COAL AGE

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

SYDNEY A. HALE, *Editor*

November, 1938

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No Other Way

NOTHING CONTRIBUTES more generously to our general well-being than mechanization. Because it makes possible the production of more goods, there are more goods to divide. Before mechanization began to attain its recent stage, the mass of the people lived in destitution and only a few enjoyed a measure of comfort. Today nearly everyone has more comforts than the wealthier of earlier years, and the erstwhile homes of the latter are classed as slum dwellings.

Mechanization with its ameliorating influences continues to progress. The coal industry must keep in step. If it does not, competing industries that have no urge to avoid mechanization will deprive coal of its market and thus create that very irregularity of employment, reapportionment of jobs, exiling of persons and displacement of capital which the coal industry is so anxious to avoid.

On the Upswing

BUSINESS INDICES have been moving upward in recent weeks and most students of the economic situation expect this trend will continue for some time. How much of the improvement can be attributed to natural recovery and how much to Federal spending may be debatable. But the concrete evidences of actual gains are beyond argument.

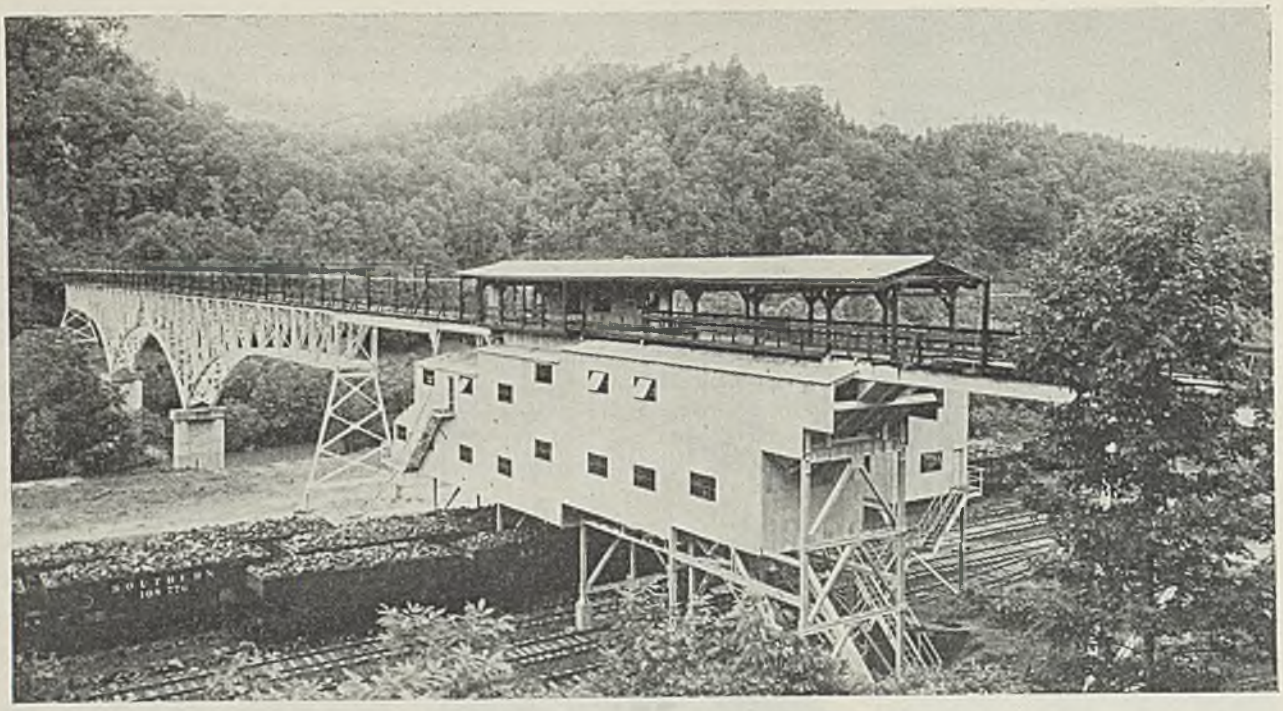
Coal itself is a case in point. During the first half of the year, cumulative bituminous output was 31.8 per cent behind that for the first six months of 1937. Bituminous production during the third quarter of 1938, however, was only 20.4 per cent under that for the corresponding three months last year, despite still further declines in lake shipments. Anthracite, 15.4 per cent behind the first half, had a third-quarter output less than 7 per cent under the July-September totals of last year.

With business moving upward, coal-mine management must face the question of its ability to handle increasing tonnage on an economical basis. When production was at the low ebb and the immediate outlook was uninspiring, there was an understandable temptation to defer improvements and new capital expenditures. Today prudent management may find further deferment too costly an economy to support.

Limitless?

ATTEMPTED MEASUREMENT of future mechanical-loading production so far has failed because proved practices were considered standardized by physical conditions and this base was used for further projections. Though physical conditions do remain fairly constant in each mine and for each producing district, to take them as the final yardsticks for measuring the future is to discount entirely the foresight and ingenuity of the coal operator and the equipment manufacturer.

Mechanization of coal loading presents an achievement record rarely equaled in the same space of time by any industry. To consider that it is now stabilized by seam thickness, bedded or banded impuri-



The tipple is at the east end of a cantilever bridge.

$250,000 PLANT

Built by Stearns Coal & Lumber Co.

At New No. 18 Mine, Blue Heron, Ky.

By J. H. EDWARDS
Associate Editor, Coal Age

WORD came that coal was being shipped from No. 18 Blue Heron mine, the new 400-tons-per-hour operation of the Stearns Coal & Lumber Co. in McCreary County, Kentucky. With pleasure the *Coal Age* editor pointed his car toward Stearns, for he had vivid recollections of his previous visit just ten years ago. The company town of Stearns had a good hotel, fine recreational facilities—it appeared to be a nice place to live. Because of Stearns control of all land under which several uncorrelated seams of coal exist, the predominating Anglo-American character of the native-white employees and evidences of long-term planning, the company was remembered as being distinctly "different." Meeting again seven out of the eight officials and executives of a decade before—some now in positions of higher responsibility—served as a reminder that stability is outstanding in the "house of Stearns."

"The purpose of the Blue Heron plant," using the words of J. E. Butler, general manager, who has been at Stearns 36 years, "is not to increase production but to replace tonnage from those mines which are nearing completion and to increase the facilities of preparation to serve adequately the markets which extend from Florida to the Great Lakes." In addition to handling the coal from a brand new mine the six-track plant has a railroad dump hopper and 250-tons-per-hour conveyor facilities for handling and preparing coal from any of the other six active mines of the company. Investment in the outside plant at Blue Heron now approximates $250,000.

Total tonnage during 1937 from the six mines was 707,643. Cumulative production since the first shipments were made in 1903 is 17,725,900 tons (Table I). During these productive years of company life six mines have been worked out and new operations opened to maintain the tonnage.

It was in 1902 that Justus S. Stearns, an experienced lumberman, began operations in the vast tract of timber and coal lands he had acquired on the Kentucky-Tennessee border (Fig. 1). Now the Stearns company

controls 120,000 acres (188 square miles) in one block in McCreary and Wayne counties, in Kentucky, and Scott, Fentress and Pickett counties, Tennessee. About 80 per cent of the area is underlaid by one or more seams known locally as the Nos. 1, 1½, 2 and 3, which have not been correlated with the coals of the Kentucky fields to the east but are known to be in the bottom measures of the whole Carboniferous series, so are among the oldest coals in America. They are high-volatile, hard-structure, and burn with a long flame with very little clinker, so are well suited to domestic and steam uses. They are marketed under the names "Golden Eagle," "Golden Pheasant," "Scarlet Tanager," and the new mine adds another "bird," the "Blue Heron."

This No. 18 Blue Heron operation is on the Kentucky & Tennessee Ry., six miles from Stearns, and its allotted territory, indicated by the shaded area of Fig. 1, comprises 5,000 acres cut by the Big South Fork of the Cumberland River, which there flows in a northerly direction. The K. & T. Ry., which serves both logging and mining operations and is a wholly owned subsidiary of the Stearns company, is a 50-mile stand-

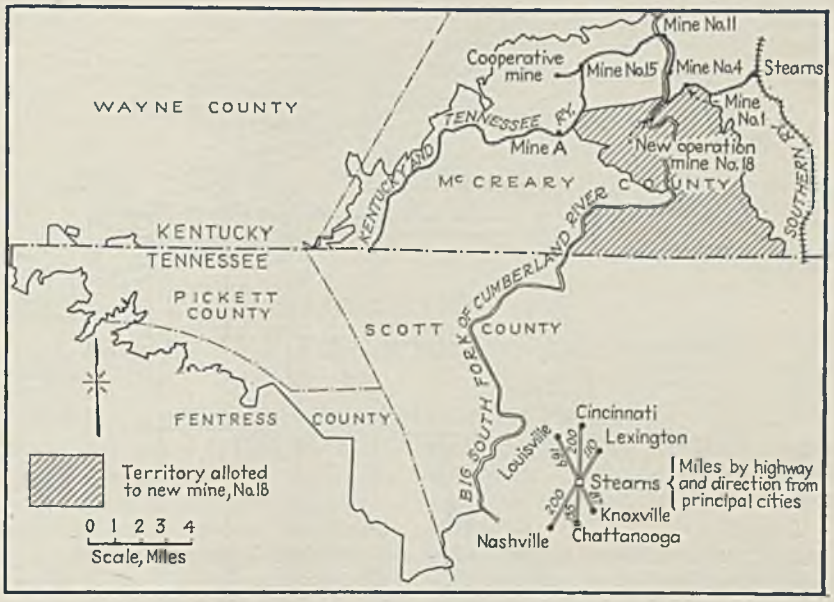


Fig. 1—120,000 acres is controlled by the Stearns Coal & Lumber Co.

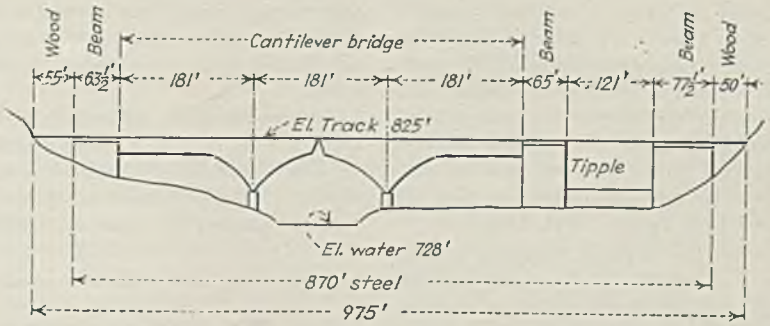


Fig. 2—Bridge, tipple and approaches span the valley at coal-seam elevation.

Table I—Coal Shipments From Stearns Mines[1]

Year	Tons
1903	32,595.45
1904	52,531.26
1905	66,557.58
1906	105,724.02
1907	155,712.24
1908	190,182.62
1909	214,087.40
1910	272,867.05
1911	300,030.93
1912	423,291.25
1913	516,188.45
1914	500,726.45
1915	480,761.25
1916	587,872.75
1917	553,764.09
1918	543,855.54
1919	466,421.90
1920	610,325.25
1921	519,988.40
1922	563,261.75
1923	751,645.00
1924	775,982.29
1925	814,712.07
1926	864,207.17
1927	903,664.90
1928	887,095.38
1929	970,083.60
1930	783,243.47
1931	583,743.25
1932	490,706.95
1933	504,280.60
1934	548,951.30
1935	397,679.62
1936	585,525.33
1937	707,643.10

Total 1903 to 1937 inclusive, 17,725,900.50 tons.

1937

	Tons
Mine No. 1	15,579.85
Mine No. 4	244,329.35
Mine No. 11	154,429.20
Mine No. 15	42,675.55
Mine "A"	74,369.20
Cooperative Mine	176,259.95
Total	707,643.10

[1] Tonnage from all mines including six mines which have been worked out and closed.

ard-gage line with six rod locomotives, the largest 140-ton, and two geared locomotives, and includes 20 miles of common-carrier track. It connects with the main line of the Southern Ry. at Stearns, which is the operating headquarters and where the sawmill, planing mill, central shops and central power plant of the Stearns company are situated.

Built at the end of a new single-track steel bridge 671½ ft. long and 97 ft. above the water (Fig. 2), the preparation plant and short wooden trestles at each end, together with the bridge, span the entire valley, 975 ft. cliff to cliff, at the coal-seam elevation (825 ft. above sea level) and connect with mine tracks entering the several drifts that are being opened on each side of the valley. Design details of the cantilever bridge and plant were prepared by Allen & Garcia in line with general plans outlined by engineers and executives of the coal company. Structural steel—approximately 450 tons—was fabricated and erected by the Vincennes Steel Corporation; machinery was purchased from several manufacturers and its erection was handled by the coal company's own construction department.

Although the plant design is predicated on the basic rule of cleaning coal at the face it does include horizontal picking tables ahead of the three loading booms. Vibrating screens handling fractions from the main shakers, a crusher with special fine-tooth segments and the necessary auxiliary conveyors meet the rapidly growing demands for stoker coal. Success in securing proper cleaning of the coal at the face depends largely upon facilities for rapid and thorough inspection of the coal loaded by the individual miners; consequently an outstanding feature of the plant design is a separate mine-car dump bin, two-speed reciprocating feeder and apron-type inspection table over which a large percentage of the mine output can be inspected.

As a result of sixteen years' experience with drop-bottom mine cars at

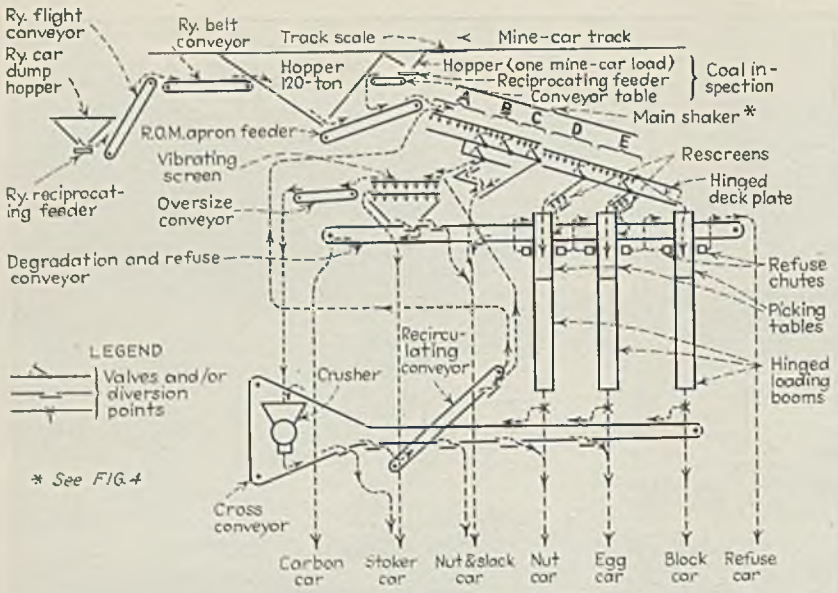


Fig. 3—Flowsheet of the No. 18 Blue Heron plant

some of the other operations, carriers of that type were selected for Blue Heron. These are dumped *en train* into a 120 ton track bin situated next following the inspection dump hopper. Coal from the 120-ton hopper and from the inspection table is conveyed to the main screens by an apron type feeder 76 ft. long.

Vibrating screens handling 1x0-in. material which has passed through section A of the main shaker prepare a stoker coal by removing the minus-$\frac{3}{8}$-in. (see flowsheet, Fig. 3). Degradation removed from the egg and nut sizes by rescreens situated ahead of the picking tables is moved to the carbon track by the same conveyor that carries the undersize from the vibrators and which also moves the picking-table reject to a seventh track, on which this refuse is loaded into railroad cars for disposal. A cross conveyor situated beyond the ends of the booms and encircling the crusher delivers block, egg or nut from the ends of the booms (in raised positions) to the crusher and carries the crushed product to a recirculating conveyor or to a choice of four loading tracks. Six sizes—block, egg, nut, nut-and-slack, stoker and carbon—can be loaded simultaneously.

The main screen consists of two balanced single-deck sections each 8 ft. wide and suspended from Peterson patent short pendulum hangers. Five screen plates in each section—ten in all—provide 320 sq.ft. of screening surface. Two plates in the upper section (see Fig. 4) and one in the lower are fixed, but all other seven plates are arranged for quick changing to make any standard size in the range 1-in. round to 8-in. round.

The double-deck vibrating screen is a 5x14 ft. Robins Eliptex which is set horizontal directly under the main shaker. The crusher—a 36x54-in. Jeffrey single-roll type of welded-steel construction—has special manganese-steel fine-tooth crushing segments and SKF roller bearings on both roller and counter shafts. Frictional resistance is so slight that a normal-torque motor starts the unit without hesitation.

Allis-Chalmers 60-cycle ball-bearing motors are used throughout the plant excepting the three 5-ton boom hoists made by Shepard. Motors are wound for the "odd" a.c. voltage of 550 because that voltage was originally adopted in the early days and because practically all a.c. motors at the mines are that voltage and, moreover, transformers to step down to 550 from the 13,000-volt transmission were on hand. Nineteen motors comprise the plant drive list (Table II) and the total connected horsepower is 353. Except one Jones speed reducer on the inspection table, Gilmer V-belts are used for the drive connections between motors and equipment.

Wiring for both light and power is protected in rigid conduit, but BX is used at the motors to provide flexibility for belt adjustment. Magnetic starting and control switches are grouped in a dust-tight room and the pushbutton controls are mounted on a panel at the trimmer's platform. Automatic sequence starting was not

Table II—Plant Equipment and Motor Drives

Unit	Type	Size	Speed	Motor Hp.	Motor R.P.M.	Drive Connection
Feeder (Ry. hopper)	Reciprocating	36 in. wide	35 f.p.m.	7½ [2]	900	V-belt and chain
Elevator (Ry.)	Flight	36 in. wide 62 ft. 1 in. c.c.	94 f.p.m.	20 [2]	900	V-belt and gears
Conveyor (Ry.)	Belt	36 in. wide 217 ft. c.c.	253 f.p.m.	20 [1]	900	V-belt and gears
R.O.M. feeder	Apron	60 in. wide 76 ft. 9 in. c.c.	30 f.p.m.	15 [2]	900	V-belt and gears
Main shaker	Peterson short-pendulum balanced 6-in. stroke	8 ft. wide 320 sq. ft. screen	100 r.p.m.	25 [3]	720	V-belt
Degradation and refuse conveyor	Flight	24 in. wide 99 ft. 9 in. c.c.	44 f.p.m.	10 [1]	900	V-belt and gears
Loading boom (block)	Apron	60 in. wide 18½-ft. horiz. sect. 30-ft. hinged sect.	100 f.p.m.	5 [1]	900	V-belt and gears
Loading boom (egg)	Apron	60 in. wide 18½-ft. horiz. sect. 30-ft. hinged sect.	100 f.p.m.	5 [1]	900	V-belt and gears
Loading boom (nut)	Apron	60 in. wide 18½-ft. horiz. sect. 30-ft. hinged sect.	100 f.p.m.	5 [1]	900	V-belt and gears
Boom hoist (block)	Rope	5-ton	40 f.p.m.	7½	1,610	Inclosed gears
Boom hoist (egg)	Rope	5-ton	40 f.p.m.	7½	1,610	Inclosed gears
Boom hoist (nut)	Rope	5-ton	40 f.p.m.	7½	1,610	Inclosed gears
Cross conveyor	Flight	36 in. wide 76 ft. 9 in. c.c.	106 f.p.m.	40 [1]	900	V-belt and gears
Crusher	Single-roll	36x54-in.	55 r.p.m.	125 [1]	720	V-belt and gears
Recirculating conveyor	Flight	36 in. wide 60½ ft. c.c.	97 f.p.m.	20 [2]	900	V-belt and gears
Vibrating screen	Horizontal	5x14 ft.	1,130 r.p.m.	7½ [4]	1,800	V-belt
Over-size conveyor	Flight	24 in. wide 61 ft. 3 in. c.c.	100 f.p.m.	15 [2]	900	V-belt and gears
Inspection table feeder	Reciprocating	30 in. wide 0 to 6-in. stroke	33 and 100 f.p.m.	2½ / 7½ [3]	600/1,800	V-belt and gears
Inspection table conveyor	Apron	36 in. wide 101½ ft. c.c.	47 r.p.m.	3 [1]	1,800	Speed reducer and gears
			Total connected horsepower	353		

Motor types: [1]Normal torque. [2]Low starting current, normal torque. [3]High torque. [4]Totally inclosed, low starting current, normal torque.

selected, but instead the buttons are positioned on the panel in proper relation to the starting sequence. The two starting buttons and a speed change button of the inspection equipment, however, are mounted at the inspection table. Emergency stop buttons are situated at four different points in the plant.

Protection against loading tramp iron with the stoker coal or with other resultant sizes is afforded by loading-chute magnets designed and built in the company's central shop. Plans are under way to install high-pressure oil-spraying equipment for dustless treatment of all sizes. A Buffalo mine-track scale with the Auto-Weight attachment is installed just ahead of the inspection hopper. Galvanized corrugated-steel covering of the plant is Youngstown "Copperoid"; No. 24 gage on the roof and No. 26 on the sides. Car retarders are Fairmont, tipple machinery not otherwise specified was built by the Webster Manufacturing Co.

Fifty 42-in.-gage mine cars made in the Stearns central shop comprise the present drop-bottom haulage equipment; construction has started on 50 more cars of that type. It is an American Car & Foundry design with certain modifications and some of the parts for the cars were purchased from that manufacturer. Level-full capacity is 69 cu.ft.; the height above rail is 24 in.; the outside width, 64½ in., and the over-all length, 14 ft. Bumpers are wood-filed and there is a spring draft at one end. Wheels are 14 in., A.C.&F. made, plate center with Timken bearings, and the wheelbase is 43 in. Axles are 2¾-in. S.A.E. 1050 steel. Car weight is 3,650 lb. and the average dumping of coal (hand-loaded) is 3½ tons.

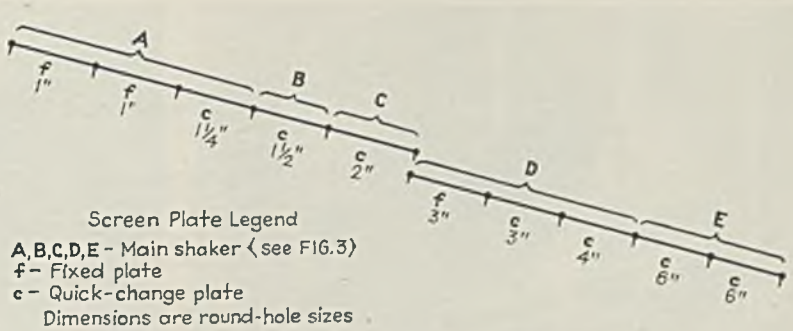


Fig. 4—Arrangement of fixed and quick-change plates of main shaker.

Coal height is expected to range between 3½ and 6 ft. and the maximum cover is 600 ft. Entries are being driven 12 ft. wide with 25-ft. chain pillars between. Room-and-pillar mining and hand-loading into cars is to be the mining system followed. Rooms will be driven 24, 30 and 40 ft. wide, according to top conditions, and the center distances will be governed likewise. Bottom cutting with shortwall machines, coal drilling with electric drills and shooting with pellet powder are the practices. For some time at least no new inside equipment will be purchased but machinery will be transferred as needed from the other mines.

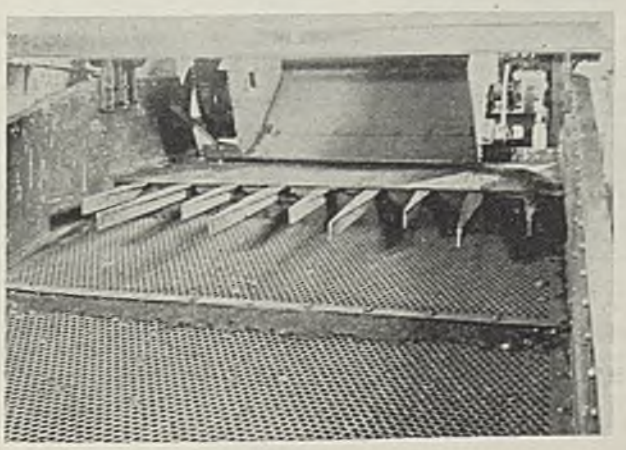
Direct-current power at 275 volts is supplied at present by one outside substation consisting of a 300-kw. synchronous converter with manual control, transferred from another mine. New grooved trolley wire, No. 6/0 (nominal) supported by new Ohio Brass hangers and fittings is being installed on the main hauls. The main-line steel is 40-lb. section and the rail are joined electrically by steel terminal areweld bonds.

A steel bridge across Paunch Creek and two miles of standard-gage railroad including sidings were built to serve the new plant. Ultimate investment in the plant and equipment, not including the land, will approximate $500,000.

The central power plant at Stearns contains two turbo-generators (one 2,000-kw. and one 1,000-kw.) and a 500-kw. engine-driven generator which serves as a standby. Waste wood "hogged" to proper size together with sawdust and shavings from sawmill and planing mill furnish sufficient fuel to meet the company's power demand. Coal is used only at times, and then because facilities for storing surplus wood waste are not available. Condensate from the 2,000-kw. turbine is used for the town supply at Stearns; hence the water is soft and pure.

In gross sales the company business is about 75 per cent coal and 25 per cent lumber. Production of the latter per year hovers around 20,000,000 board-feet and consists principally of oak, poplar and pine. A wholesale grocery and fourteen commissaries are necessary to supply the needs of the 1,800 men employed by the mining, lumber, railroad and allied departments of the company.

Left—Alternate long and short projecting arms attached to the main shaker at the upper end tip the large blocks of coal so that fines cannot ride them over the screen. Right—A cross conveyor at the ends of the boom encircles the 36x54-in. crusher.



Individual cars of coal selected at random are diverted over the inspection table.

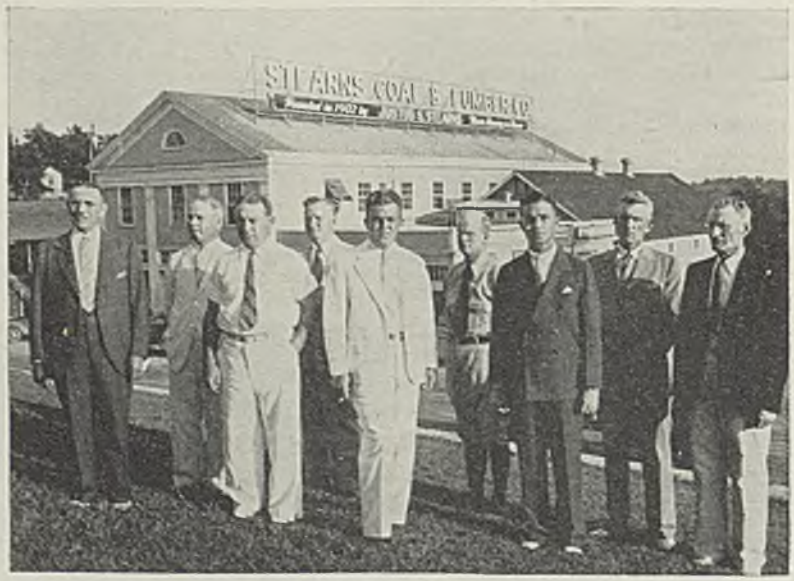
The coal is 3½ to 6 ft. thick and is without regular parting at Blue Heron mine.

For many years before the school districts became self-sustaining the company furnished school buildings free of rental and paid a portion of the teachers' salaries. In 1919 it built a modern high school at Stearns. It has built schools at its mining camps: Barthell, Worley, Yamacraw, Rock Creek, Cooperative and Fidelity. A second building erected at Fidelity is a high school. Three schools have been built by the districts at other points on the company property.

To the employees the company has sold on easy payments plots of land with houses erected and a number of the workmen now own their own homes. Married men pay $1.50 per month and single men $1 per month to the Stearns Sick and Accident Association, which employs five physicians. Ten per cent of the fund, which is the remainder after the physicians' salaries are paid, goes for the care of destitute employees.

Two years ago recreational facilities were further extended by erection of a modern swimming pool and bath house. They adjoin the golf course, which is supported jointly by the company and the employees. This nine-hole rolling course with its bent grass greens is the scene of the annual amateur tournament, a Statewide event, and this year its champion was Mr. Butler, the general manager.

The Stearns Coal & Lumber Co. retails about 25 per cent of the coal output from its own yards in Louisville and Frankfort, Ky.; Chattanooga and Fort Wayne, Ind. The company is headed by R. L. Stearns, of Ludington, Mich., a son of the late Justus S. Stearns. R. L. Stearns, Jr., vice-president and a son of "R. L.," headquarters at Stearns. Other men who have been intimately associated with the planning and building of the new plant are R. W. Henderson, assistant general manager and purchasing agent; John L. Wright, general superintendent; William Schick, mechanical engineer; Jack H. Price, sales manager; George M. Humble, mining engineer; C. L. Larmee, master mechanic and combustion engineer, and W. H. Gresham, construction foreman.



Some of the Stearns men who have been intimately connected with planning and building of the new plant. Left to right: C. L. Larmee, master mechanic and combustion engineer; J. E. Butler, general manager; W. H. Gresham, construction foreman; R. W. Henderson, assistant general manager and purchasing agent; R. L. Stearns, Jr., vice-president; William Schick, mechanical engineer; Jack H. Price, sales manager; John L. Wright, general superintendent, and George M. Humble, mining engineer.

MERCURY LAMPS

+ Aid Picking at Clymer Mine

Where Plow Turns Coal

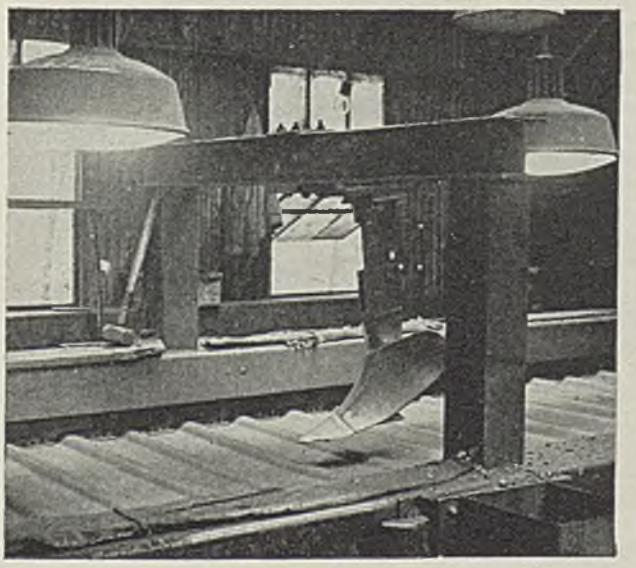
OPINIONS of mine officials as to the effectiveness of high-intensity mercury - vapor lamps for picking-table illumination at Clymer No. 1 mine of the Clearfield Bituminous Coal Corporation have not changed after several years' experience with an installation which antedates others in that section of the central Pennsylvania bituminous fields. When the mercury-vapor lamps were installed the old Mazda units were left in place so that both types could be used at the same time, if desired.

The installation illuminates a picking table over which principally run-of-mine coal destined for railway use is passed at the rate of 2,200 tons in two seven-hour shifts. Approximately half of this coal originates from hand-loading into cars and the remainder from conveyor mining. Five men comprise the normal picking-table crew.

The original Mazda units, consisting of three 300-watt lamps in porcelain-enameled steel reflectors, furnished ample intensity according to the usual standards of picking-table illumination prevailing at the time of their installation. The new lighting consists of two 400-watt General Electric high-intensity mercury lamps. These not only furnish a much higher intensity of illumination on the coal but are deemed to produce a quality of light which aids in distinguishing the impurities from the clean coal.

Color effects with mercury lamps are known to differ with the character of the products mined in different districts and localities. Just what is the effect on the Clymer product is difficult to describe. Men who have observed the effect voice the opinion that as compared to the old Mazda illumination the mercury light appears to "deaden" the slate and also the coal which contains impurities. Whether this is due to a change in color appearance of the product or to reflection characteristics is a matter of opinion.

As an aid to more efficient picking when the coal is coming over the table at maximum rate of flow a plow was installed to turn the coal over away from the center and toward the sides of the table. Two or three men pick the coal before it encounters the plow and the rest pick it after it has been turned over. This double picking, together with the improved illumination, has enabled the mine to turn out a product which continues to meet the railway fuel requirements.



Two 400-watt mercury lamps and a plow are auxiliaries to this picking table

The old Mazda units, left in place for comparison, now serve as spares

D. O. Clark tipple looking toward coal-loading gantry. Tower for hoisting rope on right. Hoist is to left of illustration, being located some distance further to right.

