Terminal Coal Corporation, Pittsburgh, Pa., described the Chance plant at the Coverdale mine, an account of which appears elsewhere in this issue of *Coal Age*.

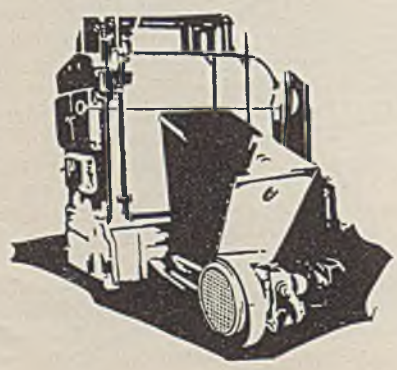
Light on Coal's Future

RETAILERS, operators, equipment manufacturers, and research men, through their representatives, had an opportunity to throw light on the question of merchandising of coal at the session on "Fuel Utilization"—the closing session of the convention, held on the afternoon of May 15, under the sponsorship of the Committee of Ten of the Coal and Heating Industries, with E. B. Langenberg, St. Louis, Mo., vice-chairman of the Committee of Ten and past president of the National Warm Air Heating Association, presiding as chairman.

Coal men have failed to appreciate the importance of heat regulators as a means of holding their old business and getting new, asserted E. W. Morrow, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., who spoke as the representative of the heating accessories industry. Other fuels in the past have exploited the advantages of regulators to their advantage, and coal operators should take the hint and push their sale as a business getter. Mr. Morrow described a new self-contained modulating valve for individual radiators as one of the latest advances in regulating equipment. This valve, he declared, is a long step in advance of the orifice system of regulation, and automatically keeps the room at the desired temperature. At night, the temperature can be lowered by reducing the boiler pressure the desired amount.

"The Stoker and Its Place in the Future of the Coal Industry" was discussed by Lorin W. Smith, Goshen, Ind., secretary of the Committee of Ten. Mining of coal, Mr. Smith asserted, has reached a peak in efficiency, while the utilization of coal is still a problem to be solved. The cost of selling stokers is still too high, he continued, and will remain so until a high degree of concentration in definite localities is reached. This relative lack of saturation also hinders the dealer in selecting types of coal suitable to different types. In spite of demonstrated savings with stokers, sales continue to lag while competing fuels go ahead. Mr. Smith called on the coal industry to get behind stoker sales if they are to begin to compare in activity with equipment for burning gas and oil.

Education of retail dealers in the sale and servicing of coal was discussed by Carlyle M. Terry, Delaware, Lackawanna & Western Coal Co., Chicago. Basing his conclusions on past experience, Mr. Terry was of the opinion that the retail coal dealer should pattern after his competitors in oil and gas and show the consumers how to burn his fuel. He also expressed the belief that the retailers would have to go in for some form of janitor service to meet the increasing demand for a real contribution to this activity.



Operators are logical people to initiate any campaign to acquaint the consumers with the merits of coal as a fuel, asserted Milton E. Robinson, Jr., Chicago, president of the National Retail Coal Merchants' Association. If it were assumed that coal was an entirely new business, he said, the first problem would be to outline the probable market and arouse enough desire in the minds of possible consumers that they would want to purchase it. As in other businesses, the producer would then be the logical man to lead the parade, as the efforts of one individual producing enterprise would go much farther than that of a retail unit.

In conclusion, Mr. Robinson offered three rules for the guidance of operators: (1) Do not look on sales offices as necessary evils, as they may have some real ideas to offer; (2) do not consider retail tonnage as a byproduct; (3) forget past glories, when all the emphasis was on production, and take the lead in developing new markets.

"Research on Coal for Utilization" was discussed by Dr. John R. Turner, president, West Virginia University, Morgantown, W. Va. Dr. Turner offered figures to show the declining relative importance of coal as a source of energy in the world and pictured the corresponding rise in oil and gas. He declared that it had been estimated that natural gas would in the near future displace from 75,000,000 to 200,000,000 tons of bituminous coal in the United States, largely because research had pointed the way to economies in the construction of pipe lines and in the perfection of pumping practice. Liquefied gases also are increasing at the rate of 50 per cent per year, he asserted. In 1930, 18,000,000 gal. was sold, equivalent to 1,000,000 tons of coal. Since 1913, he continued, oil and gas have entered 60 per cent of the domain of coal, and have removed it from the class of a necessity.

Dr. Turner estimated the cost of 1,000,000 heat units from West Virginia coal at 5c., and from Texas natural gas at 4c. Cost of transportation for coal is 2½c. per hundred miles, and for gas is 1½c. On this basis, the cost of 1,000,000 heat units in Chicago would be the same, or 17c.

There are only faint prospects of any diminution in oil and natural gas activity, and for that reason the coal industry must expect to carry on on its own initiative. Research is one powerful weapon which the industry can grasp, but it should be carried out by the cooperative efforts of the federal government, the states, and the operators. States, he asserted, should coordinate research and, in conjunction with the federal government, go into the fundamentals, leaving specific problems to the operators.

ONE YEAR'S PROGRESS IN MECHANICAL MINING AIDS

« New Equipment Shown at Cincinnati

GREATER CAPACITY and longer life were features of equipment for the mining and preparation of coal shown at the Eighth Annual Convention of Practical Coal Operating Men and National Exposition of Mining Equipment, held in Cincinnati, Ohio, May 11-15, under the auspices of the Manufacturers' Division of the American Mining Congress. Mine cars were larger and lower, and many were designed primarily for mechanical loading. Smoother, safer operation and provision for more efficient loading characterized the several types of loading machines exhibited. Advances in preparation in the past year were brought out. Corrosion-resisting qualities featured the pumps and pipe on the floor. Flameproof units and more efficient control systems were major items in the electrical display. Protective equipment and first-aid material were included in the exhibits devoted to the promotion of safety, while wire rope, lubricants, bearings, power-transmission equipment, and other specialties rounded out the list of coal-mining material shown.

Conveyors and pit-car loaders continued to hold a position of dominating interest at the national exposition of coal-mine equipment. Face and main conveyors were shown by the Bertrand P. Tracy Co., Pittsburgh, Pa. The face conveyor, the company says, is built in any length from 13 to 50 ft. Sections are designed to permit ready extension. Height along the loading section is 4⅜ in., while the width is 14 in. Height of discharge end, it is stated, can be varied to suit requirements.

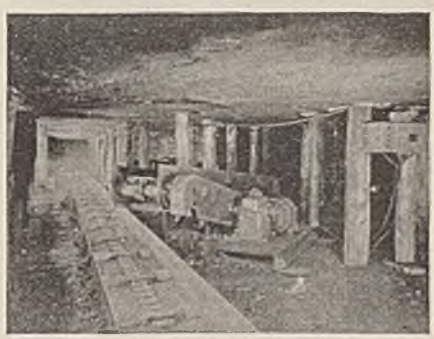
As in the face conveyor, the motor and gear reduction of the Tracy main conveyor is mounted in a single, readily detachable base. A shearing pin is provided to prevent damage in the event the conveyor is fouled. Conveyor pans are of the "double-section" type. A lower, or angle iron, section provides the base upon which the top pan rests and supports the return strand of the conveyor chain.

Vulcan Iron Works Co., Denver, Colo., showed its new SCB 15, 15-hp., electric shaker drive unit, designed, the company says, to equalize the effect of fluctuating loads, afford a reserve of power for the intermittent demands in jigging operation, and reduce to a minimum the shocks on the motor winding.

In addition to the electric drive, the Vulcan company exhibited the Flottmann air-drive unit for shaking conveyors. Still another exhibit was the Type CA, twin-valve, Flottmann hammer pick, for which increased percussive effect, reduced recoil, automatic operation, and decreased wear are claimed. The pick is equipped with an automatic starting and stopping device. Weights vary from 13½ to 20 lb.

Conveyor Sales Co., New York City, displayed its new "Cosco" C-20 shaker drive, which was described in the January, 1931, issue of *Coal Age* (p. 51), and its new D-5 and D-8 drives, said to have been developed in response to a demand for smaller units. According to the company only half the usual number of parts are required in the D-type drives. Either a 5- or a 7½-hp. motor is used, and three speeds—70, 76, or 82 strokes per minute—may be obtained through a gear reduction. Dimensions of the unit are: length, 38 in.; width, 39 in.; and height, 16¾ in.

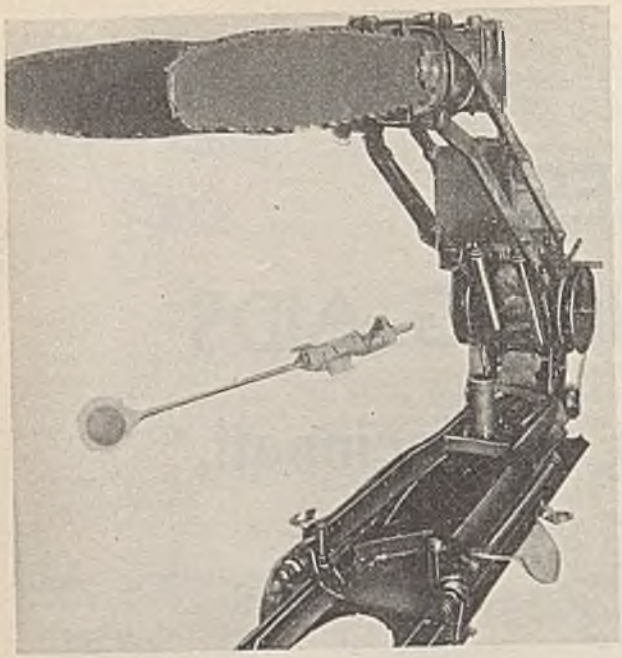
Mavor & Coulson, Ltd., Glasgow, Scotland, showed the "Samson" electric shaker driving gear, which is 16 in. high and is equipped with alternating-current motor; M & C troughed belt conveyor with top and bottom idlers so constructed as to give complete protection to the return strand of the belt; M & C belt face conveyor equipped with the idler construction mentioned above; standard, longwall-type "Samson" coal cutter equipped with a.c. motor; and a new, low-vein, direct-current coal cutter. The latter is a recent development of the company, and stands only 12 in. high. Unit construction is employed, and the cutter weighs 4,000 lb., and is 8 ft. long, 12 in. high, and 25 in. wide.



Cross Conveyor Discharging Onto Fairmount Main Conveyor

Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., showed a pit-car loader with a hydraulic lifting mechanism which the company says eliminates possibility of injury from flying cranks or levers used with the ordinary type of lifting jack. The loader is equipped with sealed ball-bearings, which, it is asserted, do not need to be lubricated until the machine is taken down for overhauling.

Brown-Fayro Co., Johnstown, Pa., showed the "Brownie" mine-car loader, the "Brownie" room hoist, and the new, Model HL, double-drum, slow-speed, heavy-duty electric hoist. The motor of this hoist is placed in the middle of the frame between the drums. The hoist is designed for a maximum rope pull of 6,000 lb., the company says, at



Joy Bros. Coal Saw and Breaker Pad

speeds varying from 25 to 75 ft. per min.

A main conveyor and a face conveyor were shown by the Lorain Steel Co., Johnstown, Pa. The Jones Flexible Conveyor Co., Pittsburgh, Pa., exhibited its rope drive for shaker conveyors. Traylor Vibrator Co., Denver, Colo., displayed a small vibrating feeder conveyor.

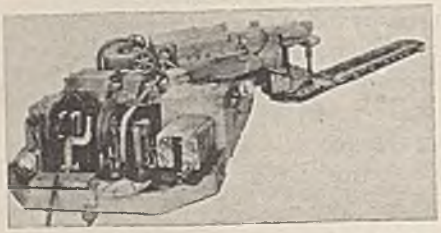
Heavy, mobile-type loading machines were shown by two companies. The Joy Mfg. Co., Franklin, Pa., had a 5 BU permissible Joy loader on the floor, while the Myers-Whaley Co., Knoxville, Tenn., displayed a No. 3 "Automat" loader. Bucyrus-Erie Co., South Milwaukee, Wis., told the story of coal mining with its stripping and loading shovels through a photographic display.

Equipment shown by the Goodman Mfg. Co., Chicago, included the following: Type 424BJ, government-approved, low-vein, mounted, bottom-cutting machine; Type 172, heavy-duty, shaker conveyor drive; high- and low-type feeder heads for duckbill loaders; and a "Red Devil" pit-car loader. The new cutting machine is similar, the company says, to the standard mounted bottom cutter except that it is 9 in. lower. Range of cutting is from 5 in. above the rail to 8 in. below. The cutter arm may be raised by power or by hand, and such movement does not alter the height of the machine. Tilting arrangements, it is declared, make it possible to follow an irregular band and maintain any desired height of kerf, while even distribution of weight on all four wheels minimizes the likelihood of derailments. During the swinging cut, the cutter arm may be locked in any one of seven positions.

A new low-type arcwall cutting machine, the 29-L, for making top, center, or bottom cuts in low coal, was shown by the Jeffrey Mfg. Co., Columbus, Ohio. The company also displayed its new A-5 post drill. For the cutting machine the company claims a cutting and traveling height of 29¼ in. The cutter head is raised and lowered by a friction drive, allowing the cutter bar to operate well below the track. A disconnect clutch is provided so that the cutter bar may be turned while the chain is standing still. Cables to the main motor are brought up through a large hose in the center of the truck to eliminate any attention while cutting.

The A-6 drill is equipped with a 1½-hp. motor. The motor is inclosed, and the drill is started and stopped through a quick-make, quick-break switch, located so as to prevent accidental starting. Advantages claimed for the drill are: forward and reverse speeds and neutral position controlled by a single wheel; auger may be withdrawn at fast speed without reversing direction to clean hole; auger socket is riveted to the end of the thread bar, and is of a new type which eliminates the necessity for a shank on the auger.

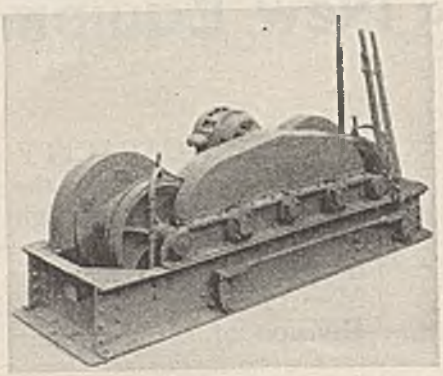
Sullivan Machinery Co., Chicago, offered for inspection the new CR-2, low-



Goodman Type 424BJ Low-Vein Cutting Machine

vein, room-and-pillar mining machine, equipped with control for operating each rope drum independently. The cutter is mounted on a drop-front, self-propelling truck, and is powered by a d.c. motor equipped with remote contactor control. The Sullivan company also showed its nickel-molybdenum, heavy-duty cutter chain, designed, it is asserted, for service where cutting conditions are hard. Samples of the new Sullivan silico-manganese cutter bits for severe service also were shown. The company also called attention to its HDE75, 75-hp., double-drum, portable hoist for scraper loading, and its WK-22, car-type air compressor for low seams.

Cincinnati Mine Machinery Co., Cincinnati, Ohio, displayed Cincinnati cutter chains and cutter heads. Mining machine bits and bit boxes were shown



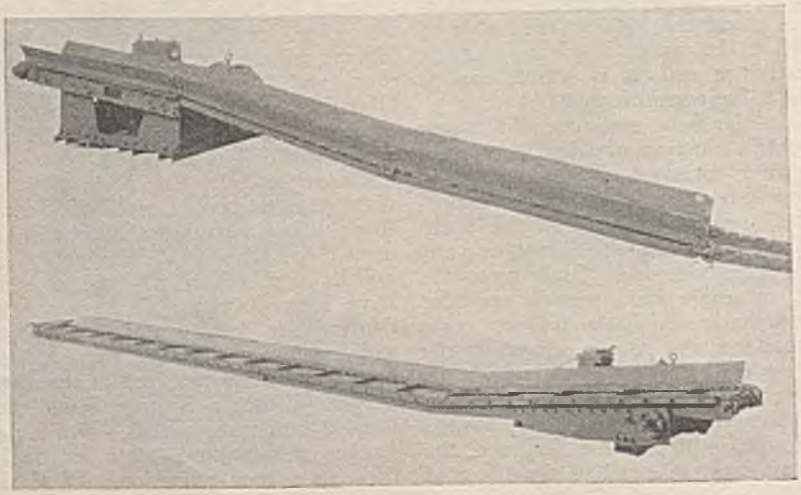
Brown-Fayro Model HL Heavy-Duty Hoist

by the Pittsburgh Knife & Forge Co., Pittsburgh, Pa., while the Bertrand P. Tracy Co. exhibited a cutter bar, repair parts, and Cincinnati cutter chains and cutter heads.

Chicago Pneumatic Tool Co., New York City, offered for inspection items from its line of electric and pneumatic tools for use in coal and soft mine rock; permissible, portable, electric coal drill and mounted electric coal drill; electric and pneumatic maintenance and repair tools of the portable type; and pneumatic rock drills. Colonial Supply Co., Pittsburgh, Pa., showed the one-man permissible coal drill described in the June, 1930, issue of *Coal Age*, p. 399.

A new machine for cutting the coal face up into blocks of predetermined size was shown at the booth of Joy Bros., Inc., Marion, Ohio. The coal saw, according to the makers, is a light,

Tracy Main Conveyor (Top) and Face Conveyor



portable machine which can be used not only for blocking out the coal but for cutting out refuse bands. Raising and lowering of the saws and sumping in to make a cut are accomplished hydraulically. For vertical cuts, the control is entirely hydraulic. To make a horizontal cut, the head bearing the saws is rotated to position and the machine is pulled across the face by a wire rope in the same manner as a cutting machine. After the blocks are formed, they are broken down by pressure pads inserted in the slots. Saws weigh 1,000 lb. and, according to the company, have a capacity of 40 to 50 tons per day.

Mt. Vernon Pit-Car Loader

An aluminum alloy pit-car loader was shown by the Duncan Foundry & Machine Works, Inc., Alton, Ill. This machine, one of a line of aluminum equipment, weighs 980 lb., against 1,650 lb. for a steel machine of corresponding size. All parts are made of aluminum alloy, with the exception of the chains, flights, wheels, and motors. Tests have shown, the company says, that the machine will stand up equally well with steel pit-car loaders and is non-corrosive. The Duncan company also exhibited a steel pit-car loader equipped throughout with Timken roller bearings.

Jeffrey A-6 Post Drill

Central Mine Equipment Co., St. Louis, Mo., displayed a new Fairfield portable face conveyor, mounted on wheels to facilitate moving. Height of the conveyor along the shoveling section is 4 in. A back board 8 in. high is furnished to shovel against and prevent spillage. It is interchangeable from side to side.

A face conveyor and main conveyor were shown by the Fairmont Mining Machinery Co., Fairmont, W. Va. The face conveyor, according to the company, is a low, rugged, double-strand flight conveyor. Total height of the intermediate sections is 3⅛ in. The discharge end is elevated to deliver onto the main conveyor, and the highest part of the machine is 19 in. The equipment is sectionalized, it is said, for ready dismantling, assembly, or extension. The new main conveyor is a single- or double-strand flight conveyor, made in sections for easy handling.

Cars Made Big for Machine Loading

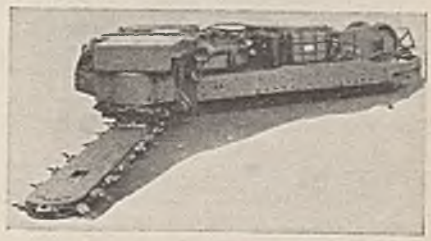
Low height and large capacity featured the mine cars shown at the Cincinnati exposition. A number of double-truck models made their appearance. Watt Car & Wheel Co., Barnesville, Ohio, displayed a model of its new double-truck mine car, designed, it is said, to give maximum capacity with the limiting over-all measurements in order that the greatest efficiency may be obtained from mechanical loaders. Dimensions of the car are: height, 40 in.; width, 66 in.; and inside length, 20 ft. Capacity with a 42-in. track gage is said to be 8 tons.

The Watt company also had on display a new mine car wheel. The axle is made of a standard section T-rail, on each end of which is cast a 5-in. hub, and the wheel is fitted with a preloaded, double-row ball bearings. The company declares that the wheel will run indefinitely after initial assembly and lubrication. Other items exhibited at the Watt booth were a model of the Watt-Allen & Garcia car and dump, Watt rail bender and straightener, automatic switches, and motor bumpers.

A model of the "1-2-3 Automatic" drop-bottom mine car was displayed by the Sanford-Day Iron Works, Inc., Knoxville, Tenn. According to the company, the principal advantage of this car over previous drop-bottom types is that the doors open in 1, 2, 3 order, laying the coal gently in the bin without breakage.

Other advantages listed by the company are: door openings 5 in. wider; doors are flat and stay clean; doors are removable without removing bolts or other fastening devices; axles can be removed without disturbing the pedestal, or without cutting rivets or bolts; axles have more than ½ in. drop, guaranteeing a minimum of derailments; doors have double the lap and are fitted with a safety latch bar to prevent accidental opening; latch end of the latch door is supported from side to side; bumpers and frame are stronger; and the weight is less.

It can be furnished to work in trains with old cars, and over the same door-closing device. A new tripping device can be supplied for service with both old and new cars. The new car, it is declared, costs less per cubic foot of capacity, and can be furnished several inches wider than previous models.



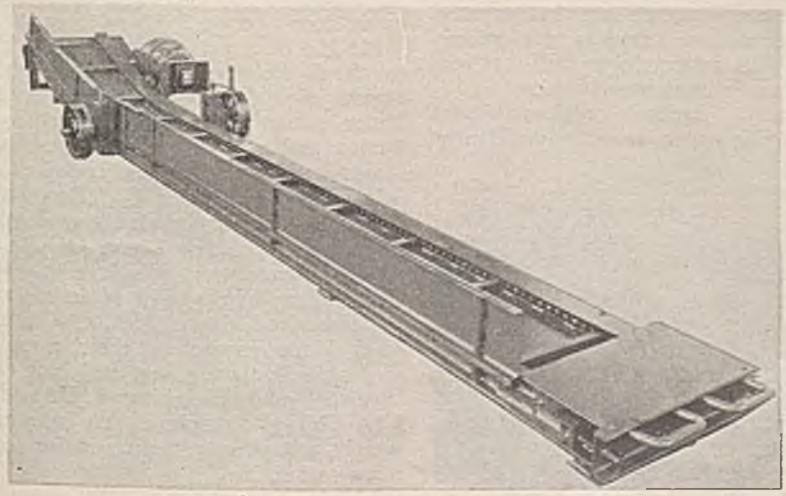
Jeffrey 29-L Arcwall Cutting Machine

A double-truck mine car for two-way dumping was shown by the Differential Steel Car Co., Findlay, Ohio. Great capacity for a given height and width has been obtained, the company says, by using small wheels and a low truck.

The car dumps to either side, the door on the dumping side automatically folding down into the same plane as the floor, while the opposite door remains closed. Dumping is done by a long cylinder operated by compressed air. The dumping mechanism, it is stated, is simple and can readily be moved. By its use a whole string of cars can be dumped without uncoupling them, and spotting need not be accurate.

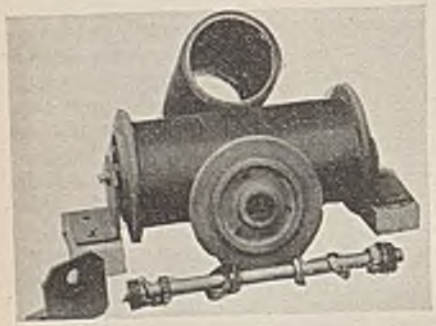
Salient points of the new low-type, large-capacity mine car shown by the Bonney-Floyd Co., Columbus, Ohio, are: weight, 5,000 lb.; capacity, 200 cu.ft.; length, 15 ft.; height, 38 in.; width, 6 ft. 3¼ in.; wheelbase, 48 in.; four-wheel, self-equalizing, cable-operated brakes; and cast steel spring bumpers. Two other high-capacity cars were exhibited by the Bonney-Floyd Co., in addition to heat-treated "MM" alloy-steel wheels equipped with Timken bearings, and "HardKote" welding rod.

Fairfield Portable Face Conveyor



American Car & Foundry Co., New York City, displayed a drop-bottom car, two large-capacity cars, and a number of used cars which had been in service one or two years. Other items in the exhibit were mine car wheels and a special pressed section drawbar and backbone for use in rebuilding old cars. Phillips Mine & Mill Supply Co., Pittsburgh, Pa., showed an all-steel car equipped with Phillips open-cap wheel truck and spring drawheads, which had been used for 14 months, to demonstrate features of design and resistance to wear. Other items in the Phillips display were wheels, links, hitchings, and mine-car parts.

An aluminum-alloy mine car formed part of the display of the Duncan Foundry & Machine Works, Inc. One of the features of the design of the car stressed by the company is the use of channels for the body for great strength and ease of replacement. The only steel or cast iron used in the construction is that contained in the wheels, bumper plates, and axle boxes. The



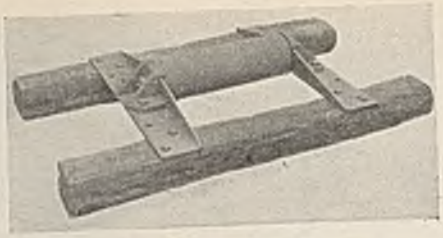
Kanawha Rubber-Covered Pipe Roller

car is equipped with aluminum-alloy axles and drawbars. Capacity, level full, is 95 cu.ft., and the weight is said to be 1,840 lb.

Enterprise Wheel & Car Corporation, Bristol, Tenn.-Va., exhibited a new, low-type mine car which is said to have an extra large capacity. A four-axle principle is employed in the construction to leave the bottom free of obstructions, thus, it is declared, making the car especially suitable for cross-over or kick-back dumps. Easy-running trucks and other mine-car specialties formed the remainder of the exhibit.

Designed, according to the company, to give greater capacity for use with mechanical loading, the new low-type mine car exhibited by the Hockensmith Wheel & Mine Car Co., Penn, Pa., has the following over-all dimensions: length, 14 ft.; width, 90⅜ in., height (14-in. wheel), 25 in. Weight of the car is 4,550 lb. Tops of the sides and ends are rolled and riveted and the sides are fitted with an angle to add strength. Two ship-bulb angles extend the entire length of the bottom to act as a backbone.

Mine cars also were shown by the Lorain Steel Co., and the Irwin Foundry & Mine Car Co., Irwin, Pa. Wheels, mine-car trucks, hitchings, links, pins, axles, and other mine-car specialties were on exhibition by the Brown-Fayro Co., Mt. Vernon Car



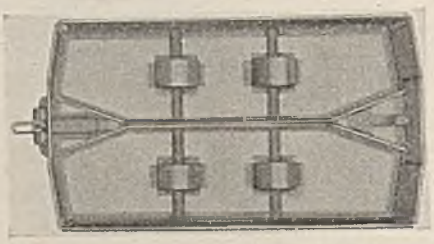
Brown-Fayro Track Roller

Mfg. Co., National Malleable & Steel Castings Co., Cleveland, Ohio; Central Frog & Switch Co., Cincinnati, Ohio; Flood City Brass & Electric Co., Johnstown, Pa.; Pittsburgh Knife & Forge Co., Pittsburgh, Pa.; Carnegie Steel Co., Pittsburgh, Pa.; and the Bethlehem Steel Co., Bethlehem, Pa.

Switches, ties, bolts, switch stands, throws, and other track material was shown by the Bethlehem Steel Co., Carnegie Steel Co., Central Frog & Switch Co., Truscon Steel Co., Cleveland, Ohio; Weir Kilby Corporation, Cincinnati, Ohio; West Virginia Rail Co., Huntington, W. Va.; Lorain Steel Co., and the Watt Car & Wheel Co.

General Steel Castings Corporation, Eddystone, Pa., displayed the new "Commonwealth" cast-steel mine-car underframe with integral floor plates and pedestals. These may be supplied for all types of cars. Use of the new underframe, it is declared, eliminates repairs and maintenance; provides greatly increased strength without additional weight; resists corrosion and deterioration; and offers an ideal construction for rotary dump conditions.

New slope rollers with Timken roller bearings were shown by the Vulcan Iron Works Co. Two types were shown, one of which is especially adaptable to



Hockensmith Low-Type Mine Car for Machine Loading

service at points where the grade changes. Shells of the first (Type STS) are made of heat-treated, 0.35-0.45 carbon, seamless steel tubing. Type WTS rollers have shells of cast chromium or manganese steel.

A new, incline, rubber-covered, flanged pipe roller, mounted on Timken

"Commonwealth" Cast-Steel Mine-Car Underframe

bearings, was shown by the Kanawha Mfg. Co., Charleston, W. Va. The shell consists of a 7-in. pipe on which is vulcanized a ⅜-in. coating of rubber. This, the company says, prolongs the life of both the roller and the rope by reducing abrasion. The Kanawha company also offered for inspection the ECK, air-cooled sand dryer, which is said to be so constructed that grates and working parts, with proper attention, will not fuse, melt or burn.

Brown-Fayro Co., displayed a new 6-in. track roller with an 18-in. face. It is mounted on Timken bearings which are carried on a large shaft and are carefully inclosed and packed in grease. The shaft is held stationary by the supporting brackets, which also serve as rope guides.

Nachod "SUD" signals for the protection of a block section on a single-track main-line haulage were demonstrated by the Nachod & United States Signal Co., Inc., Louisville, Ky. These signals, operated by a relay which is energized by contact of the trolley

Enterprise Low-Type Mine Car

wheel with an overhead contactor, give protection from both the front and the rear, the company says. The electrical circuits of the relays are so connected that only one green, or proceed signal, can be obtained, although two or more locomotives strike the contactors at the same time. The Nachod exhibit also included a Cheatham switch-throwing device, operated by a trolley contactor. An electrically operated headway recorder also was shown.

The American Mine Door Co., Canton, Ohio, showed an electric switch thrower and automatic signaling equipment for use on haulage roads. Electric Mine Door Co., Pittsburgh, Pa., demonstrated the operation of an automatic door opener.

Models of a rotary dump and chain car haul, Nolan automatic double-horn cagers, Nolan mine-car retarders, and Nolan automatic feeders for crossover dumps and for dumps equipped with scales were shown at the booth of the Mining Safety Device Co., Bowerston, Ohio. A working model, showing the operation of the new Olson, OC-7, self-dumping cage, was displayed by the Eagle Iron Works, Des Moines, Iowa.

Fairbanks, Morse & Co., Chicago, offered for inspection their mine-car dial scale for weighing coal and cars. Streeter-Amet Weighing & Recording Co., Chicago, displayed an automatic weight-recording attachment for coal-mine scales.

Power Savings Sought

As in past years, material for the use and control of power occupied a major position at the Cincinnati exposition. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., exhibited a new automatic change-over switch for mine locomotives; new explosion-tested inclosures for control equipment on trolley and cable-reel locomotives; a new combination multi-speed drive and motor; and the new Type CS squirrel-cage motor for use in explosive atmospheres; cable guides for gathering locomotives; a few standard motors; trolley line material; a Westinghouse-Nuttall Type DH7, double-reduction speed reducer; a mine locomotive trolley of late type; brushes; a gasproof locomotive headlight; and other material.

The new change-over switch, the company says, will automatically change power connections from the trolley pole to the cable reel or vice versa. Designed for 250- and 500-volt operation, the switch consists of two operating coils, one in series with the trolley and the other with the reel. When either the trolley wheel or the cable "nip" is on the wire, one of the coils of the switch is energized, engaging the corresponding main contacts and completing the power circuit to the control equipment. In case either the wheel or "nip" is placed on the wire while the other is in contact the contact will not be changed.

In the Westinghouse explosion-tested inclosures for control equipment, controller, contactors, and control auxiliaries are installed in one compartment. Frames of the Baldwin-Westinghouse locomotive are arranged to accommodate the compartment, which is constructed in two halves, bolted together. In one half is the transfer drum, reverse drum, master drum, and overhead relay. Seven switches are assembled in the other half. Control switch and fuse, headlight fuses, and reel motor fuses are mounted inside the controller cover. The only locomotive wiring necessary is that to the current collectors, resistors, and motors. The compartment is designed for locomotives 26 in. or more in height.

A cable guide for gathering reels on 250- and 500-volt, Baldwin-Westinghouse mine locomotives also was shown. This equipment, it is said, differs from previous types in that a three-piece construction, consisting of a hardened metal center and two outer Micarta insulating rings, is employed. Former guides were constructed as a unit. The inner portion of the new guide is the only wearing part. Construction, it is declared, enables the operative to replace the hardened metal center without discarding the entire guide, thereby reducing maintenance costs. In addition, the wearing portion of the guide retains its polished surface throughout its life, eliminating abrasive action and increasing cable insulation life.

A multi-speed reduction gear unit built in combination with a standard a.c. motor was an added feature of the Westinghouse exhibit. Constructed to give four different speeds at the output shaft at constant horsepower, the unit is designated as the Westinghouse-Wise multi-speed drive. Speed of driven apparatus may be changed while the motor is running at full speed and under full load. The gear unit is mounted on a standard squirrel-cage induction motor. Three units are available, ranging in rating from ½ to 7½ hp. The four speeds in the gear reduction itself, plus availability of motors with different driving speeds, makes it possible to choose a combination with a wide range of speeds.

In the Type CS squirrel-cage motor, the rotor assembly is entirely inclosed. Fan blades on each end of the rotor, however, keep the air within the motor moving so that it can dissipate heat through the walls of the case, where it is carried away by a stream of cold air driven around the motor by an outside fan. The outside cooling fan is made of a non-sparking aluminum alloy, and close fits and labyrinth seals are made to prevent the escape of flame in case an explosion should occur in the case. Leads are brought into a conduit box through a gum-filled gap.

