COAL AGE

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

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Safety Psychology

SAFETY is again in the industrial spotlight. For several weeks, the mining fields have been busy with elimination meets as a prelude to the Eighth International First-Aid and Mine Rescue Contest at Kansas City, Mo., Sept. 12-14. Later will come the Eighteenth Annual Safety Congress at Chicago, where industry as a whole will cast up the national profit and loss account for the year in accident prevention.

THESE GATHERINGS add a dramatic touch of color to the steady campaign to lessen the industrial toll on life and limb; they fire sluggish interest with a fresh burst of enthusiasm. To keep the flame burning after the curtain has fallen on these spectacles, however, is the task which stays with us. Continued success calls for dogged persistence of an unusual type and an intuitive knowledge of the springs which move men.

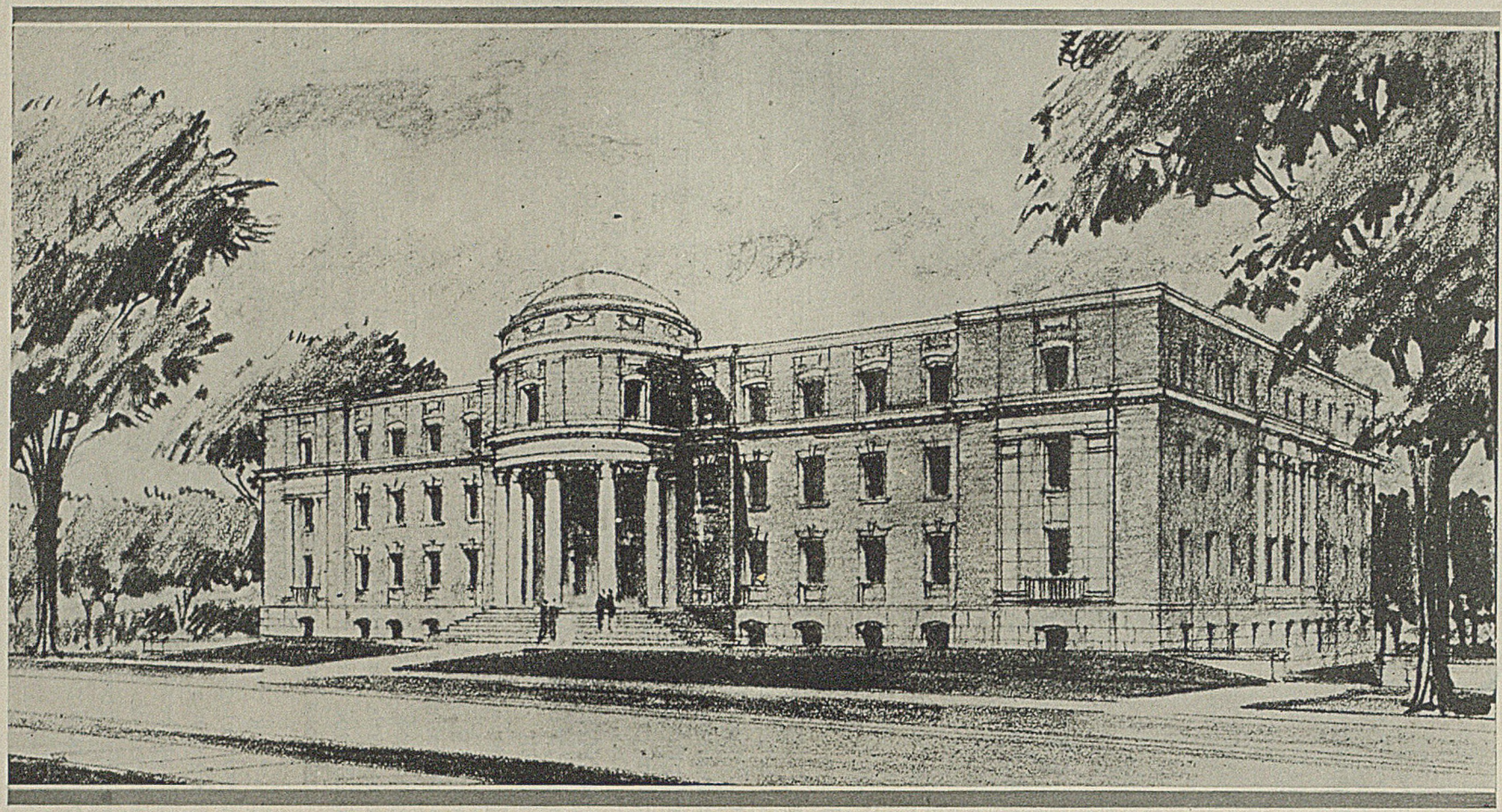
MORE THAN anything else, perhaps, is the need for a new psychology. In the commendable zeal to brighten a bad record, it was only natural that, at the outset, emphasis should have been placed on accident reduction. But the time has come to consider whether elimination should not be the goal.

THERE IS a subtle distinction here that means much in the psychological attack. With accident reduction the practical, if not the theoretical, goal, every reduction in the number of accidents is hailed as an achievement. But with accident prevention the goal, every accident becomes a blot on the record.

ACCIDENT-FREE operation may not always be attainable in a world in which familiarity with dangerous conditions breeds indifference and contempt. Nevertheless, the outstanding successes won by some companies and some individuals prove that the goal is not so chimerical as the unthinking might imagine.

WHEN some mines can run for several years without a fatality and for several months without a single disabling accident, it becomes pertinent to inquire whether the natural hazards of the industry are not sometimes stretched to cloak human and mechanical failings.

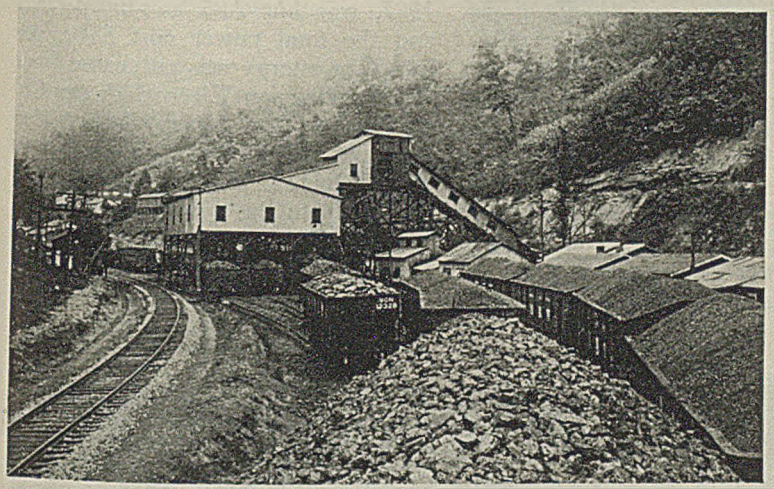
BETTER a goal hung high with the stars than one set so low that its winning is only a half-victory. Industries and men rise higher with reaching for the soaring prize.



Dedicated to Training for the Mineral Industries

Construction of a new home—the largest building on the campus—for training the coming engineers of the mineral industries of Pennsylvania has been authorized by Pennsylvania State College

What Makes a Low-Cost Mine?



In the Year Ending June 30, 1929, More Than 217,000 Tons Was Shipped

By J. H. Edwards
Associate Editor, Coal Age

RUMOR spread this word: "E. C. Minter, of Beckley, has a little mine over there which is one of the lowest cost operations that the engineers of the lately proposed smokless merger encountered." This "little" mine, however, is not as small as the engineer's description might imply—it averages 1,000 tons per day and at times produces over 1,100—but in a seam which averages only 48 in.

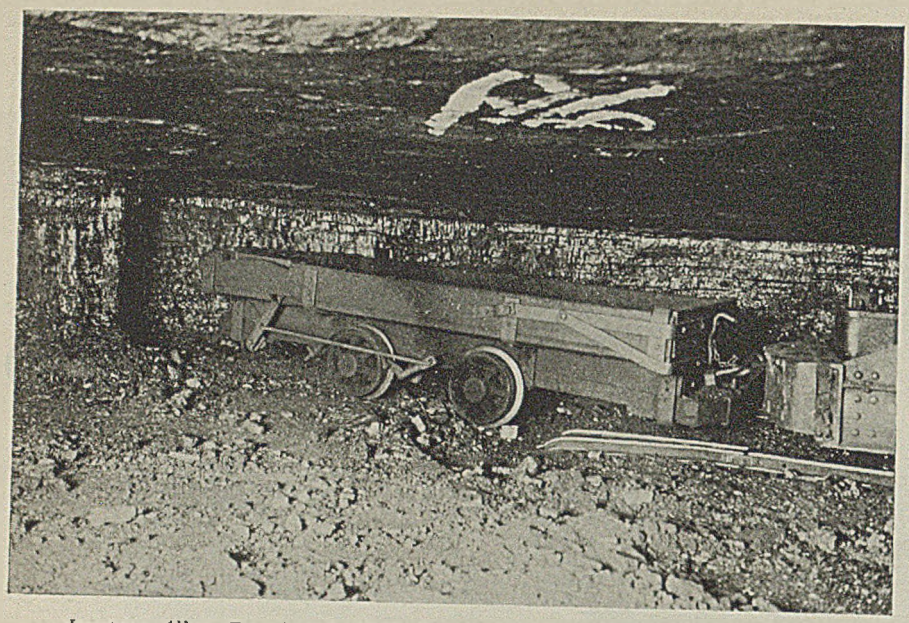
What are the equipment and methods which lift this operation out of the ordinary? A short talk with E. C. Minter, president, in his office at Beckley, W. Va., revealed the first clues. "We work only five days a week. With that schedule the miners will work regularly and they will work harder. It leaves ample time for keeping the machinery in first-class condition. We think that our equipment fits the working conditions. If it does not fit the seam, you cannot get the results." With this he turned me over to A. K. Minter, the mine superintendent.

Although the operation is but 20 miles by hard road from Beckley—it is at Rhodell, in the Winding Gulf field—A. K. Minter lives on the job, both in fact and figuratively. There was clue No. 2. The superintendent is a stockholder in the company, and he gives his time unsparingly to the work. It might be added that A. K. Minter practiced mining engineering before taking charge of the mine when it was being developed in 1921. He is a busy man, but does not make the mistake of trying to do everything himself. For instance, he has a commercial engineering firm do the mine surveying and mapping.

The mine is a slope operation in the Pocahontas No. 3 seam, which in this vicinity lies practically level. Generally speaking, the top is good; over part of the mine it is slate and over the rest sandstone. Near the top of the bed there is a 4-in. layer of bone which is discarded in the mine and on the picking tables. The mine bottom is fairly hard and a small influx of water adds to the advantage. Gas is seldom reported by the fireboss.

Rooms are driven 24 ft. wide on 60-ft. centers, and pillars are taken immediately upon completion of the room to the 250- to 300-ft. limit. Panel entries are limited to about 1,000 ft., or fifteen rooms, because top is not taken on these entries and more than that distance is considered too far for men to have to walk in the restricted height. For the most part pillars are worked open-ended by slabbing cuts made at an angle of 30 to 45 deg. with respect to the room center line. The cut is started at the exposed point of the pillar each time, so that the men are moving back toward the solid and safety. When dangerous top conditions dictate that work be abandoned temporarily to wait for a pillar fall, the men are shifted to take a few slabbing cuts from other pillars not exactly on the line of retreat. The average timbering cost for the entire mine is 3c. per ton. Ready-sawed wedge cap boards are purchased in order to eliminate the danger of miners cutting their hands if they made their own.

Two Jeffrey 35-B shortwall ma-



Jumpers Allow Running the Cars Onto the Bottom and up Against the Face

chines—these are the only two at the mine—cut the entire production excepting that mined by six men on pick work. The regular average is 442 tons per machine per day, an unusual performance on room and pillar work in 48-in. coal. Ample feeders, adequate bonding, careful inspection and repair of mining machines, and close supervision over each section of the mine make possible this high production per machine without spare equipment. The machines are equipped with 6-ft. cutter bars.

Fifty-five loaders produce the 1,000 to 1,100 tons per day. This is 18 to 20 tons per man. They do no track work but do their own drilling, shooting and timbering. The average is 42 day men inside the mine, including six section bosses. The latter supply the supervision which contributes in such a large measure to the general efficiency.

The haulage equipment consists of 165 cars, six 5-ton gathering locomotives and one 6-ton haulage locomotive. The maximum haul is 6,000 ft. and the average 5,000 ft. Grades on the main haulway vary. Some are in favor of, and some against the loads, but the average is approximately 0.4 per cent in favor of the load. Two of the gathering locomotives are Ironton with Edison batteries and four General Electric with cable reels.

Cars are loaded to an average of 1.57 tons each and the car turnover is 4.3 times per day. The car height is 28 in. above the rail and the track gage is 44 in. All places are equipped with Shinkle mine-car jumpers, so that the cars can be run off the end of the track and onto the bottom against the face. After the center of the cut has been loaded, two cars are placed for the miner. All cars are equipped with roller bearings and are regularly greased every four months with a power greaser. Steel ties are used exclusively in rooms and to some extent on entries.

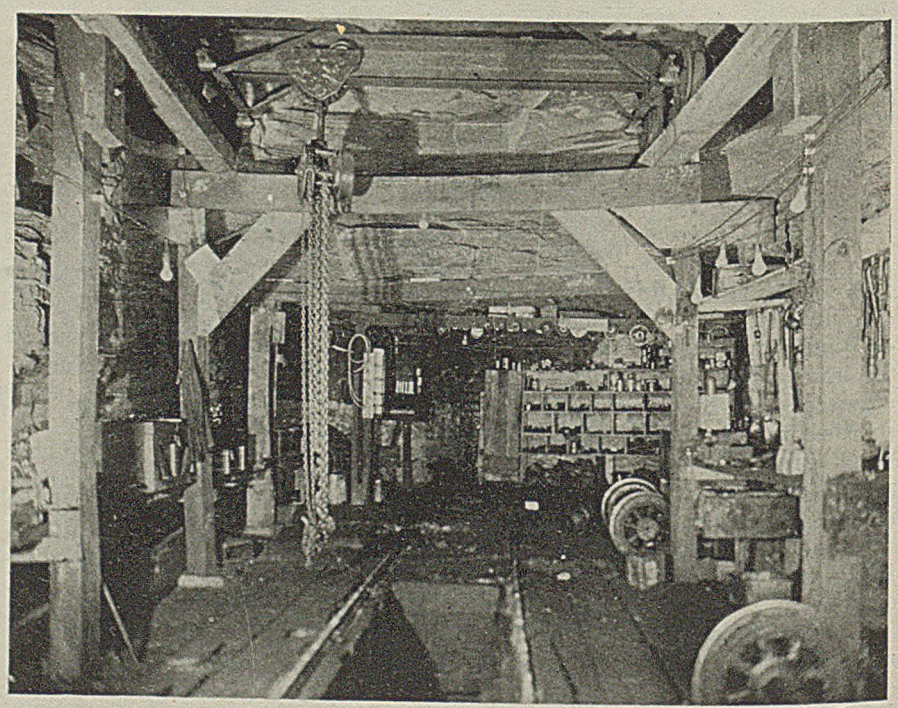
All tracks except those in rooms are laid with 30-lb. steel. In rooms, 20-lb. steel is used. Commenting on the track construction, A. K. Minter said that were he opening another mine with the same conditions he would use heavier rail and would adopt standard gage. His idea in using the larger gage would be to eliminate the flares of the mine-car sides, which construction, he asserts, is responsible for a large percentage of the repair cost.

Before going inside I asked A. K. Minter if he used mine telephones. "We couldn't get along without phones," was his laconic reply. "They are a necessity for regular operation and car dispatching, and come mighty handy in an emergency. Just lately, when a man was hurt in the mine the telephone enabled us to get a doctor before they got the man outside."

Although the mine is 100-per cent electrified the energy consumption for the fiscal year ending June 30, 1927, was but 2.85 kw.-hr. per ton and the total power cost 5.96c. per ton. The energy was purchased from the Appalachian Electric Power Co. and the total cost per kilowatt-hour averaged 2.09c. House lighting was not deducted in calculating these figures from the power invoice data.

One 150-kw. synchronous converter furnishes the 275-volt power for inside operations. The superior ability of a converter to handle high peak loads makes it possible to operate the mine with this one small unit. The substation, which is located on the outside near the tipple, contains another converter, a 100-kw. unit, which is held in reserve.

Adequate bonding and a regular



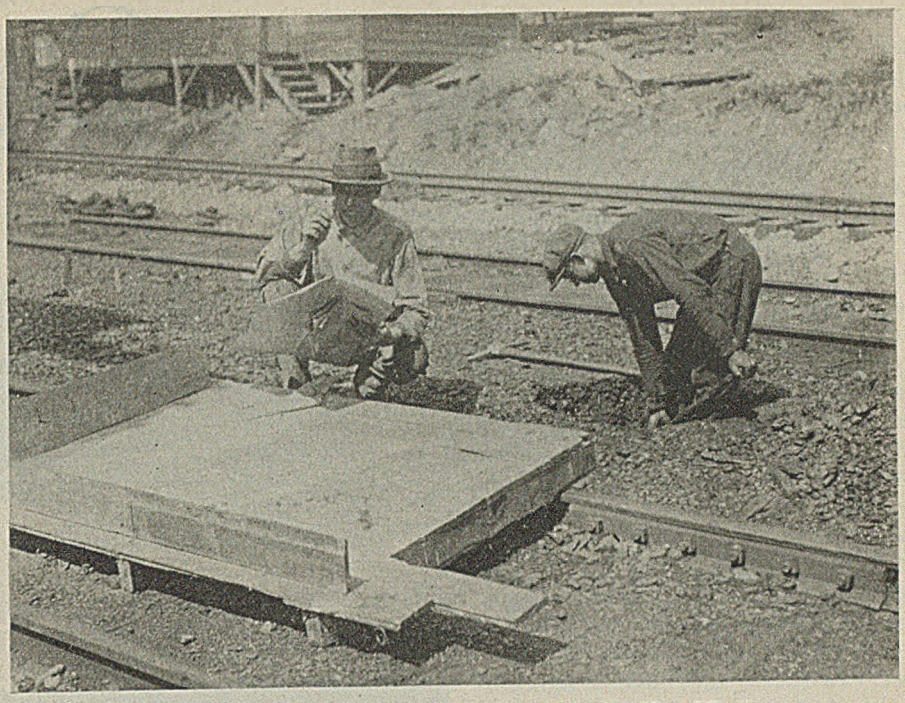
Bridge Crane for Chain Block Providing Maximum Flexibility Means Quicker and Better Repairing

schedule of inspection and maintenance are responsible in a large measure for the modest power consumption per ton of coal mined. Every Saturday a crew works on the bonding. Regular suspension of mining on that day presents an opportune time for efficient and safe work. Bonds of the steel terminal electric weld type are used. The bonding of both rails is continued to every room neck, and cross-bonds are maintained at points not more than 300 ft. apart.

"When a thing needs fixing, fix it; and it won't be a big job," was the way A. K. Minter expressed his policy regarding maintenance of all equipment. "And one thing I don't do," he continued, "is to question any repair material that the electrician wants. I order it immediately. All mine supplies, not including timber, runs from 6 to 8c. per ton."

Though there are but seven locomotives and two mining machines to maintain, the underground repair room is exceptionally well equipped. Instead of the ordinary monorail for the chain block above the pit, there is a bridge crane which allows movement of the 5-ton chain block in four directions.

One reason for the mine being known as "a small operation" is the few houses. There are but 40, averaging 4 rooms each, or 160 rooms, including the boarding house and official houses. Few day men are allowed houses and a married man cannot have a house until by tryout he has proved that he can load a satisfactory average. He must be able to load 12 cars per day in order to get a three-room house and 15 cars to get a four-room house. A single man must present a satisfactory excuse to justify a lay-off. Drunkenness, if observed personally by the superintendent, brings immediate discharge.



A. K. Minter, Superintendent, Studies Plans for the New Washer as Excavation Is Begun for the First Pier

Consideration for the health and comfort of the miners is shown by the maintenance of a bath house with individual lockers divided into two compartments, one for soiled clothes and one for clean clothes.

Coal is carried from a cross-over dump in the mine up to the four-track tripple by a 259-ft. drag flight conveyor the pitch of which averages about 32 deg. The tipple is of wood except that the Link-Belt screening equipment is supported by steel from separate foundations. The equipment includes adequate picking tables and three loading booms. Thirteen men make up the tipple crew, and eight of these, principally boys, do the picking.

On Aug. 15, the day I visited the mine, ground was broken for the piers of an addition to the tipple which will contain two 30-ton-per-hour Menzies Hydro-Separators. One will clean nut coal and the other junior egg.

Before leaving the mine I asked A. K. Minter his reasons for favoring a five-day working schedule. "Because we can mine as much coal in five days as we can in six. That gives us Saturdays for repairing equipment and cuts out all Sunday work. Personally I would like to see the whole field adopt the five-day schedule."

Continuing he said: "When I say we are shut down on Saturdays, it means exactly that. No coal is loaded. I do not believe in loading coal during a night shift or on days when the tipple is not running. Cars thus loaded do not in the end increase production; they merely cause delays on the next regular shift. When a string of cars is waiting to be dumped when the starting whistle blows in the morning it is about two hours before all of the loaders are supplied with empty cars."

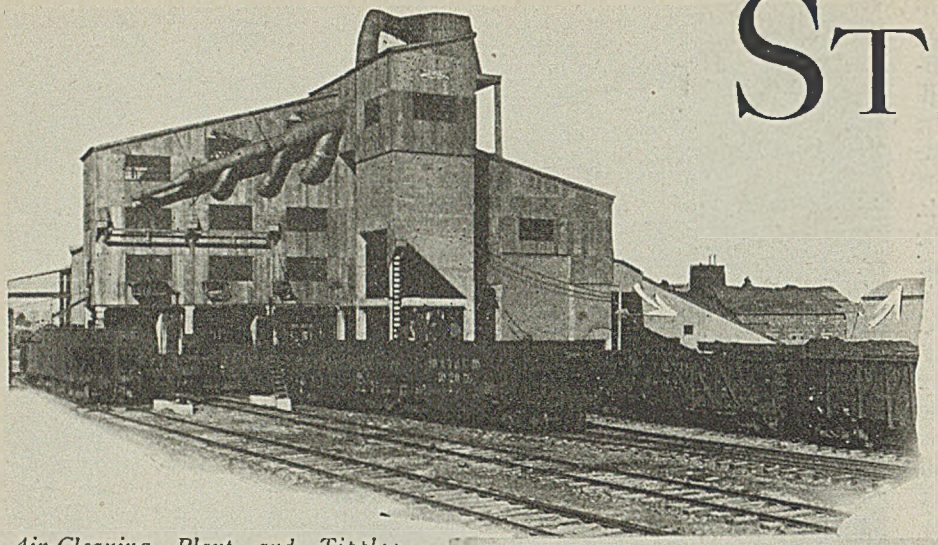
The Hudson Coal Company

BACK in 1921 *Coal Age* published its first Model Mining Number, in which the Springdale mine of the West Penn Power Co. was featured. Three years later the number gave the industry the benefit of an intimate trip on paper through the collieries of the Glen Alden Coal Co. This year, for the Ninth Annual Model Mining Number, *Coal Age* again turns to the hard-coal fields—this time to The Hudson Coal Co.

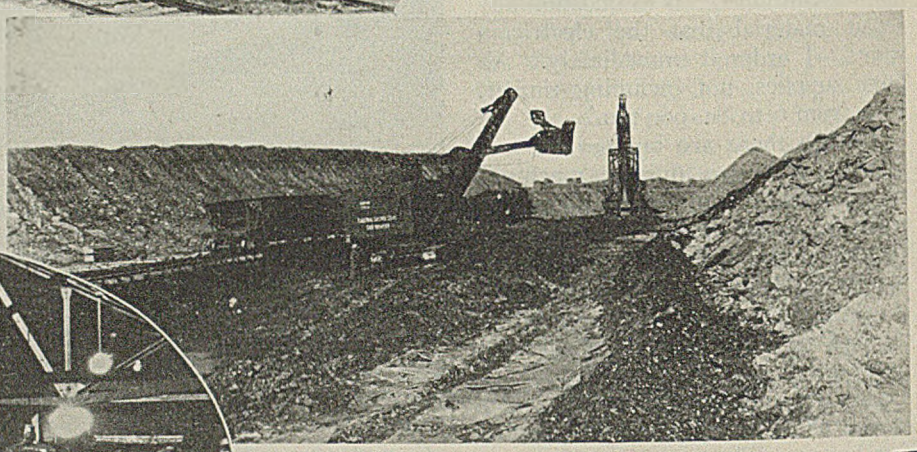
This company, the second oldest and one of the largest in the region, has an outstanding record as a pioneer in trying out new operating methods. It was among the first to install the new types of cleaning plants. It has been a leader in electrification. It has contributed much to the development of scraper loading, to improved shooting and blasting cycles, and to haulage.

The Ninth Annual Model Mining Number of *Coal Age*, to appear in October, will cover the whole sweep of the management and operations of this great company and will tell for the first time the complete story of the many developments which have given Hudson Coal its present position.

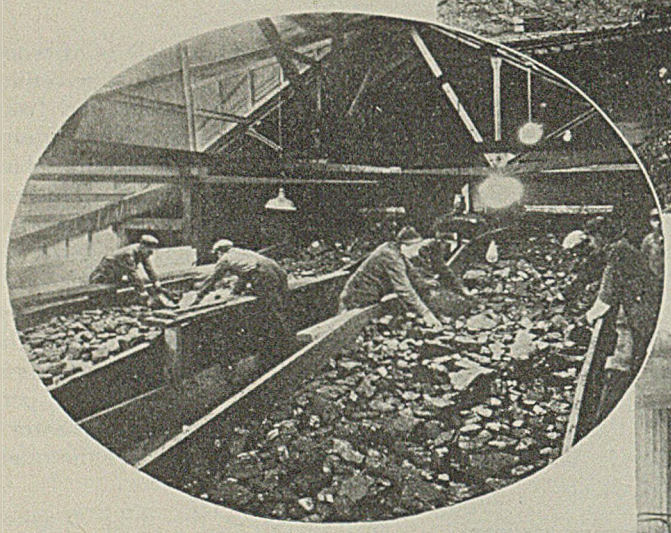
STRIP PIT



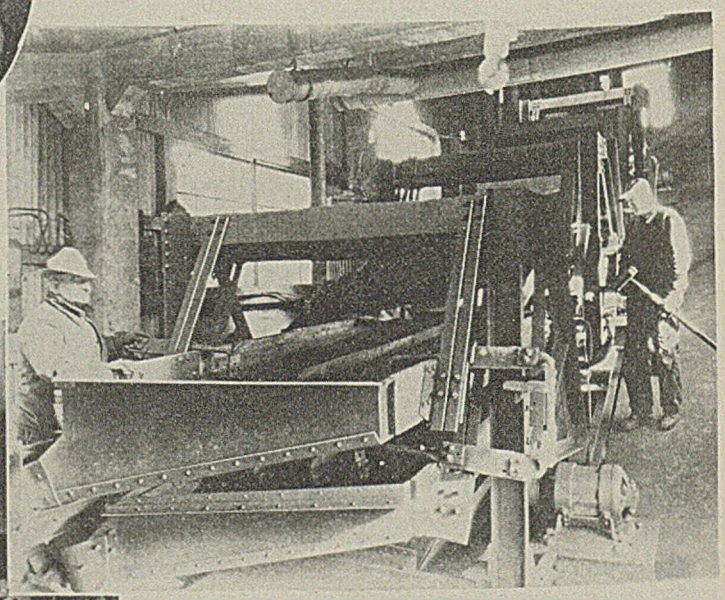
Air-Cleaning Plant and Tipple: Arrows Indicate Conveyor and Dump House Added to Pit Plant for Strip Mining



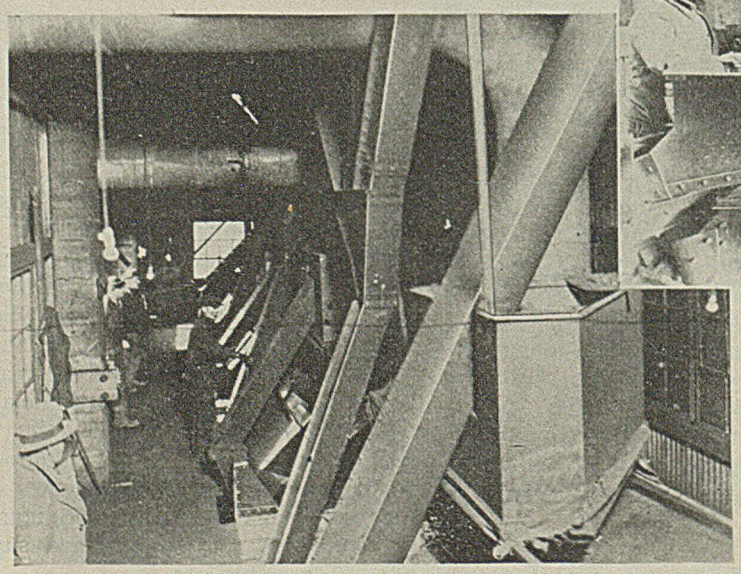
Loading 35-Ton Drop-Bottom Cars in Wake of 12-Yd. Stripper



Picking Everything Above 2 In.



Air-Cleaner Sizing Screens



Concentrating Tables in Operation

AIR-CLEANS *Its Fine Coal*

SOME have thought that air cleaners which require that the coal be closely sized before it is treated on tables are ill-suited to strip mines, because fine coal screens poorly when wet, which condition is sure to exist at times, to some extent at least, in open-pit mining. The Electric Shovel Coal Corporation, which is air-cleaning 2x⅛-in. coal from its Ayrshire strip pits at Arthur, in Pike County, Ind., is proving that the objection is by no means so vital as some have thought and that only during heavy rains is there any difficulty in the treating of strip coal.

Although practically new, this cleaning plant already has a history. It was built three years ago by the Ayrshire Coal Co. for the purpose of cleaning its mechanically loaded coal at No. 8 shaft, adjoining which was a large area of strip coal which the company sold in 1928 to the Electric Shovel Coal Corporation. Under the agreement between the companies, the No. 8 mine was closed down in July, 1928, the rails and equipment were removed, and the hoisting shaft was sealed with concrete.

The strip area acquired has an average overburden of less than 50 ft., some of which requires drilling and shooting. The coal mined is the No. 5 seam, with an average thickness of 60 in. and without any regular parting. The new owners are recovering this strip coal at the rate of from fifty to sixty thousand tons per month and are cleaning it at the Ayrshire plant, which, except for a number of mechanical changes, made with a view to improving the preparation of the coal, stands as it did when the same coal was being loaded by underground machines. To the tipple was added a housed mechanical dump pit for the 35-ton automatic drop-bottom standard-gage cars used in the pit, also a scraper conveyor extending from this dump to the point of feed on the shaker screens.

Though the preparation plant is provided with every facility for cleaning, the coal is handled with meticulous care in the loading pits. Following each of the type 5480 Marion 12-yd. electric stripping shovels is a caterpillar tractor with bulldozer scraping attachment. After this machine has removed all but the fine refuse from the top of the coal, men armed with high-pressure air jets sweep away every vestige that is left. Where necessary, a hand pick is used to dislodge tight material.

In this manner the coal is carefully cleaned on its upper surface before loading. Care is taken not to dig into the bottom when picking up the coal with the loading equipment. Marion 1¼-yd. Type 37 electric shovels are used for loading, and four Heisler steam locomotives handle the coal from pit to tipple.

The coal is not shot, which does away with the chilling effect which results from such shooting in other strip pits and which, tests have shown, reduces the heat value of the coal in close proximity to the powder blast.

The refuse to be removed at the tipple consists principally of pyritic sulphur. All coal above 2 in. is divided into two sizes and picked by twelve men on Marcus tables. A Bradford breaker will be installed soon to reclaim from the refuse of the picking tables the coal which clings to the pyritic materials.

Five Arms concentrating air tables designed originally for a total capacity of 100 tons per hour are in use. They handle the following sizes: 2x1¼, 1¼x¾, ¾x½, ½x⅜, and ⅜x⅛ in. Taking the product collectively, these reduce the ash content of the 2x⅛-in. coal to between 6.5 and 8 per cent, and the sulphur content to 1.95 per cent. The raw feed averages 10 per cent ash and 4.5 per cent sulphur. The inherent ash is 5.5 per cent. All tables are effective cleaning units, but the greatest quantity of refuse is removed from the 1¼x¾-in. and ¾x½-in. tables.

Smudging requirements in brick plants form the principal market for the minus ⅛-in. size, which is termed "duff." This coal is not air-treated. Most of it finds a market within sixty miles of the mine. As this duff does not normally carry over 12 per cent ash, it is highly satisfactory for use as powdered fuel.

For some time after the plant began to handle strip coal, the duff consisted of minus $\frac{1}{16}$-in. As this material at times was rather wet as it came from the pit, the cloth of the screen through which it was passed was electrically heated. Sixteen hundred amperes of alternating current at 12.5 volts was forced directly through the screen from copper bars by which the mesh was clamped at either end. In order to utilize a current of such low voltage, it was necessary to cut the screen lengthwise through the center and connect the two halves in series. The 220-volt power available in the plant was reduced by a 22.5-kva. transformer having secondary taps for 7.5, 10, 12.5 and 15 volts. When the screen was changed to ⅛ in., the electric heating was discontinued, it having been found that heat was not a necessary requirement for this mesh of screen.

A STRIKING feature of this air-cleaning plant is the small quantity of dust within and without the building. A cloud of dust resembling smoke might be expected to appear over the outlet of the centrifugal dust-collecting system, but none can be seen. The dampness of the coal and the fact that the minus $\frac{1}{16}$-in. material is not air-cleaned accounts for the absence of dust. The exhaust for all tables is furnished by a single fan, which is driven by a 75-hp. motor. The total connected horsepower of the five blowers delivering air to the tables is 115.

Preparation plants such as this have definitely raised the standard of strip coal. No longer can it be said with truth that strip pits are never equipped with cleaning facilities to equal those which may be found at deep mines. In fact in many instances the strip pit has the better equipment for improving the condition of the coal.