FOUR BELTS IN SERIES

+ Carry Coal Up Half-Mile Slope

In Southern Wyoming Mine

By R. DAWSON HALL
Engineering Editor, Coal Age

TO PRODUCE a tonnage of 7,500 daily and to replace several mines nearing exhaustion in the Superior district, Wyoming, the Union Pacific Coal Co. has under development the D. O. Clark mine, named after the first executive head of the Union Pacific Coal operations. The mine is approached by two slopes 2,600 ft. long, already driven in the rock, and at an inclination roughly of 10 deg., or 18 per cent. As these slopes dip into the hill they intersect seams Nos. 7½, 7, 9 and 15, which are inclined in the opposite direction. If extended the slopes would reach also No. 19 seam. One of them has a 48-in. belt-conveyor line to bring the coal to the newly constructed steel tipple, which is equipped to prepare four different sizes of coal and combinations of such sizes.

Topography—While the territory mined has some bold rock escarpments 100 to 200 ft. high rising from a level of about 7,200 ft. above sea level, it is for the most part merely heavily rolling country. The mouth of the manway slope of the D. O. Clark mine has an elevation of 7,265 ft. Due to the pitch, which is 7 per cent, the cover of the lower measures will in places reach 1,100 ft.—a depth that is not likely to be exceeded during the next 30 years. The canyons which run through the hills to Bitter Creek, for the most part, are wide with spacious flats in between the hills, though near Bitter Creek and occasionally even in Horse Thief Canyon, in which lie the village and mine mouths of the Superior mines, the topography is more rugged.

Coal Seams—For the most part, the rocks, composed of sandstone and shale, are soft, and the roof breaks readily, making it possible to obtain eaves at any point desired without excessive difficulty; at the same time the hard sandy-shale floor, which is even harder than the roof, affords good footing for pillars and mine props. However, the weakness of the mine roofs generally makes careful timbering in rooms necessary.

Numbering of seams in the Rock Springs field is irregular and misleading, because in the early days of mining in that area the seams were numbered or named after the mines as they were first opened. Thus, where a seam, such as No. 1, was developed at two mines, Rock Springs Nos. 1 and 2, the latter mine did not give its name to any seam, so no No. 2 seam is found in the classification. No. 5 is the top seam of the series, although it has been little worked in the Rock Springs field. The names applied around Rock Springs were carried to Superior.

No. 1 seam in the No. 1 mine of Rock Springs has an average thickness of 11 ft., but at Superior the thickness averages only 7 ft. At the Superior operations below No. 1 bed, at an interval of 160 ft., is No. 7½ seam, between 5½ and 5 ft. thick; this

is 130 ft. above No. 7, which has a thickness between 6½ and 7½ ft. where worked, though in pockets it may thicken to 12 ft. Under No. 7 bed is the Van Dyke, or No. 9, seam, 175 ft. lower, which is of about the same thickness as No. 7½. Another, 165 ft. below, is No. 15 seam, which is the name given to a 4-ft. bed at Rock Springs, but which in Superior denominates an entirely different seam 7½ to 8 ft. thick.

Below this is No. 19 bed, not worked nor explored as yet by a sufficient number of drillholes but apparently workable. This seam will not be drilled from the surface; instead the roof of No. 15 seam will be drilled and shot to form "potholes," and exploratory drillholes (shorter than those in the main exploration) made through the 90 ft. of intervening cover between Nos. 15 and 19.

Geology—All these seams are in the Mesa Verde formation of the Cretaceous, under which are the Blair formation (1,000 to 2,000 ft. thick), the Baxter shale (1,000 ft. thick), unexposed shales (1,800 ft. thick) and then the Frontier, another coal-bearing formation, which is 500 ft. thick, formerly mined by the company at Cumberland, Wyo., and still being operated by others at Kemmerer, Wyo., and in the State of Utah. The Aspen shale (200 ft. thick) follows. This possibly marks the base of the Cretaceous. Below this last-mentioned measure, there is no coal.

Mining Sequence—Weakness of the roof makes it necessary to mine the upper beds first. Otherwise, floor and roof would be so broken in the upper beds that their extraction would be extremely difficult and performed only with expensive workings timbered with big posts set skin to skin; nor would columnization be practicable between seams, for in places spars, rolls and splits make inevitable a divergence from uniformity in the driving of rooms.

As in sections the thinness or splitting of coal beds brings the thickness of the coal below 4 ft. so that it cannot now be mined with economy, the area has been extensively drilled with holes at 1,500- to 2,500-ft. centers so as to determine what areas are workable and to provide for the operation of the upper workable seams in advance of the lower beds.

Slopes—The belt-conveyor slope, which is lined for about 100 ft. from the portal with reinforced concrete (see Fig. 1), has a neat construction width of 9 ft. 6 in. and a neat construction height of 7 ft., an extra foot being allowed for breaking into the roof, floor and sides, or 6 in. in every direction, but, because of the unequal hardness of the measures as the slope entered new and untried rock seams, the width and the height of the opening varied considerably, especially the latter. The nature of the steel timbering can be determined from Fig. 1.

Though roughly on a similar inclination to the other member of the pair of slopes (the material-and-manway slope, in which rails are laid), the belt-conveyor slope actually is the steeper, because there are four belts in series and at each junction the floor is made level for a distance of about 45 ft. Hence, the actual belt-slope gradient is 18.174 per cent, though its average gradient is that of the material-and-manway slope, which is 17.50 per cent. Diagonal crosscuts were made at 230-ft. centers; these crosscuts were made at angles so that, in construction, cars set in them could be drawn up the slope by a rope.

The manway-and-material slope, lined with concrete for about 75 ft. at the portal, is 12 ft. wide and 8 ft. high in neat rock cross-section, with 6-in. allowances right and left and up and down. A 42-in. gage, 75-lb. track is laid in the left half of the manway, as seen in Fig. 1, with guard rails from end to end.

The slopes are supported by steel sets. The roof is lagged with 3x 12-in. California redwood, assuring long life. However, should it prove necessary, after many years, it will be easy to set precast concrete slabs over the I-beam cross girders of the steel sets. The sides, being of rock, need no lagging, certainly not now,

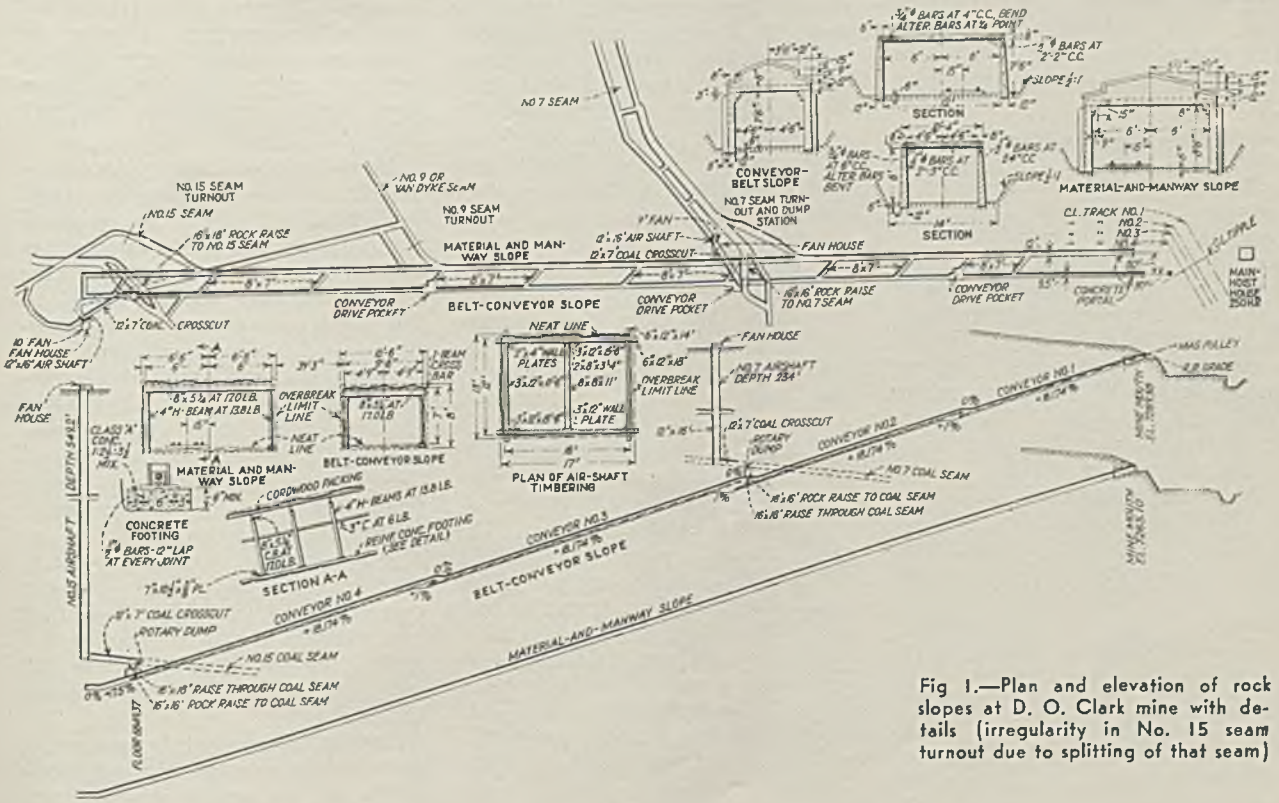


Fig 1.—Plan and elevation of rock slopes at D. O. Clark mine with details (irregularity in No. 15 seam turnout due to splitting of that seam)

Belt by which coal is brought to surface, with idlers and oiling system

but these also will be lagged later with concrete, if needed, to the level of the tops of the mine cars, thus filling the spaces between sets and preventing their displacement by derailed cars. The turnouts to the coal at seams Nos. 7 and 15 will be thus lagged to prevent the upsetting of the steel timber sets should cars leave the track. As the cars will travel slowly, being used only for the travel of men and material, and as the gradient is uniform and the track absolutely straight, no derailments probably will occur except perhaps where Nos. 7 and 15 debouch on the slope. The slopes were driven and timbering set by the Utah Construction Co.

How Coal Is Handled

Belts—Coal received from 25-ton hoppers at Nos. 7 and 15 intersections along the belt line, which is of Link-Belt construction, is carried by four 6-ply 42-oz. duck belts, 48 in. wide, with the plies solidly united by a skim coat between them. The belt is covered on the top by ⅜ in., and on the bottom by ¼ in., of rubber. No. 1 and No. 4 belts (No. 1 being at the top of the slope and No. 4 at the bottom) are of United States Rubber Co. construction, and No. 2 and No. 3 were supplied by the Goodrich Rubber Co. The top run travels on troughed rollers at 3½-ft. centers, with self-aligning idlers at 56-ft. centers.

These self-aligning devices act by the friction of a small roller extending to the edge of the belt from the end of the idler. The idler is swiveled and when the small roller makes contact it revolves the idler a few degrees, causing the belt to move back toward the center, this giving the belt the correct alignment. This obviates the need for holding the belts in place by raveling side pressures throughout their length and makes the belts return to center by self-adjustment rather than by side pressure. Idlers on the lower run are flat with self-aligning idlers at 180-ft. centers.

Servicing Intermediate Seams—It will be noted that coal is received at only two points along the belt line; the coal from intermediate seams will share the dumping points provided for seams Nos. 7 and 15. Coal from No. 1 seam, the top coal bed, which covers an area of only 200 acres, will be hoisted up a slope in that seam to the surface and will be dropped over the surface by this hoist to a parting at the upper end of No. 7½ main coal plane (which, like all the rest of the pitch headings, is on a gradient of 7 per cent). This coal, as well as that from No. 7½ seam, will be dropped by a hoist at the head of that plane to a point roughly over the main level of No. 7 seam.

There the road will be turned on the strike and the inclination will be increased to 10 deg. so that the road will pass through the 130 ft. of rock to a parting on No. 7 seam. The cars from both seams Nos. 1 and 7½ will travel along the main level of No. 7 seam with those from that bed, cars from which are already being weighed on a Howe scale and being discharged by a Card revolving dump into a 25-ton hopper through a plate feeder with forks that separate the +4-in. coal from the fines. The fines fall on the belt and the coarser coal rolls down on it; thus the belt receives the coarse material at a higher elevation than the fines. In this manner, the lumps are cushioned on the finer material.

As the coal from seams No. 15, No. 9 and perhaps No. 19 will be carried up to this same point by the main belt, the coal at No. 7 would pile up on the top of it. To prevent this undesirable condition, which would overload the belt in spots and result in spillage, a "low bridge" with "breakers" pushes it back to a point on the belt not so heavily loaded.

No. 9 coal eventually will be taken to No. 15 bed much as No. 7½ coal is diverted to No. 7 and will be dumped at No. 15 station, near the end of the belt, as is the coal from No. 15 seam. A cut back from No. 19 to No. 15 seam will be used in that seam should the working of that bed be feasible, but the determination of that point will be reached only after sufficient progress has been made in the mining of bed No. 15 to permit of extensive drilling down to the lower seam.

Little Pumping Needed

Drainage—The slope has been extended about 200 ft. beyond the end of the belt to act as a sump. At no time perhaps will it be as much used as today, for these seams usually are relatively dry when once the water accumulations of years have been drained. However, other pumps will have to be provided to bring the water from the slopes to a main sump yet to be excavated below the main-level haulage roads near the rock slope.

Dump Stations—Forty cars can be landed on the 0.5-per-cent track leading to each of the two revolving Card dumps. A feeder passes the cars on over a level track toward the scale, where they are separated and fed to the scale one by one by gravity on a —1.0 per cent gradient; they pass on that gradient to the revolving dump, which is on an inclination of —0.75 per cent. On clearing the dump 14 ft. the gradient is increased to —4.0 per cent. After returning from a back switch, the cars arrive at the tripmaker, which lifts them up a +10 per cent inclination, where they run slowly down a —0.5 per cent gradient to the point where they are attached to the locomotive for hauling to the main plane in the coal or to other planes further along the level entry.

The brake is set lightly on the first car and the cars are pushed along slowly by the action of other cars

coming over the tripmaker. Thus, the noise and wracking effect of the colliding of cars when advanced by gravity is avoided. Tests have shown that these empty cars, when broken into service, will start on a 1.0 per cent down gradient and loaded cars on a gradient of 0.75 per cent.

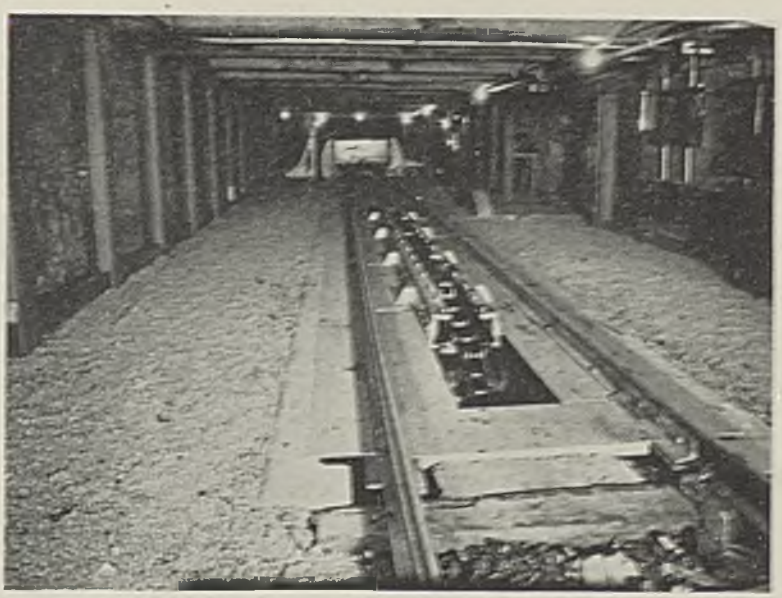
Mine Development — Main coal planes will be driven in all the seams on the full pitch, which, to the rise, runs South 45 deg. West. The main haulage entries will come to the surface in Twin Rocks Canyon, the waters of which flow into Long Canyon and thence through Kilpatrick Creek to Bitter Creek. Distance from mine portal to this outcrop will be about 3½ miles, and the mine may be extended across the shallow canyon into the hill beyond, where a large tonnage in all the seams but No. 3 awaits extraction.

It is planned to extend the main haulage lines on a gradient of 0.5 per cent in favor of the loads, laying heavy track and using large locomotives, which will move 300 to 400 tons per trip. This track will be protected by block signals. By these means the life of the mine, the tipple tracks, tipple, town, and water-supply system and other construction will be extended for from forty to seventy years. Also, by this large-scale haulage, it will be possible to escape the cost of building about sixteen miles of branch railroad, a new town, water-supply system, mine track, tipples, etc.

Main Planes Down Pitch

The main coal planes will be extended down the pitch in a straight line, North 45 deg. East, in all the seams to form slopes and, from both slopes and planes, level twin entries for the driving of rooms, and running South 45 deg. East and North 45 deg. West on the respective sides of slopes and planes, will be constructed at 350-ft. centers. The planes and slopes will have their four passages (two intakes with a return on either side) at 75-ft. centers. The exterior pillars between returns and rooms will be 150 ft. thick. In every case, where practicable, planes and slopes in the several seams will be laid immediately over each other, but the levels and rooms in those seams will not necessarily be columnized, as they will not be of similar permanence.

In No. 15 seam, in order to avoid the loading point, one of the "levels" east of the rock slope is to be developed for some distance on a down gradient of 2 per cent from the left



Loading station at No. 7 seam; revolving dump and creeper at center and control board on right

of another higher level until it is at 350-ft. centers from that level so that full-length rooms can be driven between them. None of the strike entries will be truly level but on a gradient of 0.5 per cent in favor of the loads. Thus, the resistance to travel will be about the same for empty and loaded cars.

Grabens—Those levels to the left of the main planes (and to the right of the main slopes) will eventually reach a downthrow fault running about North 80 deg. East. Here the coal drops 90 ft., and this will furnish the limit of present operations in that direction. Rooms will be driven and pillars drawn on retreat from this fault, which is one of a pair of almost parallel dislocations, the second of which is about 2,000 ft. away. This, viewed from the mine side, has an upthrow of 80 ft.

Thus, between them, is an area of coal at a lower elevation than the rest, technically known as a "graben." To the east, these faults fade out, and no sign of them is found across Horse Thief Canyon, where previous operations of the company were conducted. This graben has not been noted in the Baxter basin to the west and what happens to it there is not clear, though before it reaches the basin it has developed a throw of almost 150 ft.

Beyond this graben about 3,000 ft. is another parallel phenomenon of the same nature, the depth of throw of which is 100 ft. and the width 2,150 ft. The upthrow to the north of the second graben cuts off coal in Superior B mine. The throw decreases as the graben goes west, whereas the throw of the other graben decreases as it goes east, but roughly they run along parallel lines.

Western Retreat Lines—Fortunately, neither faults nor grabens of size appear to the west of the main coal plane and slope until Twin Rock Canyon is reached, where a similar graben appears. To the west, the line for room retreat will start outside the barrier pillars protecting the main planes and slopes driven at about 3,000-ft. centers along the main haulage roads.

Coal Mechanically Loaded

Loading Equipment—In the present stage of incomplete development, only headings are now being and, for some time, will be driven, and just now only in Nos. 7, 9 and 15 seams; hence, few units of equipment are being used in the coal. There are three Goodman shaking conveyors with Goodman duckbills and one Joy 11 BU loader. This equipment will be greatly augmented as development progresses. Joy or similar loaders will be used on the main headings and in slopes, which run to the dip. Shaking conveyors with duckbills will operate in the rooms, as the latter in every case will be driven uphill. They will be used also in driving the planes.

Room-Driving Methods — Rooms will be 30 ft. wide wherever the cover is 300 ft. thick or less and the pillars will be of equal width. In deeper coal, the latter will be in-

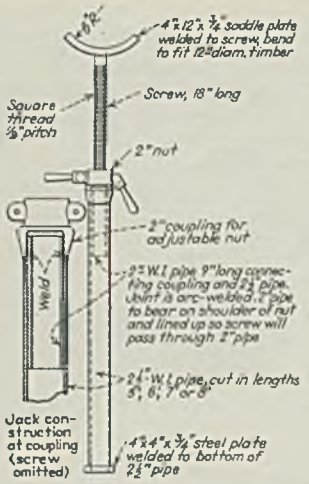


Fig. 2—Saddle-jack construction

creased in width, but the room width will be reduced to 20 to 25 ft. In no case will the pillars be of less width than the rooms.

Methods of driving rooms will be varied, depending on the strength of the roof. The character of this timbering may be judged from the practice at many other mines of this company. Where the roof proves strong, posts may not be needed, but a row will be set for security wherever it will not interfere with the operation of the duckbill. With somewhat weaker roof, many more props will be used, but where the roof is less strong it may suffice to erect crossbeams of at least 6-in. diameter at the small end, supporting them with wood posts and safety posts, or adjustable steel posts.

However, there will doubtless be some roof so tender that no more than a 3x3-ft. area will stand unless supported. The method adopted (forepoling as in Fig. 3) will be to square the face by trimming so that a crossbeam 6 in. in diameter at the small end and almost the full width of the room can be set against the face. The exterior posts on which this will be mounted will be "permanent"; that is, they will stand until it is necessary to remove them to attack the pillar toward the goaf or until the time arrives for caving the section of the room in which the crossbeam and its posts stand.

Temporary adjustable steel posts, or saddle jacks (Fig. 2), will be set between these permanent posts. These are made of pipe with a base and at the upper end a screw jack carrying a saddle which embraces the underside of the crossbeam, set, however, so as to permit the use of the duckbill over a range of one-third of the face at any one time, which with the rest of the face will be undercut with a 6-in. kerf to a depth of 8 ft.

After undercutting, the center third of the face will be drilled and shot, after which three or four timbers 6 in. in diameter and 7½ ft. long are driven ahead over the last crossbar. These timbers are wedged tightly against the roof, after which part of the loose coal is loaded with the duckbill to permit placing a saddle jack and a temporary crossbar. When the center coal is loaded, the right side of the place is shot and forepoled in a similar manner, and as soon as clearance is made for another saddle jack, the 8-ft. temporary crossbar is replaced by a 12-ft. bar and loading is resumed. The third step consists of taking out the left side in almost the same way, except that as soon as the coal is shot and forepoling is completed, a full-length permanent crossbar and the right corner prop are placed, the remainder of the crossbar being supported by two saddle jacks. As the swivel end of the conveyor advances, the saddle jacks are replaced by fixed wooden posts (five under each 20-ft. crossbar).

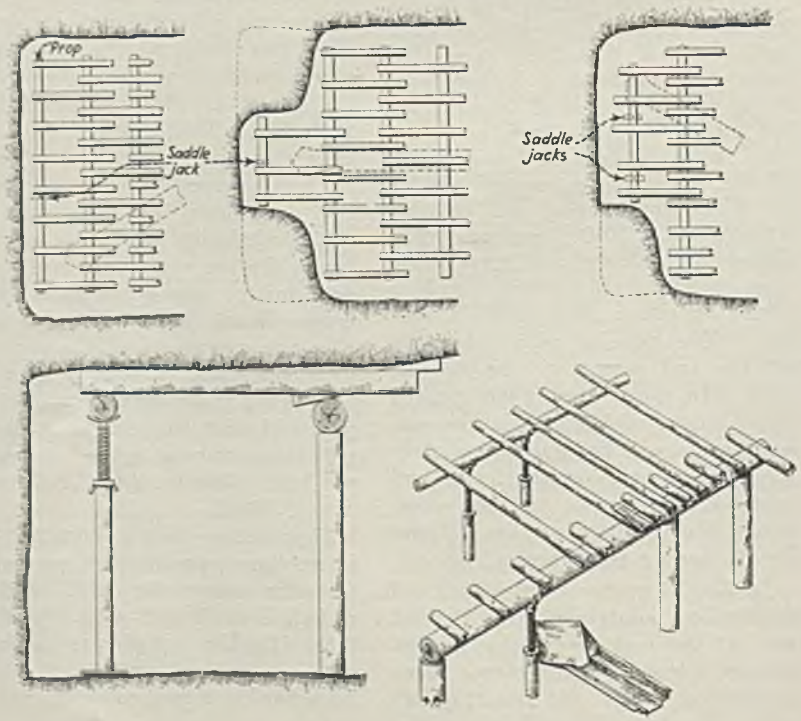
In forepoling, the forepoles are wedged from alternate sides of the permanent crossbar: i.e., a wedge for one forepole being driven from one side of the bar and for the next from the opposite side. This equalizes the pressure on both sides of the bar and prevents it from rolling.

When the room will have been completed the pans will be retreated three pan lengths, or 39 ft., and two 30-deg. swivels inserted at the end of the pan line to change the direction of the pans toward the goaf pillar. A place 10 or 15 ft. wide will be driven at 60 deg. to the direction of the room center line almost through that pillar using, where the roof is heavy and the coal is broken, a pan 16 ft. long and flared out flat the last 3 or 4 ft., termed a "gouge" pan. Light shots will be used to dislodge the coal. Should the coal be under light cover, and the roof and coal be strong, an undercutter and duckbill loader will be used in this advance. Posts will be erected and crossbars also, if necessary.

With a 30-deg. swivel the coal between this narrow place and the goaf of the next level will then be removed. A thin fender will be left to keep the waste from entering the coal, and a small pillar will be lost near what was the tight corner of the main room. A few so-called permanent props will have to be removed in the swinging and retrogression of the conveyor pans.

Having loaded this first section of the pillar, the removal of all the timber beyond this section will be attempted; Sylvester prop pullers will be used in all cases. Most of

Fig. 3—Method of advancing face under bad roof by forepoling



the vertical timbers will be recovered, but in such cases experience shows that the cross timbers usually are lost. Meantime, a new section of the pillar will be attacked. In every entry, a pillar will be removed as a room is being advanced; hence, synchronously with the commencement of pillaring, a new room will be started outby the first.

Coal Recovery—Everywhere, unless the seam is less than 6 ft. thick, coal will be left in the roof of room crosscuts and about 4 in. of coal will be left undisturbed in the floor to prevent the sandy shale from mixing with the product. Room-crosscut coal will be recovered; floor coal will be lost. Thus, in a 6-ft. seam, 5 per cent of the room coal will be wasted. Experience shows the areal recovery of the pillar will be about 80 per cent. Hence, about 75 per cent of the pillar coal will be extracted. Thus, where room and pillar are of equal width, 85 per cent extraction is effected. With a thicker bed, a lower percentage of mineral is lost from rejection of the floor coal, but more is lost in recovery of pillars; so the result probably is much the same. Few coal beds are as completely extracted in this country, especially where the roof is bad.

Shaker Pans Cradled

All shaker pans are mounted on roller cradles. As the mine is free of gas, as the coal cutters are supplied with sprinkling devices, as the coal cars, whether empty or loaded, are sprinkled, as the rooms and headings are rock-dusted and as shots are singly fired with Monobel, a permissible explosive, the coal can safely be shot during the working period. Every room will have a blower fan with Ventube to assure rapid removal of the shot fumes. A passage between the posts is left in each room for advance and removal of material and for miners to enter and leave the face. The conveyor is laid in the center of the room in a similar lane provided between props.

Usually two men work at the face of each heading or room when conveyors are operated. One man loads the cars from two headings as the coal is brought from the far heading by a crosspan. However, when conveyors are operating in rooms, one car loader is needed for each conveyor. Usually two headings and two rooms (one advancing and the other pillaring) are placed under a unit foreman. When the roof is extremely tender, a unit foreman may have only one place in charge. Usually one motorman places cars for all the needs of an entry, both headings and rooms. Only when the haul is long is he accompanied by a trip-rider.

Haulage—Only a few haulage units are in place, and their number will be increased as the need arises. At present three 8-ton Goodman cable-reel-and-trolley locomotives are in use. The steel cars have inside dimensions of 67x131 in., and a height above rail of 40 in. Track gage is 42 in. and wheelbase 46 in. Wheels are of 14-in. diameter and have Timken bearings with 3-in. axles. When loaded mechanically they hold 4 tons, but they can be loaded by hand to a capacity of 6 tons. Cast-steel couplers with self-contained draft rigging and hand brakes operated from the car end are other details. Haulage headings are strung with 6/0 copper wire and the rails are bonded with Ohio Brass long welded copper bonds.

During the last few years, under mechanical loading, which has been universally adopted at its mines, the Union Pacific Coal Co. has found it necessary to use cars of larger capacity, and the standard car adopted has been one of 4-tons capacity, level full. Such cars have been installed at Winton, Reliance, Hanna and the D. O. Clark mine. All future operations of the company have been planned with a 42-in. track gage and this larger-capacity car in view.

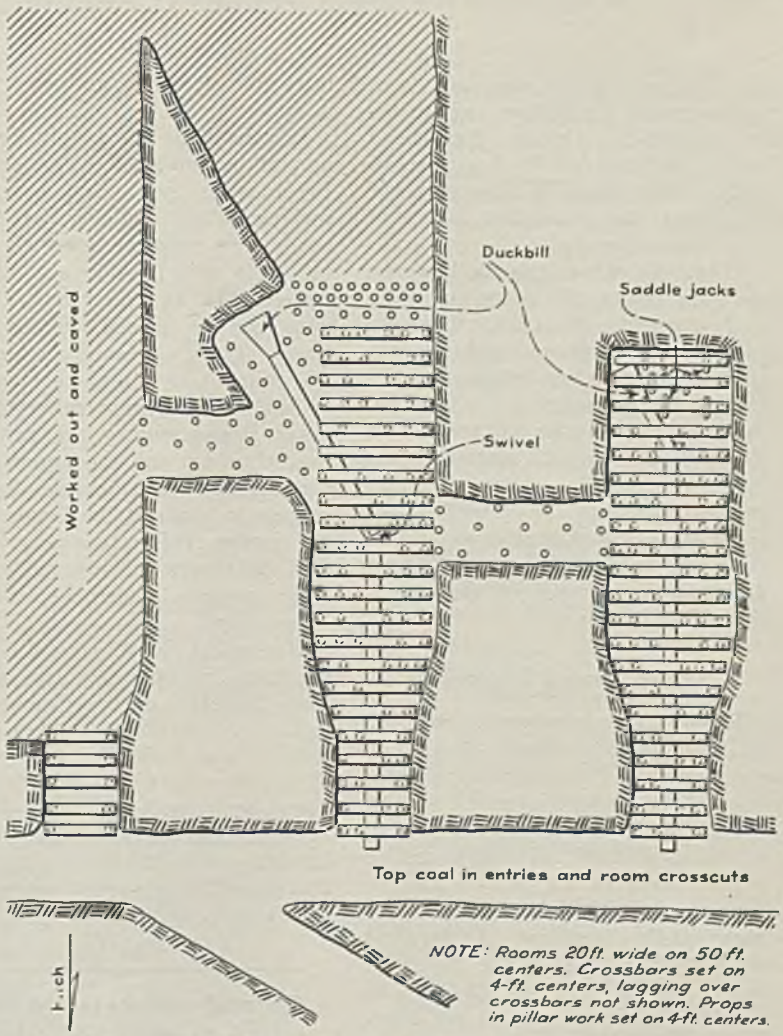


Fig. 4—System of mining under fairly good roof

Ventilation—At present, the difficulty is to reduce the ventilation provided by the two double-stage Jeffrey Aerovane fans so that work may be done in comfort. Both the 9-ft.-diameter fan for No. 7 and tributary seams and the 10-ft.-diameter fan for No. 15 and its tributary seams are now operating single-stage with si . blades at below normal velocity

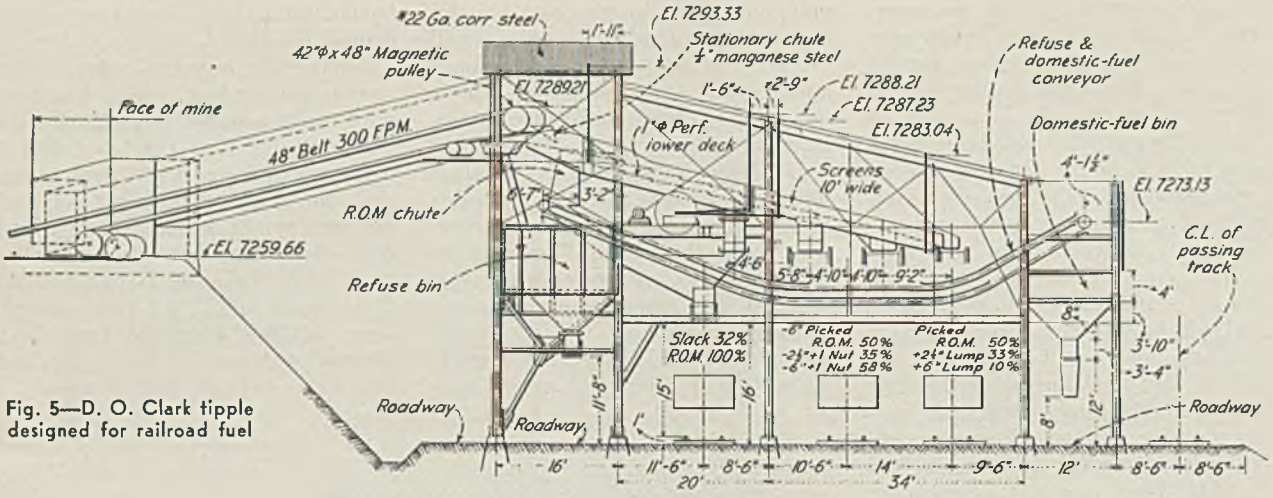


Fig. 5—D. O. Clark tipple designed for railroad fuel

drawing air down the two rock slopes, round the bottom and up the two 12x16-ft. (inside dimension) shafts, 242 and 549 ft. deep respectively. Dust made in dumping will not enter the mine but is swept directly up the shafts.