General Electric Co., Schenectady, N. Y., exhibited the following equipment: fan-cooled induction motors: Class BM (Bureau of Mines) a.c. and d.c. motors and controls; locomotive accessories, including a Type EW gearless reel and locomotive armature coils; substation equipment, consisting of a 600-amp. sectionalizing feeder device; CR-9504 "Thrustor" actuated by a photo-electric relay; and mining-type cables.

Duncan Aluminum-Alloy Mine Car

In addition to its regular line of trolley material, overhead line materials, rail bonds, headlights, safety and control equipment, and insulators, the Ohio Brass Co., Mansfield, Ohio, displayed its incandescent headlight (*Coal Age*, March, 1930, p. 196), a mine harp for low coal (*Coal Age*, December, 1930, p. 754), and a new time limit circuit breaker (*Coal Age*, April, 1931, p. 218).

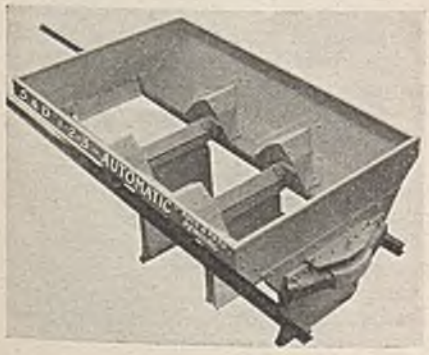
Allis-Chalmers Mfg. Co. displayed a new Type ARZZ explosion-proof, squirrel-cage motor, approved by the Underwriters' Laboratories for use in inflammable atmospheres. Among the construction details set forth by the manufacturer are: total inclosure, fan cooling, positive sealing, conduit box (approved) adjustable to four 90-deg. positions.

Electric Railway Improvement Co., Cleveland, Ohio, exhibited "Erico" rail bonds and portable welding rheostats for bonding. In addition, the company showed a new Type CX-2 cross-bond for copper arc-welding application. According to the company, the bond is the shortest possible for the purpose, and is completely protected from derailments or dragging equipment. Maximum projection of the bond terminal from the edge of the rail base is ¼ in.

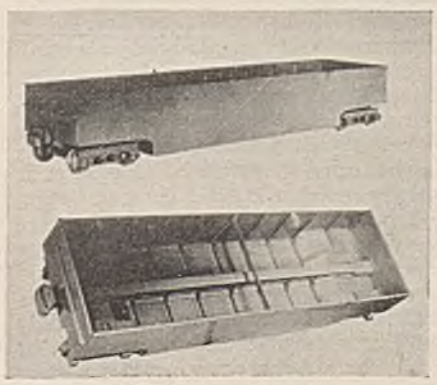
New equipment shown by the Electric Railway Equipment Co. included: "Elreco" acid-proof, high-strength insulating material for use in mine hangers; I-beam adapter for standard-type hangers, eliminating special equipment; adjustable current tap which provides easy adjustment for wire used for lighting or other types of service; and a non-aligning, "Shure-Grip" trolley clamp.

Plugs and receptacles for mine use were exhibited by the Albert & J. M.

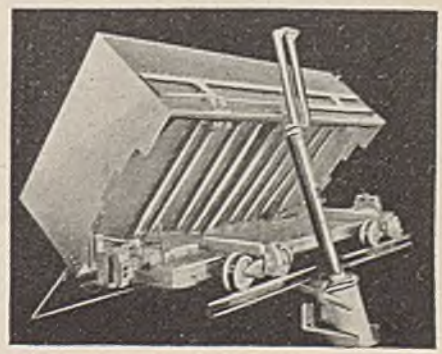
Sanford-Day "1-2-3 Automatic" Drop-Bottom Car



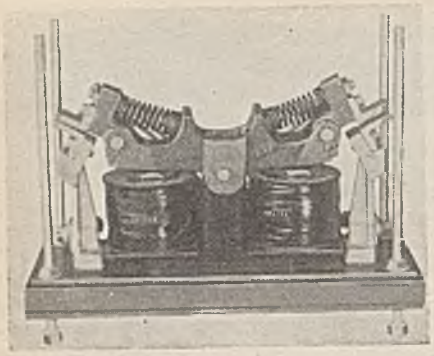
Watt Double-Truck Mine Car



Double-Truck Mine Car of the Differential Steel Car Co.



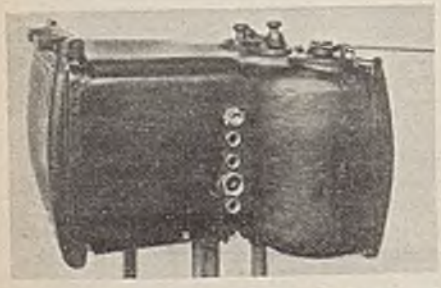
Safety Promoted by New Products



Westinghouse Change-Over Switch for Mine Locomotives

Anderson Mfg. Co., Boston, Mass. Line material and other specialties were shown by the Flood City Brass & Electric Co., Johnstown, Pa.; Simplex Wire & Cable Co., Boston, Mass.; American Steel & Wire Co., Chicago; and the General Cable Corporation, New York City. Post-Glover Electric Co., Cincinnati, Ohio, exhibited steel resistance grids, and a transfer switch for locomotives. Evansville Electric & Mfg. Co., Evansville, Ind., displayed Bakelite insulating materials, armature coils, and line materials.

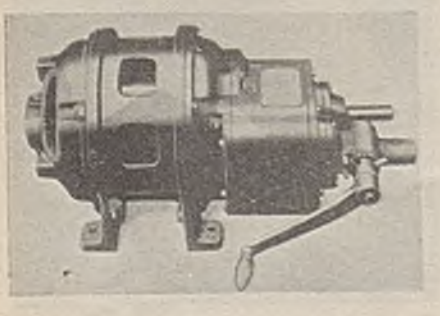
Electric Storage Battery Co., Philadelphia, Pa., used sectional cells to tell the story of its batteries. Edison Storage Battery Co., Orange, N. J., showed cutaway cells, cap lamps, and other



Westinghouse Explosion-Tested Inclosure, Showing the Two Halves Bolted Together

equipment. Mavor & Coulson, Ltd., displayed several items from its line of flameproof switchgear; automatic circuit breakers; and remote control equipment for gate-end loaders. Jeffrey Mfg. Co. showed an automatic transfer switch for cable-reel locomotives; continuous steel trip resistance for locomotives, cutters, and loaders; and controllers for use in mine locomotives. National Carbon Co., Inc., Cleveland, Ohio, offered for inspection carbon graphite and metal graphite brushes.

Westinghouse-Wise Reduction Gear Unit



Edison electric mine lamps, approved electric cap lamps, portable searchlights, hand lamps, trip lamps, fireproof charging racks, first-aid material, gas-detecting instruments, and respiratory protective equipment, including the Burrell "All-Service" gas mask, the new M-S-A self-rescuer, and the McCaa two-hour oxygen-breathing apparatus were features of the exhibit of the Mine Safety Appliances Co., Pittsburgh, Pa. Additional material comprised four models of the M-S-A protective headgear, including a new cap, safety clothing, signs, goggles, etc.

Westinghouse Cable Guide for Gathering Locomotives

The new self-rescuer is now arranged in an airtight steel case of improved design, and is tested for leakage under a pressure of 10 lb. per sq.in., the company says. The protective cap is of the molded type, is black in color, and, it is claimed, is properly balanced, well-ventilated, absolutely waterproof, and durable. It is made in the standard hat sizes.

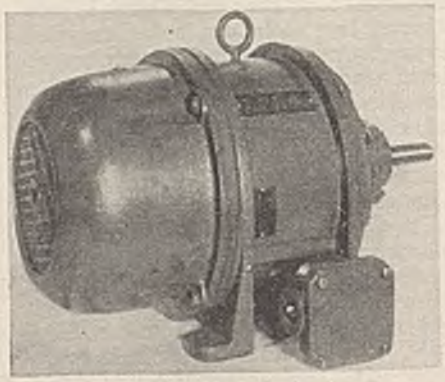
When equipped with a flood-type projector, the new permissible portable floodlight and search lamp has, according to the company, a beam candlepower of several hundred over a fairly wide angle. With this reflector, it is asserted, the light is particularly valuable for loading by hand or by machine at the face. With a polished reflector, the company says, the lamp throws a beam of light of several thousand candlepower, making it particularly suitable for lining up track.

Portable Lamp & Equipment Co., Pittsburgh, Pa., distributor for the Koehler Mfg. Co., showed a new lightweight trip lamp (3½ lb.) with a combination battery jar. The inner part of the jar is hard rubber and the outer part is of soft rubber to guard against damage from the shocks and rough handling incident to trip service.

A new constant-potential charging system also was shown by the company. Essential equipment consists of a 5-volt motor-generator set, switchboard, and a charging rack with busbars for charging batteries in parallel. Operation is entirely automatic, the company says, and lubrication is necessary only once every few months. The charging rate is set when the system is installed, and need not be changed afterward. It is stated that the charging time is only two-thirds of that usually required, or 6 to 8 hr. After charging, the battery floats on the line, offsetting local action and, it is declared, contributing to the life of the plates. Less labor is required with this system, according to the company.

One unit of the Union Carbide & Carbon Corporation, New York City, showed the U.C.C. methane detector (*Coal Age*, January, 1931, p. 51), Everready shotfiring units, and Everready permissible flashlights. American Mine Door Co., Canton, Ohio, displayed a high-pressure rock-dusting machine. Safety Mining Co., Chicago, had an exhibit of Cardox cartridges for breaking down coal. Safety First Supply Co., Pittsburgh, Pa., offered for inspection first-aid material, hard-boiled hats, hard-toed shoes, goggles, and other material. Max Wocher & Son Co., Cincinnati, displayed first-aid and health-preserving material. At the booth of the U. S. Bureau of Mines, proper timbering methods were shown by full-size models.

The following explosives were shown by E. I. duPont de Nemours & Co., Inc., Wilmington, Del.: Monobel Nos. 1, 6, 8, 9-A, 11, and 12; Duobel; Duobel No. 4; Gelobel No. 3; and pellet powders Nos. 1, 2, and 3. All except the pellet powders are permissible. Duobel No. 4, according to the company, is a bulky explosive with an intermediate density and an average cartridge count of 205. Unit deflective charge is 209 grams, and the rate of detonation is 8,000 ft. per sec. It is especially adapted for the production of lump from soft, friable coal, the company states. No. 3 pellet powder is a



Westinghouse Type CS Totally Inclosed Squirrel-Cage Motor

new, slow type for blasting hard, blocky coal. It is asserted that it can be used for breaking down faces which have been undercut or for shooting coal off the solid with as good results as the larger granulations of black powder.

Atlas Powder Co., Wilmington, used printed matter to tell of its line of explosives. Hercules Powder Co. Wilmington, displayed coal-mining explosives and blasting supplies, including a complete series of pellet powders (Grades A, B, and C) and a new gelatin type permissible explosive,

M-S-A Protective Cap

Hercogel C. Higher than usual cartridge count features this explosive, the company states, and it may be used in place of Hercogel and similar types for wet work.

Brown-Fayro Co. had on display the new "Brownie" tubing blower. Its total weight is 270 lb., thus allowing two men to carry it. In construction, a special "Sirocco" blower unit is mounted on a fabricated steel base, with the fan wheel mounted on the shaft of a special, totally inclosed, compound-wound motor. Normal rating of the blower, according to the company, is 1,200 to 1,500 c.f.m. Maximum pressure within the limits of the unit is 3 in. of water gage.

A permissible flameproof blower (16-in.), made up of a Westinghouse flameproof motor, together with a government-approved starting switch mounted on the base was shown by the Jeffrey Mfg. Co. This company also showed the new No. 3 blower, equipped with a 5-hp. motor and a drip-proof cover. Both blowers, it is pointed out, are fitted with the new Jeffrey expansion discharge, which receives the coupling band without requiring more than that the band be compressed and inserted into the mouth of the discharge. Robinson Ventilating Co., Zelienople, Pa., exhibited a model of a reversible mine fan, three types of blowers for auxiliary ventilation with tubing, and man-cooling fan for industrial applications.

M-S-A Self Rescuer

Mechanical Preparation Goes Ahead

In addition to full-size equipment set up and operating on the exposition floor, models and photographs were employed to tell the story of coal preparation. Motion pictures were employed by the Hydrotator Co., Hazleton, Pa., to acquaint the delegates with the operation of the coal-washing equipment of the same name. The Hydrotator Co. also showed by means of a working model how coal is cleaned by the "Aersand" process (*Coal Age*, February, 1931, p. 66). The Pennsylvania Mining Machinery Co., New York City, in conjunction with the Fairmont Mining Machinery Co., displayed a working model of the Peale-Davis air table. A scene-in-action view of a Rhéolaveur plant was exhibited by the Koppers-Rhéolaveur Co., Pittsburgh, Pa., as well as photographs of previous installations.

M-S-A Portable Searchlight

A working model of the Simon-Carves washer was set up in the booth of the Link-Belt Co., Chicago. Morrow Mfg. Co., Wellston, Ohio, had a working model of a complete Morrow tipple on display. Pittsburg preparation equipment was shown in pictures at the booth of the Pittsburg Boiler & Machine Co., Pittsburg, Kan. American Coal Cleaning Corporation, Welch, W. Va., showed a model of the R-type pneumatic separator cleaning coal at the rate of 10 tons per hour. A metallic filter was connected for removing the dust. Roberts & Schaefer Co., Chicago, featured "RandS" revolving dumps, Marcus screens, and Menzies hydro-separators, including a multiple-unit separator with rewash features.

A new white rubber cover for Nos. 7 and 7C, Deister-Overstrom diagonal-deck coal washing tables was shown by the Deister Concentrator Co., Ft. Wayne, Ind. Use of the new covering, the company says, enables the operative to see the dividing line between refuse and coal more clearly, thus increasing the recovery of coal and raising the quality. Life is equal to that of black rubber. The Deister company also exhibited one of the Deister-Overstrom diagonal-deck tables, and a Leahy "NO-Blind" vibrating screen.

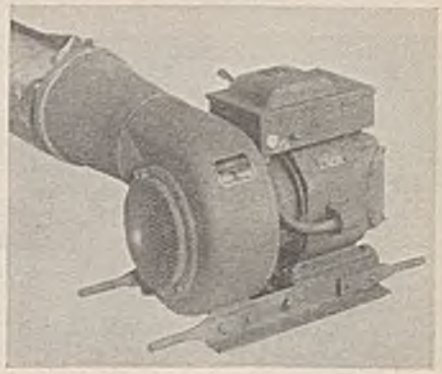
Niagara Roller Bearing Screen Co., Buffalo, N. Y., showed a new, large-capacity vibrating screen for tipple service. Dimensions are: width, 4 ft.; length, 14 ft. According to the company, the screen is designed for installation in existing structures with a minimum of alteration. Simplicity Engineering Co., Durand, Mich., displayed a 2x3-ft. double-deck utility screen driven by a V-belt. Traylor Vibrator Co., Denver, Colo., exhibited the "Conveyanscreen," described in the April, 1931, issue of *Coal Age*, p. 217. W. S. Tyler Co., Cleveland, Ohio, showed a vibrating screen; "Ro-Tap" machine with testing sieves; a "Delatester"; and samples of woven-wire screen cloth and perforated metal. Hendrick Mfg. Co., Carbondale, Pa., showed perforated plates for sizing coal; bronze plates with milled slots for coal-washing plants; and "Mitco" grating.

Allis-Chalmers Mfg. Co. showed one of its line of vibrating screens, entirely suspended from the structure by rods. The "Bronco" vibrating screen was displayed by the Fairmont Mining Machinery Co. This screen, the company says, has a thoroughly balanced mechanism. The material as it travels over it is given both a horizontal and vertical kick, adjustable, it is said, between wide limits to suit the material being screened.

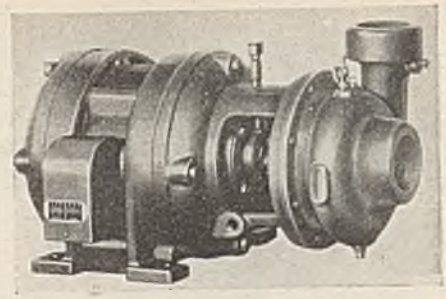
"Dustilize," an oil-base solution for treating coal to render it dustless, was offered for inspection at the booth of the Coal Treating Equipment Co., Cleveland, Ohio. According to the company, the new solution is a lubricant and will not corrode any equipment; it forms a film dense enough to prevent air slacking, yet is pliable enough to attract floating particles. Other advantages claimed are: less solution required in any weather; smaller particles will not pack, thus facilitating screening; color of the coal is not changed; does not affect the skin; requires only a smaller orifice in the spraying equipment; and does not wash off under ordinary weather conditions.

A new, "Pennweld," single-roll crusher, designed for crushing lump coal to egg or egg coal to nut in one

"Brownie" Tubing Blower



operation in tipple service with a minimum of ⅜-in. slack, was exhibited by the Pennsylvania Crusher Co., Philadelphia, Pa. The machine is only 29 in. high, thus requiring, it is said, little headroom. It has a hopper of sufficient size to enable it to handle large lumps. All-steel frame, cut steel gear and pinion, and 13 per cent manganese wear liner and wear tip are some of the features of construction emphasized by the company. A total crushing adjustment of 6½ in. is available on the breaker plate, which can be pulled back until the narrowest part is at the throat at the top of the crusher.



Allis-Chalmers "SSU" Pumping Unit

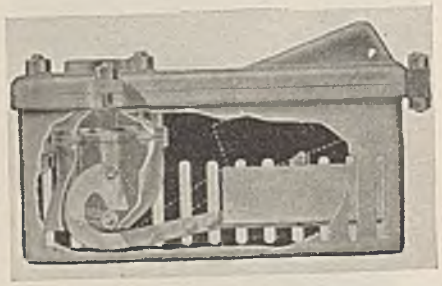
Pumps and Pipe Last Long

Eight manufacturers exhibited pumps, pipe, and auxiliary fittings at the Cincinnati exposition. The Fairmont Mining Machinery Co. showed its new Model "A," portable, electric, mine pump, made in two sizes—50 and 100 g.p.m. It is mounted on a cast-iron base and may be equipped with wheels and axles if desired. Its lightness and compactness facilitate movement, the company says. Acid-resisting bronze is used wherever corrosion is likely to take place, and all gears are inclosed and run in oil.

Fairbanks, Morse & Co. showed the new Fig. 520 and Fig. 525 centrifugal pumps, designed, the company states, for high efficiency at a low price. The pumps, of the side-suction type, have, according to the manufacturer, the following unusual characteristics for their class: efficiencies as high as many double-suction pumps; unusual mechanical refinements, including ball bearings; maximum dependability with lowest maintenance cost; easy accessibility and assembly; and moderate price. Sizes range from 1 to 8 in. in capacities from 25 to 2,200 g.p.m. at heads up to 120 ft.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., showed one of its line of "SSU" centrifugal pumping units, which includes ratings from 30 to 500 g.p.m. at heads under 100 ft. "SSU" units are of the single-shaft, two-bearing design. Use of totally inclosed, fan-cooled motors and the adoption of inclosures for the motor housings on the pump end of the units, according to the company, allow their use under severe conditions of service.

In addition to a self-priming centrifugal pump, the LaBour Co., Elkhart, Ind., exhibited the new automatic suction control valves, demonstrating their ability to drain sumps down to low levels or operate in various sumps regardless of their respective levels. The valves are designed, the company says, for draining water in a sump from a high level of 3 in. down to a low of 1½ in. Operation of the valve is float-controlled but not float-operated. When the water is low, the weight of the float closes the valve, but when sufficient flows into the sump, the float rises and the suction of the pump lifts the valve and drains the water. The valve, the company says, can be installed in almost any location, because of its compactness. Dimensions of a 2-in. valve are: height, 8½ in.; length, 15 in.; width, 10 in. Where it is desired to keep workings wholly dry, the valve must be placed in a depression about 3 in. deep.

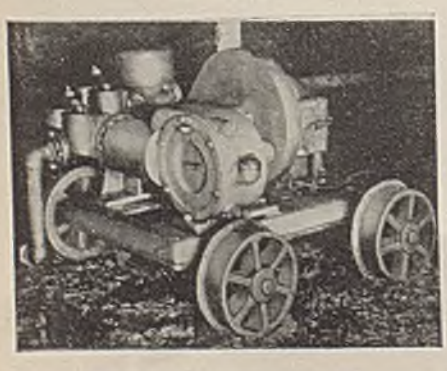


LaBour Automatic Suction Control Valve, Cut Away to Show Operation

A. D. Cook, Inc., Lawrenceburg, Ind., displayed a small, self-oiling, deep-well plunger pump for town water service with a capacity of 150-300 g.p.h. Control is automatic, and the working pressure may be varied from 20 to 40 lb. per sq.in. The second item in the Cook exhibit was a small, self-oiling, deep-well turbine pump, made in a range of sizes for wells 4 to 16 in. in diameter. Other equipment shown included second growth Northern ash sucker rod with refined wrought-iron bars; brass tube strainer, with slots cut from the inside to the outside, to pass any particle that enters; Type R spring-loaded rubber valve, designed for the small, electric, deep-well water system; and other pumping accessories.

One of its line of Austin mine pumps was shown by the Brown-Fayro Co. American Hard Rubber Co., New York City, displayed rubber-lined pipe, gate valves, and fittings, as well as all-rubber pipe, fittings, and strainers. National Tube Co., Pittsburgh, Pa., showed its "Copper Steel" pipe and "National" Talbot-lined pipe, coated on the inside with molten bitumen to resist corrosion. Talbot-lined pipe is available in sizes from 4 in. up, with a protective coating of ¼ in. Colonial Supply Co., Pittsburgh, Pa., offered for inspection "Bermico" fiber pipe, described in the March, 1931, issue of *Coal Age*, p. 168. American Cast Iron Pipe Co., Birmingham, Ala., exhibited "Doublex Simplex" cast-iron pipe, "Simplex" cast-iron pipe for coal-mine use, and "Mono-Cast" centrifugal cast-iron pipe.

Fairmont Model "A" Mine Pump (Portable)



Specialties Offered by Industry

Oils and greases, gears, wire rope, mine jacks, and other specialties were offered for inspection by a number of manufacturers at the Cincinnati exposition. The Fairmont Mining Machinery Co., displayed a new automatic bit-tempering machine, shown in an accompanying illustration. As the bits are sharpened, they are dropped into the four cups on the spider and are carried around into the tempering bath. The length of time a bit stays in the bath is determined by the length of the guide, which is adjustable. After the cups come out of the bath, a trip turns them to one side and allows the bit to drop out into the container. With this method of quenching, the company explains, a definite part of the point is cooled. Then, after the bit leaves the bath, the heat runs down into the cooled portion, leaving it tough and eliminating the usual line of breakage.

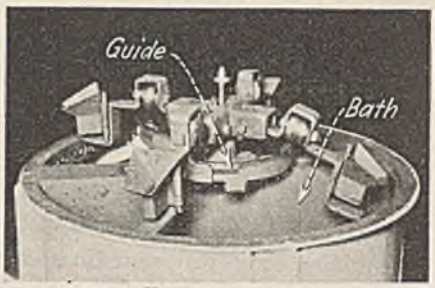
Watt Car & Wheel Co. had on display its new bit boxes. These are made in the form of a cylinder, and the lids carrying the handles screw on. According to the company, rough handling will not change the shape of the boxes, and the loss of bits is minimized. Three sizes are available: No. 1, 125 bits; No. 2, 70 bits; and No. 3, 75 bits.

Garlock Packing Co., St. Louis, Mo., showed samples of its line of packing. One item was the new Garlock-430 "Chevron" packing, designed, the company says, for use on rams and plungers of heavy hydraulic equipment. Construction allows it to pack tighter as the pressure increases. Garlock 701 industrial brake lining, constructed of asbestos cloth impregnated with a

special rubber compound and compressed under a pressure of 2,000 lb. per sq.in., also was exhibited.

The Lincoln "Flex-O-Matic" lubricating system, by which small measured quantities of lubricant are automatically injected into the bearings at frequent intervals, was shown by the Lincoln Engineering Co., St. Louis, Mo. The quantity of lubricant is determined by the size of the injector, and the entire pump pressure is available to overcome stubborn conditions.

"Tulc" greases, made by the Universal Lubricating Co., Cleveland, Ohio, were shown in conjunction with the Post-Glover Electric Co. According to the company, these greases last longer, thus saving labor and increasing life of bearings. Pennsylvania Lubricating Co.,



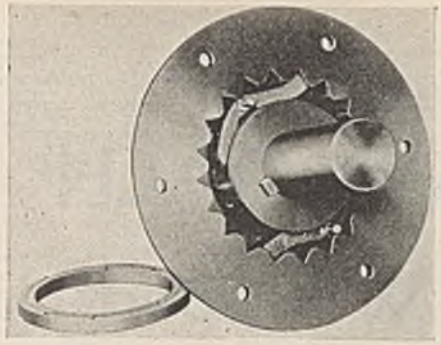
Fairmont Bit-Tempering Machine

Pittsburgh, Pa., showed items from its line of greases for coal-mining use, as did the Keystone Lubricating Co., Philadelphia, Pa.; Pure Oil Co., Columbus, Ohio; and the Hulburt Oil & Grease Co., Philadelphia.

Wire rope for mine use was shown by the American Cable Co., New York City; American Steel & Wire Co., Chicago; Broderick & Bascom Rope Co., St. Louis, Mo.; Hazard Wire Rope Co., Wilkes-Barre, Pa.; A. Leschen & Sons Rope Co., St. Louis; MacWhyte Co., Kenosha, Wis.; and the John A. Roebling's Sons Co., Trenton, N. J. Bearings were shown by the Pruyn Co. of America, Philadelphia, Pa. (reground bearings); Timken Roller Bearing Co., Canton, Ohio; Norma-Hoffmann Bearings Corporation, Stamford, Conn.; and the Bertrand P. Tracy Co., Pittsburgh, Pa. Ahlberg Bearing Co., Chicago, stressed the new "EC" Type self-aligning ball-bearing pillow blocks.

Gears, speed reducers, and other equipment for the mechanical transmission of power were shown by the Link-Belt Co.; Tool Steel Gear & Pinion Co., Cincinnati; and the Westinghouse Electric & Mfg. Co. Jeffrey Mfg. Co. displayed removable split rim gears for various types of its motors. Jos. T. Ryerson & Son, Inc., Chicago, had at their booth a display of special steels. Truscon Steel Co. showed steel tunnel liner plates.

Central Mine Equipment Co. showed the Landahl "Life-Time" backstop for the announced purpose of providing a positive means of preventing shaft reversal. Its action, the company states, is such that no impact needs to be overcome. Operation, it is said, is automatic, silent, and instantaneous. Construction



Landahl "Life-Time" Backstop

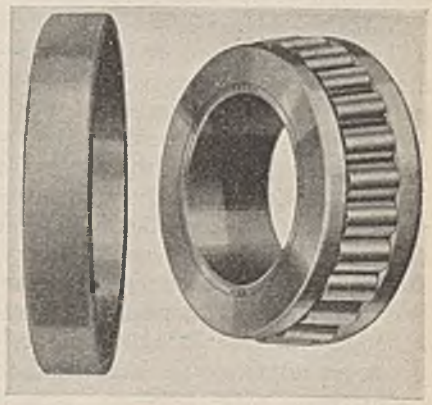
is such that the backstop acts not only as such but as a bearing. It eliminates, according to the company, shaft end thrust in either direction, so that no separate set collars are necessary. Neither is extra shaft space required, as the backstop takes the place of a standard-type bearing. Internal construction consists of two locking pawls mounted on pins held by two floating rings and a pawl collar.

A complete line of cageless, tapered roller bearings was placed on display by the Tyson Roller Bearing Corporation, Massillon, Ohio. The principal feature stressed by the company is the elimination of the conventional cage or retaining ring, positive roll alignment being obtained by a double-ribbed back plate at the high end of the rolls. Omission of the cage, the company asserts, leaves room for 20 to 50 per cent more rolls, with consequent increase in capacity. The bearings are made in S.A.E. sizes and are interchangeable with all types of anti-friction bearings, the company says.

Mining machine jacks, timber jacks, post pullers, and similar equipment were shown by the Duff Norton Mfg. Co., Pittsburgh, Pa., and Templeton Kenly & Co., Chicago. The Lorain Steel Co. showed its line of Langham jacks for supporting mine roofs. "Adjustoprops," or steel roof jacks made by the Walter Mfg. Co., New York City, were shown by the Conveyor Sales Co. Standard units consist of a cap, one-piece head, and base. Between the head and cap is a ball-and-socket joint, said to permit the cap to adjust itself to irregular roof or uneven wedging. This feature, it is claimed, permits eccentric loading and allows the jack to carry much heavier loads. Contact line between the head and base is a curved plane, and the head is normally held in position by the locking ring. To dismantle the prop, the locking ring is tapped with an ax, whereupon it flies up, the head rotates out sideways, and the prop collapses.

A two-piece screw head may be provided, if desired, and this will permit more rapid installation, it is stated, because it may be screwed up to tighten the prop without the use of wedges. Extension rings may be secured to make up the height between the prop and the floor, or timbers may be used for this purpose. Standard props come in 18- or 24-in. sizes, the weights being 110 and 130 lb., respectively. Props with screw-type heads are available in the same sizes, the weights being 120 and 140 lb.

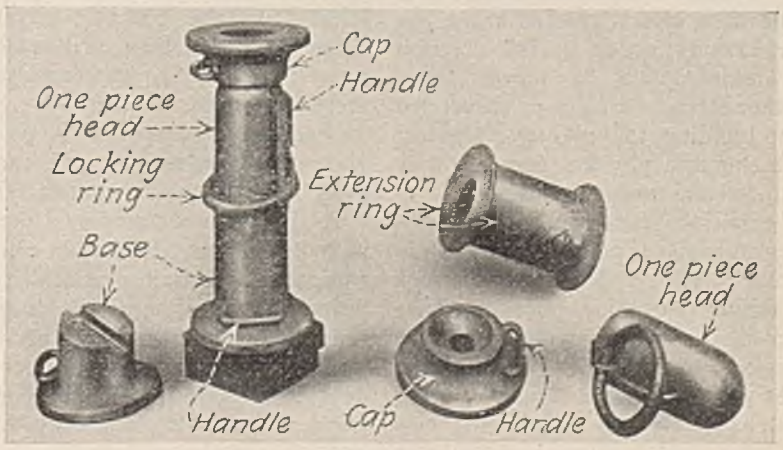
Units of the Union Carbide & Carbon Corporation offered for inspection carbide; "Carbic" lamps; welding cylinders



Tyson Roller Bearing With Cup Removed

and outfits; welding and cutting torches, regulators, gages, etc. "Gredag" lubricants also were on display. "Gullick" couplings for hose handling compressed air, gasoline, oil, water, steam or other liquids or gases without leakage, were exhibited by Mavor & Coulson, Ltd. Photographs of industrial towns and of individual houses built by it were shown by the R. H. Hamill Co., Huntington, W. Va.

Walter Mfg. Co. "Adjustoprop," Showing Component Parts



PHYSICAL APPROACH
« To Safety at Wildwood

By G. N. McLELLAN
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Butler Consolidated Coal Co.
Wildwood, Pa.

SAFETY can be approached in two ways: the mechanical or physical and the mental or moral. In the issue of May, pp. 243-246, reference was made to the latter approach as exemplified by the Wildwood mine of the Butler Consolidated Coal Co., Wildwood, Pa. This article will deal with the effort made to remove as many hazards as possible by improvements in equipment.

So greatly has the use of electricity in industry increased that at some plants practically all the employees are brought in daily contact with some form of electrically driven machinery. In the absence of better protection and increased education, a corresponding increase in electrical accidents on an exposure basis, and in comparison with previous records might be expected.

Such would be the case, no doubt, were not additional precautions taken in the safer design and installation of equipment. Responsibility does not end with these improvements; a maintenance program must be added, one which does not present daily hazards to the mechanics engaged in it, and one which will maintain and even improve the standards under which the plant was originally installed.

When accidents are closely classified, it is easy to see that a large part of the casualties attributed to the use of electricity occur in the erection and maintenance of power lines, whether strung on poles or suspended from building to building. Subject to storms and physical damage, they create several major hazards.

Electricians come in contact with wires and fall off poles or buildings in making repairs, and others are struck by falling wires or poles and are shocked, or even electrocuted, by cross-connections of high-tension wires with telephone, signal, or other low-tension circuits and by the passage of lightning along electric wires. Many fatalities and injuries have been caused by workmen on the tops of buildings coming in contact with wires carried on or over such structures.

Despite all that is being done to prevent the occurrence of such accidents, they continue to represent quite a large proportion of the total. For the foregoing reasons, at Wildwood all surface-plant electrical distribution for power, lights, signal, or telephone wiring is accomplished by the use of underground cables, thus eliminating many serious hazards.

As all open wiring presents chances for injury by contact, wires, switches and controllers, wherever possible, are incased in metal conduits and sheet-metal cabinets. High-tension equipment is placed where none but authorized persons can have access to it. Automatic or remote control is used, so that operating employees need not come in close proximity to dangerous potentials. Any metal parts that accidently might become charged are thoroughly grounded.

At the Wildwood mine the electric potentials used vary from 2,300 volts a.c. to 275 volts d.c., the latter being selected as the general distribution voltage for the mine, principally because the safety of the employees is thereby assured. Trolley wire, which of necessity is exposed, is provided with guards wherever men carrying tools might come in contact with it.