HOW KINGSHILL

Beats Daily Man-Average

By Over 70 Per Cent

How much is a technically trained man worth to coal mining? The management of the Scotch colliery described by Mr. Pierce in this article looks upon them as one of its principal assets. There is a lesson here for the American mining industry. Only specialized training to meet coming changes, says the author, will keep American mining costs within reasonable limits.

By J. H. Pierce
Stuart, James & Cooke, Inc., Consulting Engineers
New York City

SCOTLAND, by reason of the thin seams it possesses, has been obliged to introduce longwall and machinery to a larger extent than is general in English mines. This development is well illustrated by the Kingshill Colliery, which is owned and operated by the Coltness Iron Co., Ltd., the office of which is located at Newmains, Lanarkshire, Scotland, the mine itself being at Allanton, in the same county. This company owns ten mines in Scotland, of which nine are working and producing 7,300 net tons per day; and another in Warwickshire, England, producing 2,800 net tons daily. At the present time it is sinking shafts in Scotland for two new mines.

There are two workable beds on the Kingshill property, the Upper Allanton ranging in thickness from 2 to 3 ft., and the Wilsontown Main, 22 to 30 in. thick, which at present is not being worked. The coal is used chiefly in gas works, for locomotives and for steamships. The accompanying table shows the average quantity of byproducts to be expected per net ton of run-of-mine coal.

Byproducts Per Net Ton of Run-of-Mine Coal

Volume of gas	11,045 cu.ft.
Coke	1,205 lb.
Ammoniacal liquor	28.4 U. S. gal.
Tar	7.08 U. S. gal.

Though this company is working a number of mines in which the thicknesses of the coal seams average from 18 to 37 in., it produces 1.61 net tons per man per day contrasted with an average of 1.34 net tons for all of Scotland. It speaks well for the management that with such adverse conditions it can attain so favorable a record.

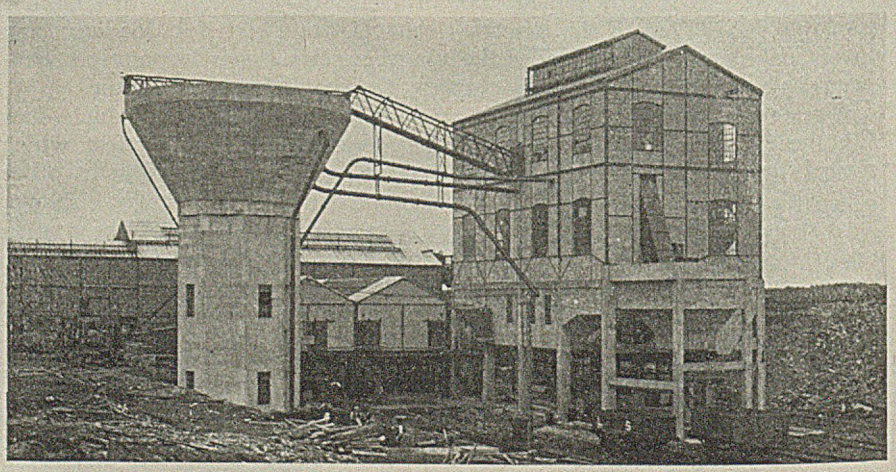


Fig. 1—Baum Washer at Kingshill Colliery

The coal dips approximately 4 deg. and has a strong roof which varies from sandstone to slate. The bottom is of fireclay which usually is strong. The mine is non-gaseous, but special regulations are prescribed for certain areas in which safety lamps and permissible explosives must be used.

Fig. 3 indicates the general mining plan, which may be classed as advancing longwall. As the main locomotive roads are driven, all the coal is extracted for 390 ft. on each side of the roadway. The coal to the rise of the main road is brought by a shaking conveyor to a "loading machine" or loading boom located at the roadway. The coal that lies to the dip is carried to this "loader" by a belt conveyor.

The main "loading roads" are driven off the locomotive road at an angle which lessens the haulage grades, and here also the coal is removed for 390 ft. on each side of these roads by means of conveyors loading into a common "loader" on the "loading road." The cars are

transported from the advancing face along the "loading roads" by rope haulage to the main-line locomotives.

Fig. 4 shows in more detail the method of advancing the longwall face and also the method of packwalling.

Every 75 ft. a dummy road is driven parallel to the "loading road," and a packwall 18 ft. wide is carried on each side of the "dummy road." It will be noted that the packwall is made continuous between the "loading road" and the first dummy road on each side of it.

The coal is hand-loaded into the face conveyors. Each 390-ft. face produces 130 to 160 tons, depending on the thickness of the coal, and the double face constitutes a working unit. The coal is undercut by longwall chain machines driven by motors actuated by 3-phase, 50-cycle, 550-volt alternating current. These machines cut both up and down the dip, except where the pitch reaches 20 deg., in which case they cut only uphill. The depth of undercut is 5 ft., which also is the daily face advance. Holes are drilled by hand to a depth of 4 ft., and the coal is shot down with light shots of Gelignite, which is a 50 per cent nitroglycerine dynamite.

Timbers are set on 4-ft. centers, both at right angles and parallel to the face. Round props are used, on the top of which are wedged half-round props as cap-pieces, so placed as to protect the roof between the coal face and the nearest prop row.

The length of shift is 8 hr., measured from the time the last man of the shift leaves the surface till the time when the first man of the shift returns to the same point. The face workers actually work about 6¾ hr. at the coal face and other employees about 8 hr.

The men engaged on a pair of longwall faces and the "loading road" transportation crew which serves them form a working unit and together number 51 men, who produce 260 to 300 tons daily, or an average of 5½ to 6½ net tons per man. The total underground force is 745 men, surface force 139 men, making 884 men, who produce 2,016 net tons daily, or 2.28 net tons per man—an extremely creditable performance in a seam of this thickness.

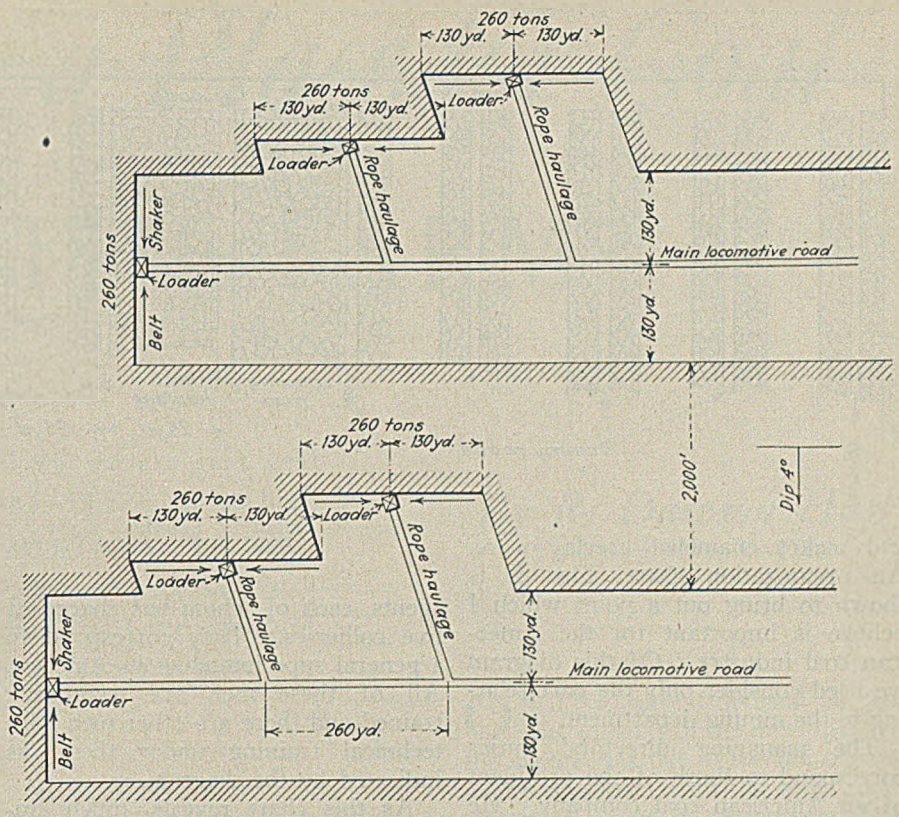
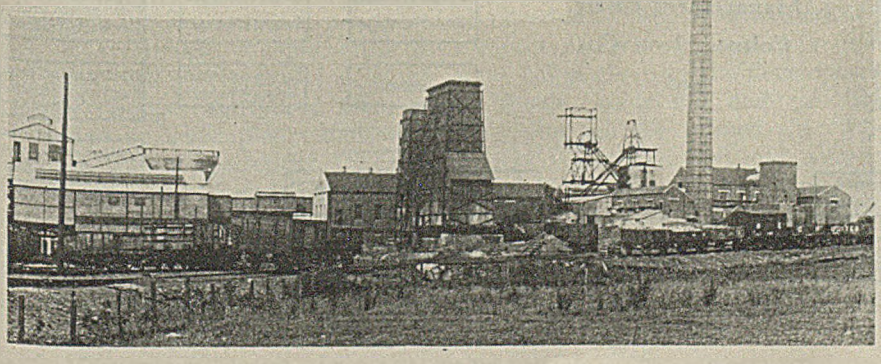


Fig. 3—General Layout at Kingshill Colliery

The coal reserves of this property are 31,000,000 net tons and as the yearly production is 521,000 net tons, the mine has a life of 60 years. With this long life, and working under a cover of 1,200 ft., it is essential that main roadways be made permanent and of ample size that the mine may be adequately ventilated without an excessive water gage.

Fig. 2—Kingshill Colliery, Newmains, Scotland



It is interesting to note here that the management believes that when a new colliery is to be opened to attack the coal held in reserve, $3.57 per ton of annual output may safely be spent. When it is recalled that for the third quarter of 1928 the cost of producing a net ton of coal in Scotland was $2.89 and the realization price only $2.64, representing a net loss of 25c. per net ton, it brings home the serious problem facing the Scottish coal operators with respect to future investments.

If $3.57 is a fair annual investment charge per net ton, and if a venture as risky as mining is entitled to a net return on capital of 10 per cent, then the profit should be 36c. per net ton. Based on the figures cited earlier in this paragraph, the Scottish operator has to better his position either by increased realization or by reducing costs to the extent of 61c. per net ton.

The surface buildings are all in keeping with the high standard of this mine. The accompanying illustrations showing a general view of the most important buildings, and also a close-up view of the screening plant and Simon-Carves washery with fine-coal recovery system, indicate the substantial character and simplicity of these structures.

The Coltness Iron Co., Ltd., in addition to its coal properties operates iron, steel, cement and brick plants. It also crushes and tars slag

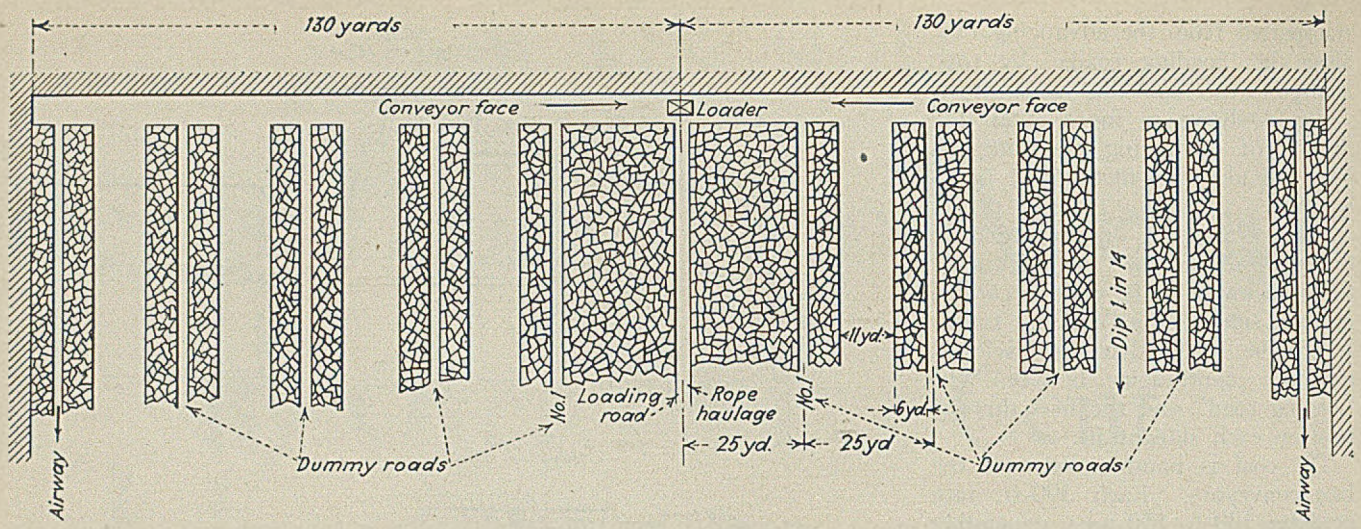


Fig. 4—Detail of Longwall Face

and makes enameled fireclay ware. An organization chart, Fig. 5, is shown to bring out a point which I believe is important for the American coal industry. Of this diagram we need consider only the part relating to the mining department.

The managing directors' duties correspond to those of the president of an American coal company. He is required to have a broad general business knowledge, in order to pass intelligently on financial matters and sales policies. In addition he generally is a technical man, a condition which is unusual in America. The general mining agent, who is next in authority, corresponds to our general manager.

There are two assistant mining agents, each of whom has charge of five collieries. They correspond to a general superintendent in America. All of these men are technically trained and there are other men with technical training under them, as indicated by the diagram.

As this chart reveals, much emphasis is placed on technical training. The same is true in practically all foreign coal companies. Those familiar with the subject will realize that the engineer is allotted a much higher place abroad than in America. I have observed organizations of large size in the United States with hardly a single technically trained man.

Mining engineering is just as much a science as automobile engineering but we have failed to recognize it as such. The great motor-car companies have made their rapid progress because they have allotted to their technicians a proper place in their program. They have picked their organization so as to attract the finest engineering talent in the country; these engineers are charged with the necessity for determining the most economic procedure. They must do sufficient research work to prove the practicability of their plans. They must justify these plans financially, and if they are good engineers, the management can act on their commendations with the feeling that the-

(*Turn to page 540*)

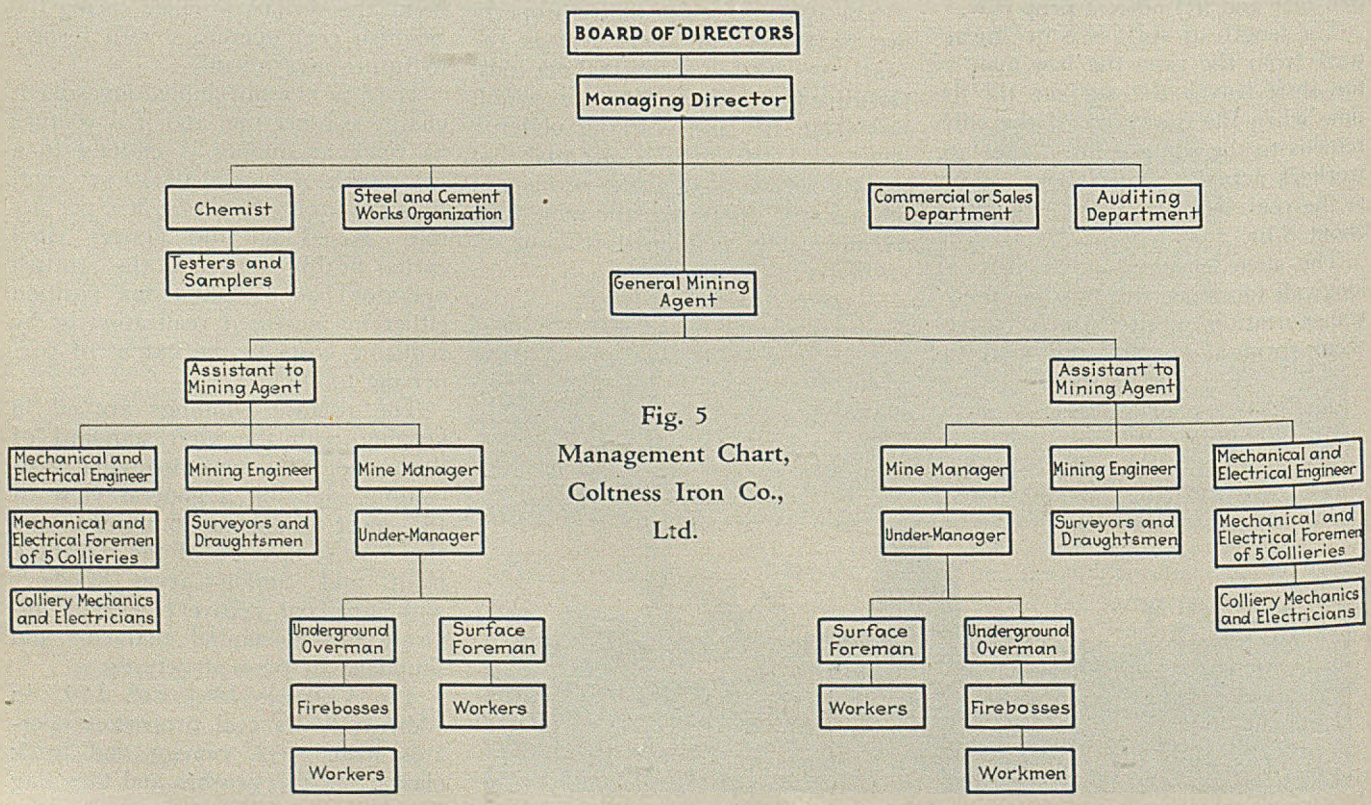


Fig. 5
Management Chart, Coltness Iron Co., Ltd.

Is There a Place for Coal

ON THE FARM?

MANY EXPERIMENTERS declare that coal has given excellent results as fertilizer. It has been used in Colorado and in Pennsylvania. For years it has been applied in Germany. Recently a Czechoslovakian scientist has tried the effect of lignite on soil and reported favorably on it.

By R. Dawson Hall
Engineering Editor, Coal Age

THOUGH little has been written about coal on the farm and its value for soil amendment or fertilization, enough has been said to make one curious to know whether an opportunity is not being overlooked. Despite some slight contradiction in the evidence, it seems permissible, even advisable, to try by experiment to ascertain the facts; the more so that soils and crops vary so much that a generalization, favorable or unfavorable—and they are nearly all favorable—may be unfair because the soil chosen had a peculiar quality or the crop was or was not well fitted to the form of stimulant.

Here let it be said that Congress has defined fertilizer, and that one cannot, in view of the definition, place coal under that head, however valuable its action might be. Fertilizer must contain assimilable nitrogen, phosphorus or potash. Other compounds and elements are plant foods, and the plant will take them from the ground, but Congress has seen fit to limit the definition of fertilizer so as to protect the farmer against imposture. Nevertheless calcium, sulphur and iron are necessary for plant growth. Copper and boron seem to be needed by some plants and with others vanadium is essential. So also are other most important plant foods which are so generally present that they are likely to be overlooked. Prominent among these are alumina and silica. So coal is not to be dubbed fertilizer, no matter how greatly it may—or may not—enrich the soil.

The Pittsburgh Coal Co. at its Champion No. 1 preparation plant, collects a fine sludge from the Dorr thickener which is higher in sulphur and lime than the raw product. Because of the soft nature of the fusain in the coal, there also is a concentration of the material in the sludge.

As a result of a suggestion in an editorial in *Coal Age* an effort was made to use the coal in the raising of cereal crops and garden truck. The whole subject was attacked with an open mind to find out whether the coal would help or hinder agriculture.

Of this work, which started on April 8, 1929, T. J. Wardell, superintendent, Champion No. 1 preparation plant, took charge, giving it constant attention and striving to conduct the experiments so that the value of coal as a fertilizer might be subjected to an impartial test. A plot of 3.7 acres, having soil described by S. B. Barley as "very poor, it having laid idle for eight years," was divided into four divisions for comparative observation. The soil consisted of a compact sandy clay, and was quite sour, being given to the development of thistle, goldenrod and the like. This plot will be termed the "Plot No. 1." The four divisions were of about equal size and with equal exposure to the sun. On the southerly one the sludge was spread over the surface about ¾ to 1 in. thick. Then the soil was plowed. About 3½ tons of wet sludge was used.

ON THE second division no coal was added. In the third division the sludge was put in the hill or row in direct contact with the seed. The sludge was used in varying quantity so as to be able to note any change in effect. Some was put under and some over the seed. In this work about ¾ ton of sludge was used.

On the fourth division the sludge was used as a mulch or inhibitive covering over the surface of the ground after the seeds had been covered with soil and after the crop had started but was not doing well. The process was repeated several times to insure a complete mantle of sludge over the soil at all times. About 1¼ tons of sludge was used, including original and succeeding applications.

Looking over the oats, corn and wheat, it was noted that the crops mulched with sludge appeared to be better than any of the others and that all of the plants on soil to which coal had been applied looked more thrifty than those on the soil which had not been thus treated. On a recent visit the oats were measured and the result was as in Table I.

Table I—Effect of Sludge on Oats

Treatment	Height, In.
Mulched on top of ground after seed had been sown	20
Seed row covered with sludge	18
Sludge plowed under	16–17
Seed planted on top of sludge	15
No sludge used	13

In no case was any manure added. Garden crops as well as cereals were planted.

There was another plot of ground of about 2.3 acres planted on a heavy humid loam with a lime base—a desir-

able piece of ground for its intended use as a vegetable garden. It had been in grass for four years and, earlier still, had been the garden of a farmer. This area will be termed "Plot No. 2." As the vegetables grown on this ground did not seem to show, after the first few weeks, any obvious advantage from the use of sludge, it is perhaps well to point out that the test was made on land that was not in much need of betterment at the time it was treated. It should be stated, however, that the vegetables on the field plot which was poor ground showed little betterment by reason of the coal treatment.

A third plot was the poorest of them all, as could be seen on inspection. It was grown over with hawthorn sour moss, and the weeds were so deep, says Mr. Barley, that it was necessary to plow almost 2 ft. deep to remove them and to loosen the hard shale clay, which had a lime base with much sand and stone. But on making my visit I found the ground where it had been mulched with coal was so soft it could be dug with one's hand. The farmers who had been present during the planting had said that the potatoes would never grow, but here they were thriving and free from bugs. The field corn did not show any great benefit from the mulching, however.

Mr. Barley made tests of samples of the soil on all three plots for water retentivity, pH value and density, using the standard practice of the experiment station of the U. S. Department of Agriculture at the University of Illinois. Seventy - five - pound samples were taken to the depth of each plowing and quartered to 400 to 600 g. for analysis. Titrations were made with N/10 and N/100 solutions of potassium hydroxide standardized against a sodium carbonate standard solution of N/10 sulphuric acid. An average of six samples before and after treatment with sludge is given in Table I. It must be remembered that values of pH below 7 are acid—the lower the figure the more acid they are—and above 7 are alkaline.

Values of Hydrogen-Ion Concentration Before and After Treatment by Sludge

Sample		pH Values—Raw Soil	pH Values—Treated Soil
Plot No. 1	Lower....	3.4	4.8
	Upper....	3.7	4.9
Plot No. 2	Lower....	7.7	8.8
	Upper....	8.3	9.4
Plot No. 3	.....	2.9	4.8

It appears, therefore, that the acidity of the ground was reduced, and where the ground was already alkaline, as in the old garden that had been in grass for three years, the alkalinity was increased.

The water retentivity test showed almost equal decreases in the retentivity of the soil in each of the three plots. Thus the porosity of the soil was increased. The density of the soil was not affected by the use of the sludge.

According to Mr. Barley's observation and my own, the use of the fine coal was everywhere either beneficial or in no way harmful. Differences of reactions to the sludge, of course, were to be expected.

Thomas Kirsopp, who is in charge of the plots, is enthusiastic in regard to the value of the sludge both as a soil dressing and as a means of keeping down insects. He even spreads it over the cabbage and declares it frees the heads from cabbage worms. He finds that the bleach in wheat is corrected by mulching with sludge. He says that the beetles that infested the cucumbers and eggplants have disappeared since sludge was applied. He finds the sludge restores ailing plants.

HE PLANTED three grains of corn to a hill and covered it with 2 or 3 in. of sludge. The plants grew up through it as if it were a natural covering for the seed. With potatoes the result was the same, thus proving that the sludge does not burn the seed or even the tender new-born plant.

Just why all these phenomena are exhibited is not easy to explain. The most natural explanation—and perhaps also the least likely one—is that the sludge consists of carbon and the plant needs carbon and gets it from the coal. Perhaps it is just because this explanation was so likely to be advanced that scientists who believed it to be false declared against any use of coal for fertilizer and usually did so without any tests of its qualifications.

Van Helmont, about 200 years ago, made a classic experiment. "He took a willow branch weighing 5 lb.," says Dr. Arthur, Boyce Thompson Institute for Plant Research, Yonkers, N. Y., "and planted it in a pot of soil weighing when dry about 200 lb. The plant was protected against dust accumulation and was fed with rain water. At the end of five years the tree was removed and weighed. It was found to have gained 159 lb., whereas the soil had lost only about 2 lb." (*Technical Engineering News*, April, 1928).

It is well known that by the action of the sun on the chlorophyll of the leaves the plant receives its carbon from the carbon dioxide of the air. At germination prior to the development of leaves it uses the starchy matters in the seed and in the early spring it derives the material for the sap from the starch it has deposited in the roots during the autumn. Consequently it seems to have no need for carbon from any other source.

Another explanation might be that coal contains the earthy materials which the plant life, from which it was derived, used in building its structure. However, it may be objected that many of these have been leached from the peat bogs and those that were not leached then probably have been leached since. If they did not leave the peat bog, how may they be expected now to leave the sludge?

THERE are some possibilities, however, in this direction, notably the sulphur and the lime. The pyrite oxidizes and, combining with the lime, may make a basic ferric sulphate. The fact that the land appears to be more alkaline than before suggests that the lime is present, and analyses show that the +48-mesh coal has 5.6 per cent of the ash as lime, the +100-mesh 10.5 per cent, the +200-mesh 6.2 per cent and the —200-mesh 4.9 per cent. There is, therefore, enough lime to assist the acid soil. Reducing the figures to percentages of the sludge, which is the correct base, they are 0.39, 1.34, 1.36 and 1.24 per cent. On the other hand, the sulphur percentages also are higher than in the coarser coal—1.90, 2.60, 3.65 and 3.65 for the same fractions.

But there are other possibilities as to the manner in which coal may be of assistance to plant life. Coal emits carbon dioxide and though plants apparently will not take carbon from the soil they will take more from the air if given an opportunity. That opportunity has been given at the Boyce Thompson Institute, just mentioned. The natural quantity was multiplied tenfold, that is the carbon-dioxide concentration in the air was kept at 0.3 per cent instead of at 0.03, as in normal overland areas. As a result plant life was speeded up considerably.

Henrik Lundegardh, in "Der Kreislauf der Kohlensaüre in der Natur," declares that in his belief the only advantage of manure over inorganic fertilizer lies in the carbon dioxide emitted by the manure which gas feeds the leaves. He proved that it

was found in excess around a plant thus manured.

Again the sludge lightens the soil and so lets water pass through to the subsoil and lets it rise again as evaporation dries the surface layers. It also gives the roots easy passage into the moister material. When the soil is thus lightened the oxygen can get to the roots and the nitrifying bacteria will thrive. There is no question as to the value of this action. Furthermore, the sludge is black and absorbs the sun's rays and thus hastens growth in the spring and protects the crop against early frost.

NO EXPERIMENT in the growth of farm products is concluded, however, till it is ascertained what is the weight of product obtained. Dr. Arthur says that a plant so covered with cheesecloth or with violet-ray glass that half the light will be shielded will grow tall and lusty, but that when it is dried it will be found that it has so much water in its composition that it is not as heavy as the shorter specimen that grew under normal conditions. Yet linear measurements or photographs would show the heavier and more productive plant as the less attractive.

So again with grains: the weight of the grain is what counts. One may have unusual herbage without unusual fruitage and be grievously disappointed. This is said to have been the outcome of the use of basic ferric sulphate on farm land. So it is advisable to wait, as J. B. Morrow, preparation manager, Pittsburgh Coal Co., is doing, before announcing the results of an experiment.

It is interesting to note what others have said about the value of coal for soil amendment. A. D. Kissel discusses some experiments in an article entitled "O pouziti uhli jako hnojiva," in *Paliva a Topeni*, a Czechoslovakian magazine, apparently an article delivered at the World Power Conference. In his summary, written in English, he says: (1) Humic substances on the one hand aid in developing physico-biological conditions of the soil which are favorable for plant growth, and on the other hand simultaneously decay and form products which in the form of organic solutions are sources of secondary organic nourishment to the plant organism. (2) Their occurrence in the soil adds to the richness of the harvest. (3) If these humic substances are not present at all or in an insufficient quantity, the defect may be compensated (a) either by adding to the soil a quantity of crude finely powdered brown coal, or (b) by using artificially prepared humic substances prepared from coal and corresponding in physico-chemical properties with natural humus. "(4) In this manner brown coals, and especially those of low grade, may be utilized in the manufacture of organo-inorganic fertilizers.

With Mr. Kissel's opinion most agriculturists will take issue. He lays stress on "secondary organic nourishment of the plant organism," which is a doctrine that agricultural chemists will hold to be unacceptable.

PERHAPS the most favorable comment on the value of coal as fertilizer was that by Captain David Shield, of Shields, Pa., at the meeting of the Fertilizer Section of the First International Conference on Bituminous Coals at Pittsburgh, Pa. He said he had been using coal as plant fertilizer for 40 years on various crops in the growing season and on potted plants in the greenhouse during the winter. He grinds the coal to pass a screen with 15 to 20 meshes to the inch, and mixes it with salt water obtained from wells 1,000 or more feet below the surface. These salts, he says, contain chlorides, of sodium, calcium and magnesium, also iron, sulphur and alum.

He uses 1 lb. of water to 4 lb. of coal. This he heats to a temperature of 110 deg. F. Signs of fermentation then appear, increasing greatly till 170 deg. F. is reached. The heat is "then stopped," and the mixture is held in that condition from 18 to 24 hr. At that time the mass has increased in volume as much as 33 per cent. This material he mixes with clay, leaving it to mature, for about six weeks.

The ratio of clay to coal and salt, he says, is not important, though good results are obtained from a mixture of clay to coal of 3 to 1. He uses about 824 lb. to the acre. On this ground, 0.85 acre, he got in the year of application 6,000 lb. of dry hay, the next year a large crop of field corn, the next year 190 bu. of white potatoes and the following year 42 bu. of clean rye. All this from one application of 700 lb. of humus. The U. S. Census report shows 12 bu. to the acre to be the average yield of rye.

Finally, it may be said that the manner in which coal may assist *physically* in plant growth has been clearly indicated. It may help by keeping down insect growth. Whether it helps chemically by forming a plant food, by releasing such food or by aiding catalytically in the production of such food is by no means clear.

The tests being made, however, are worthy of close attention. The operator with sludge on his hands or the farmer who may want to use it does not need to know how it helps the soil. All they need to know is whether it will help. No one is able from our present state of chemical knowledge to decide the question dogmatically. Attempts to foretell results from such an uncertain basis are to be condemned.

ONLY the pragmatic test of experiment can be held reliable, and even when the proof is presented —whether favorable or unfavorable —care must be taken not to dogmatize freely, because coals vary in the character of their ash and of their organic constituents and are of various states of maturity. Then again there are differences in soils. It will be necessary to have many experiments in many places before final conclusions are reached.

But this, at least, can be said: that there is less danger of burning the soil with coal than with commercial fertilizer. The abundance of sludge placed around and over the seed and used on the living plant at Champion is in startling contrast with the necessity, when using fertilizers of the recognized type, of keeping from direct contact with the plants which they are intended to develop. Even manure should be mixed with the soil and not allowed to stand around the plant, and no fertilizer of the inorganic type should be applied without careful admixture with the soil, unless at a point somewhat remote from the plant to be fertilized. All these precautions seem needless with sludge.

COAL WHICH CONTAINED *from 0.39 to 1.24 per cent of lime made the ground less acid or more alkaline wherever applied. It lightened the soil and increased its capacity for absorbing water and holding it. In no case did it interfere with the growth of seed or plant, no matter in what quantity or in what manner applied. Cereal crops treated with coal grew more rapidly than when not so treated.*

AT MONA MINE

New Loading Machines Dig Their Way Into Shot-Shaken Coal

By Ivan A. Given
Editorial Staff, Coal Age

SPEAKING comparatively, the mechanical loader—in its various forms—has made little progress in West Virginia, especially in that large area in the northern part of the state where the Pittsburgh bed is mined. Hand loading is still the principal means of getting coal into the mine car, and the retention of this practice may be in part ascribed to the unusual thickness of the Pittsburgh bed, which has given the operator the benefit of a lower loading scale. For this reason and because of difficulties arising from the bad roof the possibility of increasing the tonnage per loader by mechanical means has not received the same intensive study as in other regions, but that large economies can be effected has been proved in the Mona mine of the Arkwright Coal Co., near Morgantown, W. Va., where experimental work has been under way for some time.

Here, as in the greater part of this region, the Pittsburgh seam is operated. The coal, which is reached through a drift facing the Monongahela River, slopes away from that river to the west. Seven feet of the total thickness is removed in mining, and the remainder, usually 1 or 2 ft., is left up to protect the roof which is a heavy drawslate. The rooms are driven 18 ft. wide; the coal in most places in the mine is still loaded into mine cars by hand.

About three months ago a new type of loader was set to work in some of the rooms of this mine. It is manned by a crew of two men, who perform all the necessary mining operations, including timbering, tracklaying, drilling, blasting, coal loading, cleaning up the working face and moving the machine. Ordinarily, they are able to load two 18-ft. places in one shift of eight hours, or about 70 tons in all. The places are undercut to a depth of 7 ft., and the cars are handled by mules.