When the mines extend, however, the rock slopes will carry an inadequate quantity of air, so the main planes will be driven with all due speed to provide two intakes and two returns in each seam, the intakes being near the center of the pillar. The present fans will serve for permanent operation, though another smaller fan will be provided for No. 1 seam. Thus, it is expected that the water gage of each fan will keep within 2 in. throughout the operation of the mine.

Safety Record Improving

Despite the treacherous roof, in 1937 the Union Pacific Coal Co., throughout its entire system, incurred only 40 lost-time injuries, with a production of 3,315,628 tons and an exposure of 3,707,237 man-hours, or a production of 82,891 tons and an exposure of 92,680 man-hours for each lost-time accident. In the first eight months of 1938, the lost-time-injury record rose to 101,778 tons per lost-time accident and the exposure to 107,448 man-hours on the same basis.

Tipple—A heavy three-track steel tipple designed for the exclusive loading of railroad coal and constructed by Allen & Garcia Co., has been erected at the mouth of the belt-conveyor slope. The coal at the head of the incline passes over a Dings magnetic pulley to remove tramp iron, and then over screens which separate the coal into large lump (+6-in.), small lump (2½x6-in.), nut (2½x1-in.) and slack (1x0-in.).

In general the sizes made are +6-in., 1x6-in. and slack. The +6- and 1x6-in. sizes then pass to separate picking tables and loading booms, but a cross-conveyor below the picking table will provide any mixture desired. In an emergency, run-of-mine can be loaded on the slack track. The slack coal goes direct to the railroad car, and pickings are loaded on a separate conveyor; the lower strand carries the refuse to the refuse bin and the upper strand carries the domestic coal for employees to a bin at the front end of the tipple. This refuse is now handled by truck, but eventually some other mechanical arrangement may be provided.

Mechanical and Electrical Detail—Current for operation is brought from the plant of the Union Pacific Coal Co., at Rock Springs, a distance of about 25 miles, at a voltage of 33,000 a.c., where it is stepped down by transformers at the old Superior E station to 2,300 volts. Later the current will come to a station where switching equipment will distribute power to the D. O. Clark mine and perhaps Superior D, situated above the slope. A transformer bank steps this current down to 220 volts, giving suitable power for driving machinery on the tipple.

General and Resident Staff

Eugene McAuliffe, president
G. B. Pryde, vice-president in charge of operations
I. N. Bayless, general manager
C. E. Swann, chief engineer
H. C. Livingston, assistant chief engineer and construction engineer, D. O. Clark mine
Guy Stevenson, chief electrician
D. Faddis, master mechanic
G. A. Brown, superintendent, Superior mines
Melvin Sharp, mine foreman, D. O. Clark mine
D. C. Foote, resident engineer, D. O. Clark mine

Feeding Belt Circuit

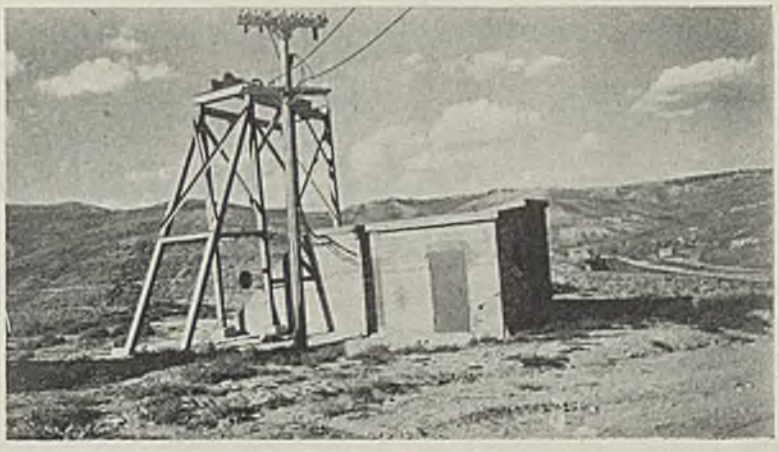
A 2,300-volt circuit for the belt conveyors is carried down the slope in 4/0 three-conductor armored cables. Down each of the ventilation shafts for No. 7 and No. 15 will travel two three-conductor suspension cables, to feed underground machinery. These conductors are rubber-insulated, wrapped together with jute and covered with lead, steel armor and suspension steel braid. Direct current, generated by a 200-kw. motor-generator set between the ventilation shafts, passes down both of them, through a 500,000-cir.mil stranded cable in each shaft; the return is provided through another cable of the same size. Cutting, drilling and loading machines, conveyor drives, pumps and locomotives and lights will use d.c. current.

The tipple has three 500,000-cir. mil cables to busbars which pass to a safety switch and thence to deionizing line starters. All the motors are totally inclosed, dustproof, ball-bearing, fan-cooled, and have been inspected by the Underwriters Laboratories, Inc., as "electric motors for hazardous locations." Each motor has a lock-out button, so that if the mine electrician desires to work on it, he can be assured that he can do so without fear that it will be started from the pushbutton station. All circuits, whether for drives or interlocking controls, are laid separately in conduit from the central switch panel, where every unit is provided with a safety switch.

In a light bay of the tipple over

the tracks are eleven momentary-contact buttons for tipple operation with a horn for calling the attention of the railroad-car loaders, also push-buttons for starting the belts on the slope which are interlocked through centrifugal governors that will not permit the belt below it to start until its own belt has reached the required speed.

Two telephone systems are installed, both Western Electric, one specially for the tipple and the two underground dumps, and one for general mine use.



Fan at No. 7 shaft. Note rolling terrain.

To Add Mercury Lamps

Illumination in the tipple is provided by a large expanse of glass. Later, three mercury 250-watt lamps will be added, one over each picking table, supplied by a transformer of which the primary is 220 volts and the secondary 150 volts. Another 400-watt vapor lamp will be erected to floodlight the screens. This will work in conjunction with a reactor, so as to provide that the 220-volt current will not fluctuate.

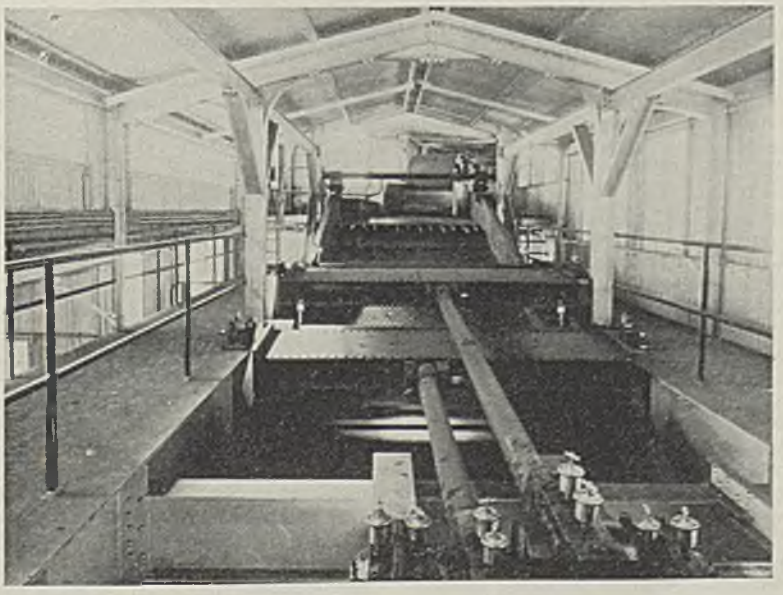
Belt-drive motors are totally inclosed, ball-bearing, fan-cooled motors of squirrel-cage type with automatic magnetic starters. Slope-belt stations have an emergency pushbutton at each belt and another half way up the belt, so that all the belts below the button pushed can be stopped by that single application of pressure. Cutler-Hammer control is provided for each of these belts. An automatic electro-magnetic thrustor brake at each station forms part of the interlocking system and is located at the drive on the coupling between motor and speed reducer. It holds the belt when it is stopped so that whether loaded or empty it will not run backward. The brakes are adjustable and are now set for a forward drift of the belt of about 10 ft., no backward drift taking place.

Centrifugal governors at each belt station attached to the head snub pulley prevent the starting of the belt below until the upper belt has reached the required speed. Weights on the governor fly out and establish contacts which enable the lower belt to start. The magnetic starters are set for an interval of 25 seconds from low to high speed, after which the centrifugal governor makes its contacts.

Car feeders, trip makers and reciprocating feeds at the two underground dumps are operated by 220-volt motors, of the same rigid specification as those used elsewhere. At each dump station, the 220-volt feed is taken off the 2,300-volt circuit through a bank of three Pyranol transformers. The dump motors are controlled by pushbuttons at the dump station through a switch panel; each unit has a safety switch and lock-out button on the motor.

Except for two Shaw-Box Type LRS motors in the gantry for lifting booms, Allis-Chalmers and Westinghouse motors are used. Much of the equipment is of either one of two capacities, so that the machinery could be transferred and the spare equipment reduced to its lowest limits.

Screen in top deck of tipple with magnetic pulley in rear



Why Belt Is Used

Two considerations caused the installation of the belt: (1) to escape the high power peaks accompanying a hoist installation and (2) to obtain a regular delivery of coal to the tipple. Had all the coal come to that point in mine-car trips from the slope, a long coal-car-storage yard would have been necessary on the surface, and in the severe winter, when demand is greatest, this would have been undesirable. Had all coal come to the surface from the slope, the cost of the tipple approach, because of the contour of the surface, probably would have equaled or even exceeded that of the belt installation.

This D. O. Clark mine has been designed in accord with the policy of the Union Pacific Coal Co. to increase the size of its mines and to reduce their number. In 1923, it had nineteen mines, and only nine in 1938, and the D. O. Clark operation will produce, when fully developed, 25 per cent more coal than the present "B," "C" and "D" mines in the Superior district. Eventually, the tonnage mined by the company will be produced by about five mines instead of by nine, as at present.

Notes . . . FROM ACROSS THE SEA

MUCH so-called "shale" is composed of a fine sand, not of clayey materials (kaolin) nor of sericite or feldspar. The British, who are making a careful study of the action of the mine roof and who are troubled with a different name for every kind of material in almost every mining division, are trying to get a reasonably accurate nomenclature. Hence, it has been proposed to term any material of 0.1 to 0.01 mm. diameter "siltstone" and to divide such rocks into sandy and clayey subclasses. Mudstone is another subclass which may be silty, calcareous or carbonaceous. Like clay, it is not laminated and that distinguishes it from shales. The mudstones are more indurated than the clays and do not so easily become plastic. These designations are part of Paper 98, on Coal Measure Rocks, of the Safety in Mines Research Board, which gives the material from which the following table is constructed and which apparently is not wholly original with the authors.

CLASSIFICATION OF ROCKS

Rock Type	Dominant Grain Size Millimeters	Inches
Conglomerate	2 ..	+0.078
Very coarse sandstone	1x2	0.039x0.078
Coarse sandstone	0.5x1	0.020x0.039
Medium sandstone	0.25x0.50	0.010x0.020
Fine sandstone	0.10x0.25	0.004x0.010
Siltstone	0.01x0.10	0.0004x0.004
Mudstone, shale, clay	0.01—0.0004	

ROPES which, under stress, elongate more than is normal tend to reduce shocks, but in a deep shaft there are practical objections to an excessive elongation, declared M. A. Hogan, Safety in Mines Research Board, at a meeting of the Institution of Mining and Metallurgy, of London, England. Such ropes he designated "elastic," referring to elongation rather than to resilience. Preformed ropes stretch more than ordinary ropes when new, but, from such information as is available, there is little difference between them after wires and strands have bedded.

Though at the rope-testing station of the Westfaelischen Berggewerkschaftskasse, Bochum, Germany, an electro-magnetic testing apparatus is in regular use, its indications are used to supplement, not supplant, the regular methods of testing and examination. In Dr. Hogan's view, interpretation of the results requires much knowledge and skill.

Though the forms of apparatus vary in several details, the essential feature lies in magnetizing the rope and scanning the magnetic field with a search coil; thus any irregularity in the section of the rope causes an irregularity in the field which can be detected. The German apparatus will note a change of 1 per cent in cross-section. If rope deterioration arose solely from loss of cross-section by wear or broken wires, this form of detection would be satisfactory, but, when the rope has fatigue, results may be quite misleading, for fatigue cracks, once formed, may not cause a break for some time; meantime the loss of cross-section from such cracks may be negligible.

In the Rand, said C. B. Brodigan, ropes are opened to ascertain the condition of the interior. British engineers and rope makers regard such an operation with no little apprehension, but Mr. Brodigan said experience proved that the practice was justified.

When several layers of rope are wound on a drum, the rope wears unevenly and the position of the rope should frequently be shifted so that parts of the rope previously worn will be transferred to points where the wear should be less, said Dr. Hogan. If the worst deterioration occurs near the drum end, where tension is greatest, that would appear to be a reason for reversing the rope so as to bring the weakened portion to a place where the wear would be less severe, but, in shallow shafts or shafts of medium depth, the deterioration usually is worse toward the capel end of the rope, and to bring this weakened end to the drum, where the tension is greater, although the shocks may be less, would be bad practice.

Special circumstances may justify turning a rope end for end, but the operation should be undertaken only with a detailed knowledge of the condition of the rope and after a full consideration of the action of the rope in reversed position. If a rope has a sufficient number of dead coils on the drum to permit all this rope, after reversal, to lie between drum and cage when the cage has landed at the top, then the worst part of the rope would be safely stowed in the dead coils and reversal would be justified.

AVERAGE fatality rate from explosions of gas or dust per 1,000 persons employed underground in France for the ten years 1925-34 was 0.03, while that for Great Britain was 0.10, according to H. M. Hudspeth, who was commissioned by the British Government to make an inquiry into the superior record of France in this regard. As the figures on the man-shift basis were proportional and as in 1935 gross outputs per man-shift were almost equal, the figures on the ton basis may fairly be compared with each other, though the definition for statistical purposes of a fatal accident is not quite the same in the two countries.

American statistics for fatality rates per 1,000 persons employed below ground from explosions of gas and dust, major and minor, in the period 1925-34—both years inclusive—on the authority of W. W. Adams, U. S. Bureau of Mines, are: bituminous mines, 0.4424; anthracite, 0.2637; all mines, 0.4061. However, these rates were decreasing, and in 1933 the rates for all mines had fallen to 0.0925 and in 1934 to 0.1113—about those of Great Britain for the ten-year period. The bituminous rates, at first so unfortunate, were better than the anthracite. Bituminous rates in 1933 and 1934, respectively, were 0.0765 and 0.1039, whereas anthracite rates were 0.1639 and 0.1457.

No very definite conclusions were given in Major Hudspeth's report, but certain differences in conditions, drawn from his presentation, may in part explain why France suffers less than Great Britain from the explosion hazard. One is that the measures in Great Britain merely roll, whereas in France they pitch heavily. Where a mine is being operated by longwall with the wall extending from one level to the next, a heavy pitch favors ventilation. The tendency is for the air to escape by old workings wherever it does not travel along provided airways, whereas, with more level workings, the air in the old excavations tends to move out into the intake roadways, carrying its methane with it.

With pitching seams, air can be led to the lowest parts of the workings and carried ascensionally past the working faces. Where, as in the anthracite region of this country, the breast or chute method is used, steeply pitching coal may be disadvantageous, because the air may have to return to the level from which it has been drawn. In France, wherever the inclination is 3 per cent or more, ascensional ventilation is obligatory except with the consent of the inspector. Complete stowage is required and the work must proceed in descending stages.

Again, the French drive haulways largely in rock. Thus, there is less methane in the gangways than where these roadways are driven in coal, and this makes development as well as operation less hazardous. Further, the haulage being in rock tunnels, the only coal dust in these roadways is derived from the mine cars, which are built so as to be free of leakage. As the air is carried away from the haulageways, no fine dust enters them from mining. The only dust is that from the tops of the cars, and these, even with locomotives, travel only about a mile an hour and with animal haulage at no great speed. Another advantage is that there is less air leakage along the roadways.

Moreover, whereas 51 per cent of the output in Great Britain in 1935 was mined with the aid of undercutting machines, only about 6 per cent was so mined in France; hence less dust is formed. Just how much spontaneous combustion troubles the mines of France is not noted by Major Hudspeth, but he states that in the period 1925-1934 three explosions which were attributed to spontaneous combustion accounted for 54 deaths in Great Britain. None with fatal results was so caused in France. In 1936, according to the Government report, Great Britain had 44 underground mine fires, five of which were of an origin not stated. It is to be regretted that this matter was not extensively elaborated in Major Hudspeth's report.

In the non-fiery mines of France, air measurements are not required to be made more often than at three-month intervals, but in others they must be made monthly. The Leon-Montlucon firedamp detector,

which utilizes the Wheatstone bridge, is used widely for measuring the methane content. If this exceeds 2 per cent in an air current, operation is considered dangerous. In Great Britain that limit is 2½ per cent and upward. The quantity of air required per worker in France is not specified, but if it is less than 106 cu.ft. per minute, that fact must have the special attention of the inspector.

Return airways from any development working must not contain more than 1½ per cent of methane; other returns are limited to 1 per cent. Great Britain has no such requirement. Rarely, perhaps, in French mines is the content of methane from working operations as much as 1 per cent. In Great Britain in 1930-32 only 12 per cent of the returns from nearly 3,000 ventilating sections had more than 1 per cent of methane. In 68 per cent the proportion was ½ per cent or less. Major Hudspeth credits the universality of the bathhouse as being a defence in French mines against illicit smoking. Where there is no bathhouse, presence of smoking materials may be due to the harmless use of the materials between house and mine. When a bathhouse is provided and used, there is no such excuse.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.

Studies of Roof Movement in Coal Mines: 1—Montour 10 Mine of the Pittsburgh Coal Co., by H. P. Greenwald, E. R. Maize, I. Hartman and G. S. Rice, U. S. Bureau of Mines. R. I. 3355, 41 pp. and 21 page cuts; paper; mimeograph.

The Pittsburgh sandstone, which is 49 ft. thick, is regarded by the authors as the main roof support and the rest as little more than roof loading, though nowhere is this view thus positively expressed. So much does the character of the Pittsburgh sandstone change that it is sometimes termed a "sandstone" and sometimes a "shale." When it is termed a sandstone, it is a coarse gray sandrock with bituminous matter well segregated. It fails under beam loading at 2,210 lb. per square inch. When it is termed a shale, it is a fine dark sandrock, with closely commingled bituminous matter and fails under beam loading at 990 lb. per square inch. The diameters of the coarse granules in the sandstone are roughly 340 times as large as in the "shale." The sandstone has a calcareous or clayey bond, but the "shale" has a carbonate bond. Factual data rather than generalizations dominate the report in regard to convergence and subsidence and, with the present uncertainties, little else could be expected.—R. D. HALL.

Mine Plant, by B. F. Tillson, American Institute of Mining and Metallurgical Engineers, New York; 371 pp., 9x11½ in., cloth. Price, to members, $5.00; to non-members, $7.50.

This book, embodying many entirely original features, devised by Mr. Tillson, gives working drawings of plants all over the mining field, prepared under the auspices of a committee of 24 members of the A.I.M.E., of which Mr. Tillson was chairman and by far the principal collaborator. It is published by the Rocky Mountain Fund. Mr. Tillson made an extensive trip gathering this material.

All pages are printed on one side only and numbered accordingly and are transparent, so that a reproduction can be made by slipping sensitized paper between the pages and directing light on the face of the drawing. Uncut outer edges of the book will hold the sensitized paper in place. The stock has been carefully selected so as to be even in texture—a feature none too common in uncalendered sheets. It gives a clear print without obverse images from the under pages.

In the book are twelve sections on surface, eleven on shaft and seventeen on underground plant, each section containing at least two and usually several pages. Mine-working layouts are not included, but track and ventilation layouts are. All the drawings have been remade to omit unimportant details and to conserve space. Appendix notes, giving important items, are bound in the inside of the back cover so that the page describing the cut can be folded by the reader onto the drawing to which it refers.

Regulations and Orders Relating to Safety and Health, Coal Mines Act, 1911 (1938 edition), British Mines Department. British Library of Information, New York. 190 pp.; paper. Price, 50c.

This booklet gives the regulations as revised to Feb. 28, 1938, and it contains many rules that the reviewer does not recall as being incorporated in any of our many mining codes. One relates to precautions against spontaneous combustion, but none refers to mine fires not spontaneous. Another, relative to working under moss, sounds strange to our ears, but England has extremely thick mosses or bogs filled with water. Signaling and telephone apparatus are rigorously controlled, as is fitting in gassy mines. Sinking—a source of many accidents here—is not forgotten, though we do not give such accidents enough thought. These rules, however, say nothing about methane. Surprising are the rules relating to the use of candles and paraffin wax, which are still in use in the smaller British mines.

The Use of Iowa Coal in Domestic Stokers, by M. P. Cleghorn and R. F. Helfinstine, Iowa Engineering Experiment Station, Ames, Iowa. Bulletin 134, 28 pp.; paper.

Tests show, say the authors, that Iowa coal furnishes the cheapest heat source throughout most of that State, though it will evaporate only about three-fourths as much water per pound as out-of-State coal. It holds fire well and needs attention only once a day except in the coldest weather. Automatic operation was obtainable from most Iowa coals despite troublesome clinkering characteristics. Large heating plants are needed for Iowa coals.

Liquid Carbon Dioxide Used to Extinguish a Gob Fire in a German Coal Mine, by G. S. Rice and I. Hartmann, U. S. Bureau of Mines. I. C. 6970, 5 pp.; paper; mimeograph.

A fire in the Prasident mine, Bochum, Germany, broke out in the dirty-coal filling of a longwall working advancing with an inclined face but directly up the 85- to 90-deg. pitch. The filling accordingly was covered with 6 ft. of sand and later flushed with water. As the fire was not extinguished, pipes were put through the sand cover, and carbon dioxide, from a liquid supply, fed below the sand seal promply extinguished the fire.

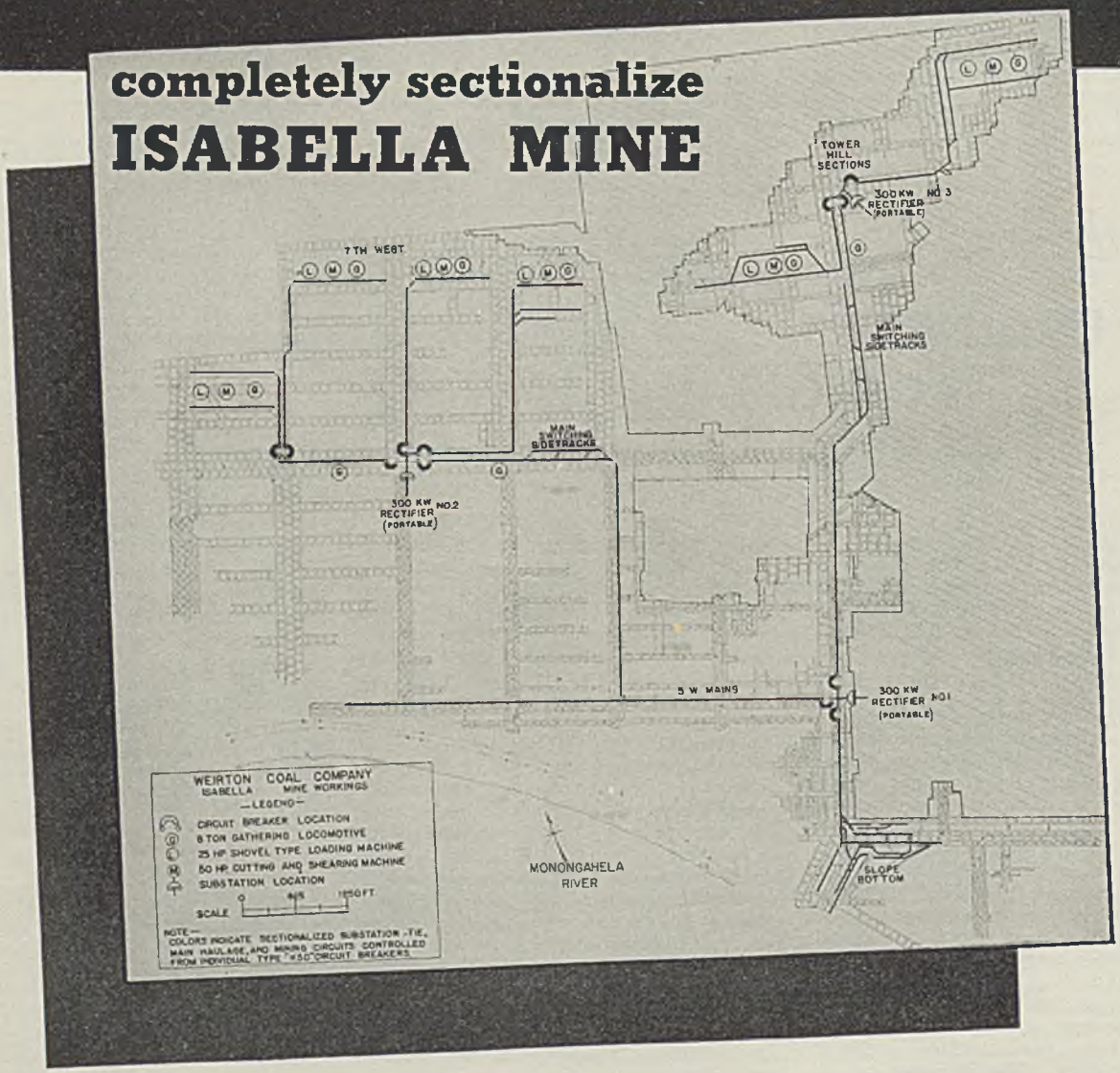
Shaft- and Slope-Bottom Layouts at Coal Mines, by R. L. Anderson, U. S. Bureau of Mines. I. C. 6949, 39 pp., with 14 page cuts; paper, mimeograph.

Covering terminal tracks for loaded- and empty-car storage, locomotive runarounds, locomotive shops, charging stalls, supply rooms, pumprooms, waiting rooms and offices for dispatcher, weighmen and foremen, this circular shows 21 arrangements at bottoms of shafts and slopes. Of course, no criticism is attempted; only by the age of the installation and the size and number of cars handled can a somewhat inadequate evalution be made of the various plans and elevations presented.

With two tracks for loads and two for empties and no interference, 1,078 tons of coal was handled per bottom employee; with one track for loads and one for empties and no interference, 622 tons. With locomotives handling loaded cars on the bottom, 855 tons was handled per bottom employee per shift; with a chain-haul or car-feeder, 590 tons; and with gravity, 429 tons. With skip hoisting, the average tonnage per shift per bottom employee was 1,180; with automatic caging, 490 tons; with conveyor, 450 tons, and with hand caging, 329 tons. In all these instances, one mine at which no bottom labor is required was omitted from the calculations.

AUTOMATIC RECLOSING CIRCUIT BREAKERS . . .

completely sectionalize ISABELLA MINE

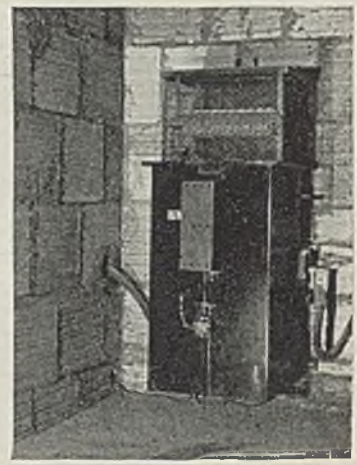


Weirton Coal Company's mechanized Isabella Mine derives these advantages from complete sectionalizing

. . . Low cost in relation to protection afforded; increased coal production through confinement of electrical disturbances; lowered demand and consumption of energy; maintenance reduced; greater safety.

Send for I-T-E Bulletin 1038 which describes the Isabella installation in detail.

Representatives in principal mining areas.



Typical Sectionalizing Circuit Breaker for mining applications

I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

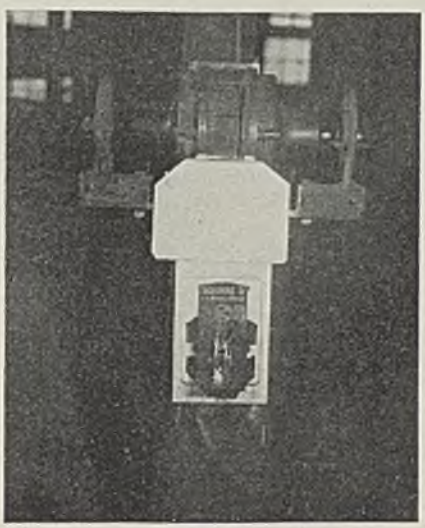
OPERATING IDEAS

From Production, Electrical and Mechanical Men

Goggles Must Be Picked Up Before Starting Grinder

"With the increased mechanization of coal-mining operations the traditional blacksmith shop has been replaced by modern maintenance facilities," observes K. N. Banthin, mining engineer, Oak Park, Ill., in describing a method of insuring the wearing of goggles during grinding operations. "The adoption of modern abrasion-resisting wearing plates, hard-facing materials and coal-drill, rock-drill and mining-machine bits has necessitated a wider use of grinding equipment.

"Without proper precautions, this grinding equipment presents increased hazards. In many shops the slogan 'Wear Safety Glasses While Grinding' is conspicuously posted in the vicinity of grinding equipment and together with other educational measures is bringing the hazards of grinding and the proper use of equipment to the attention of employees. In spite of these precautions, however, additional positive mechanical safeguards are necessary. As an example, Jim Jones, an old employee, has just a small chisel to sharpen and so goes to the grinder without goggles and by holding his head far to one side gets the job done without injury to himself. He may get by in this manner for years, but the inevitable accident will occur some time.

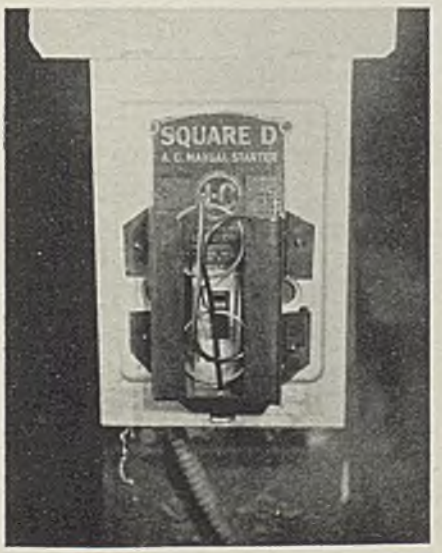


General view of the grinder with goggles in place in front of the switch lever

"After a study of the mechanical problems and human traits involved in the case of men working on the general-service grinder it was decided that the best protection would be to place the goggles directly in the hand of the employee before he could start the equipment. In this manner, the constantly reiterated educational campaign could be made effective, as with the glasses in his hand the man would be reminded of their necessity and use. Thus, the combined faculties of hearing, seeing and feeling were brought to focus on the objective.

"A standard 'Square D' manual starter was equipped with a sheet-metal frame to hold the goggles in front of the switch handle. Therefore, before the man could start the machine he had to take the goggles in his hand. Also, to prevent him from misplacing them after completion of the job, all surrounding shelves, nails and ledges were removed or covered with sloping sheets, thus making it inconvenient to deposit them anywhere except in the appointed place. This system has proved an effective, practical and reasonably priced method of safeguarding a general-service grinder."