A thorough maintenance program is required for permissible electrical equipment. A failure of one of these units may ignite gas or dust, and though the accident resulting is not, strictly speaking, an electrical accident, it is the result of improper electrical maintenance, and only by care on the part of the electrical force can it be avoided. Items to be watched in assuring the safe condition of permissible mining equipment are: Character of the men composing the maintenance force, their education, and the availability of necessary spare parts.

A type of electrical accident, which in some cases is quite serious is the common flash or burn. It may possibly destroy the eyesight or impair the vision. Moreover, such burns are extremely painful and slow to heal. Probably the greatest offender on this score is the trailing cable. In the handling of some fifty trailing cables daily amid the rush of mechanical mining, employees are likely to be injured by electric flashes should there happen to be a faulty splice or a defect in the cable near their hands or eyes. Accidents of this type are much more likely to be serious when the power circuit is well maintained and the generators are of large capacity, as in a big mechanically operated mine. Much has been accomplished by the increased use of gloves and by instructing employees how to avoid such accidents.

Electricity being one of the most frequent causes of fires and explosions in and about mines, precautions were taken at our mine to select equipment giving the maximum protection in dusty atmospheres. Thus motors were used with inclosed commutators or sliprings, and vaporproof lighting equipment and other fireproof inclosures were provided. Suitable fuses and overload protection also are essential.

Probably the principal causes for accidents to careful and competent

electrical men occur from tapping hot lines and working on equipment while the current is on. These practices are encouraged by the desire, which all men possess, of keeping the plant running if possible.

Many occasions for taking this risk arise from insufficient sectionalizing of circuits and lack of switching facilities. Ample switching equipment, therefore, has been provided, so that a minimum of the so-called "hot work" is required. Safety stop buttons are provided near the drive of practically all machinery, making it possible to lock out the unit electrically from this point in case of emergency.

Probably too much underestimated is one feature of real importance on which much emphasis has fortunately been laid at Wildwood: namely, the employment of careful, competent mechanics wherever the safe and successful use of electrically driven machines is expected.

Portable first-aid stations are placed on all sections and are kept within 500 ft. of all working faces. All men are instructed to receive prompt first-aid treatment for all minor injuries.

Some fifty flame safety lamps enter the mine each shift and each man has been thoroughly instructed in the use of the lamp. Classes of instruction are held for these men, and demonstrations are given as to the manner in which to test for methane and how to take care of a safety lamp so that it will always be in safe condition. The explosibility of methane and the ability of a defective safety lamp to ignite that gas and cause an explosion are demonstrated to these men in a McCaa methane-testing chamber.

Shotfirers are given special instructions in the safe handling of explosives and detonators, on the examination for methane before and after each shot is fired, on the "dangering off" of all entrances to places where shots are being exploded and of adjacent places where crosscuts which are being driven through the pillar approach completion. Motormen and snappers also are given special instructions in their work.

Because of the many hazards which arise from the design and use of haulage equipment, careful study has been given at Wildwood to the selection of locomotives, cars, and accessories. Notable among the accessories selected to increase safety and to aid operation is the A & G semi-automatic safety coupler, with which the cars and locomotives are all equipped. As the cars are of steel and the couplers were incorporated in this design, they are of unusually rugged construction.

The coupling consists of alloy steel castings, with a forged spring that absorbs both pushing and pulling shocks. It has been noted that, with this spring mounting, a motorman can handle, with safety, trips larger than could be handled with the conventional mine-car coupler and a given size of locomotive.

Observation during approximately eighteen months of coupling service has shown that with these safety features provided it is unnecessary for employees to place their bodies between car ends while coupling trips. The pin can be placed by hand and the cars coupled automatically by impact. With such accessories, coupling hazards are eliminated at the dump because the cars swivel so freely that it is unnecessary to uncouple them.

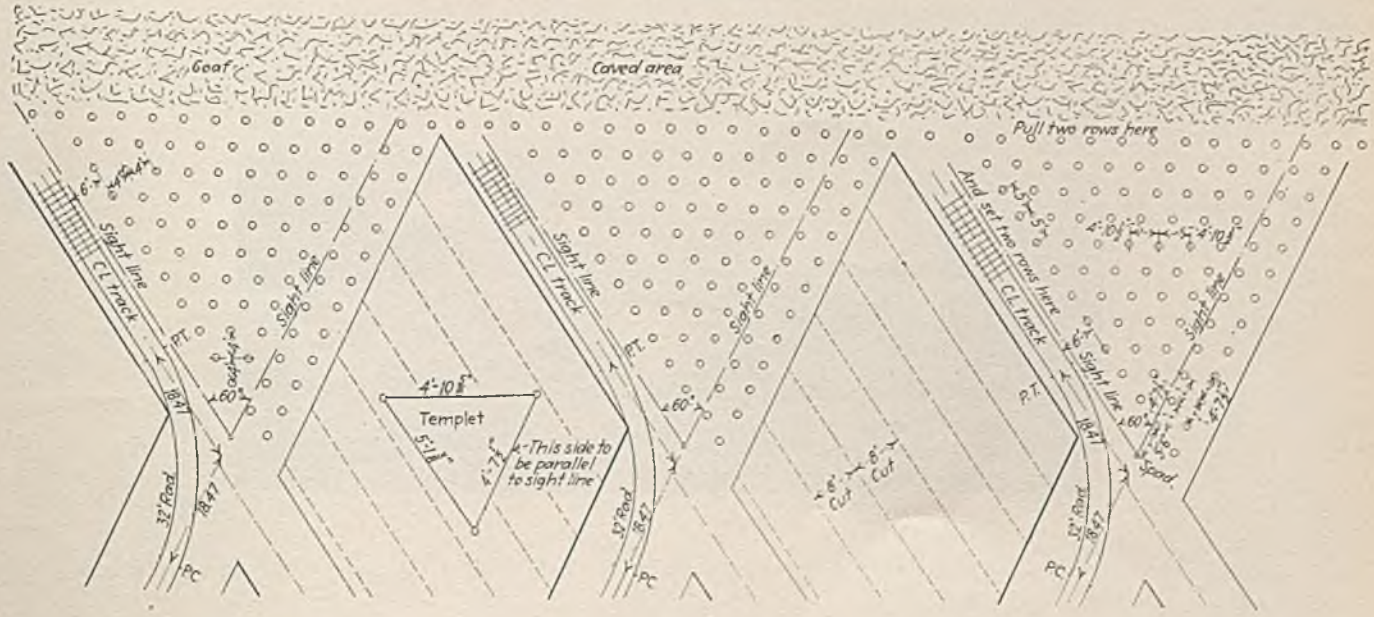
It is interesting to note that, because these couplers have been used, derailments and coupling breakage have been greatly reduced and no hands or other parts of the body have been injured during the mining of approximately one and one-half million tons of coal.

Cleaner haulage roadways have resulted, because the spring drawbars of the couplers ease the shocks to which the cars would otherwise be subjected. This is an important safety feature, because with clean roads the employees are less likely to stumble and fall and derailments are less frequent.

Every man in the mine wears safety-toe shoes. Before adopting them as standard, many feet were injured by the lumps of coal which fell from booms of loading machines and from the cars as the latter were being loaded. This provision has eliminated toe injuries. Practically all of our men are wearing goggles for eye protection and 80 per cent of them carry M.S.A. self-rescuers.

Pillars are all drawn on the open end. Where such a method is used, systematic timbering is essential. To permit of the use of machines with a long wheelbase for cutting and loading, the crosscuts were driven at an angle of 60 deg. to the rooms, dividing up the pillars in the diamond shape shown in the illustration accompanying this article. Curves of 32-ft. radius are used to carry the machines

Method of Removing Pillars and of Placing Timber Adopted at Wildwood Mine of Butler Consolidated Coal Co.



from the room into the crosscut. Cutting machines make in turn six 8-ft. cuts and one shallower cut off the end of the pillar, and other machines load these out.

The important requirement is that the props shall be parallel to the pillar cuts and shall line and be equally distant along the face and along the pillar line. Parallel to the face they are set at 5-ft. centers, and at right angles to the face the prop lines are spaced 4 ft. apart. Parallel to the break line the props are set at 4 ft. 10½-in. centers and at right angles to the breakrow the prop lines are set at 4-ft. intervals. Thus two rows can be removed near the break line and two adjacent to the working face whenever 8 ft. of coal is removed from the face of the pillar.

In order to assure that the posts will be properly located, templets are provided of correct angle and correct length. One of these is shown in the illustration. It would be quite easy to use this templet incorrectly unless provision were made against that eventuality, so the top surface of the limb of the triangle, which should be placed parallel with the room sights, is painted white. The templet is part of the timberman's outfit and is equipped with a long chalk line, which is stretched along the edge parallel to the face of the slab cut and as far beyond as necessary. A mark is made on the roof with this chalk line, and posts, 8 ft. long and 6 in. or over in diameter, are set along this line at the required centers with 2x8x12-in. caps.

It will be noted that sight lines have been located in the center of each room and of each crosscut. The lining of the crosscuts is facilitated by the fact that the crosscuts of one room are set off so as to line with those of the next room.

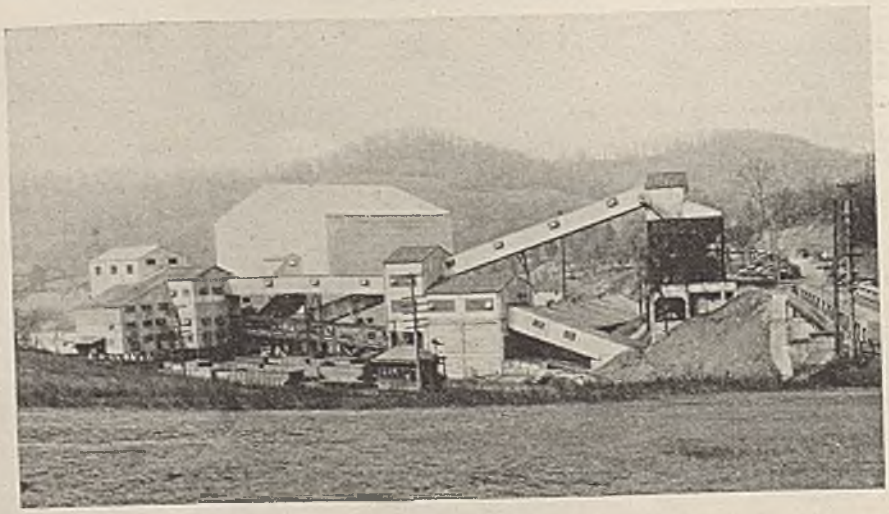
Posts are pulled mechanically under supervision of a section foreman. Thus far, approximately 300,000 tons of coal has been mined from pillars by mechanical cutting and loading, working on the open end, and there have been no fatalities or major accidents that can be ascribed to this work. Oldroyd loading machines, which load a 5-ton car in 50 sec., are used for this work and a slab is removed each day, making the progress 8 ft. daily, except when crosscuts are reached, when the advance is, of course, more rapid. The hard slate or sandrock top and hard fireclay bottom and light overlying cover, as also the speed of advance, favor operation on the open end.

It has been said that increased mechanization would increase the number of accidents. Though our mine is 100-per cent mechanized, it is holding its own with the hand-loading mine in lost-time accidents per million tons of coal mined. We expect to show a big decrease this year in the number of lost-time accidents and in our compensation costs.

A foreman's safety council, with a president and secretary, was organized some few months ago for the purpose of making a cooperative study of mining hazards. The secretary keeps reports of all meetings. The council meets on the third Friday of each month; all foremen and department heads attend, and our mining hazards are discussed. Accidents which have occurred during the month are studied, recommendations are made by the foremen, and suggested rules are formulated by the council, which cover the operation of machines and other matters relating to safety.

An executive committee, which consists of the electrical and the mechanical engineer, the superintendent, mine foreman, outside foreman, mining engineer, and safety engineer, meets on Tuesday following the foremen's safety council. It acts on recommendations and rules offered at the regular safety council meetings. Frequently rules have been presented which the executive committee has found inadequate to correct the condition, so the recommendation has had to be laid on one side.

All matters brought up at the foremen's council must be disposed of by the executive committee and the secretary must read his reports to show the action taken on each item. Monthly reports on accidents, their causes, cost, etc., are made each month; of these, all officials receive copies. They describe how the accident occurred and who was responsible for its occurrence; they also make recommendations for future prevention and give other safety suggestions.



VOLUME vs. PROFITS—II

« Wages Not Only Avenue To More Productive Cost-Dollars

By RALPH N. HARRIS
Industrial Engineer
Morgantown, W. Va.

WHEN MANAGEMENT in the bituminous coal industry accepts the premises that no profit will be found in production beyond the needs of the market and that the profit which may be expected must be based upon an investment no larger than that necessary to serve the market properly, the next step toward stabilization will not be so difficult. That step is the complete rebuilding of the unit organization upon the basis of the reduced tonnage for the purpose of increasing the productivity of each component part of the cost-, expense-, or outgo-dollar.

American industry as a whole, when, about ten years ago, it began to sense a shortening market with a narrowing profit margin, turned its attention to increasing the productivity of all parts of its outgo-dollar. It was so successful in the results obtained that unit costs were decreased while the number of workers and hours worked both decreased and wage earnings and profits both increased.

These are exactly the results desired by the bituminous industry. It is necessary to obtain a wider spread between income and cost by increasing the value received per ton of product through control of production volume in line with the market needs while costs per ton are decreased, without reducing wages. The operator has long recognized the relationship of wages to cost and has vainly sought to effect a reduction in his costs by reducing wages sufficiently to offset the diminishing return per ton brought about by crowding the market. It is but a short step from a recognition of the fact that costs may be reduced by decreasing wages or increasing the output per dollar of payroll to the acceptance of the fact that wages paid are but one part of the cost-dollar and that total costs per ton may be reduced also by increasing the productivity of the other parts of the cost-dollar.

Obviously, the procedure necessary to accomplish this result must be undertaken by the individual unit, and so we have come through a discussion of the general situation to the point where a detailed application of approved methods may be made to the individual organization.

In making such a detailed application, the first step will be a careful and minute examination of the outgo-dollar. It may be broken up into the following broad classifications:

1. Labor
   - Direct
     - Mining
     - Haulage
     - Dumping and Preparation
   - Indirect
2. Depletion and/ or Royalties
3. Operating Expense
   - Administration and Supervision
   - Compensation Insurance
   - Power
   - Supplies
   - Depreciation
   - Sundry
4. Commercial Expense
   - General Administration
   - Sales
5. Interest on Borrowed Money
6. Profit—Allocated to
   - Major Repairs and Replacements
   - Expansion
   - Dividends and Surplus

The foregoing is merely an outline showing major classifications and is in no sense comprehensive of the detail into which each organization should disintegrate its own outgo-dollar so that each component part may be closely inspected.

The first segregation of cost items from the outline will be those which make up "shut-down" costs. These will be those items of outlay required to be made whether the organization is in production or not, the total of which must always be considered so long as the entity of the organization is maintained. This total remains constant without regard to the tonnage produced and is 100 per cent of total costs until operations are started, when its ratio to total costs decreases as production increases. This group will include corporation and property taxes, insurance, depreciation, and sufficient payroll to provide the necessary drainage, ventilation, and policing of the property. Determination of "shut-down" costs is the first guide post in profit-planning. It is the lowest total of outlay obtainable and represents the maximum loss which should ever be sustained.

The second segregation is to the group known as "nucleus," or "readiness-to-serve," costs. This total is made up of all items necessary to maintain a minimum or skeleton organization in operation, sales, and administration with production at an absolute minimum; that is, tonnage coming only from those sections of the mine which must be worked regularly in order to keep the mine in operating condition. The personnel of all departments will contain just sufficient manpower to keep the property and all departments in the position of "readiness-to-serve." The

total will absorb increments from all parts of the outgo dollar, except profit, and will remain constant regardless of output, while its ratio to total costs decreases with increased production. This group, together with "shut-down" costs, make up the total "fixed costs."

Recognizing the fact that the total of fixed costs is constant, it is readily apparent that every effort should be made to keep it as low as possible. At this point only do we see the make-up of total costs in its simplest form and it is at this point that the mechanism of the organization for profit making can be most clearly disintegrated. All useless appendages, whether of men, jobs, excessive salaries, or unwarranted outlays of whatever nature, will be most easily discerned and must be ruthlessly eliminated.

It will be highly advantageous and the work will be greatly facilitated if the executive responsible for the program will take into his confidence all of the key men of his organization before attempting compilation of the fixed costs. The work should not be left either to the company's accountant or to a firm of outside auditors or accountants unless the one to whom the work is delegated is peculiarly fitted by a background of operating or manufacturing experience and has the engineer's viewpoint. If he does have this experience and viewpoint, he will undoubtedly call to his assistance the key men of the organization and attempt to make the formulation of the program a copartnership affair in which he will act merely as the leader to direct their thought and as a collector and coordinator of their ideas.

Accountants and auditors have been trained to record and appraise what has been done. What is needed here is someone to determine what it is possible to do. The training and mental habits of the accountant enable him to present an understandable picture of past accomplishment; the training and mental habits of the engineer make it possible for him to so correlate facts from his own and the experience of others that he can project for us a diagram or plan of the practicable mechanism that will best serve our needs and desires. If the management feels that the program we are undertaking is merely the development of a new cost system which had best be left entirely in the hands of the accounting organization, no results will be obtained.

In any event, before the nucleus costs are assembled, it will be necessary to obtain the hearty cooperation of the key men, and this is particularly true of those in the operating or production departments. Their intimate knowledge of the inside workings and their personal acquaintance with the individual and peculiar characteristics of the plant and equipment must be available for the proper carrying out of this work. Their support, based on personal self-interest, may be easily obtained if it is pointed out to them that the effort is being made to provide for them a target at which to shoot in the control of costs and that their responsibility in such control will be clearly defined and understood both by them and their executive officers; that the adoption of such measures is made necessary by external conditions; that this is merely a call to man the pumps in order to lighten ship during heavy weather and that unless the water is pumped out, the craft probably will founder.

The required mental attitude of the executive responsible for the program is of paramount importance. He must completely detach himself from his existing organization so far as its personal loyalties and friendships are concerned and view it impersonally and coldly as one inspecting a mechanism which needs simplification, more straight-line motions, the elimination of parts, and the reduction of friction and lost motion so that it may perform its functions with less input of energy and therefore do so more efficiently and economically. He must, primarily, consider not men but jobs; he must change his conception as to the function of the mechanism he is inspecting and at all times must be convincingly conscious that this function is the making of profit and not the production of tonnage.

He must take apart the mechanism which has been placed in his hands for inspection and reassembling. He must carefully inspect each part, decide definitely whether or not it is vitally essential to the operation of the mechanism, and, by comparing its cost to its contribution to the function of profit making, decide whether it must be discarded completely without replacement or be replaced with a cheaper part. The question he must continually ask himself throughout this analysis of values is, "What relationship does this job, method, or piece of equipment bear to the realization of a profit?" and not, "What is its relationship to increased production?"

That there is a certain parallelism between profits and tonnage is true, but, as we have decided that tonnage cannot be brought to the desired point without depreciation of value of production, we are compelled to reduce the total costs of the organization so that profit can be obtained on a tonnage which will not, theoretically, exceed two-thirds of the productive capacity of the plant. This we are attempting to do by obtaining maximum productivity from each component part of the outgo-dollar. Therefore, each and every item of outgo must be closely scrutinized and evaluated, using as a criterion in this judgment its relationship to profit and not, primarily, its relationship to tonnage. For, the bituminous coal industry is not a 750,000,000-ton plant so far as profit making is concerned, although it is so far as tonnage capacity is concerned. It is only a 500,000,000-ton plant for profit making and its organization must be built on that basis and not on the larger one.

If none of the operators accepts this viewpoint, the working of fundamental laws, previously outlined, will exact its toll and the production of the industry will be brought down despite any other resistance which may be offered. If all the operators curtail production, results beneficial to all will be obtained. But regardless of the number of operators accepting this viewpoint, it is decidedly advantageous for any individual operator to determine for himself the minimum tonnage upon which his organization can earn a profit or prevent a loss and so remove from his thinking the urge to increase production. By so doing, he strengthens his own position and his ability to survive present conditions; he is working in harmony with the economic laws and each withdrawal of tonnage from the market, however small, helps to change the market trend as to value.

[*A case history showing the application of these principles to a specific operation and the cost figures involved will be the subject of the final article in this series by Mr. Harris.*]

MODERN PREPARATION « Have Mid-West Fields Met Test of Consumer Demand?

By H. B. COOLEY and JOHN A. GARCIA

Allen & Garcia Co.
Chicago, Ill.

NO FIELD has given more care to the study of methods which would assist the miner in eliminating impurities[1] at the time coal is being loaded than has Illinois and Indiana. The impurities have been eliminated in three ways:

1. By snubbing, whereby the coal is obtained in larger lumps, so that the miner can more readily see and remove the impurities before loading. Snubbing has been followed by shearing, which accomplishes mechanically much the same results.

2. By undercutting below the coal, and removing and gobbing the machine cuttings before the coal is shot down. This practice has been especially common in Indiana.

3. By docking men who persistently load dirty coal. This arrangement has been made part of the contract with the union and has done much to convince the individual miner that to load clean coal is one of the first requisites of a successful mine.

Even the keenest competitor will admit that Illinois and Indiana have led the bituminous field in producing a uniformly sized product. The first Illinois preparation plants date back to the time when the northern Illinois and Springfield districts were still the largest producers in the state. Following this, mining developments began in the Williamson County field, and Carterville washed coal from the No. 6 seam became popular. At these mines, many of the old-type jig washers were in use, and to get even fair results with these units, presizing was necessary.

Thus it happened that the smaller sizes were separated from the larger. After separation of the 2x0-in. coal, for instance, for washing, this fine coal was not remixed with the larger size, and the consumer thus found available Carterville washed nut in several sizes. With the opening up of the No. 5 seam in Saline County and the No. 6 in Franklin County, similar screening equipment was introduced, but the coal was not washed. It was not long before both producer and consumer discovered that accurate grading was far more important than the reduction in ash which washing would accomplish.

Grading of 2-in. screenings to produce the small nut sizes leaves a resultant $\frac{3}{8}$x0-in. duff that has, to date, found only a limited market. With the development of the small stoker for household and semi-industrial plants, this duff was further sized, thus furnishing a product similar in size to anthracite pea or buckwheat, leaving a residue of very fine coal. For this a market may be found, perhaps as a powdered fuel, but a

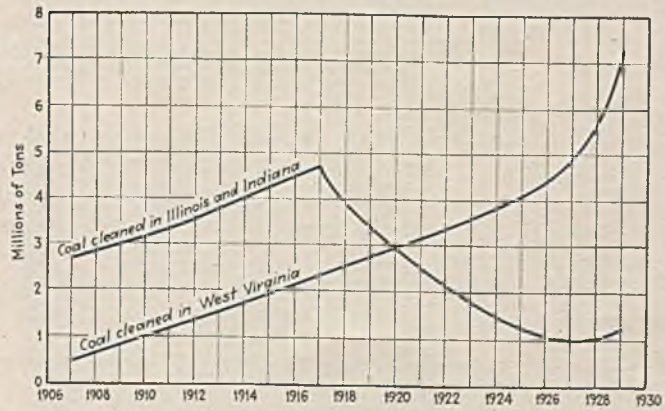


Fig. 1—Trend in Washed Coal Production in Illinois-Indiana and West Virginia: 1906-1929

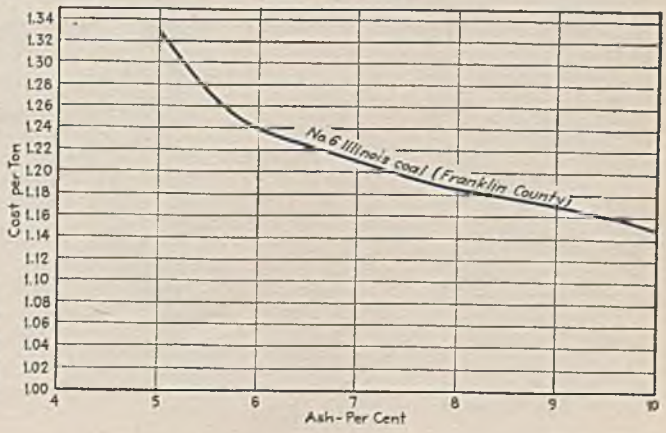


Fig. 2—Cost of Cleaning Franklin County 2x0-in. Coal

[1]Preparation is "the removal from the coal of part of its separable impurities, and the sizing of the coal, both in response to the demands of the market."—Callen, Bulletin 217, Engineering Experimental Station, University of Illinois.

Abstracted from an address entitled, "To What Extent Has Mid-West Coal Met the Demand for Better Preparation," delivered at the Mid-West Bituminous Coal Conference, University of Illinois, Urbana, Ill., May 22, 1931.

portion of the product may have to be wasted.

Table I shows a screen and ash analysis of a sample of Franklin County duff.

Table I—Screen and Ash Analysis of Franklin County Duff

Size	Percentage Weight	Percentage Ash
1x3/16-in.	40.8	9.23
3/16-in.x10 mesh	20.2	8.74
10x20 mesh	16.0	8.03
20x48 mesh	14.0	12.38
48x100 mesh	4.2	14.42
100x200 mesh	2.1	14.90
200 mesh x 0	3.5	14.45

By screening out the —48 mesh material, the yield would be: ⅜-in. x 48 mesh, 90.2 per cent weight with 9.40 per cent ash; —48 mesh, 9.8 per cent weight with 14.60 per cent ash. The first of these sizes would give a coal practically free from dust and one that should find favor for use in small automatic stokers.

Almost every commercial mine in the Mid-West field has some provision for hand-picking of the larger sizes. The effectiveness of hand-picking depends not only on the character of the impurities and the individual efforts of the men employed at the work but also on the mechanical apparatus provided to minimize physical efforts. It must be admitted that hand-picking is inefficient, especially where the impurities tend to cling to the coal, for then it is necessary to discard not only the impurities but the coal adhering to them. This coal, however, often can be recovered by crushing the picked material and washing the crushed resultant.

A recent test on egg-coal pickings (6x3 in.) showed that if this material were crushed to 1¼-in., sufficient coal would be freed to permit a recovery of 69 per cent of the feed. The coal so recovered would have an ash content no higher than that of 2-in. screenings shipped from the same mine. In some cases this coal can be recovered by passing the rejects from the picking table through a revolving cylindrical breaker with perforated plates.

More efficient picking can be done by giving thorough study to the method of table lighting and the arrangement of the picking table itself. The flat-top reciprocating table not only provides means for removing very large lumps without lifting them from the table but also makes it possible to rescreen the prepared coal just before delivery to the railroad cars.

Why has the Middle West lagged in the production of washed coal? Fig. 1 indicates the rapid increase in washed coal production from West Virginia, and similar data would show a corresponding curve for Pennsylvania. Both of those states are turning to washeries to meet a demand for metallurgical coal. In the Middle West, efforts have been confined largely to the production of domestic and steam coal at a low cost.

However, the cleaning of Mid-West coal is not being entirely neglected. Proof of this is seen in the upward trend of the curve in washed-coal production and the fact that many operators are now studying the possibilities of mechanical cleaning as a part of the mechanical loading problem. By adding a washing plant to his present facilities, the Mid-West operator can offer a product with an ash content as low as the average of his competitors. Is the consumer ready to pay the additional necessary cost?

With Franklin County raw coal at $1 per ton, a washing plant handling a raw feed of 300 tons per hour would mean an added cost of approximately 15c. per ton for plant investment and carrying charges, with further increasing costs for each 1 per cent reduction in ash (see Fig. 2). Moreover, to reduce Franklin County coal to the same ash content as West Virginia smokeless, it would be necessary to suffer an increased refuse loss of approximately 5 per cent (see Fig. 3).

Every operator should make a washability study of his particular coal before attempting to determine the possibilities of cleaning. Such an investigation should be further supplemented by experiments to determine the possibilities of coal recovery from treatment of picking-table refuse. Another important factor to be determined for each individual mine is the uniformity, or lack of uniformity, in the percentage of impurities in various parts of the mine. Most Mid-West coals are of a uniform character over a wide area. However, this is not universally true, for, when coal is loaded mechanically and large tonnages are obtained from concentrated mining sections, it is not uncommon to have a wide daily, or even hourly, variation in the raw coal ash.

A recent series of tests to determine this variation indicates that where the composite of daily samples showed an average of 9 per cent ash in the 1¼-in. screenings, the ash analyses of individual railroad car samples during the same day varied from 6 to 16 per cent. Complete results of this test are shown in Fig. 4. This variation can be smoothed out by mechanical cleaning. An efficient cleaning plant can be designed so that the range will not exceed 0.5 per cent either way. It is this uniformity of ash content that often makes a coal-cleaning plant successful, for a uniform coal with a slightly higher ash is much to be preferred, within reasonable limits, to one having extreme variations either in sizing or ash content.

Fig. 3—Recovery Chart—Franklin County vs. West Virginia Smokeless 2x0-in. Coal

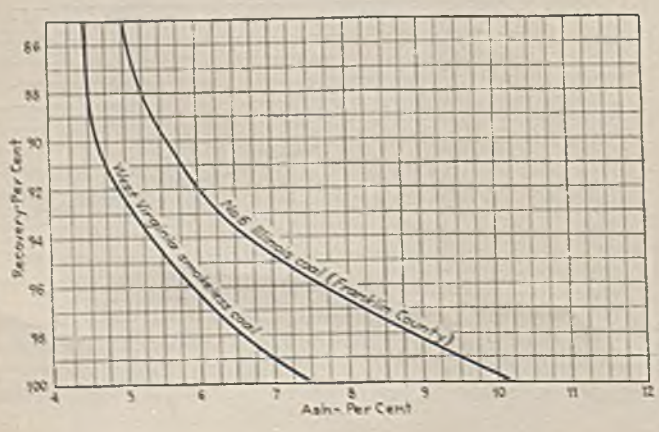
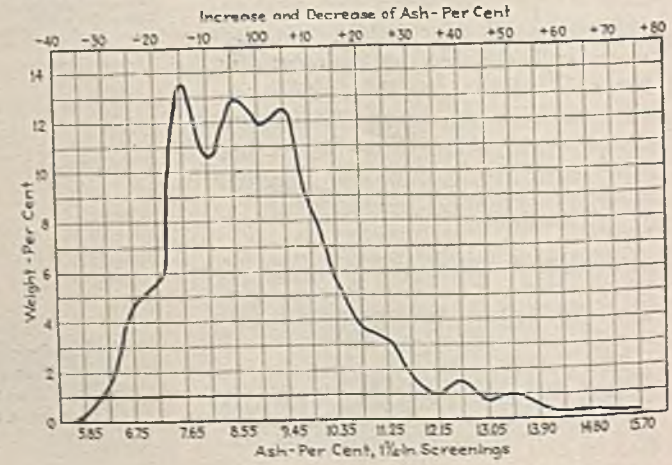


Fig. 4—Variation in Ash Percentage in One Day's Sampling



MINE INSPECTORS

« Discuss Fire Fighting, Gas Analysis, and Roof Falls

ACCIDENT COSTS, the value of organized safety, reduction of injuries from roof falls, the place of the local institutes, systematic air analyses, and scientific handling of mine fires were the high spots in the program of the twenty-second annual meeting of the Mine Inspectors' Institute of America, held at the John Marshall Hotel, Richmond, Va., May 4-6. The sessions were presided over by L. W. Brown, inspector, oil and gas division, West Virginia Department of Mines, the retiring president of the institute.

Edward Flynn, safety inspector, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., was elected president for the 1931-32 term. John F. Daniel, chief, Kentucky Department of Mines, Lexington, Ky., was elected first vice-president; P. J. Friel, state mine inspector, Shamokin, Pa., second vice-president; John G. Millhouse, director, Department of Mines and Minerals, Springfield, Ill., third vice-president. C. A. McDowell, safety and personnel manager, Pittsburgh Coal Co., Pittsburgh, Pa., was again chosen secretary, and Dr. J. J. Rutledge, chief mining engineer, State of Maryland, Baltimore, Md., treasurer. Thomas Stockdale, district mine inspector, Freeman, W. Va., was made assistant secretary. James T. Beard, Danbury, Conn., who until his retirement a few years ago was senior associate editor of *Coal Age,* was re-elected editor-in-chief of the institute publications; J. H. Edwards, associate editor, *Coal Age,* Huntington, W. Va., was re-elected publicity editor.

Papers were presented by Rush N. Hosler, superintendent, Pennsylvania Compensation, Rating and Inspection Bureau, Harrisburg, Pa., on "Direct and Indirect Costs of Mine Accidents"; by Charles W. Connor, superintendent of Mines, American Rolling Mill Co., Nellis, W. Va., on "Value of Organized Safety"; by J. V. Berry, chief, mine safety, mine rescue, and first aid, Bethlehem Mines Corporation, Johnstown, Pa., on "Method of Sealing and Reopening Barrackville (W. Va.) Mine Fire"; by C. A. McDowell on "Value of Systematic Air Analysis and Relation to Mine Ventilation"; by James F. Bryson, director of safety, Harlan County Coal Operators' Association, Harlan, Ky., on "Value of Local Mining Institutes"; and by J. W. Paul, senior mining engineer, U. S. Bureau of Mines, Pittsburgh, Pa., on "Some Means for Prevention of Injury by Falls of Roof."

Snapped During the Stop at Yorktown. C. A. McDowell, John V. Berry, J. J. Forbes, and at Right, Drinking Coffee, J. Hopkins Hall, Jr., Commissioner of Labor, Virginia

Prior to the presentation of papers, Mr. Paul, as chairman of the standardization committee, submitted a report recommending that the institute sponsor a code of practice for the use of explosives in anthracite mines, provided the state department cares to cooperate, and that the institute promote the development of a standard form for reporting mine accidents.