This rate of loading is made possible by the characteristics of the loader used and the willingness of the crew. The latter is composed of two picked men who take an interest in their work. They are backed up in their efforts by mine officials who believe in giving the machine an opportunity to do its best and who reinforce their convictions by providing the loader with plenty of cars.

With the pit-car loader all the coal loaded has to be shoveled onto the conveyor, involving no little labor. The idea of the inventor of this machine, George R. Lang, of the Charleroi Iron Works, was that much of this could be eliminated without going to the extreme of constructing a loading machine like the heavy yet mobile types now being operated. He argued that even with these some hand work is needed at the face.

Mr. Lang conceived the idea that loaders of the pit-car type could be modified so as to add to their function the greater part of the job of

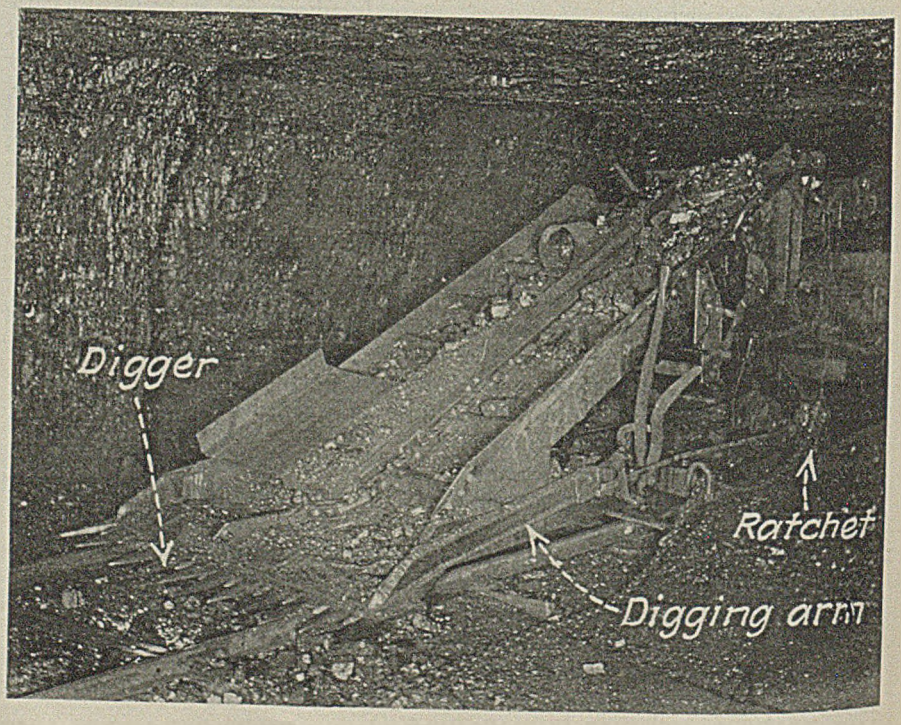


Fig. 1—Front View Exhibiting Digging Element and Ratchet

breaking down and loading the coal, which thus far they have not assumed. He believed this could be done without rendering the pit-car loader any less portable and convenient than such machines in general now are.

The operation of the loader is as follows: Two anchor bars, one of which is shown in Fig. 2, are inserted in the undercut before the face is shot down. Each is equipped with a steel rope, which is passed through a pipe that has been welded along one face of the anchor. One end of the rope is fastened to a rod on the right side of the machine and the other to a chain which passes through a ratchet on the left (see Fig. 1).

The chain is tightened by hand after the machine is run up to the face. Then the coal is shot down and loading begins. As the foremost part the coal fall is removed, a reciprocating digger with a wedging and prying action forces itself under the remainder, bringing more coal down, and as the material within reach of the flights is exhausted a ratchet works on the anchored chain already mentioned and the machine is drawn toward the face.

Thus the reciprocating digger with its forward and up-and-down motion, which is imparted by a crank, breaks down the coal; the conveyor removes it and a ratchet draws the machine in toward the face, giving the digger renewed opportunity, until the whole cut, 7 ft. deep, is removed. The ratchet is operated by hand until the chain is tightened; thereafter a rod, actuated by the crank which operates the digging arms, works the

Fig. 2—One of the Anchors Which Hold the Lang Loader Up to the Cut

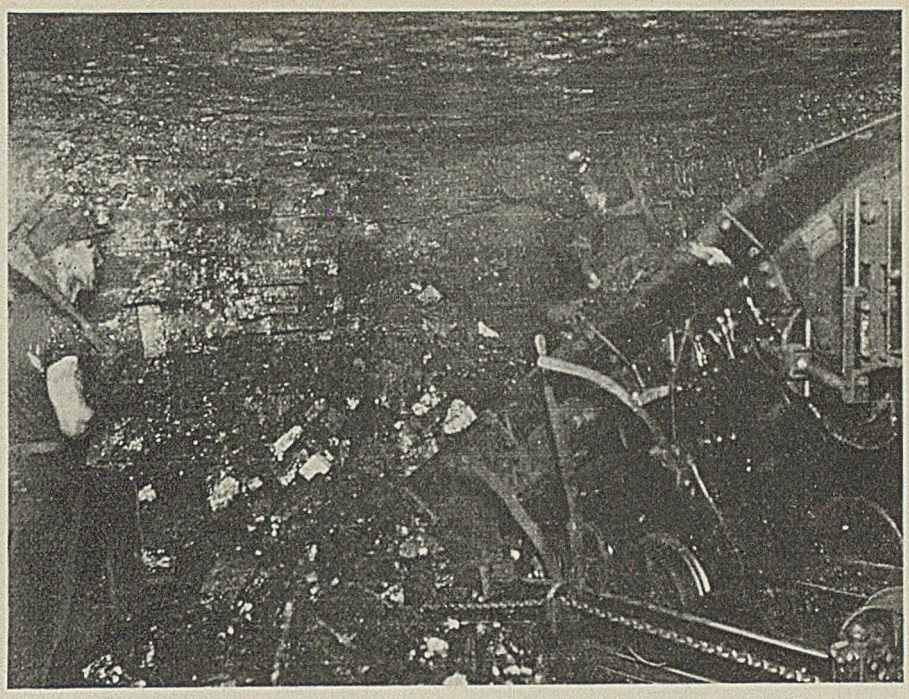


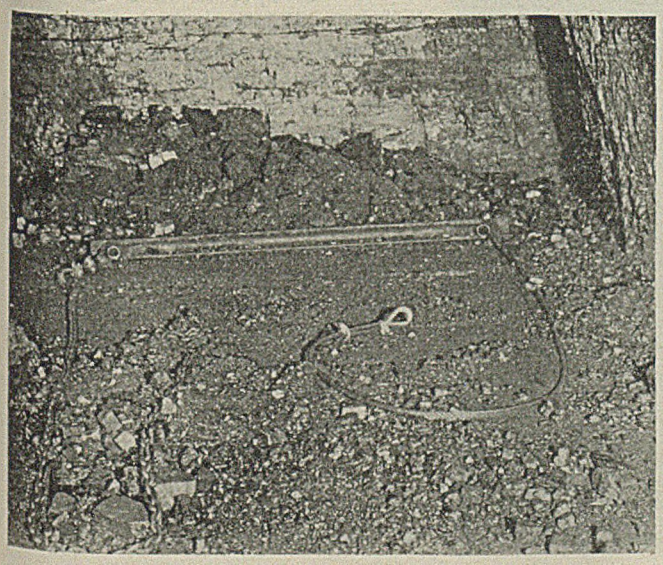
Fig. 3—Loading Out Right-Hand Shot with Lang Loader

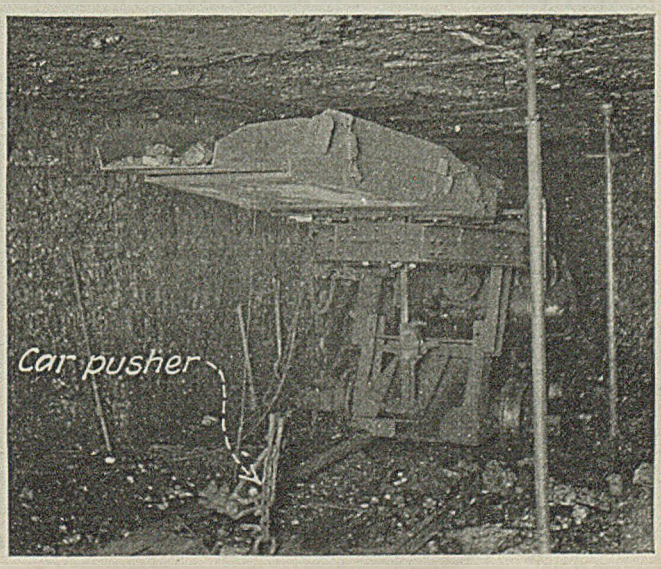
ratchet automatically and feeds the loader forward at a rate of 6 in. per minute. Two flukes, one at each end of the anchor, engage the bottom and when the coal falls on them they are driven into the floor. They prevent the anchor from pulling loose even when nearly all the coal is removed. It is said that the pull of the anchor on the 5-ton loader is equivalent to the crowding action of an ordinary loading machine weighing 25 tons.

With most machines the car being loaded has to be pushed or pulled back by locomotive, mule or human muscle as soon as the rear end is loaded. With this type of loader, that function is taken over by the machine itself, which has a power-operated car pusher (see Fig. 4) that operates when a clutch is thrown. This pusher is used to move the car where the grades are against the load.

Like most types of loading machines, this one has two conveyors, one to raise the coal and the other to deliver it to the car, but the latter conveyor in this machine is of the jigging type. Because of this variation from accepted practice the coal is discharged at a point 8 in. lower than otherwise would be inevitable, reducing breakage, decreasing the height of the machine and making it possible to load larger lumps. With a flight or belt conveyor space must be provided for the sprocket and the return strand, and it must be remembered that breakage occurs not

Fig. 4—Rear View of Lang Loader, Showing Car Pusher





only at the discharge but also where the inclined conveyor delivers coal to the swivel conveyor if both are of flight or belt type. It is said that the shaking conveyor will carry the coal up a pitch of 4 in. in 6 ft. The conveyor, which rests on rollers, is moved forward by a cam and returned by springs attached to its sides. It can be raised or lowered and swiveled 45 deg. either way.

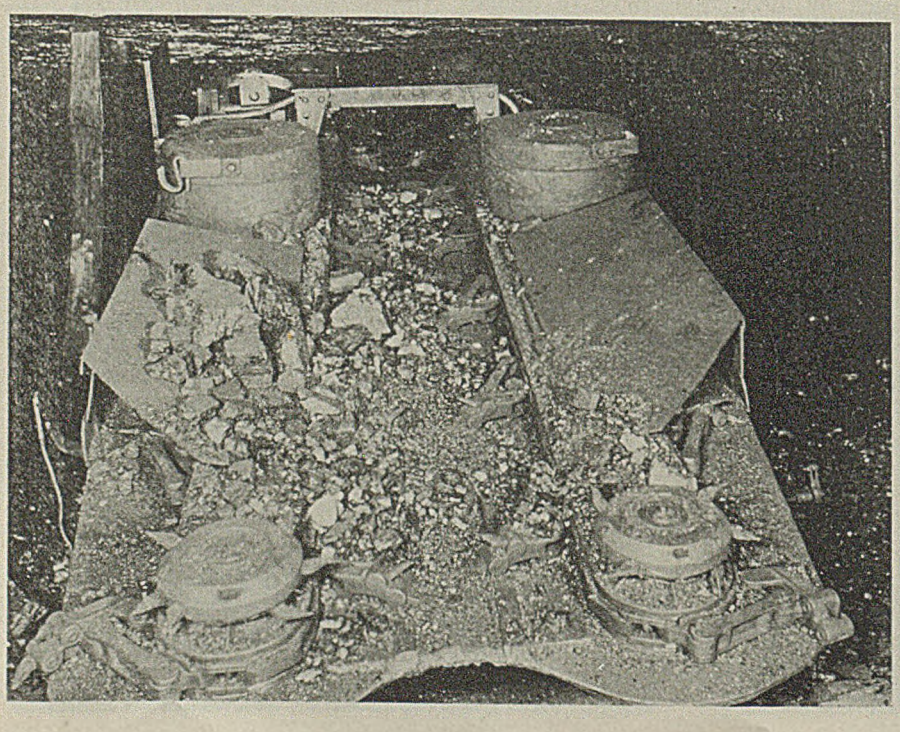
Power for operating the loader is provided by a 7½-hp. motor of either the flameproof or open type. This motor operates the entire machine, including the rear conveyor, car pusher, digging arms and digger, propelling mechanism and front conveyor. The machine is automatic in operation after it is started and anchored in place, and the members of the crew are at liberty to devote their full time to picking down tight coal and to loading coal onto the conveyor from each side of the digger. Protection against breakage is provided by friction clutches which disengage when the load becomes excessive.

The cycle of operation, beginning with the cleaning up of a place, is as follows: When the last car is loaded out of the working face, the jigging conveyor is locked to prevent motion and any coal left over is thrown on the front conveyor. The tools and anchors are then loaded up, and the digger raised to ride on the rails. The machine is then trammed to the next place. If long moves are made, the digger is locked in position off the rail, but for going from room to room this precaution is not necessary. No trouble is encountered in negotiating switches or curves.

Upon reaching the next place, the track is advanced by laying a pair of long rails on steel ties up to the face. By means of balled rails and clamps connection is made to the main track, which is laid on wood ties. The section laid on steel is then swung to the side of the room, where loading is to begin. After shifting the track, steel safety posts are set as shown in Fig. 4. Two anchors are placed in the undercut and three holes drilled, one—for the breaker shot—in the center about halfway up the face. This latter brings down the middle band which is characteristic of the Pittsburgh seam. Before this breaker shot is fired, the machine is run up to the face, the digger dropped down and run under the cut and the ratchet connected and tightened by hand. The jigging conveyor is released and a car placed in position, after which the machine is started and the breaker shot fired electrically. As the machine is on the side of the room, the rib shot on that side is fired before the men start loading.

As soon as the coal is loaded the machine is run back from the face, the safety posts are taken down and the track shifted toward the opposite rib. The safety posts are then reset, the machine run forward and the remaining coal shot down and loaded as above. The place is then cleaned up and left in condition for cutting.

Fig. 5—Front View, MacEachen Loader



Wooden ties and timbers are extended whenever during the day the men find time to do this work.

The permanent room track is in the center of the room and a line of props is set to the left of this track. Permanent room tracks are never allowed to trail more than 60 ft. behind the working face and the end of the timber row is always kept within 20 ft. of the coal face, the safety props being used for support between that point and the face.

With an anchor to keep the machine up to the face and with a digging and wedging element to free the coal and cause it to fall it is not necessary to shoot the face as heavily as where neither of these devices is provided. Consequently more lump coal is obtained. The help which the loader gives in loading the conveyor is said to be equivalent to the work of two men, and in addition, by actually conveying the coal from the level of the floor of the mine to the car, it doubles the hand-loading capacity of its operatives. Officials at the Mona mine say that the operation has been entirely satisfactory and, despite the fact that the loader was used for 10 months at another mine, no mechanical defects of any moment have been encountered.

THE average time required to load a 3-ton car is 6 to 8 minutes. This interval is sufficient to give the driver time to visit other places while the car is being loaded and thus utilizes his time to the best advantage. One car is loaded at a time and the changing period is employed by the loading crew in doing the other jobs necessary to keep up production. Though track is required in all places, there is no need for heavy rails: the loader will operate on 20-lb. rail or heavier. This is fortutnate, for with light rail the swinging of the track is made less difficult.

Another machine—a heavy, mobile-type loader of new design—also is in experimental use in the Mona mine. As is common with others of the same characteristics, it performs the whole of the loading operation. Under ordinary conditions, such as are encountered in this mine, it is able to fill a 3½-ton car in from one to two minutes.

In room-and-pillar and entry work, the approved method of operation is as follows: As the machine goes into the place, whether pushed by a locomotive or under its own power, the trip rider accompanying the

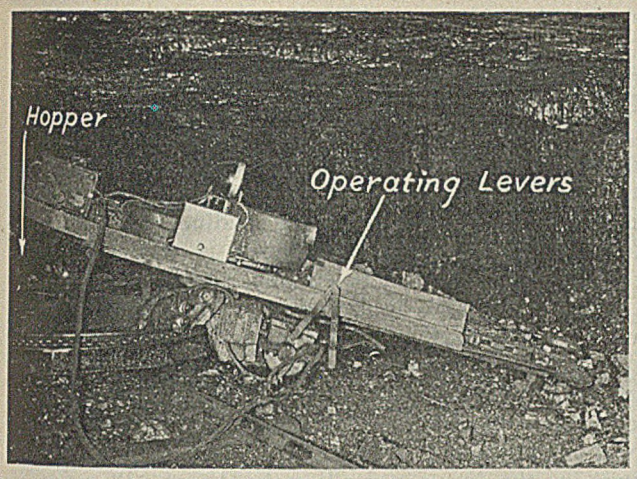


Fig. 6—Shovel Swung to Load From Straight Track

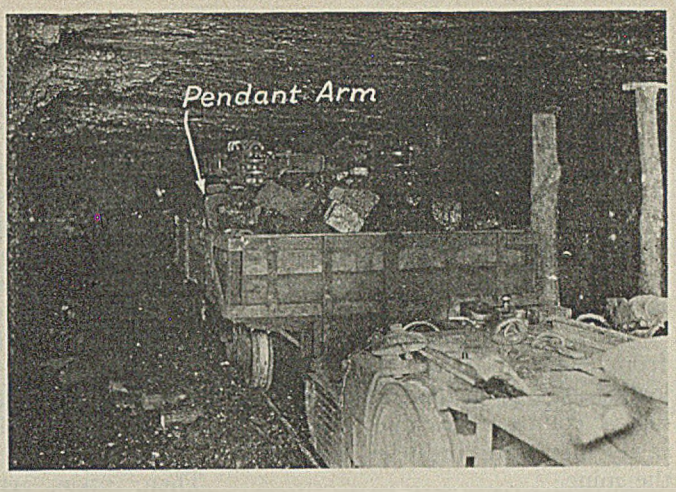


Fig. 7—Rear Conveyor and Loaded Car

empty car makes the power connection. When the machine nears the face the operative puts on the single control which starts all chains and shunts the shovel (described later) forward until it is within 2 or 3 in. of the rail—this while still in motion. When the shovel reaches the face it is dropped and immediately begins gathering coal.

The design of the machine, which was perfected by Dr. R. A. MacEachen, Morgantown, W. Va., incorporates great flexibility and enables the movements described immediately above to be easily performed. Provisions also have been made to eliminate trouble encountered in trying to load out standing shots and the machine also is equipped to smooth down lips in the bottom left by an undercutting machine.

Five years of experimental work were required to evolve the present model and enable it to reach the coal anywhere within the area included in a half-circle 36 ft. in diameter. In construction, it is composed of two radial, endless-chain conveyors. The forward end, shown in Fig. 5, is an endless-chain shovel composed of two adapted cutter chains with braced, bit-bearing arms pivoted thereto. Each chain is driven by a separate motor. On the forward sprocket shafts are mounted bit-bearing snubber disks. The shovel point is double-curved, as shown in the figure, and the ends of the bit-bearing arms, when passing around the forward sprocket extend some distance over the edge. This construction enables the shovel to make its own path and smooth out obstructions, as stated above.

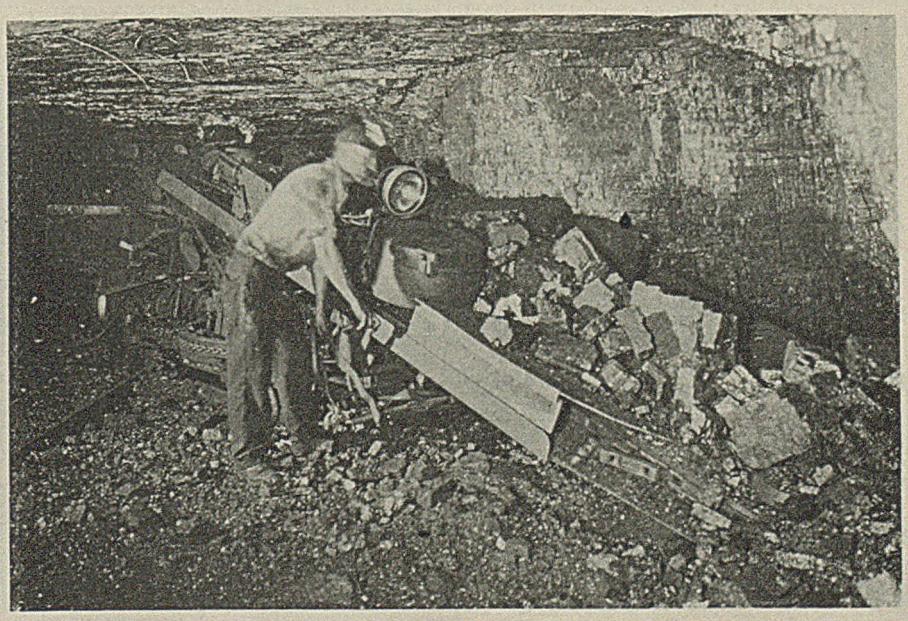
The shovel is designed to undermine standing coal by means of the bit-bearing arms and snubber disks and drag it into the conveying trough. Arcuate and telescopic movement is obtained by pivoting the shovel which, on the present machine, is about 16 ft. long. In operation, it is tilted about midway and shunted forward and under the coal on rail racks. This forward—or back—movement may take place at any point to which the shovel may be swung within a half-circle. Its reach is about 18 ft. beyond the end of the rails or on either side of the track—or, in other words, it is capable of gathering coal throughout a half-circle 36 ft. in diameter.

The shovel is mounted over a hopper, into which it feeds regardless of the distance it is extended. To enable it to do this properly it is fitted at the rear end with a telescoping bottom. As the shovel is shunted forward and back this bottom plate is held by a latch so that its rear end always extends slightly over the hopper's edge in position to discharge the coal picked up by the conveyor chains. The shovel is shunted forward and backward and swung laterally by band friction mechanisms which endow its movements with smoothness. Two small levers, shown in Fig. 6, control its movements after the driving motor is started.

The rear conveyor, Fig. 7, is composed of two flight-bearing endless chains. It is mounted upon the same truck and pivoted upon the same kingbolt as the shovel carriage and has a lateral movement independent of the shovel movements. It also is raised and lowered as the loading operation requires by means of a power-driven screw. Two pendant arms, one of which is shown in Fig. 7, swing loosely within the car and hold it in proper position for loading and also when passing around curves in the mine.

The special feature of the rear conveyor is its open end, which makes it self-trimming. The portion which extends over the car is bottomless.

Fig. 8—Loading Out the Second Cut in a Breakthrough



Coal carried from the hopper along its trough first begins to pour into the rear end of the car. As the car fills, the flights drag it along up to the front end. When it is withdrawn the coal is found to be rounded up, or topped, from end to end and from each side to a height of 18 to 24 in., depending upon clearance. No hand trimming is necessary.

When the machine is in transit from place to place the shovel is loaded back upon the conveyor, making a compact machine which can easily negotiate ordinary curves in the mine.

Only one man, as shown in Fig. 8, is required for the operation of the machine alone. As it is able to cut down standing coal itself, dig out sprags in the corners and clean up the loose coal on the mine floor without shoveling, other labor at the face is reduced to a minimum. The only pick work necessary would be that required to bring down coal which had stuck to the roof in an undercut place, and even this would be eliminated by top cutting.

The present model, which is 22 ft. long and weighs about 6½ tons, is pushed from place to place by a gathering locomotive. The omission of tramming gear, which can easily be added if desired, according to Dr. MacEachen, is based upon the fact that a locomotive is required for the purpose of changing cars. In moving, a car is placed ahead of the locomotive and coupled to the loader. Then, upon arriving in the new working place, there is no halt while one is brought in position and, as the pendant arms always hang down inside the car, the rear conveyor is always in position to begin discharging coal, whether on curved or straight track.

Coal loading is direct and all movements of the machine are positive. When it grips the coal it holds it until it is delivered and the action on the coal is smooth and devoid of shocks. Quiet operation is one of its features, as conversations can be carried on in an ordinary tone of voice while loading, and the quantity of dust raised is very small.

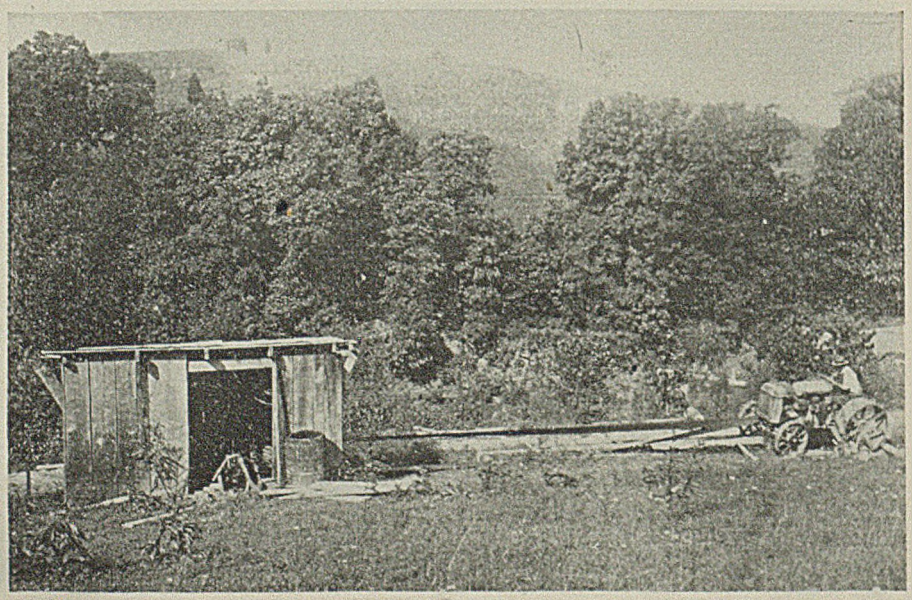
Essentially, the MacEachen loader is composed of standard mining machine parts. Two motors drive the front conveyor chains and a single motor, in future designs, will be employed in operating the rear conveyor, propelling the machine and swivelling the shovel. Places varying in width from 6 to 36 ft. may be loaded and the machine will operate on turns as well as on the straight. An important feature is that places, such as breakthroughs and room necks, may be advanced two cuts from the straight track, considerably lessening the task of laying switches.

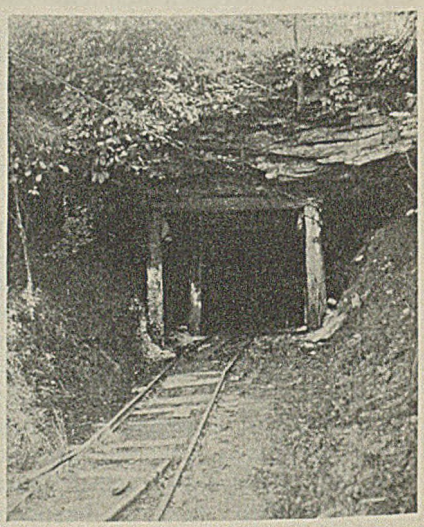
Tractor and Auto Engine Supply Power For Small Wagon Mine

HOW MANY bituminous mines that produce but 1,000 tons per year can boast of mechanized undercutting and an electric generating plant? Probably only one—that operated by Dr. C. A. Ray, of Charleston, W. Va., on his farm in the northern extremity of Kanawha County about 17 miles from the city and 15 miles from a railroad.

The undercutting is done with a Jeffrey type 16-A breast machine. Electric power for its operation is generated by a 50-kw. dynamo driven by a Fordson tractor and by an engine removed from a Model T Ford car. The tractor is belted to the generator and the engine is direct-connected. When the photograph was made the car engine was out of commission because of a damaged bearing, but the dynamo was being operated by the tractor alone. The cutting was slowed somewhat by reason of having to stop the feed intermittently to allow the tractor to speed up the generator.

An Operative Governs Speed of Tractor Engine While Cutting Is in Progress





Portal of the 1,000-Ton Per Year Electrified Mine

The coal is sold principally to farmers, who do their own hauling, and pay $2.50 per ton. Because the mine is on a dirt road the demand is heaviest in the early autumn before the road gets bad. The local man in charge of the mine also is in charge of the farm. He works as well as bosses. A pony is used to pull the cars out of the drift to the dump. The power plant is operated only during cutting, which is only a small percentage of the time. The Fordson tractor prime mover can be utilized for farm work whenever necessary.

Too Strong *and* Too Tender ...

Roof in Pittsburgh No. 8 Field Needs Careful Study

By Howard L. Werker

Moundsville, W. Va.

NEW METHODS of roof control are anxiously sought in the Pittsburgh No. 8 coal district, which occupies so important a place in eastern Ohio and in the Panhandle of West Virginia. The search is not without reason, for costly indeed are the losses of workable coal which the uncertain roof entails.

The overburden, protected against collapse by the abnormally strong Pittsburgh limestone, bears down on the pillars with its full weight, crushing everything beneath it. Thus, pillars that would be abundantly adequate if the roof would break readily are found wholly unequal to their task of supporting the entire cover of the seam. Wherever the Pittsburgh limestone is found, unusual methods for the control of the roof are adopted. Nevertheless a plan has yet to be devised which will prevent the adverse roof conditions from causing the loss of a large percentage of the coal.

But it must be borne in mind that the troubles are not all due to the limestone bed, for the stratum immediately overlying the coal seam adds its share to the difficulty. Though it varies in its nature and thickness, nowhere in this district does it consist, as in other fields, of a more or less hard shale with a fair degree of strength and permanence. Instead it is a drawslate which contains lime. This varies in thickness from 1 in. to 3 ft.

Where mining machines are in use it cannot be posted successfully and must be taken down. There are, however, places where with pick-work it can be held up by close propping. As a rule, however, the miner removes it as soon as possible, as it is very dangerous unless secured by temporary posts.

Fortunately, above this treacherous drawslate is found a roof-coal of a thickness ranging from a few inches to several feet. If this coal is hard and adhesive, the roof is good; and, in narrow work little timbering is necessary, nor are many posts required in wide work. If, however, this coal should be soft and composed of layers 1 to 2 in. thick, proper care should be taken to timber or post the roof before it is slaked by the air and caused to fall up to the shale or soapstone that lies directly over it. A good roof in the No. 8 bed is generally understood to consist of a hard, thick roof-coal.

A LIME ROOF *usually is troublesome. A thick lime rock will resist fracture and thus as mining proceeds, more and more weight presses on the pillars that surround the extracted area. On the other hand, lime in the shale makes it swell and causes it to fall. So the anomaly of a roof that is so weak that its underside falls constantly and weights heavily and that is so strong that it will not fall in mass has to be met—a problem that can be attacked in two ways both of which are so unsatisfactory that opinions differ as to which is the worse*

OVERLYING this rider coal, however, is a clay shale which is a menace to life and difficult to control. This layer also contains lime and, upon coming in contact with the air, it crumbles and falls till it exposes the limestone above it. Consequently, it should never be exposed to the air in either rooms or entries unless properly timbered. The first weight noticed on the timbers comes from this stratum, and in long rooms it breaks down may of the posts. These must be replaced immediately if falls are to be prevented. Whenever a squeeze occurs, falls of this shale and of the roof-coal immediately follow.

Two weak shaly strata have been described separated by a bed of roof-coal. Now we come to a strong bed, the Pittsburgh limestone, that is as troublesome because of its strength as the shale beds are because of their weakness.

This layer of limestone lies immediately above the clay shale just described. It is from 12 to 50 ft. in thickness. Because it is so thick and of a conglomeratic nature it is elastic and sags instead of breaking. It will support a tremendous weight before it reaches the floor and, as it rarely ever breaks, its destructive action on the pillars adjacent to a large mined-out area may be considerable.

IN STARTING any room-and-pillar system in this district, the popular practice is to drive main face and butt entries. Upon first opening a mine, the main entries should be driven and protected in such a manner that they will serve for air and haulage throughout the life of the property.

The main entries of the better mines have three headings, with the intake airway in the middle and the returns on each side. Though three headings usually are desirable they are especially so when the seam generates large quantities of gas; they also will aid in speeding up transpor-

tation in mines where a large tonnage is to be produced. The butt, or producing, entries are driven in pairs at right angles to the main entries; consequently the room faces are on the face cleats, which makes the coal break down more easily.

As the main intake headings must stand for many years and the other headings are exposed to the foul air of the return, the roof in time becomes brittle and cracks, whereupon trouble comes in abundance. Obstructed aircourses are common in this district and in time the return headings may be completely filled with falls of rock. These falls result not only from the air-slacking of the roof but from the insufficiency of the pillars between the entries and workings on either side.

Several methods of timbering an aircourse for permanent support are used, each having its adherents. Some operators believe in taking down everything up to the limestone, after which the entry is timbered and lagged over the crossbars. The lagging supports any loose material which from time to time might otherwise fall.

IN OTHER mines track is maintained in the aircourse, and falls are loaded out at intervals or, where practical, spread out over the entry. Steel timbers and a gunited roof will assure permanent protection for all entries. Their use applies especially to the haulage roads, where more precautions must be taken than in airways. Steel and gunite have advantages over wood for purposes of roof support, the principal one being that with them the height of the heading can be increased 2 to 4 in. with the same excavation as before. If, therefore, headings are driven at their original size, then either the air velocity is less and the power bill correspondingly smaller or the volume of air is increased.

Steel timbers are not subject to decay and do not vitiate the mine air. They also afford a smaller area for the lodgment of explosive coal dust and are easily cleaned. In addition, their absolute incombustibility renders them especially suitable for underground pump and engine rooms. The first cost of steel timbering at various mines has been found to be 20 to 25 per cent more than that of wood, but its much longer life has made its use advantageous. However, steel timber and gunite will effectually support an entry only if sufficient pillars are left on either side and between the entries to protect them from any movement of the roof resulting from mining operations.

If a program of timbering main entries with steel proves too expensive, then wood must be used, though it probably would be better in most cases to leave track in the aircourses and haul out the falls that occur rather than to support the roof with wood. It is impracticable on haulage roads, however, to let the roof fall, and the roof of such roads must be supported. The use of wood has several drawbacks, as the timbers are subject to decay, and more excavation is required.