The goggles must be taken in the hand before the switch can be thrown

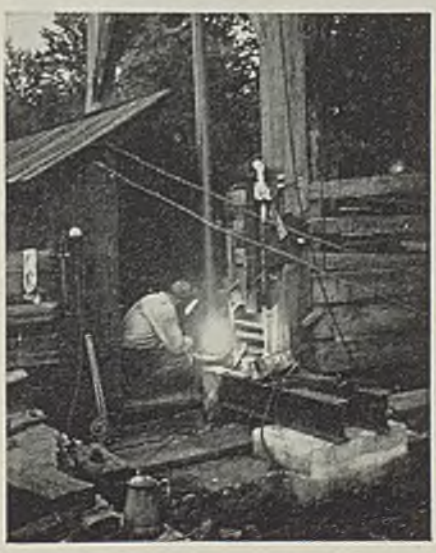


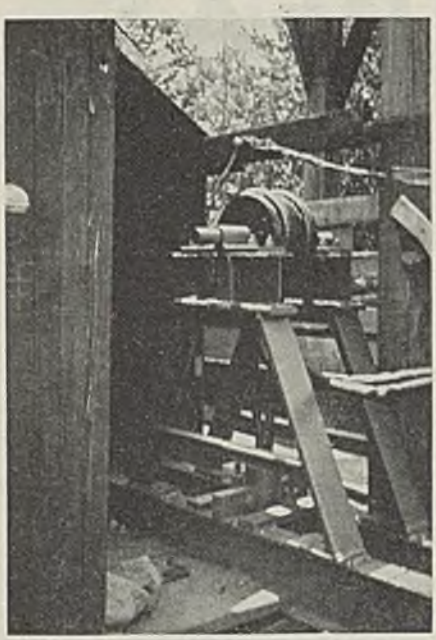
Continuous Suspended Conduit Carries Power Cable

A continuous conduit suspended free from the shaft timbering has been installed at a Pennsylvania mine to improve the method of taking power down to the underground workings, reports E. J. Lynch, Gallitzin, Pa. Originally, a 4-in. pipe protecting the power cable was fastened to the timbers lining the sides of a 432-ft. air shaft. Because of the extremes in temperature, ranging from minus 10 to plus 90 deg. F. during the year, with consequent expansion and contraction of the pipe, the clamps loosened from the timbers. Also, the timbers themselves moved, some to the center of the shaft, allowing the pipe to buckle and separate about 2 ft. some distance down the shaft. This, of course, resulted in damage to the cable and poor power in the mine.

To remedy the situation, it was decided to suspend the 4-in. conduit entirely free from the shaft timbering and to make it into a continuous column by welding the joints electrically as the pipe lengths were assembled. One joint at a time was welded at the bottom of the sleeve, after which the column was dropped a convenient distance to permit welding the top

Welding the pipe together to form a continuous column



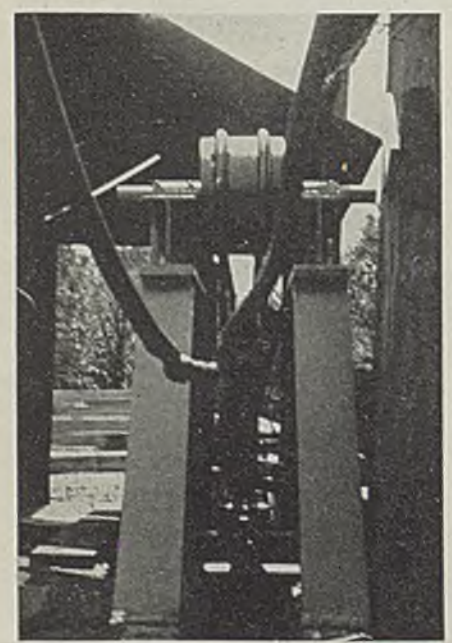


Supporting structure carrying spool at the top of the shaft

of the sleeve and then was lowered sufficiently to permit work on the next joint. Two 10-in. I-beams, cross-braced to prevent weaving, were placed on concrete piers built on each side of the shaft, forming the base of a double-sided supporting stand made of channels. This stand carried a shaft fitted with a wooden spool used to support cable loops.

The spool was made of thoroughly seasoned wood. Two ¼x1-in. bands were applied to the ends and then the spool was treated under pressure with a waterproof insulating compound. The 1,000,000-circ.mil insulated cables were passed around the spool, leaving a space of 3 in. between them. Then each conductor was brought together in a loop, the insulation was removed for a space of a foot, and they were moused together with galvanized-steel wire, soldered and reinsulated. Two clamps were fastened to the pipe at points 100 and 300 ft. from the bottom of the shaft. These clamps were supported by guy wires running through eyebolts, thus permitting proper tension to be placed on the supporting structure at the top of the shaft.

Close-up of the spool showing the cable loops



New Distribution System Cuts Bit Losses

With eleven conveyors in use at the Ringgold mine, Timblin, Pa., each working three shifts a day, difficulty was experienced in getting each cutter on the several shifts to do his share of changing bits and also to see that used bits were sent outside immediately instead of being laid to one side with a strong possibility of their total loss. The old distribution plan was to send boxes containing full sets of bits to each cutter. The new distribution plan, to be outlined below, was developed by E. J. Davis, foreman, and, according to a description submitted by James Thompson, foreman of the Reid mine, operated by an affiliated company, has entirely eliminated excess bits at the face, with attendant possibilities of loss. Also it has resulted in an equal distribution of the work of spotting, or changing, bits among the several cutters.

As the coal is very easy to cut and the bits are hard-surfaced, greatly lengthening the cutting life of the points, very few bits are required per machine per seven-hour shift. Conveyors are numbered from 1 to 11, with an A, B and C crew on each. Each one of the 33 cutters is given a bag of eight bits when he starts work, and is required to take the bits from the station to his working place and return the same number at the end of the shift, whether dull or sharp. Bit stations are established in each section of the mine and are of cupboard-like construction with numbered pigeonholes. The conveyor repairman on each shift checks on whether the cutters take their bits out and return them at the end of the shift, as required by the rules. Dulled bits are collected from the several bit stations and are sent out in large boxes. They are returned in the same way, and the required number is placed in the bags in the pigeonholes.

Mouse Traps

● The story of the better mouse trap is perhaps one of the most widely known tales ever created in the fertile brain of an author. Mouse traps seldom figure in the operation of coal mines, but the man who can do a thing a little better generally comes out with the lion's share of the credit. Naturally, doing a thing better requires a little knowledge in addition to one's own ability to reason, which is the idea back of this Coal Age department. Here is where the editors attempt to present selected bits of knowledge for the use of operating, electrical, mechanical and safety men. The work is cooperative. Mining men develop the ideas and we pass them along. So if you have done something that has cut cost, saved time, increased efficiency or made a job safer, here is the place for it. So send it in, along with a sketch or photograph if it will help to make it clearer.

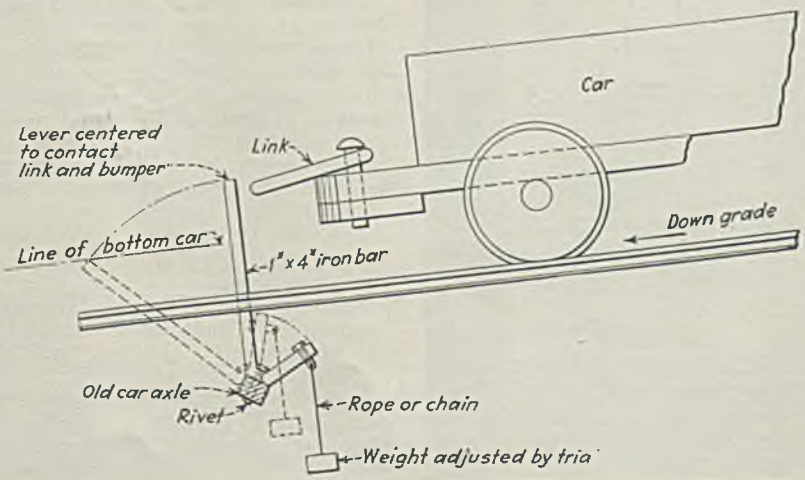
For each acceptable idea, Coal Age pays $5 or more.

Retarder Prevents Shock In Making Trips

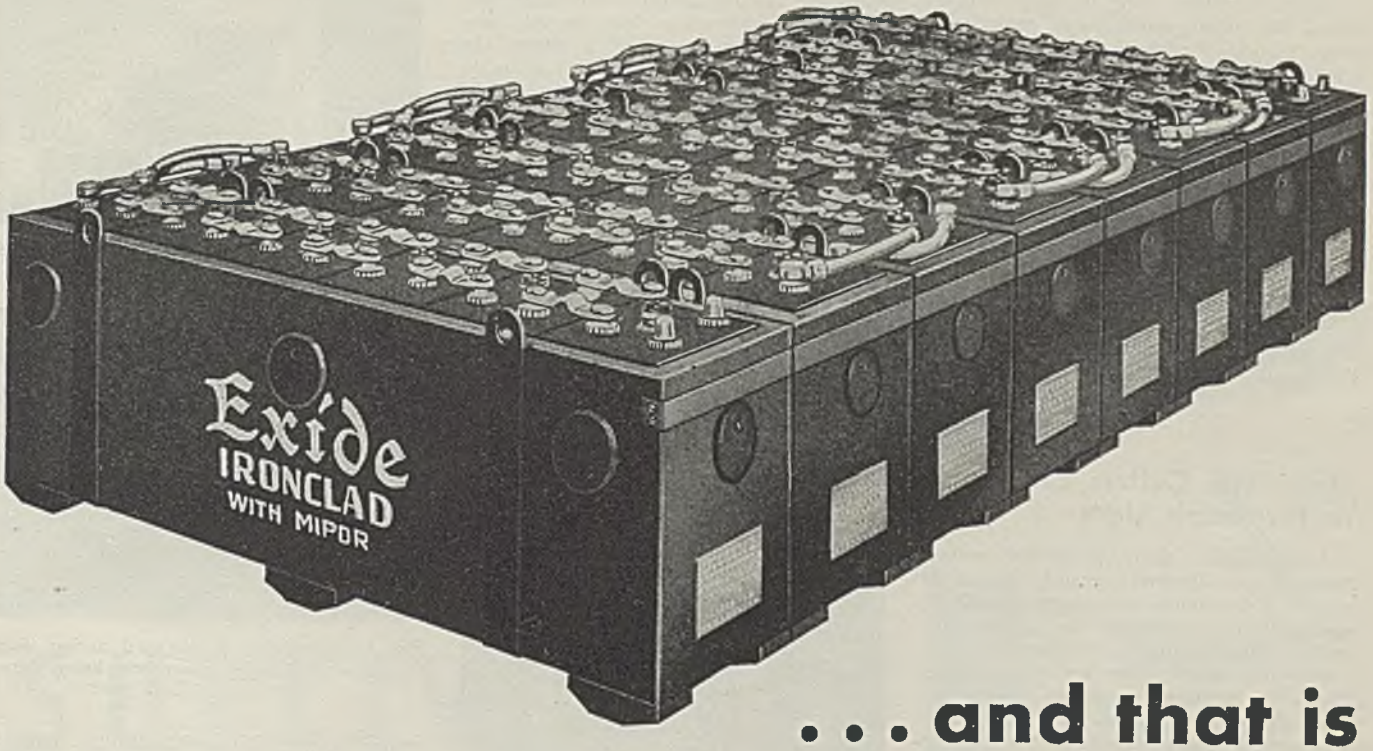
In too many cases mine cars have bumpers torn off or badly damaged due to excessive shock from collisions in running into the empty hole, points out E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky., in offering a retarder for use in this particular operation. Also, if a bumper is knocked out of shape it will not slide properly on a second bumper, with the possibility of derailments, particularly on curves, due, perhaps, to only a single bad "nose" in a whole trip.

A simple car retarder built on the plan shown in the accompanying illustration

Diagrammatic sketch of one type of retarder for empty mine cars



There's only one way to build a battery like Exide-Ironclad . . .



. . . and that is to spend 50 years learning how

NOBODY yet knows all there is to know about storage batteries, but in fifty years' time it is possible to learn a great deal—not only about batteries, but about the needs and the problems of those who use them. For exactly half a century, that is what Exide has been doing to the exclusion of everything else.

With no other interests except batteries and the problems of battery users, Exide was able to develop the Exide-Ironclad Battery as far back as 1910. Within three years, this battery had begun to revolutionize underground haulage methods, and in its improved modern form it is the most widely used battery in underground haulage service today.

It is literally true that the Exide-Ironclad Battery now has behind it fifty years of experience and intensive development. It is not surprising that it is a battery ideally fitted for underground haulage, a battery with high power ability, with the rugged stamina that means long life in this service, ready and able to haul heavier loads faster and more dependably than ever before. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

To mark the fiftieth anniversary of Exide Batteries, a handsome souvenir booklet has been prepared, illustrating the essential part these batteries play in daily life. Write, and we will gladly send you a free copy.

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IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

or some other good plan "should be an asset at many mines, as it is not always practicable to have an empty grade exactly right for every type of car." Sometimes, the management buys better-running "buggies," with the result that the original grades are all wrong. At the same time changing them might be extremely expensive if part of the empty track were on a well-constructed trestle, in a tipple, etc. Therefore, a retarder placed close enough to the empty hole so that a car could not regain a high speed before it bumped would seem to be the logical answer. Naturally, the retarder should be so arranged that entanglement with the link would not cause a derailment, and should work on the bumper with enough resistance to slow the car down properly.

Open-Type Cutters Changed To Permissible Units

A coal-mining company in the central Pennsylvania district recently found it necessary to change some open-type Goodman mining machines to permissible units. This required building up cover plates and motor cases and filling open places by welding, as shown in the accompanying illustrations. All joint surfaces and cover plates were built up to have a surface of at least 1 in., and then were machined so accurately that it was impossible to get a 0.003-in. gage between the joints. An adjustable brace (Fig. 8) was required to prevent the sides of the motor cases from being drawn out of line while the edges were being built up by welding.

Figs. 1 and 2 show, by means of chalk marks, the spaces which had to be filled and the joints which had to be built up. Fig. 3 shows the increased surface for mounting the resistance cover plate and Fig. 4 the increased surface for the commutator-end housing. Fig. 5 shows the original application of airplane tubing to make a gas-tight connection between the controller and the machine. This method, however, was not approved by the State electrical inspector, and consequently a circular split-type case was designed to protect the control cables from injury. The circular shape of the necking glands, as shown in Fig. 7, permits them to be manufactured readily, and the removal of three screws on each side of the case allows the cover to be taken off so that the controller may be swung to one side to work on the machine parts underneath. When completed, these machines were approved by the State electrical inspector.

Fig. 1—Chalk marks show spaces to be filled and joints to be built up

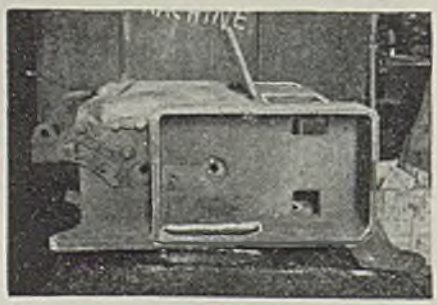


Fig. 2—Another view showing additional points where filling and building up were necessary

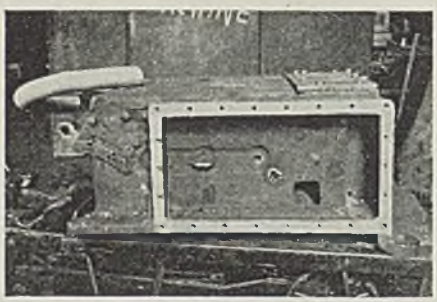


Fig. 3—Increased surface provided for mounting resistance cover plate

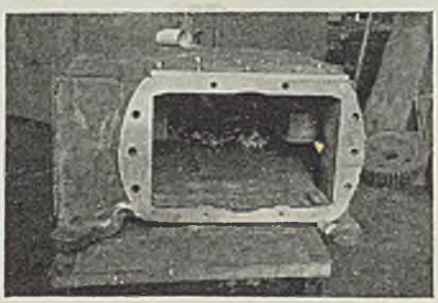


Fig. 4—Increased surface for the commutator-end housing

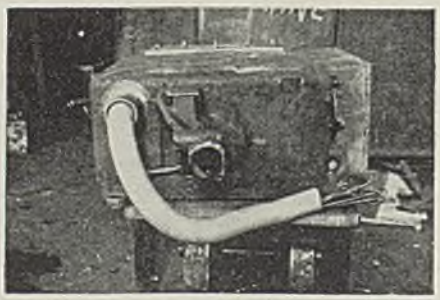


Fig. 5—Airplane tubing originally employed for a gas-tight connection between controller and machine, which was disapproved by the State electrical inspector

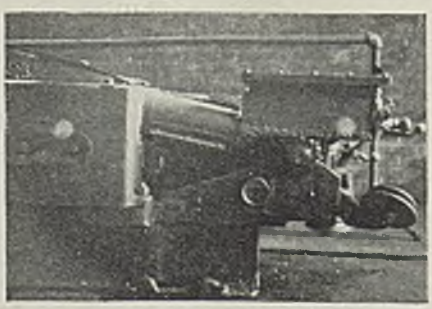


Fig. 6—Circular split-type case designed to replace the airplane tubing and protect the control cables

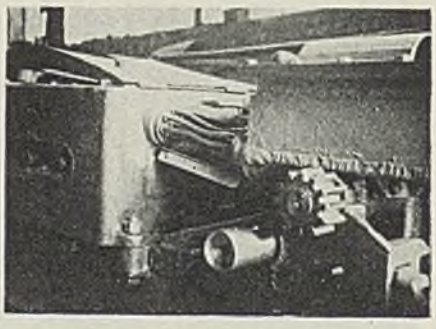


Fig. 7—Circular shape of the necking glands permits ready manufacture

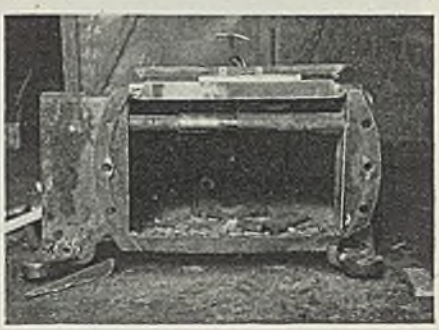


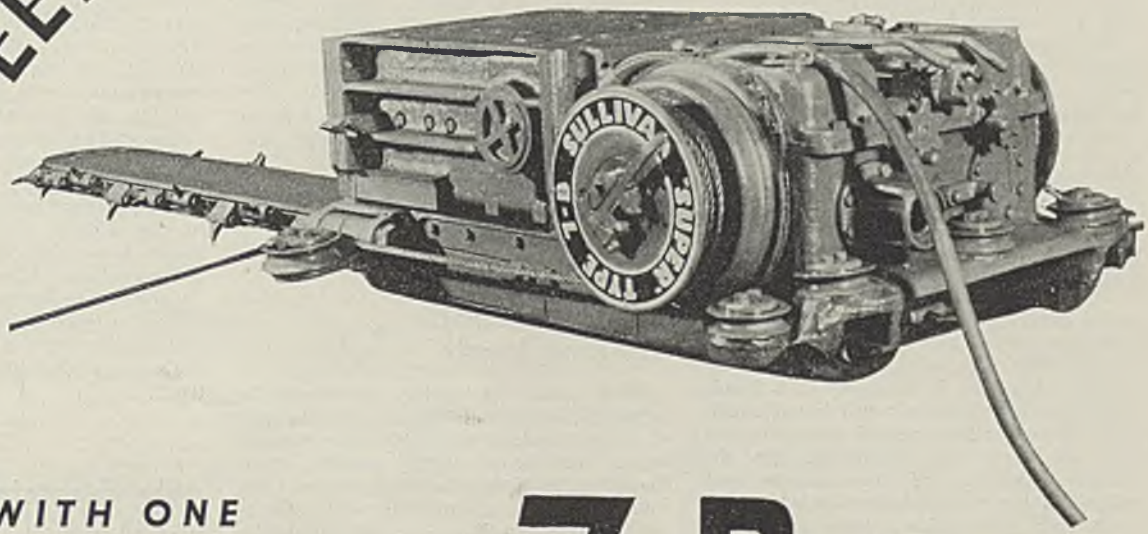
Fig. 8—Adjustable brace used during welding to prevent motor cases from being drawn out of line

Special Cables Make Welder Substitute

Although not recommended for continuous use, two special cables may be used for welding and cutting, when the bonding welder is out of commission or busy elsewhere, declares Thomas James, mine manager, American No. 2 mine, Knox Consolidated Coal Corporation, Bicknell, Ind. The necessary resistance is supplied by the resistance on a gathering locomotive and the idea has been of great help many times. One cable is made with a common spring nip, such as is used to connect mining-machine cables to the main circuit, on one end, and a sharpened piece of trolley wire on the other. Nip and point, of course, are connected with a piece of motor cable or other insulated wire of the required length. The second cable is made with a similar sharpened point on one end and a common nip hook on the other.

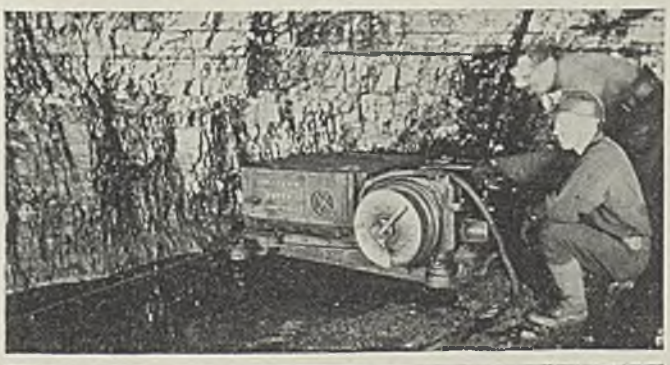
To weld a bond, a welding rod is placed in the spring nip and the point on the

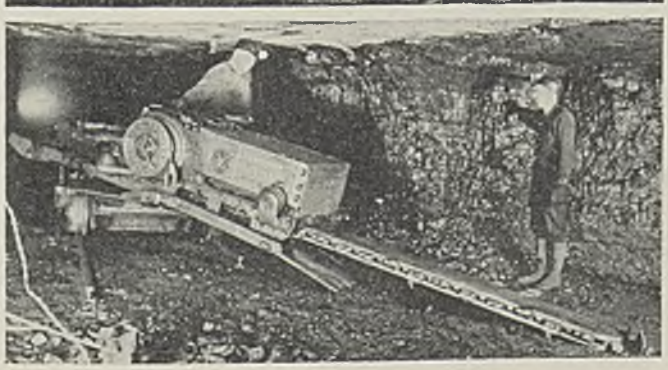
480 FEET OF FACE *cut in 7 hours*



WITH ONE SULLIVAN 7-B "Super" Shortwall

• This record performance was reported by a large operation in Southern Kentucky, where the cutting is severe. The Superintendent's statement, "I think that the 7-B is the last word today in a mining machine," reflects the enthusiasm of officials, mechanics and machine men at this company. The 7-B "SUPER" shortwall is establishing equally high production records throughout the various Coal Fields.





Present day production schedules require that more tons be mined per shift. Cutting machines used on loading machine territories must have capacities greater than loading units. The Sullivan 7-B "Super" shortwalls embody this needed power and assure continuous cutting at increased speeds.

•

SULLIVAN MACHINERY CO.

CLAREMONT, N. H., U. S. A.

other end of that particular cable is pushed in between the grids in the gathering-locomotive resistance. Then the sharpened point on the second cable also is pushed into the grids far enough away to provide the necessary resistance and the hook is hung over the trolley wire. Thereupon, welding can be done exactly as with the regular bonding machine.

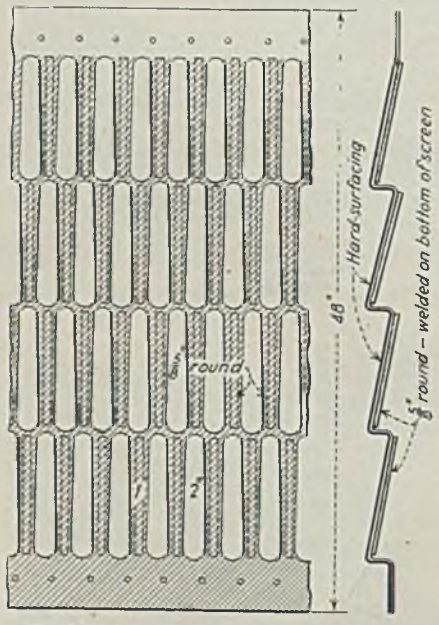
By changing the points in the grids to provide the required resistance, these cables also may be used to burn holes for fishplates, cut rails, etc., using a piece of carbon instead of a bonding rod. The core out of an old dry cell, ground at one end to fit the nip, will answer the purpose "Carbons such as are used in an arc light are better, but in an emergency even a piece of an old motor brush may be used." Ten holes can be burned while one is being punched or three rails can be cut while one is being cut and broken with a bender, says Mr. James, and "where a piece only 2 or 3 in. long needs to be cut off, this idea is priceless if a bonding machine or cutting torch is not available. Where ribbon-wound rheostats are used, nips can be substituted for the sharpened points and these can be connected to the rheostat terminals instead of between the grids. Care should be taken not to get the resistance too hot."

Lip Screens Reinforced And Hard-Surfaced

"While visiting some mines recently I noticed some lip screens on the scrap pile at a few of them, which leads me to describe how we repaired ours," writes John Gross, chief electrician, Ohio Block Coal Co., New Philadelphia, Ohio. "These screens are 60 in. wide and 48 in. long. In a short time they became baggy and worn so that we had continuous trouble with them.

"To recondition the screens, §-in. round iron was welded to the bottom, as shown in the accompanying drawing, while the entire top wearing surface was covered with Stellite. Any hard-surfacing material, however, may be used. These screens were reconditioned in 1933 and have been in continuous service ever since with no trouble whatever. We work two shifts per day and run 600 tons per shift.

"This reconditioning job can be done in any shop equipped with a welder and torch and does not require an expert. The screens in question do not show any sign of wear or bagging at the present time."



Shaded area indicates hard-surfacing

The screen is reinforced underneath and covered with hard-surfacing material on the top.

Safety Brake Block Has Rivet Inserts

Wood brake blocks may be materially improved in several respects by the use of inserts made of old car bolts or rivets driven into holes slightly smaller than the rivet or bolt diameter, writes Anthony Shacikoski, superintendent, Cochran Coal Co., Salina, Pa. If the brake block is used without inserts, contends Mr. Shacikoski, drawing it down tight will cause the car wheels to slide and, particularly on grades where there is sand on the rails, result in flat wheels. And flat wheels, among other things, shake more coal out of the cars and are harder to haul over grades.

Showing inserts made of old rivets driven into holes in the braking surface of the block

Where the insert-type block is used, however, the friction between block and wheel is reduced and thus there is less tendency for the wheels to slide when the brakes are tightened. And a wheel that does not slide will result in greater total braking effect. For instance, in moving a trip of cars down a grade the brakes may be applied to the first six. If the wheels on the first car slide, they polish the rail and leave no grit for the following cars to work on, thus reducing the braking effect, says Mr. Shacikoski.

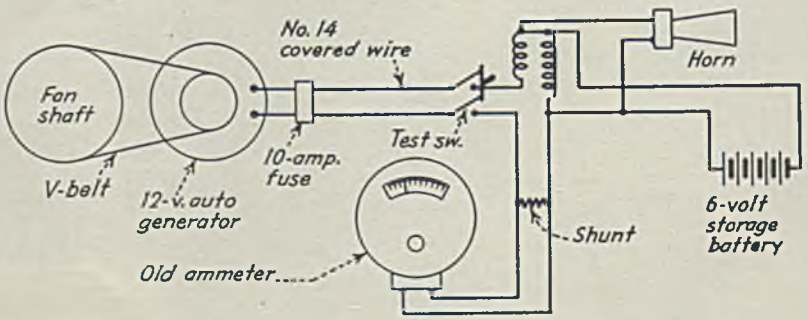
Use of the insert-type brake block also is more economical in that it will outlast six ordinary plain wood blocks. Another saving grows out of the reduction in flat wheels. While more screeching occurs in service, the brakes stay in better condition. The inserts tend to cut on the false flanges, if any, while with the plain wooden brake block the cutting action, growing out of sand embedded in the wood, is distributed all over the wheel tread.

Auto Generator Used In Fan Signal

In constructing an approved signal to show fan operation at the mines of the Cambria Fuel Co., writes H. H. Wagner, electrical engineer, use was made of a 12-volt automobile generator. The generator was fastened to the fan bearing and is driven by a V-belt, also from an automobile engine. Telephone wire was used for the circuits, and an old ammeter was installed to show the fan revolutions.

In making the installation, the cut-out was removed from the generator and the original large winding was taken off and replaced with 40 turns of No. 25 B-S wire so that it would oppose the 6-volt coil and hold the cut-out open until the fan slowed down. Upon slowing of the fan, the cut-out closes and blows a horn, supplied with current from a 6-volt storage battery. With the wiring plan in use (see illustration), the generator also charges the horn battery (one-half mile of circuit will consume 6 volts, leaving the remainder for battery charging). The only attention required is to water the battery. Material may be purchased at a small cost from any second-hand automobile dealer. No trouble has been encountered in more than six months of operation with this fan signal, says Mr. Wagner.

Diagrammatic sketch of fan-signal system



WORD FROM THE FIELD

Prompt Development of Coal Urged by Gas Executive

Development of hydro-electric power in a country with adequate coal reserves, such as the United States, is suicidal folly, said A. M. Beebee, general superintendent of the Rochester (N. Y.) Gas & Electric Corporation, on Oct. 12, in an address at the twentieth annual convention of the American Gas Association, held in the Municipal Convention Hall, Atlantic City, N. J. "In our country, where unemployment is our greatest problem and the spreading of purchasing power our greatest need," he added, "such a development is a modern Frankenstein.

"There might be justification for such policies in this country if energy could be developed cheaper from water power than from fuel, but where the reverse is true it can be justified only by lack of understanding of the facts. The quicker we develop the uses of coal the better; the more we develop water power the more we will delay those factors which are going to bring about our much-sought-after and apparently elusive 'more abundant life.' Testimony by the National Coal Association before the Senate hearing on July 1 last showed that the government's total hydro program involved the loss of 338,000,000 days of work, or the work of more than 1,000,000 men employed steadily for 50 weeks a year. This is indeed a sizable item in our unemployment situation."

Lynch Men Join Progressives

The Lynch Employees, a local union of the United States Coal & Coke Co. mines in Harlan County, Kentucky, announced late in September that it had become affiliated with the Progressive Miners. W. F. Corn, president of the local, said it had a membership total of 1,208. George Titler, United Mine Workers secretary in Harlan County, said only 70 members would be added to the Progressives by the move.

U. P. Notes Coal Anniversary

A monument celebrating the 70th anniversary of the first mining of coal at Rock Springs, Wyo., in 1868 by the coal department of the Union Pacific Railroad Co., was dedicated by the Union Pacific Coal Co. on Sept. 17. Among the speakers were Eugene McAuliffe, president; T. S. Taliaferro, Jr., who presided; Edwin Magagna, representing the Mayor; W. A. Muir; B. B. Brooks, chairman, Historical Landmark Commission of Wyoming; Brigadier General Peck, of the same commission; W. M. Jeffers, president, Union Pacific Railroad Co., and L. A. Miller, Governor of Wyoming. This

monument was unveiled by Miss M. L. Korogi, granddaughter of C. M. Spence, former employee of Mine No. 1.

At the banquet in the Old Timers' Building, John Hay, president, Rock Springs National Bank, was toastmaster, and Governor Miller, President Jeffers, former Attorney General Mullen and Chief Justice Blume spoke. After the ceremony about fifty persons drove to the D. O. Clark mine and inspected the operations and tipple.

Keeping Step With Coal Demand

Bituminous Production

	1938 (1,000 Tons)	1937* (1,000 Tons)
September 3	6,875	8,500
September 10	6,480	7,776
September 17	7,372	9,175
September 24	7,840	9,503
October 1	7,923	9,808
October 8	7,910	9,648
Total to Oct. 8	242,894	338,762
Month of September	32,010	39,177

Anthracite Production

September 3	925	845
September 10	510	599
September 17	806	794
September 24	816	924
October 1	898	1,155
October 8	1,147	1,167
Total to Oct. 8	33,865	38,996
Month of September	3,381	3,682

* Outputs of these two columns are for the weeks corresponding to those in 1938, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

(Thousands of Net Tons)

	Sept. 1 1938	Aug. 1 1938	Sept. 1 1937
Electric power utilities	7,834	7,905	8,558
Byproduct coke ovens	5,540	5,364	7,456
Steel and rolling mills	651	652	1,388
Railroads (Class 1)	4,556	4,532	7,174
Other industrials *	9,138	8,812	12,475
Total	27,719	27,265	37,051

Bituminous Coal Consumption

(Thousands of Net Tons)

	August 1938	July 1938	August 1937
Electric power utilities	3,315	3,038	4,034
Byproduct coke ovens	3,534	3,085	6,492
Steel and rolling mills	660	583	1,085
Railroads (Class 1)	5,662	5,482	6,738
Other industrials *	7,175	6,674	9,832
Total	20,346	18,862	28,181

* Includes coal-gas retorts and cement mills.