In his analysis of direct and indirect costs, Mr. Hosler enumerated and explained the items entering into the two classifications. He said that for the five-year period 1925 to 1929 the cost of compensation and medical treatment at bituminous mines of western Pennsylvania amounted to 3.6c. per ton.

Adding the wage loss trebles the figure, bringing the direct cost to 10.8c. per ton, not including time loss in man-years to society and to the industry. The most conservative estimates place the indirect loss as equal to the cost of compensation and medical treatment; in this case 3.6c. Adding this brings the total per ton cost of accidents in the Pennsylvania bituminous region to more than 14.4c.

Lee Long, vice-president, Clinchfield Coal Corporation, asked Mr. Hosler if the 3.6c per ton for compensation and medical expense was for self-insured mines or otherwise, and said that at his company's group of mines, which are self-insured, the cost of compensation, medical treatment, and salary of a supervisor amounts to about 2.45c per ton. The cost of first-aid activities is not included. Mr. Hosler replied that whether or not a mine is self-insured has no bearing on the cost figures he submitted. Nothing was added for rate loading to cover insurance administration.

In the absence of Mr. Connor, his

Box Lunches Were Served at Yorktown

At the Base of the Monument at Jamestown

paper was read by James Berry, chief mine inspector, Ohio. This paper outlined safety advances up to the recent conception that "proper results could be secured only through united and cooperative effort and that to permeate the organization with the safety spirit, that spirit must come down from the top.

"There are few mining companies in this day that do not realize the value of safety and accept it as one of their responsibilities. A great many of them, however, labor under the misapprehension that carrying out a safety program requires the expenditure of a great deal of money. This may be true in some instances, but, generally speaking, organized safety can be carried on at very little additional cost, and it is frequently the case that the immediate saving in production costs is more than ample to cover the actual cost of the safety work."

Leading the discussion of the paper, Walter H. Glasgow, Secretary of Mines, Pennsylvania, reviewed the results of organized safety started about 1911 by a certain large producer in the bituminous region of Pennsylvania. Fatalities per million tons dropped from 5.3 during the period of 1906-1915 to 3.53 in the period 1921-1930 and to 3.51 for the year 1930. The Pennsylvania companies having well-organized safety activities last year produced 600,000 tons per fatality and 74,000 tons per 60-day disability accident. Comparative figures for those of the other class are 300,000 tons and 55,000 tons. He reported that there has been no catastrophe in the Pennsylvania bituminous mines for the last 25 months, which in that region is the longest period that has ever elapsed without a calamity.

J. T. Ryan, Mine Safety Appliances Co., Pittsburgh, told of the reduced accident cost of a large company which in 1929 had a "safety department on paper," and which during 1930 adopted efficient safety methods. During the first quarter of 1930 the direct cost of accidents was 7.9c. per ton and during the first three months of 1931 it was but 7.2 mills per ton.

J. H. Edwards, associate editor, *Coal Age*, suggested a discussion of the merits of the bonus system for promoting greater safety efforts on the part of foremen. He reported that one company which had been giving each foreman $10 for each month his men went without a lost-time accident had recently changed to the practice of computing the bonuses on the basis of total man-hours supervised by each foreman. Instead of the bonus being looked upon as pay for working safely, it can be just as well be considered a part of total salary and that salary is paid for safe operation as well as for productive operation.

Mr. Bryson objected to the principle of a safety bonus to foremen on the ground that a man should be sufficiently interested in his job to do his best to promote safety without receiving a special premium for this effort. C. O. Morris, of the West Virginia mining department, attributed much of the success at Nellis to the payment of monthly prizes of $10 to the foreman who maintains his section in the best condition, $10 to the coal loader who has the best working place, and $5 to the trapper whose station is best maintained. The total outlay for bonuses is $300 per year. Mr. Long said that his company at one time indulged in bonuses but stopped the practice and he believed the discontinuance was a wise move.

While not personally favoring the bonus, Mr. Daniel said he advocates its use where local conditions indicate it will bring results. Mr. McDowell said that the Pittsburgh Coal Co. has a bonus system, but that it is not based on accidents alone.

The discussion of the safety bonus was concluded by Wm. Roy, who described the practice at the Hanna mines. Each mine foreman is given $2.50 for each month that his territory goes without a compensable accident. Each man working in such a territory is given a Hanna company safety cigar. If a mine foreman operates for six consecutive months without an accident in his section, he receives $25. A loader and day man from each mine is to be sent to the Mining Congress meeting and exposition at Cincinnati.

John V. Berry illustrated his paper describing the fire in Mine No. 41 of the Bethlehem Mines Corporation with a 50-ft. scale map showing all details. The fire started Oct. 24, 1930; was permanently sealed Oct. 26; and normal operations were resumed in the section Jan. 16, 1931. In the 100 acres included in the area first sealed, approximately 100,000 cu.ft. of methane was liberated every 24 hr. Recovery work was started soon after Dec. 1 and the first move was to reduce the sealed area to about five acres. No lives were lost or injuries suffered in the fire nor in the recovery operations.

Plotting of pressure and temperature data relating to the sealed area disclosed a relationship between the outside temperature and the pressures within the seals. Relative pressures were controlled so far as possible by slowing down the exhaust fan to reduce somewhat the negative mine pressure while the pressure within the seals was positive. Calculations made during the week of Nov. 15 indicated that with controlled fan speed the gas liberated from the coal would build up sufficient positive pressure to prevent occurrence of negative pressures after Dec. 3, and this held true.

That the Burrell methane indicator is a dependable and accurate instrument when in experienced hands was

set forth in Mr. McDowell's paper. Instances were cited to show why it is important that percentages of methane smaller than can be detected with a flame safety lamp should be detected and properly recorded; this calls for systematic analyses.

Since establishing a regular system of air analysis on Feb. 1, 1928, the Pittsburgh Coal Co. has used the Burrell indicator and the Burrell air analyzer. For some time, all readings of the indicator were checked by analyses of bottle samples. These proved that the indicator would check within its recognized tolerance; therefore it alone has been used for the past six months, excepting that bottle samples are taken when indications show methane contents above certain established limits.

During a certain period, 3,980 tests were made with the indicator and an equal number of bottle samples taken at the same time were analyzed. The average reading on the analyzer was 0.094 per cent, and on the indicator 0.091 per cent. Of the total number of comparative readings, 3,268, or 82 per cent checked within 0.05 per cent. During 35 months of use ten new glowers were purchased for the indicator, and the total repair cost was $8.17. With eleven glowers 4,570 determinations were made, or an average of 415 per glower.

Discussing the paper, Joseph J. Walsh, state mine inspector, Wilkes-Barre, Pa., submitted data on tons per fatality in gas explosions at a certain group of anthracite mines at which systematic air analysis was begun in 1908. These tonnages were: 700,000, 1906-8; 1,300,000, 1909-11; 1,800,000, 1912-14; and 4,100,000, 1915-18. He also reported instances of gas explosions in seven mines which up to the times of the explosions were thought to be non-gaseous. A total of 21 men were killed in these first explosions in the seven mines.

In his paper, "Value of Local Mining Institutes," Mr. Bryson reviewed the possible benefits to be derived, and cited proved accomplishments in improved safety records. In 1927, in Harlan County, Kentucky, before there was an institute in the district, there were 39 fatal accidents and 1,225 non-fatal accidents. In 1930, when an institute organized in April, 1929, was functioning, the fatals were reduced to 21 and the non-fatals to 673.

Discussion indicated a keen interest in Mr. Paul's paper on prevention of injury from roof falls. He presented statistics to prove the importance of this phase, carefully analyzed the reasons for roof accidents, and then made recommendations covering schemes for closer supervision and better timbering.

Mr. Millhouse said that about 60 per cent of the accidents in Illinois are from falls in working places. He believes that each man should be a safety factor in himself.

"The greatest responsibility rests with the mine foreman, and if each place was properly examined once a day the number of roof falls would be greatly reduced," was the comment of Mr. Spencer. Dr. Rutledge stated that Maryland suffered six fatal accidents during 1930, all due to falls of roof and all preventable.

"Two years ago, in Colorado," said James Dalrymple, chief mine inspector of that state, "70 per cent of the mine accidents were from falls of roof and 80 per cent of these occurred at the road head." It was determined that time of setting is just as important as the number of posts set. Introducing the safety post regardless of character of roof, and correcting the time element has reduced the roof accidents 15 per cent.

Mr. Flynn remarked that with his company, falls of roof and coal are now responsible for less than 12 per cent of all disabling accidents, as compared to a figure of 75 per cent some twenty years ago. Systematic timbering, education, and discipline are given credit for the improvement. Demotion has been found to be by far the most effective and fair method of discipline.

Mr. Edwards mentioned the case of a company which increased the number of posts set, but reduced the timbering material cost by using smaller posts. The result was fewer roof accidents. Apparently in the recent history of coal mining in this country few, if any, instances are on record of roof accidents caused primarily because a post was too small. The accidents result from "no post being set." Mr. Brown deplored any disposition to decrease post sizes.

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Mine Water Generates Stray Currents

(Continued from Page 289)

It does not seem desirable to ground pipe lines, etc., to the haulage tracks or negative feeders, for any failure of the haulage circuit would cause the return current to flow in the pipes, in which case it might boost any stray currents that might be present.

It has often been suggested that electric blasting caps be designed for higher voltage. This seems undesirable, because it would then be necessary to replace all the blasting machines and because some of the caps might fail if the firing generator were not so operated as to deliver the required voltage.

Tests on standard blasting caps show that they do not all fire at the same voltage and current, or in the same time. One make of cap having a resistance test of 0.38 volt and 0.20 amp. fired with some consistency at an average of 0.60 volt and 0.30 amp. but in times varying from 2 to 30 seconds. Another make of cap having a resistance test of 0.35 volt and 0.20 amp. fired on voltages as low as 0.48 volt and 0.30 amp., while others of the same make would not even fire on 1 volt and 0.60 amp. and many would not fire in 5 minutes.

Results of tests show that improvement can be made on some makes of the present electric blasting caps so they will all fire within a reasonable range of voltage and current. In order to avoid accidents, more instruction should be given the miners on the proper handling of electric blasting caps, particularly in regard to their retaining the short-circuiting shunt on the leads until the cap is inserted in the cartridge and ready to place in the hole to be fired.

A more foolproof design of cap leads would consist of a two-conductor cable to prevent wide separation of the two ends, but the objection to this practice is that in order to reach adjoining holes two additional wires would have to be spliced to the cable, and these splices might cause the shot to be delayed or to fail to explode.

As there seems to be no way of eliminating stray currents, greater care must be used in handling electric blasting caps. With proper care in handling them and with the safe installation of wires from the face to the blasting machines, the usual accidents can be materially reduced, if not entirely eliminated.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, JUNE, 1931

A challenge to industry

DEFENSE of the machine age and a challenge to capitalistic civilization to justify its technologic advances in terms of social values emerged from the meeting of the International Chamber of Commerce at Washington, D. C., last month. An Italian, Dr. Alberto Pirelli, head of a large rubber concern and former president of the International Chamber, took up the cudgels for the machine and disagreed with those who charge that mechanization has enslaved the worker; it has freed him, the doctor retorted. An American, Walter B. Donham, dean of the Harvard School of Business Administration, was the man who wanted to know what Frankenstein will do with his own creation.

Uncontrolled mass production, made possible by the machine, he argued, had brought on colossal unemployment. For this management must accept full responsibility. Unless management is able to restore employment and security to the millions now out of work here and in Europe, Western industrial civilization must confess defeat by the system it brought into being. The problems raised by mechanization no longer can be avoided.

Few would advocate a return to the Arcadian simplicity and drudgery of the hand-labor era. Neither does it seem wise to trust to an early development of a new automotive, radio, or rayon industry to again take up the slack in employment or to a further absorption of idle workers into personal-service occupations; indeed, opportunities for employment in these occupations has been measurably curtailed by industrial depression. The problem to be faced is how industry may best retain the machine and its advantages and at the same time eliminate the anti-social aspects of mechanization. That many industrialists frankly recognize the immediacy of this problem is one of the best auguries of its successful solution.

Research in perspective

THAT a genuine spirit of research and a desire to keep in touch with the developments in which that research has resulted are animating the industry was an impression which bit in deep upon the observer at the Cincinnati convention and exposition last month. No longer does the coal man look askance at the laboratory with its investigation by sample in small quantities and under controlled conditions, but recognizes this work as a necessary preliminary to investigation and development on a commercial scale.

This commercial-scale research, however, cries out for experts as loudly as the laboratory. Managers and company presidents with problems of mining, labor, taxation, freight rates, finance, and sales—to name but a few of the host—are not the people to note painstakingly the details of mechanization, to watch the roof, the coal, the machine, the jacks, and all the multifarious details of mine operation. These need experts for appraisal and study, and opportunities for these experts to compare notes, decide on policies, and ascertain what must be watched and anticipated.

More significant than a competitor to any operator have been the changes in business which have shrunk his market—economies in the use of coal and substitute fuels. To meet them the industry must perfect a technique of coal production which will cut costs, improve quality, and yet keep labor well paid, satisfied, and cooperative. All these things depend upon research, and the labor of every one in the industry is needed to promote and extend such research, for "whether one member suffer, all the other members suffer with it."

Under-cover job

MINING is a manufacturing and merchandising process different from almost any other. The tools by which the material is mined must be brought to the material instead of the material to the tools, as in a factory, and that has never been a method of operation which favored the use of machinery. Then again, a new portion of the mine has to be constructed in its entirety every time one part of the mine is worked out. Imagine a store which had to open up another freshly stocked establishment every time it sold the goods on its shelves!

What is still worse is that the mine is a factory building the walls of which are continually being attacked by the workers. There is no operating stability. There is no opportunity for getting down to all manner of refinements. "Business" has to be "as usual" with the building being torn down all around. And such a building, with a roof so heavy a dozen Empire State Buildings would weigh far less over an equal area of coverage!

Machinery has had to show extreme flexibility to overcome these difficulties. It has done so to such a degree that one man can do the work of five or more—a gain comparable with that hitherto achieved in the construction and farming industries wherever these are conducted, like coal-mining, with the most modern equipment. Obviously, it is not reasonable to anticipate the same reductions as are possible in a stable factory, but, when the differences in natural conditions are taken into account, the achievements of mechanization in mining are little, if any, ranked by the achievements of the machine in industries where everything favors its adoption and makes success easy.

Mr. Farrell speaks

IN TIMES like the present, when tortuous explanations of why things are as they are become part of the current stock of the day, the blunt statement of James A. Farrell, president of the United States Steel Corporation, at the recent meeting of the American Iron and Steel Institute, comes with refreshing and compelling candor. Steel production is down and steel prices have been declining, but Mr. Farrell places little of the blame for that upon either the buyer or the general industrial situation. His most stinging flagellations are reserved for steel management—the heads of the companies who seem obsessed with the idea of tonnage at any price, and take that price out of the stockholder and the worker.

> I do not see any hope of better prices in our business until the presidents of the companies are willing to stop this diabolical business. . . . . It is all well enough, you know, for some people, just as soon as there is a cloud in the sky, to touch up the wages and knock something off the dividend and all that sort of business. But it is not honest for us to go on and sell our goods below the cost of production and deprive our stockholders and our workmen of what they are entitled to.

What is true of steel is even more true of coal. Mr. Farrell specifically paid his respects to the policies of the coal industry when, in the course of the same speech, he said that "the squalor and misery" in some of the mines of West Virginia and eastern Kentucky beggared description and thanked God "that there was no destitution at the mines of the company that employs me." Maintenance of high standards of living for labor and adequate returns for capital, as was pointed out in the McGraw-Hill Platform for American Business published as a supplement to the March issue of *Coal Age*, is essential to stabilized prosperity. Ruinous price competition is not the way to attain that end in any industry. Certainly no coal company executive who looks at his balance sheets can say that selling wages and giving away capital assets have been profitable either from the standpoint of tonnage or of net earnings.

The philanthropists

STUDY of 1931 bids on public coal contracts and a review of current spot prices certainly justify awarding the bituminous operators as a group a wreath of laurel and bay as the world's greatest philanthropists. True, sad to relate, there are a few soulless companies and hard-boiled individuals that have not joined in the general distribution of capital assets and the contributions of labor, but they are so much in the minority that their non-eleemosynary policies cannot dim the luster of the benefactions of the majority. Beside these largesses of the majority, the gifts of highly endowed foundations for the alleviation of distress are trifling titbits.

Moreover, there is nothing narrow in the distribution of these coal philanthropists. There is no discrimination against the large industrial consumers, the public utilities, and the railroads, who could conceivably pay a higher price for fuel without financial distress—and who might even be willing to do so. These buyers who can, and properly do, pass on their fuel costs in the price of their services or their goods to the public fare better in the distribution than the household consumer, who must absorb his own heating bills.

That an ungrateful buying public renders them no thanks for this wanton waste of capital and labor in no wise dampens the ardor of these philanthropists. That no paeans of praise rise in their honor from the throats of their stockholders and their employees may sadden them, but does not halt them in their good deeds. Surely, an unregenerate and insensate world will not suffer them to go on indefinitely without suitable reward; "something," as the Mikado would suggest, "slow and lingering, like boiling in oil," or suffocating in natural gas.

Safety records

NO CONSISTENT RECORD in safety work is ever made at a mine unless accident prevention is part of the creed of the executive management. The initial impulse to better conditions may come from any division in the organization, but the continuing drive is impossible unless the chief officers of the company are constantly energizing the movement—not with perfunctory lip service, but with steady attention and with a genuine zeal that is not born of a passing "hurrah" emotion.

Talk to the management of any mine which is making a commendable record in safety work, and what invariably comes to the forefront of the discussion? An acceptance upon the part of management of a share of responsibility for accident-free operation which must be extremely heterodox doctrine to the easy-going executives who discourse feelingly on "the great natural hazards" of the industry and the hopelessness of attempts to make careless workmen less careless. There is little refuge taken in natural hazards, fellow-servant responsibility, and like explanations by managements that are lowering their injury and fatality rates.

It is this situation which so enlarges the possibilities of the safety campaign undertaken by the National Coal Association. This is an association of executives and its campaign can reach coal-mine management by the shortest and most direct route. The sane enthusiasm already generated within the safety committee itself and the encouragement which it must draw from executives already back of the drive in their own producing companies can be spread until every chief executive is made conscious that safety work starts at the top and never ceases to be a major executive responsibility.

NOTES

. . . from Across the Sea

EUROPE is greatly interested in the possibilities of what is termed "petrographic coal separation." It has long been noted that coal beds are not of uniform quality from top to bottom, but that usually they consist of layers, some of which may be admirable for coking, others better suited to gas making, others again for steam raising, while others are of little value for any purpose. Petrographic separation is the name coined for the segregation of these various kinds of coal. It could be attained by the loading of the several layers into different mine cars, but that would interfere seriously with the efficiency of operation in mining, loading, transportation, dumping, and treatment. The fusain could be removed in a degree by screening or aspiration on the tipple.

It has been found in the Ruhr region of Germany, where, as in England, there is much durain, that by breaking the coal electrically with light blows and taps and then sizing it, the vitrain, durain, and fusain may be separated and the products resulting sent to the various plants to which they are best suited. Thus durain, which is hard and resilient, makes the largest pieces; clarain and vitrain make the intermediate, and fusain the smallest material. Durain, which is quite rare in America, has been found well suited to hydrogenation. It liquefies more completely than the other parts of the coal output and gives a larger quantity and higher quality of the lighter oil fractions. Vitrain is crushed more than durain, and this is well, for vitrain is preferred for the manufacture of coke, for which purpose a crushed product is desirable. Fusain, which crushes to a fine powder, is undesirable in coking, except in small quantity. It can be removed by air suction and can be added to the vitrain in any quantity desired.

Thus all the coal that does not go to the coke oven as vitrain is large enough for domestic use, except the extremely fine coal, which goes as fusain. A vitrain content up to 85 per cent has been obtained by these methods and a durain content up to 80 per cent. As absolute separation of the coal types is not essential, the plant would seem to be reasonably efficient.

In America, breaking and sizing are not new means of separating two kinds of coal material. The Bradford breaker and the Ayres separator work on that principle, but in their case the material treated is bone and not run-of-mine coal and the purpose is not to separate one type of coal from another but to separate pure coal from the impure material.

Petrographic separation—pardon the name—loses some of its value for America because of the absence of durain and because percussive methods seem less well suited for the differentiation of anthraxylon and attritus (vitrain and clarain), but it would be overbold to say at this stage that it will not eventually find foothold in this country. For preparing coking coal its fault seems to lie in the quantity of coal which is crushed to the finest of sizes to be classed as fusain, which in some sections of this country it is not or may not be.

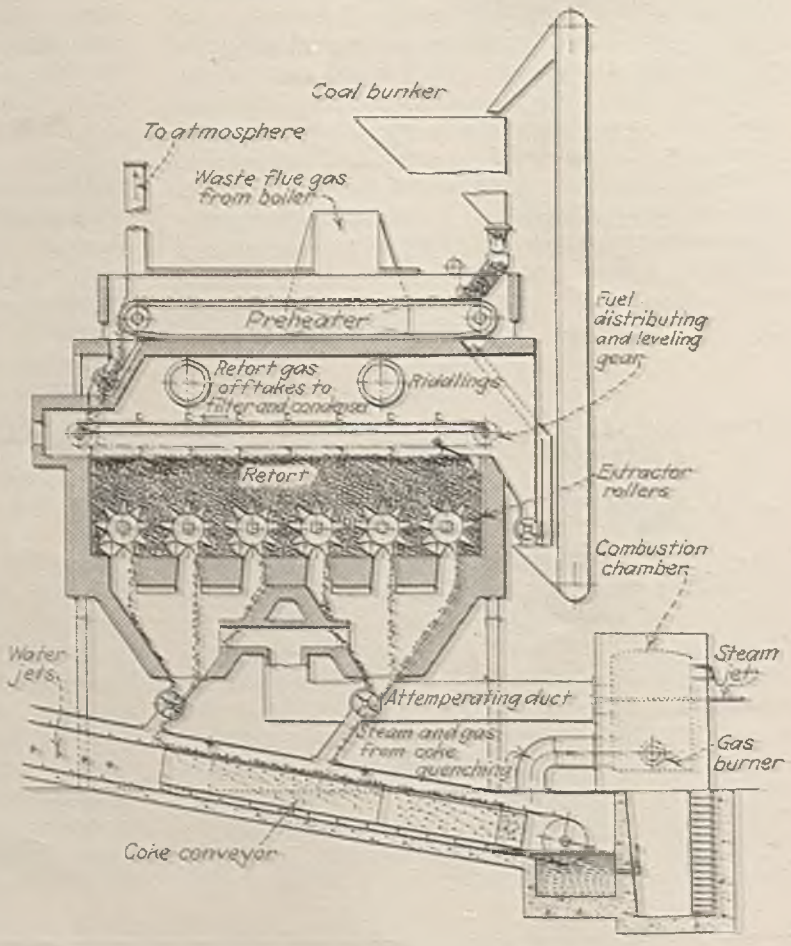
It would seem well to speak of "percussive coal separation" rather than of "petrographic," but if a broader term were desired, one that would include all forms of separation on the basis of variant types, the expression "classificatory separation" or "separation by types" might be suggested. But if the tongue gets twisted on such a fourteen-lettered word as "classificatory" and one more euphonic and more expressive, because less hackneyed, is desired, how about the title "taxonomic," or, even better, "taxic" separation, the word "taxis" meaning "an arrangement into types"?

LOW-TEMPERATURE carbonization has been bedeviled by the use of the expression "valuable byproducts." As a result, millions of dollars has been spent to recover chemical compounds which, however priceless they may be to the happiness and comfort of mankind, could as readily and as well be obtained from other sources and at low cost.

Let it be remembered that the expression "valuable products" was coined by the critics of the coal industry and has been glibly repeated by the promotors of carbonization processes. The byproducts have value, it is true, but that value may all be lost if too much amortization, depreciation, and interest have to be found to carry the cost of the plant, and if too much of the fuel is of a kind which the markets will take only at a nominal price.

Perhaps, therefore, the simple and fairly high-capacity system installed by

Plant at Dunston for Production of Semi-coke



the Newcastle-upon-Tyne Electric Supply Co. and Babcock & Wilcox, Ltd., at Dunston, in England, deserves consideration. The *Power Engineer* of London, in its April number, describes this plant, which uses what is known as the Babcock system. So far, nothing more than a 60-ton plant has been constructed, supplemented by two 30-ton-a-day plants built at an earlier day and of a somewhat different construction. Let it be clearly understood that for the purposes of this description the word ton means a long ton and applies to the input and that a day is of 24 hours' duration.

Because coal suitable for coking is expensive and has a definite specific use, the coal selected for operation of the plant is of a non-coking type with a moisture content of 9.3 per cent, volatile matter of 30.8 per cent, fixed carbon of 49 per cent, and ash of 10.9 per cent. The coal is passed over a Babcock & Wilcox chain-grate stoker and heated with waste flue gas from boilers, which raise the temperature to 392 deg. F. This drying and heating of the coal prevents the oil vapors made in the retort, to which the coal goes, from condensing and thus impeding the flow of distilling gases. The coal thus preheated is delivered into the retort proper through a rotary sealing valve, where it is leveled across the retort by a drag-link conveyor.

A device prevents the retort from being overfilled and assures its complete charging at all times. This device, when the retort becomes filled, slows up the motor which drives the hydraulic gear by which the extractor rollers are operated. These rollers remove the semi-coke as it is formed, deliver it through chutes to the coke conveyor, whence it is dropped into water.

It is stated that of the 45 tons of semi-coke produced from 60 tons of coal, 40 tons is well suited for domestic fuel and the rest for steam raising. At Dunston the calorific value of the retort gas runs from 80 to 100 B.t.u. Coke-oven gas is used for heating the retort, the temperature of which latter is about 1,832 deg. F., depending on the quantity of excess air admitted, this quantity being regulated to suit the nature of the coal in the retort.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

The Friability of Illinois Coal, by Cloyde M. Smith. Illinois Coal Mining Investigations Co-Operative Agreement, Bulletin 218, Engineering Experiment Station, University of Illinois. 22 pp., 6x9 in.; paper. Price, 15c.

In this bulletin are records of friability for coals from fifteen counties in Illinois and from an unspecified county or from two unspecified counties in northern Illinois. It is shown that the friability varies from place to place in the same mine and seam. Thus one mine showed a degradation due to falling of 35.2 per cent in coal from one place and 46.7 per cent in coal from another.

No consideration is given in the study to the effect of the presence of slaty impurity and pyrite in changing the strength of the coal. The reviewer has frequently been told that where the coal has more of one or the other impurity the coal is less friable. This rule does not apply between one seam and another or even between one locality and another.

Sometimes in a seam there may be other causes than impurity for variation in strength, some intrinsic and others due to methods of working. Heavy and ill-advised shooting, a sloping face, or long-standing pillars may increase friability. Because this quality sometimes is the outcome of greater purity, it is at times a well-compensated fault, especially if the coal is to be used for purposes where strength is not an important desideratum.

Experiments were made to ascertain the effect of storing coal. It was found when the stored coal from three mines was examined it was more friable than freshly mined from the same mines, the storage varying from 46 to 67 days. The weight degradation of the stored coal was from 3.4 to 5.5 per cent greater than with fresh-mined coal. This, it may be remarked, is the reverse of conditions generally found with stone, which frequently becomes harder when the quarry sap is removed.

It was found also that coal from strip mines was appreciably more friable than from neighboring underground mines in the same seam. "For example, the average weight degradation of samples from two strip mines in No. 6 coal in southern Illinois was 42.7 per cent, whereas that for six underground mines in this seam and district was but 35.3 per cent, a difference of 7.4 per cent in favor of the coal from underground mines. However, a comparison of the screen analysis of the output of a group showed that the average size of coal shipped from four underground mines was 2.9 in., whereas that for the two open-pit mines was 3.6 in., a difference of 0.7 in. in favor of the strip mines in spite of the greater friability of their coal."

This bulletin should be read in connection with Bulletin 196 of the same series, which details the method of approaching the problem and defines the terms used. However, a helpful appendix at the end of the bulletin under review clears up many of the uncertainties.

R. Dawson Hall.

Treatise on Leather Belting. By G. B. Haven, professor of advanced machine design in charge of textile research, and G. W. Swett, professor of machine design, both of Massachusetts Institute of Technology, Cambridge, Mass. Technical Composition Co., Cambridge, Mass. 249 pp., 5x8 in. Price, $1.50.

Users of belts have little knowledge of the technical skill used in the making of belts on the one hand, or of the means by which transmission belts can be made to do their best work on the other. So the American Leather Belting Association engaged the authors to prepare a manual on the subject. They have been able to add to their own considerable knowledge the information which the members of the association possess, using the special researches on this subject made by R. F. Jones, at Cornell University.

The latter has shown conclusively that the grain, epidermis, or outside of the hide has a much greater ability to transmit horsepower for a given belt slip than the flesh, dermis, or inside of the hide at the same tension. The cells of the first have their longer axis at right angles to the hide and so, of course, should resist slip better than the flesh side of the hide, the cells of which have their longer diameters parallel with the hide and thus in the direction giving the least resistance to slip. This question has long been debated, the European authorities having, it is said, favored putting the belt on the pulleys in the same way as it lies on the back of the animal from which the belt is made.

The tensile strength of the hide varies greatly. The sides and first crosscut (that furthest from the neck) have a strength of 4,500 to 6,000 lb. per sq.in., whereas the second crosscut (near the neck) and the whole girth (near the tail) have a strength of 3,500 to 4,000 lb. per sq.in. For belting of the best quality the center stock used is approximately 30 in. wide (15 in. on either side of the backbone) by 48 in. long. This reserves for the use of the belt maker about 26 per cent of the total area of the hide.

Subjects treated in this volume are leather manufacture, physical properties of belting leather, manufacturing methods, belting practice, installation and care of belting, leather belts for motors, belt-drive engineering, belt research, specification and inspection, tables, nomographs and plots. The association and authors are to be commended for the balance and completeness of the presentation.

R. Dawson Hall.

OPERATING IDEAS

From PRODUCTION, ELECTRICAL

And MECHANICAL MEN

Locked Signal Box Indicates Status Of Fireboss Inspection

WHEN a fireboss goes into his mine section to make a between-shift run, to all intents and purposes that section is boarded off. That being so, some physical indication should be provided to notify all plant employees of this condition. Blackboards or crude signal boxes are used at some mines to warn against trespassing, but neither arrangement is proof against tampering.

George A. Richardson, technical lecturer, Bethlehem Steel Co., describes a workmanlike, steel fireboss signal box, with semaphore bullseyes, each controlled through individual switch compartments. This device was developed and is used by the Marion division of the Bethlehem Mines Corporation, at Barrackville, W. Va.

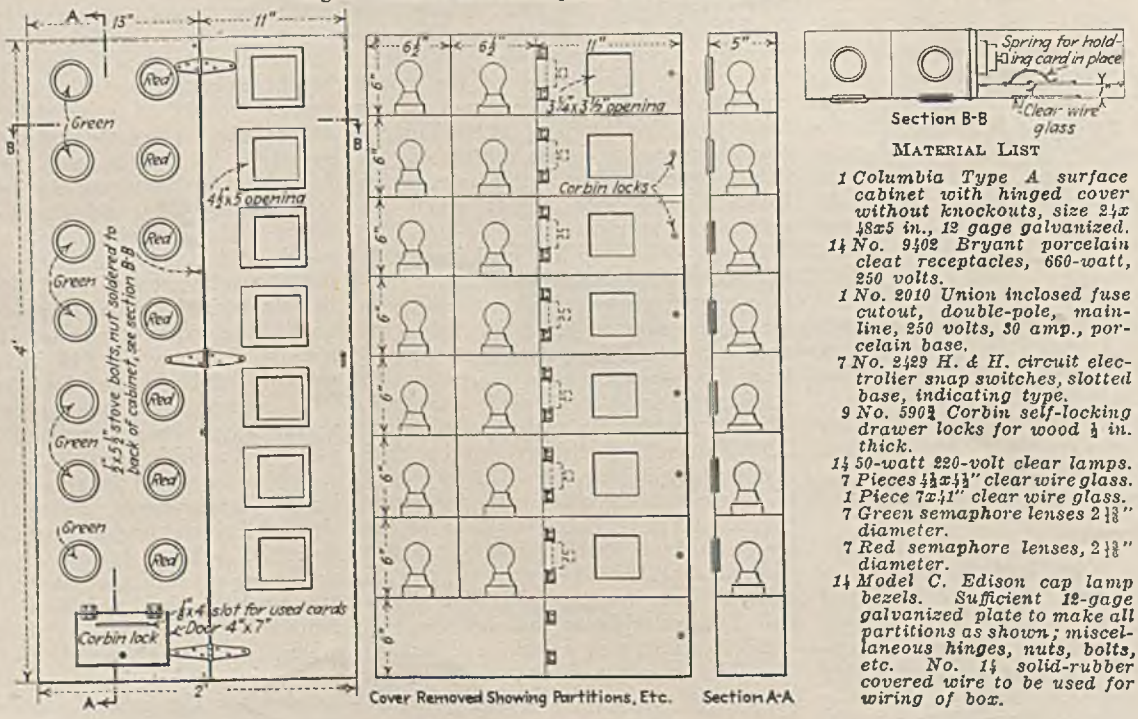
The body of the unit, Fig. 2, is a sheet-steel cabinet which is divided vertically inside, into two main sections. Over the right-hand section is a fixed panel on which are mounted two vertical rows of semaphore lenses, one red and one green. Behind each semaphore is a 50-watt incandescent lamp. Also on the right side at the bottom is a letter box with a hinged door, in which daily inspection cards are deposited.