THE replacement item is a big factor, but this expense can be reduced by treating the timber. According to figures of the U. S. Forest Service published for 1906 and later years, proper treatment may be expected to increase the life of treated timbers 50 to 100 per cent. Zinc chloride seems best adapted for inside use, and it will give adequate protection against decay at minimum cost. This point is particularly important where low-grade, inexpensive timber is used and an expensive preservation treatment would not be justified.

The absence of odor and the decreased liability to fire with chloride-treated wood is a considerable advantage in underground work. Leaching, the greatest source of failure of chloride, is at a minimum underground. Zinc chloride can be shipped in dry form and mixed with water at the mine. Thus, there is a considerable saving in freight when zinc chloride is used instead of creosote, particularly where only small quantities are required.

This preservative is better suited for mine use than coal-tar creosote, as it costs 1½c. per cubic foot against 6½ to 20c. for the creosote. The cost of applying zinc chloride is slightly less. In using untreated timbers the bark should be removed before the timbers are taken into the mine and they should be of a resistant type of wood, properly seasoned.

Efficient roof support on the main haulage roads will exert quite a favorable influence in time on the output of a mine. Efficient haulage is the secret of output and a haulage road that is properly timbered is necessary for uninterrupted transportation. The timbers should be of suitable material. They should be set properly and spaced at the right distance. Crossbars should be hitched into the coal and the lagging material on top should be close enough together to prevent the crumbling rock from falling on the haulage road.

Crosscuts along main haulage roads deserve more attention than has been given them. No less than three posts should be placed on each side of the stopping. This prevents its being crushed and keeps the crosscut open, thus providing additional manholes. It also keeps falls from starting which may extend out onto the haulage road.

How Kingshill Beats Daily Man-Average By Over 70 Per Cent

(*Continued from page 530*)

have practically eliminated guesswork from their program.

The mining companies of America must organize along similar lines. They must substitute facts for beliefs. They must know with reasonable certainty where they are going and when they will arrive, before they spend a single dollar of new capital.

Engineers must be regarded as an investment and not as an expense. They should be required to work underground in various capacities until they have become practical men. The matured engineer will then apply his trained analytical mind in a practical way and will yield his employer a handsome return on the cost of his training.

Only in this way can America maintain her pre-eminent position in the mining industry. The shallow deposits of the past fifty years will be replaced by the deeper lying coals during the next fifty years. Only specialized training and preparation to meet coming changes will keep costs within reasonable limits. Prompt recognition of mining engineering as a science will go a long way to solve the troubles of the coal industry.

I desire to express my appreciation of the kindness of W. H. Telfer, managing director, and Alex. M. Ritchie, mining agent, in permitting a visit to this interesting plant.

Mine Illumination...

A Fruitful Field for Study

By Samuel G. Hibben

Westinghouse Lamp Co.
Bloomfield, N. J.

FROM the standpoint of lighting, coal mines probably are the worst working places in the world. The possibilities of effective artificial illumination in the mines have received far less attention than in many other industries. The expense of adequate installations, the relatively short life of the individual working place and the uncertainty in the minds of many operators as to the real effect of better lighting upon production all have contributed to lack of interest in the problem.

Years ago, we were prone to assume that the many accidents in the mining industry resulted from conditions beyond human control. Certainly this opinion no longer exists. The work of the U. S. Bureau of Mines has demonstrated that mines can be made far safer to human life and that by improved rescue methods lives may be saved when accidents occur. The time has come when we must go further and advocate a feature of safety—lighting—not only to reduce hazard but to increase production and raise the standard of human efficiency.

The place and the value of the cap lamp are too well known to call for detailed discussion here. As a portable light operating under severe conditions, the cap lamp is doing its job and doing it well. It is in the further development and extension of semi-stationary illumination to supplement the work of the cap lamp that exploration beckons.

Factory executives have long since discovered that good lighting on the order of 10 to 15 foot-candles at the work, is an investment in production and an insurance against accident. Numerous tests in industrial plants have disclosed that increasing illumination at a cost equivalent to about 1 per cent of the payroll in general increases production about 10 per cent. For example, in typical machine shops and assembly plants, going from 3 to 10 foot-candles resulted in an 11 per cent increase in output—not to mention the somewhat intangible, but nevertheless inevitable, improvement in morale, sanitary conditions, supervision, and in reduced labor turnover resulting from better illumination. Furthermore, economy in lighting cannot be figured correctly on the basis of the cost of operating the sources of light. The real measure is how much work can be done or how much output can be obtained, and hence inadequate light is often an economic loss and not a saving.

The introduction of electricity in coal mines for haulage and pumping has provided a means by which standard large Mazda lamps may be used for lighting such places as shaft bottoms, turnouts and switching points. It is vital that a more extended use of artificial and of shaded light be made

The headpiece illustrates the possibilities of floodlight illumination of tipple yard tracks. The night photograph from which the headpiece was made was taken at the Champion plant of the Pittsburgh Coal Co., with the camera 90 ft. in front of the lights and facing away from them. The nearest car was 160 ft. distant from the camera and 250 ft. distant from the building with the floodlights.

at these places, for speed and safety in car movements will determine the output; moreover, the lighting cost where electric power is already available is less for a whole year than the workman's compensation for one crippling accident.

One place that especially needs to be well illuminated is the storage track or landing. Every car that goes into or out of the mine must be handled at this point, which consequently is the busiest part of the mine. One man at least must be employed to uncouple the cars and drop them to a point where they can easily be run onto the cage. He must so perform his work that cars are always ready for caging, and at the same time prevent cars from crashing into the cage or shaft structure. There is a constant switching of empty cars onto the tracks that lead from the cage, and of loaded cars from the tracks leading away from it.

At the entrance to the storage track it is essential, for the safety of all concerned, that the motorman be sure that the switches are properly set and the tracks clear. The illumination here should compare favorably with that provided in the business sections of our streets, the space in the immediate vicinity of the shaft bottom having a higher intensity than any other point. Dust-tight floodlight projectors offer one good solution, one 250-watt unit taking care of some 100 ft. of track.

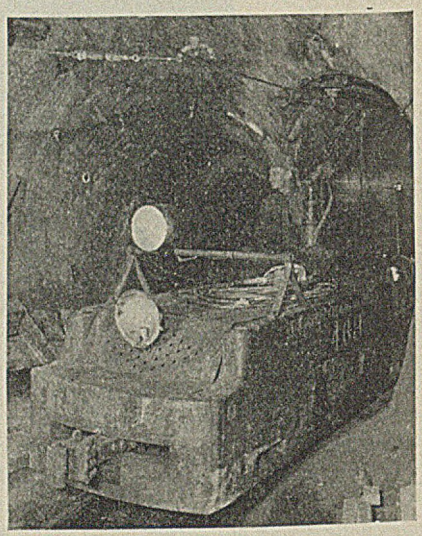
The same conditions prevail in a lesser degree at the other turnouts or switching points on the haulage road. At the junction of an entry with that road good illumination should be provided to indicate to the motorman when to reduce speed to take the curve and switches safely, and also to enable him to see that the switches are properly set. "Good illumination" must not be confused with merely "more light"; bare lamps will not suffice, for where the pupil of the eye is enlarged, any brilliant light source against a black background will be exceedingly disconcerting, and will really constitute a menace, for by a bare lamp the driver or motorman will be temporarily blinded. The larger the lamp, if unshaded, the worse, and not better, will be acuity of vision.

Mine locomotive headlights that are completely inclosed, yet cushioned to prevent destruction of front glass or lamp bulb, are now available. With the 23- to 94-watt Mazda concentrated filament lamps they furnish beams sufficiently intense to illuminate a track for distances of 200 yd. or more.

Danger of gas explosions from electric lamps in mines is small. Even if gas were present, the breaking of the bulb of a Mazda vacuum (type B) lamp would not cause ignition of the gas except under the rarest of conditions. The bulb temperature of any of the vacuum Mazda lamps is not sufficiently high to ignite deposits of coal dust settling on them, although any of the Mazda lamps when exposed to breakage in any particularly flammable dust mixture ought to be inclosed in the vapor-proof (i.e., dust-tight) glass globes. Then the hazard becomes zero.

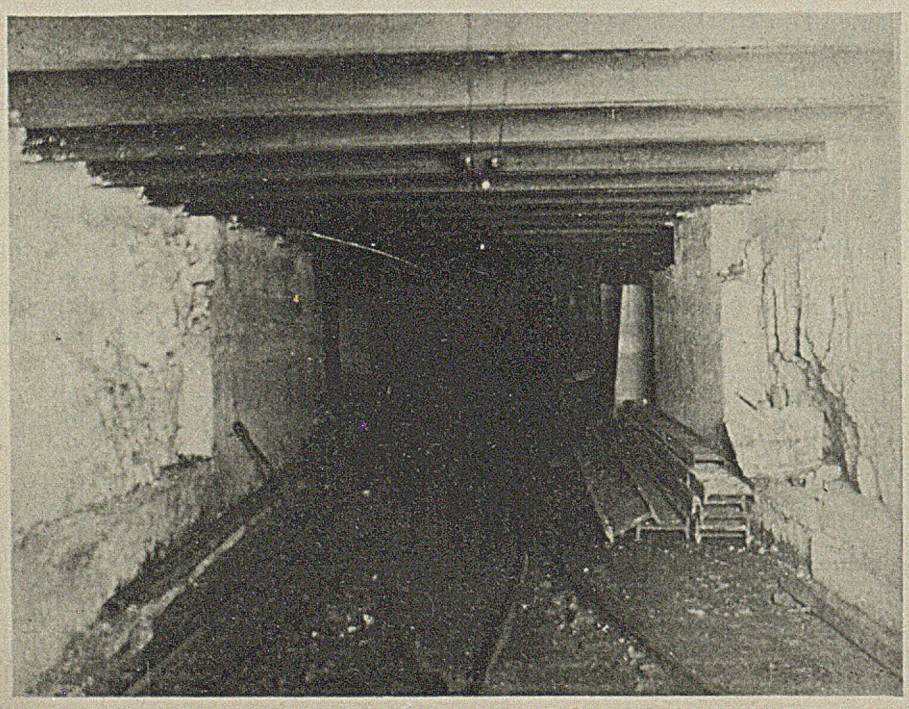
Exposed gas-filled (Mazda C) lamps are not generally desirable. For underground service, they are recommended only when inclosed in vapor-proof globes, or in sealed protective fixtures like mine-locomotive headlights, or floodlights without ventilation.

Poor quality of electric wiring and extremely rough service have delayed the extended use of large Mazda lamps. Only by specially constructed mine cable, moisture- and abrasive-proof, can lamps be wired satisfactorily to portable extensions. Unavoidable voltage drop at distant points should be considered and allowance should be made for it when installing or purchasing lamps. As each 1 per cent drop in volts brings about nearly 4 per cent decrease in candlepower, this voltage maintenance problem is acute. A 230-volt lamp burned at a socket where the actual voltage is 215 will afford only about half the normal candlepower.



Long- and Short-Throw Headlight Equipment on Mine Locomotive

Cement Sprayed On, or Whitewash, Will Brighten Passageways and Aid Lighting



For permanently placed overhead lighting units, the regular commercial fittings, using enameled steel reflectors, are satisfactory. Tin reflectors surfaced with white paint are not suited to service in a damp atmosphere, or where exposed to blows. Even if the paint does not chip or peel, it will soon discolor from the heat of the lamp and from sulphurous gas. Bare lamps in mines are all too common, and are particularly dangerous because such brilliant light sources directly in the field of vision

cause pupillary contraction and partial blindness, with resultant risk of injury. Glare under mine conditions, where surroundings are black, is more than annoying; it is almost criminal negligence.

Another reason for using proper reflectors with large lamps is that all light that does not fall directly upon the surfaces to be illuminated is absorbed by the black surfaces. There is no diffusion of light in a coal mine; hence the light is wasted if not directed exactly to the proper place. Bare lamps near moving machinery increase the hazard of workmen whose partially blinded eyes cannot instantaneously detect moving parts, nor help them to avoid touching electrical contacts.

Large lamps in red vapor-proof globes are effective in lighting first-aid cabinet stations. A large lamp placed in or close to such cabinets and controlled by a switch placed inside of the cabinet will give ample illumination for first aid-work.

Liberal applications of whitewash in mine timbers, concrete, and even handles of tools will greatly increase illumination and the workmen's ability of perception. This idea has even been carried so far as to equip miners with light-colored overalls so that the drivers and motormen can easily see them and so that they can see each other when throwing aside tools. Some mines which have employed the cement gun for roof support have found that it increased the reflected light and bettered illumination.

ILLUMINATION of topworks at coal mines is much below par when compared with that in other industries. Tipples and mine buildings can be effectively illuminated by applying the ordinary rules of factory lighting to such places: i.e., using the enameled steel reflectors and Mazda C lamps. For installations when lamps are hung low, and used to furnish broadcast illumination, the R.L.M. reflector is superior. Its height above the work should be about one-half to three-fifths the spacing. Lamps placed high (usually over 10 ft. from the floor) should have a reflector of the narrow distribution type.

Recently the "high-bay" chromium reflector has made it possible to use fewer but larger lamps, thus saving wiring and maintenance costs. Modern lamp construction is such that ordinary building vibration does not reduce lamp life. Standard porcelain or conduit fittings are perfectly satisfactory, though the less open-wiring the better. The chief things to be avoided are fluctuating voltage and bare (unshaded) lamps. Separate power (motor) circuits from lamp circuits, for steadier light and longer lamp life, will justify this precaution. Keep the voltage drop to a minimum by judicious use of feeders and by good generator regulation.

Battery Charging Room for Cap Lamps

Where slate is sorted from the coal, it is often troublesome, under the light of yellowish colored lamps, to detect the slate and shale. Better differentiation between black and gray objects may be secured by using the Mazda C-2 or daylight white (blue bulb). Wherever manual operations are performed, either in the breakers or elsewhere, higher values of illumination speed up production.

Lighting intensities of ½ to 1 foot-candle, such as now found in many working spaces, are little better than moonlight. Values of 5 to 10 foot-candles, or approximately one watt of power per squre foot of floor area, are not excessive nor in any sense extravagant when considering both output and accidents.

Often in places such as the charging tracks above beehive coke ovens, the smoke and dust and the difficulties in maintenance are too great to allow of efficient operation of ordinary lamps and open reflectors. Here a few heavy-duty floodlight projectors mounted on wooden poles and pointed to direct a narrow beam along the line of ovens is the best solution. Railway switch yards when operated at night, also may be illuminated to reasonably good intensities by 500- to 1,000-watt floodlight projectors, spaced about 100 to 300 yd. apart, and one such unit on the corner of a building will often take care of a large expanse of yard that otherwise would remain dark.

All switch control, particularly of the prevalent high voltages usually existing around coal properties, is a source of danger unless safety or inclosed switches are used. In plain language, such precautions are good because they make the lighting equipment foolproof.

A growing responsibility and desire on the part of both executives and workmen to facilitate rapid and safe operations, leading to increased output and better wages, has been an incentive to improve mine lighting conditions. Among the economic items one of the most interesting is the cost of lighting versus man power and efficiency. Though the figures would have to be revised with mine lighting, an example from the factory may be presented as exhibiting the correct trend of thought in regard to this problem. Under certain conditions, it costs from $10 to $15 annually to provide reasonably good lighting for each man. Expressed in terms of wages, the lighting cost represents 23 sec. out of one hour of operation. Thus, if better lighting can save more than 23 sec. of each workman's time per hour, it will pay for itself through increased output.

With Close Supervision

Will Hand Loading

Have Less to Fear From Machines?

By Van B. Stith

General Superintendent
Black Diamond Coal Mining Co.
Drakesboro, Ky.

MECHANICAL LOADING is not a cure-all nor is it an absolute necessity for the successful operation of a mining property. This statement is not made to oppose the mechanical loading of coal, for in the future it probably will be the system most generally used. It is stated merely in answer to those who are convinced that of the two methods of loading coal, mechanical and hand, only the former rightly can be considered.

Mechanical loading has brought vividly to the mind of the operator the value of "concentrated, scientific and detailed supervision." Rule-of-thumb methods are now a part of the past. However, the question arises as to what caused this change of viewpoint. The correct explanation is that the operator, having locked up cold cash in a machine, got on the job to see that he received a dividend from his investment.

Once on the job he discovered that a foreman was needed to provide that the machine would be supplied at all times with cars, coal and repair parts and would be kept continually in operating condition. When hand loaders were employed under the piece-work system, the operator considered them as being of no expense and thought that rigorous supervision was unnecessary. However, if as close supervision is given to hand loading as has been applied to machine loading, the outcome of the former will be far more favorable than with the old hit-and-miss methods of earlier days.

In making this comparison, the room-and-pillar system of mining, which is prevalent in the Central Competitive Field, will be considered as standard. The average loading machine handles approximately 200 tons per day, though it has been known to go up to 300 and down to 100 tons. Each loader for gathering 200 tons of machine-loaded coal requires one locomotive. In a hand-loading mine, it would gather 300 tons or more.

One boss will be required for 200 tons in a machine-loading mine. In a hand-loading operation, however, that same man would be able every hour to make one visit to each face on a 300-ton section, and thus the supervision cost would be one-third lower than with machine loading.

Question and Answer

"WHY should COAL AGE*," asked a friendly critic who read Mr. Stith's manuscript, "publish an article which takes up the gage for hand-loading? Have you abandoned your leadership in the cause of mechanization?"*

ANSWERING *the second question first,* COAL AGE *has not abandoned, nor has it any intention of abandoning its advocacy of more mechanization. But the editors believe that one of the greatest services they can render to the industry is to make the pages of* COAL AGE *an open forum for the discussion of all operating and management problems.*

MOREOVER, *Mr. Stith raises a question which merits further consideration. Management, he hints, has done as much as machinery to reduce costs. There are many who will feel that the author gives hand-loading too generous a defense.* COAL AGE *will welcome an expression of opinion from both those who agree with Mr. Stith and those who challenge his conclusions.*

The total cost of operating a mechanical loader for one shift and producing 200 tons is given in Table I. The cost of producing 300 tons in one shift by hand loading is given in Table II. To make the figures as flexible as possible, a wage rate of $5 per man per day is used in both tables.

The item "increased labor in preparation plant" in Table I arises from the necessity of employing six more tipple men where a mine that is producing 2,000 tons per day goes on a machine-loading basis. Based on this figure, 0.6 additional man is required per loading machine. "Additional power for the loader" includes the 42 kw.-hr. required to load 200 tons into mine cars 54 in. high. If generated by the consumer or purchased, the cost per kilowatt-hour will be at least 4c. when transmission losses to the point of consumption are figured, as also those for the maintenance of the transmission lines. Based on an average cost of $8,000 for a loading machine, the interest on the investment will be 1.2c. per ton, or a total of $2.40 per day.

The average life of a loading machine should be around ten years, but, to choose a liberal figure, it will be taken as twenty. Assuming that the machine works 200 days per year, the depreciation charge will be $2 per day. The "loss in housing and store revenue" charge arises from the fact that most operators are located in isolated districts and have been forced to house their labor and provide a general store with provision suitable to the number of men needed to load coal by hand.

According to the tables seven more men are needed when 200 tons of coal is loaded by hand than when the same quantity is loaded by machine. These will continue to rent the houses and trade at the store as long as

manual methods are employed. Our employees have an average store account of $20 per payroll and pay a rental of $8, 10 per cent of both of which will be profit. The reduction of the force by seven men will result in a charge of $19.60 per payroll against the loading machine. Working 200 days a year, the average payroll period would be 8.3 days. The total tonnage per pay period would then be 1,660 and this figure divided into $19.60 and multiplied by 200 tons per shift will give a charge of $2.36 against the machine.

IN BLASTING coal for machine loading it must be freed from the face, at least more so than for hand loading; in consequence, as my experience has shown, the plus 6-in. product will be decreased by machine loading and increased by hand loading. This increase is made at the expense of the 1¼-in. screenings, the lowest priced coal, and consequently hand-loaded coal may be expected to give a higher market revenue than machine-loaded coal. (Table III.)

The cost of hand loading is shown in Table II. The personnel necessary to produce 300 tons per day also is shown. At this point the question probably will arise, "Why use 300 tons as a basis in hand loading and only 200 in mechanical loading?" The answer is that the same amount of supervision, haulage facilities, etc., which was required for 200 tons of machine-loaded coal will serve for 300 tons in hand loading.

The allotment of loaders in Table II may be questioned, as I have allowed 15 tons per loader. This is a high average, but it can be attained with the aid of more efficient supervision, if care is taken to give all loaders an equal distribution of cars throughout the day, to supervise operation adequately and to record with accuracy all causes which prevent a miner from attaining day by day an average output.

The foregoing discussion has been in relation to costs, the conclusion being that coal can be loaded by machine 10.2c. per ton cheaper than by hand. But all these figures concern production and have no relation to the most vital problem of the industry: the marketing of the product.

The mechanical loader is at a decided disadvantage when preparation is considered, as it loads the impurities as well as the coal. With hand methods the coal may be cleaned at the face as it is loaded, at least sufficiently to allow it to be prepared on top. The face also is the logical place to remove impurities as they are disposed of without haulage or rehandling.

Charging the loader with six additional men for preparation is, I think, conservative as the Central Competitive Field, the No. 6 seam of southern Illinois, the No. 3 and No. 5 seams of Indiana and the No. 9 and No. 11 seams of the Kentucky series would require more than six additional men for adequate cleaning due to the presence of pyrites, fireclay, shale and slate. All of these would be picked up by a mechanical loader.

It may be said, "Why not equip the mine with a mechanical preparation plant?" This is being done in some instances, but not every operator is financially able to purchase mechanical loaders and preparation plants at a cost of $100,000 to $200,000.

The opportunity afforded for

Table I—Labor Cost of Machine Loading

	No. of Men	Cost
Operating loader	2	$10.00
Drilling and shooting	1	5.00
Taking up machine bottoms and squaring up corners	1	5.00
Supervision	1	5.00
Haulage	2	10.00
Timber and track	2	10.00
Cutting coal	2	10.00
Increased labor in preparation plant	0.6	3.00
Cost Other Than Labor Not Encountered in Hand Loading		
Additional power for loader		1.68
Interest on investment		2.40
Depreciation on loader		2.00
Loss in housing and store revenue		2.36
Loss in market revenue		6.50
Total cost of producing 200 tons		$72.94
Total cost per ton		36.47c.

Table II—Labor Cost of Hand Loading

	No. of Men	Cost
Loading	20	$100.00
Supervision	1	5.00
Laying track	1	5.00
Haulage	2	10.00
Cutting coal	2	10.00
Drilling and shooting	2	10.00
Total cost of producing 300 tons		$140.00
Total cost per ton		46.67c.
Total cost per ton, machine loading		36.47c.
Apparent saving resulting from machine loading		10.20c.

Table III—Comparative Revenue; Hand- and Machine-Loaded Coal

Size	Per Cent in Mine-Run	Circular Price	Return After Sizing
Machine Loaded Coal			
6-in. lump	25	$2.40	$0.6000
6x3-in. egg	15	2.40	0.3600
3x2-in. egg	12	2.40	0.2880
2x1¼-in. nut	8	2.00	0.1600
1¼-in. screenings	40	1.75	0.7000
Total received per mine-run ton			$2.1080
Hand Loaded Coal			
6-in. lump	30	2.40	0.7200
6x3-in. egg	15	2.40	0.3600
3x2-in. egg	12	2.40	0.2880
2x1¼-in. nut	8	2.00	0.1600
1¼-in. screenings	35	1.75	0.6125
Total received per mine-run ton			$2.1405
Loss of revenue per ton of machine-loaded coal			3.25c.

Van B. Stith

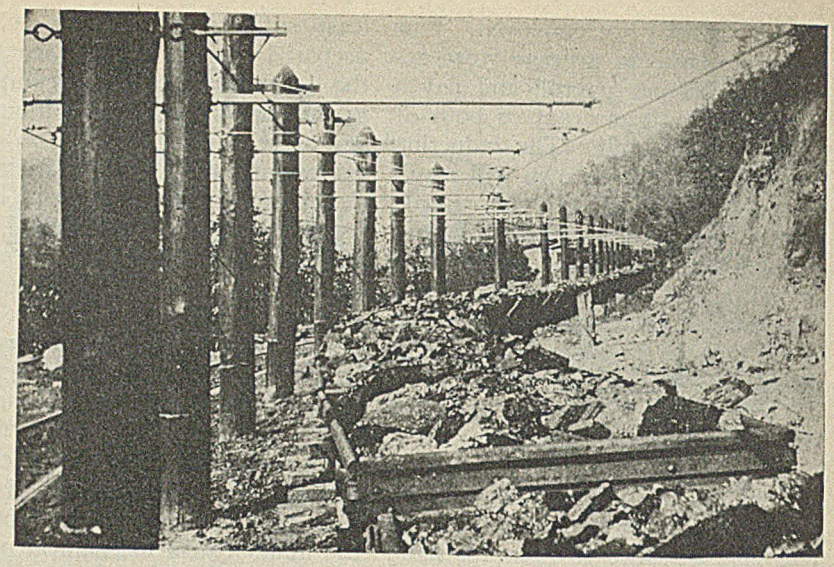
cleaning at the face, together with the low initial cost, has brought the pit-car loader into the limelight. Its chief advantages are that it eliminates the work of lifting the coal into the mine car and allows it to be cleaned. However, the fact still remains that the coal must be put on a conveyor, and if results are to be obtained supervision must not be neglected.

In either system competent supervision at the face is an absolute necessity for best results. The mechanized mines are obtaining it but the hand-loading mines are not, and in the latter the introduction of supervision may prove to be the factor that will turn failure into survival. As a rule, a hand loader is turned loose in the mine from starting until quitting time with but little or no attention.

Whether this man loads one car or six, he must make a living wage out of his work. And as all wage adjustments are based on the cost of living and on a man's average earning power it simmers down to this: that *if an operator is not providing a full day's loading for the loader, he is paying him too much for what he is loading!*

From what has been said as to the possibilities derivable from well-supervised and well-regulated hand labor it should be clear that the operator who has not sufficient funds to join the ranks of those using mechanical loaders need not get disgusted and quit the business. He should tighten up on supervision and see that the coal loader gets a full day's loading, that the right kind and proper quantity of supplies are purchased and that when they are received they are used in the proper manner and place.

Permanent Tracks Should Have PERMANENT TROLLEY LINES



Looking Along the Double Track Toward the Dump House

EXCEPT where the life expectancy of an operation is unusually short, money is well spent for the most rugged and serviceable equipment available. Because so many types of construction are possible for supporting trolley wire on outside hauls, this part of the equipment of drift mines is in many cases entirely too frail for the best economy. Months or years instead of days should elapse between repairs, and it should be unusual instead of a regular occurrence for a trolley wheel to leave the wire.

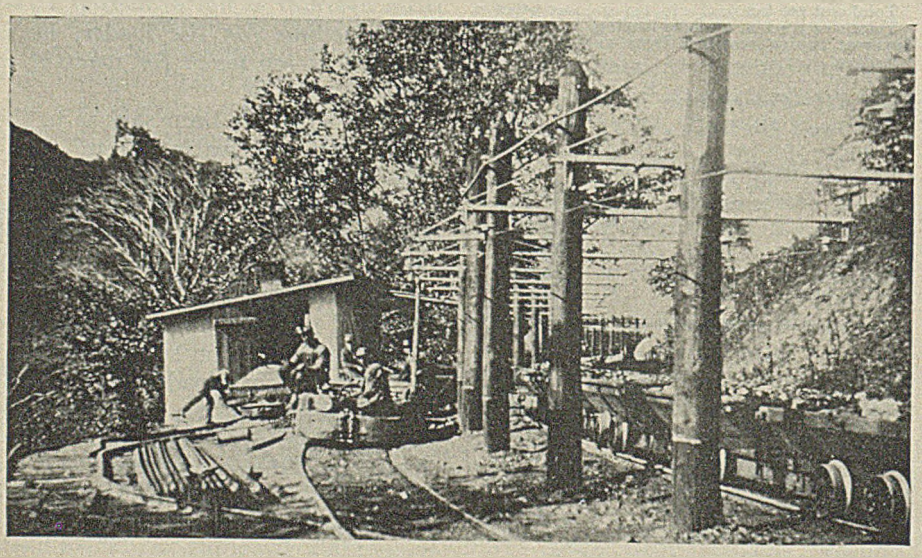
An example of construction which represents the best that the mine officials found available, and which after two years of service still has their indorsement, is shown in the accompanying photographs made at Yancy mine of the Harlan Fuel Co., Harlan County, Kentucky.

This trolley-wire construction is used on a 3,000-ft. stretch of double-tracked main haul graded along the mountainside between the mine portal and the dump house. The occasion for the new installation arose two years ago, when the original single-track road was changed to double-track and the small trolley posts were found to be badly rotted.

The first thought was to set posts on each side of the double track to support spans of pipe or steel messenger wire, but this was ruled out because of the liability of earth slides taking out the posts on the lower side, because of the lack of firm ground in which to guy these posts if messenger wire were used, and because a pipe span would not provide the desired flexibility.

Single posts set between the tracks and each equipped with two flexible brackets which conform to specifications of the American Electric Railway Association was the construction selected. The chestnut posts, which were cut locally, average 12 in. diameter at the ground line. They are set to a depth of 4 ft. and extend 12 ft. above the ground. Creosote was applied from the base to a point 2 ft. above the ground and also to the top bevels. The body of the pole is painted red.

Curve on Main Haulway at Top of Incline and Sand House



The spacing is 12 ft. on the straight track and closer on the curves. Adjacent rails of the two tracks are 6 ft. apart, thus leaving a clearance of 30 in. from pole to rail.

Bracket arms are of 2-in. seamless galvanized tubing, 9 ft. 6 in. long on one side and 2 ft. 6 in. on the other. The support rods are $\frac{1}{2}$ in. and the messenger strand $\frac{5}{16}$ in. These parts, the pole castings, outer span holder, guide castings, hangers and clamps were purchased from the Ohio Brass Co. The trolley wire is 6 ft. 6 in. above the rail and 6 in. to the outer side.

Other conductors carried on the poles are a pair of telephone wires and a 1,000,000-circ.mil feeder from the 275-volt substation. Type-P side-attachment mine hangers are used for support of the feeder cable because these were available from some old work that was taken down.

"Even in first cost this construction figured less than if we had used a span and two poles," said Charles Guthrie, mine superintendent. "That way it would have been necessary to dig two holes per hanger."

The flexibility provided by having the trolley wire attached to a messenger strand instead of directly to the pipe is a feature which aids in keeping the wheel on the wire and one which reduces maintenance by diminishing the shock as the wheel passes over the hanger.

Experience has proved that it was wise to use large poles. Several have had three to four inches of the side cut away by contact with a wrecked trip, but none have been broken. Considering stability, durability and satisfactory service the entire installation is far above the average for mine work.

Determination of

Volatile Matter

In Colorado Coals

By W. A. Manuel and C. B. Carpenter
Colorado School of Mines,
Golden, Colo.

IN CONNECTION with a survey of Colorado coal deposits, begun at the Colorado School of Mines in 1927, it was found that the volatile matter of several coal samples could not be satisfactorily determined by the usual method of heating the coal for 7 minutes in a Fieldner electric furnace held at 950 deg. C. The results were high, because of loss of coal. Three types of difficulty were met.

One type of loss encountered was associated with coals of high moisture content. If the moisture exceeded 10 per cent, when using illium crucibles of the approved type, unburned coal or ash was found on the top of the lid, showing that coal had spewed out of the crucible. If the moisture content was less, the losses were not so large. There is, however, no sharp line of division which marks the point above which losses are too large to be tolerated and below which the losses are negligible, but there is a gradual decrease of loss as the moisture content falls.

It was found that losses due to high moisture could be avoided if the coal was oven-dried before being subjected to the volatile-matter determination. Of course, such a procedure is open to the criticism that there may be slight changes in the composition of the coal during the drying which would affect the volatile content. If however, all samples of coal are treated by this method the results should be comparable.

The procedure finally adopted, and hereinafter called the C.S.M. method for determination of volatile matter, is as follows: One gram of minus 60-mesh coal is weighed into a volatile-matter crucible, and with the lid removed the crucible is heated in a drying oven at 105 deg. C. for one hour. The lid is then replaced, so that it fits snugly but not tightly, and the crucible is heated as usual in a Fieldner electric furnace, preheated to and held at 950 deg. C. for 7 minutes.

The accompanying table gives the results for twenty different coals, from which it will be seen that the average difference between the results for the C.S.M. method and the usual method is about 1.3 per cent, the C.S.M. method being lower. Many of the coals could not be subjected to the usual procedure with success.

Volatile Matter Determinations

Sample No.	Moisture	Usual 7 Min. 950°C.	C.S.M. 1 Hr. 105°C. 7 Min. 950°C.	C.S.M. Special 6 Min. 600°C. 4 Min. 950°C.	With 1 Gram Sand 7 Min. 950°C.
10	1.1	32.9	32.4	30.9	32.3
40	2.6	*	37.7	35.8	37.8
19	2.9	*	*	38.8	....
35	3.1	38.9	38.3	36.5	38.9
6	6.0	41.2	40.2	38.2	....
8	6.6	41.1	39.7	37.6	40.6
22	7.0	37.5	36.7	35.1	....
44	8.0	38.6	36.5	34.8	....
34	9.0	25.1	24.7	24.3	24.8
15	10.0	*	37.7	....	....
41	10.9	39.9	36.9	35.3	37.1
42	11.3	39.1	37.0	35.4	37.4
3	13.6	*	35.6	33.9	....
26	15.0	*	*	29.9	....
27	16.1	*	*	32.5	....
11	17.4	*	33.3	32.4	....
18	18.3	*	36.0	35.4	....
45	18.2	*	*	32.1	....
33	19.1	*	*	30.9	....
29	19.9	*	*	31.6	....

*The determination was erratic.
Blank spaces indicate that no determinations were attempted.