Coal Conference to Canvass Extensive Program

An extensive and varied program has been arranged for the coal conference to be held Nov. 10 and 11 at West Virginia University, Morgantown, W. Va. Two sessions will be held each day, under the chairmanship, respectively, of J. P. Williams, Jr., president, Koppers Coal Co.; Julian D. Conover, secretary, American Mining Congress; J. E. Tobey, manager, fuel engineering division, Appalachian Coals, Inc., and Marc C. Bluth, secretary, Stoker Manufacturers' Association. Following an address of welcome by C. E. Lawall, acting president of the university, the following papers will be presented:

"Scientific Coal Purchasing," T. W. Harris, Jr., general purchasing agent, E. I. duPont de Nemours & Co., Inc.; "Latest Developments in Byproduct Coke Ovens," C. J. Ramsburg, vice-president, Koppers Co.; "Evaluation of Various Types of Fuel," W. A. Koehler, professor of chemical engineering, West Virginia University; "Technique of Fuel Engineering," J. G. Bently, district manager, Johnson-March Corporation; "Coal's Place in Meeting National Energy Demands," J. V. Sullivan, secretary, West Virginia Coal Association.

Improved Utilization Stressed

"Recent Developments in Coal Research," Dr. H. H. Lowry, director, Coal Research Laboratory, Carnegie Institute of Technology; "Automatic Heat and Its Control," W. B. Hughes, manager, automatic coal-burning division, American Radiator Co.; "Service Hot-Water Heating," R. E. Moore, vice-president, Bell & Gossett; "How to Select Coal for Various Purposes," Harry E. Nold, professor of mining engineering, Ohio State University; "Dustproofing of Coal by Oil Treatment," J. M. Pilcher, Battelle Memorial Institute; "Dustproofing of Coal by Calcium Chloride," Reed Scollon, West Virginia University.

"Planning Good Combustion," C. A. Reed, director of engineering, National Coal Association; "Coal Preparation," R. E. Salvati, vice-president, Island Creek Coal Co.; "Control of Fly Ash," A. C. Fieldner, chief, technologic branch, U. S. Bureau of Mines; "Briquetting of Coal by Impact," C. C. Morfit, consulting engineer; "Influence of Transportation on the Future of the Coal Industry," S. C. Higgins, secretary, New River Coal Operators' Association; "Customer Turnover," K. C. Richmond, editor, *Coal-Heat*.

"Domestic Stokers," Russell G. Glass, manager, stoker division, Pocahontas Fuel Co.; "Extension Instruction in Fuels and Combustion," Prof. Ben G. Elliott, mechanical engineering department, University of Wisconsin; "Practical Research Conducted by Educational Institutions," R. S. Hawley, professor of mechanical engineering, University of Michigan;

"Types of Heating Plants," L. L. Vaughan, professor of mechanical engineering, North Carolina State College; "Home Owners' Viewpoints," Theodore Irving Coe.

Hard-Coal Ad Campaign Gets Added Impetus

With the release during the last week of September of its opening salvo, the fall and winter advertising campaign of Anthracite Industries, Inc., took on added impetus. The addition of metropolitan Sunday newspapers made it the most extensive program ever undertaken by the organization, the mediums employed having a circulation of more than ten million, an increase of 50 per cent over previous years. The campaign, which will continue throughout the heating season, features 9- and 14½-in.x5-column advertisements emphasizing seven points of heating satisfaction found in anthracite, characterized as "the champion fuel."

By a cooperative arrangement with the Wrigley Co., manufacturer of chewing gum, the latter will distribute 20,000 window streamers for display in retail stores throughout the anthracite region featuring "Anthracite, the Solid Fuel for Solid Comfort," as well as its own product. In addition, more than 300 24-sheet billboard posters will be shown on main roads in the same area and carrying similar wording.

Rail Rate to River Cut

The rate on coal shipments between Logan and Huntington, W. Va., for transshipment by water has been reduced from 75 to 55c. by the Chesapeake & Ohio Ry., effective Oct. 21, it was announced late in September. The new rate, which had been authorized by the Interstate Commerce Commission, is expected to stimulate barge traffic on the Ohio River.

Stickers in Coal Campaign

In an effort to make manufacturers and jobbers in adjacent territory conscious of the fact that most of the orders they receive in coal-producing counties are dependent on coal, the Illinois Reciprocal Trade Association is supplying all its members with coal stickers to be affixed to their letters and orders. The stickers read as follows: "Coal: the economical, efficient, all-purpose fuel. Our business with you is made possible by coal. Use coal for heat and power and help us give you more business."

Commenting on the scheme, J. W. Spresser, president of the association, said: "If we can drive home the fact that every order for goods or equipment sent out of Illinois coal territory is dependent on coal, it will go far toward making the business men of St. Louis, Chicago and other cities coal-minded, and this should make them hesitate to use coal substitutes and also lead them to help us protest when improper restrictive ordinances and other handicaps are placed on coal in the cities."

Price Hearing Proceeds as Atlanta Sues To Annul Coal Control Act

- Hearing on price differentials in Area 1 gets under way.
- Producers' board member says Commission prices will stand this time.
- Consumers permitted to cross-examine witnesses at price hearing as a matter of policy.
- Producers directed to file cost and realization data for 1938.
- New chief of trial examining division of Commission appointed.
- City of Atlanta, Ga., files suit charging coal act is unconstitutional.
- Arguments heard by appellate court in suit to enjoin Commission from making individual cost reports accessible to interested parties.
- Quantity discounts to large consumers proposed by District Board 1.
- Producer in Arkansas anthracite field seeks review by appellate court of Commission ruling that its coal it bituminous and subject to Guffey act.
- Iowa producers who sought exemption from regulation are permitted to withdraw applications.
- Applications for approval as marketing agencies taken under advisement.

WASHINGTON, D. C., Oct. 17—Despite another attempt to invalidate Government coal control, this time by the city of Atlanta, Ga., the National Bituminous Coal Commission opened on Oct. 10 the hearing of evidence in regard to proposed minimum prices in Minimum Price Area 1, comprising districts 1 to 8 and part of District 13, with all six commissioners sitting. Consideration of price differentials between the various kinds and sizes of coals produced in Districts 6 (northern West Virginia Panhandle) and 3 (northern West Virginia) occupied the first week, with District 7 (southeastern West Virginia and part of Virginia), to follow.

Differentials proposed, especially by the District 3 board, provoked more than the usual number of protests. Charles W. Shinnamon, executive secretary of that board, however, said his group was especially desirous of establishing a differential between certain coals because it was felt in his district that the prices the Commission is about to establish will stand this time. Another significant development was the statement by W. H. Matthews, general solicitor for the Commission, that consumers were being permitted to cross-examine witnesses and present affirmative evidence as a matter of policy rather than as a right.

The Commission released an order Oct. 13 directing the filing of cost and realization data for 1938 by all producers having an actual daily capacity of 50 tons or more, or who ship direct by rail or river, regardless of capacity, such information to be supplied on the Commission's cost form No. 3 before Jan. 25, 1939. This report is to be filed in lieu of the similar report covering the month of December. Mines not falling in the classification described are to file the December report, but not the one covering 1938.

Repudiates Commission Authority

In its attempt to nullify the coal act the city of Atlanta filed suit Oct. 5 in Federal District Court here contending the act is unconstitutional and that the Commission is without authority to promulgate minimum price orders and that if the Commission should issue price orders they should not apply to Atlanta or any coal it buys. The petition asserted that the Commission was preparing to establish minimum prices "greatly in excess of the prices for which the city has been able to obtain coal in the open market." Minimum prices, it said, would constitute an invasion of State rights and an unauthorized and unconstitutional interference with the governmental functions of the city.

Arguments of counsel in the case of the Utah Fuel Co. et al vs. National Bituminous Coal Commission, in which 22 producers seek to enjoin the Commission from making individual cost reports available for inspection by interested parties, were heard on Oct. 3 by the U. S. Court of Appeals for the District of Columbia. Counsel for the companies contended that to construe the language of several apparent guarantees of confidence contained in the coal act as the Commission did "would impute to Congress an intention to deceive or that it did not know what it was saying."

Counsel for the Government, however, argued that the whole question turned on the exception in Sec 10 (a): "No information obtained from a producer disclosing costs of production or sales realization shall be made public without the consent of the producer from whom the same shall have been obtained, *except where such disclosure is made in evidence in any hearing before the Commission or any court.*" He maintained this clearly gave the Commission authority to put the reports in evidence at a hearing. A temporary injunction granted Sept. 14 (*Coal Age*, October, p. 84) remains in effect pending disposition of the appeal.

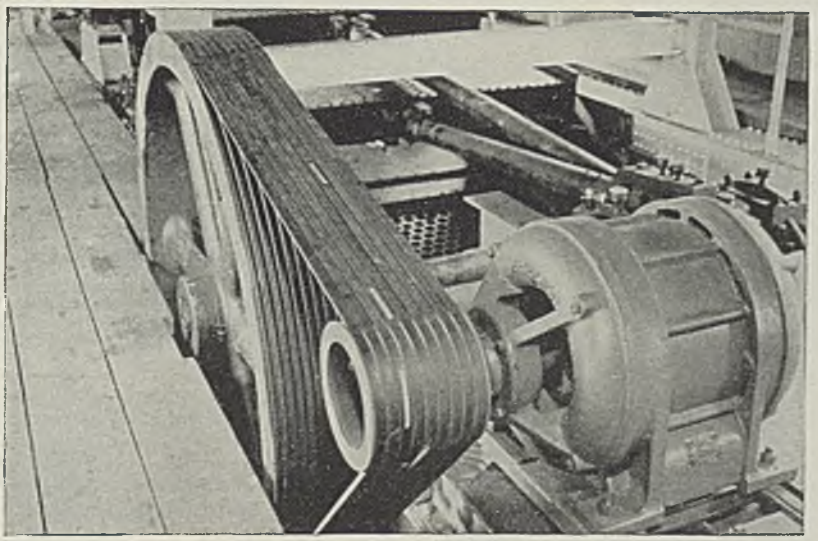
Quantity discounts to large consumers of coal were recommended for considera-

Coming Meetings

- Coal Conference: Nov. 10-11, West Virginia University, Morgantown, W. Va.
- Southern Appalachian Coal Operators' Association: annual meeting, Nov. 18, Knoxville, Tenn.
- Coal Mining Institute of America: 52d annual meeting, Dec. 8 and 9, Fort Pitt Hotel, Pittsburgh, Pa.
- New River Coal Operators' Association: annual meeting, Dec. 13, Mountainair Hotel, Mount Hope, W. Va.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 13-16, 1939, 29 West 39th St., New York City.

5 REASONS WHY "BELT BLUES" ARE OUT AT NO. 18 BLUE HERON

GILMER "V's" Used Throughout the New 400-Tons-Per-Hour Operation of Stearns Coal & Lumber Company, McCreary County, Kentucky



One of many multiple V-belt drives equipped with Gilmer Belts

A $250,000 investment in a new coal operation demands plenty of protection. Costly breakdowns, possibly due to improper initial selection of belting, are outlawed. That's number one reason why Stearns came to Gilmer—belt engineers who build only belts. Built with real "guts" to do the job, Gilmer "V's" pay in power *plus* service. They are "tailor-made in the groove" on the world's largest assortment of V-moulds. The famous Gilmer grip (cuts out power-wasting slippage) is only one of five profitable reasons why coal operators everywhere are turning to the "Gilmer Gang" for help in solving vexing belting problems. Send today for a *free* copy of the Gilmer V-Belt catalogue.

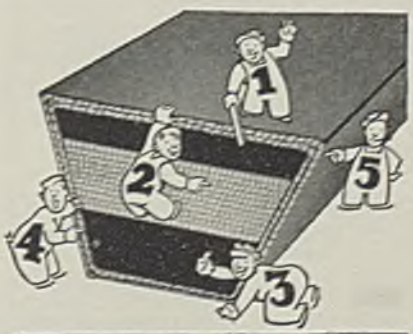
Gilmer Top Tension Rubber—Tough, resilient. Cuts out costly misfits.

Gilmer Rubber-locked Pulling Cords—Patented construction, concentrating brute strength in thin section, makes cords ride parallel, without twisting, under pressure.

Gilmer Heat-resisting Bottom Rubber—Specially developed by Gilmer engineers to insure cool running at high speeds and eliminate "squashing" in the groove.

Gilmer Double Jackets—Protect the belt's vital working parts from oil, dirt, and grease, making Gilmers last three times as long.

Gilmer Controlled Stretch—Pre-tested, to guarantee permanently matched working lengths on every job.



★ PUT THE GILMER GANG TO WORK FOR YOU ★

L. H. GILMER COMPANY, TACONY, PHILADELPHIA

"BELT ENGINEERS WHO BUILD ONLY BELTS"

tion by the Commission in a resolution submitted by District Board 1 (eastern Pennsylvania) on Sept. 29. Under the plan proposed, on direct sales to purchasers for consumption of 50,000 to 99,999 tons for delivery over a period of not less than twelve months there would be a discount of 5c. a ton; 100,000 to 199,999 tons, 7½c. a ton; 200,000 tons or more, 10c. a ton. Coal purchased by railroads for use as locomotive fuel, however, would not be granted discounts.

The Sunshine Anthracite Coal Co., Clarksville, Ark., has petitioned the U. S. Circuit Court of Appeals for the Eighth Circuit to review the order of the Coal Commission dated Aug. 31 declaring its coal to be bituminous and subject to the Bituminous Coal Act. The petition declares the findings and orders of the Commission are contrary to law and against the weight of the evidence and asks the court to set aside the order permanently. A temporary injunction enjoining the collector of internal revenue from collecting the 19½ per cent excise tax pending final hearing, obtained by the Sunshine company on June 4, remains in effect.

Exemption Requests Withdrawn

Withdrawals of applications for exemption from the coal act which had been scheduled for hearings at Des Moines on Sept. 26 were granted by the Commission on Sept. 21 to the following Iowa companies: C. A. Riggen Coal Co., Harvey; Bradley Brothers Coal Co., Knoxville; Beck Coal & Mining Co., Des Moines; Diamond Block Coal Co., Pella, and Mahaska Coal Co., Oskaloosa. Counsel for 45 other Iowa companies informed the Commission that their clients also were disposed to withdraw exemption petitions rather than remain outside the code, with the perils of cut-throat competition and a penalty tax of 19½ per cent on the sale price of their product.

Following hearings the Commission has taken under advisement applications for approval as marketing agencies by the following: Kentucky Coal Agency, Western Pennsylvania Coal Corporation, Fairmont Coals, Inc.; and Southern Illinois Coals, Inc.

Thurlow G. Lewis, Benton (Ill.) attorney, has been appointed chief of the trial examining division of the Commission, vice L. R. Via, who resigned to become U. S. District Attorney for southern West Virginia. The new appointee was counsel for the United Mine Workers for five years, then was associated for twelve years with coal producers, and for the last six years again represented the U.M.W.

Progressives Win Point

The Mine B Coal Co., Springfield, Ill., has been ordered by the National Labor Relations Board to cease encouraging its employees to join the United Mine Workers or discouraging membership in the Progressive Miners. The latter group had complained that the company entered into a closed-shop agreement with the U.M.W. at a time when the Progressives did not represent a majority of the employees. A board-conducted election last Jan. 3, however, resulted in the designation of the Progressives as sole bargaining agency for the company's employees.

Operating and Sales Problems Discussed At West Virginia Institute

OPERATING problems relating to ventilation, power, lubrication, blasting and safety, competitive fuels and the labor picture as developed at the international conference in Geneva, Switzerland, last May were the program themes at the 31st annual meeting of the West Virginia Coal Mining Institute, at Charleston, W. Va., Oct. 7 and 8. Opening the technical session, Carel Robinson, retiring president of the institute, cited a 43.5 per cent increase in mechanically loaded tonnage in West Virginia in September, although State production as a whole was under 1937 monthly averages. He also reported that the union was cooperating in safety work. Tonnage per fatality in September had risen to 391,891 tons, as compared with an average of 324,153 tons in 1937.

F. F. Jorgenson
President-Elect,
West Virginia Coal Mining Institute

Ventilation, normally considered only a safety problem, is a major operating problem with many mines, declared William Norris, Jr., safety director, Carter Coal Co. Many fans of obsolete design are still being used and many mines are being ventilated by fans no longer suited to the specific conditions. Sufficient and properly maintained airways, ample pillars between headings, eliminating sharp bends, crosscuts spaced as far apart as possible, because brick stoppings are likely to leak, and liberal use of overcasts were mentioned as the principles to be followed in developing for proper ventilation. Spread over the annual tonnage, in large mines the cost of overcasts need not exceed 1 mill per ton and in small mines 1c. In many large mines it would pay to have a ventilation foreman to supervise construction and maintenance of stoppings, doors, overcasts and other air controls. Building brick stoppings by setting the bricks in lime and water, thus providing for easy recovery, is a practice of the Carter company.

Olga No. 1 mine produces 6,000 tons per day and is ventilated by a centrifugal exhaust fan delivering 410,000 c.f.m. at 4.64 in. water gage. Olga No. 2, which produces 5,500 tons per day, has two blowing fans 9,000 ft. apart working in parallel and delivering a total of 735,000 c.f.m. with 902 hp. consumed. One of these fans at Olga No. 2 is a new 13-ft. Aerodyne (78 per cent efficiency calculated from a test made by the manufacturer) driven by a 600-hp. synchronous motor and situated at the top of a new 756-ft. air shaft (*Coal Age*, June, 1936, p. 52). With the new shaft and fan the present air volume is delivered with less horsepower expended than when 500,000 c.f.m. was supplied by the original steam-driven centrifugal fan, which now operates in parallel with the new fan. The operating efficiency of the centrifugal was found to be 52 per cent.

Higher cost by lower production plus higher maintenance costs of machinery represents the penalty for not supplying adequate power, said Paul Weir, consulting engineer, Chicago. The increase in power for mechanical loading may be as much as 100 per cent above the hand-loading requirement. Because there is a tendency to underestimate, an increase in production per unit above the original calculation may be one reason for a shortage of power. Within a few weeks there is a tendency for production to synchronize with the quality of power at the face and that quality is conveniently expressed in the terms "good," "fair" and "bad." Some authorities set a voltage drop of 20 per cent, under sustained load, as permissible, but under some conditions that can be improved. A working-place voltage of 220 instead of the rated 230 may mean 5 to 15 per cent difference in production.

Diversity in Power Improvement

By proper planning, advantage can be taken of the diversity factors to improve power. Substations of the semi-portable and semi-permanent types are to be considered and automatic sectionalizing and tie breakers are helpful. Adequate power means supplying the necessary energy to extract, load and transport the coal plus the energy lost in effecting the supply. If power is inadequate, to its cost must be added the penalty by loss of production and other unfavorable factors.

H. L. Griffin, St. Clairsville, Ohio, declared that providing adequate power for mechanical loading means keeping eternally after the electrical distribution. J. J. Foster, assistant general manager, Island Creek Coal Co., said that they find power of high importance in mechanical loading and "keep the substations pushed well up."

Based on experience at Nellis mine, where 100 per cent mechanical loading was instituted "suddenly" instead of by gradual displacement of hand loading, C. W. Connor, general superintendent, Nellis Coal Corporation, expressed satisfaction with that method and cautioned that with a gradual change-over, development of the power is likely to be allowed to lag. He agreed with Mr. Weir that the men tend to fix their tempo to that of the power available to the machines. In order to improve power distribution

at the Orient mines, in Franklin County, Illinois, added Mr. Weir, a.c. voltage was changed from 2,300 to 4,000 and the substation motor generators were rewound for the higher voltage (*Coal Age*, August, 1936, p. 321).

A paper on lubrication, prepared by R. H. Morris, general manager, Gauley Mountain Coal Co., was read by Stanley Higgins, secretary, New River Coal Operators' Association. At Gauley Mountain, a sizable saving in lubrication cost was made as a result of a survey by an engineer of a lubricant sales company. Over the last several years this coal company has used oil and grease in the proportions, 81 per cent and 19 per cent, respectively. Some engineers have determined that power cost is likely to be twelve times the cost of lubricants and maintenance cost 24 times. A first principle in lubrication is that viscosity, defined as the internal friction of the lubricant, should be as low as practicable from the standpoint of application to the specific use. Besides reducing friction, proper lubricants may act as seals against entrance of dirt, carry away heat and be the means of allowing a simplified and lower-cost design of equipment.

William Miller, general manager of mines, Hatfield-Campbell Creek Coal Co., expressed surprise at the low figure of 19 per cent grease used at Gauley Mountain. That the cost of lubrication, and safety as related to misplaced grease, are determined to a large extent by the method of handling and applying lubricants was offered by Mr. Griffin. Ernest Bailey, consulting engineer, Charleston, said that lubrication is largely a question of education. In his experience costs were reduced every time that an expert was brought in to check on lubrication. He observed that a reduction in lubricants is accompanied by intangible savings.

Burden Must Be Balanced

For the most efficient blasting the resistance of the coal to the pressure generated by the blast should be the same outward as it is toward the kerf was the thesis set forth by Neil Robinson, Elkhorn Coal Corporation, Wayland, Ky., in dealing with the new problem of breaking down coal for mobile loaders and conveyors. With this condition a minimum of explosive force will heave the coal forward for easy loading and at the same time will shear the coal vertically at the back of the cut. Instead of the old rule of a balanced cut—that is, making the depth of the undercut equal the height of the seam—the new method takes into consideration coal structure, cleavage planes, character of impurity bands, etc. If the seam contains a tough band of bone, the proper depth of undercut is greater than if the band were not present.

Because the deeper the undercut the more economical will be the production and because machines of 75 and 100 hp. are now being built which will cut at least 12 ft. with the standard chain, it becomes desirable to find ways of blasting which are overbalanced in favor of the depth. One way is to treat the cut as two balanced cuts, one behind the other, and shoot each individually. Another possibility is to place two charges in the same hole at different distances from the back and shoot simultaneously or with delay detonators. Still another method of artificial balancing and one which is being used successfully is to drill holes at such angles that a wedge at the center of the cut is shot out and followed by shooting of the rib holes before the center is loaded.

West Virginia has lost an average of 2,000,000 tons of coal annually for the past twenty years to competing fuels, asserted C. C. Dickinson, president, Dickinson Fuel Co., in an address, "Coal and Its Competitive Fuels." Unless the industry takes every opportunity to impress the public with the importance of mining, the industry "will continue to be the football of grasping politicians." There is, he insisted, no sound basis for the construction of hydro-electric dams where coal is available—and such is true in most instances in the eastern part of the United States. Money appropriated for such construction might have been spent more wisely than in displacement of labor in an industry that is, "according to the experts in Washington, a sick industry in the deepest depths of depression."

R. M. Lambie added his second to the need to "fight" to place the facts before the politicians in Washington. Jess V. Sullivan, secretary, West Virginia Coal Association, stated that inasmuch as about one-fifth of the coal produced in the State is consumed in byproduct ovens and 20,000 miners are engaged in producing this coal, it is in line to urge the use of coal tar instead of asphalt for the black top material on certain types of streets and roads. The problem, added Mr. Connor, is what to do right now to recapture or retain markets and not depend wholly on what research can do "in the next three or four years." He suggested lowering the cost of coal as the most effective method.

J. R. Cameron, of Bluefield, said that the coal sales department must control the price to the householder instead of at the tipple. Cutting the price in half at the tipple would mean but a small reduction to a consumer in New England, remarked F. F. Jorgenson, assistant general manager of operations, Consolidation Coal Co.

Observe all safety precautions at all times on all shifts was the receipt given by N. P. Rhinehart, chief, West Virginia Department of Mines, for preventing accidents "instead of overlooking them." He reported the 1938 accident record as running better than during any other year in the history of the State. Efforts are being directed toward more sincere attention to better practices which will improve inspection ratings. Twenty-five per cent of the production of the State comes from mines with excellent inspection ratings and these mines show better accident records by any way of figuring or measuring. By way of contrast, and without mentioning names, Mr. Rhinehart cited one large company where officials are sincere and achieve a good record, while the record of another large company that does not sincerely obey the State mining regulations is poor.

The accident record of any company, asserted Mr. Jorgenson, is a reflection of the attitude of the top officials and on down the line. In safety enforcement he looks upon the section boss as the top sergeant and believes the boss should be given full official backing when right. Too often he gets only the censure when wrong.

That West Virginia's $3.50 coal-mining base rate for compensation, as compared to base rates of $6.50 to $12.00 in six neighboring States, means a large saving was pointed out by A. C. Mathews, commissioner, West Virginia Compensation Department. As compared to insurance by mutual companies, which take out 25c. of each dollar, and stock companies, which take out 35 to 50c. of each dollar for administrative expenses, the West Virginia department uses in administration of the law less than 4c. of each dollar collected. The coal industry pays in 70 per cent of the total received into the State fund but takes out slightly more than that percentage. Mr. Mathews observed that there is an ever increasing cost of medical service. The West Virginia act, passed in 1913 and amended from year to year, does not compel participation except that the low rates act to that end.

Preliminary to reading his report of the Geneva conference, Duncan C. Kennedy, secretary, Kanawha Coal Operators' Association, and employer representative at the conference, said that he was surprised to learn that a great deal of the labor legislation of this country had originated at Geneva. At this conference to consider hours of labor, 68 delegates were in attendance and the English and French languages were used. Dr. Ralph J. Watkins, professor of economics and director of the Bureau of Business Research, University of Pittsburgh, represented the U. S. Government, and A. D. Lewis, international representative, United Mine Workers, represented the employees.

New Institute Officers

F. F. Jorgensen, assistant general manager of operations, Consolidation Coal Co., was elected president of the West Virginia Mining Institute at the 31st annual meeting. He succeeds Carel Robinson, general manager, Kelleys Creek Colliery Co. Other officers were chosen as follows:

Vice-presidents—C. W. Connor, general superintendent, Nellis Coal Corporation; George Caldwell, general superintendent, West Virginia Pittsburgh Coal Co.; W. J. German, general superintendent, Pocahontas Fuel Co.; Walter G. Crichton, general manager, Johnstown Coal & Coke Co., and Truman E. Johnson, vice-president in charge of operation, Huchinson Coal Co.

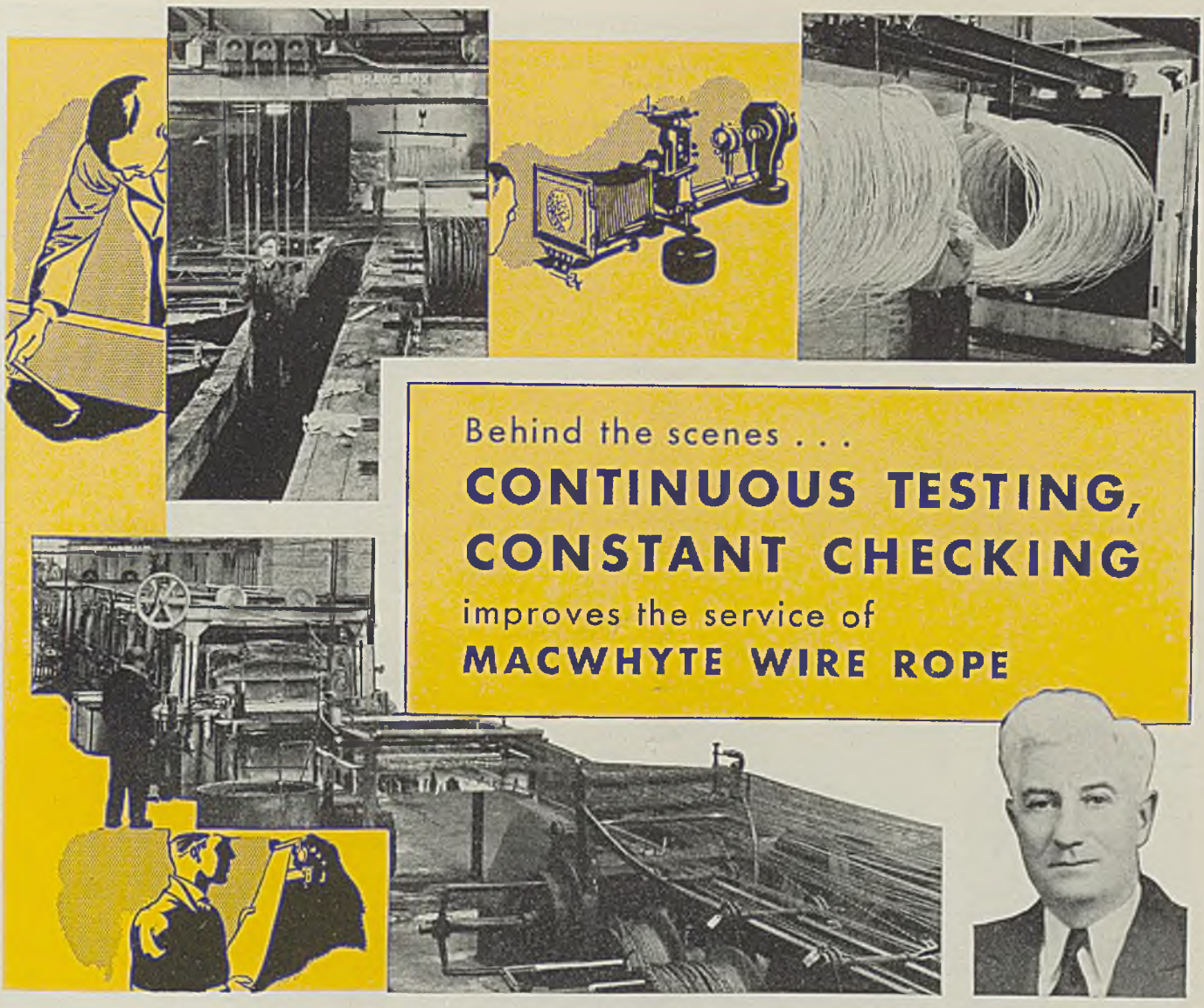
Executive Board—E. B. Agee, superintendent, Youngstown Mines Corporation; R. J. Burmeister, general manager, Raleigh Coal & Coke Co.; R. E. Salvati, vice-president and general manager, Island Creek Coal Co.; Carel Robinson, general manager, Kelleys Creek Colliery Co., and N. P. Rhinehart, chief, West Virginia Department of Mines.

Secretary-Treasurer — C. E. Lawall, acting president, West Virginia University.

Association Changes Name

American Coal Distributors' Association is the new name of what was formerly the American Wholesale Coal Association, the change having become

(*Turn to page* 70)



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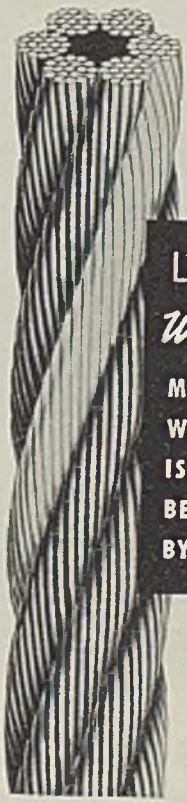
Mr. George Cudahy, Supt. of the Wire Mill, explains: "We work hand in hand with the laboratory. They help us and we help them. Together we make what we believe is the best wire you can find *anywhere*."



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effective Oct. 17. According to an announcement on Oct. 8, the primary purpose of the change is to broaden the scope of the organization so as to encompass all distributors of coal in cargo or railroad carload lots.

Personal Notes

K. D. ALBAUGH has been appointed safety director by the Kelleys Creek Colliery Co., Ward, W. Va., vice ROBERT DICKSON.

FRANK BERRY has been made foreman at Jamison No. 9 mine of the Jamison Coal & Coke Co., Farmington, W. Va.

B. L. BISH has been named foreman at Besoco mine of the Leccony Smokeless Coal Co., Besoco, W. Va.

DR. STEPHEN P. BURKE, president of Fairmont Coals, Inc., has resigned as chairman of the committee on price proposals and classifications of District 3 Bituminous Producers' Board. This action was due to ill-health.

LOUIS S. CATES, president of the Phelps Dodge Corporation, with coal operations at Dawson, N. M., was elected William Lawrence Saunders gold medallist at a meeting of the board of directors of the American Institute of Mining and Metallurgical Engineers, held Oct. 17.