A hinged door, kept closed by a hand latch, covers the right-hand section of the cabinet. Within, this section is divided into a single tier of compartments, each of which is paired with one green and one red semaphore light. Control of these two lights is effected through a two-circuit, indicating-type snapswitch which is mounted inside the compartment, as shown in Fig. 1.

Each compartment, and also the card-deposit box, is kept under lock with an individual key. In each door is a small window of clear wire glass. Against the glass is a spring clip for holding the daily report card of the fireboss assigned to that particular compartment. The main door of the cabinet also is provided with windows of clear wire glass. These are slightly larger than and directly over the inside windows. With the various compartments locked, it is impossible to tamper with the lights unless the assembly is deliberately wrecked. This feature is considered important.

The signal box is installed in a

Fig. 1—Details and Arrangement of Cabinet Interior



MATERIAL LIST

1 Columbia Type A surface cabinet with hinged cover without knockouts, size 24x48x5 in., 12 gage galvanized.
14 No. 9402 Bryant porcelain cleat receptacles, 660-watt, 250 volts.
1 No. 2010 Union inclosed fuse cutout, double-pole, main-line, 250 volts, 30 amp., porcelain base.
7 No. 2429 H. & H. circuit electrolier snap switches, slotted base, indicating type.
9 No. 590½ Corbin self-locking drawer locks for wood ½ in. thick.
14 50-watt 220-volt clear lamps.
7 Pieces 4½x4½" clear wire glass.
1 Piece 7x41" clear wire glass.
7 Green semaphore lenses 2 1/8" diameter.
7 Red semaphore lenses, 2 1/8" diameter.
14 Model C. Edison cap lamp bezels. Sufficient 12-gage galvanized plate to make all partitions as shown; miscellaneous hinges, nuts, bolts, etc. No. 14 solid-rubber covered wire to be used for wiring of box.

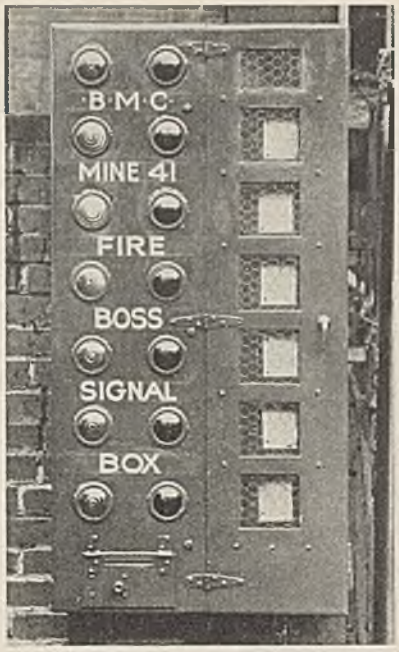


Fig. 2—A Red and a Green Light for Each Fireboss, Under Individual Lock and Key

prominent position at the head of the man shaft and can be seen by all who enter the mine. Before a fireboss enters the mine he unlocks the door of his compartment, takes out yesterday's report card from the clip, and drops it through the slot into the deposit box. These used cards are collected daily and filed in the office. Next he turns on the red light and locks up the compartment. The red light and the absence of a report card in line with this light give instant visible indication that that particular section of the mine is under inspection. After inspection the fireboss returns to the surface, unlocks his compartment, turns the switch to green if conditions are safe, and places a filled-in daily report ticket in the clip behind the glass. Then once more he locks the door.

This system provides a permanent record of the fireboss' inspection, augmenting the book record required by law. In an older form of this same device, no individual compartments were provided. The clips for tickets were placed behind glass-covered openings in the main door of the cabinet, which was kept locked. It had the disadvantage that a fireboss might snap the wrong switch. The new arrangement of separate compartments makes it impossible for a fireboss to touch any signal or card other than his own.

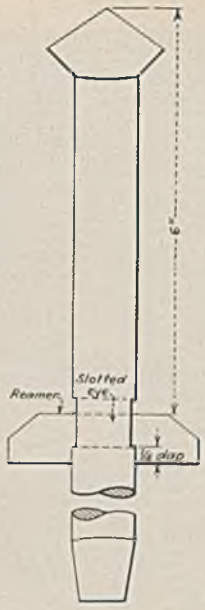
Reamer and Bit Combination For Hanging Trolley Wire

In thin-seam mines, headroom is not easily provided. To get the maximum clearance under the trolley wire on haulageways, it is frequently found advisable to countersink the bell of the trolley hanger in the roof. The usual practice in doing this is to use two bits, using the one of least diameter for drilling the hole in which the expansion bolt is anchored.

The Glogora Coal Co., at Glo, Ky., uses a plant-made drill bit and reamer combination which in one operation drills the smaller hole and reams it to the necessary depth for the bell of the hanger. According to Walter Hornsby, this combination tool is much more convenient and saves both time and effort.

Opportunity!

If you have a practical idea, a short-cut method, or a new wrinkle in operating or maintaining a machine, here is the place to shout about it. Every man learns from his mates, and here is the opportunity for you to do your coworkers a service in helping them to lick that problem that is bothering them. Your ideas, in addition, are worth money to you, as *Coal Age* pays $5 and up for every item that appears in these pages. Send in your story. A simple sketch or a photograph will help to put it over.



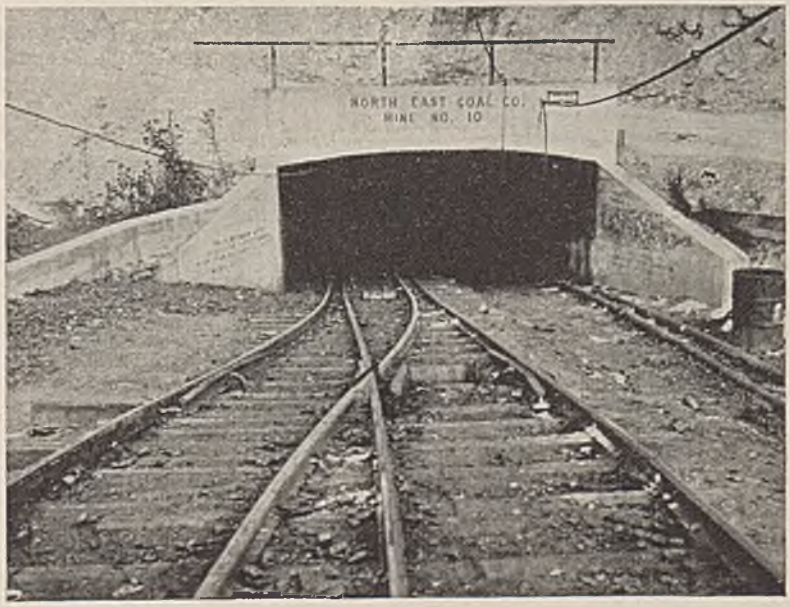
This Tool Drills and Reams in One Operation

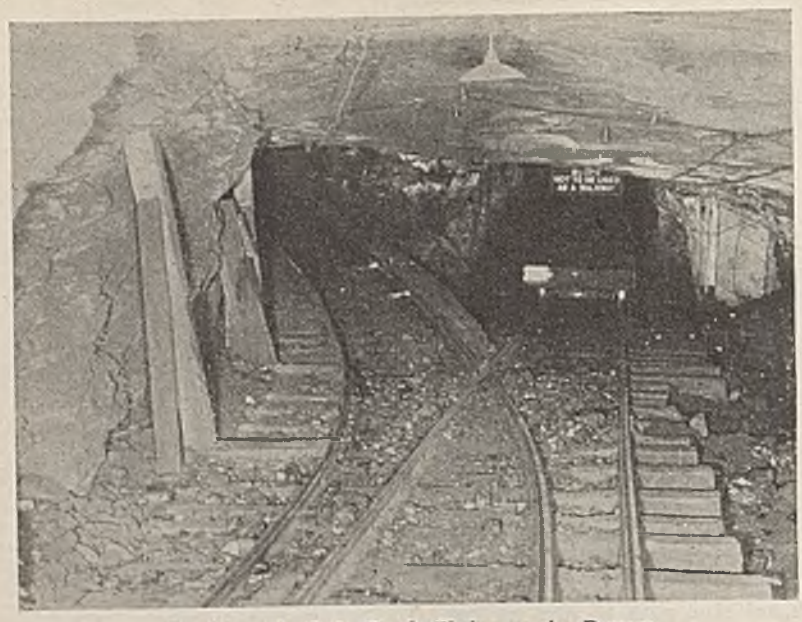
The bit is made in the shop and is of tool steel, the length, size, style, and type of point depending upon the group to be drilled. About 6 in. from the cutting end of the bit a slot or eye is made which receives the reaming arm. To keep it on center, the bottom of the reamer is dapped ¼ in., it being made of tool steel. In the event the reamer is not needed, it can be readily taken out and the bit used alone for drilling.

Switch Points Eliminated On Slope Haulage

In single-rope slope hoisting, if the slope is not so long as to run the cost of extra steel to an excessive figure, a good plan is to lay two pairs of rails

Empty Track Laps Over Onto the Loaded Track at the Portal





One Frog Is Only Track Fitting at the Bottom

with the track center lines about 6 in. apart. This scheme is especially adaptable to a mine where the coal bed lies practically horizontal and there are no right and left levels from intermediate points along the slope.

Such is the case at the Auxier (Ky.) mine of the North East Coal Co. The overlapping double-track arrangement is used, one pair of rails serving for hoisting the loads and the other for lowering the empties. At both top and bottom the empty track turns out to the same side of the loaded track. Therefore no switch points are needed. One frog at the top of the slope and one at the bottom are the only track fittings required. This arrangement helps to reduce the chance of derailments. The slope is on a 17-deg. pitch and is 600 ft. long.

Faceplate Is a Combination Surface Plate and Anvil

In the central repair shop of a coal company there are many uses for a large surface plate or table which has holes and dovetail grooves for bolting. This has been demonstrated at the Jenkins (Ky.) shop of the Consolidation Coal Co., where the faceplate from a scrapped wheel lathe was mounted as a table in the welding and smith shop.

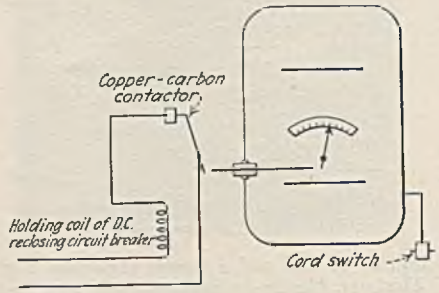
Parts to be welded by acetylene or electricity are bolted to the plate to prevent warping. The plate is also used as an anvil and plane surface for straightening heavy parts such as locomotive frames. Another faceplate from the same lathe is mounted on the ground outside of the shop and serves the same purpose when the plate inside is occupied.

Bolted to the Plate Ready for Welding

Demand Limited by Adding Contactor to Meter

One substation unit supplies the mine of the Babcock Coal & Coke Co., Clifftop, Fayette County, W. Va. At this mine, W. B. Amick, chief electrician, decided that a saving could be effected by making provision for automatic opening of the circuit breaker to limit the purchased power demand-charge. The accompanying sketch shows how he arranged the Westinghouse type OA watthour meter of the substation switchboard to accomplish this purpose.

The original register was replaced by a demand attachment costing approximately $15. A hole was bored in the left-hand side of the glass case to accommodate a guide bushing for a small rod or pin which is pushed outward when the bottom end of the demand pointer moves over to a certain point. On the switchboard panel beside the meter is mounted a contactor which the



Attached to the Watthour Meter

pin engages and opens at a predetermined demand value. Gravity causes this contactor to reclose when the demand attachment pointer returns to zero at the end of the 15-min. interval.

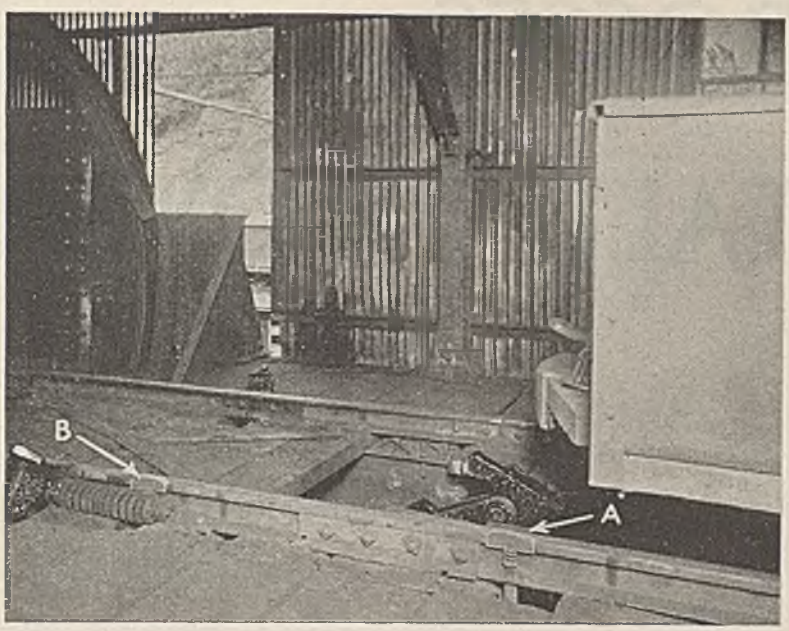
Opening and closing of the contactor causes like action of the d.c. feeder breaker controlling the mine circuits. These circuits carry the principal load; therefore the demand increase is practically halted while the breaker is open.

The contactor is unusual in that it is light enough in weight to be actuated by the meter pointer and yet capable of carrying the circuit-breaker control current. The movable part is made of No. 12 copper wire and the stationary block is carbon. A pendant snap switch on the right-hand side of the case provides for stopping and starting the demand interval timing motor to synchronize the interval with that of the power company's demand meter. Adjustment is accomplished by cutting off a piece of the pin that extends through the meter cover or by substituting a longer pin.

Tread Limit Switches Effect Stopping of Feeder

One of several practical methods of effecting automatic stopping of a feeder for spotting cars in a rotary dump is illustrated in the accompanying picture made at No. 9 mine, the new full-mechanical operation of the Carbon Fuel Co. in Kanawha County, W. Va.

Cars are equipped with swivel couplings and the trip is advanced through the dump by a single-direction chain feeder. The dump operative starts the



The Trip Will Stop When the Car Wheels Depress Both Treads at the Same Time

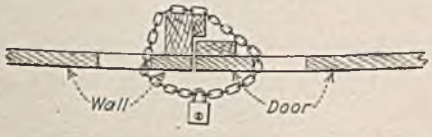
feeder motor for each car length of advance, but the stopping is automatic. It takes place when the car wheels span and simultaneously press down the treads *A* and *B* which are spaced to equal the wheelbase dimension.

Each tread, working against a spring, operates a limit switch and the two limit switches are connected in parallel in the motor circuit so that operation of one switch alone does not stop the motor. Each time the dump returns to normal position it automatically sets the horns which provide the final definite limit of travel of the approaching car. Automatic stopping of the trip allows the dumper time to record the car number on the paper strip of the automatic weight recorder. The rotary dump was made by the Kanawha Manufacturing Co., Charleston, W. Va.

Loose Chain and Padlock Forms Two-Way Lock

In many instances it is advantageous that outside doors of a preparation plant, and of the conveyor gallery and headhouse that may be connected thereto, be arranged so that they can be locked or unlocked from either the inside or outside. This provision is useful to repair men and officials who often find it necessary to gain access to a certain part of the plant or to walk through it when it is shut down and locked.

To Unlock From the Inside Pull the Padlock Around Through the Hole

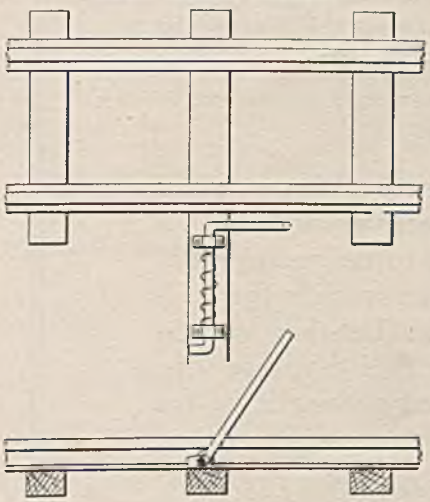


One way of avoiding the expense and certain construction disadvantages of installing mortise locks is to use a padlock and chain, as shown in the accompanying sketch. Holes in the door and wall are large enough to allow turning the chain so as to pull the padlock to either side. This old and simple method of two-way locking was installed on the new plant built last year by the Imperial Smokeless Coal Co., Quinwood, W. Va.

Spring Knocker Releases Brakes Set by Dump

At No. 2 tipple of the Gauley Mountain Coal Co., Ansted, W. Va., some difficulty was encountered due to partial setting of brakes on mine cars by reason of the cars being turned upside down in the rotary dump. Momentary reversal of gravity forces allowed the levers to catch in the first or second notch. This put an extra load on the trip feeder and involved the work of walking the length of the trip and releasing the brakes.

Brake Handle Knocker

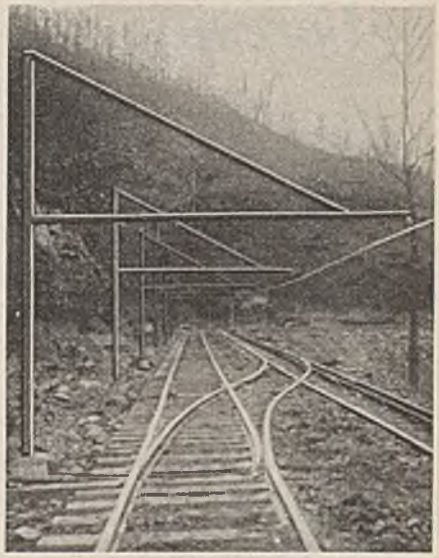


To eliminate this a 1-in. round steel knocker with a coil spring was installed at the end of the rotary dump. The spring snaps the knocker back to an upright position after it has been pushed down by the car and released as the end of the car passes by. On the cars in use at this mine the brake levers are along the end of the body and the handle is in a position out far enough from the car end and low enough to be hit by the knocker with sufficient force to release the brake.

Welded Rails Support Wires For Double Track

On a newly graded 3,000-ft. double-tracked outside haul of the Gauley Mountain Coal Co., Ansted, W. Va., it was impractical to attempt to set permanent trolley posts along the outside of the grade in the filled ground. Instead, both trolley wires were supported from cantilever arms attached to posts set in the solid earth along the inside of the track grade.

The posts are made from 60-lb. rail and the arms and braces from 20-lb. rail.



Permanent Supports in Unfilled Ground

Assembly was by electric welding. To simplify the problem of setting the posts in concrete and keeping them plumb while the concrete was setting, 4-ft. lengths of 6-in. pipe were first set in piers of concrete at points marked for the posts. The upper 30 in. of these pipes was kept free of concrete on the inside to accommodate the posts.

After the piers had set for a few days, the posts of 60-lb. rail were inserted in the pipes, plumbed with shims, and grouted in place. The tops of the piers were then rounded with concrete to provide drainage.

THE BOSSES TALK IT OVER

Safety Bonus to Foremen—

How Should It Be Paid?

"I WONDER," mused Jim, almost forgetting Mac's presence, "whether Dad's proposal of a bonus to foremen for avoiding lost-time and compensable accidents is the thing. Of course I can see how the bonus would serve as an incentive to cleaner records; but I don't quite like the flat bonus."

"Why not, Jim?" asked Mac, startling the super out of his reverie. "His plan is fair. It pays $10 to each foreman having no lost-time accident in the month, $5 to each having one lost-time accident, and nothing to the foreman having a compensable accident. It should get results."

"That's true, but isn't there a better plan? Thinking out loud, I see greater possibilities in a plan which rewards according to the record established: Pay the foreman, say, two mills for man-hours of supervision without a lost-time accident on a monthly basis; give him half that rate if he has one lost-time accident, and nothing if he has a compensable accident."

"I like Dad's plan best," remarked the foreman.

WHAT DO YOU THINK?

1. Should section foremen be rewarded for establishing high standards of safety? The mine foreman, too?

2. Will an incentive influence better results?

3. Which of the two proposed plans do you prefer and why?

4. What other plan can you propose?

All superintendents, foremen, electrical and mechanical men are urged to discuss the questions on page 328. Acceptable letters will be paid for ▶▶▶▶

What advantages are derived from the use of steel ties in place of wood ties? Jim and Mac considered this substitution in May. What the readers think is told in the letters following.

Yardage Cost Was Reduced By Use of Steel Mine Ties

THERE are few conditions in which steel mine ties may not be adopted with advantage in room work, but, like the installation of machinery, the first cost often keeps them from being used. With the steel mine tie, however, it is not necessary to purchase a sufficient number at one time to run the entire mine.

At a coal mine in eastern Kentucky the following conditions prevailed: Coal, 38 in.; flinty rock, 4 in.; hard bone coal, 6 in.; and soft bottom, 6 in. Since the bone coal was very hard, in order to have proper clearance for the equipment, with the track laid on wooden ties, it was necessary to drill one and sometimes two holes in the bottom. Usually this shooting required the handling of 12 to 15 in. of muck. Naturally, the miner had to be recompensed for this work on a yardage basis, and his productivity consequently fell, because of the time lost to loading coal. Frequently it was found that the bottom material could not be gobbed in the clear and had to be moved again when the pillar was extracted.

Because of these difficulties, it was decided to try steel mine ties. However, the steel mine ties did not provide sufficient clearance when laid directly on the floor formed by the undercut. It was found necessary, therefore, to remove the 4 in. of flinty rock which laid directly under the coal. This was easily accomplished by wedging. With this system, the miner could take up the bottom in less than one-third the time previously required and, accordingly, the yardage paid was reduced to one-third the previous rate.

A sufficient number of steel cars were purchased each month to extend the track into a few rooms. In the course of six months enough ties were recovered from worked out rooms and pillars so that current purchases were cut in half. Incidentally, the cost of the steel ties was far below that paid for wood ties in the same service each month. In the course of a year's time steel ties were available to take care of the needs of the entire mine, so that only at intervals was it necessary to purchase a few additional ties to replace those lost or destroyed.

Room entries and main entries are still laid with track supported on wooden ties. Only in the rooms and blind aircourses are steel ties used. Besides the saving in the yardage, there is a saving in the track crew's time in recovering material from worked-out places. Since steel ties have been adopted, all track joints in the rooms are plated and the locomotives do not lose the return, nor do they wreck at joints for the lack of plates, as so frequently is the case when track is laid on wooden ties.

LLOYD G. FITZGERALD.
Diablock, Ky.

Prefers Steel Ties

STEEL is being utilized to a greater extent each year in coal mining, and steel ties have come into more general use. The first cost of steel ties is not great when their durability as compared with ties of wood is considered. When a steel tie is damaged by a derailment, it can be replaced more easily than can a wood tie.

The steel tie has other advantages. For one thing, it reduces the height that a loader must raise the coal in shoveling into the mine car. It also enables the loader to top the car higher, because it gives more clearance between the car and roof. There is no reason why switches and main-line track cannot be laid on steel ties as well as on wood ties, provided precautions are taken. By using concealed bonds and regular stock bonds the danger from arcing is no greater than when wooden ties are used and are allowed to become saturated with moisture. Water must be kept off the haulway whether the tie is of wood or of steel. Steel ties are a benefit in sections of a mine where water has a tendency to heave. For general all-around use, I prefer the steel tie to the wood tie, provided drainage and bonding are properly taken care of. F. O. NICHOLS.
Smithfield, Pa.

Steel Ties for Long Life

CERTAINLY steel ties can be handled with much greater convenience than those of wood. The tracklayer needs to carry no tools except a hammer, nor does he require a helper. In pillar sections, track laid on the steel ties can be recovered bodily, merely by attaching a hook from a rope or chain to a locomotive or animal harness. As the steel tie is low and flat, there is little drag on the bottom. With proper attention, a heavy steel tie should give a life of five to seven years; under identical conditions a wood tie will last one to three years. F. J. HALL.
Stickney, W. Va.

Britain Utilizes Steel Ties On Main Haulways Only

WHAT the ultimate life of steel ties will be has not been definitely established for British mines, because their general use in this country began scarcely three years ago. Our limited experience indicates that steel ties serve best on the main haulways and that they are not so good on temporary branches. This is the direct antithesis of American experience.

Of course, the real advantage of steel ties is their permanency, which means that they will require much less maintenance than wood ties, provided they are permanently placed in the initial installation. It has been found practically impossible to maintain a haulway entirely free from water at all times. To meet this difficulty, the ties are given two coats of acid-resisting paint before they are placed. Each tie is securely bonded electrically to the track.

Although we have not experienced electrolytic deterioration, that reaction is possible and would be a source of trouble which, possibly, we avoid by our practice of bonding the ties to the track and otherwise maintaining good electrical grounds. W. E. WARNER.
Herts, England.

Steel Ties Effect Economies In Thick-Vein Coal Mines

IN the Middle West the use of steel ties has never been extensive. When used at all, they are considered only a temporary measure, probably because it has been customary to think favorably of them only in connection with conditions where roof height is at a premium. There are few, if any, low-vein mines in the Illinois coal basin, and wooden ties usually are plentiful and cheap. Nevertheless, from the standpoint of economy, the saving represented by wood ties is more or less superficial. Especially is this so in connection with rooms, where the frequent removal and re-laying of track is the limiting factor in the life of the tie.

Steel ties have been used to advantage on main haulways during development stages, especially where grading wa

required to eliminate adverse grades on the permanent track. The lightness of the steel tie and the ease with which it can be attached to the rail and removed when necessary are characteristics in its favor.

Steel ties on main haulage, however, are not to be recommended, as there is a tendency of the track to shift out of alignment at the slightest provocation. Heavy wood ties, tamped solidly, will hold the track in position, and when properly ballasted and drained, make a roadbed hard to excel.

Exhaustive tests by one coal corporation showed a saving in the use of steel ties over the wooden variety of $22.50 per room of 280 ft. depth. Further investigation has shown that the life of the steel mine tie is about six times that of the wood tie, and since only one-half as many are required per foot of track, the ratio of comparative utility runs about 1 to 12. Again, assuming the cost of a steel tie to be $0.50 and that of a wood tie $0.10 and disregarding the cost of spikes, the cost ratio lies somewhere in the neighborhood of 5 to 1. From the standpoint of comparative cost there is no question that steel ties represent a real saving. On one occasion where the grade line ran into hard limestone, the steel ties eliminated expensive drilling and shooting, also the possibility of undermining a number of timber sets which held dangerous overburden. ALEXANDER BENNETT.

Panama, Ill.

Widespread Interest

Interest in these pages is widespread. From every direction have come expressions of the help derived from the discussions. Mac, Jim, the Old Man, and others who participate in this forum derive a great deal of satisfaction from the part they play. But they want you to participate also. If you have a problem, send it in. At the same time send in your letter on the current problem. COAL AGE *pays for problems and letters accepted.*

Teach Miners From Bottom Up

JIM was right. There are no two men who can estimate the time it takes to do a piece of work and agree on it. Conditions are not always the same. Supervision does not have so much to do with a piece of work as it does with having the right man for the job. All foremen and superintendents should have had experience in all work about the mines. If a man has never run a motor, laid track, nor done any other work around the mines he cannot expect to be able to estimate the time it takes to do a piece of work.

Two assistants and myself have about 150 men to look after. Therefore, we are not able to give as much attention as Mac does to each particular job. I look after most of the day labor, main-line motors, and the track. The assistants look after the face work and any day labor that might be on their sections. We move our track men from one section to another, thus doing our work with less men and getting better results. We have three men who lay all the track at the face, and four men who lay all main-line track, all switches, and do all repair work on the track. We keep two track helpers for extra brakemen and two wiremen whom we use for extra motormen. We also have men loading coal whom we sometimes use as brakemen in case of emergency. This keeps us from having to keep extra men on our force.

When they have proved their ability our men are promoted to better jobs as soon as we have openings for them. They all start at the bottom and work up to better jobs. We find by using this system that we make better men and that they will do better work and more of it. I think this is better than trying to standardize labor, as I have tested both methods. G. K. BEAVERS.

Splashdam, Va.

Slovenly Workmanship Demands Doing Job Over Again and Again

ARE day labor costs the result of inefficient management, inefficient from many angles of view? Whether a mine produces 400 tons of coal per day or 3,000 there are a number of fixed charges which are common to each. The solution, therefore, is to obtain the maximum tonnage, in order that the per ton cost of these charges

Recent Patents

Apparatus for Separating Coal From Dirt and Like Foreign Substances; 1,780,965. W. H. Berrisford, Stoke-on-Trent, England, assignor to Lockwood's Clean Coal Process, Ltd., London, England. Nov. 11, 1930.

Method for Heating Coal or the Like; 1,781,079. Frank Puening, Pittsburgh, Pa., assignor to Koppers Co., Pittsburgh, Pa. Nov. 11, 1930.

Method of Treating Coal to Restore Luster; 1,781,102. Ernest V. Collins, Jr., Brooklyn, N. Y., assignor to Delaware, Lackawanna & Western Coal Co., New York City. Nov. 11, 1930.

Apparatus for Conveying From the Working Face in Mines; 1,781,259. Arthur Welsh and George Raw, New Washington, England. Nov. 11, 1930.

Rock Duster; 1,781,509. A. J. Gurney, Canton, Ohio, assignor to American Mine Door Co., Canton, Ohio. Nov. 11, 1930.

Coal-Loading Machine; 1,781,895. George M. Crawford, Ingomar, Pa., and Jacob M. London, Butler, Pa. Nov. 18, 1930.

Cutter Bit and Carrier; 1,782,172. Nils D. Levin, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Nov. 18, 1930.

Mining Machine Cutter Chain; 1,782,408. Frank Cartlidge, Cincinnati, Ohio, assignor to Cincinnati Mining Machinery Co., Cincinnati, Ohio. Nov. 25, 1930.

Agitator for Coal Hoppers; 1,783,092. Basil C. Lewis, Frederick, Md., assignor to Frederick Iron & Steel Co., Frederick, Md. Nov. 25, 1930.

Mining Lamp; 1,783,136. James A. Paisley, Cleveland, Ohio, assignor to Valley Camp Coal Co., Cleveland, Ohio. Nov. 25, 1930.

Mine Car; 1,784,472. Victor Willoughby, Ridgewood, N. J., assignor to American Car & Foundry Co., New York City. Dec. 9, 1930.

Mine Car; 1,784,477. Leopold Almquist, Jersey City, N. J., assignor to American Car & Foundry Co., New York City. Dec. 9, 1930.

Apparatus for Carbonizing Coal; 1,784,676. John Mitchell, Clinton, Ind., assignor to Charcolite Corporation, Clinton, Ind. Dec. 9, 1930.

Coal-Handling Apparatus; 1,783,619. Henry H. Israel, Lansford, Pa., and George Trussa, Nesquehoning, Pa. Dec. 2, 1930.

Mine-Shaft Construction; 1,783,812. R. V. Proctor, Youngstown, Ohio, assignor to Commercial Shearing & Stamping Co., Youngstown, Ohio. Dec. 2, 1930.

Coal Breaker; 1,784,983. G. W. Borton, New Lisbon, N. J., assignor to Pennsylvania Crusher Co., New York City. Dec. 16, 1930.

Mining Machine; 1,785,196. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago.

Trade Literature

Sprockets. Link-Belt Co., Chicago—Book No. 1,267, 24 pp., illustrated, devoted to specifications of sprocket wheels.

Recorders. Catalog RA-31, 24 pp., issued by Hays Corporation, Michigan City, Ind., describes and illustrates operating principle, method of installation, and mounting dimensions of Combustion Recorders.

Electrical Equipment. Ohio Brass Co., Mansfield, Ohio—New Products Supplement No. 4, Listing new and improved products announced since General Catalog No. 20.

Conveyors—Mavor & Coulson, Ltd., Glasgow, Scotland—Folder illustrating and describing its face belt conveyor with totally protected lower belt.

Turbines. Besides data on turbines and their operation, this bulletin, issued by Coppus Engineering Corporation, Worcester, Mass., contains information on how to select the proper unit for each specific duty.

Steam Equipment. Fuel burning and steam generating equipment. General Condensed Catalog GC-6, 16 pp., illustrated; Combustion Engineering Corporation, New York City.

Electrical Equipment. Phase Protective Panels, GEA-132; Photoelectric Relay, GEA-1266A; Fractional-Horsepower Motors, GEA-1276; General-Purpose Squirrel-Cage Induction Motors, GEA-1336; Steam Turbines, GEA-1080A. General Electric Co., Schenectady, N. Y.

Hoists. Sullivan Machinery Co., Chicago, has recently issued the following: Turbinair Portable Hoists, single- and double-drum models; Bulletin 76-M; 15 pp. Turbinair Cathead, for air or steam; Bulletin No. 76-L; 2 pp. Rock Drills, Class "L-6" Rotators; Bulletin No. 87-D; 7 pp. Core Drilling by Contract; Bulletin No. 139; 11 pp. Type "50" Core Drill, driven by gasoline engine; Bulletin No. 85-M; 7 pp. Type "10" Diamond Core Drill, belt-driven by gasoline engine or electric motor; Bulletin No. 85-L; 3 pp. These bulletins are all illustrated.

First Aid. Mine Safety Appliances Co., Pittsburgh, Pa.—Catalog No. FA-2; 36 pp., illustrated. Covers all necessaries for first-aid work.