Certain coking coals produced a second type of difficulty and loss in the volatile-matter determination. If the coal caked rapidly and formed an impervious layer on the outside before the gas was all eliminated from the inside, sufficient internal pressure to explode the coke button was sometimes generated. Often a part of the coke was thrown from the crucible and its contents exposed to oxidation.

The modified method just explained —that is, the C.S.M. method—did not alleviate this trouble. But it was found that the addition of one gram of clean sea sand, minus 40-mesh and plus 60-mesh, predried and ignited, eliminated this difficulty, but gave higher results than the C.S.M. method when applied to coals which responded to either procedure. It was found later that this type of coal would "behave" when treated by the modified method next described. Therefore, the use of sea sand is optional.

A third source of loss met with in some Colorado coals was that due to the presence of compounds other than moisture which decomposed with sufficient rapidity and violence to cause a part of the coal to be spewed out of the crucible as a fine powder. Many of the sub-bituminous coals, which approach the lignite type, react in this troublesome manner—even in the methods just described.

The modification adopted to meet this difficulty was suggested by the procedure advocated by the Bureau of Mines for the determination of volatile matter in lignite (Stanton, Fieldner and Selvig: "Methods of Analyzing Coal and Coke," U. S. Bureau of Mines Technical Paper 8, p. 10, 1926). In their report the suggestion is made that the coal be given a preliminary heat treatment of five minutes with a moving bunsen flame before it is subjected to the full temperature of 950 deg. C. for a final period of six minutes. That method, however, seems open to the criticism that the temperature of the preliminary flaming is not standardized, and a variation in it might change the results. This suspicion was verified by heating samples of the same coal for varying lengths of time and at various temperatures in a Fieldner electric furnace and then ending the determination in another Fieldner furnace held at 950 deg. C.; that is to say, when the period and degree of heating were varied, the results varied.

This method of using two furnaces, with controlled temperatures, was the method finally chosen for coals of the type being considered. In seeking to determine the optimum conditions for this modification, it was assumed that temperatures in the first furnace should be as close to 950 deg. C. as possible, as they probably would produce results with a minimum of variation from those which might be obtained in the standard procedure if it were applicable. It was found that temperatures in excess of 600 deg. C. in the first furnace did not eliminate the loss, and that at this temperature six minutes' preliminary heating was necessary.

The time in the second furnace, held at 950 deg. C., was set at four minutes. This period was selected

because it was noticed that at the end of the six minutes' preliminary heating the visible vapors being eliminated had ceased and that this condition apparently was the same as that existing in the usual method at the close of three minutes or when the remaining time at 950 deg. C. was four minutes.

The method adopted for all coal which gave unreliable results for volatile matter by the C.S.M. method is as follows: One gram of the minus 60-mesh coal sample is weighed into a volatile-matter crucible, the lid adjusted so it is fairly snug but not tight, and the crucible is heated for six minutes in a Fieldner electric furnace at 600 deg. C. At the expiration of this period the crucible is removed from the furnace, the lid gently tapped to insure its proper position, and the crucible quickly transferred to a second Fieldner furnace at 950 deg. C.

It will be noted, from the table, that the results obtained by this C.S.M. special method are lower than those obtained by the C.S.M. regular method. It is therefore not advocated that this special method be used for all samples, but that its use be restricted to those coals which cannot be satisfactorily analyzed by the C.S.M. standard method. It is recommended that oven drying the samples before the determination of volatile matter be made the routine.

Rock-Dusting Will Not Carry Entire Safety Burden

"ROCK-DUSTING is an effective means of preventing coal dust from propagating an explosion in a coal mine," states G. S. McCaa, district engineer, U. S. Bureau of Mines, in Information Circular 6144, "but it will not prevent gas from igniting explosively and with much attendant damage locally. Ventilation must be effective at all times, regardless of the employment of other explosion-preventing methods."

As an example, a gas explosion in a bituminous mine worked on the panel system is described. The area in which the explosion occurred is shown in the accompanying figure, adapted from that given in the circular. Seven days prior to the explosion, the intake and return entries were rock-dusted to within 38 ft. of the face and this was to be extended at the time of the explosion.

The rock-dusting machine, pushed by a cable-reel locomotive, passed through the controlling door at the mouth of the entry, which was then closed. The operator of the rock-dust machine preceded the motorman and went to the face of the return entry to test for gas, leaving the curtain in the next to the last crosscut open, as was customary. The motorman, upon a signal from the operator, advanced to a hill about 50 ft. from the face, stopped the trip and was about to notify the operator to start the machine when a bright flash occurred near the cable reel on the locomotive.

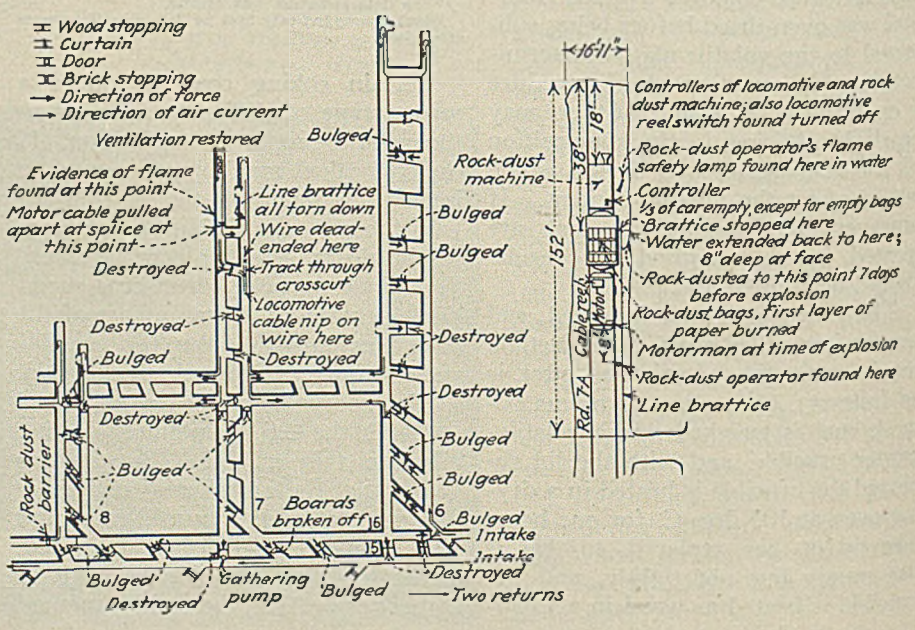
The ensuing explosion of gas resulted in the death of the rock-dust operator. Subsequent investigation showed that the flame was limited to a distance of about 90 ft., but stoppings were destroyed as far as 1,000 ft. away and others were bulged as far away as 1,500 ft.

Rock dust was credited with preventing propagation by coal dust or at least definitely lessening the violence if it did occur, but cessation of ventilation resulting from opening the curtain and failure to test at the high point for gas contributed to the cause. Finally, a source of flame was introduced in the open-type cable-reel locomotive. Inspection after the accident led to the belief that a splice became short-circuited near the cable reel, igniting the gas. Cables on mining equipment, Mr. McCaa says, are decidedly hazardous.

The presence of rock dust should not lull crews into a false sense of security, as it furnishes absolutely no protection against gas, even when the machine is running. "Only permissible electrical equipment, including locomotives, rock-dusting machines, etc., should be allowed near the face of the workings and on return airways, even while rock-dusting."

Recommendations given in the circular include the following provisions: rigid examination of any place into which electrical equipment is to be taken should be made by a competent person with a flame safety lamp, the equipment remaining on the intake side back of the last permanent crosscut until the test is finished; half-hourly tests while operating in any place that may generate explosive gas; inspection of equipment at the beginning and end of each shift for defective cables, loose connections, loose or missing bolts or other defects, and the immediate repair of such defects; daily removal of rock-dust accumulations on the motor of the rock-dust machine; insulators for all cables passing through steel housings; cover plates kept on commutators at all times; bottom chain guard to be kept on rock-dusting machine; elimination of temporary or makeshift electrical connections; fire extinguishers to be a part of the equipment of all electrically operated compressors and locomotives; elimination of all open-type switches, and removal of accumulations of oil and grease around motors.

Effect of Gas Explosion in Rock-Dusted Mine



NOTES

From Across the Sea

EUROPE in many places is cutting steeply inclined coal by cutters that move straight up the pitch. Strangely enough, there is a distinct advantage in highly inclined coal where the seams are thin, because men are able to stand upright in a seam so tilted, whereas, if it were flat, they would have to grovel on their knees and perhaps might find even that mode of progression impossible. Rarely is a man so thick from front to back that he cannot climb around in the thinnest working seams where these are standing almost on end. The roof also is stronger than it is where it lies as a level sheet over the working place.

In almost all cases of really steeply inclined coal abroad the seam is being mined with the face advancing with the strike and the coal-cutting machinery advancing up the pitch. Even with hand working this system of advance is quite general, the "full battery" method so general in the anthracite region being unusual if not unknown in Europe.

So long as the inclination of the seam is less than 60 deg. the machine has sufficient purchase on the floor to work well suspended by ropes. Coal has been undercut by machine in seams inclined at an angle as steep as 85 deg. to the horizontal, but in such cases the cutter is fairly hanging on the ropes and the floor contact has little steadying influence.

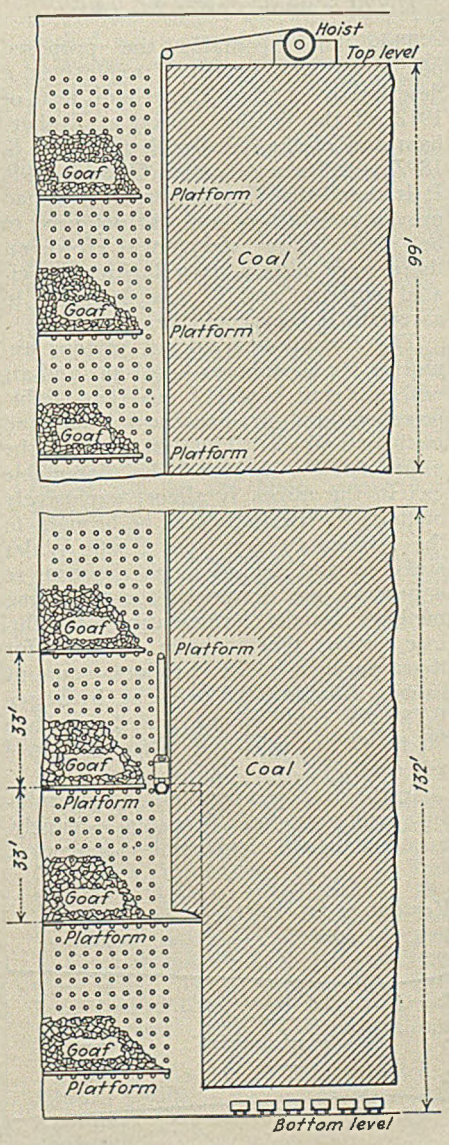
In seams inclined at angles between 30 and 40 deg. to the horizontal, according to Mavor & Coulson in *M. & C. Machine Mining,* the labor costs are 40 per cent less with cutting machines than with hand mining on the same inclination. The operation of cutters on such gradients "involves neither exceptional difficulties nor dangers." The face, say these authorities, should be aligned straight up the pitch, for any deviation such as is usual with hand mining is "attended by inconveniences which are seldom compensated by the anticipated advantages, and experience almost invariably leads to the face being brought into the line of dip or rise."

The coal is cut uphill because the seam when undercut is weak and disposed to fall. If the cutting machine is being worked below a great length of face that has been undercut, there is a risk that the coal will break at some point above the machine and roll down on the luckless men who are handling the undercutter. This is especially likely because the operation is by longwall and there is much pressure on the working face.

Besides this, with uphill cutting, the cut tends to be kept clean by gravity. This reduces the resistance of the cutter and decreases the degradation, which is especially desirable when the coal rolls down a long inclination and raises a dangerous dust. No one should work below the mining machine for fear it may break loose and that coal broken off the face might fall down the inclination.

As the machine has a greatly reduced purchase on the mine floor, if the coal has soft and hard layers, difficulty is almost inevitable. The gravity of the machine is insufficient to prevent the cutting element from finding the soft measure and cutting in it, an unfortunate circumstance when the layer thus selected by the bits is not near the mine floor.

Longwall in Czechoslovakian Mine on Face Inclined at 80 Deg.



In a Czechoslovakian mine which is operated by the Nordbahn Co. coal is being undercut by machine on an inclination of 80 deg., says the authority already cited. The rope which pulls the machine uphill along the face which is being cut has to be unusually strong, for it has on it not only almost the entire weight of the machine but also it has to hold the cutter up to its work against the resistance of the bits and it has also to overcome the frictional resistance, the last element being reduced, however, by the fact that the cutter has little or no purchase on the floor.

The seam being cut is 16 in. thick, but above it is 8 in. of rock and another coal seam 8 in. thick, all of which are eventually removed. The machine used to cut the coal is a Pick Quick, which is described in England as a "bar machine." In America perhaps it would hardly receive that designation. The Hess dustless machine formerly used in West Virginia was of the same type (see *Coal Age,* Vol. 2, p. 914). It has a tapering horn like the horn of a unicorn on the front end and bits disposed spirally along the horn. It cuts by the revolution of this element aided by the advance of the machine.

The object of all writing being to create a clear and unequivocal conception of what is described, I trust I shall be pardoned if I call all machines of the type of this one by an expression of my own fabrication—a "horn machine"—rather than a "bar machine," for in the United States the latter would mean a breast or chain machine with a cutter bar. It is interesting to note that in 1928 there were 635 of the horn type of machine in use in Great Britain. They appear also to be widely used on the Continent of Europe.

AT THE mine described it is said that 131 ft. of face was cut in 7 hours, the eighth hour being devoted to lowering the machine to the bottom of the line of face ready for the next cut. The length of the cutting bar, or horn, is 3 ft. 3 in., and the weight of the machine is about 2,700 lb. A ½-in. rope is used.

The machine is held in place at all times by a rope passing up to a level driven at the upper end of the face, where a compressed-air hoist is located by which the rope is held as in the illustration. Air is kept on the hoist so as to keep the rope taut. This hoist is of especial use when jack posts are being changed. Doubtless there are ratchets on the hoist so that it cannot let go should the air fail. The hoist does not, of course, provide for the feed of the machine. That is arranged for in the usual manner, but it does afford additional security and the means for holding the cutter when the jack posts are being relocated. It also serves for lowering the machine when it has completed the cutting of the face.

After undercutting, the coal is stripped from the bottom upward. Platforms are set at distances of 33 ft. along the face line. These, of course, rest on props solidly set between roof and floor.

When the coal is brought down, these platforms are extended out to the seam. On these the coal is sorted from the rock of the parting; the coal is thrown down to the next platform and the waste cast back among the timbers, which are not recovered. As the coal is strong it is not much broken by the fall.

Later, references to other methods of working highly pitching coal will be given, taken from mines in other countries.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

The Ventilation of Mines, by Henry Briggs, Head Professor of Mining, University of Edinburgh; 136 pp.; 5x7½ in.; Methuen & Co., Ltd., 36 Essex St., W.C., London, England; price 7/6 ($1.82)

This is not just another book on ventilation as far as American engineers are concerned. British engineers have strayed further away from precedent than have their American confreres, their problems being much more difficult. And in reference to British engineers thought is given here to metal mining as well as to coal mining, to the British in South Africa and in Brazil as well as to those in the "tight little island."

With mines of great depth with accompanying high temperatures and need for large volumes, with mines growing with the years and none too well planned for the extensions that those years have affected, British engineers have needed to be resourceful. Whether their developments are always in the correct direction remains to be shown. The only way to judge is by studying their methods. This book also reflects in a degree Continental European practice.

Here on pages 102 and 103 is R. A. H. Flugge de Smidt's Korting blower operated by compressed air. This was developed in South Africa. The pipe *A* enters a nozzle *B* and induces an inflow of air from the sides. This air enters another nozzle and draws more air into the stream, and so on. This blower is being used in auxiliary ventilation on the South African Rand. Here also on page 95 is the Rateau aeroventilator and on page 82 the Steart propeller fan, one with no less than fourteen propellers in series.

Professor Briggs stirs the reader to new thinking and indeed the American mining public needs stirring. Interest in ventilation is rather dead, an assurance that few are giving it the thought to which it is entitled. Yet as this book is compared with the books of twenty years ago on the same subject, how great is the progress that has been made!

* * *

The Testing of Explosives for Use in Fiery Coal Mines, by Explosives-in-Mines Research Committee, Great Britain; Paper No. 51, 50 pp. and 5 pl.; 6⅛ x 9¼ in.; price 2/- (49c).

This book contains the proposed official test of "permitted" explosives, a description of the Rotherham test of 1912, of the testing station at Rotherham and of the Woolwich test Oct. 8, 1897, with its modification Oct. 18, 1899. It is stated that the Rotherham test had proved satisfactory and did not need to be made more stringent. However, there were certain irregularities associated with it, and it was desirable to ascertain if they could be eliminated.

The committee tried out various explosive atmospheres—coal-gas-and-air with varying kinds of coal gas, light-petroleum-and-air, benzene-and-air, and methane-and-air. The last seemed the most suitable because the flammable gas in the mines is almost exclusively methane. Firedamp could be brought to the Ardeer gallery from South Wales and Scotland, but at much expense, so a process was developed for producing methane by the fermentation of cellulose, using thermophylic bacteria for that purpose. The product contains carbon dioxide 0-0.5 per cent, hydrogen 0-1.0 per cent, ethane traces, methane 96 to 99 per cent and nitrogen 1 to 4 per cent.

In the proposed new test the gas mixture will consist of "firedamp"—namely, air containing combustibles equivalent to 9 per cent methane with plus and minus 0.25 per cent tolerances. The committee concludes with the following sentence: "It should be possible with the new test to increase the strength of certain existing permitted explosives to an appreciable extent." If a guess might be hazarded it might be said that the British authorities believe that one can go too far in providing for explosives that can be shot safely in methane and air even without due precaution because if they are too safe in that direction they become insensitive and then fail to explode and thus create a danger of another type.

* * *

Falls of Roof in Bituminous Coal Mines—Influence of Seasons and Rate of Production; by J. W. Paul; Technical Paper 410; 40 pp.; 5¾x9⅛ in.; U. S. Bureau of Mines; Price 10c.

For many years the U. S. Bureau of Mines has been collecting dry-bulb temperatures of mines when occasion served, and this book incidentally gives the results. These have been rearranged and abridged as in the accompanying tabulation. Some of the states are missing, among them Ohio, Iowa, Maryland, Michigan, Texas, Virginia and Washington.

Average Dry Bulb Temperatures at Coal Mines by States

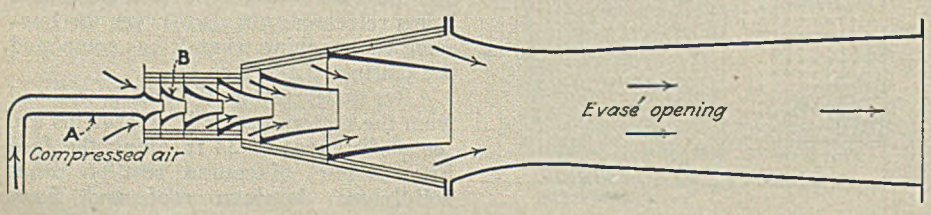
State	Temperature, Deg. F.	No. of Mines Noted
(1) Montana	56.0	1
(2) Pennsylvania	57.0	13
(3) Utah	57.5	8
(4) West Virginia	60.0	9
(4) New Mexico	60.0	3
(4) Kentucky	60.0	13
(7) Colorado	62.7	18
(8) Missouri	63.0	3
(9) Indiana	64.0	14
(10) Illinois	66.0	11
(11) Tennessee	66.5	1
(12) Alabama	68.0	12
(13) Kansas	71.0	1
(13) North Carolina	71.0	1
(13) Oklahoma	71.0	10
(16) Arkansas	72.0	1

When the outside air is hotter than indicated by these temperatures and it has enough moisture to be super-saturated when reduced to them, water is deposited on all the surfaces in the mines. When it is colder it becomes heated as it enters the mines and in consequence, being under-saturated, it draws the water from mine roof, ribs and floor. The drying and wetting of the roof is believed to cause roof falls.

The report declares that the records for fatalities due to falls of roof do not show that seasonal changes of the weather and differences in temperature and humidity have any marked influence upon fatalities from falls, apparently because there are no such changes in the parts of the mines where approximately 85 to 90 per cent of the workers are employed and where the liability to falls is the greatest.

It is found that irregular working periods seem to increase the fatality rate, as also quick increases of production. Changes in temperature seem to increase falls in intake roadways, especially in the summer months and also where there is a shale roof. In the

Blower for Auxiliary Ventilation in Mines



Appalachian field haulage and traveling ways usually are on the intake and are thus affected.

In the Middle West, where these roads are generally on the return of the air, because it is more comfortable for the workmen during the winter months, the seasonal changes affect the roof only in untraveled headings. The report concludes with a description of the means taken to protect intake airways against falls.

* * *

Some Phases of Coal-Mine Ventilation, by J. J. Forbes and M. J. Ankeny, Information Circular 6126, 18 pp., U. S. Bureau of Mines.

This bulletin deals with ventilation not as a matter of calculation but as a safety problem. The whole subject of safety against gas combustion and explosion is covered with 36 conclusions which are definitions of what the Bureau advocates as safe practice. Decisions 1, 4, 7, 8 and 9 of the Mine Safety Board of U. S. Bureau of Mines are quoted.

Incidentally the authors say: "It is not unusual to see a fireboss or foreman come out of the mine to sign his report book, go to his locker or cupboard and get his spectacles, and then proceed to sign the book. It is impracticable for a man who cannot see well enough to sign the report book without glasses to detect small quantities of gas without them, and practically no consideration is given to the fact that a man may be color-blind and unable to see the nonluminous flame of a gas cap. These facts are pointed out to show that there is definite need to supplement the flame safety lamp if not to supplant it."

"Any conscientious foreman," the authors say, "should know that when there is as little as 1½ to 2 per cent of gas in any split in the mine, he should recognize this as a dangerous condition and take steps to remedy it immediately by supplying more air to the split." Then follows an overstatement: "It should interest him just as much to know that he has 1 per cent, 0.5 per cent or 0.2 per cent."

The foreman would certainly do well to know the condition, even though the percentage be as low as any of those given, because if the fan stopped it might rise in an hour to a much higher figure and exhibit that percentage over a larger area. Surely with three times or four times as much gas as in the example presented by the authors the dangerous condition described would be reached if the fan stopped for a third or a fourth as long a period.

Among the recommendations is one to the effect that in any ventilating split the quantity of pure intake air flowing per minute shall be at least 100 times the number of men in that split but the minimum quantity in regular splits shall not in general be below 10,000 cu.ft. per minute.

* * *

The Deterioration of Colliery Winding Ropes in Service, With Descriptions of Some Typical Failures, by S. M. Dixon, M. A. Hogan and J. M. Robertson, Paper No. 50, 42 pp. text, 2 tabular charts, 6 pp. plates, 6¼x9⅝ in., Safety-in-Mines Research Board, Great Britain.

Problems relating to the breaking of hoisting ropes have baffled science for many years, and the authors of this bulletin have not solved any notable number of them, in which failure they have followed a long line of quite honorable precedent on both sides of the water. The authors declare that when a wire develops a crack the cracked wire at a point a short distance on either side of the crack takes up its full proportion of the load, because friction distributes the stress. When a wire begins to crack it does not break at once, for the resistance of the wire to stress is reduced. If the wire were not supported from other wires it would rapidly break at the crack. Its yielding saves it from the stress, and the other wires receive a greater load in consequence.

When a rope is working, the lubricant in the hemp core is squeezed out into the interstices between the wires, if it has not already been squeezed out in the manufacture of the rope. Only in the case of rope with a graphite lubricant does anything remain, for the lubricant soon decomposes and disappears. Whatever may be the condition with a graphitized core, other dry cores certainly will absorb moisture. Possibly this is well, for if moisture condenses on the core that would condense otherwise on the internal wires the latter may be saved from corrosion.

Pieces cut off at recapping, say the authors, provide the only means of ascertaining the condition of the interior of the rope. Such pieces should be examined carefully and, if possible, tested—a regular practice of some mine managers. The wire test should be both in tension and torsion. At the end of the book are twenty micrographs of wires cracked or fractured.

Publications Received

Capitalism's Individual Ownership, by George L. Bolen. Pp. 760. Price, $7.50. Wages, Wealth and Welfare Press, Battle Creek, Mich.

Inflammability of Mixed Gases, by G. W. Jones. Bureau of Mines, Washington, D. C. Technical paper 450. Price, 10c. Pp. 38; illustrated. Gives the results of numerous experiments made on the inflammability of gas mixtures consisting of methane, hydrogen, carbon monoxide, nitrogen and carbon dioxide combined in varying proportions.

Coal-Mine Ventilation Factors, by H. P. Greenwald and G. E. McElroy. Bureau of Mines, Washington, D. C. Bulletin 285; 106 pp., illustrated. Price, 25c.

Terminology in Coal Research, by Reinhardt Thiessen and Wilfrid Francis. Bureau of Mines, Washington, D. C. Technical Paper 446; 27 pp., illustrated. Price, 10c. Reviews the observations which led to the conception of certain English, German and American terms.

The Gastropod Genus Yvania—Contribution to the Paleontology of Illinois, by J. Marvin Weller. State Geological Survey, Urbana, Ill. Report of Investigations No. 18; 45 pp. The first of a series of papers giving the results of paleontological studies of fossil forms belonging to the Pennsylvania (coal measures) system of Illinois.

Engineering and Legal Aspects of Land Drainage in Illinois, by G. W. Pickels and F. B. Leonard. State Geological Survey, Urbana, Ill. Bulletin No. 42; 334 pp. (First revised edition.) Part I deals with status of drainage, January, 1928; Part II, engineering problems, and Part III, legal problems.

Specific Heats of Gases at High Temperatures, by E. D. Eastman. Bureau of Mines, Washington, D. C. Technical paper 445. Pp. 28; illustrated.

Use of a Type N. Miners' Gas Mask, by S. H. Katz and G. S. McCaa. Bureau of Mines, Washington, D. C. Miners' Circular 32. Pp. 29; illustrated.

Best Practices in the Handling and Use of Pellet Powder, by F. T. Luscher. Explosives Service Bulletin of E. I. du Pont de Nemours & Co., Wilmington, Del.

Coal in 1927, by F. G. Tryon, O. E. Kiessling and L. Mann. Bureau of Mines, Washington, D. C. Price, 30c. Pp. 182. Covers, in addition to the standard tables of production, value, men employed, days worked, etc., a special study of consumption of bituminous coal, distribution of coal, mechanical loading in bituminous mines and a study of screening and sizing of bituminous coal.

The Northward Extension of the Sheridan Coal Field, by A. A. Baker. U. S. Geological Survey, Washington, D. C. (Contributions to economic geology, 1928; Part II, pp. 15-67.) Bulletin 806-B; illustrated. Gives the results of a geologic examination of about 700 square miles in southeastern Montana, including parts of Rosebud and Big Horn counties.

Fuel Briquets in 1928, by O. E. Kiessling and J. M. Corse. Bureau of Mines, Washington, D. C. (Mineral Resources of the U. S., 1928; Part II, pp. 1-11.) Price, 5c.

Recommendation for Safety in Coal Mining Relating to Placing Main Haulage in Intake Air, by the Mine Safety Board. Bureau of Mines, Washington, D. C. Information Circular 6,139; 2 pp.

Coal-Dust Explosions in Mines: Causes, Effects and Recommendations for Prevention, by George S. Rice. Bureau of Mines, Washington, D. C. Technical Paper 448; 24 pp.

Carburetion of Combustible Gas with Butane and Propane-Butane Mixtures, With Particular Reference to the Carburetion of Water Gas, by William W. Odell. Bureau of Mines, Washington, D. C. Bulletin 294; 96 pp., illustrated.

The Bureau of Mines, Washington, D. C., recently issued the following information circulars: Some Phases of Coal-Mine Ventilation, by J. J. Forbes and M. J. Ankeny; Circular 6126, 18 pp. Safeguarding Electrical Equipment Used in Gassy Mines—European Practice: 1—Great Britain, by L. C. Ilsley; Circular 6134, 12 pp. The Unusually Good Safety Record of a Coal Mine and of a Coal-Mine Foreman, by E. H. Denny; Circular 6130, 5 pp.

Practical Aspects of Resuscitation, by Edward Steidle. Reprinted by Mine Safety Appliances Co., Pittsburgh, Pa. Pp. 23, illustrated.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, SEPTEMBER, 1929

The scientific approach

SCIENCE has been defined as "knowledge gained and verified by exact observation and correct thinking"; it presupposes facts and more facts. If past practices in the operating end of the coal industry have been sneeringly condemned as dictated by rule-of-thumb methods how shall the hodge-podge of tradition, hunches and incomplete data which forms the basis of sales programs with too many companies fittingly be characterized? The measure of the failure to approach merchandising problems in the scientific spirit is written in red over the industry.

In view of this background, the recent announcement of one of the largest bituminous producers that it had created the position of director of sales research in its organization is significant. It is another promise that the engineering skill—using that term in its broadest sense—which is changing the operating policies of far-sighted companies is to be given an opportunity to demonstrate what the scientific attack can do in modernizing archaic merchandising methods.

Sales research in coal is largely exploration in virgin territory. The fields already mapped out are few and some of the existing cartography has the vagueness of geographic projections in the Middle Ages. Inertia, ignorance and prejudice block easy access to the fertile lands bounded by exact knowledge of facts. Patient, determined research, however, eventually can level these barriers. The job will not be easy; its accomplishment will not be easy. But, when the groundwork has been finished, the industry will have taken a big forward step in the solution of its major problem—profitable sales.

Savings from co-ordination

LOADING MACHINERY brought to light the deplorable lack of co-operation between the miner who shot and loaded the coal and the operator's employees who transported it and dumped it. The operator got into both divisions of the industry by the introduction of loaders and forthwith he co-ordinated their operation, and this in the main is what is meant by management.

The mechanical loader also reconciled the miner to gang operation. Formerly he wanted to work alone, be his own boss, and so long as he demanded this isolation with all that it entails there could be no efficiency. With the machine, be it a real loader, a pit-car loader, a face conveyor or a duckbill, he saw the need for concentration of operation and consented to gang labor. It is the only hope for the miner and the industry, which have suffered greatly from economy in coal use of all kinds, from water power, oil and natural gas and may yet lose to airpower and the energy of the tides if operation is not conducted at lowered cost.

The economy of close supervision and good management will bring results in hand-loading mines wherever loading is done by the day and where the tonnage rate on mining is not fixed arbitrarily without any regard to the opportunity offered the miner to obtain a large tonnage. It will do much to lower costs, but Van. B. Stith, who argues the case for hand loading elsewhere in this issue of *Coal Age*, still shows a profit for machine loading of 10¼c. per ton. That is enough to make a competitor extremely uneasy. What will not a coal operator do for a dime? Certainly more than men in most industries. After all, at a 2,000-ton plant this thin dime means $200 a day and $40,000 a year. Moreover, there is the possibility that the tonnage mined will be nearer 300 than 200 tons per machine, and the dime may be expanded to 19½c., which means a saving of $390 daily and $78,000 a year.

Nevertheless, the plea of Mr. Stith for closer supervision of hand loading is sound. Where men are paid by the day or where wages can be regulated according to opportunity for production, supervision will pay big dividends. Management should not be restricted to the machine mine as has too frequently been the custom. It may raise the tonnage per loader from 10 to 15 or even 20 tons per day, which, using Mr. Stith's $5 wage, is 25c. per ton between extremes. Why should so large an opportunity be passed up?

Chemically minded

ARE coal companies overlooking opportunities to draw upon the cheaper products of the chemical industry in their operations because of a belief that even the cheapest are too costly to apply to the improvement of coal or the operation of the mines? The opportunities already tested in a small way are suggestive. Hydrochloric acid is being used to remove ash from lignite so as to fit that fuel for service as a filtration agent. Oxalic acid has been tried as a means of removing iron stain from the faces of weather-beaten coal.

The use of chlorides to make coal dustless and prevent freezing is attracting increasing attention. Lime has been employed to neutralize mine water. Many chemicals—the list includes creosote, phenol, copper sulphate, zinc sulphate, and zinc metasilicate—have been used to preserve timber. In Great Britain coal is being floated in calcium chloride and thus separated from its impurities.

These evidences might be held to prove that the coal industry *is* chemically minded, but surely all

the possibilities have not been exhausted. Some chemical might be found that would coat lignite and make it less susceptible to desiccation, deterioration and spontaneous combustion, above and below ground. Some day all coal in storage may be treated, either by sections or more generally, with some kind of spray to immunize it from spontaneous combustion.

A spray of chemical on mine roofs that swell in the presence of air might prevent many dangerous roof falls. Chemicals used on mine-fire stoppings and on the roof and coal adjacent might make the approaches to the fire so tight that no air would pass. Extremely fine coal might be treated with chemical to remove impurities, especially if the product is to be exploded in internal combustion engines, or employed for the coating of flasks in the casting of metal, where clean coal is essential.

Chlorides may be used to prevent the heaving of mine tracks in the intake airways near the mine mouth and on the outside. They will serve the same purpose on the railroad tracks under the tipple, where the maintenance of gradients is so important. They also will preserve the ties. In Nova Scotia salt is being used to lengthen the life of mine timber, the posts of the Acadia Coal Co. being boiled in brine for 24 hours. The brine should have three times the concentration of natural sea water.

The industry needs to look to the chemical industry for all such assistance as it can render. It may well afford services along lines which at present cannot readily be visualized.

Graphic records

ORDINARILY, the meter is accepted as a dependable but commonplace watchman, whose job is to indicate or measure. But the graphic wattmeter in a motor circuit may point the way to astonishing economies when coupled with an inquiring or experimental disposition. Its records are permanent and not subject to the inclinations or errors of fallible humans.