J. C. CONSTABLE has been appointed foreman at Consolidation No. 97 mine of the Consolidation Coal Co., Rivesville, W. Va.

FRANK P. CUNNINGHAM has been made foreman at Consolidation No. 86 mine of the Consolidation Coal Co., Carolina, W. Va., vice O. F. ALLEN, promoted.

ORAL CUNNINGHAM has been named foreman at Jamison No. 8 mine of the Jamison Coal & Coke Co., Farmington, W. Va.

MIKE EVANOFF has been appointed foreman at Pursglove No. 5 mine of the Pursglove Gas Coal Corporation, Pursglove, W. Va.

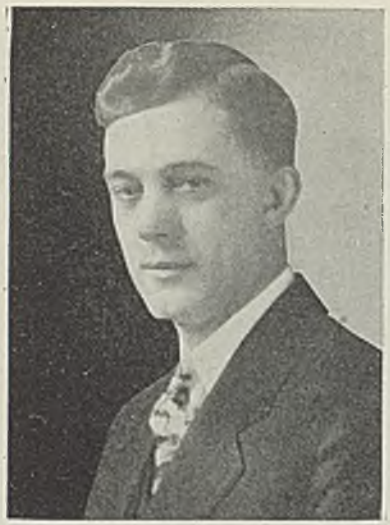
THOMAS G. FEAR, assistant to the president of the H. C. Frick Coke Co., Pittsburgh, Pa., until April 30 last, has been appointed general manager of the Elk Horn Coal Corporation, effective Oct. 1, with headquarters at Wayland, Ky. For many years he was connected with the Consolidation Coal Co.

P. A. GRADY, general superintendent, Carrs Fork Coal Co., Allock, Ky., was reelected president of the Kentucky River Mining Institute at its annual meeting, held Sept. 28.

JOHN HULLEY has been made foreman at the Barbour mine of the George Annese Coal Co., Flemington, W. Va.

L. V. JENKINS has been named foreman at the Gay No. 3 mine of the Gay Coal & Coke Co., Mount Gay, W. Va.

B. L. LUBELSKY, formerly explosives engineer and tunnel supervisor, Philadelphia & Reading Coal & Iron Co., has been placed in charge of the engineering department organized by the Heitzman Sales Corporation, a development of the Heitzman Safety Blasting Plug Corporation, and will have headquarters at Shamokin, Pa. He also is engaged in the practice of consulting engineering in the special field of tunnel work, explosives and blasting, besides general engineering.



Thomas G. Fear

A. J. MORGAN has been appointed general manager the Ward mines of the Kelleys Creek Colliery Co., Ward, W. Va.

FRANK B. PENROD, of St. Charles, W. Va., has been appointed as mine inspector by Thomas B. Morton, State Commissioner of Labor and Industry. This, being an enlargement of the staff, makes a force of four assistants in addition to the chief.

H. R. PLOMMER, manager of Vancouver Island Coals, Ltd., and sales manager in Vancouver, B. C., for the Canadian Collieries and the Western Fuel Corporation since 1930, was appointed general manager of Canadian Collieries (Dunsmuir), Ltd., on Sept. 29. He succeeds Col. C. W. Villiers, who died Sept. 3.

H. C. ROSKEY has been made foreman at the Puritan mine of the Puritan Coal Corporation, Puritan Mines, W. Va.

CHARLES E. RALSTON, general manager, Benedict Coal Corporation, St. Charles, Va., has been elected to the board of directors of the Virginia Manufacturers' Association.

ARTHUR ROEDER, president, Colorado Fuel & Iron Corporation, was advanced to chairman of the board at the company's annual election, Oct. 10. W. A. MAXWELL, JR., who was vice-president, was elevated to the presidency.

B. H. SCHULL, formerly general manager with headquarters in Terre Haute, Ind., has been elected vice-president in charge of operations for the Binkley Coal Co., and will have general control over mining activities at the properties of the company in Indiana, Illinois, Missouri and Arkansas. Mr. Schull succeeds the late C. F. Hamilton.

BERT TEASDALE has been made superintendent at No. 2 mine of the Kelleys Creek Colliery Co., Ward, W. Va., vice HEWITT SMITH.

JOHN THOMPSON has been named superintendent at Bellwood No. 71 mine of the Bellwood Coal Co., Bellwood, W. Va.

A. H. TRUAX, president, Truax-Traer Coal Co., was made president of Illinois Coal Strippers Association on Oct. 12, vice CHARLES F. HAMILTON, deceased.

L. L. WHITE, president of the Pittston Co., and the Northwestern Mining & Exchange Co., with mines in central Pennsylvania, has severed his connection with the former company and has been elected president of the Pennsylvania Coal Co. The last-named company owns anthracite mines which since 1930 have been operated under lease by the Pittston Co. This lease is to be terminated by mutual consent, according to reorganization plans of the Pittston Co. Mr. White will retain his connection with the Northwestern Mining & Exchange Co.

State Anthracite Control Decried by Operators

Enactment of the four measures drawn up by the Lauck commission to put the anthracite industry under the dominance of a State commission would inevitably result in further loss of tonnage, increased unemployment in the mining region and greater burdens on the State, according to hard-coal operators who appeared Oct. 11 and 18 before the subcommittee of the House Committee on Mines and Mining of the Pennsylvania Legislature at Harrisburg. The statements were made by W. W. Inglis, president, Glen Alden Coal Co., who was too ill to appear in person but whose views were read by J. Hayden Oliver, vice-president of the company; James H. Pierce, president, East Bear Ridge Colliery Co.; J. B. Warriner, president, Lehigh Navigation Coal Co.; Donald Markle, president, Jeddo-Highland Coal Co.; Ralph E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; E. C. Weichel, in charge of operations for the Hudson Coal Co.; Walter Gordon Merritt, counsel for the operators; L. R. Close, president Lehigh Valley Coal Co., and Frank W. Earnest, Jr., president, Anthracite Industries, Inc.

"As long as competition remains where it is, we might as well recognize that unemployment in the anthracite field is something far from temporary," said Major Inglis' statement. "Is unemployment, however, the real reason for the legislation you are asked to consider? Unemployment is certainly not as great as in many other basic industries today. No one has suggested legislation to rehabilitate the steel industry, even though it got down to 25 per cent of capacity and is now operating at only 45 per cent of capacity.

"Had the State recognized its responsibilities and stopped the theft of anthracite from the properties of its lawful owners when the practice began, there would have been no Anthracite Industry Commission and there would have been no suggested legislation. Having evaded its duty in the first instance and having permitted bootlegging to grow to gigantic proportions, an expedient plan was to condone the theft on the theory that people were forced to steal or starve, and to appoint a commission to find a way out.

"When it comes to retail distribution the Commission's remedy is to eliminate most of the retailers and, through concentration of distribution through those remaining, reduce the delivery costs and in turn reduce the price to the consumer.

The practicability and the results of a plan of this kind could not have been considered in the light of its effect on those dealers who were deprived of anthracite. Under such a program would they go out of business or would they make an intensive effort, with their customers, to substitute some other fuel for anthracite? The logical point of view is that they would adopt the latter course and that the final result would be a decreased volume and not an increased volume of anthracite going to market."

The State could best serve the industry, and those employed in it, Major Inglis concluded, by stopping bootlegging; cooperating with the coal companies in stopping importation of foreign coals and getting more favorable freight rates; preventing excessive taxation of coal reserves; and giving the industry such enabling power as it may be able to grant in matters which affect internal competition unfavorably.

Mr. Pierce gave it as his belief that the problems of anthracite could best be worked out by collective bargaining between employers and labor, and not by any form of licensing or legislation. The proposed measures, he declared, would increase the costs of the industry by fifteen million dollars annually. Mr. Warriner said he believed he could see daylight ahead for the industry if it was not made the subject of this special legislation. Mr. Markle also was positive that State regulation would be of no help whatever to the industry, and that the proposal to open additional mines would serve only to decrease the working time and earnings of those now employed.

Working time in the industry would be curtailed to 113 days a year by the program proposed by the Lauck bills, according to Mr. Taggart, and no colliery could keep going economically on such a schedule. He added he had read and reread the measures in the hope of finding something constructive, but he was convinced they offered no solution to the major problems of the industry. Speaking briefly for the Hudson company, Mr. Weichel said it was opposed to the bills, believing them impractical, and indorsed the position taken by the other operators.

Says Industry Will Cure Itself

"Awakened to its precarious condition," said Walter Gordon Merritt, counsel for the operators, "the anthracite industry has resolved to survive and cure itself. By application of drastic remedies, including labor-saving machinery, abandonment of important parts of its capital investment and a concentration of production activities, it stopped the ravages of disease and now apparently is holding its own against its assailants—competing fuels. To enact and enforce the provisions of these bills, as it is contemplated that they shall be enforced," he continued, "would be nothing short of industrial murder."

Protesting that the proposed measures might bring retaliation from fuel dealers in other States, L. R. Close, president of the Lehigh Valley Coal Co., asserted that price fixing by the State would be sure to fix prices upward.

Frank W. Earnest, Jr., president, Anthracite Industries, Inc., declared: "Anthracite is coming back and can continue to forge ahead if not halted by destructive legislation."

Safety Council Deliberates on Bonuses, Fire, Electric and Falling Hazards

PROBLEMS common to all mining featured the three-day session of the Mining Section of the National Safety Council at its 25th Annual Congress, held Oct. 10–12, in Chicago. The proceedings emphasized the organic similarity of the basic problems of the entire mining industry. For example, though unafraid of methane, explosive dust or combustible mineral, the iron companies, much perturbed about fire possibilities and shock, have taken unusual precautions against electrical grounds. They have used conditioned air from compressed-air lines for drillers' masks. G. J. Barrett, Oliver Iron Mining Co., general chairman of the section, presided over the sessions.

- Hoisting in return air dangerous.
- Drillers breathe conditioned air from compressed-air lines.
- Lightning travels along rails underground 4,000 ft., firing methane and shots.
- Lower parts of shafts made intakes and upper parts returns.

Even where there is no methane, asserted Daniel Harrington, chief, department of safety and health, U. S. Bureau of Mines, shafts and slopes should not be on the return current. Can operators so readily forget the unfortunate conditions when men had to be hoisted through return air dangerously filled with smoke and fumes from a mine fire? True, a mine manager may fool himself, believing he can reverse the air current and convert a return into an intake, but, to do that, doors which close with the current in one direction will swing open when it is reversed and thus negative every effort toward reversal.

This was his rejoinder to the statement of C. M. Fellman, safety and ventilating engineer, Montreal Mining Co., that at his property No. 4 slope and No. 6 shaft serve as return-air outlets for their respective mine areas and that No. 5 shaft is maintained as a return during the winter months and as an intake during the summer. Main shafts, continued Mr. Harrington, should be downcasts (intake), not returns, but if kept neutral there must be a separate intake and return, which is expensive. There is danger from ice when intake air is taken down an unheated hoisting shaft, added Angus D. Campbell, general manager, Omega Gold Mines, Ltd.

When, at the Montreal mine, rock headings are ventilated with auxiliary fans, stated Mr. Fellman, the return current from the face passes through two water curtains to settle the dust, smoke and gases after blasting. During drilling, miners wear "air-line respirators" supplied with compressed air from underground pipe lines, after the air has been passed through a conditioner that reduces the pressure, removes impurities, and heats and humidifies the air. During loading, approved felt-pad respirators are worn, and the rock is wetted by a water spray. To settle dust and gases after blasting, a cross-connection between air and water lines is used. On returning to the face, the men wash down sides and back with a water spray.

In shaft work, continued Mr. Fellman, the air-conditioning unit is mounted on the carriage which usually carries air and water manifolds and hoses for drilling. Respirator hoses are suspended from the air conditioner to the miners at the bottom of the shaft. Fans, filters and exhaust-piping systems have been installed to remove dust from between the washhouse lockers, for these spaces gather dust from the clothes of the men when changing between shifts.

Fans at Foot of Shaft

When there is a surface fan, maintained in good condition, asserted Raymond Mancha, manager, ventilation division, Jeffrey Manufacturing Co., propeller fans may be put with advantage on each split at the foot of the shaft or two or more splits may be combined, each fan being suited to the needs of the split, thus eliminating regulators from the more readily ventilated splits (see *Coal Age*, May, 1938, p. 53). If the surface fan is made to draw air through a bottom fan or fans in case of an emergency, such fans will present no appreciable resistance to the passage of air.

It is true, he said, in reply to C. W. Gibbs, general manager, Harwick Coal & Coke Co., the fan does restrain the air in a measure, but the distance over which that resistance operates is so short that it is, like the presence of a man in the gangway, not a measurable resistance—not in any way comparable with that interposed by the falls along several hundred feet of heading. The restriction in this case is purely local. If the fan did oppose a measurable resistance, it could not be, when in operation, an efficient unit, and such fans give about 90 per cent efficiency. Air might pass the fan without affecting it or might cause it to spin. Regulators have little effect until nearly closed. The cowling will direct the air to the fan so that there will be no resistance from turbulence.

If it should ever be desirable to increase temporarily the mine ventilation to clear the mine after a prolonged shutdown or following an explosion, or for other reasons, the surface and both fans could all be operated, thus placing the two systems in series. If this were done with a for-

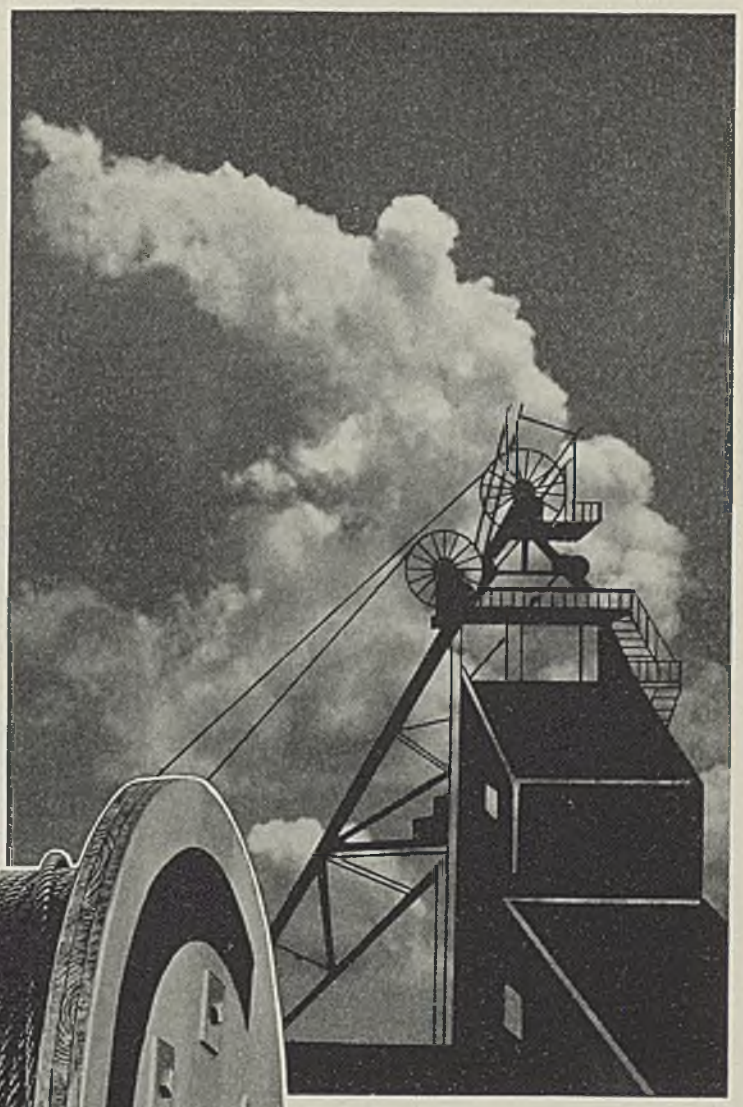
Some Campaign!

In three short months the campaign of the National Coal Association to regain lost markets for coal has reached impressive proportions. Instituted on July 5 with the issuance of a bulletin containing factual data about the bituminous coal industry, the movement has been marked by the release of posters, cartoons, leaflets, booklets, stickers and envelope stuffers totaling 49. Copies of this material printed and distributed have varied from five thousand to a million and a quarter each, the grand total reaching the amazing figure of 5,315,500 copies.

FOR MINING PURPOSES HERE'S THE WIRE ROPE of TODAY and TOMORROW

The new Gilmore Wire Rope is so much different than any you have ever used that it should sell for a lot more—but it doesn't. Every machine in this great new J & L plant is a precision machine. In mining work many operators have discovered that special "Tailormade" cables have proven the most satisfactory and this plant is equipped for just such service.

Every approach towards perfection is embodied in these new ropes . . . no interstices to receive grit . . . no painted strand, because we cannot lubricate a strand and paint it . . . neither can anyone else, so we think you prefer to have it lubricated . . . Every Wire, Strand, Rope and Lay, precision built to 1/1000 of an inch—and so many other improvements, you should write us for further information . . . and . . . let us have your inquiry for the next replacement—then make a critical comparison.



Other J & L Steel products:

Standard Pipe in seamless and welded — Seamless Steel Boiler Tubes—Hot Rolled Shapes—Abrasion Resisting Plates—Bar mill products including Bars for Concrete Reinforcement — Bar size shapes—Track Spikes—Wire Nails and Spikes — Galvanized Sheet Steel Roofing and Siding—Woven Wire Fencing—Barbed Wire—Soft Annealed Wire.

GILMORE
WIRE ROPE DIVISION

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JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH PENNSYLVANIA

J&L STEEL

ward-bladed surface fan, this would make the motor load more than normal. Generally, this fan would be equipped with sufficient motor capacity to stand this increase of temporary load, but this would have to be ascertained in every instance.

Should there be an electric storm, lightning might strike the motor of the surface fan, the motor house or power line, thus interrupting ventilation. For this reason, auxiliary gasoline or steam drives often are installed at much expense, recalled Mr. Mancha, but if the entire motor house is wrecked by lightning, the auxiliary drive is helpless to restore operation. However, with a fan located at the shaft bottom, only the surface power line is vulnerable. To this a Canadian member registered objection, and Mr. Mancha said that at least the interference with the underground fans would be less likely.

Mr. Harrington declared that the chief inspector of British Columbia recently had asked what could be done to prevent lightning setting fire to the methane in the mines, as it had done 4,000 ft. underground where there was no trolley line. The current went through the rail to a point where the mine authorities up to that time had not discovered methane. Soon after, the chief inspector of Quebec wrote to ask how to prevent lightning from igniting blasting charges prematurely in underground mines, as had happened recently several times. The only instances the Bureau knew were where lightning had ignited shots in quarries. It was customary in some places to take men out of the quarry if lowering clouds presaged a lightning discharge.

Discussing a paper by R. D. Satterley, superintendent, Morris mine, Inland Steel Co., where the intake was heated by steam, Clifford Gibson, Ontario Mine Association, said that the downcast at one mine is heated by the return water from a compressor plant. Here the current was 22,000 c.f.m. In some cases, in Ontario, the lower parts of shafts are intakes and the upper parts of the same shafts are returns. The intake air for the downcast section of the shaft is warmed by passing it through special slopes.

- Bonus plans improve accident rates.
- If too many receive bonuses, the incentive is inadequate.
- Too infrequent bonuses cause loss of interest.
- Value of drama in award of bonuses.
- Safety consciousness a matter of years.
- Old air hose used on drawslate bars.
- How to load from high piles.
- Treated timber saves lives and limbs.

Safe working conditions, safe machinery, mechanical guards or teaching men to avoid dangerous practices, all of which some have thought, each in itself, the assured way to safety, have proved good but inadequate, said W. B. Hasleton, Pickands, Mather & Co., speaking for George Martinson, safety director of the corporation. A quarter of a century is too short a time to have nature develop in the minds of the workers the habits and thinking necessary to the success of an accident-prevention program. Though the company had never established training schools, no new man is put to work until the superintendent or foreman has explained to him in a heart-to-heart talk the dangers of the work and the safe and correct way of doing his job. Done rightly, it paves the way for the rest of the program.

The Pickands, Mather company has safety committees of workmen and committees of supervisors and foremen. Both are good. At some plants, both should function; at some mines it has one, in others the other type of organization; much depends on the local management; let it try which it will, for results are what count. The chief value of safety committees is that they keep the subject of accidents and their prevention ever alive.

We have learned, declared Mr. Martinson in his paper, that we get quicker results if there are rewards for those who learn the safe way—just as students at school have to be rewarded for accomplishment. The oldest incentive plan is to set up sizable units and, for the first month of the year, credit a certain sum for each individual in any group having no disabling accident; next month, if there are no such accidents, the credit is doubled, and if the record is extended for another month the credit per individual is three times that in the first month. For any additional month, the credit is on the basis of the third month.

If a disability occurs, not only do the credits cease but the unit has to start over again. At the end of the year the sum of the accumulated credits is turned over to the group in cash for any desired use—merchandise, picnics or safety dinners. Pickands, Mather mines operating under this plan have won five prizes in the National Safety Contest, many honorable mentions and over sixty awards of merit from the Joseph A. Holmes Safety Association.

At another, far-removed property, Mr. Martinson's paper went on to say, a bogey both for the frequency and severity rate was set for each foreman. If he exceeded either, he got a bonus. The maximum amount of bonus obtainable was $1,200; and the foremen got in aggregate $1,050. Later, the company set a severity rate of 2 as a bogey and promised each underground foreman $7.50 and each outside foreman $5 for a rate of 2 or under in each calendar month. If, at the year's end, the total rate for the mine was 1.75 to 1.45, an extra bonus of $25 was given to each foreman, and if it was 1.45 or lower that bonus would be raised to $50.

At the end of nine months the mine had a severity rate of 2.06, whereas the average rate for the seven preceding years at this operation had been 7.45. Extra bonuses are no longer given, but the average rate for this mine for the five years preceding the bonus plan was 9.40, while for the three years under the plan the average rate has been 3.94—a reduction of 58 per cent. In another group a plan that pays a monthly bonus of 1½ per cent of the monthly earnings of each earner in a unit that has no disabling injuries within the month has been established.

Few and Big Awards Win Out

Where too many men get awards, declared Eugene McAuliffe, president, Union Pacific Coal Co., the incentive is inadequate. When a man must wait a year for an award, he tires and is disgusted. Only by elimination by lot and a prospect of a glittering return, dramatically awarded in the presence of the contestants, can the requisite enthusiasm be evoked. For a few per cent a workmen will rarely buy stock, much less will he buy safety.

Up to 1923 the Union Pacific company used black powder, provided no sprinkling water, did not use rock dust, had no safety standards, and used open lights in all mines but three which were definitely gassy, and coal was shot without undermining. The men wore no safety clothing. In the next ten years a total of $1,019,176.35 was expended on special safety payrolls and safety material. Adequate track clearance and continuous rock-dusting were established; 48 miles of water line was installed for sprinkling cutter-bar, face, fallen coal and cars.

First-aid classes for miners and for boy and girl scouts were introduced. Safety

(*Turn to page* 77)

Next Year's Official Roster

General Chairman: L. C. Campbell, Koppers Coal Co., Pittsburgh, Pa.

Vice-Chairmen: A. D. Campbell, Omega Gold Mines, Ltd., Larder, Lake, Ont., Canada; Lee Long, Clinchfield Coal Corporation, Dante, Va.; N. D. Hasulton, Pickands, Mather & Co., Duluth, Minn.

Secretary and *News Letter* Editor: Daniel Harrington, U. S. Bureau of Mines, Washington, D. C.

Poster and Slide Committee Chairman: J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa.

Publicity Committee Chairman: M. R. Budd, *Explosives Engineer*, Wilmington, Del.

Statistics Committee Chairman: W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

Committee members at large: G. J. Barrett, Oliver Iron Mining Co., Duluth, Minn.; Thomas Allen, chief coal mine inspector, State of Colorado, Denver, Colo.; J. W. Alt, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.; P. M. Arthur, American Zinc Co. of Tennessee, Mascot, Tenn.; F. E. Bedale, Consolidation Coal Co., Fairmont, W. Va.; J. L. Boardman, Anaconda Copper Mining Co., Butte, Mont.; Maurice Coulter, Clearfield Bituminous Coal Corporation, Indiana, Pa.; C. W. Gibbs, Harwick Coal & Coke Co., Pittsburgh, Pa.; George Martinson, Pickands, Mather & Co., Cleveland, Ohio; H. T. Harper, Tennessee Copper Co., Copperhill, Tenn.; H. C. Henrie, Phelps Dodge Corporation, Bisbee, Ariz.; R. N. Hosler, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.; C. F. Keck, Jamison Coal Corporation, Greensburg, Pa.; T. E. Lightfoot, Koppers Coal Co., Pittsburgh, Pa.; W. G. Metzgar, Hudson Coal Co., Scranton, Pa.; D. D. Moffat, Utah Copper Co., Salt Lake City, Utah; V. O. Murray, Union Pacific Coal Co., Rock Springs, Wyo.; R. N. Seip, New Jersey Zinc Co., New York; J. T. Ryan, Mine Safety Appliances Co., Pittsburgh, Pa.; L. T. Sicka, St. Joseph Lead Co., Bonne Terre, Mo.; John Treweek, Homestake Mining Co., Lead, S. D.; O. V. Simpson, Alabama Byproducts Corporation, Birmingham, Ala.; N. P. Rhinehart, Department of Mines, West Virginia, Charleston, W. Va.; C. M. Fellman, Montreal Mining Co., Montreal, Wis.

clothing was worn, but the number of man-hours per non-fatal accident, which in 1923 was 19,440, was in 1931 only 20,852. In the last half of 1931, two automobiles were given in a formal drawing in which only those who passed through the last half of 1931 without a lost-time accident were allowed to participate. In 1932 the number of man-hours per non-fatal accident was 44,188. In 1937, it was 97,559. For the five-year period (1933–1937) it was 66,749.

It might be profitable also to suggest to the workers that safety of life or limb is at least equal in importance to them as are some of the other matters they so continuously discuss. "For myself," concluded Mr. McAuliffe, "I would rather work seven or eight hours a day and live to reach seventy than to work thirty hours a week and die before my time."

As the extraction of minerals was begun in early years when little thought was given to safety, asserted M. L. Workman, superintendent, Koppers Coal Co., Beards Fork, W. Va., mining men are faced not only with the problem of developing safe thinking and safe working habits but also with a breakdown and change of years-old heritage of unsafe thought and work habits, in a totally dark and scattered environment where supervisors can exercise little supervision. Rules made for the employee's safety must be such as not to inconvenience him unduly or lessen his earning power. In the average mine it will take four to five years to establish in the minds of the workmen a standard method of timbering because adults, while learning more rapidly than children, do not remember so well.

Learn Mostly by Sight

Educators say that education is 60 per cent visual and some say as much as 87 per cent, so the Koppers company, continued Mr. Workman, has made use of 16-mm. cameras to take pictures of work done in an unsafe and safe manner, for by the use of the screen a worker is able to see and assimilate 30 years of experience in a two-hour period. These pictures are shown to school children in the daytime and to men and women at night. Thus women and children see the men at work inside the mine and a "safety sense" is developed in the worker's entire family, which reacts on the worker himself.

At the Matahambre (Cuba) mines, which have worked 1,451,704 man-hours without a lost-time accident, signs have been placed, said T. G. Murdock, safety engineer, at the entrance to each working place reading: "Attention, miners: Before doing any work, carefully bar down the back (drawslate) and side of your working places." Continual inspection and barring down when necessary are made during the entire shift. The bar must be of sufficient length so that the workman does not have to stand under bad rock, and he must use a short piece of old air hose on the bar to deflect sliding material. Also the bar must be sharp, and the miner must have a good footing and an unobstructed way to escape quickly. A slogan is "The bar is the miner's most important tool from a safety standpoint."

Accidents from rocks rolling down piles of material on the shoveling crew are prevented by teaching the men to roll the large pieces down before commencing to load muck and by keeping the slope at an easy inclination. Sledging accidents are avoided by use of goggles, eliminating rounded sledges and directing blows against the weakest face of the material, so that chips will fall away from the sledger and his companions. Safety belts are required in all places where there is danger of a fall, especially in timbering very steep places, and in placing transmission line.

A loud speaker broadcasts a safety message as the men wait for the cage to enter the mine. It has even an announcer and musical talent. Movies in which the company's employees take part are popular, partly because the actors are their companions. Timber life was one to two years; hence, Wolman-salt-treated timber was introduced, eliminating failures from fungus or termites. This is believed to be an important safety measure.

- Grounding areas must have 3-ohm resistance or less.
- Three-conductor cables for d.c. current, four-conductor cables for a.c.
- Place floodlights correctly to avoid "Klieg eyes."
- Guards should not touch trolley wire.
- Fatality frequency (man-hour basis) increased slightly by mechanization and non-fatal frequency diminished in Franklin County, Illinois.
- Based on tonnage, all accident rates greatly reduced by mechanization.

Ground-fault protection for electrical cables in open pits, urged P. L. Hendricks, chief electrician, Hibbing district, Pickands, Mather & Co., causes an electric circuit to trip out a defective circuit when the balance between the circuits is affected, but it is as useless as a fire engine with a broken hose if the ground wire is broken. So periodical tests should be made of the ground resistance on the shovel frames and operating tests should be made of the protective apparatus.

Overhead power lines on wooden poles transmit electric power to open-pit operations and have instantaneous circuits of ample rupturing capacity to clear the line instantly if a short circuit develops. Power lines may be routed to take advantage of banks and ground elevations and thus provide for ample clearance without excessively long poles.

Flexible power cables transmit power from the overhead lines to the machine through portable switch houses equipped with facilities for disconnecting the power and suitable protective and metering apparatus. The cables include the necessary number of insulated power conductors and one or more ground conductors. They are covered with tire-stock rubber, resistant to wear and weather. The high-voltage cables used with electric shovels are of ground sheath construction, in which each conductor is completely inclosed within a grounded tube of a copper braid or spiral.

One or more supplementary bare ground conductors are laid in the cable in intimate contact with the three ground sheaths, and the combination makes up the ground wire of the cable. With this system the outside of the cable scarcely can be charged by current leakage from bruises or cuts in the insulation, but faults are difficult to find and repairs are not easily made, so facilities for testing the insulation are advisable as well as vulcanizing apparatus for jacket repair.

Motors and starting equipment, either stored or in service, should be covered adequately and not merely wrapped up in tar paper. Most of the insulation in such apparatus is either paper, cotton or fiber, which have no insulating properties when wet. Motors thus wetted should not be used until dried and tested by the electrical department; otherwise windings will be destroyed and men may be shocked.

Pole-top disconnecting switches are being installed immediately adjacent to the engine house or substation, which will be so accessible that, on grounds of delay in depowering the circuits, there will be no excuse for jeopardizing workmen who must work on or near high-tension equipment on the outside of the mine, stated C. A. Lindberg, general surface foreman, Marquette District, Oliver Mining Co.

Grounding areas must have a resistance of 3 ohms or less and should be solidly connected to the electrical equipment and conduit lines and to the steel framework of the building through copper conductors of ample carrying capacity and should be tested periodically. Fused switches are being replaced in some instances by air circuit breakers with thermal and short-circuit protection.

Electric Hazards at Chutes

Underground, trolley wires are hung 7 ft. above the track rail, but crushing sometimes makes it lower. At chutes a trough-type guard is used, but in some cases the gangway headroom and the height of the timber sets in front of the chute are increased 18 in. or more, making for better protection for the wire and its guard against flying material. Sectionalizing or insulating the wire in front of chutes interrupts service beyond the chute, creates a hazard in opening switch, and makes it difficult to operate in front of the chute because of the dead section. So this provision is not desirable.

Material is being scraped more and more with 3-phase 220- or 440-volt a.c. power in place of d.c. A typical contract service using a.c. power will have a fused safety switch or air-break circuit breaker at the branch tap on the main feeder, four-conductor rubber-clad cable to the working place, an unfused safety switch for

Posters Promote Sale of Coke

Koppers Kops are helping to promote Koppers coke for the Seaboard Division of the Koppers Co., Kearny, N. J., in a series of outdoor posters currently appearing at 450 locations throughout New Jersey and Staten Island, N. Y. The copy theme used in the posters ties in closely with that used by the company in a newspaper campaign.

scraper-hoist control, a fused switch or breaker and dry-type transformer for lighting and a fused switch and a motor starter with thermal overload protection for the ventilating-fan motor. The fourth wire in the cable is used as a continuous ground conductor from the main-line track and pipe-ground system to the machine frame in the working place.

With d.c. power a three-wire cable is used, two for the power circuit and a third for an independent ground return. Fusing is necessary because the rubber in the cable is flammable. Non-flammable insulation already developed may be the answer.