Mining Machines. Goodman Mfg. Co., Chicago, has issued Book H-302, giving complete specifications and details of a 6-ton, 2-motor low-vein gathering locomotive; Book M-301, a 4-pp. folder describing its low-vein universal shortwall machine; Book M-300, covering standard and low-vein slabbing machines; and Book M-292, giving specifications and details of its mounted bottom cutter.

Transite. Johns-Manville Corporation, New York City. Pp. 20, illustrated. Tells what transite is, of its corrosion and weatherproof qualities, and gives dimensions, weights, etc.

Crushers. Type "S" All-Steel Ring Crusher. American Pulverizer Co., St. Louis, Mo.—Pp. 8, illustrated.

will be a minimum. Another factor in high day labor costs is introduced by slovenly workmanship, which requires doing over, again and again, jobs which might have been made lasting in the first instance. To what avail is the practice of cleaning track by shoveling the cleanings to the side? There comes a day when these cleanings will have to be shoveled again, put into mine cars and transported to the outside. That is an example of doing the job twice at a cost which is much more than it should be.

Day work can in many respects be standardized, but why attempt to so standardize? It would be better to employ honest men and get from them an honest day's work for an honest day's pay. The honest man will give you a full day's labor, whether his accomplishment for the day is big or little. The honesty of labor cannot always be measured by the work accomplished.

Linton, Ind. W. H. LUXTON.

Give the Assistant a Chance

IF Mac's day labor cost is out of control, he certainly is not paying much attention to results obtained from dollars spent. Any foreman should be able to tell how he stands as to cost within five minutes after receiving his daily tonnage sheet. Jim is right in saying the question is not how much supervision but how intelligent.

I would not be in favor of Jim's plan of supervising day men. The day men should be under the direction of the assistant in whose section they are working. The assistant foreman certainly should know where his most important work is if he is pushed for day men, and should be able to tell his men, when he comes to them on his rounds, where they will be working and what they will be doing the following day. For a main-track job the foreman should know how much material of the different kinds he needs for the job and how many men it will take to do the job in a given time.

No, I don't think specialized supervision according to Jim's plan is the solution, but more attention to the details of the job, such as having all necessary material and tools ready and selecting the right men. Then comparing results obtained with dollars spent. If the assistant foreman is not given the opportunity, how can he ever be able to supervise intelligently and put over a construction job of any kind if acting "on his own" as a foreman?

Ernest, Pa. T. J. LEWIS.

Few Jobs Can Be Standardized

IN that portion of the bituminous coal field of western Pennsylvania known as the coke region, entirely different conditions oftentimes exist in adjacent mines. Entirely different roof and bottom conditions may exist within a section of a mine where the pillar lines are short in length. In these mines it would be a difficult matter to standardize the time required for each individual job.

In some sections of these mines a pair of trackmen may, under favorable conditions, lay two switches and curves of 20-lb. rail, while another track crew, working not over 500 ft. away, will be working equally as hard and just as efficiently. But, due to a heavy roof condition or a heaving bottom, the latter will have difficulty laying one switch during the same period. Again, a timber crew, working under good roof conditions, will be able to set twelve timbers over which three, four, or five lagging are placed, while another timber crew, equally as efficient, with the same effort, will be able to set only half as many sets. Perhaps the roof to be timbered is badly fractured and also requires more time to locate a suitable bottom slate on which to secure a solid footing for the timber legs. Other day labor jobs in this region are frequently as variable as the two mentioned.

Therefore, I do not think that day labor can be standardized as to time required. What is needed is not a time limit for each individual job but honest, faithful workmen. Working under experienced, intelligent, and efficient foremen, who should be able quickly to determine whether they are receiving a day's work for a day's pay, the workers will produce. J. L. HAMILTON.

Brier Hill, Pa.

Publications Received

The Inflammation of Coal Dusts: The Effect of the Presence of Firedamp, by T. N. Mason and R. V. Wheeler. Safety in Mines Research Board. Paper No. 64; 32 pp., illustrated. Price, 6d. net. Deals with the effect of the presence of firedamp on the amount of incombustible dust required to suppress the inflammation of coal dust. H. M. Stationery Office, Adastral House, Kingsway, W.C. 2, London, England.

Accuracy of Manometry of Explosions: Comparative Performance of Some Diaphragm - Type Explosion Manometers When Using Hydrogen-Air Mixtures, by C. M. Bouton, H. K. Griffin and P. L. Golden. Technical paper 496; 52 pp.; illustrated. Price, 15c. Bureau of Mines, Washington, D. C.

Explosives Accidents in the Anthracite Mines of Pennsylvania, 1923-1927, by S. P. Howell. Bulletin 326; 93 pp., illustrated. Price, 20c. Bureau of Mines, Washington, D. C.

Analyses of Washington Coals. Technical paper 491; 203 pp. Price, 30c. Bureau of Mines, Washington, D. C.

Bibliography of United States Bureau of Mines Investigations on Coal and Its Products 1910-1930, by A. C. Fieldner and M. W. von Bernewitz. Technical paper 493; 56 pp. Price, 10c. Bureau of Mines, Washington, D. C.

Recent Developments in Byproducts From Bituminous Coal, by A. C. Fieldner. R. I. 3,079; 13 pp., illustrated. Bureau of Mines, Washington, D. C.

Coal-Mine Safety Organizations in Alabama, by R. D. Currie. Bureau of Mines, Washington, D. C. Technical Paper 489; 48 pp.; price, 10c.

A Study of Refractories Service Conditions in Boiler Furnaces, by Ralph A. Sherman. Bureau of Mines, Washington, D. C. Bulletin 334; 144 pp., illustrated; price, 50c. Investigation by the Bureau of Mines and the Special Research Committee on Boiler-Furnace Refractories of the American Society of Mechanical Engineers.

Mine Explosion, Mine Fires and Miscellaneous Accidents in the United States During the Fiscal Year Ended June 30, 1930, by D. Harrington and C. W. Owings. Bureau of Mines, Washington, D. C. I. C. 6,419; 33 pp.

Analyses of Wyoming Coals. Bureau of Mines, Washington, D. C. Technical Paper 484; 159 pp.; price, 25c.

Economics of Strip Coal Mining, by O. E. Kiessling, F. G. Tryon, and L. Mann. Bureau of Mines, Washington, D. C. Economic Paper 11; 32 pp. Price, 10c.

Bibliography of U. S. Bureau of Mines Investigations on Coal and Its Products 1910-1930, by A. C. Fieldner and M. W. von Bernewitz. Bureau of Mines, Washington, D. C. Technical Paper 493; 56 pp.; price, 10c.

The Propagation of Combustion in Powdered Coal, by H. E. Newall and F. S. Sinnatt. Safety in Mines Research Board. Paper No. 63; 58 pp., illustrated; price, 1s. 3d. net. H. M. Stationery Office, Adastral House, Kingsway, W.C. 2, London, England.

Permissible Methane Detectors, by A. B. Hooker, W. J. Fene, and R. D. Currie. Bureau of Mines, Washington, D. C. Bulletin 331; 30 pp., illustrated; price, 10c.

Intensities of Odors and Irritating Effects of Warning Agents for Inflammable and Poisonous Gases, by S. H. Katz and E. J. Talbert. Bureau of Mines, Washington, D. C. Technical paper 480; 37 pp., illustrated; price, 10c.

Combustion Tests With Illinois Coals, by Alonzo P. Kratz and Wilbur J. Woodruff. Conducted by the Engineering Experiment Station, University of Illinois, in co-operation with Zeigler Coal & Coke Co. Bulletin No. 213; 60 pp., illustrated; price, 30c. Engineering Experiment Station, Urbana, Ill.

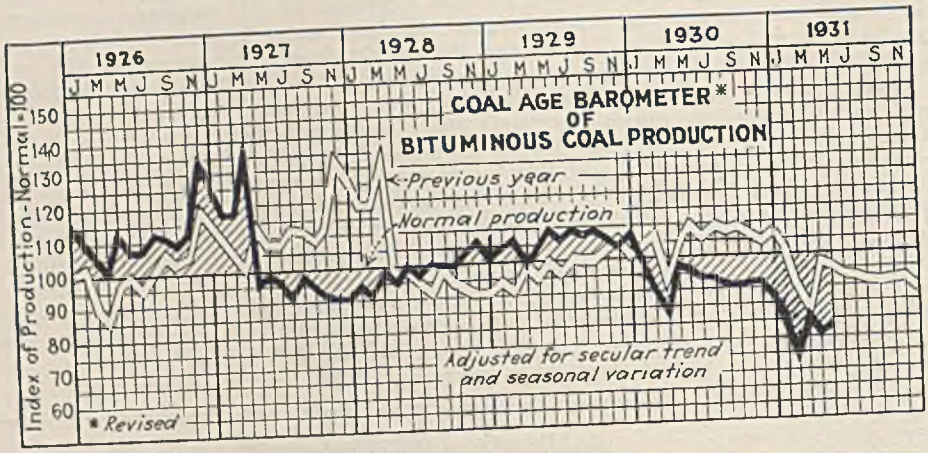
Timbering Regulations in Certain Coal Mines of Pennsylvania, West Virginia, and Ohio, by J. W. Paul, J. G. Calverley, and D. L. Sibray. Bureau of Mines, Washington, D. C. Technical paper 485; 41 pp., illustrated; price, 10c.

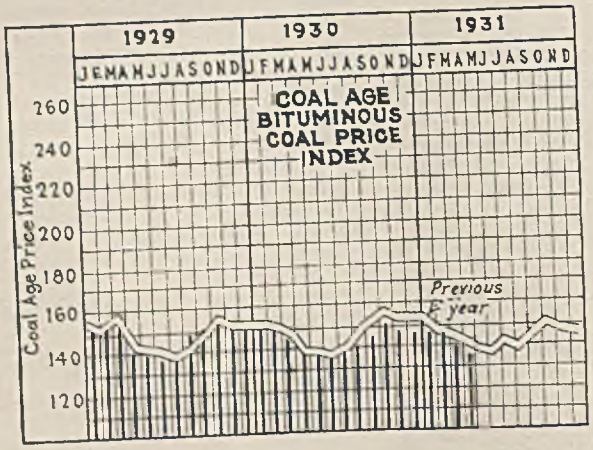
A.S.T.M. Standards, 1930. American Society for Testing Materials, Philadelphia, Pa. Issued triennially, in two parts. Part I, devoted to metals, has 1,000 pp.; Part II, covering non-metallic materials, has 1,214 pp. Both volumes are illustrated. Price for each volume, cloth, $7.50; half leather, $9; both parts in cloth $14; half leather, $17.

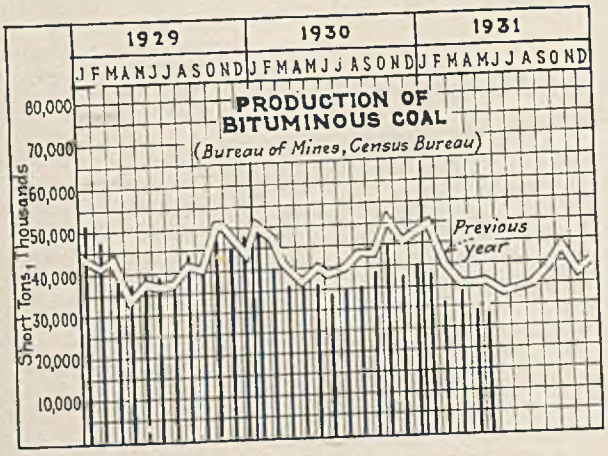
Accelerated Laboratory Test for Determination of Slacking Characteristics of Coal, by A. C. Fieldner, W. A. Selvig, and W. H. Frederic. Bureau of Mines, Washington, D. C. R. I. 3,055; 24 pp.

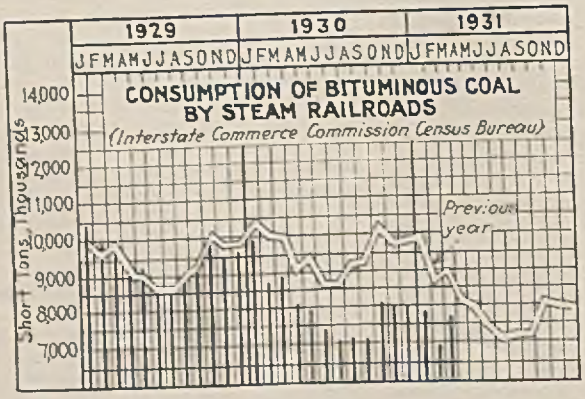
How Some Firedamp Explosions Are Prevented. Safety in Mines Research Board. H. M. Stationery Office, Adastral House, Kingsway, W.C. 2, London, England. Price, 3d. net. Pp. 30, illustrated.

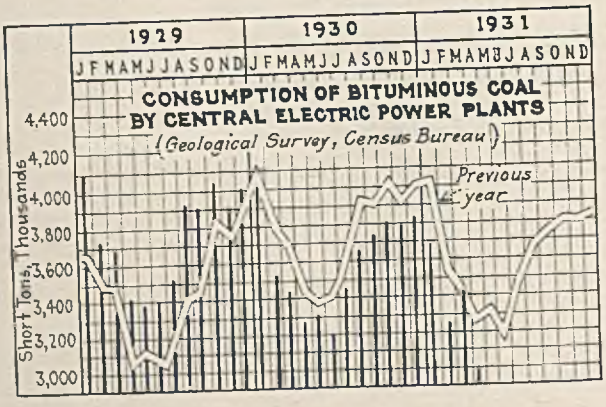
Indicators of Activities in the Coal Industry

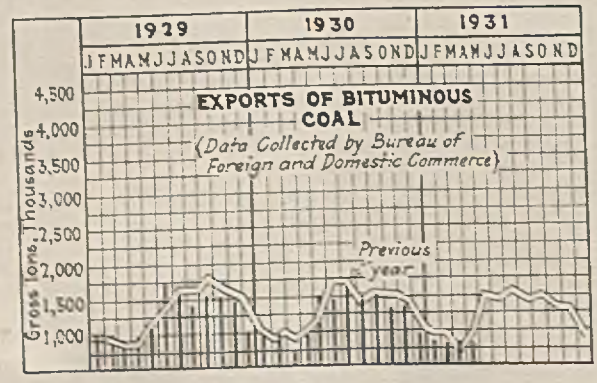


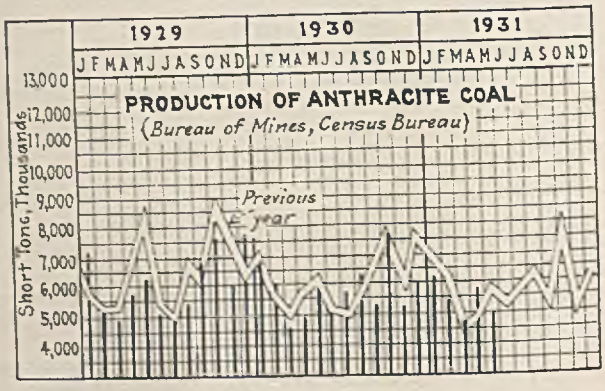












MARKETS in Review

THE bituminous trade took another hitch in its belt in May and prepared to weather the doldrums of summer. Retailers purchased domestic sizes only for current needs and turned a deaf ear to the blandishments of producers interested in moving coal into stockpiles. The steam trade, reflecting the continued slackness in industrial activity, was quiet in May. Continued curtailment in production, however, kept slack and screenings in the strong position they have occupied for some months.

Cautious buying in May throttled movement of the domestic sizes in the anthracite markets of the country, with the result that no real demand was apparent until the end of the month. Egg was favored, while chestnut received the least attention. Demand for pea and buckwheat receded somewhat in May, with the result that these sizes were slightly easier than in previous months. The steam trade was quiet.

May production of bituminous coal is estimated by the U. S. Bureau of Mines at 28,333,000 net tons, as compared with 28,478,000 tons in April and 35,954,000 tons in May, 1930. Anthracite production is estimated at 5,005,000 net tons for May. This compares with 5,700,000 tons in April and 5,841,000 tons in May of last year.

Coal Age Index of spot bituminous prices (preliminary) stood at 132 for the five weeks ended May 2, May 9, May 16, May 23, and May 30. The corresponding weighted average price was $1.60. Revised Index figures for April were: 136, April 4, April 11, and April 18; and 134, April 25. Corresponding weighted average prices were: $1.65, April 4; $1,64, April 11 and 18; and $1.62, April 25. The monthly Index for April was 135½, as compared with the unrevised figure of 132 for May.

Shippers to the lower lake ports found May to be a disappointing month. Movement for the five weeks was only 50 per cent of the rate in the corresponding weeks in May, 1929. For the season to June 1, dumpings were as follows: cargo, 4,544,730 tons; fuel, 139,320 tons; total, 4,684,050 tons. In the same period in 1930, the dumpings were: cargo, 7,963,410 tons; fuel, 269,619 tons; total, 8,233,029 tons. Prices on lake coal also were proving unsatisfactory, new low levels being reported on a number of contract items.

CHICAGO reported increased shipments of both steam and domestic coal in May, though demand failed to show briskness at any time. The slight rise in the call for domestic sizes increased the slack tonnage to the point where producers were forced to quote sacrifice prices to move it. For the first time in months, there were no spot cars of smokeless prepared sizes in the market, and prices stiffened accordingly, lump and egg advancing 25c. for June shipment. Slack piled up, however, with the result that some mines curtailed production to protect the price. Shipments of mine-run on contract increased about 25 per cent in May, though the price was steady at $1.75.

EASTERN high-volatile mines failed to share in the heavier demand for domestic sizes. Absence of any great amount of lake business also helped to depress the large sizes, with the result that lump and block were easy all the way along. Slack, however, reflecting the curtailment in production, moved into a stronger position. Illinois, Indiana, and western Kentucky operators were swamped with unsold cars of domestic coal. In spite of what ordinarily could be expected under such conditions, slack tended to soften instead of growing firmer. Southern Illinois producers announced an advance of 15c. on lump and 10c. on egg for June shipment.

Although a brief spurt of business was generated by chilly weather, St. Louis found things rather slow in May, and prepared to dig in for the summer. Production was restricted, causing a slight stiffening in slack prices. Other quotations showed no material change.

Dullness featured the wholesale trade in the Southwest in May, in spite of the fact that retailers cleaned up their yards during a short cold snap. A few shovel operations easily supplied cur-

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

		Week Ended						
		May 2, 1931		May 9, 1931	May 16, 1931	May 23, 1931	May 30, 1931	
	Market Quoted	Independent	Company	Independent	Independent	Independent	Independent	Company
Broken	New York	.....	$6.70	.....	.....	.....	.....	$6.70
Broken	Philadelphia	$6.70@$6.95	6.70	$6.70@$6.95	$6.70@$6.95	$6.70@$6.95	$6.70@$6.95	6.70
Egg	New York	6.95	6.95	6.95	6.95	6.95	6.95	6.95
Egg	Philadelphia	6.95@ 7.20	6.95	6.95@ 7.20	6.95@ 7.20	6.95@ 7.20	6.95@ 7.20	6.95
Egg	Chicago	6.95	6.95	6.95	6.95	6.95	6.95	6.95
Stove	New York	7.20	7.20	7.20	7.00@ 7.20	7.00@ 7.20	7.00@ 7.20	7.20
Stove	Philadelphia	7.20@ 7.45	7.20	7.20@ 7.45	7.20@ 7.45	7.20@ 7.45	7.20@ 7.45	7.20
Stove	Chicago	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Chestnut	New York	7.20	7.20	7.00@ 7.20	7.00@ 7.20	7.00@ 7.20	7.00@ 7.20	7.20
Chestnut	Philadelphia	7.20@ 7.45	7.20	7.20@ 7.45	7.20@ 7.45	7.20@ 7.45	7.20@ 7.45	7.20
Chestnut	Chicago	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Pea	New York	4.95	4.95	4.95	4.70@ 4.95	4.70@ 4.95	4.95	4.95
Pea	Philadelphia	4.95@ 5.20	4.95	4.95@ 5.20	4.95@ 5.20	4.95@ 5.20	4.95@ 5.20	4.95
Pea	Chicago	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Buckwheat	New York	3.25@ 3.50	3.25†	3.25	3.25	3.00@ 3.25	3.10@ 3.25	3.25†
Buckwheat	Philadelphia	3.25@ 3.50	3.25	3.25@ 3.50	3.25@ 3.50	3.25@ 3.50	3.25@ 3.50	3.25
Buckwheat	Chicago	3.25@ 3.75	3.25	3.25@ 3.75	3.25@ 3.75	3.25@ 3.75	3.25@ 3.75	3.25
Rice	New York	1.85@ 2.00	1.85	1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.85
Rice	Philadelphia	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@ 2.35	1.85@ 2.35	1.85@ 2.35	1.85
Barley	New York	1.00@ 1.25	1.40	1.00@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25	1.40
Barley	Philadelphia	1.40	1.40	1.40	1.40	1.40	1.40	1.40

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

rent demands. Summer storage prices were announced in May, the quotations for that month being as follows: Spadra (Ark.) anthracite grate, furnace, and nut, $5.50, corresponding to 1930 levels; Arkansas semi-anthracite lump and nut, $3.50, a decrease of 50c. in twelve months; McAlester (Okla.) lump and nut, $4; Wilburton (Okla.) lump and nut, $3.75; Henryetta (Okla.) lump and nut, $2.75. Oklahoma prices were 50c. to $1.25 below those in 1930. Kansas domestic prices were cut 25@50c. under last year. Screenings from all fields ranged from unchanged to 10c. lower. First advance of 25c. over May prices will not be made until July.

The market at the Head of the Lakes pursued the even tenor of its way in May without outstanding event of any kind. Shipments from the docks are expected to compare favorably with the total of 10,068 cars in April, and with loadings in the same month in 1930. Prices were steady and unchanged from those prevailing in April.

Reductions of as much as $1.50 in the mine prices, coupled with a touch of cold weather, brought much of satisfaction to the Rocky Mountain trade. Retail dealers took an increased supply of coal, while sales of steam grades were excellent. The new quotations are: bituminous, lump, nut, and washed chestnut, $4; steam sizes, $1.50@$1.75; Rock Springs-Kemmerer 7-in. lump, 3-in. lump, grate, and nut, $3.75; slack, $1.50@$1.75.

Dullness pervaded the Louisville market in May. Demand for both domestic and steam sizes was below normal, considerably reducing the tonnage ordinarily moved for the month. Spot prices on domestic varieties slid off slightly, but the decreased production caused slack to stiffen. Reports from western Kentucky brought to light the fact that several companies that stored screenings last fall, when quotations ranged from 5 to 10c., are now selling them for 70@80c.

May brought in its train a far-reaching disorganization of price levels in the Cincinnati market. One of the principal causes of the upset was the action of a group of Hazard operators which cut domestic lump to $1 to move slack at a good figure. Other producers immediately followed, though their reduction went only to $1@$1.35, thus, with premiums at $2.25@$2.70, giving the buyer a choice of three price levels. An almost complete absence of a tonnage movement to the Lakes further aggravated the situation, and expected relief from the Harlan strike failed to materialize.

High-volatile egg moved in greater volume, and considerably improved its position. Slack, which was firm at the beginning of May, weakened at the last. Prices as low as $1.10 on a mine-run basis for lake contracts were reported, with others ranging around $1.35@$1.40 or higher. The lake situation also hampered smokeless shippers. While domestic prices ranged from $2 to $2.25 on the average, some New River operators marked them up to $2.50 upon securing lake contracts. Dry stove slumped, and was in many cases sacrificed at ridiculous figures. Mine-run sales for the most part went at 25c. under the nominal price of $1.75. Slack finally felt the weight of unsettled conditions, dropping to $1@$1.25.

BOTH the domestic and steam trade in Columbus passed through a quiet May. Prices continued to slide off, though there was a slight upturn in smokeless quotations at the end of the month. Hocking Valley, Jackson, Cambridge, and Pomeroy mines operated at 35 to 50 per cent capacity, one retarding factor being the slow movement to the Lakes. Prices on lake coal were reported to be 10@15c. lower than in 1930.

Extreme sluggishness characterized the Cleveland market in May. Such buying as was reported was only for current needs, while the movement to the Lakes ran far behind last year. Prices were unchanged.

May brought a slight in-

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

	Market Quoted	Week Ended May 2, 1931	May 9, 1931	May 16, 1931	May 23, 1931	May 30, 1931
LOW-VOLATILE, EASTERN						
Smokeless lump	Chicago	$1.75@$2.25	$1.75@$2.25	$1.75@$2.25	$2.00@$2.50	$2.25@$2.50
Smokeless egg	Chicago	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	2.00@ 2.50	2.25@ 2.50
Smokeless stove	Chicago	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	2.00@ 2.50	2.25@ 2.50
Smokeless nut	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.25	1.75@ 2.25
Smokeless pea	Chicago	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	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	1.50@ 1.75
Smokeless slack	Chicago	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35	.60@ 1.25	.60@ 1.10
Smokeless lump	Cincinnati	2.00@ 2.25	1.85@ 2.25	2.00@ 2.25	2.00@ 2.50	2.00@ 2.50
Smokeless egg	Cincinnati	2.00@ 2.25	1.85@ 2.25	1.85@ 2.25	2.00@ 2.25	2.00@ 2.50
Smokeless stove	Cincinnati	1.75@ 2.25	1.75@ 2.25	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
Smokeless nut	Cincinnati	1.50@ 1.60	1.50	1.50	1.50@ 1.60	1.50
Smokeless mine-run	Cincinnati	1.65@ 1.75	1.60@ 1.75	1.60@ 1.75	1.50@ 1.75	1.50@ 1.75
Smokeless slack	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	.85@ 1.25	.90@ 1.25
*Smokeless mine-run	Boston	4.00@ 4.15	3.95@ 4.15	3.90@ 4.10	3.95@ 4.15	3.90@ 4.10
*Smokeless nut-and-slack	Boston	3.42@ 3.53	3.42@ 3.53	3.42@ 3.53	3.42@ 3.53	3.42@ 3.53
Clearfield mine-run	Boston	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Clearfield mine-run	New York	1.70@ 1.90	1.60@ 1.80	1.60@ 1.75	1.50@ 1.75	1.50@ 1.75
Cambria mine-run	Boston	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10
Somerset mine-run	Boston	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85
Pool 1 (Navy Standard)	New York	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Pool 1 (Navy Standard)	Philadelphia	2.00@ 2.30	2.00@ 2.30	2.00@ 2.30	2.00@ 2.30	2.00@ 2.30
Pool 9 (super low-vol.)	New York	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90	1.65@ 1.90	1.65@ 1.90
Pool 9 (super low-vol.)	Philadelphia	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Pool 10 (h. gr. low-vol.)	New York	1.60@ 1.70	1.50@ 1.70	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Pool 10 (h. gr. low-vol.)	Philadelphia	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Pool 11 (low-vol.)	New York	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50
Pool 11 (low-vol.)	Philadelphia	1.35@ 1.50	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	$0.95@$1.15	$0.90@$1.15	$0.90@$1.10	$0.85@$1.10	$0.85@$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	1.00@ 1.15
Pittsburgh sc'd gas	Pittsburgh	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80
Pittsburgh steam lump	Pittsburgh	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pittsburgh egg	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh gas mine-run	Pittsburgh	1.45@ 1.60	1.45@ 1.60	1.45@ 1.60	1.45@ 1.60	1.45@ 1.60
Pittsburgh steam mine-run	Pittsburgh	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
Pittsburgh gas slack	Pittsburgh	1.00@ 1.20	1.00@ 1.20	1.00@ 1.20	1.00@ 1.20	1.00@ 1.20
Pittsburgh steam slack	Pittsburgh	.75@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Connellsville coking coal	Pittsburgh	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75
Westmoreland lump	Philadelphia	1.80@ 2.00	1.80@ 2.00	1.80@ 2.00	1.80@ 2.00	1.80@ 2.00
Westmoreland ¾-in. lump	Philadelphia	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85
Westmoreland egg	Philadelphia	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65
Westmoreland mine-run	Philadelphia	1.55@ 1.65	1.55@ 1.65	1.55@ 1.65	1.55@ 1.65	1.55@ 1.65
Westmoreland slack	Philadelphia	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15	1.00@ 1.15
Fairmont lump	Fairmont	1.10@ 1.50	1.10@ 1.50	1.10@ 1.40	1.10@ 1.40	1.10@ 1.30
Fairmont ¾-in. lump	Fairmont	1.05@ 1.35	1.00@ 1.25	1.05@ 1.20	1.00@ 1.15	1.00@ 1.15
Fairmont egg	Fairmont	1.05@ 1.30	1.00@ 1.25	1.00@ 1.20	1.00@ 1.10	.85@ 1.10
Fairmont mine-run	Fairmont	1.00@ 1.20	.90@ 1.10	1.00@ 1.15	1.00@ 1.20	1.00@ 1.20
Fairmont slack	Fairmont	.60@ 1.00	.60@ .90	.65@ .90	.65@ .90	.60@ .80
Kanawha lump	Cincinnati	1.35@ 1.75	1.35@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Kanawha egg	Cincinnati	1.25@ 1.50	1.10@ 1.50	1.10@ 1.50	1.10@ 1.50	1.15@ 1.50
Kanawha mine-run (gas)	Cincinnati	1.40@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Kanawha mine-run (st)	Cincinnati	1.10@ 1.35	1.10@ 1.35	1.00@ 1.35	1.00@ 1.35	1.00@ 1.35
Kanawha nut-and-slack	Cincinnati	.85@ 1.10	.85@ 1.10	.85@ 1.10	.85@ 1.10	.75@ 1.10
Williamson (W. Va.) lump	Cincinnati	1.35@ 1.75	1.35@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Williamson (W. Va.) egg	Cincinnati	1.25@ 1.50	1.15@ 1.50	1.10@ 1.50	1.10@ 1.50	1.10@ 1.50
Williamson (W Va.)mine-run (gas)	Cincinnati	1.40@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.50	1.35@ 1.60
Williamson (W.Va.) mine-run (st.)	Cincinnati	1.10@ 1.35	1.00@ 1.35	1.00@ 1.35	1.00@ 1.35	1.00@ 1.35
Williamson (W.Va.) nut-and-slack	Cincinnati	.85@ 1.00	.85@ 1.10	.85@ 1.00	.75@ 1.00	.75@ 1.00
Logan (W. Va.) lump	Cincinnati	1.25@ 1.60	1.10@ 1.50	1.10@ 1.50	1.10@ 1.50	1.15@ 1.60
Logan (W.Va.) egg	Cincinnati	1.10@ 1.35	1.10@ 1.35	1.00@ 1.35	1.10@ 1.35	1.10@ 1.35
Logan (W.Va.) mine-run	Cincinnati	1.10@ 1.40	1.10@ 1.35	1.00@ 1.35	1.10@ 1.40	1.10@ 1.40
Logan (W.Va.) nut-and-slack	Cincinnati	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ .85
Logan (W. Va.) slack	Cincinnati	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00
Hocking (Ohio) lump	Columbus	1.70@ 1.85	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	1.50@ 1.65
Hocking (Ohio) mine-run	Columbus					
Hocking (Ohio) nut-and-slack	Columbus	.75@ .90	.75@ .90	.75@ .90	.75@ 1.00	.75@ 1.00
Pitts. No. 8 (Ohio) lump	Cleveland	1.50	1.50	1.50	1.50	1.50
Pitts. No. 8 (Ohio) ¾-in. lump	Cleveland	1.15@ 1.30	1.15@ 1.30	1.15@ 1.30	1.15@ 1.30	1.15@ 1.30
Pitts. No. 8 (Ohio) egg	Cleveland	1.20@ 1.35	1.20@ 1.35	1.20@ 1.35	1.20@ 1.35	1.20@ 1.35
Pitts. No. 8 (Ohio) mine-run	Cleveland	1.10@ 1.15	1.10@ 1.15	1.10@ 1.15	1.10@ 1.15	1.10@ 1.15
Pitts. No. 8 (Ohio) slack	Cleveland	.75@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85

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

crease in production to the Pittsburgh district, compounded largely of a rise in industrial demand and some quickening in lake shipments. The latter, however, were not in normal volume and were largely confined to companies with their own docks.

Extreme dullness featured the northern West Virginia market in May. Prices eased off considerably all along the line, though the tonnage moved compared favorably with that of May, 1930.

Central Pennsylvania experienced a slight increase in demand at the close of May, giving a fillip to an otherwise dull month. Production was slack, and prices slid of slightly to the following: Pool 1, $2@2.30; Pool 71, $1.80@$2.15; Pool 9, $1.70@$1.80; Pool 10, $1.50@$1.70; and Pool 11, $1.40@$1.50.

While the New England steam trade dragged in May, a feeling of optimism became apparent as the month wore on. Quotations f.o.b. vessels at Hampton Roads were reasonably firm, with No. 1 Navy Standard smokeless mine-run at $3.90@$4. An occasional cargo sold up to $4.10, while nut-and-slack (stoker) hung at its long-standing level of $3.42@$3.53. Supply and demand were better coordinated in May, and there was less shading of prices and less pressure to move coal. Pennsylvania all-rail coals went through an uneventful month without change.

THE New York market went through a quiet month in May. Industrial users bought only for current needs—already below normal, retail demand showed a further seasonal decline, and contract buyers failed to take their usual quotas. Quotations on all grades of mine-run weakened, while limited supply caused slack to move into a stronger position. Operators were unable to move much lump. New competition appeared to plague Pennsylvania operators in the guise of several 6,000-ton steamer cargos of New River and Pocahontas coal from Hampton Roads.

Demand in the Philadelphia market slumped considerably in May. In spite of low reserves, users persisted in their refusal to lay in stocks, while prices continued to seek unsatisfactory levels. Several sellers priced tonnages at lower than the spot market in attempts to obtain institutional contracts.