For example, take the subject of bits for a cutting machine. On the surface it would appear that they are just bits, to be put on, dulled in use and then removed for resharpening. Appearances, however, are deceptive. The shape, character of the temper or the presence or absence of an abrasion-resisting material on the points may have a considerable influence on the power input of the mining machine. One West Virginia operation found, with the aid of the graphic recording wattmeter, that a saving of 4.9c. per ton, including cost of bits, power, time, upkeep and depreciation, could be made by changing the style of bits.

Numerous other opportunities for savings, ranging from a study of losses over the whole power network down to the performance of a single isolated pump working part of the time on air and the rest on water, should present themselves around any coal mine. In addition to hunting down losses or gathering the data on which to base economies—both fertile fields in themselves—the graphic meter serves as an admirable timekeeper. On equipment where the capital outlay is great, as in the case of heavy, mobile-type loading machines, the meter is a tireless servant which never loafs on the job and furnishes a written record of delays, moving time and loading time.

A vacation suggestion

DESPITE the steady liquidation in the number of excess mines which has been going on quietly for several years, full-time operation of the properties that remain is still in the distance. That does not mean, however, that intermittency is wholly beyond control. Some degree of regulation and of regularization is both possible and feasible. In a small way, at least, the disadvantages of broken running-time may be turned into a social gain for the worker.

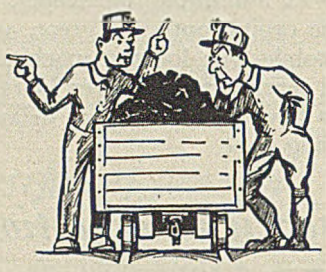
An interesting experiment along these lines was made this year by the Union Pacific Coal Co. During the summer months all its mines except one at Cumberland were closed down for ten- to fourteen-day vacation periods. Earnings of the workers were not materially affected by this concentration of lost time and the plan afforded them and their families a chance to enjoy a vacation comparable with that open to men in many other vocations. The results of the experiment, the company states, were so generally satisfactory that it is probable that a ten-day vacation period will be planned for all mines of the company next year.

The fact that this particular company is a captive operation controlled by a railroad that does not have to be sold on the virtues of coal storage, of course, makes amicable arrangements between buyer and seller on supply during such shutdowns less difficult. Nevertheless, the plan is not without its possibilities for the commercial operation with a group of mines. With the fluidity now existing in transportation and the greater education which industry at large has had on storage, it is not unreasonable to suppose that suitable supply arrangements could be made and the vacation-shutdown idea given wider application.

If it had been coal

RESTRICTION in production is urged upon the farmers of the country by Washington. Last week, the Department of Agriculture formally warned them that proposed increases in wheat acreage this Fall would jeopardize the prices they would receive on the 1930 Winter crop. No one thinks of challenging the timeliness or the soundness of the advice thus officially given. But, if coal operators or oil producers were to meet and formally agree to limit output to normal requirements, the shadow of the Sherman law would darken their windows.

The BOSSES



Getting Down to a Finer Point In Shooting

"MAC, it looks as if we've reached the limit in percentage of lump," said Jim, the super, to the mine foreman as he fingered through a sheaf of monthly reports. "There has been no increase in lump for the last three months. What can we do next?"

Mac was slow in answering. He reviewed mentally the experiments in quantity of charge, hole placing and cushioned blasting which had netted a 6 per cent increase in prepared sizes. Finally he spoke: "We've got to do one of two things—have shotfirers load the holes or keep a closer check on the powder issued to each man. Again yesterday I found a man overloading. He has been getting the extra powder by taking the regular issue even when his place was not cleaned up."

"As I've told you before," said the super, "the Old Man won't agree to shotfirers, so I guess it's up to us to work out some check-up on the powder."

Apparently Mac had already given the problem considerable thought, for he had a plan on the tip of his tongue. "The section bosses," he reflected, "know more about the varying daily requirements than anyone else. Why not give each miner a card, like a meal ticket, good for 31 days, which his section foremen can punch each day to indicate the exact quantity of powder to be issued to the man the next morning?"

HOW DO YOU DO IT?

1. *Is it practical to designate the quantity of explosive each day?*
2. *Have you tried Mac's proposed method?*
3. *Do you know of a better way?*
4. *What is your system?*

All superintendents, foremen, electrical and mechanical men are urge

Talk It Over

Can Men Be Trained To Mechanized Mining Processes?

Better Jobs for Better Men

THERE EXISTS quite a diversity of opinion among mine operators and executives as to just what should constitute the principal or controlling traits demanded of an employee singled out for training in some particular development of the mining industry. The problem which Mac is faced with, however, seems fairly well defined. His greatest obstacle lies in overcoming the natural prejudice of not merely the rank and file of his men but also his immediate mine organization.

The appearance of any new and untried piece of machinery has been the signal for all doubters to rise and condemn it without a fair trial. It is significant that much of this sort of opposition comes from the foremen and other officials, to whom will be intrusted the experimental work. Superintendents and managers must first obliterate from their minds preconceived opinions and doubts and substitute confidence and enthusiasm. Those who have had the burden of selling their organizations on loading machines will agree with me that the removal of doubt and distrust conceived from dogmatic ideas is the greatest handicap encountered.

In the selection of men for the operation of a new machine the utmost care must be exercised in picking out a man to head the crew who is singularly free from expressed adverse opinions—one who is open-minded and receptive to new ideas. Such a man should be possessed of plenty of confidence and a quick, active mind; his mining experience should include a good mechanical knowledge of machinery and a fairly practical acquaintance with mining methods, especially as pertaining to the seam in which he works. His loyalty to the company and his boss should be unquestioned, as it is liable to be severely tested before he is successful in demonstrating the practical and economical value of mechanical loading. This is rather a large order, and difficulty will be experienced in locating the right man. He will meet many difficulties and therefore must have courage and tenacity. Above all things he should be a good finisher rather than a good beginner. It usually is unwise to commit one's self to definite promises, but some unusual inducement must be offered to the employee selected for work of this character.

I might mention here that some years ago the writer was involved in a proposition similar to that contemplated by Mac. Four loading machines were purchased and installed. No stone was left unturned in giving these machines every advantage to prove whether or not they could produce a tonnage consistent with the cost of operation and maintenance. The guiding idea was to achieve independence from the uncertainty of hand mining.

The management selected young men to take charge. They were all men of proved ability and loyalty, of a high type of intelligence, and aggressive withal. They were paid the highest rate; in fact the wages were made higher than those of any other occupation at the mines. Mechanical loading was then in its infancy. Despite poor physical conditions and in the face of all sorts of discouragement from their fellow workers and adverse criticism on every side. these men put the job over. The machines have been operating in these mines five years.

Three of the original operators of these machines are salesmen or demonstrators of loading machines for a large manufacturer and the fourth has charge of the mechanical-loading department for a large coal company. Their incomes are considerably in excess of the pay which they received as machine operators and their positions are assured.

It is well to point out to prospective candidates for such positions that a great future lies in store for the worker who take up the study of mechanical loading and mining. Encourage interest and desire for more knowledge among employees, promote night classes for study on all mining subjects—keep in closer contact with your men. The present generation offers a bumper crop of young men receptive to new ideas, and it is mighty fine to know that you have a lot of bright lads studying and training under your leadership for bigger and better jobs. Mechanization means better men and safer mines.

Stanaford, W. Va. H. A. McCoy.

Spotting Machine Candidates

HAVE you ever motored along the road with an automobile mechanic at the wheel? Almost everyobdy has, and those who are observant no doubt have noted that the mechanic is a skilled driver. There is a lesson in this observation that reaches deep down into the roots of mechanized mining. Briefly explained, it points to the absolute necessity of choosing for the job of machine operation men who show a flair for mechanical things. That is Lesson No. 1.

Have you ever watched a middle-aged and, in contrast, a young man, learn to run an automobile? If you have, you must have noted a wide difference in the progress made by the two men in their learning. The older man is not sure of his ground and therefore hesitates in the manipulation of the clutch and gear shift; he is more or less awkward and easily excited. On the other hand, the younger man takes complete possession of the situation; he maneuvers deliberately, if not skilfully, and

Help Yourself

After all is said and done, the pen is your best tutor. It guides you in your thinking, as can no other device, mental or physical — contradicting, then clarifying and finally giving color to your ideas. Relatively few men know or ever learn how to think. Mental calisthenics, engaged in when writing, are powerful developers of clear thinking. That every great thinker is a good writer proves this to be true. It therefore behooves every man to form the habit of setting down his opinions in writing. Why not use this opportunity of discussing problems in your job as a channel to sounder reasoning?

to discuss these questions. Acceptable letters will be paid for

laughs at the "muffs" he makes. Youth learns quickly and therefore comparatively young men should be selected as machine runners. That is Lesson No. 2.

Have you ever, in a procession of automobiles on a congested road of a Sunday afternoon, watched the progress of two cars, the one driven by a careful and the other by a reckless man? The bold and selfish driver shoots out and around cars and endangers others as well as himself. You see him take such a chance and then he disappears from view. Meantime your attention is attracted to the driver in front of you. He is careful but he is also deliberate and not slow. Your thoughts turn to other things until perhaps a half hour later, you find the two cars under your observation earlier in the day running one behind the other. The erratic driver made no better progress than the one who was steady. The parallel of this story applied to mechanical loading is obvious. Choose for machine operation only those men who are safe. That is Lesson No. 3.

The qualities of successful machine men are mechanical inclination, youth and safety. They constitute the yardstick by which candidates for the job should be measured. G. M. B.

Pittsburgh, Pa.

High Class Men Only

SPEAKING from experience in operating a loading machine and in repairing all types of machines used underground, my advice on the selection of men to handle these units is that they be experienced miners who are safety-minded and have had some machine-repair experience. Men lacking any one of these three qualifications will not make skilled operators. Be particularly observant of the candidate's grasp on safety, including knowledge of the mining law. The requirements of the job are high and the qualifications of the prospects therefore must be correspondingly high.

STEPHEN J. STRENNEN.

Bentleyville, Pa.

Pay Them Well

INCREASED use of machines is raising the question as to whether mechanized mining is safer than the older hand methods. It has been pointed out that in group working, many men, instead of one, are exposed to injury from a single cause. It has further been pointed out that concentrated mining, increased use of power, roof action on long faces and other factors may constitute new hazards that are not present in hand loading, or at least in the same degree. These sources of danger undoubtedly do exist, but to take the view that they make mechanized mining more hazardous is like looking through the wrong end of a telescope.

The safety of any occupation is not measured by its potential hazards but by the effectiveness of the means adopted to prevent accidents. The real comparison between the safety of mechanized and hand mining, therefore, is a comparison of the degrees to which safe practices can be enforced in the two methods.

In hand mining safety rules are effective only in so far as the men may choose to follow them. In the scattered workings of a hand-loading operation the miners as a rule have to be forced to protect themselves. In mechanized mining this situation is changed. The men work in groups and are subject to constant supervision, so that effective safety practices devised to eliminate the hazards brought about by new types of equipment and new methods of mining can be, and are being, enforced for the betterment of working conditions and for greater safety.

Spotting candidates for mechanized jobs usually is difficult. Their best recommendations are steadiness and a practical turn of mind. Pay them well, so that there will be some incentive for them to do this job well. At large mines where much mechanical mining is being done training classes should be held and the right type of men should be encouraged to join them. When men with no aptitude for the job are assigned to the operation of costly equipment with very little training, results are disastrous, not only to the machine but to mechanized mining generally. A machine cannot think or arrange the things upon which its success depends. It is a useless mass of steel if not guided by the intelligence of the human hand.

The best way to create interest is by example and accordingly bosses should be chosen who can instill and maintain team spirit in the men under them. The keynote or motto of the whole thing, then, is organization. This must be so complete that nothing is left to chance, that all operations will dovetail nicely into one another and the whole be made into one cycle of operations.

W. W. HUNTER.

Mt. Hope, W. Va.

Machine Runners Must Have Good Hearing and Eyesight

COMMON sense, plus a little mechanical instinct, should be the principal qualification of men chosen to operate machines. Likely candidates can be spotted by noting which of them take an interest in their work and can be

Trade Literature

"Nikrome—A Heat-Treated Alloy Steel of Guaranteed Physical Properties," is the title of a four-page folder issued by Joseph T. Ryerson & Son, Chicago.

Keith Dunham Co., Chicago, has issued a 22-pp. bulletin on Loxite, with photographs showing views after blasting and a description of the cartridge.

Catalog No. 14 of the Martindale Electric Co., Cleveland, Ohio, covers its electrical maintenance equipment; illustrated.

Rex Chains and Conveyors; Chain Belt Co., Milwaukee, Wis., and Stearns Conveyor Co., Cleveland, Ohio; Catalog No. 330, pp. 816 illustrated.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued the following: Circular 1856, bedplates for Type SVR and DVR speed reducers; Leaflet 3746-B, covering application, distinctive features and details of construction on synchronous motor generators; Leaflet L20377, on geared-turbine generator units; Leaflet 20392, covering application, advantages and construction of cog-belt drives for industrial service; Circular 1676-B, fittings for pipe structures, including many new applications since the issuance of the old leaflet. Special Publication 1841, Mine and Industrial Locomotives, contains plans and data on Baldwin-Westinghouse locomotives recently placed in service in mines.

"Modern Feed Water Regulation With the Copes System of Boiler Control"; Northern Equipment Co., Erie, Pa.; pp. 16; illustrated; describes the Copes feed water regulators.

General Electric Co., Schenectady, N. Y., recently issued the following bulletins: Type EW Resistors for Line and Industrial Haulage Locomotives, GEA-1142; Type WD-200A Arc Welder for Belt, Motor, or Gas-engine Drive—Stationary or Portable, Self-excited, Variable-voltage, Single operator, GEA-874D; Induction Motor-Generator Sets, ⅜ to 35 kw., 125 or 250 volts, GEA-294A; Type WD-300A Arc Welder for Belt, Motor or Gas-engine Drive—Stationary or Portable, Self-excited, Variable-voltage, Single-operator, GEA-875D. These are all illustrated.

Axiflo, Hiflo and Coniflo Deep Well Pumps. Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin D-450-B1, pp. 24; illustrated. Describes the construction and application of each of these three types of pipes; a table on flow of water through pipes, horse power required, etc., also is included.

Roberts & Schaefer Co., Chicago, has issued a four-page folder, Bulletin No. 121, showing typical RandS coal-cleaning plants using Menzies hydro-separators, Arms horizontal screens and Arms concentrating tables.

The Elesco Multiple-Loop, Single-Pass Superheater is the title of Bulletin T-19 issued by the Superheater Co., New York City; illustrated.

Placing the Detonator to Get the Best Results, by Paul F. Lewis, is an Explosives Service Bulletin of E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

The Electric Controller & Mfg. Co., Cleveland, Ohio, has issued the following bulletins: Bulletin 970, describing A.C. Manual Controllers and includes the V-4 Dinkey Controller; Bulletin 1021, covering D.C. Type "S" Crane Switchboards, includes 115-volt and 550-volt ratings; Bulletin 1037-D, covering D.C. Type B Limit Stops, including dimensions of the new style Contactor; Price sheet 1004-A, applying to Type WB Brakes and containing price revisions.

Leaflet 20,420, issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., illustrates and describes its Midget Locomotive for mine haulage duty. Specifications and ratings, when equipped with either of two makes of standard batteries, are also incuded.

Wilson Welding Helmets, Handshield and Goggles, also the Over-all, which fits over spectacles, are illustrated and described in two bulletins issued by E. D. Bullard Co., San Francisco, Calif.

Type N Amperehour Meters are illustrated and described in Bulletin No. 78 issued by the Sangamo Electric Co., Springfield, Illinois.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: Type WD-300A Arc Welder, Buda Gas-Engine Driven, CR7051, GEA-1009A; Automatic Starting Compensators for Squirrel-cage Induction Motors, GEA-416B; G-E Arc Welding Accessories, GEA-571C; Totally Enclosed, Fan-Cooled Squirrel-Cage Motors "900" Series Frames, GEA-724B; Direct-Current Motors, Type BD, GEA-752A; Type WD-400A Arc Weder, Belt or Motor Drive —Stationary or Portable GEA-876C.

Binks Manufacturing Co., Chicago, has issued Bulletin No. 12, covering the uses of sprayers for water base paints, kalsomines, whitewash, insecticides, etc.

Leaflet 20416 recently issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., describes its new line of Type A d-c. drum controllers for general reversing services and for dynamic lowering hoist service; and Leaflet 20418 describes its 300-amp. gas-engine-driven arc welding set. Both leaflets are illustrated.

trusted to carry out instructions without being watched. Any man with a mechanical turn of mind will make a good machine operator, provided he is willing. Men chosen for machine operation should have good hearing and eyesight.

The inducement to learn should be the prospect of advancement both in wages and in position. Wage rates should be so set that once a machine operator becomes competent his minimum earnings will become more than those that ordinary manual workers receive.

Methods of training must differ according to conditions and the facilities available. It is quite necessary that the prospective candidate have a thorough grounding in the rudiments of mining, which means that he must have worked underground for at least twelve months. A short series of lectures on the type of machines to be used should start the course of training. The first actual experience of a candidate should be gained as an assistant to an experienced operator. After a fortnight he might reasonably be expected to be capable of handling the machine himself under the supervision of the experienced man.

After working three months under this arrangement he should qualify as a full-fledged operator. In case a newly developed machine is to be used, the prospective operators should be sent to the factory where they will learn the details of its construction and operation.

W. E. Warner.

Brentford, England.

Loading Machine Runner Helps In Making Necessary Repairs

OUR mine has now been working on a mechanical loading basis for the past year and a half, and during the last year the operations have been double-shifted. This meant we had to find and train twice as many men as are ordinarily needed for the number of machines installed. Having weathered this storm, we know what a job it is to provide good runners.

Our first decision was that those picked for the job should be young men from our own organization. Two of our best mechanics were sent to the factory where the machine used is made and here given the opportunity to study it from the ground up. These men formed the nucleus of the repair crew, which, I believe, must be made one of the strongest cogs in the gearing of the machine-loading organization. Without a good maintenance department production will fall off and maintenance cost mount.

We started our training program by picking two of our best men, each about 30 years old, letting the factory demonstrator coach them. After being satisfied that these men were competent to handle a loader, we assigned them new machines and charged them with the responsibility of teaching their helpers how to operate them. The men selected as helpers were not more than 35 years old.

At this point one of the first operators was made a labor-training foreman. His duties consisted of visiting the various mechanical-loading units and observing the machines in operation. He would then make any suggestions to the men that might help them in their work and turn in a report on the possibilities of each man as a machine runner. At first the training period was not long, but as the program unfolded the term was gradually increased to about six months. Under this system we were able to train nine operators in three months. In seven months we had eighteen men eligible as machine runners, the number needed to double-shift nine machines. All these men made good and are still on the job today. In addition to these skilled hands, we also have eighteen helpers who are capable of taking over the operation of the machines, which eliminates the problem of absenteeism.

Delays in mechanical loading are bound to occur, especially those due to machine breakdowns. While we maintain face mechanics at all times, in some cases time has been lost in locating machine troubles. The machine runners were not sufficiently informed on the design and construction of the machine to point out the trouble to the mechanic. This made it necessary for the mechanic to find the trouble before requisitioning the needed repair parts. All this has been changed. When a machine goes to the shop for adjustment or repairs, the operator goes with it and helps to put it into condition. He is now prepared to make out an intelligent report on the condition of his loader at the end of each shift, stating the nature and extent of defects. This plan, coupled with small supply rooms underground and face mechanics, has lowered our delays due to mechanical troubles about 12 per cent.

Adena, Ohio. A. J. Ruffini.

Talk to Them

MUCH of the success of the loading machines to be installed by the Old Man will depend on Jim and Mac, as they are the men who have to mold and make the new organization. They should have a private talk with each prospect, explaining what they will expect of him and indicating the wages they will pay for the work. The candidates should be impressed with the fact that their training will cost the company a good deal of money, in return for which they should give some assurance of their willingness to stay and see the job through.

If the men are offered the incentive of satisfactory wages and living conditions they are not likely to jump to some other mine at the first offer after they are trained. You may be sure that such offers will be forthcoming. Some companies make the mistake of putting a $4 a day man on a $10,000 machine and expecting results.

Walter Hornsby

Stickney, W. Va.

Give Them What They Want

A GOOD FOREMAN will always select as machine helpers men who show indications of liking the work. He is a poor foreman who will put a man on a locomotive as a brakeman if that man does not want to become a motorman but would prefer to become a machine man. My experience has been that it is best to talk to your men and learn their aspirations. Then you can place them to best advantage. This applies to mechanical loading as well as to other lines of mine work.

Caples, W. Va. C. E. Lively.

Train Young Men

IN THE proposed change-over from a "pick-and-shovel" mine to one partly or fully mechanized, the Old Man no doubt has taken under consideration the natural conditions, grades of coal desired, effect on cost, new equipment that will be needed, and many other things that make or break a mechanically equipped mine. His part in the new work has been comparatively easy compared with Jim's job.

No factor contributes more to the success or failure of mechanical mining than the attitude of the men and bosses. Therefore Jim is wise in giving undivided attention to his men. In the lack of confidence in the bosses will be found one of the strongest reasons why many plants have returned to hand loading. It is up to Jim to think constantly of the morale of his men and remember that there is always some person who has the ability and adaptability for any job.

A good foreman knows his men and will be governed accordingly in spotting likely candidates. First he will want a good man to place in charge. In selecting the remainder of his crews, men mechanically turned, industrious, and resourceful will be needed. The foreman should be a man of practical experience, possess good judgment, have faith in his new work, have the ability to handle men, and be resourceful. Next comes his fellow workers of whom he will be in charge. Young men usually learn faster and accept new ideas and conditions more readily.

A boss should be sparing in his promises, but once a promise is made he should live up to it at all cost. Promises must be governed by the kind of labor employed and by conditions. Better work might appeal to one man, advancement to another, higher wages to another, but I reiterate that a promise should never be made unless it can be fulfilled.

One method of training, though sometimes slow, is to start a man at the bottom, and as he learns to accept responsibilities give him additional responsibilities. Just as water seeks its level so will a man find his level. He is limited only by his ability to accept responsibility and the interest he takes in his work.

Wyco, W. Va. Leo H. Ramsey.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

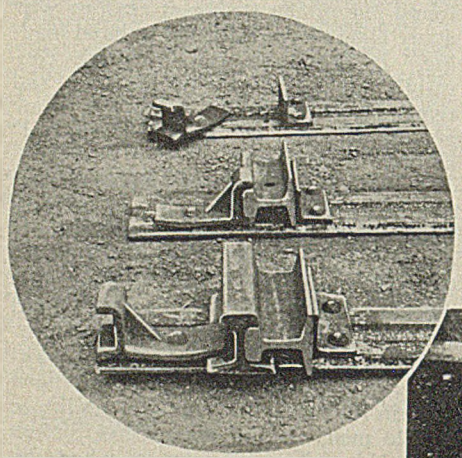
Island Creek Develops Special Tie for Change to Track-Mounted Cutters

INSTALLATION of several track-mounted cutting machines by the Island Creek Coal Co., of Holden, W. Va., as an extensive experiment with that type in place of shortwalls, soon indicated the necessity for an improved type of steel tie suitable for "balling" rails at the working face instead of cutting jumpers, which is expensive. It was the aim to obtain a tie which would require neither wedges nor bolts and yet which could be clamped quickly to the rails so as to form a rigid track.

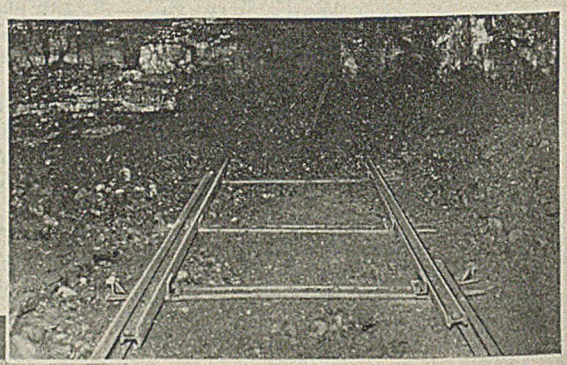
Recognizing the requirements, it was not long until W. A. Hunt, the general superintendent, had developed a tie to suit, several thousand of which have since been put into service in the Island Creek mines.

The patented feature is a clip which in one position fits around the ball of a rail that is tipped on its side and, in the other postion, clamps the base of a rail that is standing in normal position but in contact with a balled rail. A heavy hammer is the only tool required in securing the clip. The balled rail is held in a horizontal position instead of at an angle to the horizontal.

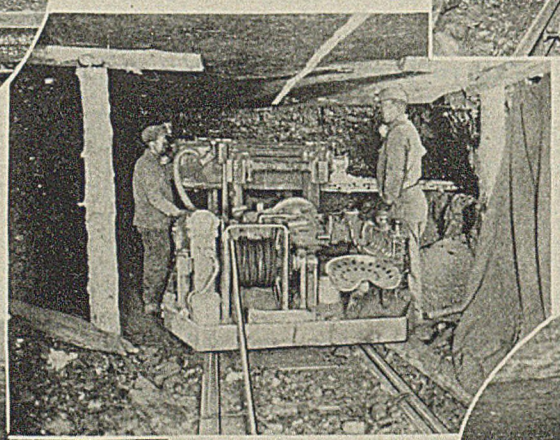
Mr. Hunt arranged with the West Virginia Rail Co., of Huntington, for manufacture of the ties instead of assembling them in the mine shop. The clip, which is made of cast steel, is of



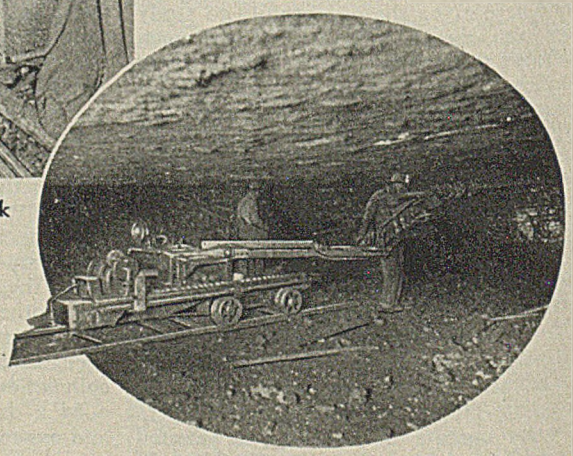
One End of the Clip Fits the Ball and the Other Clamps the Base



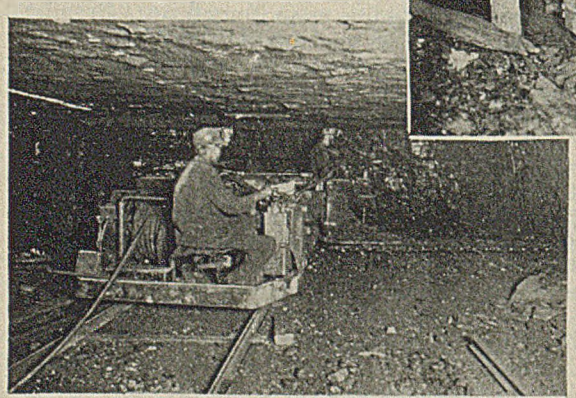
Extension Rails in Working Position



Drilling Two Holes at Once in a 26-Ft. Room



Bottom-Cutting a 26-Ft. Room



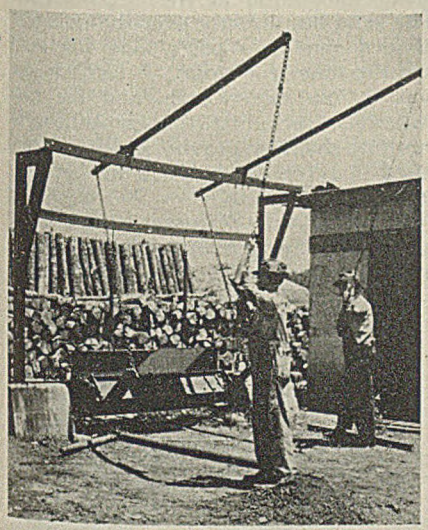
Cutting a Room Neck in a 14-Ft. Entry

an especially rugged design. All of the ties that have been made up for the Island Creek mines are fitted for 25-lb. rail.

Four of the accompanying photographs, which were made recently at Holden, show the ties in regular service. The Jeffrey mounted drilling machine does not require the track rigidity that the tie provides, but the Goodman slabbing machines do require a rigid track when encountering hard cutting. The photograph, with short pieces of rail to show details of the clip, was made at the Holden shop. The track photograph at the face was made after the slabber had completed a bottom cut. The cuttings were cleaned from the track to show the balled rails and steel ties.

Mechanical Bender Takes Heavy-Gage Sheet Iron

A mechanical sheet-iron bender is in use at the No. 8 mine of the Old Ben Coal Corporaton, West Frankfort, Ill., which will shape metal sheets, up to ¼ in. thick and 6 ft. wide, into any angle greater than 90 deg. It consists merely of a vise of two I-beams which hold the sheet in position while a third beam is



A Hard Job Made Easy—Bending Sheet Iron

made to swing about an axis parallel to and adjoining the jaws of the vise, thus bending the sheet. The vise arrangement is provided in the two holding beams through two hand screws which are tightened after the work is set in proper position. The bending beam is hinged by two lug pins, one at either end. Bending moment is procured through levers and chains mounted on a gallows frame. This scheme not only eliminates labor but assures accuracy in bending.

No Mere Substitutes

An analysis of these pages will convince you that the ideas presented are more than useful—they are invaluable—in the daily pursuit of operating a mine. None of them is a plant-made substitute for some piece of equipment, method or practice already developed to a high degree and in general use. Each is chosen on merits of originality and capability of filling a pressing need. For these reasons and others you should review the pages of this department month after month. Another thing, you can earn extra money by sending in a single idea of your own, together with a sketch or photograph. If it is published you will receive $5 or more for it. An idea usually can be expressed in a few words, which means the writing will take but a few minutes.

Would Use Wider Belts On Linestart Motors

Normal-load linestart motors require pulleys and belts 20 to 25 per cent wider than standard motors, and high-torque linestart motors of 10 hp. and over require a 50 per cent greater width than standard, according to J. R. Hopkins, of the Chicago Belting Co. Unless the purchaser specifies the width of pulley to be supplied with a linestart motor he receives one which may spin from 30 seconds to 3 minutes in the belt, resulting in burning the belt or throwing it off the motor pulley entirely.

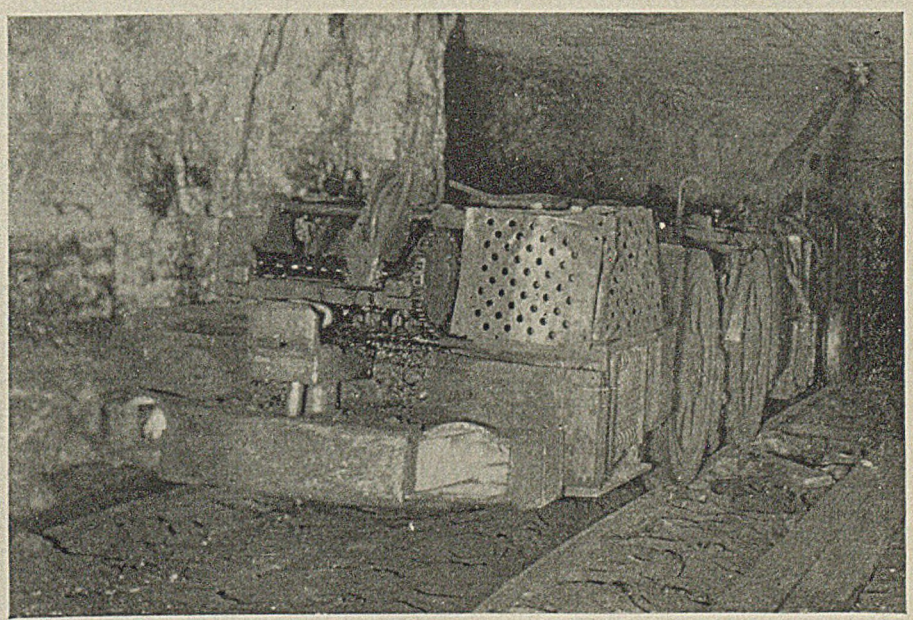
It is estimated that linestart motors now comprise 15 per cent of the new installations and that the percentage will increase to 70 in five years. Although the motor manufacturers and plant users have not generally recognized the need for wider belts, one large manufacturer has standardized on a 50 per cent wider pulley for one model of linestart motor and has the entire question under advisement.

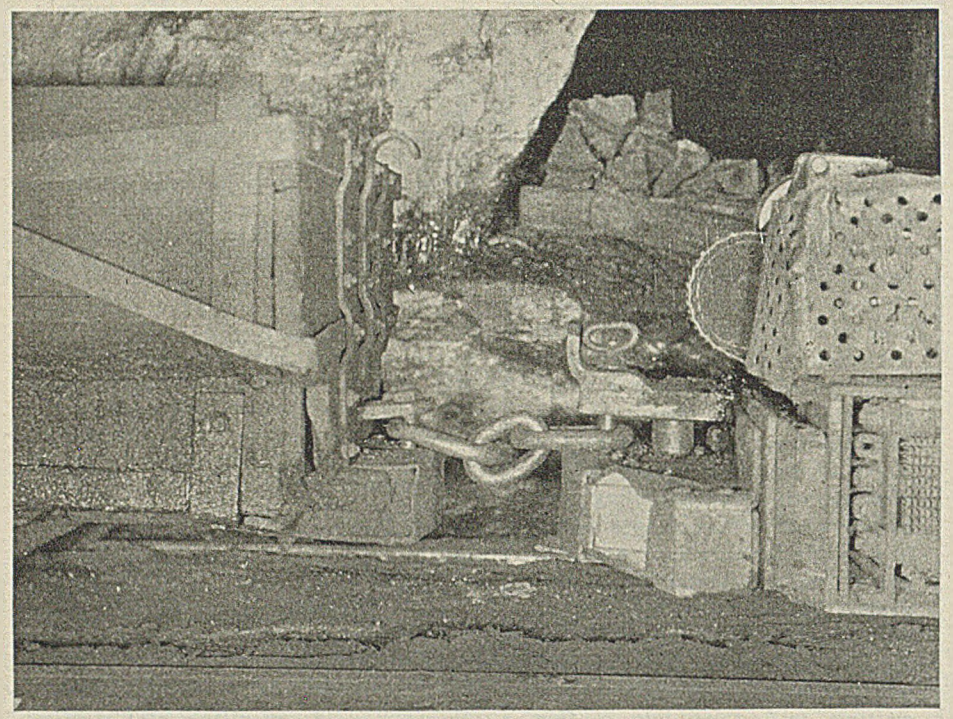
The need for the wider belt and pulley originates in the fact that the linestart motor exerts a starting torque of 150 to 300 per cent full-load torque as compared to approximately 112 per cent for standard type motors which are started on reduced line voltage supplied through a compensator.