A 250-volt lamp is likely to explode at any time, but many have used them in order to utilize the 250-volt trolley circuit. Where possible a 110-volt lamp should be preferred, receiving its power from a dry-type transformer connected to the 220- or 440-a.c. distribution through a suitable fused switch. But if the d.c. power is to be used it should be through a series-multiple lighting system with the cheaper, more rugged and efficient 130-volt lamp in an independent lighting system protected at trolley tap with fused safety switch.

Small portable floodlights, which are growing in favor, cause "Kleig eyes" if not properly placed. Impermanent repairs, if not promptly corrected, are soon forgotten and before long become an accepted standard. Extra wire for ground circuit is not the practice of all Mesaba range mines, but is used by the Pickands-Mather and Oliver companies, said the speakers, in answer to Mr. Harrington. Ground wire can never be absent when it is made integral with the cable. Floodlights are 100- to 150-volt lamps. Lowest lighting voltage is 110.

Wet Trolley-Wire Guards

Danger of guards, even of rubber, if they touch the trolley wire and are wet was emphasized in discussion. The guard should not rest on the trolley wire. Mr. Gibbs mentioned that a split tubing was being manufactured for trolley guarding. A horseshoe-shaped rubber guard hung on the wire was said not to be the answer to a demand for a safe guard, except when dry or as against contact with a drill. Bakelite and vulcanized rubber are being adapted to the purpose. Slit steam hose and fire hose are being used by the Hudson Coal Co. for trolley-wire protection.

In Franklin County, Illinois, the frequency rate on non-fatal accidents involving a loss of time of 30 days or more, when based on man-hours worked, according to Paul Weir, consulting engineer, has materially improved since the mines have been mechanized. So also has the frequency rate of lesser non-fatal accidents in the last twelve years to and including 1937, for which he had secured data.

For fatal accidents by man-hours worked, frequency has grown slightly worse. Based on tonnage produced, all the figures demonstrate a most significant improvement. There are, Mr. Weir averred, many reasons why mechanized mining can be and should be made relatively safer than non-mechanized mining. Failure to take advantage of this opportunity for greater safety lies at the door of the management. Mechanization involves new hazards but eliminates others. With this expression of opinion Mr. Harrington agreed.

C. F. Hamilton

Obituary

C. F. Hamilton, 63, vice-president in charge of operations of the Binkley Mining Co., and prominent in coal mining in Illinois and Indiana for a quarter century, died Sept. 22 in Wilmette, Ill., after an illness of several months. He was a director of the National Coal Association, 1920-30; past president of the Illinois Mining Institute; president of the Illinois Strip Operators' Association and a director in the Illinois Coal Operators' Association for about ten years.

Thomas Stockdale, 66, veteran mine inspector of the West Virginia Department of Mines, died Oct. 19 at his home in Bramwell, W. Va. He had been in failing health for three years and had recently returned from Johns Hopkins Hospital, Baltimore, Md., where he had undergone treatment. Born in England, he came to this country in 1904, obtaining employment in the New River field; subsequently he saw service with the Tidewater Coal & Coke Co. as fireboss, then with the Island Creek Coal Co., Keystone Coal & Coke Co. and the Peerless Coal & Coke Co. He joined the State Department of Mines in 1917.

Paul Hardy, 59, vice-president and general manager of the Isaban Coal Co., Huntington, W. Va., died Oct. 18 at his home in that city following a heart attack. He had been in failing health since last December. Soon after his graduation from Ohio State University as a mining engineer he joined the Jeffrey Mfg. Co., after which he became general manager of the Island Creek Coal Co. Later he organized a group of coal companies on Coal River in Kanawha County and subsequently organized and managed the Hardy-Burlingham Mining Co. in Kentucky. In 1922 he formed the Hardy Coal Co., which became the Isaban company last year. He also was president of Hardy-Resener Co., real estate operator.

C. O. Roberts, safety engineer of the Vesta Coal Co., California, Pa., died Oct. 5. He had been for a number of years connected with the U. S. Bureau of Mines as first-aid instructor and foreman on a mine-rescue car; also he was secretary-treasurer of the National Mine Rescue Association.

William Slater, superintendent of the Blaine mine of the Lorain Coal & Dock Co., Blaine, Ohio, died Oct. 9 in the Martins Ferry Hospital, Wheeling, W. Va., after six days' illness. He had been identified with the Lorain company for 50 years.

Roy A. Rainey, 65, chairman of the board of W. J. Rainey, Inc., with offices in New York and operating headquarters at Uniontown, Pa., lost his life in the hurricane of Sept. 21 when his home at Watch Hill, R. I., was demolished.

P. J. Somers, 45, mining engineer for the Mallory Coal Co., Mallory, W. Va., died Oct. 12 at Mallory. At one time he served as district State Road Commission engineer for Logan and Lincoln counties.

Two More Harlan Operators Sign Union Contracts

Signing of union contracts by two more Harlan County (Kentucky) coal-mining companies was announced on Sept. 22. William Turnblazer, president of District 19, United Mine Workers, said that the Green-Silvers Coal Co., Harlan, headed by former Harlan County Sheriff Theodore Middleton, and the Creech Coal Co., Wallins Creek, had entered into contractual relations with the U.M.W.

Litigation over a cease and desist order of the National Labor Relations Board against the Clover Fork Coal Co., Harlan, Ky., ended on Sept. 13 in the Sixth U. S. Circuit Court of Appeals, when a stipulation was filed providing for modification of the board order directing the company to dissociate from the Harlan Coal Operators' Association. In view of the fact that the association had signed a U.M.W. contract (*Coal Age*, October, p. 74) the company was given permission to reestablish its membership.

Harlan Case to Be Retried

Retrial of the Harlan County (Kentucky) anti-labor conspiracy case at the May term of the U. S. District Court at London, Ky., was ordered on Oct. 1 by Judge H. Church Ford. The first trial ended Aug. 1 with the jury unable to reach an agreement on charges against 39 persons and 16 coal companies of conspiracy to thwart unionization of coal miners in southeastern Kentucky.

Plan Utah Coal Revival

More than 200 business and civic leaders from Carbon and Emery counties met at Price, Utah, during the second week in October and laid the foundation for a permanent State-wide drive to revive the State's coal industry, which they charged was being choked to death by unfair competition. The organization is to be known as the Eastern Utah Associated Industries.

With the tentative slogan "We're in the Coal Business," the group plans to support people in the State who support their industry and to refrain from patronizing

HAZARD

ELECTRIC SHOVEL CABLE

Hazacord 3 conductor electric shovel cables are *tough*. Their general rugged strength and durable tear—and wear—proof jackets give them a *toughness* that stands up to any job. The jacket has a tensile strength of 2 tons per square inch and is resistant to all weather.

This is the result of painstaking research, the use of several chemical ingredients (which were comparatively unknown to cable makers a few years ago) and improved methods of processing.

For long satisfying service where the going is *toughest*, use Hazacord.

HAZARD INSULATED WIRE WORKS

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those who could use coal and won't. Being non-profit in character, the group will have a full-time secretary whose work will be of an educational nature. Taxing of natural gas will be a concrete objective. Among the speakers at the initial meeting were B. P. Manley, executive secretary of the Utah Coal Producers' Association, and Walter F. Clark, superintendent, Independent Coal & Coke Co.

Old Breaker to Be Razed

The Buttonwood breaker of the Glen Alden Coal Co., in Hanover Township, Pa., is to be demolished, and coal from the company's Buttonwood operation will be prepared at the new Maxwell breaker, which is expected to be ready early next year. The old plant, which was more than 60 years old, had a daily capacity of 2,500 tons, whereas the new one will be able to turn out 1,000 tons of prepared anthracite per hour. The operation will be renamed the Huber colliery, after C. F. Huber, chairman of the board of directors of the company.

Connellsville Mines Resume

The Republic mine of the Republic Steel Corporation, Connellsville, Pa., was reopened during the second week in October, after being idle more than a year. Operations also were resumed at the Bessemer mine, an independent, in the same field, which likewise had been shut down for more than a year.

Blue Diamond Offices Merged

Headquarters of the operating department of the Blue Diamond Coal Co., hitherto located at Middlesboro, Ky., have been consolidated with the company's Knoxville (Tenn.) office, in the Hamilton National Bank Building. The change became effective as of Oct. 12.

Sales of Mechanical Stokers Continue to Climb

Sales of mechanical stokers in August last totaled 12,859 units, according to statistics furnished the U. S. Bureau of the Census by 112 manufacturers (Class 1, 66; Class 2, 43; Class 3, 46; Class 4, 37; Class 5, 13). This compares with sales of 9,061 units in the preceding month and 13,489 in August, 1937. Sales by classes in August last were: residential (under 61 lb. of coal per hour), 11,380 (bituminous, 9,923; anthracite, 1,457); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 602; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 573; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 258; high-pressure industrial steam plants (more than 1,200 lb. per hour), 46.

J. E. Butler Is Golf Champion

The general manager of the Stearns Coal & Lumber Co., whose Blue Heron plant is described elsewhere in this issue, is something of a wizard on the fairways, as attested by his capture of the low score prize at this year's Stearns annual amateur golf tournament. Not only did he lead 118 top-flight players from various parts of his home State of Kentucky, as well as Ohio and Tennessee, with a card of 147, but he registered the only par round of 70 shot by any of the contenders.

Industrial Notes

American Optical Co., Southbridge, Mass., announces a new and complete line of protective clothing, gloves, sleevelets, leggings, aprons, hats and hoods. The products are provided in a variety of materials to protect workmen from heat, fire, acids, cuts, abrasions, etc.

Beaver Pipe Tools, Inc., has appointed Avery Phillis as district manager of its Mid-Western sales territory with headquarters in Chicago. He succeeds W. S. Andrews, who has resigned to accept a position with the Equitable Meter Co. of Pittsburgh, with which he was formerly associated.

Bower Roller Bearing Co., Detroit, Mich., has appointed the Ahlberg Bearing Co. as nation-wide distributor of its products. Almost entirely confined hitherto to the automotive industry, the Bower line will be distributed to a broader industrial field.

Gould Storage Battery Corporation, Depew, N. Y., has arranged to acquire the power battery department of the USL Battery Corporation with equipment and necessary personnel, and will continue inspection and replacement service on the latter's industrial batteries now in the field. USL will devote the entire facilities of its Niagara Falls factory to the manufacture of automotive, radio and farm lighting batteries.

H. H. Robertson Co., Pittsburgh, Pa., manufacturer of prefabricated building products, has appointed F. C. Russell as general manager of sales, and Pierre Blommers as assistant general manager of sales. Mr. Russell was formerly manager of roofing sales, and Mr. Blommer was manager of ventilation and daylighting sales.

L. H. Gilmer Co., Philadelphia, Pa., manufacturer of flat belting, has opened a new Chicago factory branch at 351-363 East Ohio St., removed from 665 West Washington Blvd. The new branch management is in charge of A. B. MacFarland, for five years assistant to the sales manager of the company. Philip J. Walsh has been appointed district manager at Pittsburgh, Pa.

Sterling Pump Corporation announces that it will remove its plant from South Bend, Ind., to Hamilton, Ohio, effective about Nov. 15.

Leemon Moulding Machine Co., recently located in Grand Rapids, Mich., is introducing the Leemon coal-packaging machine, designed to convert slack into packaged fuel bricks at the rate of 1½ tons per hour. The bricks are packed four to a carton weighing 10 lb.

D. R. Burr, consulting manager for the mechanical goods sales department of the Goodyear Tire & Rubber Co., Akron, Ohio, a veteran of 44 years' service in the rubber industry, 25 of them with the Goodyear company, has announced his retirement.

Safety Men Get High Score

Two Kanawah County mine-rescue teams emerged with first and second honors in the West Virginia State championship safety contest, held Oct. 8 at the athletic field of Fairmont State Teachers College, Fairmont. The winning team was the Wevaco squad of the Truax-Traer Coal Co., which scored 1,499 points out of a possible 1,500, second

Mine Rescues to Feature Golden Gate Fair

Spectacular mine rescues, showing the efficiency of modern safety methods and equipment, will be staged twice a day in the Palace of Mines, Metals and Machinery at the 1939 Golden Gate International Exposition, San Francisco, Calif. Clouds of black smoke and coal dust will issue from the mouth of the shaft. Fire and broken water mains will add to the general pandemonium; bells will ring and whistles screech.

With siren wailing, a rescue truck of the U. S. Bureau of Mines will speed to the rescue, and into the smoke, flames and firedamp will plunge the rescue workers, protected by goggles and self-contained breathing apparatus. A few moments later they will emerge, bearing the "injured" on stretchers. "Broken limbs" will be set in splints, "wounds" cared for medically, and the "unconscious" revived by pulmotors, and their "lives" saved.

The exhibition is being planned by S. H. Ash, district engineer, Health and Safety Branch, U. S. Bureau of Mines, in cooperation with Dr. Dorsey A. Lyon, chairman of the technical committee of Mining Exhibits, Inc., sponsor of the "Treasure Mountain" exhibit. Special rescue contests also will be held during the exposition, said Dr. Lyon.

SAVES COSTLY CHA
IN BEARING DESI

• COSTLY SHUT-DOWNS were eliminated and an expensive bearing change avoided on a large stripping shovel, a Central state mine operator relates.

This operator had installed a 100-ton counterweight to balance the 85-foot boom and shovel load. The counterweight reduced power peaks about 25%, but brought a difficult lubricating problem.

Temperatures in the plain bearings on the counterweight cable shaft ran dangerously high. Periodic shut-downs were necessary to allow the bearings to cool.

Installation of anti-friction bearings seemed the only solution. But before making this change the operator tried a number of different lubricants. All failed to reduce bearing temperatures. Then a Standard Lubrication Engineer was called in. He recommended Superla Grease, which when tested easily kept the bearing temperatures at a safe level. The cost of a bearing replacement job was saved.

High consumption, excessive wear, or overheating in bearings can often be overcome with the right lubricant. Call a Standard Lubrication Engineer. He may make a saving in power, maintenance and lubrication costs for you. His service is free to all operators in the Middle West. Write 910 South Michigan Ave., Chicago, Illinois, for the Engineer nearest you.

SUPERLA GREASE

STANDARD OIL COMPANY

place went to the Marfork team of the same company. In the competition for negro teams, the Grant Town group of the Koppers Coal Co. was first, and the Helen Run team of the same company was second. Twenty teams competed in the events, with about 4,000 persons in attendance. Preceding the competition, a safety day parade was witnessed by nearly 25,000. Prizes were awarded by N. P. Rhinehart, chief of the State Department of Mines.

Docena Mine Resumes

Operations were resumed Oct. 3 at the Docena mine of the Tennessee Coal, Iron & Railroad Co., Adamsville, Ala., after five months' idleness. During the idle period, repairs and improvements were made, including a new dump on the tipple and the installation of 600 new mine cars. The mine employs about 600 men.

New Equipment at Blossburg

Complete installation of loading conveyors has been made by the Brookside-Pratt Mining Co. at its "E" mine, Blossburg, Ala. The new equipment is of the Jeffrey type, with a capacity of about 1½ tons each, being employed at the face of all rooms and headings.

K. & H. Operations Sold

Sale of the Kanawha & Hocking Coal Co.'s mining operations in Fayette and Kanawha counties, West Virginia, to Semet-Solvay Co., Inc., was disclosed on Oct. 6. Included in the sale were miners' homes at two plants and two large stores. T. C. Miller, who will be superintendent in charge of operations, said the Longacre mine and coke ovens will be continued until the mine is worked out—about ten months.

Webster to Reorganize

The organization plan of the Webster Mfg. Co., Tiffin, Ohio, which has been operating for the last year under a trusteeship, was approved by the Federal District Court at Toledo, Ohio, on Sept. 24. The organization, which manufactures elevating and conveying machinery, will be known as Webster Mfg., Inc., and will remain under the present management, four to six weeks being required for consummation of the proposed set-up.

Mineral Building for V. P. I.

A new mineral industries building is to be constructed as part of a building program at the Virginia Polytechnic Institute, Blacksburg, Va., during the coming year. The structure, which will house departments of mining, geology and metallurgy, will have a three-story stone front containing offices, classrooms and research facilities; in the rear will be a one-story structure 113x145 ft. with various laboratories, a museum and additional classroom space. Planned as a P.W.A. project, it is hoped that construction will start soon.

A.I.M.E. Views Selling, Mine-Safety And Coal-Stripping Angles

HOW SELLER and buyer can dovetail their interests was the main theme of the joint meetings of the Coal Division, American Institute of Mining and Metallurgical Engineers, representing producers, and the Fuels Division, American Society of Mechanical Engineers, representing coal consumers, at Chicago, Oct. 13-14. The Chicago sections of both parent organizations, Western Society of Engineers, Illinois Mining Institute and Indiana Mining Institute also were represented. Two technical A.I.M.E. sessions—one on operation and one on safety—followed the joint deliberations.

When, to quote Gustav Egloff, said H. H. Storch, supervising physical chemist, Central Experiment Station—speaking for himself and A. C. Fieldner, chief, technological branch, Coal Division, U. S. Bureau of Mines—gasoline reaches 16c. per gallon, with coal prices as they are, coal hydrogenation will be profitable. But, as coal hydrogenation produces 25 to 30 times as much tar acid (such as formaldehyde) as coal carbonization, many plants will be built when gasoline reaches 15c., and even earlier smaller plants will spring up to produce tar acids.

Pittsburgh coal is high in material suited to hydrogenation—anthraxylon and translucent attritus—and low in opaque attritus that hydrogenates with difficulty and in fusain that will hardly hydrogenate at all. Together, anthraxylon and translucent attritus run 85 per cent in the Experimental Mine coal being tested and up to 94 per cent in Edenborn coal of Fayette County, Pennsylvania. Of the two easily hydrogenated constituents 99 per cent is converted to oil, whereas opaque attritus yields only 75 per cent as oil and fusain about 9 per cent. Though the least valuable coals are the most easily hydrogenated, it is possible that they are not the most desirable coals so to treat, for they have a high percentage of oxygen.

Centers of production in any area change with mechanization, stripping, cleaning, wage- and freight-rate differentials, truck transportation and changes in consumer requirements, asserted Paul Weir, consulting engineer, Chicago. Depletion may be disregarded in Illinois as a factor in production shifts except that a substantial shift may follow a depletion of strippable areas, for only a small percentage of the deep-mine coal reserves in any of the districts has been mined. Wage differentials have not changed for many years. Rate differentials, too, have been constant in recent years, but truck transportation has caused some minor shifts. The significant shifts from one district to another have come largely from mechanization and from beneficiation of the coal by cleaning. The highest grade coal in the State is generally considered to be that mined in the southern district. Cleaning in other districts, therefore, may shift some tonnage from that area, which now has approximately 33 per cent of the mechanical cleaning-plant capacity installed in the State.

Coal Constitution and Utilization

- All ash in a coal seam does not fuse at the same temperature.
- Ash of light coal will fuse more or less readily than the ash of heavier coal.
- Ash of fine coal will be more or less refractory than the ash of larger coal.
- Iowa coals give steady heat with automatic-stoker operation.
- Mid-West coal proves efficient when pulverized.
- Not efficiency but low cost per pound of steam should be stressed.
- Uniformity in product is prime need of small consumer.

Ash-softening temperatures vary greatly up and down with any given kind of coal, declared L. C. McCabe, associate geologist, Coal Division, Illinois State Geological Survey, speaking for himself and O. W. Rees, head, Analytical Division. He divided the ten coals tested into four groups. When all sizes above and including a certain size are mixed, the groupings shown in Table I, however, no longer can be made. Greatest differences in ash-softening temperatures were obtained when comparing sized coals of different narrow specific-gravity ranges. This may explain clinkering difficulties experienced with

Table I—Ash-Softening Temperatures of Various Sizes of Illinois Coals

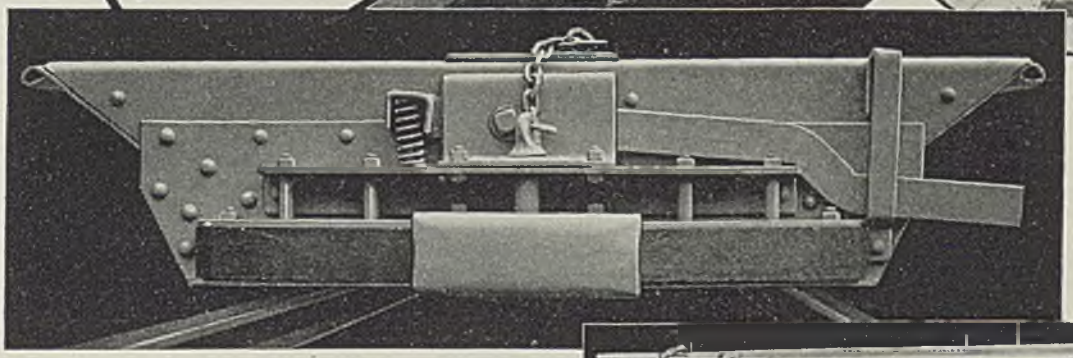
(Arranged in Order of Temperature)

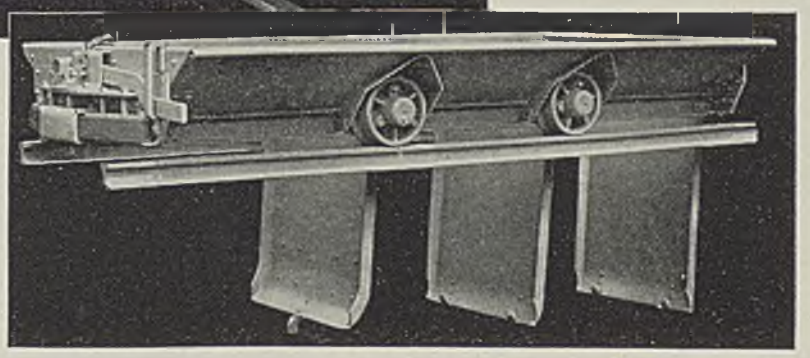
County	Seam	Size	Temp. Deg. F.	Size	Temp. Deg. F.	Size	Temp. Deg. F.	Size	Temp. Deg. F.	Size	Temp. Deg. F.
Group I											
Peoria	5	—4Sm.	2077	10x4Sm.	2063	⅜x10m.	2027	¾x⅜-in.	1987	1¼x¾-in.	1986
Sangamon	5c	—4Sm.	2056	1¼x¾-in.	1968	¾x⅜-in.	1963	10x4Sm.	1956	⅜x10m.	1930
Group II											
Williamson	6	1¼x¾-in.	2205	10x4Sm.	2141	—4Sm.	2130	¾x⅜-in.	2097	⅜x10m.	2036
Henry	1	10x4Sm.	2071	1¼x¾-in.	1987	—4Sm.	1981	¾x⅜-in.	1969	⅜x10m.	1908
Group III											
St. Clair	6	—4Sm.	2099	⅜x10m.	2073	¾x⅜-in.	2048	1¼x¾-in.	2044	10x4Sm.	2041
Marion	6	1¼x¾-in.	2027	¾x⅜-in.	1990	⅜x10m.	1989	—4Sm.	1984	10x4Sm.	1933
Group IV											
Vermilion	b	¾x⅜-in.	2155	1¼x¾-in.	2148	⅜x10m.	2138	10x4Sm.	2056	—4Sm.	2038
Woodford	2	¾x⅜-in.	2153	⅜x10m.	2150	1¼x¾-in.	2118	—4Sm.	2048	10x4Sm.	2046
Christian	6	¾x⅜-in.	2139	⅜x10m.	2131	—4Sm.	2089	1¼x¾-in.	2088	10x4Sm.	2030
Saline	5c	¾x⅜-in.	2072	1¼x¾-in.	2036	⅜x10m.	2022	—4Sm.	2017	10x4Sm.	1996

a, Springfield seam; *b*, Grape Creek seam; *c*, Harrisburg seam.

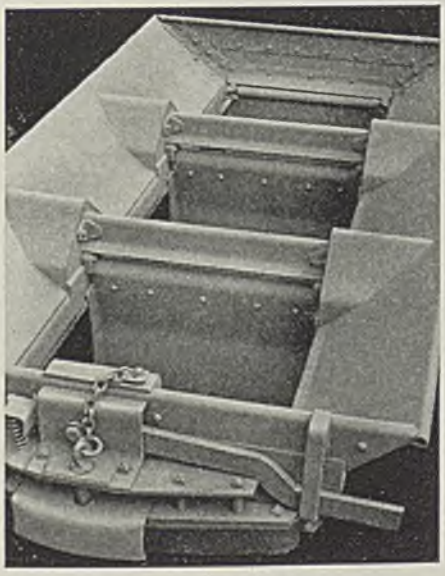
ANNOUNCING—

The NEW S-D "CAPACITY SPECIAL" Automatic





CAPACITY? This car HAS it! The one shown is only 20 inches above rail and the first installation is averaging 3 tons per car per trip, in a 36 inch seam.



Here's SIMPLE, FOOL-PROOF construction . . . here's CAPACITY PLUS . . . here's ROCK BOTTOM OPERATING COST . . . in the PERFECT mine car.

THE CAR EVERY OPERATOR IS LOOKING FOR. Maximum-plus capacity, with all of S-D'S fast, fool-proof automatic features; which S-D alone can supply. And, in addition, this new "Capacity Special" frame construction provides a ruggedness to meet every requirement, and has been proved through actual tests, under heavy operating service, to be the perfect mine car.

In buying mine cars, don't fool yourself with "Purchase-cost-per-car" figures, when it's "Cubic-foot-capacity-transportation" you're paying for. Remember, every *extra* cubic foot of capacity means 50 *extra* pounds of coal per car per trip, and that's worth thinking about. If you are interested in reducing transportation and handling costs, ask a few questions about the new S-D "Capacity Special" automatic at once.

SANFORD-DAY IRON WORKS, Inc., Knoxville, Tenn. U. S. A.

Mine Cars, all types — Trailers — Sheaves — Wheels

stoker coals when changes are made in sizing or washing procedure.

Size consist modifies fusion temperatures materially, asserted Dr. Clayton G. Ball, of the Paul Weir engineering staff. Clarain has no calcite, pyrite or kaolinite; vitrain has much kaolinite. Studies of the petrographic character of the various sizes probably would show that some have a predominance of certain of these constituents, explaining the high or low ash-fusion temperature.

Perhaps, said Joseph Harrington, consulting combustion engineer, who presided over the opening session, we shall arrive eventually at a "prescription fuel" for each furnace. Regardless of ash-fusion characteristics, there is a definite desirable coal sizing for any specific furnace, declared L. A. Shipman, Southern Coal & Coke Co. Much clinkering is due more to concentration of burning rates and imperfect cleaning than to sizing.

Underfeed stokers do not burn coke and coal strictly on the underfeed principle because of the flaring of the retort and because the coal sometimes falls back consumed into the fire; the principle is a combination of underfeed, crossfeed and overfeed burning, asserted C. A. Barnes, assistant fuel engineer, Fuels Division, Battelle Memorial Institute, at the second session, presided over by Alex Bailey, vice-president, Commonwealth Edison Co.

With coke, maximum temperatures are found in the center of the retort and range from 3,000 to 3,100 deg. F.; for Millers Creek and Pittsburgh seam coals, normally from 2,400 to 2,800 deg. F., but Millers Creek has its zone of high-burning rate as an annular ring around a cone of comparatively cool fuel, whereas that zone with Pittsburgh seam may be near the center or at the edge of the bed, depending on the channeling through the coke structure at the moment.

Table II—Cost of Running Fan

Per Cent Efficiency		Per Cent Efficiency	
30	$23,300	60	$11,650
40	17,500	70	10,000
50	14,000	80	8,740

Despite its high moisture and sulphur contents and a thermal value of from 8,040 to 11,663 B.t.u., Iowa coal will furnish the cheapest source of heat with a domestic stoker over most of that State, although in actual tests it evaporated only about three-fourths as much water per pound as the non-Iowa coals tested. Except in the coldest weather, the stoker needs attention only once a day, according to Prof. M. P. Cleghorn, mechanical engineering department, Iowa State College. Satisfactory automatic operation was obtained from most of the Iowa coals tested, although clinkering was troublesome, declared B. M. Guthrie, Fairbanks, Morse & Co. Iowa coals require a larger heating plant than many others because of lower heating value and unevenness of combustion.

Present codes being suited only to fans of less than 36-in. diameter, a method of testing propeller mine fans was described by Raymond Mancha, manager, ventilation division, Jeffrey Manufacturing Co. Carl Lee, electrical engineer, Peabody Coal Co., questioned the change in the fan duct from round to square and back to round. With a fan producing 100,000 c.f.m. at 4-in. water gage driven with power costing 1.5c. per kilowatt-hour, the costs are as in Table II, he added, which usually is a fixed charge whether the mine runs or is idle. One cannot afford to run a fan which, from unsuitability to location or from inherent lack of efficiency, gives such a high operating cost.

A Six-to-One Squeeze

Freight rates on bituminous coal have increased 78.8 per cent since 1910, while wholesale commodity prices, including bituminous coal, have risen only 12.5 per cent, Homer Carpenter, chief statistician of the traffic unit, Consumers' Counsel, testified on Oct. 20 before the Interstate Commerce Commission in opposition to the petition of the railroads for continuance of the emergency advance in rates due to expire on Dec. 31. This disparity further emphasized by an exhibit showing that if freight rates for bituminous coal had increased in that period only in the same ratio as wholesale commodity prices, soft-coal consumers would save on their 1938 coal freight bill $209,262,000.

Despite a heating value of only 8,500 to 12,000 B.t.u. per pound of coal, up to 15 per cent moisture, up to 5 or 6 per cent sulphur and 15 per cent ash which will soften at a temperature as low as 1,850 deg. F., Mid-Western coals can be burned satisfactorily as powdered fuel, asserted Ollison Craig, Riley Stoker Corporation, at the session presided over by T. A. Marsh, chief engineer, Iron Fireman Manufacturing Co. At the plants of the John Morrell Packing Co. it has been proved, said B. Winger, that Iowa coal thus can be burned with satisfaction.

Down with boiler efficiency talk, demanded Mr. Harrington. Many concerns wreck themselves to get the last tenth of efficiency, which is a mere bauble. What is really wanted is lowest cost per pound of steam generated, and, to get that figure cost of pulverization of ash, the interest on and the depreciation of the plant have to be considered. Give the old chain grates all the gadgets provided when pulverized coal is burned and they will give a good account of themselves.

Quite frequently more money can be saved in the purchasing office than in the power plant, interjected Vernon Leach, combustion engineer, Peabody Coal Co. Low-grade coal might be defined as the kind that needed high-grade engineers, remarked Mr. Marsh.

Like a bridge player with 635,013,559,600 possible different hands is the purchaser of coal, lamented T. W. Harris, Jr., division purchasing agent, E. I. duPont de Nemours & Co., who listed nineteen variables which may influence the purchaser's choice and suggested still others. Inquiries had shown that 68.5 per cent of purchasers bought their coal on specifications, 31.6 did not and the rest failed to give information; 25.7 per cent purchased on analysis, 31.5 per cent on experience, 5.7 per cent on B.t.u. basis only and 2.9 per cent on recommendations of a fuel service. A few large consumers bought on a penalty bonus basis, and some had to take what was afforded by the narrow market they had.

Small plants using 50 tons of coal per day or less down to and including the mechanically fired household plant are the principal users of industrial coal, in the opinion of B. R. Gebhart, vice-president in charge of sales, Chicago, Wilmington & Franklin Coal Co. Their skilled boiler-room men run engines, operate elevators and ice machines, and meet steam-heating and even cooking requirements. What time have these boiler-room bosses to tell their assistants what to do if the furnace won't make steam? What such a man wants, therefore, is coal uniformity and dependability rather than high analytical value or other characteristics that appeal to the larger consumer.

Too many companies make a practice of calling for a higher-fusion ash than they need, observed A. W. Thorson, field representative, Detroit Edison Co. All they require with a pulverized-coal furnace is a fusion temperature for ash that will keep it from slagging on the tubes, and, with a slagging furnace, a lower-fusion ash is even desirable. Tolerance in specifications as to analysis is as natural a provision as it is in steel contracts and as necessary, declared J. B. Morrow, preparation manager, Pittsburgh Coal Co. One of the worst evils in the coal industry for consumer and producer alike is purchasing turnover; it runs about 70 per cent in many cases, declared J. E. Tobey, Appalachian Coals, Inc. Too many plants, small and large, said one, are planned for a high load and run at a low load or are suited to low and run at high load. With this arrangement, satisfaction is impossible.