Both domestic and industrial movement in the Birmingham market, though already at a low ebb, slumped still further in May. Domestic prices were scheduled to advance on June 1 to the following: Big Seam lump, egg, and nut, $1.80; Carbon Hill lump and egg, $1.95; nut, $1.80@$1.90; Corona lump and egg, $2.30; nut, $2.05; Cahaba lump and egg, $2.55@$3.65; nut, $2.80; Black Creek lump and egg, $3.05@$3.30; nut, $2.70; Montevallo-Aldrich lump, $4.15; egg, $3.90; nut, $2.70; Dogwood lump, $4.15; egg, $3.90; Straven lump, $3.55; egg, $3.30; nut, $2.45. Quotations on steam sizes were unchanged.

With stocks swollen by extra tonnage purchased in April to forestall a price advance, dealers curtailed buying in the New York anthracite market in May until the extra tonnage could be worked off, with the result that there was an abrupt falling off in business. As bin-filling orders came in slowly, the surplus tonnage was not disposed of until the middle of the month. Though buying was resumed on a somewhat heavier scale after that time, it did not attain any volume until the last of May. Egg was the most active of the larger sizes, while chestnut was the slowest. Pea and buckwheat relaxed still further, with some independent sales below circular. Rice was firm, barley weak.

Retail dealers bought anthracite cautiously in the Philadelphia market in May, despite the fact that cool weather resulted in a fairly active demand for current heating needs. Stockpiles were well filled. Pea, especially, was stored in quantities. The steam trade was quiet, with an ample supply of all sizes, including buckwheat.

Exports of coal and coal products in April, the latest month for which records are available, were as follows: bituminous, 671,420 long tons; anthracite, 119,542 long tons; and coke, 5,254 long tons.

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

	Market Quoted	Week Ended May 2, 1931	May 9, 1931	May 16, 1931	May 23, 1931	May 30, 1931
MIDDLE WEST						
Franklin (Ill.) lump	Chicago	$2.25	$2.25	$2.25	$2.25	$2.25
Franklin (Ill.) egg	Chicago	2.25@2.40	2.25@2.40	2.25@2.40	2.25@2.40	2.25@2.40
Franklin (Ill.) mine-run	Chicago	2.15	2.15	2.15	2.15	2.15
Franklin (Ill.) screenings	Chicago	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75
Central Ill. lump	Chicago	1.75@1.90	1.75@1.90	1.75@1.90	1.75@1.90	1.75@1.90
Central Ill. egg	Chicago	1.75@1.90	1.75@1.90	1.75@1.90	1.75@1.90	1.75@1.90
Central Ill. mine-run	Chicago	1.70@1.80	1.70@1.80	1.70@1.80	1.70@1.80	1.70@1.80
Central Ill. screenings	Chicago	.80@1.25	.80@1.25	.80@1.25	.80@1.25	.75@1.25
Ind. 4th Vein lump	Chicago	2.10@2.50	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	2.00@2.50
Ind. 4th Vein mine-runl	Chicago	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00
Ind. 4th Vein screenings	Chicago	1.25@1.50	1.25@1.50	1.25@1.50	1.25@1.50	1.25@1.50
Ind. 5th Vein lump	Chicago	2.00@2.10	2.00@2.10	2.00@2.10	2.00@2.10	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	1.75@2.00
Ind. 5th Vein mine-run	Chicago	1.21@1.75	1.21@1.75	1.21@1.75	1.21@1.75	1.21@1.75
Ind. 5th Vein screenings	Chicago	.85@1.25	.85@1.25	.85@1.25	.85@1.25	.70@1.25
Mt. Olive (Ill.) lump	St. Louis	1.60@1.75	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	1.50@1.60
Mt. Olive (Ill.) mine-run	St. Louis	1.40@1.50	1.40@1.50	1.40@1.50	1.35@1.50	1.35@1.50
Mt. Olive (Ill.) screenings	St. Louis	.90@1.25	.90@1.25	.90@1.25	.90@1.25	.90@1.25
Standard (Ill.) lump	St. Louis	1.50@1.60	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	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	1.25@1.40
Standard (Ill.) screenings	St. Louis	.85@1.10	.85@1.10	.85@1.10	.85@1.10	.85@1.10
West Ky. lump	Louisville	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40
West Ky. egg	Louisville	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40
West Ky. nut	Louisville	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40	1.15@1.40
West Ky. mine-run	Louisville	.85@1.25	.85@1.25	.85@1.25	.85@1.25	.85@1.25
West Ky. screenings	Louisville	.65@.85	.75@.85	.65@.85	.70@.80	.70@.80
West Ky. lump	Chicago	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40
West Ky. egg	Chicago	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40
West Ky. screenings	Chicago	.70@.85	.70@.85	.70@.85	.70@.85	.65@.85
SOUTH AND SOUTHWEST						
Big Seam lump	Birmingham	$1.70	$1.70	$1.70	$1.70	$1.70
Big Seam mine-run	Birmingham	1.60@1.75	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	1.60@1.75
Harlan (Ky.) egg	Chicago	1.50@1.65	1.50@1.65	1.50@1.65	1.50@1.65	1.50@1.65
Harlan (Ky.) slack	Chicago	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20
Harlan (Ky.) block	Louisville	1.75@2.00	1.75@2.00	1.75@2.00	1.50@1.75	1.50@1.75
Harlan (Ky.) egg	Louisville	1.40@1.75	1.40@1.75	1.40@1.75	1.40@1.60	1.35@1.60
Harlan (Ky.) mine-run	Louisville	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60
Harlan (Ky.) nut-and slack	Louisville	.90@1.25	.90@1.10	.90@1.10	.90@1.25	.90
Harlan (Ky.) block	Cincinnati	1.35@2.25	1.25@2.25	1.25@2.25	1.25@2.25	1.35@2.25
Harlan (Ky) egg	Cincinnati	1.25@1.75	1.10@1.75	1.10@1.75	1.10@1.75	1.10@1.75
Harlan (Ky.) mine-run	Cincinnati	1.10@1.60	1.10@1.60	1.00@1.60	1.10@1.60	1.10@1.60
Harlan (Ky.) nut-and-slack	Cincinnati	.85@1.10	.85@1.10	.85@1.10	.85@1.10	.85@1.00
Hazard (Ky.) block	Chicago	1.35@1.50	1.35@1.50	1.35@1.50	1.35@1.50	1.35@1.50
Hazard (Ky.) egg	Chicago	1.35@1.50	1.35@1.50	1.35@1.50	1.35@1.50	1.35@1.50
Hazard (Ky.) slack	Chicago	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Hazard (Ky.) block	Louisville	1.25@1.75	1.25@1.75	1.25@1.75	1.15@1.75	1.15@1.75
Hazard (Ky.) egg	Louisville	1.25@1.50	1.25@1.50	1.25@1.50	1.15@1.40	1.15@1.40
Hazard (Ky.) mine-run	Louisville	1.25@1.50	1.25@1.50	1.25@1.50	1.15@1.50	1.15@1.50
Hazard (Ky.) nut-and-slack	Louisville	.75@1.00	.85@1.10	.75@1.00	.75@1.00	.75@1.00
Hazard (Ky.) block	Cincinnati	1.00@1.50	1.00@1.50	1.00@1.50	1.10@1.50	1.10@1.50
Hazard (Ky.) egg	Cincinnati	1.00@1.50	1.00@1.35	1.00@1.35	1.00@1.35	1.00@1.35
Hazard (Ky.) mine-run	Cincinnati	1.10@1.35	1.00@1.35	1.00@1.35	1.10@1.35	1.10@1.35
Hazard (Ky.) nut-and-slack	Cincinnati	.75@1.00	.75@1.10	.75@1.10	.75@1.00	.75@1.00
Elkhorn (Ky.) block	Chicago	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75
Elkhorn (Ky.) egg	Chicago	1.60@1.75	1.60@1.75	1.60@1.75	1.60@1.75	1.60@1.75
Elkhorn (Ky.) slack	Chicago	1.10@1.35	1.10@1.35	1.10@1.35	1.10@1.35	1.10@1.35
Elkhorn (Ky.) block	Louisville	1.40@1.75	1.40@1.75	1.40@1.75	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	1.25@1.50
Elkhorn (Ky.) mine-run	Louisville	1.25@1.50	1.25@1.50	1.25@1.50	1.25@1.50	1.25@1.50
Elkhorn (Ky.) nut-and-slack	Louisville	.90@1.25	.90@1.10	.90@1.10	.90@1.25	.90@1.25
Elkhorn (Ky.) block	Cincinnati	1.35@2.70	1.35@2.70	1.35@2.70	1.35@2.70	1.35@2.70
Elkhorn (Ky.) egg	Cincinnati	1.10@2.00	1.10@2.00	1.10@2.00	1.10@2.00	1.10@2.00
Elkhorn (Ky.) mine-run	Cincinnati	1.10@1.60	1.10@1.60	1.00@1.60	1.00@1.60	1.10@1.60
Elkhorn (Ky.) nut-and-slack	Cincinnati	.85@1.10	.85@1.10	.85@1.10	.85@1.10	.85@1.10
Kansas shaft lump	Kansas City	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25
Kansas strip lump	Kansas City	2.25	2.25	2.25	2.25	2.25
Kansas mine-run	Kansas City	2.00@2.10	2.00@2.10	2.00@2.10	2.00@2.10	2.00@2.10
Kansas screenings	Kansas City	1.75	1.75	1.75	1.75	1.75

WORD from the FIELD

Dismissal of Lake Cargo Case Asked by Examiner

Dismissal of complaint of the Ohio Lake Cargo Coal Rate Committee and the Western Pennsylvania Coal Traffic Bureau that the rates on lake cargo coal from Ohio and Pennsylvania coal fields, on the one hand, and coal-producing districts in West Virginia, southwestern Virginia, and eastern Kentucky and Tennessee, on the other, were unduly prejudicial to Northern mines and unduly preferential to Southern operators was recommended to the Interstate Commerce Commission by Examiner E. M. Bardwell in a proposed report filed May 8. The Northern groups asked that the differential between the Northern and Southern coal fields be widened, though a particular differential was not specified.

The examiner's report was assailed by the western Pennsylvania group in exceptions filed with the commission on May 29, asserting the right of the Northern group to equality of treatment and opportunity as a competing locality. A date for final argument on the case is expected to be announced in the near future.

Mines Resume Operation

Work was resumed in May at a number of coal mines throughout the country. According to an announcement of the Chicago, Wilmington & Franklin Coal Co., Orient No. 1, West Frankfort, Ill., resumed operation May 11. The mine, which employs about 1,200 men, had been closed about two months, during which mechanical loaders were installed. The Orient reopening was antedated by that of Mine No. 5 of the Taylor Coal Co., Freeman, Ill., which started up with 700 men on May 1, after an idleness of several weeks.

The beginning of May also witnessed the stepping up of production schedules in the Williamson field of West Virginia and Kentucky. The Tierney Mining Co., Stone, Ky., went on a schedule of full-time operation to last for several weeks, while the Fordson Coal Co. advanced operations to five days a week. Operations of the Red Jacket Consolidated Coal & Coke Co., in the vicinity of Red Jacket, W. Va., embarked on a schedule of four days per week, after a long period of two- and three-day weeks.

In Colorado, the Colorado Fuel & Iron Co. closed contracts to take the entire output of six Fremont County independent mines during the next season and announced that it would reopen its own mine in that county. In addition, the company again started operations at its Crested Butte mine on May 1, after a month's shutdown, giving employment to 200 men.

Canada Increases Coal Duty

Increased duties on imported coal were included in the new Canadian budget presented to the Dominion Parliament at Ottawa, June 2, by Premier R. B. Bennett. Under its provisions, United States coal moving into the Dominion will pay, under the general classification, the following duties: anthracite and lignite, 40c. per short ton; coal not otherwise provided for, including bituminous coal, screenings, and dust, 75c.; and coke, $1. Anthracite and coke formerly entered the country free of duty, while the duty on bituminous coal was 50c. per short ton. The new schedules became effective on June 2, subject to legislative revision.

The increase in tariffs will be supplemented by subsidies to the coal industry in the Maritime provinces and in western Canada in the form of rail-rate concessions on shipments of coal from both eastern and western producing fields to Ontario and Quebec. The proposals, Mr. Bennett said, were aimed at a movement of 1,870,000 tons a year at a cost to the government of $1,800,000.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations for the month of April are as follows:

Bair-Collins Co., Roundup, Mont.: Link-Belt Co. engaged in the construction of a new tipple, to be equipped with shaker screens, auxiliary treating plant for nut coal, and 140 lineal feet of picking table; capacity, 250 tons per hour; to be completed July 15.

New River & Pocahontas Consolidated Coal Co., Kaymoor, W. Va.; contract closed with Link-Belt Co. for third Link-Belt-Simon-Carves coal-washing unit; capacity, 75 tons per hour.

Pennsylvania Miners Oppose Changes in Law

Representatives of the United Mine Workers and of the three anthracite districts of the union last month appeared before legislators composing the Pennsylvania anthracite bloc in opposition to a proposed measure designed to enlarge the functions of the Department of Mines to include marketing of coal, freight rate revisions, and equalization of working time. The bill was sponsored by Governor Pinchot. Opposition of the miners arose from the fact that they were afraid the state department might neglect safety in favor of the new pursuits. As a result of the hearing, it is reported that the bill will be amended to provide a special bureau in the Department of Mines under a separate head.

Iowa Adopts Trade Code

To stimulate the use of state-mined coal, the Iowa coal producers on May 6 adopted a code of trade practices drawn up after consultation with the retail dealers and the Iowa Coal Institute. Intentional misrepresentation of facts, procuring the breach of a contract, and selling of coal in less than carload lots to other than retail dealers for resale, or without taking into consideration the additional costs of such service, were branded as unfair practices. Producers are adjudged to be acting within the scope of the code when selling to retail coal merchants, industrial consumers on a railroad line or off the railroad line if they have been buying direct. In addition, producers may sell direct to consumers in any Iowa town where no dealer handles Iowa coal. The code recommended the formation of a committee to adjudicate complaints and a second body to interpret the rules and definitions.

To Build Briquet Plant

Construction of a briquetting plant at Salida, Colo., was started on May 5 by the Robert Gage Coal Co., Bay City, Mich. Upon completion, it will be operated by the Acme Smokeless Fuel Co., a subsidiary. Capacity of the plant will be 15 tons per day, and anthracite slack from the Crested Butte field will be used.

Utilization of Illinois and Indiana Coals Stressed at Mid-West Fuel Conference

MORE effective utilization of Illinois and Indiana coals was stressed at the 1931 Mid-West Bituminous Coal Conference, held at Urbana, Ill., May 21-22. The conference, the second of its kind, was sponsored by the University of Illinois and Purdue University in cooperation with the Coal Trade Association of Indiana, the Fuels Division of the American Society of Mechanical Engineers, Illinois Coal Bureau, Illinois State Geological Survey, Midwest Stoker Association, National Association of Power Engineers, and the National Association of Purchasing Agents. Over 300 coal men, power-plant engineers, equipment representatives, and university officials attended.

Methods of determining the relative values of coal was the theme of an address by W. D. Langtry, president, Commercial Testing & Engineering Co., Chicago, who opened the first session of the conference, presided over by M. S. Ketchum, dean, College of Engineering, University of Illinois. Mr. Langtry laid special stress upon the necessity of careful sampling, so that the coal submitted for analysis would be truly representative of the mine or the seam. He also emphasized the fact that the character of the coal mined may change materially as recovery goes on so that frequent periodic sampling is advisable.

The sampling value is determined by the accuracy with which the sample has been taken, declared G. H. Cady, geologist in charge of the coal section of the Illinois State Geological Survey. Machine mining, he added, has changed the significance of the face sample as an index of the value of the coal shipped.

Tests of coal and natural gas in burning vitrified sewer pipe were discussed in a paper by Edward F. Clemens, secretary, and Eugene C. Clemens, ceramic engineer, Cannelton (Ind.) Sewer Pipe Co., read in the absence of the authors by Prof. R. K. Hirsh, professor of ceramic engineering, University of Illinois. Although the tests had shown a lower B.t.u. consumption and higher yield of first-grade product with gas, the cost with gas had been double that of coal. As a result of these tests, together with consideration of the factors of known adequate supply of solid fuel, lower investment costs and lower labor costs, the Cannelton company decided to continue to use coal.

"The cost of gas fuel was approximately 2.9 times that of soft coal and 1.8 times that of anthracite under comparable conditions" in heating the research residence laboratory at the university, said A. C. Willard, professor of heating and ventilation, University of Illinois, in a paper on comparative heating values of fuels in home heating. The "practical" heating value of a highly volatile fuel can be improved only by the better or more complete combustion of the volatile matter under all load conditions and at all combustion rates. "The total heat of the fuel, less heat loss at the top of the chimney, is all in the building somewhere" and the "vagrant" heat is quite an important element.

Successful application of pulverized fuel to residences and small industrial plants was outlined by C. W. Callaghan, Automatic Coal Co., Sioux City, Iowa. The coal used for these installations is crushed, dried, and pulverized so that 99 per cent will pass through a 100-mesh screen, 95 to 96 per cent through a 200-mesh, and 83 to 85 per cent through a 300-mesh. The equipment installed includes a tank, feeder, meter, and carburetor. Installations have been made at a cost of less than $300. The cost of the fuel at Sioux City approximates $10 per ton.

Less and less coal will be used in the future as a raw fuel and more and more as a raw material for processing, was the message brought to the conference at its evening session in a paper prepared by the late Prof. S. W. Parr and D. R. Mitchell, associate in mining engineering, University of Illinois, and briefed by Prof. Mitchell at the evening session, presided over by Jonas Waffle, managing director, Coal Trade Association of Indiana. Prof. Parr had worked on this paper up to within an hour of his death on May 16. Emphasis was placed on the value of research and the coal industry was exhorted to begin to capitalize upon the laboratory achievements already made.

The Parr coking process, said Prof. Mitchell, is applicable to Mid-West coals and offers one way to check the increasing penetration of Eastern coals into Mid-West markets. This process will yield a low-ash, low-sulphur fuel, easily ignited and hard-structured. The process also may be used in making metallurgical coke. Another possibility is the greater use of hydrogenation to meet the growing commercial demand for this gas. Synthetic rubber from coal also is in the picture.

Illinois, declared M. M. Leighton, chief of the State Geological Survey, is much concerned over the decline in its mineral industries. The state proposes to launch upon an extensive program to aid these industries by field study of the resources and the possibilities for their utilization, by encouraging the use of these resources by industries already established, and by encouraging the establishment of new industries. This, in turn, will help the coal industry by swelling the demand for coal.

The value of research was also strongly indorsed by C. B. Huntress, executive secretary, National Coal Association, Washington, D. C. No commodity so lends itself to research as does coal, but a community of interest is needed among coal men to prosecute this research and to take advantage of the opportunities which research will disclose. The work of the Committee of Ten—Coal and Heating Industries was outlined by Oliver J. Grimes, Chicago, managing director of the committee.

Domestic utilization of Mid-West coals was the theme of the third session of the conference, held on the morning of May 22 and presided over by B. R. Gebhart, director of public relations, Illinois Coal Bureau, Chicago. On behalf of the Midwest Stoker Association, E. L. Beckwith, Chicago chairman of the engineering committee of that organization, presented recommendations covering the heights of settings for boilers equipped with mechanical stokers. Mr. Beckwith stated that these settings must be high enough to give proper efficiency in the mechanical burning of Mid-West coals. This plan was backed by Joseph Harrington, Harrington Stoker Co., Chicago, who declared that settings must be higher because of the physical requirements of the stoker apparatus, to effect smokeless combustion and for safety.

Eastern coals have had the edge, asserted T. A. Marsh, Modern Coal Burner Co., Chicago, because the older textbooks on combustion engineering were written by Eastern engineers who were unfamiliar with Western coals. Stokers should be designed specially and specifically for Mid-West fuels. Settings alone are not a cure-all, in the opinion of J. H. Walter, Iron Fireman Manufacturing Co., Chicago; proper installation is of prime importance. This point was reiterated by Homer Linn, American Radiator Co., Chicago, who said he would rather have a poorly designed stoker properly installed than a good stoker poorly installed. "I have never seen too much combustion space,"

Permissible Plates Issued

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, 1931, as follows:

(1) Mavor & Coulson, Ltd.; "Samson," Type HT, longwall mining machine; 35-hp. motor, 440 volts, a.c.; Approval 220-A; April 21.

(2) Mavor & Coulson, Ltd.; Type VT shaker conveyor; 15-hp. motor, 440 volts, a.c.; Approval 221-A; April 22.

(3) Goodman Mfg. Co.; inclosed 3-pole fused switch; 200 amp., 220 volts, and 100 amp., 440 volts, a.c.; Approvals 403 and 403-A; April 14.

(4) Mavor & Coulson, Ltd.; inclosed, 3-pole, automatic, oil-immersed circuit-breaker, Type A141B1; 45 amp., 440 volts, a.c.; Approval 404-A; April 16.

(5) Bond Electric Corporation; Bond safety-type flashlamp; Approval 602; April 6.

added H. C. Carroll, director, mechanical engineering department, Commercial Testing & Engineering Co.

How coal had ousted oil after comparative tests in the Eastgate and St. Clair hotels, Chicago, was described in detail by George I. Methe, president, Chicago Coal Merchants' Association. As the result of these tests, the equipment at the hotels was changed from oil to coal-stoker firing. In three months since the change was made there had been a saving of 36.1 per cent in fuel costs (including labor and ash removal) at the Eastgate, as compared with the same period last year, and 43.3 per cent saving in two months at the St. Clair. Average outside temperatures during these months in 1931 was somewhat lower than in 1930. The change meant an additional investment in excess of $5,000, but 30 per cent of that investment already had been returned in the lower costs.

Results of 28 tests to determine the applicability of Indiana coals to small stoker installations were presented by William T. Miller, assistant professor, and G. A. Young, professor, School of Mechanical Engineering, Purdue University. Two series of tests were run, one to determine the reliability of operation and the other, ability to operate at maximum capacity. The over-all efficiencies developed in these tests are summarized in the following tabulation:

Coal	Per Cent Over-all Efficiency Maximum Capacity Test	Reliability Test	Hours*
Brazil			
Third Vein 1¼-in. screenings	68.0	66.6	12
Fourth Vein 2-in. screenings	71.4	69.7	9
	68.7	69.9	10½
Fourth Vein 2x¾-in. nut Linton-Sullivan	67.6	71.6	12
Fourth Vein 1½-in. screenings	66.0	72.3	12
Fifth Vein 2-in. screenings	66.4	†	..
	68.2	†	..
	†	67.8	12
Pike County			
Fifth Vein 1¼-in. screenings	68.5	68.5	12
	64.2	†	..
	†	67.8	12
	†	68.6	10
Fifth Vein 1¼ x ¾-in. nut	66.6	68.6	12
	70.3	69.3	10
	67.9	73.1	12
Fifth Vein, ¾ x ¼-in. nut	65.0	71.6	12
	68.1	73.6‡	12

* Hours of continuous automatic operation.
‡ Air-washed coal.
† Where no figures are shown, maximum capacity and reliability tests were not made with same stokers.

With the exception of a paper on Mid-Western coal preparation by H. B. Cooley and John A. Garcia, Allen & Garcia Co., Chicago, abstracted elsewhere in this issue of *Coal Age* (see pp. 315 and 316), the closing session of the conference was devoted to questions of industrial utilization primarily of interest to power-plant engineers. A. P. Kratz, research professor, department of mechanical engineering, University of Illinois, summarized Bulletin 213 of the Engineering Experimental Station in a review on Mid-West coal combustion tests, which showed average over-all efficiencies of 65.5 per cent with southern Illinois coals and 62.9 per cent with northern Illinois coals. A. A. Potter, dean of engineering, Purdue University, who presided, said that tests made at Purdue indicate that over-all boiler efficiencies of 79.2 per cent may be obtained with Indiana coal in connection with water-tube boilers and forced-draft mechanical stokers. With hand-fired fire-tube boilers, efficiencies as high as 69.6 per cent had been obtained.

The Mid-West Bituminous Coal Conference is the outgrowth of a movement started by Purdue University and the Indiana operators four years ago. After two Indiana meetings, the scope of the conference was broadened last year to include the Illinois interests. The 1932 conference will be held at Purdue.

Sullivan the Scene of a Safety Banquet

Celebrating the conclusion of a seven-months' course in accident prevention and first aid, carried on in cooperation with the U. S. Bureau of Mines, the Foremen's Club of the Templeton Coal Co. and the Linton-Summit Coal Co. tendered a banquet to Bureau of Mines men, Indiana state mining officials, company officers and employees, guest operators, and business and professional men on May 2. The affair was held at Sullivan, Ind., and C. A. Dillahunt, president of the club, was toastmaster. The list of speakers included the following safety and mining men: J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa.; D. Harrington, Washington, D. C., chief safety engineer of the bureau; John Hessler, Terre Haute, Ind., general superintendent, Coal Bluff Mining Co.; Phil Penna, Terre Haute; J. A. Templeton, Terre Haute, president of the Templeton and Linton-Summit companies; and William Cunningham, Linton, Ind., superintendent of the Linton-Summit mines. W. H. Forbes, of the Bureau of Mines, Washington, D. C., was presented with a token of appreciation by the club.

West Virginia Meets Scheduled; International Contest Off

Observance of the annual West Virginia state-wide safety day, scheduled for Huntington, W. Va., may be held up this year for lack of funds, R. M. Lambie, chief of the Department of Mines, told a group of coal men last month during the course of a meeting in Charleston, W. Va. However, dates for a number of sectional and company meets were set, and these will be run off during the summer.

Sectional meets, aside from those already held, are as follows: New River and Winding Gulf Mining Institute, Mt. Hope, July 4; Monongahela Valley Coal Mining Institute, Morgantown, July 18; Pocahontas Safety Association, Welch, July 23; Panhandle Mining Institute, Wheeling, Aug. 1; Central West Virginia Safety Association, Jacksons Mill, Aug. 22; Logan Safety Day Association, Logan, Aug. 29; Kanawha Valley Mining Institute, Montgomery, date to be set; Coal River Mining Institute, Whitesville, Sept. 7. Company meets will be held on the following dates: New England Fuel & Transportation Co., Grant Town, June 13; New River Co., Scarbro, June 13; American Rolling Mill Co., Nellis, Aug. 9; Koppers Coal Co., Montgomery, Sept. 5.

Lack of funds also will prevent the holding of the annual international first-aid and mine-rescue contest this year. Decision of the U. S. Bureau of Mines not to hold an international first-aid and mine-rescue contest in 1931 was announced last month. According to bureau officials, the action was taken for three reasons: to relieve the mining and allied industries of the expense of sending teams; allow the bureau men to concentrate on cooperative field work in first-aid and safety training, and on the new accident-prevention course; and to try to secure from Congress an adequate method of financing the meets.

Southwest Joins N.C.A.

The Southwestern Interstate Coal Operators' Association, after a lapse of several years, has voted to reaffiliate with the National Coal Association, according to Ira Clemens, Kansas City, Mo., president.

Bon Ayr Mine Sold

The Bon Ayr No. 2 mine of the Bon Ayr Coal Co., Jasonville, Ind., was sold last month to the Manfield-Firman Co., Terre Haute, Ind., for a consideration said to be in the neighborhood of $500,000. The mine normally employs about 350 men. No definite date for resuming operations was set by the new owners.

Scotts Run Operators Sign Union Agreement; Colorado Investigation Started

DEFINITE recognition of the United Mine Workers marked the end of the month in a general strike in the Scotts Run coal field, situated in Monongalia County, northern West Virginia. On May 28, the National Fuel Co., National, W. Va., and the Continental Coal Co., Fairmont, W. Va., signed an agreement with the union. Within the next two days, the Arkwright Coal Co., Morgantown; Domestic Fuel Corporation, Morgantown; Chaplin Collieries Co., Morgantown; Bravo Coal Co., Booth; and the Osage Coal Co., Osage, took similar action. The Maxine Coal Co., employing about 75 men, signed on June 4.

The strike started on May 11, when miners at the Pursglove No. 2 mine of the Pursglove Coal Mining Co., Pursglove, and at the Jere mine of the Scotts Run Fuel Co., Jere, struck against a wage cut, and rapidly spread to all the other Scotts Run mines, as well as to operations in the vicinity of Maidsville, W. Va., and on Indian Creek. Twenty companies, operating 23 mines in which it was estimated that 4,000 men were employed, were affected by the stoppage.

Conferences between some of the operators and representatives of the union were begun at Morgantown on May 25, and were followed by agreements in the next few days. At the end of the month, it was estimated that 1,250 men were back at work. As far as could be learned, the contracts entered into by the eight companies were in most particulars similar to former agreements, with three exceptions. The new agreement provides that the pit committee is to be named by District 31 of the United Mine Workers, instead of by the men at the mine, and a part of the pit committee clause reads that there shall be "no discrimination because of *age*, creed, race, or color," against the old phrase of "creed, race, or color."

Under the new contract, the operator is pledged to meet with union officials every 60 days for the settlement of disputes and adjustment of wages. An added clause states that the operator will attend a general conference (date not stated) for the purpose of adjusting wages and deciding other questions of general importance in the field.

Loaders on machine sections will receive 30c. a ton under the new wage scale. Miners asserted that the rate formerly paid had been cut to as low as 18c. at some mines. Pick miners will be paid 38c. a ton. Other rates, as compared with those reported to be paid in northern West Virginia by the Consolidation Coal Co., are shown in the accompanying table.

The close of May in the Pittsburgh district brought in its train a material increase in the number of miners said to be out on strike, as well as a struggle between the United Mine Workers and the National Miners' Union for control of the situation. P. T. Fagan, president of District 5, said that 4,000 miners were on strike, while Frank Borich, secretary, National Miners' Union, asserted that the total reached 5,600. Both men declared that miners at the Coverdale, Castle Shannon, Horning, and Mollenauer (Pa.) mines of the Pittsburgh Terminal Coal Corporation were on strike. A. J. Appel, vice-president of the company, said that the men had made no demands. Employees of the Kinloch mine of the Valley Camp Coal Co., Parnassus, Pa., also were said to be on strike. Fagan on May 26 had announced that he intended to call a strike at these properties, part of the Paisley and Pursglove interests, because, he asserted, they paid lower wages than any one else in the region.

Classification	Union Scale	Consolidation Scale
Loading	$0.30	$0.39
Cutting	0.05	0.055
Motormen	3.60	4.40
Helpers	3.60	4.40
Trackmen	3.60	4.40
Timbermen	3.60	4.40
Inside labor	3.20	3.84
Tipplemen	3.60	3.70
Car repairmen	3.60	4.50
Lampmen	3.60	4.00
Outside labor	3.60	3.70
Picking labor	2.40	3.00
Coal hoist	4.40	5.44
Man hoist	2.60	4.88

A total of 1,800 men walked out at the Atlas, Cedar Grove, and McDonald mines of the Carnegie Coal Co., Pittsburgh, in protest against the wage scale paid. C. C. McGregor, on June 2, told representatives of the miners that competitive conditions made union recognition impossible until the Southern fields were organized, and stated that the company would pay a maximum wage scale of 42c. for loading and 7.5c. for cutting. Stoppages also were said to have occurred at the following mines: Washington Coal Co., Cecil; Chartiers Creek Coal Co., Canonsburg; the Rich Hill mine, Washington; and two mines at Point Marion. The Vesta Coal Co., Pittsburgh, Pa., announced a wage reduction affecting 3,200 miners late in May. The day scale was cut from $6 to $5, with a corresponding reduction in tonnage rates. Earlier in the month, 150 men employed at the Melrose mine of the South Fayette Coal Co., La Belle, returned to work when a compromise agreement on a wage reduction was reached.

Clashes between the strikers and state and county peace officers occurred in the opening days of June. Tear gas was employed to beat off attackers at the Lincoln Hill (Pa.) mine of the Lincoln Gas Coal Co. on June 6, after a demonstration there had turned into a riot. Strikers on the same day injured three men in ambushing a truck load of workers bound for the Kinloch mine of the Valley Camp Coal Co.

Rioting broke out anew at two widely separated points on June 8. Several persons were injured, two seriously, in a clash between state police and miners marching on the Westland (Pa.) mine of the Pittsburgh Coal Co. Two strikers were shot by state police after a trooper had been severely beaten, and other injuries were incurred by both sides. At Ellsworth, Pa., state police came to the rescue of fifteen coal and iron police who were being overcome in a battle in which tear gas, stones, and clubs were used.

Wage reductions which would cut the base day rate from $6.52 to $5 have been demanded by a number of Colorado operators in notices filed with the State Industrial Commission at Denver. The three largest producers in the state, however, have not joined in this movement. The operators whose applications are now before the commission are: Alamo, Barbour, Bear Canon, Caliente, Corley, Huerfano, Mutual, Oakdale, and Vickers Coal companies, City Coal Mining Co., Columbine Anthracite Co., and Pikes Peak and Temple Fuel companies. The Empire Fuel Co., which was originally a party to the proceedings, announced withdrawal of its petition prior to a hearing by the commission on June 8.

Reports that the Rocky Mountain Fuel Co., which has been working under a contract with the United Mine Workers since 1928, would seek reductions were indignantly denied by officials of that company. When the agitation for wage cuts first became public last month, Merle D. Vincent, vice-president of the company, appeared before the commission in opposition to any lowering of wage scales. Under its union agreement, this company is paying a base day rate of $7.