Locomotive Bumper Has Safety Features

A locomotive bumper with which the headlights are integral, designed to replace the solid-face type and to provide greater all-round safety, has been devised and put into use by A. R. Long, superintendent of the New River Co.'s mine at Scarbro, W. Va. The solid-face type bumper, having a slot in the center, into which the car coupling, consisting of three links, must be inserted endwise, is objectionable from considerations of safety and delays by derailments. Locomotives equipped with bumpers of this type cannot be coupled when tight against the cars, but have to be backed off a few inches. In these maneuvers the man who is making the coupling is liable to have his fingers or his hand injured. Also, when cars are being pushed around a curve, the links sometimes foul themselves against

Safety Bumper on a 5-Ton Cable Reel Locomotive





Light Is Thrown Under and Along Each Side of the Car

the solid bumper and derail the first car.

These difficulties are overcome in the new bumper here described. Instead of having a high solid face, the bumper shoe is narrow and the drawbar is on top. Attached to the drawbar and projecting beyond it about 1 in. is a curved piece of 1x6-in. steel which acts as a guard to prevent climbing of the car in case of a wreck. A wood filler cushions the shock of a bump. By virtue of two plates which sandwich this filler, the strain of a pull is distributed over the entire width of the bumper. These plates are bent to an angle of 90 deg. at the back. Another cushion of wood is placed between the bumper unit and the locomotive frame. It is obvious from the photographs that with this bumper a coupling can be made in perfect safety even when the locomotive is tight against the car, as the link can be inserted from the side.

In the present arrangement of headlights on mine locomotives brakemen are blinded by the illumination glare while coupling cars, as a man's eyes come in direct line with the lights when he bends over to perform this task. This fault is eliminated by this bumper, for the lamps are placed in pockets at each end of it. The lights being located low, and well to each side, there can be no glare in the face of the brakemen when he is bent over in making a coupling. For the same reason the roadway is efficiently illuminated under and on each side of the first car for a distance of 8 to 10 ft. This is a feature which contributes to safety where the clearance to props or ribs is close and where otherwise unseen irregularities on the bottom might cause the brakeman to stumble. The lamp sockets are mounted on cushions of rubber ½ in. thick.

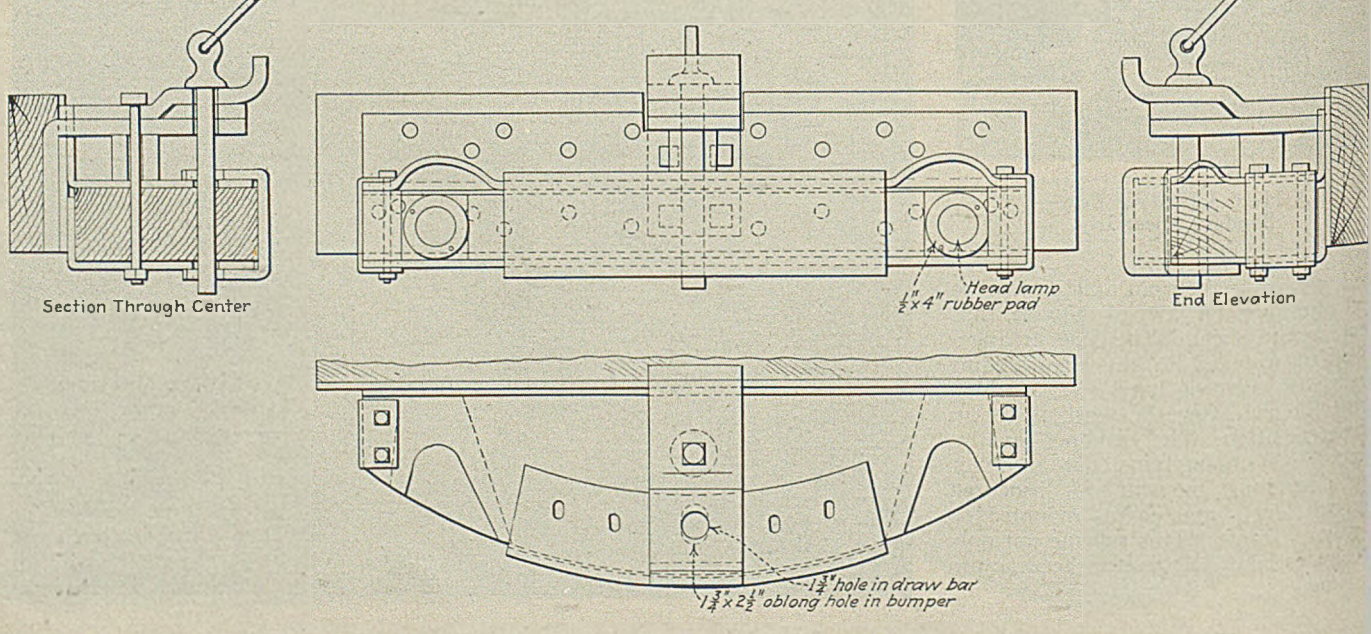
Thirty-five of these bumpers are now in use on locomotives in mines of the New River Co. and twenty more are being made. In the Scarbro mine, where five are in use, the motormen have dubbed the locomotives equipped with them "sport models." The haulage men are said to show a decided preference for them. One bumper for a 5- or 6-ton locomotive weighs 450 lb. Patents covering this device have been applied for.

Ready-Mixed Concrete for Mine Construction

At the new Wildwood mine of the Butler Consolidated Coal Co., near Pittsburgh, a borehole, primarily intended for dropping sand from the surface into the underground workings, was put into service for transporting 500 cu.yd. of concrete for the rotary dump foundation at the slope bottom. The sand bin directly over the hole was divided into two parts, one for sand and the other for stone. A batch mixer was set up under each, and the raw materials, including the cement, were run into them by gravity and in the finished state dropped down the borehole into a 6-in. pipe.

Bends in this pipe were made by a heavy 5-ft. section of rubber hose. A quick-opening valve was placed in the 6-in. line at the bottom of the hole and

Sketch Indicating Bumper Design



directly below it was connected up with a 2-in. air line. A man was stationed at this point to handle the valves. Telephone communication served to keep the mix uniform at all times.

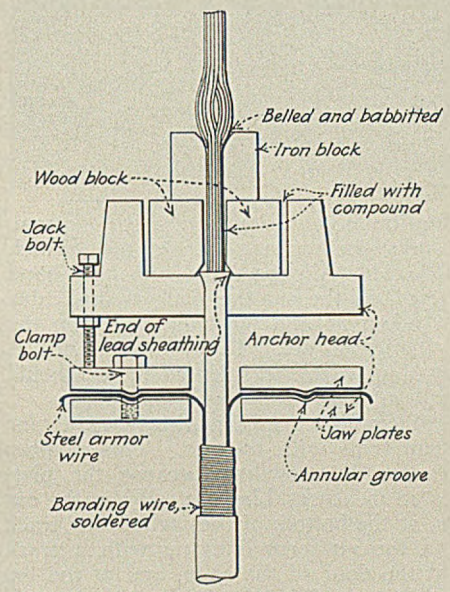
It is the intention of this company, according to E. J. Weimer, superintendent, to use ready-mixed concrete on jobs elsewhere in the mine, just as it is being used in all large cities. The ready-mixed concrete will be dropped down through the borehole into a concrete car and transported in that way to any point underground.

Every Cable Wire Is in Tension in This Borehole Installation

AN UNUSUAL arrangement for the suspension of a 2,000,000-circ.mil. cable in a bore hole has been used by the Old Ben Coal Corporation and is installed at the Main East substation of the No. 14 mine of this company, Buckner, Ill. The chief feature of the suspension is that each wire of the steel armor strand acts individually in assuming its portion of the suspended load. A slack take-up scheme is provided by which a portion of the load is transmitted to the copper-wire core, jack bolts being used for the purpose. These details, along with the general arrangement of the suspension, are shown by photograph. Those details of the suspension which cannot be seen on the photograph are indicated by the accompanying schematic sketch.

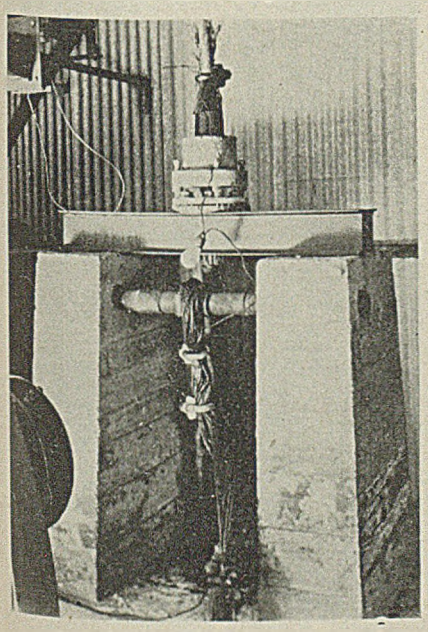
The anchor head rests on two I-beams between two concrete piers and consists of a pair of jaw plates which grip the steel armor wires. The wires are fanned out radically and secured between the two plates by bolts and nuts. An annular groove in the jaw surface of the lower plate and a complementary annular ridge on the jaw surface of the upper plate together make a crimp in each wire, thereby increasing the holding friction. Above the jaw plates is a socket head in which is anchored the copper wire. By turning the jack bolts the copper is made to assume a portion of the load. The borehole is 520 ft. deep and the cable weighs 8,525 lb.

In this installation, as is general practice, the positive and return cables are separate and so suspended. Consideration is being given, in future installations, to substituting copper of sufficient cross-section for the steel armor wire in an arrangement similar to that here described. Thus the positive and return circuits would be confined in one cable.



Details of Anchor Head

Borehole Cable Suspension



Small Supplies Stored in Metal Bin Boxes

In all supply houses at mines of the Peabody Coal Co., Illinois, small stuff, such as bolts and rivets, is stored on shelves in individual and removable all-metal boxes. This method of storing is more convenient and efficient than the stationary wooden bins which are customarily used for the purpose. The boxes measure 8 x 8 x 16 in. and are constructed from three pieces of 18-gage sheeting. They are equipped with a handle at each end through which is a ¾-in. hole that is used for moving them.

For Convenience and Accessibility

These receptacles are furnished the Peabody company by the H. Channon Co., Chicago, and by the All Steel Equipment Co., Aurora, Ill.

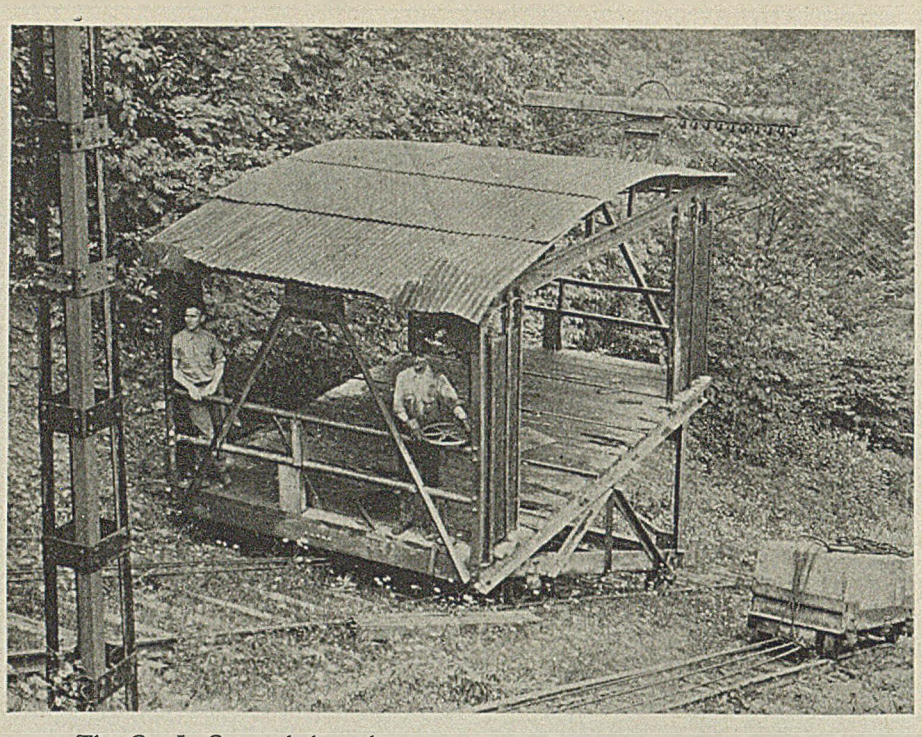
Larger First-Aid Packet For Accident Treatment

First-aid packets of the pocket type fill a great need, but there are occasions when a larger packet, say 6x4x1 in., with a fastening for carrying on a belt, would prove more satisfactory, writes Mell. E. Trammell, of Altoona, Ala. This packet would contain iodine, gauze, roll bandage, compress bandage, tourniquet, spirits of ammonia and an artificial respiration chart.

In the mines one of these packs could be furnished to each boss and shift man and in the mills and factories they could be given to all foremen, to be carried on the belt at all times. Thus provided, these men could without loss of time treat minor injuries received by themselves and others and thereby avoid the danger of infection. If first-aid material is immediately available, the tendency of a worker is to submit a fresh injury to treatment; otherwise he is likely to consider it of no consequence and disregard the necessity for treatment.

Hillside Incline Plane Controlled from Car

At the No. 5 mine of the Kellys Creek Colliery Co., at Ward, in the Kanawha field of West Virginia, an incline plane of unusual type is in operation. Its design incorporates many features desired, but not generally provided, in equipment for hoisting men, mine supplies and heavy equipment, such as locomotives. The mine is a drift in coal which outcrops on the mountainside at an eleva-



The Car Is Counterbalanced By a 6-Ton Truck

tion about 225 ft. above the railroad track. A large canopy covers the car which has a level platform, on which are two tracks of mine gage. Contrary to customary practice, the plane is controlled from the car and not from a hoist house.

For its entire length of 557 ft. the incline track is on a practically uniform grade of 39 per cent, or 23 deg. The car is counterbalanced by a truck of 6 tons weight, to which it is tied by two ¾-in. cables that pass over head sheaves at the top of the incline. This weighted truck travels on a narrow gage and the incline car on an extra wide gage.

Traction is controlled by two ⅞-in. cables, one attached to the incline car and the other to the truck, the other ends of both being attached to the drum of the hoist at the top of the incline. This drum, which is 52 in. in diameter and is spirally grooved, always carries one full layer of cable. One rope is attached to each end of the drum and as one rope unwraps from a groove the one on the other side wraps into the groove.

A Westinghouse 37-hp. d.c. crane-type motor drives the hoist and a contactor controller provides for dynamic braking. There is a solenoid brake on the motor shaft, a band brake on the drum, a geared switch which limits bottom and top travel, and an automatic switch for stopping the motor in case the rope should begin to pile up on the drum. Ten control wires, of No. 6 copper, from the contactors parallel the incline track and ride in as many collector wheels mounted on top of the car. These wheels are connected to a master drum controller on the car.

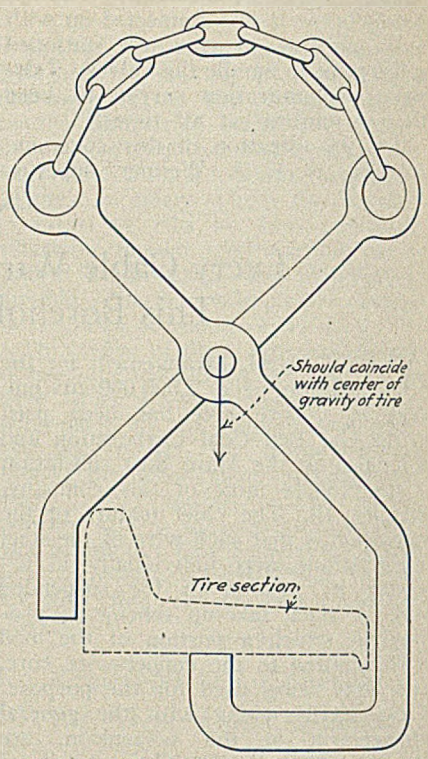
From the band brake on the hoist drum a ½-in. wire rope is carried down the incline and anchored at the bottom. Under the car are sheaves over which this cable is looped. By turning a hand wheel on the car the slack in this cable is taken up and the band brake on the hoist drum set. This safety device is used in case the solenoid brake should fail to hold.

Twenty-five men is the limit set for man trips with the car. This number causes no crowding because the platform measures 12x18 ft. When the car is at the bottom of the incline, the track on the platform lines up with a track at the door of the shop, and at the top it lines with the end of a mine track. Locomotives, mining machines or mine cars loaded with machinery or supplies can thus be transferred up or down the hill without special arrangements.

C. E. Hedrick, chief electrician, says that the incline equipment is the most convenient he has ever seen; he particularly likes the arrangement whereby no hoist operator is required, and also the level platform with track for hoisting truck-mounted equipment. The installation was made nine years ago.

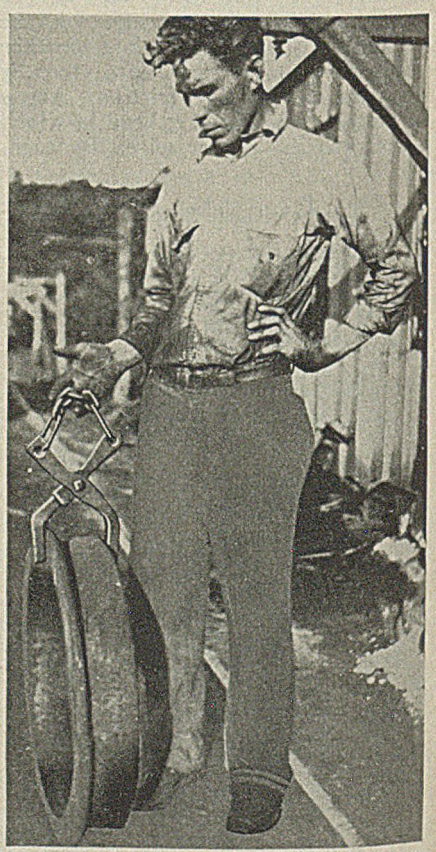
Tongs for Loco Tires in Shrinking-On Process

When a locomotive tire is heated prior to being shrunk onto the wheel, it is awkward to handle. It cannot be manipulated with bare or gloved hands and the customary mechanical means utilized for the job are usually unsatisfactory. The problem has been solved by C. L. Burdette, mine electrician for the Dunedin Coal Co., Concho, W. Va., through the use of tongs, made of 1-in. square iron, as shown in the accompanying illustrations. After the tire has been heated over a fire it is pulled from the flames and gripped by the tongs. For easy handling, a bar or a piece of pipe is slipped through the chain. With this arrangement two men, one at each end of the pipe, can conveniently lift and apply the tire to a wheel.



It Must Hang Straight

For Easy Handling



WORD *from the* FIELD

Unlimited Reconsigning Opposed by N.C.A.

Changes proposed by shippers and receivers of all classes of freight, through the National Industrial Traffic League, to permit unlimited division or reconsignment at through rates from original point of shipment to final destination, plus a reconsigning charge, are being opposed by the National Coal Association on the grounds that the practice is not to the best interests of coal shippers. After hearing John D. Battle, traffic manager, a committee representing the League, meeting in Chicago, Aug. 13, agreed to make an exception of coal and ask the carriers for the privilege only on other commodities.

At a public hearing before a committee representing the railroads, the League spokesman disclaimed any intention of asking that coal and coke be given unlimited reconsigning privileges. Mr. Battle, speaking for the operators, claimed the proposed reconsigning rule would go far to undo the present progress in the orderly marketing of coal. His position was endorsed by W. Y. Wildman, Illinois Coal Traffic Bureau, and opposed by T. B. Hedrick, of the Geo. S. Wood Coal Co., Chicago, representing the American Wholesale Coal Association and the Chicago Wholesale Coal Shippers' Association.

Injunction Bill Rewritten

The executive council of the American Federation of Labor, at a meeting held in Atlantic City last month, rewrote the so-called Norris anti-injunction bill which was introduced in the 70th Congress as a substitute for the Shipstead bill. As rewritten, the bill specifically prohibits the issuance of injunctions by federal judges to prevent strikes, and sets aside the decision of the U. S. Supreme Court in the Hitchman case, which upheld employment contracts forbidding union membership.

The rewritten bill denies the courts the right to enjoin payment of strike benefits or to enjoin a union from assisting its members in appealing, as provided by law, from a lower court order evicting them from their homes. Other things which could not be enjoined under the proposed law include the giving publicity to the facts relative to a strike by any method not involving fraud or physical violence; assembling peaceably to organize or prosecute a strike; inducing, without the use of fraud or physical violence, men to quit work.

T. C. Mullins

Formerly vice-president in charge of operations, has been elected president of the Northern Illinois Coal Corporation and its affiliated organizations, vice Joseph E. Hitt, resigned. Mr. Mullins was born at Fayetteville, Ark., Feb. 27, 1885, and was graduated from the University of Arkansas with the degree of Bachelor of Civil Engineering in 1905. For several years he held various engineering positions, going to the Sunlight Coal Co. as manager in 1915. Later he became vice-president and when Sunlight was merged with the properties of the Illinois corporation his jurisdiction over operations was extended to cover all mines of the Hitt interests. During the World War, Mr. Mullins served as captain in the Engineer Corps of the U. S. Army and now holds the rank of major in the U.S.R.C. He also has been mayor of Boonville and is prominent in the business life of southern Indiana.

Nova Scotia Coal Miners Get Rescue Award

The rescue corps of the Acadia Coal Co. was presented with a check for $1,500 for valiant work in the explosion at the Stellarton, Nova Scotia, collieries some months ago. The presentation was made on the behalf of the government, at a meeting at Stellarton, Aug. 22, by the Honorable Gordon S. Harrington, Minister of Mines and Public Works.

National Safety Council Meets Sept. 30

Safety in all classes of industry will be considered at the Eighteenth Safety Congress of the National Safety Council, to be held in Chicago, Sept. 30-Oct. 5. The program for the mining section includes both the presentation of papers and discussion. Sessions will be held in the Stevens and Congress hotels.

Papers scheduled for presentation in the mining section, Oct. 1, are as follows: "Last Year's Accomplishments in the Mining Section," General Chairman Martinson; "Be Sold on Accident Prevention and Back Up Your Safety Engineers," A. T. St. Clair, Federal Mining & Smelting Co., Baxter Springs, Kan.; "Our Method of Promoting Accident Prevention," F. C. Miller, Colorado Fuel & Iron Co., Trinidad, Colo.

On Oct. 2, "Our Aspect of Safety," will be presented by A. W. Dickinson, Union Pacific Coal Co., Rock Springs, Wyo., and Wm. C. Bochert, Bonne Terre, Mo., will talk on "The St. Joseph Lead Co's. Campaign Against Accidents."

Three papers will feature the concluding session, Oct. 3. These include "Value and Methods of Our Safety Work," Frank Smith, Brule Mining Co., Crystal Falls, Mich.; "Tonnage vs. Safety," D. D. Wilcox, Superior Coal Co., Gillespie, Ill., and "Mining; Safe and Unsafe Practices" (motion picture), H. G. Hensel, Youngstown Sheet & Tube Co., Chicago.

Industrial Coal Reserves Rise To Twenty-Nine Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on August 1 totalled 32,712,000 tons, according to the monthly report of the National Association of Purchasing Agents. This figure represents the first substantial advance since April 1, 1929, and is 1,297,000 tons above the low of July 1. Total consumption figures advanced one-half million tons in July as compared to June, 1929, and an increase in stocking was noted, especially in Canada. As a result of the stocking movement the number of days' supply on hand increased to 29 days as of August 1, compared to 26 days on July 1.

Estimated total stocks of bituminous coal in the hands of commercial consumers in the United States as of July 1 were 33,100,000 net tons, according to

a survey by H. O. Rogers and F. G. Tryon, U. S. Bureau of Mines. This is a decrease of 3,800,000 tons since April 1, the date of the last report, and is the smallest tonnage in storage since the Fall of 1922. Although consumption in the second quarter of 1929 showed the usual seasonal decline, production continued lower than consumption and reserves were drawn upon accordingly. At the rate of consumption prevailing in May and June, the stocks on July 1 were sufficient to last 28 days if evenly divided, compared to 38 days for the same date a year ago.

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

Byproduct coke	24
Electric utilities and coal-gas plants	46
Railroads	19
Steel mills	27
Other industries	32
Average total bituminous stocks throughout the United States	27

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
July, 1928	41,785,000	33,527,000	40,700,000
August	48,598,000	33,890,000	39,415,000
September	48,332,000	34,223,000	40,090,000
October	58,914,000	36,500,000	40,778,000
November	53,498,000	35,879,000	41,520,000
December	49,606,000	37,354,000	41,010,000
January, 1929	58,500,000	35,518,000	41,492,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,556,000	40,108,000
April	43,329,000	37,750,000	35,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,385,000	31,282,000
July	45,635,000	35,040,000	31,415,000
August 1	.....	.....	32,712,000

Y & O Company Issues Bonds For Improvements

The Youghiogheny & Ohio Coal Co. of Pennsylvania, Inc., Pittsburgh, Pa., operating bituminous coal mining properties in western Pennsylvania, has arranged for a bond issue of $2,000,000, a portion of the fund to be used for extensions and improvements in plants to increase capacity.

Coming Meetings

National Safety Council; annual congress of the Mining Section, Sept. 30 to Oct. 4, at Chicago, with headquarters at Stevens Hotel.

World Engineering Conference, October 1, 1929, at Tokyo, Japan.

Fuels Division, American Society of Mechanical Engineers; third national meeting, Oct. 7-10 at Philadelphia, Pa.

The Canadian Institute of Mining and Metallurgy; annual Western meeting Oct. 9-11, at Edmonton, Alberta, Canada.

National Coal Association: twelfth annual meeting, Oct. 23-25, at Sinton Hotel, Cincinnati, Ohio.

Second World Power Conference; June 16-25, 1930, Berlin, Germany.

Eighth National Exposition of Power and Mechanical Engineering; Dec. 2-7, Grand Central Palace, New York City.

First International Heating and Ventilating Exposition; Jan. 27-31, 1930, at Commercial Museum, Philadelphia, Pa.

Watson Begins to Distrust Legislative Remedies

Doubt that the so-called problems of the bituminous coal industry can be solved by legislative means recently was expressed by James E. Watson, formerly chairman and now a member of the Senate Committee on Interstate Commerce. Senator Watson last year introduced Senate bill 4490, drafted by the United Mine workers, providing for a Bituminous Coal Commission. Discussing the coal situation, he intimated that his views as to the inadequacy of legislative remedies were shared by President Hoover.

What the industry needs, he asserted, is a czar—"somebody to crack their heads together," but there will never be one owing to the inability of the factions to get together and the deep-seated prejudices from which the industry suffers. The problem is an economic one, in the opinion of the Senator, and cannot be solved by legislation. He declared that it was not his intention to introduce a coal bill at the coming session, as the only reason he introduced S. 4490 was because he was chairman of the Committee on Interstate Commerce, and not being chairman at present, he would not repeat the performance.

Companies Report Earnings

The statement of the Hatfield-Campbell Creek Coal Co., operating in the Kanawha field of West Virginia, shows an income of $75,630 for the first half of 1929. Current assets were listed at $1,535,538, current liabilities at $456,500, and total assets at $8,369,574.

The Pittsburgh Terminal Coal Corporation reports net losses of $96,648 and $224,717 for the first and second quarters of 1929, respectively.

A net income of $66,416, equivalent to 41c. per share on the 100,000 shares of common stock outstanding after payment of a 5 per cent dividend on the preferred shares, was reported by the St. Louis, Rocky Mountain & Pacific Coal Co., Raton, N. M., for the six months ended June 30.

Engineering Profession To Be Studied

Engineers are to study themselves with the aim of improving the status of their profession and of uncovering new possibilities for the betterment of society, according to the American Engineering Council. Earnings will be analyzed, a yardstick applied to the engineer as a professional man, the trends of engineering thought explored and machinery devised to adjust the relationships of engineers whenever difficulties arise either nationally or locally. Fresh objectives for the profession as a whole will be set up.

Appointment of a Committee on Engineering and Allied Technical Professions to direct the study, was announced by Arthur W. Berresford, president of the Council. H. C. Morris, retired mining engineer, Washington, D. C., is chairman, and committees from the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Washington, D. C., Society of Engineers will assist in the work. The findings, it is expected, will enable the Council, organized ten years ago under the leadership of President Hoover, to enter on a program of professional betterment.

Middle West States Urge Home-Mined Coal

Newspapers of Ohio, Indiana, Illinois and Iowa are carrying editorials endorsing the "buy home-mined coal" campaigns which are going forward in those four states. One prominent Ohio business man, according to the Chillicothe *Gazette*, "would compel industrial users of coal, operating in the state, to use Ohio coal." Indiana coal only will be used in the Indianapolis public schools, and Illinois is conducting a well-organized and intensive campaign. Newspapers in that state are now making unfavorable references to the action of the U. S. Government in awarding a contract for Kentucky coal for use in the federal building at Lincoln, Ill. At a recent meeting held in Des Moines, Iowa., and presided over by Governor Hamill, opinion was generally expressed to the effect that Iowa institutions, enjoying patronage because of home-made products, should burn Iowa coal exclusively.

Bureau of Mines Approves Explosive

One change in the active list of permissible explosives was made by the United States Bureau of Mines in August. The basic data on the permissible explosive Hercoal F. was changed as follows:

Change in List of Permissible Explosives During Month of August

	Vol. Poisonous Gases	Characteristic Ingredient	Weight of 1¼x8-in. Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation in 1¼-in. Diameter Cartridge, Ft. per Sec.
*Hercoal F	B	1a	92	¾[1]	231	9,120

*Hercules Powder Co., Wilmington, Del. [1]Formerly 1¼-in.

Bituminous Coal Industry Turns to Safety; Workers Show Skill In Meets

Teams in Action, West Virginia Meet

THE MONTHS of July and August and the first part of September seemingly have been devoted to the fruition of intensive training in first aid. Numerous district and some state-wide meets have been held, many in preparation for the Eighth International First-Aid and Mine Rescue Contest, at Kansas City, Mo., Sept. 12-14.

Teams from mines in Marion, Monongalia and Preston counties participated in a meet held at Riverside Park, near Morgantown, W. Va., July 20. First place was won by the team representing the Sands mine of the Continental Coal Co., Rivesville, W. Va.

Thirty-five teams competed in the contest held in connection with the First Annual Kanawha Valley Safety Meet, at Montgomery, W. Va., Aug. 3. With a score of 799 out of a possible 800 points, the No. 1 team of the Kingston Pocahontas Coal Co. carried off first honors.

On the same day, seven teams of the American Rolling Mills Co. participated in the company first-aid contest held at Nellis, W. Va. Team No. 7 was first. A ladies' team which competed in this meet will enter the West Virginia state-wide meet.

The team representing the Elkhorn Piney Coal Mining Co., Weeksbury, Ky., took first place in the First Annual District First-Aid Meet held at Pikeville, Ky., Aug. 10. Sixteen teams tied for first place and a second contest was necessary to decide the winner. Teams from all the companies in the Big Sandy field were entered.

Twenty-seven teams were entered in the First Annual District Safety Day of the Central West Virginia First-Aid Association, held at Jacksons Mills, W. Va., Aug. 10. The meet, attended by teams from the 10 central counties, was won by a team representing the Davis Coal & Coke Co., Thomas, W. Va.

First honors in the First Annual Pocahontas District Safety Meet, held at Welch, W. Va., Aug. 17, went to the Sagamore team of the Pocahontas Fuel Co., with a score of 800 plus. They were tied with the team from No. 6 mine of the United States Coal & Coke Co., Gary, W. Va., which came in second in the play-off.

Teams representing the Mahan-Ellison Coal Corporation, Liggett, Ky., and the United States Coal & Coke Co., Lynch, Ky., tied for first place in the First Annual Harlan First-Aid Meet, held at Harlan, Ky., Aug. 17. A subsequent contest to decide the winner was won by the Mahan-Ellison team.

Thirty-nine teams were entered in the first-aid contest held on Logan County Safety Day, Logan, W. Va., Aug. 18. First place was taken by the Monaville No. 12 team of the Island Creek Coal Co., Holden, W. Va., and second by the Holden No. 7 team of the same company.

The Eleventh Annual Virginia State-Wide First-Aid Contest was held at Norton, Va., Aug. 24. Overcast skies and frequent showers failed to dampen the enthusiasm of the participants or the spectators. First place was won by the Wilder team of the Clinchfield Coal Corporation, Dante, Va., with a score of 2,388 out of a possible 2,400 points. Dante No. 1 team of the same company took second place with 2,387 points, and third place went to the Roda No. 2 team of the Stonega Coke & Coal Co., Roda, Va. Members of Roda No. 1 team of the Stonega company, which won the new-team contest, were presented with individual cups donated by the National Coal Association.

First place in the First Annual Panhandle Safety Meet, held at Wheeling, W. Va., Aug. 24, went to the Elm Grove Mining Co., Elm Grove, W. Va. Ten teams participated in the contest.