Low- and medium-volatile coals are used in metal-furnace firing, because of their high heat value, 0.40 to 0.65 per cent sulphur and ready grindability. Ten pounds of coal equal a gallon of oil; therefore, oil has to sell for 2c. a gallon to be as cheap as coal at $4 a ton. Grinding coal and preheating an equivalent quantity of oil alike cost $0.50, said W. R. Bean, vice-president, Whiting Corporation.

Operating Problems

- Crushing coal before loading on belts.
- Dry coal at less than 140 deg. F.
- Stripping haulage costs.
- Recommended American Rock-Dusting Practice needs revision.
- How Susquehanna Collieries Co. cuts accident record.

At the Buckhorn mine of the Consolidated Coal Co., a slope was constructed on an inclination of 17½ deg., the limit for belt operation if the coal is to be prevented from rolling back, stated G. S. Jenkins, general superintendent, at the operating session, at which N. G. Alford, of Eavenson, Alford & Auchmuty, presided. As the rock was about 65 ft. below the surface, an open cut was made, but the slope bottom heaved and the sides broke down, so that it was necessary to move the excavated material 700 or 800 ft. away from the sides of the cut, and yet the bottom could not be controlled. Four times as much open cut was made as had been anticipated.

A concrete slope with a floor 30 in. thick at the rock end and 17 in. thick at the surface with intermediate thickness pro-

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portional was constructed in two weeks and the slope backfilled, but even then it was difficult to hold the structure in place. The sides were 18 in. thick at the bottom and 15 in. at the top, and the center wall was 12 in. wide throughout. There are two compartments, one 8½ ft. wide, the other 6 ft. wide and both 7 ft. high, with 4-ft. openings every 20 ft. between them. Ninety-five tons of reinforcing iron was used.

The rock slope is 16 ft. wide and 7 ft. high. Rock, after drilling with jackhammers having patent bits, was shot down with a gelatin permissible, lifted by a loading machine and placed on a flight conveyor and delivered thereby to a belt conveyor. The flight conveyor was extended by 6-ft. sections to 150 ft., after which it was shortened, and the belt conveyor similarly extended. In 24 hours, 22 ft. of advance was averaged, though sometimes 30 to 33 ft. was driven by the three shifts, each of which comprised four men and a boss.

A main heading was started with a 60-ft. radius curve, diverging 60 deg. from the material compartment of the slope, which it left by a vertical curve of 60-ft. radius, traveling 100 or 200 ft. where crosscuts were started to pick up the haulage headings and aircourse, which were driven backward toward the slope. All these were made 10 ft. wide with crosscuts of equal width at 60-ft. centers, and the headings had an equal spacing.

Under the second, or haulageway, heading a 4-ft. hole was driven upward from the slope. The men worked on the rockpile without scaffolding, as the height was only 25 ft. This waste was later removed by a mobile loader feeding to a flight conveyor, and this in turn to the belt. This hole was enlarged to form a hopper holding about 100 tons, and the material thus dislodged was chuted to the belt, which meantime had been extended. Material falling from the end of the belt at the surface was removed by a 7-yd. scoop pulled by a diesel tractor. A hopper under the third heading will be of 300-ton capacity, for here the rock slope is 45 ft. below the coal.

Buckhorn's 15-Ton Cars

Drop-bottom cars holding 10 tons water level and 15 tons with 10-in. sideboards 21 ft. long, 7 ft. wide and 54-in. high will shuttle between the hoppers and the mother belts within the mine. The heading in which the first mother belt was to operate, however, was first extended by drag flight conveyors 300 ft. and thereafter the mother belt was installed to receive coal from the drag flight conveyor, which is standard for this mine, 15 in. wide, extensible 6 ft. at a time and driven by a 20-hp. motor. If extended 400 ft., these conveyors are jerky; hence 300 ft. is the usual limit to their extension.

Rooms leave the entry on both sides, and coal is brought to the heading conveyor by a flight conveyor in each room. Cross conveyors bring the coal from the flight conveyors in the side headings to the central heading. One loading machine is provided for driving the three headings and one for driving each of the group of four active rooms on either side; thus there are three such units in each entry. Spacing between room centers will be 50 to 80 ft., as future experience dictates, and checkerboard methods will be used with an expected recovery more than normal, as

C. A. Gibbons

Nominee for Chairman Coal Division, A.I.M.E.

speed of advance will be unusually fast.

Shortwall cutters will have to cross the conveyors from room to room, and for this a transfer truck on endless tracks is used. Tramming is effected by two motors, each driving one of the endless tracks with individual control on each motor, thus permitting the transfer truck to be turned like a tractor. Electric drills travel on a rubber-tired cart which is readily moved by hand. Material is delivered by rubber-tired pushcarts, but a rubber-tired storage-battery tractor will be used pulling several semi-trailers with similar wheels, which will be taken by the tractor from the trailer trip one by one, leaving them in the working places for unloading.

Airdox, which is used so that coal can be brought down on shift, is operated by air piped into the territory instead of taking a compressor to the face. A hydraulic snubber also has been under test for six months. It has a rubber tube incased in a woven sheath which is placed in the hole instead of the Airdox container. A 7½-hp. pump puts a pressure of 2,500 lb. per square inch in one minute on the water, driving it to the rubber tube through a flexible pressure hose.

Coal Division Nominations

C. A. Gibbons, general manager, Susquehanna Collieries Co., Nanticoke, Pa., has been nominated for chairman of the Coal Division of the American Institute of Mining and Metallurgical Engineers for 1939. Other nominees are: vice-chairman, C. E. Lawall, acting president, West Virginia University; executive committee members for three years, H. L. Griffin, mine superintendent, Lafferty mine, Hanna Coal Co., Lafferty, Ohio; H. F. Hebley, advisory engineer, Commercial Testing & Engineering Co., Chicago; H. H. Otto, mining engineer, Hudson Coal Co., Scranton, Pa. The following are nominated for directors of the parent body: A. B. Jessup, mining engineer, Waverly, Pa.; and L. E. Young, vice-president in charge of operations, Pittsburgh Coal Co., Pittsburgh, Pa. Election of those in nomination is customary. Ballots will be counted Nov. 7.

One room will be loading, one cutting and one drilling and shooting. A fourth will provide opportunity for those who get ahead of the schedule or are idle because service has been disjointed in advancing the conveyors. Rooms will be 300 ft. long, and panel entries 2,000 ft. Small hoppers or a suitably arched end overhanging the car may be placed at the discharge end of the mother conveyor, so as to permit a cessation of loading when one car is filled and the next is not yet in place. Another system is to use button control and stop all the conveyors, starting them again with a short time delay to prevent peaks.

Improvements in rotary dumps and use of crushers to reduce strip coal about to be fed to tipple belt were described by N. L. Davis, Link-Belt Co. A slope conveyor usually is preferable to a skip hoist where the coal seam is less than 500 ft. below the level of the preparation plant. Heat-dryer installations will not oxidize the coal if no particle of the latter exceeds a temperature of 140 deg. F. and exposure to this heat does not exceed 4 or 5 minutes.

Weighted average cost of hauling raw coal from a strip pit to the tipple by motorized haulage per round trip follows a hyperbolic curve and averages $0.039 per ton for ¾ mile to $0.169 for 8 miles, stated A. L. Toenges, U. S. Bureau of Mines. Rail-haul figures also follow a hyperbolic curve and average $0.052 for ¾ mile to $0.132 for 8 miles. The costs cover operating and repair labor, supplies and road or track maintenance—but not fixed charges, depreciation, amortization, interest and insurance. Heavy gradients caused by local dips affect rail haulage much more than motorized haulage. Thin coal increases the cost materially, as there is less coal to pay for rail movement and road repair.

With dual haulage and labor and supplies at the transfer station charged to operating costs, the average cost per ton is only $0.046 for 2.7 miles to $0.058 for 9 miles, because here the road runs between established points. If 10-ton cars are hauled in a train the cost is $0.081 per ton; 30-ton cars can be hauled for $0.034 per ton. If the round-trip is less than 2.7 miles, operating cost of motorized haulage is less than rail haulage. Motorized haulage interferes less with the shovel than rail haulage, as the spoil does not have to be carried over the pit tracks, thus shortening the shovel cycle. Rail shifts also reduce tonnage because car spotting interferes with the regularity of loader-shovel operation except where circle haulage is provided.

Limit Fineness of Rock Dust

The more finely rock is ground, to form rock dust, the more effective it is until a limit of 70 per cent of 200-mesh dust is reached, asserted H. P. Greenwald, supervising engineer, experimental coal-mine section, U. S. Bureau of Mines, at the safety session, over which Gordon MacVean, Mine Safety Appliances Co., presided. With modern grinding machinery the requirement of the Recommended American Practice that all the dust shall pass a 20-mesh screen is superfluous, as dust 70 per cent of which will pass a 200-mesh usually will pass 99 per cent through a 60-mesh screen.

Since rock dusts containing not over 2 per cent of combustible matter usually are

available in most mining districts, the requirement of the Recommended American Practice of 5 per cent is not severe. The limit of 25 per cent on free silica, however, doubtless is too high. Drastic revisions downward may be expected when research studies now under way begin to bear fruit. In July, 1935, the Public Health Service declared that where men are repeatedly exposed to breathing the dust, less than 5 per cent of free and combined silica is preferable. This restriction is not burdensome where pure limestone or gypsum is available locally, but in some districts it may involve more distant transportation.

Coal dust resists wetting, added Mr. Greenwald, but when mixed with rock dust the whole mass may become wet. To some extent a thin sprinkling of coal dust will bind itself to wet rock dust, but it is likely to remain dry and dispersible, whereas the rock dust cannot be raised in a cloud. Some rock dust when wetted and then dried will be almost as dispersible as when freshly ground, but other rock dust will be caked into a solid mass. Pure high-calcium limestone dust and pure dolomite cake the least, but, in general, impurity increases caking characteristics. Gypsum and shales cake unduly.

In connection with tests of rock-dust explosion barriers a limestone dust treated with a water-repellent substance has been brought to the Bureau's attention. Apparently, each particle of rock dust is coated, and the dust is then as difficult to wet as coal dust, and if it is wetted by vigorous agitation with water, it dries without caking.

Table III—How Much Incombustible Dust Should Be Present*

Volatile Content of Coal†	Percentage of Incombustible Required When Percentage of Methane in Air Current Is		
	None	1 Per Cent	2 Per Cent
14	14	31	48
17	31	45	59
20	47	58	68
22	58	66	75
25	61	69	77
40	61	69	77
43	63	70	78
49	69	75	81

* Based on the percentage of incombustible dust required in coal-mine dust to prevent propagation of an explosion under conditions of test in the Experimental Coal Mine.
† Moisture-and-ash-free basis.

Silicates are damaging to health. Only pure sulphate and carbonate dusts are suitable. Of the first, only gypsum and anhydrite have commercial possibilities, and in the United States they are, in most cases, generally more expensive than limestone. Limestones are preferable to gypsum and anhydrite when places are damp or humid, for, in that event, the sulphates cake and become less dispersible than limestones. Waterproofing with a moisture repellent appears the best solution with both carbonate and sulphate dusts.

In the Recommended American Practice, it is urged that enough rock dust be maintained so that, in the absence of methane, the incombustible material shall constitute 55 per cent of the dust and that 10 per cent additional shall be present for each 1 per cent of firedamp. Table III shows a more satisfactory basis for rock-dusting. This table, Mr. Green-

wald pointed out, shows that (1) under the test conditions used the minimum incombustible content set by the Recommended American Practice is inadequate for coal containing 22 or more per cent of volatile matter on a moisture-and-ash-free basis, and (2) that the quantity of added incombustible material required to offset a given percentage of firedamp decreases as the volatile content of the coal increases.

Relating his experience with rock dust since he had gathered dust, which promptly turned to mud, from the highway in 1917, John E. Jones, safety engineer, Old Ben Coal Corporation, described his system of bag barriers (*Coal Age*, October, 1938, p. 40). A resolution that the Recommended American Practice on rock-dusting be revised and that the A.I.M.E., sponsor for the old code, be sponsor for the revision, was passed by the meeting.

Outbursts of coal, stated C. G. Brehm, supervisor of safety and compensation, Susquehanna Collieries Co., frequently occur at the face in the southern anthracite field, where the coal is 1,300 ft. below the sea. To avoid these bumps, face batteries, a line of posts, are set against the face of the steeply pitching chamber. Illustrating his paper with lantern slides, Mr. Brehm showed a battery with seven posts and also a door short of the last crosscut in the gangway with an air box extending from the door almost to the face of the gangway to compel the air to travel to the end of that heading and to return thence to the crosscut.

Takes Fireboss With Him

No advance notice is given of colliery visits by the company safety inspectors. On the occasion of the visit, the inspector selects a fireboss or section foreman to accompany him, covers that official's district in his inspection and notes the safety of workings and attitude and action of the foreman or fireboss with respect to safety. A detailed report of sections visited is made on a form which on one side shows criticisms leveled at the mine condition and on the other side the comments of the mine foreman as to the action taken to correct the deficiency and see that the offense will not be repeated. The inspector also questions the fireboss as to the latter's opinions on safety matters, talks with the miners, observes their work and counsels them.

The safety department keeps a card file showing the record of every foreman and fireboss. One side of the card records the result of the safety inspection, date and number of criticisms made and a summary of these; the reverse side is a record of all accidents. Hence district can be compared with district and one period in a district with another.

Daily five-minute safety meetings are held by firebosses with their men at the firebosses' stations in the mines. In each section of the mine a slate shows the number of working days of that section since the last lost-time accident. A mine opening, or more than one, or a subdivision of an opening, depending on the number of men employed, is designated a "unit." At the close of every three-month period, each employee of the unit with the best safety record who has not suffered a lost-time accident during the period is permitted to draw for a substantial cash prize.

Since the present safety organization

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WEBSTER IS ON THE JOB

Order received from one of the largest coal operators Wednesday evening at 6:30 for 378 feet of flight conveyor with 48" x 12" welded steel flights mounted between two strands of 18" pitch steel bar bushed roller chain, complete with cast steel head sprockets and cast iron chilled foot sprockets.

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Shipment was promised not later than a week from the following Friday. Shipment (24,000 lbs.) was actually made Wednesday noon or in less than ONE WEEK from time order was actually secured.

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SIGNAL by turning the crank — then TALK and LISTEN over this *voice-powered* telephone that needs no external power! Developed by Bell Telephone Laboratories, the transmitting — receiving — signaling unit measures 3" x 3" x 2½", weighs 1 lb. 14 oz., is easily carried in your pocket. It can be connected to the line in a matter of seconds — provides high quality transmission over many miles.

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Gentlemen: Please send me bulletin describing the new Western Electric 10A Voice-Powered Telephone.

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Permissible Plates Issued

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

Sullivan Machinery Co.: Type 9-B top-cutting machine; 25-hp. motor, 220, 440 and 500 volts, a.c.; Approvals 354 and 354A; Sept. 22.

Ray-O-Vac Co.: Ray-O-Vac B-3 dry-cell-type blaster; Approval 1214; Sept. 27.

Ray-O-Vac Co.: Ray-O-Vac F-2 dry-cell-type blaster; Approval 1215; Sept. 27.

was instituted, June 1, 1931, compensable accidents have dropped consistently from 27.13 to 16.95 per 100,000 net tons of fresh-mined coal and fatal accidents with equal persistence from 0.30 to 2.03 on the same basis. Final figures given are for 1936.

Trade Literature

CENTRIFUGAL PUMPS — Lawrence Machine & Pump Corporation, Lawrence, Mass. Bulletin 201-2 (4 pp.) gives specifications and diagrams on double-suction horizontally split type, citing wide range of adaptability.

EARTH-MOVING EQUIPMENT—R. G. LeTourneau, Inc., Peoria, Ill. Folder Form No. B-303 cites broad range of usefulness of new 15-yd. buggy for bulky material. Form G-1009, entitled "Stay in Business," gives job stories and pictures showing equipment in action in a variety of fields. Form G-1011, entitled "The Handiest of All Tractor Tools," describes numerous ways in which "Angledozers" and "Bulldozers" can be used to speed construction jobs, clear rights of way and maintain roads. Form R-305 tells briefly how "Rooters" break up old road surfaces, shatter concrete and loosen hardpan and rocky formations for easy "Carryall" loading.

ELECTRIC MOTORS—U. S. Electrical Motors, Inc., Los Angeles, Calif. Form 938 (4 pp.) describes the company's uniclosed motor. Form 731 (4 pp.) details the advantages of asbestos insulation in U. S. motors.

FLEXIBLE COUPLINGS—Poole Foundry & Machine Co., Baltimore, Md. (Catalog 38, 70 pp.). Gives data, tables and descriptive information on flexible couplings, including explanation of their value and advantages.

FUSE WEDGES—Electric Controller & Mfg. Co., Cleveland, Ohio. Bulletin treats of "Loctite" units designed to solve the fuse-pressure problem.

GEARS AND GEAR UNITS—Farrel-Birmingham Co., Inc., Ansonia, Conn. (80 pp. catalog, illustrated). Gives valuable information on the various types of speed-reducing and speed-increasing gear units and related products manufactured by the company.

HAULAGE LOCOMOTIVES—Goodman Mfg. Co., Chicago (Bulletin H-377, 28 pp., illustrated). Presents the company's line covering the haulage field from small single-motor units to large three-motor types; includes engineering data and specifications.

MINE-CAR DUMPING AND CONTROL DEVICES—Mining Safety Device Co., Bowerston, Ohio. Catalog (24 pp.) describes and pictures various types of Nolan patent devices, outlining their advantages and listing representative users. A 6-pp. folder, devoted entirely to rotary car dumpers, tells of special features.

PYROMETERS—Bacharach Industrial Instrument Co., Pittsburgh, Pa. Bulletin 300 (8 pp.) pictures and describes method of operation of the company's optical pyrometer. Bulletin 299 and Leaflet 301 tell of the features and uses of the ardometer.

ROLLER-BEARING PILLOW BLOCKS—Shafer Bearing Corporation, Chicago. Bulletin 521 gives description, specifications and load ratings for "Super Sealed" units.

ROOMBELTS—Goodman Mfg. Co., Chicago (Bulletin C-383, 4 pp.). Gives description and summarizes advantages of the 95AR18 unit.

SHOVELS—Bay City Shovels, Inc., Bay City, Mich. Twelve-page booklet entitled "Compare" reviews the features in modern shovel design and construction which result in greater yardage and higher safe crane loads.

SPEED CONTROL—Reeves Pulley Co., Columbus, Ind. (Catalog G-384, 124 pp., illustrated). Covers complete line of Reeves variable speed control equipment, including variable speed transmission, variable speed motor pulley, and Motodrive. Engineering data, dimension drawings and illustrations of installations and uses are included.

Quick Dividend

In a Pike County (Kentucky) mine of the Eastern Coal Corporation, Fred Williams, a young miner, rescued and revived Ted Simpkins, a mine dispatcher, when the latter touched a live wire and was rendered unconscious. Only a short time previous, Williams had completed a first-aid and mine-rescue course under Simpkins, which he put to use in aiding his former teacher.

Coal-Mine Fatality Rate Maintains Low Level

Accidents at coal mines of the United States caused the deaths of 64 bituminous and 12 anthracite miners in August last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 28,280,000 tons, the death rate among bituminous miners was 2.26 per million tons, compared with 2.71 in the corresponding month of last year.

The anthracite fatality rate in August last was 4.69, based on an output of 2,774,000 tons, as against 3.44 in August a year ago.

For the two industries combined, the death rate in August last was 2.48, compared with 2.76 in August, 1937.

Fatalities during August last, by causes and States, as well as comparable rates for the first eight months of 1937 and 1938, by causes, are shown below.

COAL-MINE FATALITIES IN THE UNITED STATES IN AUGUST, 1938, BY CAUSES AND STATES

	Underground										Open-cut and Surface					
State	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Mining Machines	Other Machinery	Suffocation	Other causes	Total Underground	Mine cars	Railway cars	Machinery	Electricity	Other causes	Total Surface	Grand total
Alabama	2	..	..	....	..	..	....	....	..	..	2	....	....	..	..	..	..	2
Arkansas	..	..	..	....	..	..	....	....	..	..	....	....	....	1	..	..	1	1
Colorado	..	..	2	....	..	..	....	....	..	..	2	....	....	..	..	..	..	2
Illinois	4	1	..	....	1	..	....	....	..	1	7	....	1	..	..	..	1	8
Kentucky	4	..	2	....	1	..	....	....	..	..	7	....	....	..	..	..	..	7
Missouri	1	..	..	....	..	..	....	....	1	..	2	....	....	..	..	..	..	2
Ohio	1	..	..	....	1	..	....	....	..	..	2	....	....	..	..	..	..	2
Oklahoma	..	..	1	....	..	..	....	....	..	..	1	....	....	..	..	..	..	1
Pennsylvania (bit.)	5	..	3	....	1	..	....	1	..	..	10	....	....	..	..	1	1	11
Tennessee	2	..	1	....	..	..	....	....	..	..	3	....	....	..	..	..	..	3
Virginia	4	..	..	....	..	..	....	....	..	..	4	....	....	..	..	..	..	4
West Virginia	9	..	6	4	..	1	1	....	..	..	21	....	....	..	..	..	..	21
Total (bituminous)	32	1	15	4	4	1	1	1	1	1	61	....	1	1	..	1	3	64
Pennsylvania (anthracite)	7	....	1	1	2	..	....	....	..	..	11	1	....	..	1	..	2	15
Total	39	1	16	5	6	1	1	1	1	1	72	1	1	1	1	1	5	77

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–August, 1937 and 1938

	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
	1937	1938	1937	1938	1937	1938	1937	1938	1937	1938	1937	1938
Falls of roof and coal	386	271	1.339	1.336	87	88	2.589	2.994	473	359	1.470	1.546
Haulage	154	88	.534	.434	19	15	.565	.510	173	103	.537	.443
Gas or dust explosions:												
Local	10	17	.035	.084	...	2	.....	.068	10	19	.031	.082
Major	47	60	.163	.296	...	18	.....	.612	47	78	.146	.336
Explosives	30	15	.104	.074	9	9	.268	.306	39	24	.121	.103
Electricity	35	21	.122	.104	2	2	.060	.068	37	23	.115	.099
Machinery	22	12	.076	.059	2	...	.060	.....	24	12	.074	.052
Shaft	11	3	.038	.015	4	3	.119	.102	15	6	.047	.026
Miscellaneous	25	13	.087	.064	10	9	.298	.306	35	22	.109	.095
Stripping or open-cut	14	4	.049	.020	5	8	.149	.272	19	12	.059	.052
Surface	43	19	.149	.094	13	7	.387	.238	56	26	.174	.112
Total	777	523	2.696	2.580	151	161	4.495	5.476	928	684	2.883	2.946

* All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

SAFETY CAR STOP; TRANSITION RAIL

A new malleable-iron car stop is offered by the Portable Lamp & Equipment Co., Pittsburgh, Pa. Essentially, the stop consists of five individual malleable-iron castings and a ⅝ - in. - diameter rolled - steel hinge pin assembled as a complete unit. Height of the stop over the rail is 3 in. The base is secured to the rail by a special malleable-iron clamp plate and wedge. The stop

member is hinged to the base and can be thrown off the rail when not in use. Lugs on base and stop member prevent the latter from being thrown off the rail by shock or accidentally, and therefore it stays in position to repeat its function on the rear wheels of a car if it should become necessary.

Portable Lamp & Equipment also announces a new "Transition Rail" for joining two different-sized mine rails into one smooth member of great strength. Over-all length of the member is 24 in. Features

cited by the company include: perfect joints at each end; no necessity for rights and lefts; and use of standard fishplates or angle bars in making connections, as well as reinforcing the member its entire length. Bonding is accomplished with a continuous bond around the transition rail. Standard stock sizes include: 60- to 40-lb., 60- to 30-lb., 60- to 25-lb. and 40- to 25-lb. rails. Other sizes are available on request.

ARC-WELDERS; SWITCH

A new 150-amp. d.c. single-operator arc-welding unit has been announced by the General Electric Co., Schenectady, N. Y., as an additon to its line of equipment for light-gage work. Adjusting range varies from 20 to 200 amp. at 25 volts. High instantaneous recovery of voltage is said to prevent pop-outs with any good bare, lightly coated or heavily coated electrode. High stability is declared to prevent excessive current surges. A three-point selector switch and an easily operated intermediate dial are provided for current adjustment.

For low-current welding with heavily coated a.c. arc-welding electrodes General Electric also offers a new 150-amp. a.c. welder of the transformer type. While intended chiefly for light-gage metals, its 35- to 180-amp. range is said to permit its use on fairly heavy materials as well. Power costs are said to be reduced 50 per cent as compared with rotating welders. Troublesome arc-blow also is avoided, it is stated. A choice of two open-circuit voltages (80 and 100) is provided to permit using all types of a.c. electrodes.

A new a.c. magnetic switch (CR7006-D51) is another General Electric development for full-voltage starting of single-, two- and three-phase motors. Basically, the switch consists of a line contactor with interlock to provide undervoltage protection and two isothermic temperature overload relays to protect the motor against overheating. These elements are mounted in a general-purpose sheet-steel case. The open-type switch is furnished with a rigid mounting plate. Principal features cited by the company, in addition to small size, are conservative electrical design, long mechanical life and low maintenance cost.

CELL FILLER

Electric Storage Battery Co., Philadelphia, Pa., offers the new Type LV Exide cell filler, said to eliminate guesswork, simplify and speed up the filling operation, promote neatness and insure filling to the proper level. The device consists of a hard-rubber nozzle in which is molded a set of electric contacts and a filler pipe. A handle is mounted on the filler pipe and behind the handle is a Lunkenheimer hand-operated valve to which the water hose is connected. The electric wires pass from the nozzle contacts into the handle and from there to a signaling device — either a

lamp or a buzzer on the cell-filler handle.

Power for the operation of the signaling device may be taken from the battery being filled or from a separate dry battery. The filler is made in two standard lengths, the distance between the center of the handle and the center of the nozzle on the short filler (Type LV-14) being 14 in., and on the long filler (Type LV-21), 21 in. The short filler is said to be more convenient where there is ample headroom, while the long filler is better where the top is low and where there is considerable distance to the cells in the rear of the battery compartment.

D.C. DISTRIBUTION; STRAIN CLAMP

Ohio Brass Co., Mansfield, Ohio, offers a new "Wedge-type" rail bond stated to be especially designed for mine installations where a high degree of permanency with easy reclamation is desired. The bond is available in 2/0 and 4/0 copper strand in any desired length. Semicircular copper terminals are slipped into holes in the web of the rail. Then a hardened steel wedge is

driven in to fasten the terminal and give a tight mechanical and electrical joint. To reclaim the bond, terminal and wedge are driven out with a few blows of a hammer.

For drilling holes to accommodate the terminals of wedge bonds, and for other rail-drilling work, Ohio Brass has developed a portable power-driven drill adjustable for all weights of rail. The drill is regularly available for line voltages of 250 and 600 d.c., and will handle both ⅝- and ¾-in. drills. The motor is a standard 1-in. drill motor. The drill rides along the track on four wheels and may be operated conveniently in low coal, the company states.

Another Ohio Brass product is a new "Bulldog" feeder clamp with clamp-type terminal. It is available in two styles, one for 0 to 6/0 grooved

and Fig. 8 wire, and one for 3/0 and 4/0 round wire. Clamp jaws open and close to accommodate the wire when the clamp nut is turned. The adjustable terminal is operated by means of a setscrew and will accommodate a wide range of feeder-tap sizes. Both clamp jaws and feeder terminal are made of bronze.

To provide for dead-ending high-tensile-strength ground wires and conductors in long-span heavy-load construction, Ohio Brass has brought out a heavy-duty clamp in the "Hi-Lite" design. Ultimate strength is 32,000 lb. and the clamp will develop in excess of 90 per cent of the ultimate of high-strength ground wires, according to the company. With liners, the clamp will take cables from 0.273 to 0.54 in.; without liners, 0.8125 to 0.625 in.

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DUMMY FILLER

A patent on a new machine for filling tamping bags has just been granted to Harry S. Gay, general manager, Gay Coal & Coke Co., Mt. Gay, W. Va. The machine consists of a hopper into which dummy-filling material (screened clay, sand, rock dust, etc.) is placed. A worm, brought into service when a foot pedal is depressed, starting a motor, feeds the material out through a tube just large enough and long enough to accommodate the tamping bag, which is slipped over it. As the bag is filled it is pushed back from the hopper and when full is taken off, either with or without stopping the worm, depending upon the dexterity of the operator. Capacity of the machine, it is stated, is 15 to 20 bags a minute. The filling machine is made by the Guyan Machinery Co., Logan, W. Va.

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LABORATORY MILL

O. B. Wise Co., Knoxville, Tenn., announces a new laboratory mill. Designated as the Model No. 2, this new mill is stated to have double the capacity of previous Wise laboratory coal crushers, or 50 lb. per minute through a ¾-in. screen. The crushing mechanism consists of three swinging hammers weighing 3½ lb. each operated at 3,400 r.p.m. through a double V-belt drive by a 2-hp. motor. The feed opening measures 6x11 in. Shipping weight is 350 lb.

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METALLIZING GUN

Metallizing Engineering Co., New York City, offers a new lighter-weight metallizing gun (Meteo Type E) said to be faster, more reliable and more economical to use, in addition to possessing improved spraying characteristics and simplified adjustments which facilitate the application of extremely fine coatings at production speeds, as well as continuous operation with maintained speed and quality. In metallizing work, metal wire is fed into the gun automatically, at the desired speed (determined by adjustment). In the gun, the wire is melted by an oxy-acetylene or oxyhydrogen flame, atomized by compressed air and sprayed on any base metal. The gun may be used either as a hand or a lathe tool.

Metallizing applications include building up of worn parts or the application of corrosion-resisting coatings made by atomizing various metals. In the coal industry, the company states, the equipment is used for the application of a zinc coating to conveyors, coal cars, mine doors and electric-motor housings to prevent corrosion, and for building up all types of worn bearings and shafts.

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ELECTRICAL AIDS

New Type U De-ion indoor air circuit breakers for both central-station and plant use in 2,500- and 5,000-volt ratings are offered by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to complete a line of medium-capacity indoor units with interrupting-capacity ratings from 75,000 to 500,000 kva., 25 or 60 cycles or other commercial frequencies. Type U breakers, according to the company, function entirely without oil or liquid in normal atmosphere, and are not dependent upon the maintenance of any medium such as air pressure or a vacuum. High-speed arc control, arc-resisting contacts, solenoid operation, universal-mounting arrangements and improved mechanical construction are said to assure low operating costs.

A new line of heavy-duty Type HD pushbutton stations suitable for use in corrosive atmospheres and in Class I Group D hazardous locations is another Westinghouse offering. The stations are said to be explosion-proof either with or without oil in them. They are available in from one to four standard pushbutton units of the momentary-contact type, or with maintained-contact units. In addition, stations are available with two- or three-position selector switches of either the single-pole double-throw or double-pole single-throw type.

For use with portable instruments and recorders, Westinghouse has developed the PV-130 portable voltage transformers, which may be employed for all portable and laboratory applications in delta connection, except for standards. An accuracy of ± ¼ per cent on ratio and 20 minutes on phase angle is provided under ordinary conditions of load and power factor, with 0.1 per cent and 3 minutes with special test data. Designed for 115 volts secondary, the small size for primary voltages up to 2,300 weighs 24 lb., while the large size, for primary voltages from 2,300 to 4,900, weighs 48 lb.

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EXCAVATOR

Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio, offers the new "Paymaster" convertible shovel, dragline, crane and pull-shovel. It is a ¾-cu.yd. shovel weighing 35,500 lb. When equipped as a clamshell or dragline, capacity depends upon length of boom and material handled. As a crane, the unit has a capacity of 11 tons. Emphasizing a number of new design features, the company states that the unit is exceptionally fast with ample strength for steady, dependable service in all kinds of work suited to a machine with a ¾-cu.yd. capacity. As a shovel the excavator is equipped with an 18-ft. boom and 15-ft. tubular dipper handle. The standard crane boom is 35 ft., to which inserts can be added to make the length 50 ft. Crawler treads are 22 in., with 30-in. treads if desired.

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GLOBE VALVE

A new brass globe valve (No. 237) for air installations where quick-opening quick-closing valves are needed, especially in mine air lines feeding air drills, is offered by the Crane Co., Chicago. Among the features of the valve are an apron on the wheel to protect the upper part of the valve from rough handling and a brass screen in the union connection at the valve inlet to keep out foreign matter. The valve is made in ¾- and 1-in. sizes and is recommended for a working pressure of 150 lb. The composition disk can be renewed quickly and easily, it is stated, and a spring maintains a constant load on the stuffing-box packing.