The Colorado Fuel & Iron Co., which also was listed in one of the Denver newspapers as seeking to cut wages, has definitely repudiated any such intention at this time. Following a conference with the commission, Arthur Roeder, president of the company, in a letter dated June 1, said:

"Colorado Fuel & Iron Co. is unqualifiedly opposed to any reduction of wages of mine workers at this time. It is our conviction that a reduction of wages and its consequent lowering of costs of coal would not materially improve the output of Colorado coal mines. Consequently, there would be no benefit to the operators, to the mine workers, to the state, or to the communities largely dependent on mining operations. The Colorado Fuel & Iron Co. does not want to reduce wages nor does it want to be forced to reduce wages."

The Victor-American Fuel Co., which ranks second to the Colorado Fuel & Iron Co. in output, has made no move to join in the campaign for a wage reduction.

Public hearings on the proposed wage reductions opened before the commission on June 8 with testimony from witnesses for the Calumet Fuel Co., City Coal Mining Co., and Pikes Peak Fuel Co. A letter from the last-named company, read into the record early in the hearing, assailed the Colorado Fuel & Iron Co. for using gas at Pueblo and charged that company with responsibility for 90 per cent of the

wage troubles confronting the smaller operators.

Vice-President Krauss, of the City Coal Mining Co., explaining that the new schedules meant a reduction of 23.7 per cent, testified that the cuts were sharper than he believed necessary for his own company, but added that he was following the lead of the Pikes Peak company. An effort to forestall natural-gas competition in Colorado Springs was advanced as the motive for the wage slashing.

Prior to taking up this line of testimony, the commission listened to witnesses called to answer evidence presented at a hearing May 18, in which a number of companies were accused of putting wage changes into effect without giving the commission and their employees the 30 days' notice required by law. The witnesses, for the most part, denied that changes had been made other than shifting from day and tonnage rates to a flat contract basis on entry work, which shift, they said, was common practice during the dull period. The commission warned them that these changes without notice to the commission and posting at the mines were in violation of the state law.

In one case involving the National Fuel Co., however, in which the company on March 23 notified the commission that "as in the past" miners would drive entries on a contract basis beginning about April 1, and the commission replied to the effect that since that had been customary, the commission saw no objection to the company pursuing the policy outlined. Commissioner Young admitted that "the commission pulled a boner" in writing such a letter. That admission did not deter Mr. Vincent from challenging the action of the commission in what he termed ex-parte hearings. "The commission holds no ex-parte hearings," retorted Chairman Annear.

Growing disorders in the Harlan County field of Kentucky, culminating in the killing of three deputy sheriffs and a commissary clerk on the road between Evarts and Harlan on May 5, caused Governor Flem D. Sampson to dispatch 350 national guardsmen to Evarts on May 7. These were employed in replacing civilian mine guards and patrolling the field. On May 27, Col. Dan Carrell, commander of the detachment, announced that conditions had so improved that the seventeen operating mines were able to increase their forces from 913 men to 3,900.

An investigation of the acts of violence characterizing the flare-up was started by a special grand jury on May 6. Following the return of indictments, troops arrested Asa Cusick, Evarts Chief of Police; A. L. Benson, his assistant; Joe Cawood, Town Clerk; and W. B. Jones, secretary of the Evarts local of the United Mine Workers, on murder charges growing out of the shooting on May 5. In addition, W. H. Hightower, president of the Evarts local; Jack Griffin, temporary secretary, and a number of others were arrested for conspiracy and other overt acts.

Anthracite Prices at New York, Effective June 1, 1931*

Per Net Ton, F.O.B. Mines

	Broken (Grate)	Egg (Furnace)	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
Delaware, Lackawanna & Western Coal Co.	$6.90	$7.15	$7.40	$7.40	$5.15	$3.25[1]	$1.85[2]	$1.40
Philadelphia & Reading Coal & Iron Co.	6.90	7.15	7.40	7.40	5.15	3.25[3]	1.85[4]	1.40
Lehigh Valley Coal Sales Co.	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
Lehigh Navigation Coal Co.	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
Hudson Coal Co.[5]	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
M. A. Hanna Co.	6.90	7.15	7.40	7.40	5.15	3.25	1.75	1.40
Dickson & Eddy	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
Madeira, Hill & Co.	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
Payne Coal Co.	6.90	7.15	7.40	7.40	5.15	3.25	1.85	1.40
General Coal Co.:								
Raven Run, Maryd, Westwood	....	7.40	7.65	7.65	5.40	3.50	2.05	1.60
Hazle Brook	....	7.30	7.55	7.55	5.30	3.40	2.00	1.60
Midvalley	....	7.25	7.50	7.50	5.25	3.25	1.85	1.40
Cross Creek	....							
Fuel Service Co.:								
Beaver Meadow, Kingston, Westwood	....	7.15	7.40	7.40	5.15	3.25	1.85	1.40
Jeddo	....	7.65	7.90	7.90	6.05	3.50	2.00	1.50
Highland	....	7.50	7.75	7.75	6.05	3.55	2.10	1.50
Cross Creek	....	7.25	7.50	7.50	5.25	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

Sporadic strikes also were experienced in the neighboring Southern Appalachian field in May. The movement, however, was not as widespread as in the Harlan district. Little violence was reported, though two men were wounded when an armed party fired on 100 miners as they were going to work at the Premier Coal Co. mine at Middlesboro, Bell County, Ky., on June 3. Half the mine force of 150 had struck the previous week and were replaced by new men, who were in the party attacked.

An agreement between Iowa miners and operators was adopted early in May to run for a period of two years. The basic day wage is $5.80, while pick men will receive from $1.04 to $1.80 per ton, and machine miners will be paid 51.16 to 82c. per ton. The owners of the Kings Station mine at Princeton, Ind., won a victory when District 11 officials signed an agreement May 7 recognizing double-shift operation. The employees had not objected to the practice, but walked out on April 30 after orders by union officials.

Consolidation Holds Contests

Annual first-aid contests were held in all five of the operating divisions of the Consolidation Coal Co. last month. In the West Virginia division meet, held at Fairmont, W. Va., a team from Mine 86, Carolina, W. Va., captained by Joe Beardon, won first prize for the white teams entered, while the Mine 63 team, Monongah, W. Va., led by Gip Robertson, captured first honors in the colored division. Two teams, No. 78, captained by J. L. Pannell, and No. 54, A. B. Price, captain, tied for first place in the white division in the Pocahontas-New River contest, held at Coalwood, W. Va. Both teams were from Mine 251, which also claimed the victorious colored team, led by Jas. Brady.

Thirty teams competed in the Elkhorn division contest, held at Jenkins, Ky. Three white teams, headed by W. G. Fields, A. E. Corder, and H. C. Blankenship, tied for first place in the preliminary competition. In the run-off event, Mr. Fields' team, representing Mine 206, Dunham, Ky., took first prize with a perfect score. Four colored teams were entered, and first honors were won by a team from Mine 204, Jenkins, under the leadership of John Holiday. First place in the Millers Creek meet, held at Van Lear, Ky., went to a team from Mine 154, of the same city.

The Maryland division contest was held at Frostburg, and was participated in by 22 teams. First honors were won by a team from Mine 10, Eckhart, Md., captained by Philip Thomas. Team No. 1 took first prize in the Pennsylvania division contest, which took place at Gray, Pa.

Coal Stocks Decline

Commercial stocks of bituminous coal, used largely for industrial purposes, amounted to 29,500,000 tons on April 1, 1931, according to the quarterly survey by the U. S. Bureau of Mines. In comparison with the amount on hand at the beginning of the previous quarter, this is a decrease of 7,700,000 tons and is the smallest tonnage in storage for any period on record since 1922.

Exports during the first quarter of 1931 averaged 175,000 tons a week, as against 331,000 tons in the preceding quarter. The weekly rate of consumption within the United States during the first quarter of 1931 amounted to 8,868,000 tons, as compared with 8,987,000 tons in the previous quarter. In comparison with the average weekly rate of consumption during the last quarter of 1930, the rate of home consumption shows a decrease of 1.3 per cent.

Stocks of bituminous and anthracite coal in the hands of industries in the United States and Canada totaled 27,775,000 tons on May 1, a drop of 2,215,000 tons in one month, according to the National Association of Purchasing Agents. The May 1 total was equivalent to 30 days' supply, based on the April consumption of 28,105,000 tons.

Pennsylvania Coal Committee Adopts Program

Adoption of an educational program and election of officers featured the meeting of the Citizens' Pennsylvania Bituminous Coal Committee at Altoona, Pa., May 15. The committee was formed last year for the purpose of promoting the use of central Pennsylvania coal. The sum of $10,000, to be raised in Blair, Cambria, Centre, Clearfield, and Somerset counties, was voted to carry on the educational program in both the East and the Middle West.

Illinois Rules on Shotfirers

Shotfirers in Illinois mines may perform only such duties as are specified in the Shotfirers' Act, and are prohibited from drilling and preparing holes for shooting in addition to the shooting and inspection thereof, according to an opinion announced by Attorney General Oscar Carlstrom on May 23. Mr. Carlstrom made his ruling in response to a request from the State's Attorney at Benton, asking whether miners engaged in drilling and loading holes in one portion of a mine could engage in firing shots in another section of the same mine.

Stoker Development Indorsed

Indorsement of a program for furthering the development of stokers for burning coal in the home and approval of the efforts of the Committee of Ten—Coal and Heating Industries to collect and exchange educational data on the burning of coal in both large and small types of this equipment was voted at the annual meeting of the Stoker Manufacturers' Association, held in New York City, May 15. Joseph G. Worker, of the American Engineering Co., Philadelphia, Pa., was again elected president of the association. R. C. Goddard, Combustioneer, Inc., Goshen, Ind., and F. H. Daniels, Riley Stoker Corporation, Worcester, Mass., were elected vice-president and treasurer, respectively.

Fire Destroys Miami Tipple

The tipple at the No. 8 mine of the Miami Coal Co., Clinton, Ind., was destroyed by fire on May 1, with a damage estimated at $100,000.

Western Roads Ask Rate Study

Nine Western railroads on May 20 asked the Interstate Commerce Commission to investigate coal freight rates from the Rocky Mountain district to consuming territory in the West and Middle West. The action was taken, it is reported, as the result of numerous complaints filed by organizations in the Western states, and has as its objective the undertaking of a general survey to fix all the rates at the same time. Ten states probably will be affected by the survey, if made. Included in the list are Colorado, Wyoming, Utah, New Mexico, Illinois, Kentucky, Kansas, Oklahoma, Arkansas, and Missouri.

Safety Awards Presented

Certificates of honor recently awarded to the Alabama Mining Institute, William B. Hillhouse, chief mine inspector of Alabama, and the employees of the Hull mine of the DeBardeleben Coal Corporation by the Joseph A. Holmes Safety Association, were formally presented to the winners last month by Dan Harrington, chief engineer, safety division, U. S. Bureau of Mines, Washington, D. C. Presentation of the certificates to the institute and to Mr. Hillhouse took place on May 18. Hull employees received theirs on May 19.

Anthracite Section Celebrates

The sixtieth anniversary of the founding of the Anthracite Section of the American Institute of Mining and Metallurgical Engineers was celebrated at Wilkes-Barre, Pa., May 22. Visits to various collieries in the anthracite region comprised the activities during the day, which were followed by a banquet and election of officers at night. Speakers at the banquet were optimistic on the subject of the future of anthracite, and one of the chief events of the evening was the induction of J. William Smith, consulting engineer, Syracuse Pulverizer Corporation, Syracuse, N. Y. into the Legion of Honor, composed of 50-year members.

At the annual election, the following were chosen officers for the coming year: Chairman, Eli T. Conner, mining engineer, Scranton, Pa.; vice-chairman, R. E. Hobart, mechanical superintendent, Lehigh Navigation Coal Co., Lansford, Pa.; secretary, E. L. Dana, industrial engineer, Wilkes-Barre.

Penn Central Wins Safety Award

More than 300 large operations participated in the National Safety Competition for 1930, which was sponsored by *The Explosives Engineer* and is conducted by the U. S. Bureau of Mines. Seventy-two operations went through the year without a lost-time accident. In the bituminous group, the replica of the "Sentinels of Safety" trophy was awarded to the Penn Central Mine No. 1 of the Penn Central Light & Power Co., near Coalmont, Pa., which worked 211,760 man-hours with only four lost-time accidents causing 39 days of disability.

The following-named operations in the bituminous group were given honorable mention: Hull mine, DeBardeleben Coal Corporation, Dora, Ala., which worked 470,680 man-hours with one lost-time accident causing 90 days' disability; Seger No. 1 mine, Seger Bros. Coal Co., Derry, Pa., 219,808 hours with five accidents causing 70 days of disability; Humphreys mine, Humphreys Coal & Coke Co., Greensburg, Pa., 166,840 hours with three accidents involving 74 days' disability; and Dawson No. 2 mine, Phelps Dodge Corporation, Dawson, N. M., 93,704 hours with two accidents causing 54 days' disability.

T. H. Butler Elected President Of Rocky Mountain Group

Denver, Colo., June 5—T. H. Butler, superintendent, Union Pacific Coal Co., Rock Springs, Wyo., was elected president of the Rocky Mountain Coal Mining Institute at the close of the thirtieth regular meeting of the organization, held at the Cosmopolitan Hotel, June 3-5. Mr. Butler succeeds G. A. Kaseman, president, Albuquerque & Cerrillos Coal Co., Albuquerque, N. M.

John H. Emrick, manager of the Denver office of the Sullivan Machinery Co., was elected vice-president for Colorado; Gilbert C. Davis, manager, Stag Canyon branch, Phelps-Dodge Corporation, Dawson, N. M., was chosen vice-president for New Mexico; Carl Sinclair, John A. Roebling's Sons Co., Salt Lake City, vice-president for Utah; and J. C. Rae, general superintendent, Owl Creek Coal Co., Gebo, vice-president for Wyoming.

The executive committee named was: E. P. Linskey, Victor-American Fuel Co., and T. R. Jones, Mine Safety Appliances Co., for Colorado; John T. Evans, St. Louis, Rocky Mountain & Pacific Co., and William Irick, Gallup-American Coal Co., for New Mexico; H. Petersen, Hercules Powder Co., and J. P. Russell, United States Fuel Co., for Utah; R. E. Gilroy, deputy state mine inspector, and F. L. McCarty, Edwards Wire Rope Co., for Wyoming.

Benedict Shubart, Lindrooth, Shubart & Co., who has served as secretary-treasurer of the institute for a number of years, was renominated for that office, but declined to accept the nomination. Mr. Shubart, in withdrawing, nominated Hal C. Marchant, president, Pinnacle-Kemmerer Fuel Co., Denver, for the position, and Mr. Marchant was elected.

In presenting the Joseph A. Holmes gold medal and certificate to Arthur E. Hedden for the rescue of two fellow workmen at the Leyden Lignite Co. at the risk of his own life, Dan Harrington, chief safety engineer, U. S. Bureau of Mines, Washington, D. C., made an earnest plea for greater safety.

Carroll B. Huntress, executive secretary, National Coal Association, was the principal speaker at the annual dinner, on June 3. He stressed the necessity for organization to put the industry on its feet and pointed to the McGraw-Hill Platform for American Business as an example of constructive effort in troubled times.

A report of the technical sessions of the Institute will appear in the July issue of *Coal Age*.

Coal Bids Opened

Mine-run coal was offered to the government at as low as $1.16 per long ton, f.o.b. mines, it was revealed when bids to supply fuel requirements in Washington and vicinity were opened on May 1. The bid of $1.16 was made on two items of 21,300 tons of mine-run and 40,500 tons of nut-and-slack or mine-run. On the largest item of 95,000 tons of mine-run, however, the lowest bid was $1.45 per long ton at the mines, while the majority of bids on all of the five items requiring mine-run were substantially above that figure.

The lowest bid on fine coal was an offer to supply one item of 28,700 long tons of 2½-in. nut-and-slack at 75c. per ton. But in general, bids for slack, pea-and-slack, and nut-and-slack ranged from a little less than $1 up to $1.96 at the mines.

Industrial Notes

J. C. McQuiston, for 29 years in charge of advertising for the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., retired June 1 as general advertising manager. Mr. McQuiston, in addition to his other advertising accomplishments, had the distinction of arranging the pioneer program for the first broadcast of radio station KDKA. J. S. Tritle, who began working for the company at the close of the St. Louis World's Fair, was elected vice-president and general manager in charge of manufacturing, sales, and engineering at a board meeting in May. At the same meeting, S. M. Kintner, who has been assistant vice-president, was elected vice-president in charge of engineering, vice W. S. Rugg, chosen vice-president in charge of sales. Dr. Kintner entered the research department of the company in 1903.

Union of the businesses and the assets of the Dorr Co. and the Oliver United Filters, Inc., both of New York City, has been announced. The new company will be known as the Dorr-Oliver Corporation and will be managed jointly by John Van Nostrand Dorr and Edwin Letts Oliver. It will function through two new wholly owned Dorr and Oliver Filter companies, headed by Mr. Dorr and Mr. Oliver, respectively.

Cutler-Hammer, Inc., has removed its Atlanta (Ga.) sales office to 133 Cone St., N.W. The new quarters include warehouse facilities.

W. L. Lewis, formerly assistant comptroller of the Bethlehem Steel Corporation and lately vice-president in charge of finance for the Chicago Pneumatic Tool Co., New York City, has been elected executive vice-president of the latter company.

R. F. Mehl, superintendent of the division of physical metallurgy of the Naval Research Laboratory, has been made assistant director of research for the American Rolling Mill Co., Middletown, Ohio, in charge of the physical science department of the company laboratories. Mr. Mehl will assume his new duties Sept. 1.

Neil E. Salsich, for 28 years in the employ of the Pennsylvania Steel Co. and its successor, the Bethlehem Steel Co., has been elected vice-president and general sales manager of the Jeffrey Mfg. Co., Columbus, Ohio.

R. H. Bacon, formerly advertising manager, has been made manager of the pump sales division of Fairbanks, Morse & Co., with headquarters in Chicago. Mr. Bacon joined the company in 1925.

Blaw-Knox Co., Pittsburgh, Pa., has acquired the exclusive sales and manufacturing rights to the "ATECO" line of earth-moving equipment manufactured by the American Tractor & Equipment Co., Oakland, Calif.

Geo. D. Whitcomb Co., Rochelle, Ill., has become a division of the Baldwin Locomotive Works with the name of the Whitcomb Locomotive Co.

Walter C. Shunk has been appointed mining engineer of the Goodman Mfg. Co., Chicago. He succeeds the late Sidney W. Farnham.

Dardelet Threadlock Corporation, New York City, has granted licenses to the Colorado Fuel & Iron Co., Denver, Colo., for the manufacture and sale of track and commercial bolts and nuts formed with the Dardelet self-locking thread.

William L. Hartley, a member of the Link-Belt Co. organization since 1915, has been made district sales manager in charge of the Detroit (Mich.) territory.

M. B. MacNeille has resigned his position with Fairbanks, Morse & Co. to join the Dayton-Dowd Co., Quincy, Ill., manufacturer of centrifugal pumps. Mr. MacNeille will be Western sales manager, with headquarters in San Francisco, Calif.

Roller-Smith Co., New York City, has appointed the Commercial Engineering Co., Washington, D. C., as its sales agent in the District of Columbia.

W. J. Batchler, for many years a salesman out of the Baltimore (Md.) office of the Trumbull Electric Co., Plainville, Conn., has been appointed to the territory consisting of the District of Columbia, Maryland, Virginia, and North Carolina. Mr. Batchler succeeds F. G. Marden, resigned.

C. H. Adamson, for many years engaged in advertising and sales promotion work, has been made Chicago district sales manager of the Stephens-Adamson Mfg. Co., Aurora, Ill. The Chicago offices of the company have been removed to the Civic Opera Building, 20 North Wacker Drive.

King Coal's Calendar for May

May 6—Iowa coal producers adopt a code of fair trade practices drawn up after consultation with retail interests and the Iowa Coal Institute. Adoption of the code is expected to stimulate the use of Iowa coal within the state.

May 7—National Guard detrains at Evarts, Ky., to keep order in the Harlan County strike zone.

May 8—Examiner E. M. Bardwell, of the Interstate Commerce Commission, files a proposed report recommending that the complaints of the Ohio Lake Cargo Coal Rate Committee and the Western Pennsylvania Coal Traffic Bureau be dismissed on the ground that the lake cargo rates assailed are not unduly prejudicial to the Northern operators or unduly preferential to the Southern operators.

May 11—Colorado State Industrial Commission begins an investigation into the questions of wages, working conditions, and living conditions in Colorado mining camps with an initial hearing at Walsenburg. The investigation was precipitated by the filing of requests for wage reductions by five coal companies on April 30.

May 11—Miners at the Jere mine of the Scotts Run Fuel Co., and at the Pursglove No. 2 mine of the Pursglove Coal Mining Co. walk out in protest against a wage reduction, precipitating a general strike which spread to all the operations in the Scotts Run field in northern West Virginia and later tied up mines on Indian Creek and at Maidsville. Approximately four thousand men were affected.

May 11—Gas explosion in the No. 2 Victoria mine, River Herbert, Nova Scotia, kills six men and injures twelve others.

May 17—John E. Gross, secretary, Colorado Federation of Labor, and O. F. Nigro, president, District 15, United Mine Workers, petition the State Industrial Commission to begin criminal proceedings against officials of seventeen coal companies, alleging that the officers caused a lockout of their employees and reduced wages contrary to the provisions of the state industrial law.

May 19—General strike in the Cracow coal field of Poland, which began on May 18, is called off pending negotiations by the Ministry of Labor.

May 20—Nine Western railroads petition the Interstate Commerce Commission to make a survey of the rates on coal from the Rocky Mountain district to consuming territory in the West and Middle West with the object of fixing at one time all the rates, a number of which have been assailed by the Rocky Mountain states.

May 20—Four miners are killed by police and seven others are injured when a mob of 1,000 strikers attempts to storm the Pilsudski colliery in the Cracow coal field of Poland.

May 22—Anthracite Section of the American Institute of Mining and Metallurgical engineers celebrates at Wilkes-Barre, Pa., the sixtieth anniversary of its founding.

May 28—National Fuel Co., National, W. Va., and Continental Coal Co., Fairmont, W. Va., sign agreements with the United Mine Workers, foreshadowing the end of the general strike in the Scotts Run and neighboring fields of northern West Virginia.

Personal Notes

Col. W. M. Wiley, Sharples, W. Va., vice-president of the Boone County Coal Corporation, has again been elected vice-president of the southeastern division of the Chamber of Commerce of the United States. Wm. V. Hodges, a director of the Colorado Fuel & Iron Co., Denver, Colo., was again chosen a member of the board of directors.

E. B. Winning, formerly electrical engineer for the Republic Steel Corporation mines in Fayette and Allegheny counties, Pennsylvania, has been made assistant manager of the properties, and will continue to have his headquarters at Uniontown, Pa.

A B. Sisk, Madisonville, has been appointed assistant state mine inspector for eastern Kentucky, including Perry, Letcher, and Knott counties.

Lafayette Tuck, formerly general superintendent of the Cosgrove-Meehan Coal Co. of Pennsylvania, Johnstown, Pa., has been made general superintendent of the West Virginia Coal & Coke Corporation, vice J. W. Bischoff, who recently resigned. Mr. Tuck's headquarters are at Omar, W. Va.

John A. Howe has been appointed executive vice-president of the Truax-Traer Coal Co., with headquarters at the general office of the company in Chicago.

Obituary

Capt. David Harvey Barger, Shawsville, Va., president of the Monarch Smokeless Coal Co., Mohegan, W. Va., and the Croatan Coal Co., Kleenkoal, W. Va., died in a hospital at Roanoke, Va., April 26. Captain Barger, who was 74, was connected with the Norfolk & Western Ry. and the Seaboard Air Line for 27 years prior to his opening several mines at Matoaka, W. Va., and organizing the Bank of Matoaka, of which he was president at the time of his death.

Charles H. Crocker, 66, mine inspector for the 24th bituminous district of Pennsylvania, died at his home in Johnstown, Pa., May 7. Mr. Crocker was formerly a mine superintendent in central Pennsylvania and was first appointed inspector in 1915.

Harry B. Clark, 49, president of the Harry B. Coal Co. and the Clark Coal & Coke Co., died suddenly at his home in Fairmont, W. Va., May 10, after suffering a heart attack.

Dr. Samuel W. Parr, an authority on coal chemistry and professor emeritus of practical chemistry at the University of Illinois, died at Urbana, Ill., May 16, at the age of 74. Prof. Parr was recognized as one of the country's leading authorities on the chemistry of coal, and developed several new calorimetric devices for determining the heat value of fuels in addition to developing a low-temperature process for the processing of Illinois coals.

Major Samuel Dunlap Brady, 62, president of the Osage Coal Co., Osage, W. Va., died at his home in Morgantown, W. Va., May 8, from the effects of a broken ankle received at the mine on April 20. Major Brady was born at Bradys, Md., and after an apprenticeship in railroad construction activities, set up as a civil engineer at Davis, W. Va., in 1893. In 1894 he became mining engineer for the Davis Coal & Coke Co., but after two years began a program of mining-plant construction which lasted until 1901. In that year, Major Brady entered the railroad construction field, participating in the building of a number of branch roads in northern West Virginia, including the Buckhannon & Northern, which opened the present Scotts Run coal field. Since last year, he had devoted practically all of his time to the Osage company.

Frank Latuda, president of the Liberty Fuel Co., Latuda, Utah, died following an operation for acute appendicitis at Napa, Calif., May 11. Mr. Latuda, who was 64, was stricken while attending the annual convention of the California Fuel Dealers' Association. He came to the United States from Italy in 1885 and was at one time employed as a miner at Castlegate, Utah.

Fuels Meeting Scheduled

The annual meeting of the International Railway Fuel Association, usually held in May, has been postponed this year until the third week in September, when a two-day business session will be held without exhibition or entertainment features. Decision to hold the convention, which is scheduled for Sept. 15 and 16 at the Hotel Sherman, Chicago, was made at a conference of the executive committee of the association at Cincinnati, Ohio, on May 11.

Pennsylvania Coal Lands Sold

The Sharon Coal & Limestone Co., a subsidiary of the United States Steel Corporation, has purchased 1,400 acres of coal in Mercer and Lawrence counties, Pennsylvania, from the Pittsburgh & Erie Coal Co. The sale embraces the Oakes and Pennsy mines, which will be consolidated with the No. 2 mine of the Sharon company, at Volant, Pa. The consideration was not made public.

Coming Meetings

Colorado and New Mexico Coal Operators' Association: June 17, 513 Boston Bldg., Denver, Colo.

American Society for Testing Materials: annual meeting, June 22-26, at the Stevens, Chicago, Ill.

Mining Society of Nova Scotia: annual meeting, July 14-16, Nova Scotian Hotel, Halifax, N. S.

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

Anthracite Club Organized In Philadelphia

The Anthracite Club of Philadelphia was formed at a meeting of coal men and equipment manufacturers on May 11 for the announced purpose of serving the public more efficiently by promoting heating satisfaction from the use of anthracite. Improvement of the existing standards and creation of new rules of practice in the use of anthracite and in the manufacture, installation, and sale of equipment will be among the chief activities of the club. The Philadelphia organization is the fifth of its kind, being preceded in order by those in New York City, Providence, Rochester, and Malden.

Illinois Award Presented

Work at all the Zeigler (Ill.) mines was suspended on May 25 when the Joseph A. Holmes Safety Association certificate was presented to Dale Carter, superintendent of the No. 2 mine, Bell & Zoller Coal & Mining Co. in recognition of the record established by the operation over the period Aug. 6, 1928, to Dec. 31, 1930. During this time, 3,116,000 tons of coal was hoisted without a fatal accident, and the mine worked a total of 3,818,760 man-hours without a mishap. Since Dec. 31, 1930, the mine has employed an average of 1,000 men and has hoisted 311,002 tons of coal without a fatal accident, raising its record since Aug. 6, 1928, to 3,426,679 tons.

Safety Meeting Held

Three hundred miners employed by the Barnes & Tucker Co. attended the first meeting of the Thomas Barnes chapter of the Joseph A. Holmes Safety Association, held at Barnesboro, Pa., May 6. Among the men who talked on safety were: H. H. Hamilton, safety director of the company; Samuel Bolton, safety director for the chapter; and Malcolm MacDougall, Johnstown, Pa. Officers of the chapter, which was formed a short time ago, are: president, R. T. Todhunter; vice-president, Harry Barraclough; secretary, C. P. Brinton; safety instructor, Mr. Hamilton; safety director, Mr. Bolton, all of Barnesboro.

Virginia Operators Elect

J. D. Rogers, general manager, Stonega Coke & Coal Co., Big Stone Gap, Va., has been elected president of the Virginia Coal Operators' Association. Other officers chosen at the annual business meeting are: vice-president, A. W. Wagner, St. Charles, Va., president, Virginia Lee Co., Inc.; secretary-treasurer, C. B. Neel, Norton, Va. Directors selected for the coming year are: Messrs. Rogers and Wagner; R. S. Graham, Norton; J. L. Osler, Blackwood; Lee Long, Dante; D. D. Hull, Jr., Roanoke; Geo. J. Walker, Lebanon; C. E. Ralston, St. Charles; and W. R. Fleming, Norton.

Coal-Mine Fatality Rate Rises in April, 1931 But Is Lower Than a Year Ago

ACCIDENTS at coal mines in the United States during April, 1931, caused the death of 113 men, according to information furnished by state mine inspectors to the U. S. Bureau of Mines. The death rate, 3.31 per million tons of coal produced, was higher than the March rate of 3, but much below the rate of 4.01 reported for April a year ago. The actual number of deaths from accidents in April was 3 less than in March and 50 less than in April last year. Production of coal during April, 1931, was 34,178,000 tons; 6,511,000 tons less than in April, 1930, and 4,437,000 tons less than in March of the present year.

Bituminous coal mines in April, 1931, had a lower death rate than in either the corresponding month last year or in March of the present year, the rate being 2.53 per million tons, as compared with 3.63 for last April, and 2.69 for March, 1931. The number of men killed, 72, was 58 less than in April, 1930, and 19 less than in March, 1931. The production of 28,478,000 tons fell short of the records of the other two months under discussion, 33,870,000 tons having been reported for March, 1931, and 35,860,000 tons for April, 1930. Anthracite mines in Pennsylvania had a fatality rate of 7.19, based on 41 deaths and 5,700,000 tons of coal, which did not compare favorably with either April, 1930, whose rate was 6.83, or with March, 1931, with a rate of 5.27.

During the first four months of the present year, 521 lives have been lost in coal mines and 154,291,000 tons of coal have been produced. These figures indicate a death rate of 3.38, a slight improvement over the same period of 1930 when a rate of 3.98 was shown, based on 729 deaths and a production of 183,228,000 tons. Separated into bituminous and anthracite groups, the rates for the four-month period of 1931 were 2.81 and 6.77, respectively, while those for the same period in 1930 were 3.57 and 6.92, respectively.

There have been no major disasters --that is, there have been none in which five or more lives were lost—since January of the present year. During January there were three major disasters, in which 41 lives were lost. The period January to April, 1930, had a record of seven major disasters, with 88 deaths. The death rates, based exclusively on these disasters, were 0.266 for the 1931 period and 0.480 for the same period of 1930. The major disasters thus far in 1931 occurred at the rate of 1.94 separate disasters (as distinguished from the number of deaths resulting from the disaster) for each 100,000,000 tons of coal mined, as compared with 3.82 for the corresponding period in 1930.

Comparing the accident record for the first four months of 1931 with that for 1930, a reduction is noted in the fatality rates for falls of roof and coal, haulage, gas or dust explosions, explosives, and electricity, which are the principal causes of fatalities in coal mines. The comparative rates are as follows:

Cause	Jan.-Apr., 1930 — Fatalities	Jan.-Apr., 1930 — Rate	Jan.-Apr., 1931 — Fatalities	Jan.-Apr., 1931 — Rate
All causes	2,014	3.798	729	3.979
Falls of roof and coal	1,067	2.012	376	2.952
Haulage	303	.572	117	.639
Gas or dust explosions				
Local explosions	61	.115	30	.164
Major explosions	214	.404	85	.464
Explosives	78	.147	27	.147
Electricity	76	.143	28	.153
Miscellaneous	215	.405	66	.360
			17	.110
			67	.434

All-Year Rate for Alberta

The special freight rate of $6.75 per ton on Alberta coal moving to Ontario, formerly in force for only certain months of the year, has been made effective throughout the twelve months until March 31, 1932, according to an order of the Canadian Board of Railway Commissioners.

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

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

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned, suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip, or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1931	1930
Alabama					1							1													1	3
Alaska																									0	0
Arkansas	1											1													1	0
Colorado			2									2													2	3
Illinois	3		2		1		1					7													7	10
Indiana																									0	0
Iowa																									0	2
Kansas	1											1													1	1
Kentucky	5						1					6													6	15
Maryland																									0	0
Michigan																									0	0
Missouri																									0	1
Montana	1											1													1	1
New Mexico	1											1													1	0
North Dakota																									0	0
Ohio	1		1									2													2	8
Oklahoma																		1						1	0	3
Pennsylvania (bituminous)	12		1				1					14													15	23
South Dakota																									0	0
Tennessee							1					1													0	0
Texas																									0	1
Utah																									3	4
Virginia	2		1									3													0	17
Washington																									30	35
West Virginia	16	7	5				2					30													1	3
Wyoming	1											1														
Total (bituminous)	44	7	12		2		6					71						1						1	72	130
Pennsylvania (anthracite)	15	5	7	1	3	1					3	35							1	1		1	3	6	41	33
Total, April, 1931	59	12	19	1	5	1	6				3	106						1	1	1		1	3	7	113	
Total, April, 1930	69	15	29	22	5		8	1	1		4	154	1		1		2	2	2	1		1	1	7		163