Fifty teams took part in the contests staged as a part of the Kentucky State-Wide First-Aid Meet, held at Lexington, Ky., Aug. 31, under the auspices of the Kentucky Department of Mines. The team of the North-East Coal Co., Thealka, Ky., won first place with a score of 598 points out of a possible 600. Second place went to the Consolidated Coal Co., Jenkins, Ky.; third to the Blackwood Coal & Coke Co., Pardee, Va., and fourth to the United States Coal & Coke Co., Lynch, Ky. First place for the colored teams entered went to the team representing the Clover Splint Coal Co., Closplint, Ky. A girls' team representing the Portsmouth By-Product Coke Co., and a boys' team of the Elkhorn Piney Coal Mining Co., Weeksbury, Ky., received prizes.

Prizes were awarded by E. C. Mahan, president, National Coal Association, at a dinner held at the Lafayette Hotel in the evening. Frank C. Rash, president, Kentucky Mine Owners' Association, acted as toastmaster, and talks dealing with the need for larger appropriations for safety work and the necessity for greater interest in safety work on the part of operators and workers, more widespread use of rock dust and closer inspection at the face, were made by Mr. Mahan, W. A. Ellison, vice-president, Mahan-Ellison Coal Co., Harlan, Ky.; R. E. Howe, secretary, Southern Appalachian Coal Operators' Association, Knoxville, Tenn.; John P. Gorman, Hazard Coal Operators' Association, Lexington, Ky.; F. P. Anderson, dean, College of Engineering, University of Kentucky, Lexington, Ky.; J. T. Ryan, vice-president, Mine Safety Appliances Co., Pittsburgh, Pa., and C. B. Huntress, assistant to the executive secretary, National Coal Association, Washington, D. C. High praise was accorded the work of C. B. Daniel, Chief of the Kentucky Department of Mines.

The team representing No. 3 mine, O'Gara Coal Co., Harrisburg, Ill., carried off first honors in a district first-aid meet held at Johnston City, Ill., Sept. 2.

Ninety teams, chosen in nine district

Business Week Makes Bow

The first issue of *The Business Week*, the new McGraw-Hill publication succeeding the monthly *Magazine of Business*, made its initial bow on Sept. 7. It is the purpose of the new publication, as explained by Malcolm Muir, president of McGraw-Hill Publishing Co., to act as liaison agent between different industrial groups, bringing to the coal man the news of finance and to the banker the significant developments in coal. It does not aspire to give the coal man coal news or the banker financial news. That is recognized as the function of the specialized press serving the individual industries.

meets, competed in the first-aid contests held as a part of the celebration of the Fourth Annual Safety Day, at Charleston, W. Va., Sept. 6-7. First place was won by a team representing the New England Fuel & Transportation Co., Grant Town, W. Va. Second, third, fourth, fifth and sixth places went to the following mines in the order named: Mine 32, Consolidation Coal Co., Owings, W. Va.; Fordson Coal Co., Twin Branch, W. Va.; Mine 86, Consolidation Coal Co., Carolina, W. Va.; Logan County Coal Corporation, Lundale, W. Va.; Wyatt Coal Co., Laing, W. Va.

First place for the colored teams was won by the New River & Pocahontas Consolidated Coal Co., Berwind, W. Va., and second went to the Raleigh Coal & Coke Co., Raleigh, W. Va. The girls' team entered by the American Rolling Mills Co., Nellis, W. Va., won first place in that class. Among the boys' teams, first honors were taken by the American Coal Co. of Allegany County, McComas, W. Va. Second place went to West Virginia Coal & Coke Co., Omar, W. Va. Twelve teams competed in the mine rescue contest, held for the first time this year, first place going to the Continental Coal Co., Cassville, W. Va., and second to the Davis Coal & Coke Co., Thomas, W. Va.

Formal presentation of the Sentinels of Safety trophy, donated by the *Explosives Engineer*, was made to the No. 4 mine of the U. S. Coal & Coke Co., Gary, W. Va., by K. L. Marshall, U. S. Bureau of Mines. C. E. Foster, Charleston, W. Va., and Robert Lilly, Mt. Hope, were elected president and secretary-treasurer, respectively, of the Mine Inspectors' Association of West Virginia, at a meeting held on the field. The National Mine Rescue Association initiated a number of "smoke eaters" and celebrated with a banquet as part of the ceremonies. W. H. Cunningham, president, Truax-Traer Coal Co., Chicago, presided at a safety day breakfast given for the officials of the meet. Governor Conley of West Virginia was the principal speaker and guest of honor. Other talks were made by J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va.; W. M. Wiley, vice-president, Boone County Coal Corporation, Sharples, W. Va., and R. M. Lambie, Chief of the West Virginia Department of Mines, Charleston, W. Va.

Ontario Has Coal

Ontario always has believed it had coal. D. B. Dowling said that the province had 25,000,000 tons of "probable reserves." Now it is stated that not far from James Bay, a part of Hudson's Bay, on the Abitibi River at Blacksmith Rapids, 90 miles from Cochrane, is 7,000,000 to 10,000,000 tons of lignite. Dr. Dyer, provincial geologist, according to an announcement Sept. 5, has proved that the seam averages 18 ft. in thickness and covers an area of one-half square mile. By next spring the Temiskaming & Northern Ontario Ry. probably will have reached the deposit. When distilled at low temperature, 44 per cent of the product is char of 12,750 B.t.u. All areas in the vicinity will be withdrawn from staking.

S. W. Blakslee

Formerly general superintendent, Mr. Blakslee has been made general manager in charge of operations of the Pennsylvania Coal & Coke Corporation, vice C. Law Watkins, vice-president, resigned. Mr. Blakslee will make his headquarters at Cresson, Pa.

Coal Byproducts Tariff Urged by N. C. A.

Pointing out that the bituminous coal-mining industry is interested in the extraction and utilization of the so-called byproducts of coal as a means of increasing the market for bituminous coal, Harry L. Gandy, executive secretary, National Coal Association, in a letter to Senator Reed Smoot, chairman, Senate Finance Committee, Aug. 20, urged the advisability of adequate tariff protection on coal byproduct chemicals. One of the most important byproducts of coal distillation at the present time is sulphate of ammonia, Mr. Gandy stated, and for each ton produced four tons of bituminous coal is required as raw material. Adequate protection would foster the American synthetic ammonia industry, which is faced by intensive foreign competition, and remove the necessity for dependence on other countries for nitrate products.

The Superior Pocahontas Coal Co., Davy, W. Va.; Louisville Coal & Coke Co., Goodwill, Va., and the Winding Gulf Collieries Co., Winding Gulf, W. Va., recently were merged under the name of the Winding Gulf Collieries, Inc., according to Justus Collins, Charleston, W. Va., principal owner of the mines. A charter authorizing capital stock of $3,000,000 has been issued the new company by the Secretary of State of West Virginia.

Railroads Favor Cut In Export Rate

Three important tidewater railroads are in favor of a special rate on export coal, according to the Coal Exporters' Association of the United States. These railroads, it is said, are convinced such action is necessary to supplement the efforts of the United States Shipping Board to promote the export market. The Shipping Board now has nine vessels in the export trade and in the first six months of 1929 exported over 150,000 tons of coal, chiefly to Italy. A marked increase in the use of American coal in the Mediterranean has been secured by stabilizing the rate and providing continuity of service. Export interests, however, insist that a decrease in rail rates is necessary before American coal can compete in the general foreign market.

Joint Rail and Water Rates Ordered by I.C.C.

Joint rail and water rates on bituminous coal on the all-rail basis from mines on the Green River in Kentucky to destinations in Illinois and other states via the Ohio & Mississippi Transit Co. and the Illinois Central, Louisville & Nashville, Chicago & Eastern Illinois and parties to Galligan's tariff, I.C.C. Nos. 85 and 125, have been ordered by the Interstate Commerce Commission. The order was issued in connection with a certificate of public convenience granted the Transit company. The new rates are to become effective not later than Nov. 1.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations reported in August include the following:

Crab Orchard Improvement Co., Eccles, W. Va.; contract closed with Pennsylvania Mining Machinery Corporation for erection of a Peale-Davis dry-cleaning plant, capacity 200 tons per hour of 4x0-in. coal.

Hazle Brook Coal Co., Jeddo, Pa.; new breaker near Aristes, Pa., now being erected. Large sizes will be cleaned in a Chance cone and the smaller on Deister-Overstrom tables. The capacity of the plant will be 100 tons per hour and all domestic and steam sizes will be produced.

Mallory Coal Co., Mallory, W. Va.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 75 tons per hour of egg, stove and pea coal; to be completed Nov. 1.

Pond Creek Pocahontas Co., Bartley, W. Va.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 75 tons per hour of stove coal; to be completed Nov. 1.

Truax-Traer Coal Co., Chicago; erection of a new steel tipple, capacity 500 tons per hour of block, egg, stove, nut, slack and mine-run, at the Forsyth mine, Holidaysboro, Ill., completed by the Pittsburgh Boiler & Machine Co. Equipment includes shaker screens, picking tables, loading booms, crushers, mixing and assembling conveyors and rescreening equipment.

United Pocahontas Coal Co., Crumpler, W. Va.; contract closed with Link-Belt Co. for erection of a central cleaning plant, capacity 4,000 tons per day, to serve the Wyoming, Zenith and Indian Ridge mines. The American Coal Cleaning Corporation will furnish air tables for treating slack, as well as the dust collectors required in the process.

Western Kentucky Wages Up Again; Illinois Dissension Grows

WAGE ADVANCES in western Kentucky and increasing bitterness in the factional row between international and state union adherents in Illinois were the outstanding developments in the mine labor situation last month. Union organizers again have become active in southern West Virginia. In some parts of the Appalachian field concern is expressed over the diminishing labor supply. An organization drive was formally launched in Colorado Aug. 30.

In mid-July wage rates in western Kentucky were officially reduced 20 per cent under the 1917 scale, then prevailing. At the same time it was reported that some of the smaller producing interests were paying less than those figures. Effective Sept. 1 the West Kentucky Coal Co., the largest producer in that field, announced the restoration of the basis in effect prior to July 16.

As stated in the preceding issue of *Coal Age*, union organizers have been very busy in the past few months trying to win back this former union territory to the ranks of the United Mine Workers. Spokesmen for the organization continue to claim large accessions to membership, but the employers have given no indication of any desire to renew the relations ended in 1924.

In Illinois the fight which flared out openly with the removal of officials of subdistrict 9 by International President Lewis and the attack on activities of international representatives by *The Illinois Mine Worker*, published by the state organization of the union, has brought on fresh charges and countercharges. The "insubordination" which resulted in the ouster of the subdistrict officials in southern Illinois by Indianapolis revolves, it is said, about the refusal of the deposed officials to transfer title to certain real estate in Benton to the international organization.

Several local unions friendly to the Lewis group passed resolutions of censure on *The Illinois Mine Worker* for its editorial attack upon "visiting international organizers and ex-officers of ex-districts." The provisional subdistrict officers launched an attack upon Harry Fishwick, state president, for his appointment of Harry Madden, former district board member, to succeed Lon Fox, resigned, pending a new election.

This brought a quick retort from the organ of the district officers, which suggested that the provisional subdistrict appointees of Lewis take stops to have a subdistrict election. The paper also calls upon the Lewis adherents to "quit insinuating about the fraudulent real estate transaction in Benton. If it was fraudulent, say so and put yourself on record. Then prove it. Proof is what the miners of Illinois want, and not hearsay and rumors."

Frank Farrington, forced out of the presidency of district 12 in the summer of 1926 by Mr. Lewis when the news that the Illinois labor leader had signed a contract to become labor counsel for the Peabody Coal Co. leaked out, has entered the battle with a broadside against his old enemy. Mr. Farrington, who is reported to be anxious to stage a come-back in mine labor circles, characterizes "the disintegration of the United Mine Workers" under the Lewis régime as the greatest débâcle in the history of organized labor. Between 1921 and 1927, he charges, union membership decreased nearly 270,000. On Dec. 1, 192, according to Mr. Farrington, the international had 83,446 dues-paying members in the hard-coal regions and only 89,186 in the bituminous fields; more than 50 per cent of the latter membership was in Illinois.

The Illinois agreement of last fall, which reduced the base day rate from $7.50 to $6.10, was assailed by Samuel Pascoe, president of district 30, in a Labor Day address at Hanna City, Ill. "Had the representatives of Illinois known the facts and real feelings of their constituents," he said, "I am of the opinion that the supposedly spontaneous voluntary modification of wages and working conditions in Illinois would not have been tolerated."

Union proselyting in southern West Virginia, said to be headed up by a former operating official of one of the companies in the smokeless area, is being quietly directed at individual solicitation of the workers. A number of miners in the New River and Pocahontas fields are reported to have joined up, but, if so, the membership drive has not yet been followed by any demonstration. Operators in the areas named and also in Boone and Logan counties are watching the situation closely.

An organized fight for higher wages and better working conditions, backed by the United Mine Workers and the Colorado Federation of Labor, has been started by the northern Colorado coal miners. At a mass meeting at Lafayette, Colo., Aug. 30, attended by 500 miners, representing most of the mines in the northern field, a resolution was unanimously adopted demanding the same wage scale and working conditions voluntarily put into effect in mines of the Rocky Mountain Fuel Co. when that company recognized the union a year ago. At that time, the Rocky Mountain company established a wage scale of $7 per 8-hour day, together with a differential of 23c. above non-union scales "in recognition of the increased efficiency of union laborers," and agreed to a detailed plan for the adjustment of differences and the prevention of strikes. It also agreed to install a department of medicine and sanitation and to eliminate unjust working conditions.

The resolution adopted by the miners also charges that the Boulder Valley Coal Co. failed to carry out the provisions of a similar award made by the State Industrial Commission to employees of the Centennial mine, May 3, 1929, and says that the mine workers "recognize the necessity of bringing about uniformity of wages to prevent unwarranted cut-throat competition" undermining their standards. John E. Gross, secretary, Colorado Federation of Labor, in a statement made after the meeting, said that "we hope that our objective may be accomplished peacefully, but we are ready to throw the entire strength of the federation and the United Mine Workers behind our demands."

Machine Age Intensifies Unemployment Problem

Technological unemployment constitutes a new and difficult problem, in the opinion of William Green, president, American Federation of Labor. Here is what Mr. Green thinks about it, as expressed in his Labor Day speech:

"We realize that improved machinery and the use of power is the inevitable development of modern industry and that machine displacement will continue in conformity with the application and study of inventive minds. We see in it all a relief from the effects of human drudgery and excessive toil, but we must not be unmindful of the serious social and economic condition created because of human displacement. We cannot displace men in large numbers, relegating them, skilled and unskilled, artists and artisans, to the large army of unemployed without at the same time creating a menace to the existence of our political and social institutions.

"Serious-minded people, possessing a keen appreciation of the serious stage which this problem has reached, are thinking about it and about its destructive consequences. It is to be regretted that this question has not commanded more universal attention and consideration. The American Federation of Labor regards this question of machine displacement and technological unemployment as one of the most vexing questions which we are called upon to consider."

After an idleness of four days caused by the resignation of the engineer, who charged that he had been threatened by a group of masked men, the Bono mine of the Bono Mining Co., near Dana, Ind., which has been the scene of considerable turbulence since an attack on the miners in the latter part of June, started to hoist coal again on Aug. 15. The Bono mine is operated by a group of stockholder-workers.

Washington Letter

By Paul Wooton
Special Correspondent

DECREASED activity in the anthracite region in 1928 is reflected in the number of men employed and in the number of days worked. The average number of workers decreased from 165,259 in 1927 to 160,681 in 1928. This means that the number of workers in the anthracite mines in 1928 dropped back to the average maintained in 1924 and in 1925.

The average number of days worked in 1928 was 217, as compared with 225 in the previous year. The average output per man remained about the same as in 1927. It formerly was true that the working time in the anthracite mines was remarkably steady. There was a time when 270 days a year was a thoroughly reasonable expectation of employment. Even with the decrease in output, however, the anthracite worker now is in no better position than was the bituminous miner in the days before the war.

In the study of production decline, however, consideration must be given to the fact that some of it was due to the liquidation of stocks. Production of anthracite in 1928 totaled 67,275,062 gross tons. This was 4,238,834 tons less than the output of 1927, a decline of nearly 6 per cent based on the 1927 figure. This is the more significant when it is recalled that the 1927 production is smaller than that of any other year free from labor troubles in the last decade. Most of the decrease in production occurred in the Wyoming region where, in comparison with 1927, production fell 2,180,698 tons in contrast with a decline of 959,158 tons and of 1,085,692 tons in the Lehigh and Schuylkill regions, respectively.

The decline in the output is less discouraging to the anthracite industry when it is recalled that there was a large draft on stocks during the year. If consumption is considered rather than production there still is a decline, but it is a much smaller one. Consumption within the United States, allowing for changes in stocks, came within 2.4 per cent of the preceding year.

The total value of anthracite produced in 1928 was $393,638,000, as compared with $420,942,000 in the preceding year. This is in spite of the fact that unusually cold weather was experienced in New England and in the Middle West.

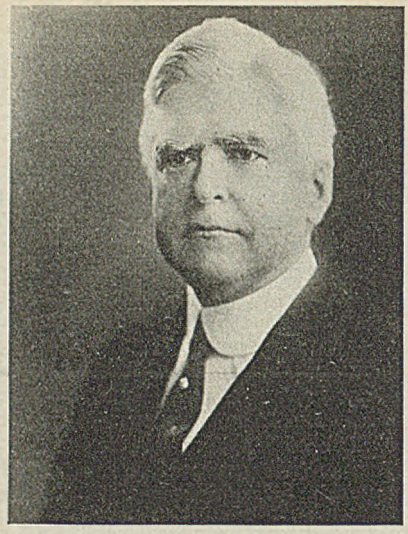
Not only did the anthracite operators receive less for coal at the mines than in 1927, but the average value per unit of product also declined. In 1928 the average value per ton of anthracite, including the output of breakers, washers, and dredges, was $6.38, in comparison with $6.50 in 1927. The average for the total of domestic sizes declined from $8.33 to $8.09, a loss of 24c. for the group which represents 71.2 per cent of the breaker shipments.

In this decline of average value of domestic sizes every one of the domestic sizes shared. The losses varied from 6c. per ton on stove coal to 90c. per ton on pea coal. In contrast with this decline in value of domestic coals was the average value of steam coals, which showed an improvement in 1928. In comparison with $1.98 a ton in 1927 the total steam sizes brought $2.12 in 1928. In fact, every coal in the steam group showed an increase. These increases varied from 6c. for No. 3 buckwheat and barley to 19c. for No. 1 buckwheat. As shown by the total value the gains made in 1928 on steam sizes, which represent 28.8 per cent of breaker shipments, were not sufficient to offset losses on the domestic sizes.

Significant of the progress made in the readjustment of the anthracite industry to the changed conditions is the sharp decline in the number of active operations. In 1927 there were 235 breakers at work. In 1928 the number fell to 226. In 1923 there were 257 breakers working.

Among the elements influencing the decline of anthracite production is the remarkable increase in the consumption of domestic coke. Sales of domestic byproduct coke have increased from 3,812,771 tons in 1924 to 6,254,382 tons in 1928.

The figures given herein were compiled by O. E. Kiessling and H. L. Bennit, of the U. S. Bureau of Mines.



George S. Rice

Chief mining engineer, U. S. Bureau of Mines, was awarded the Medal of the Institution of Mining Engineers at the annual general meeting held in London, Aug. 21, "in recognition of his eminence in all matters relating to the safe working of coal mines, with special reference to the practical application of scientific knowledge." Mr. Rice has been chief mining engineer of the Bureau since its organization in 1910.

Anthracite Shipments Fall

Anthracite shipments in July, 1929, as reported to the Anthracite Bureau of Information, Philadelphia, were 3,687,586 gross tons. Compared with shipments during the same month last year, this was an increase of 281,573 tons, but when compared with June, 1929, there was a decrease of 91,093 tons. Shipments by originating carriers for July, 1929, compared with the same month last year, and that of June, 1929, were as follows:

	July, 1929	July, 1928	June, 1929
	Gross Tons		
Reading Company	726,867	708,589	677,888
Lehigh Valley	540,007	570,094	663,481
Central R.R. of New Jersey	291,276	292,009	295,117
Dela., Lackawanna & Western	752,245	458,674	646,158
Delaware & Hudson	506,238	478,802	585,948
Pennsylvania	409,439	336,980	337,460
Erie	324,786	395,182	328,000
N. Y., Ontario & Western	86,802	68,785	78,177
Lehigh & New England	49,926	96,898	166,450
	3,687,586	3,406,013	3,778,679

For the purpose of reducing the cost of producing and marketing timber for the anthracite industry, lumbermen in several of the eastern states, including New Jersey, Pennsylvania and New York, recently organized the Producers' Co-operative Association, with offices at Oxford, N. J. Branches are to be located in the anthracite field.

Anthracite Prices at New York, Effective Sept. 1, 1929

(Per Gross Ton, F.O.B. Mines)

	Broken (Grate)	Egg (Furnace)	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
Lehigh & Wilkes-Barre Coal Co.	$8.00	$8.60	$9.10	$8.60	$4.90	$2.75	$2.00	$1.50
Delaware, Lackawanna & Western Coal Co.	8.40	8.60	9.10	8.60	4.90	*2.75	2.00	1.50
Philadelphia and Reading Coal and Iron Co.	8.35	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Lehigh Valley Coal Sales Co.	8.40	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Lehigh Coal & Navigation Co.	8.40	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Hudson Coal Co.	8.40	8.60	9.10	8.60	4.90	Prices on application		
M. A. Hanna Co.	8.35	8.60	9.10	8.60	4.90	Prices on application		
Dickson & Eddy	....	8.60	9.10	8.60	4.90	2.75	....	....
Madeira Hill & Co.	8.40	8.60	9.10	8.60	4.90	Prices on application		
Payne Coal Co.	....	8.60	9.10	8.60	4.90	Prices on application		
General Coal Co.:								
Raven Run, Maryd, Westwood and Drifton	....	8.60	9.10	8.60	4.90	Prices on application		
Hazel Brook and Upper Lehigh	....	8.85	9.35	8.85	5.15	Prices on application		
Fuel Service Co.:								
Beaver Meadow	....	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Kingston No. 2 and Gaylord	....	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Kingston No. 4	....	8.85	9.35	8.85	5.15	2.75	2.00	1.50
Westwood	....	8.60	9.10	8.60	4.90	2.75	2.00	1.50
Jeddo	....	9.20	9.70	9.20	5.90	Prices on application		
Highland	....	9.00	9.50	9.00	5.90	Prices on application		

*Domestic buckwheat, $3.25.

Russian Engineers to Study American Business

B. Kuritzin, chairman, Soviet State Machine-Building Corporation, M. Nikiforov, chairman of the Rubber Trust, W. S. Matlin, vice-chairman, Electrotechnical Trust, N. Levchenko, vice-chairman, Donugol Coal Trust and 45 other Soviet executives and engineers recently arrived in the United States to study American industry. A technical bureau to be located with the International General Electric Co., Schenectady, N. Y., will be organized by Mr. Matlin to study American methods of producing electroctechnical products. The delegation of the Donugol Coal Trust, which has technical assistance contracts with Stuart, James & Cooke, Inc. and Roberts & Schaefer, will study the American coal industry.

Earnings and Employment Decrease in June

Employment in coal mining—anthracite and bituminous coal combined—decreased 5.3 per cent in June, 1929, as compared with May and payroll totals decreased 9.4 per cent, according to the monthly *Labor Review* of the United States Department of Labor. The 1,247 mines reporting had, in June, 275,736 employees, whose combined earnings in one week were $6,920,169.

Market conditions affected anthracite mining to the extent of decreasing employment and payroll totals, in June, 10.4 and 18.4 per cent, respectively. Employment in bituminous coal mines was 1.9 per cent lower in June, 1929, than in May, and payroll totals were 2.1 per cent smaller. These figures are based upon reports from 1,096 mines, in which there were in June 173,037 employees, whose combined earnings in one week $4,137,564.

The East and West South Central States reported good market conditions and increased employment, but each of the remaining divisions reported fewer employees, although in the West North Central and South Atlantic States working time was somewhat steadier, as shown by increased payroll totals. Details are given in the accompanying tables.

West Virginia Schools To Teach Mining

Coal mining will be taught as an elective subject in all the high schools in the coal-mining districts of West Virginia, according to a resolution passed by the State Board of Education. Courses in coal mining were established in the high schools at Gary and Berwind, W. V., last year, under the direction of the School of Mines, West Virginia University, and the action of the Board will increase the scope of instruction. According to W. C. Cook, state superintendent of schools, classes during the first year will be conducted by the science teachers, but it is hoped that specially-trained coal-mining instructors will be available in the future.

Personal Notes

A. W. Dean has retired as president of the Pittsburgh & Ohio Mining Co., Cleveland, Ohio. He will be succeeded by U. C. Hatch, chairman, board of directors.

J. H. Edwards, associate editor, *Coal Age*, Huntington, W. Va., has been appointed a member of the committee on applications to mining work of the American Institute of Electrical Engineers.

Charles Piez, chairman of the board Link-Belt Co., has been nominated for president of the American Society of Mechanical Engineers.

Geo. S. McCaa, formerly district engineer, U. S. Bureau of Mines, Pittsburgh, Pa., recently was appointed a bituminous mine inspector by Governor Fisher of Pennsylvania.

George Dorsey, president, Owings Miners' Association of the Consolidation Coal Co., has been elected for a two-year term as labor commissioner for the Consolidation workmen. He will represent the workers in all matters that are carried directly to the officials of the company.

William E. Berg, for 27 years chief engineer of the water department of the Colorado Fuel & Iron Co., retired Sept. 1.

John Fielding, Jr., formerly purchasing agent of the Corrigan-McKinney Steel Co., Cleveland, Ohio, has been appointed assistant to the president, Butler Consolidated Coal Co., Butler, Pa., in charge of preparation and marketing.

H. E. Lancaster, formerly resident engineer of the Sunday Creek Coal Co. at Nelsonville, Ohio, has been appointed chief engineer, vice Glenn H. Dukes, deceased.

J. B. Marks, general manager, Independent Coal & Coke Co., Salt Lake City, Utah, has been appointed a director of the Utah Industrial Development Association.

Joseph E. Edgeworth, foreman in charge of shaking conveyors, Rock Springs Coal Co., Rock Springs, Wyo., has been made superintendent of the Wyoming properties of the Lion Coal Co., Ogden, Utah.

H. A. Glover, formerly vice-president in charge of sales, Knox Consolidated Coal Co., has been appointed assistant general manager of sales, Consolidation Coal Co. Mr. Glover was made a member of the marketing committee of the National Coal Association in 1926, and in 1927 became its chairman. He is now chairman of the trade relations committee of the association and was elected president of the Coal Trade Association of Indiana when that organization was formed last November.

George F. Heaps, Jr., president of the Iowa Coal Operators' Association, has become associated with the ownership and active management of the Midwest Coal Co., Rex Fuel Co., and Monroe Block Coal Co., all with headquarters at Albia, Iowa.

J. M. Dougherty, advertising manager, Consolidation Coal Co., has been appointed director of sales research. W. T. Coe, assistant to the vice-president, has been made director of distribution and manager of export sales, and V. G. Lowe, manager of dealer sales, has been appointed special dealer agent, with headquarters in Chicago.

Col. James Ellwood Jones, general manager, Pocahontas Fuel Co., and William McKell, president, McKell Coal & Coke Co., have been named delegates to the twenty-second annual conference of the National Tax Association by Governor W. G. Conley, of West Virginia.

Employment and Payroll Totals in Identical Bituminous Coal Mines In May and June, 1929

	Mines	Number on Payroll—May, 1929	Number on Payroll—June, 1929	Number on Payroll—Per Cent Change	Amount of Payroll—May, 1929	Amount of Payroll—June, 1929	Amount of Payroll—Per Cent Change
Middle Atlantic	349	59,961	58,524	— 2.4	$1,509,385	$1,478,202	— 2.1
East North Central	161	25,840	24,519	— 5.1	626,148	572,774	— 8.5
West North Central	47	3,999	3,958	— 1.0	86,186	88,251	+ 2.4
South Atlantic	241	37,961	37,746	— 0.6	905,461	920,567	+ 1.7
East South Central	199	38,321	38,705	+ 1.0	799,698	820,294	+ 2.6
West South Central	23	1,055	1,170	+10.9	20,728	25,456	+22.8
Mountain	66	7,879	7,072	—10.2	237,827	193,521	—18.6
Pacific	10	1,389	1,343	— 3.3	42,329	38,499	— 9.0
All divisions	1,096	176,405	173,037	— 1.9	$4,227,762	$4,137,564	— 2.1

Per Cent Change in Each Line of Employment, May to June, 1929

	Establishments	Employment—May, 1929	Employment—June, 1929	Employment—Per Cent Change	Payroll in One Week—May, 1929	Payroll in One Week—June, 1929	Payroll in One Week—Per Cent Change
Manufacturing	12,572	3,587,198	3,567,229	— 0.4[1]	$101,194,386	$98,823,873	— 1.9[1]
Coal Mining	1,247	291,042	275,736	— 5.3	7,638,474	6,920,000	— 9.4
Anthracite	151	114,637	102,699	—10.4	3,410,712	2,782,605	—18.4
Bituminous	1,096	176,405	173,037	— 1.9	4,227,762	4,137,564	— 2.1
Metalliferous mining	342	59,630	61,425	+ 3.0	1,851,018	1,869,672	+ 1.0
Quarrying and non-metallic mining	510	28,615	29,306	+ 2.4	764,194	787,844	+ 3.1
Public utilities	9,037	701,049	708,974	+ 1.1	20,597,127	20,781,521	+ 1.0
Trade	5,508	207,213	207,484	+ 0.1	5,159,134	5,213,268	+ 1.0
Wholesale	1,194	41,602	41,688	+ 0.2	1,241,646	1,236,923	— 0.4
Retail	4,314	165,611	165,796	+ 0.1	3,917,788	3,976,345	+ 1.5
Hotels	1,875	148,875	150,615	+ 1.2	2,524,367[2]	2,519,508[2]	— 0.2
Canning and preserving	313	24,674	30,489	+23.6	514,014	519,272	+ 1.0
Total	31,404	5,048,296	5,031,258	— 0.3	$140,225,014	$137,535,127	— 1.9

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

Ethyl Made From Coal

Ethyl alcohol—known as grain alcohol—is being made from coal at the South Charleston, W. Va., plant of the Carbide & Carbon Chemicals Corporation, a subsidiary of the Union Carbide Co., according to information supplied Senator Watson by Prohibition Commissioner J. M. Doran. The basis of production, Mr. Doran states, is the conversion of ethylene gas, derived principally from coke-oven gas and petroleum, to ethyl alcohol, and its subsequent purification. Under a temporary permit, 48,000 proof gallons of alcohol have been made and denatured for use in the manufacturing processes of the company.

Obituary

DAVID B. ROBB, 58, president, District No. 11, United Mine Workers, died at his home in Terre Haute, Ind., Aug. 11, of pulmonary hemorrhages. Mr. Robb, who was born in Staffordshire, England, came to America in 1902.

HENRY S. PICKANDS, a partner in the firm of Pickands, Mather & Co., died Aug. 10 of heart disease in his office in the Union Trust Building, Cleveland, Ohio. Mr. Pickands was 53 years old.

HUGH BELL SPROUL, president, Erskine Coal & Land Co., died suddenly of heart disease, Sept. 5, while attending a fair at Staunton, Va. Mr. Sproul, who was 68 years old, attended Washington and Lee University from 1890 to 1893 and entered the coal business in West Virginia immediately after. During the World War, he was Federal Food Administrator for Virginia.

Mining Profits Rise

Twelve coal-mining companies showed net profits of $4,241,000 for the six month period ended June 30, 1929, as compared to $2,864,000 for the corresponding period in 1928, according to a tabulation made by the National City Bank of New York City. This is an increase of 48 per cent as compared with 27.4 per cent for American industry as a whole.

HOWARD W. PERRIN, age 63, manager of anthracite sales in eastern United States for the M. A. Hanna Co. and vice-president, Susquehanna Coal Co., Philadelphia, Pa., died Aug. 10, at Burlington, Vt., of heart trouble.

W. H. H. MILLER, Saltsburg, Pa., general manager of the Cochran Coal Co., Salina, Pa., and the Kettle Creek Coal Mining Co., Williamsport, Pa., died Aug. 16 of injuries received in an automobile accident.

W. R. WOODFORD, president, Rail & River Coal Co., and a member of the executive committee of the Eastern Ohio Coal Operators' Association, died Aug. 24 at his home in Cleveland, Ohio.

EMANUEL LEMAIRE, chief mining engineer, Belgian Mining Department, administrative director, National Institute of Mines, Frameries, and professor at the University of Louvain, died Aug. 18. Professor Lemaire made a special study of the flame of explosives with reference to their improvement for use in gassy or dusty mines and patented the Lemaire sheath cartridge, in which a sheath of rock dust surrounds the explosive, now required in gassy mines in Belgium.

VICTOR WATTEYNE, honorary Director General of Mines of Belgium, died Aug. 29. M. Watteyne was one of the members of the foreign commission engaged in 1906 by the technologic branch of the U. S. Geological Survey, which became the Bureau of Mines in 1910, to visit the mines of the United States and make recommendations for the prevention of coal-mixer explosions.

WALTER HERD, mining engineer, Dominion Coal Co., Ltd., died at his home at Chester, Nova Scotia, Aug. 23. Mr. Herd was born at Kirkcaldy, Scotland, in 1883, and was graduated from the Heriot-Watt College in 1904. In 1912, he went to Newfoundland as manager of the Wabana mines, and was made assistant mining engineer of the Dominion company in 1914.

JOHN A. HALBERT, age 57, president and general manager of the Anchor Fuel Co., Trinidad, Colo., died at his home in Denver, Aug. 18, after an illness of more than a year. Mr. Halbert, who was one of the first superintendents in Routt County, went to Colorado in 1914 to take charge of the Pinnacle mine. He later had charge of the Wadge mine of the Victor American Fuel Co. and a few years ago organized the Anchor Fuel Co.

King Coal's Calendar for August

Aug. 2—David Fowler, Scranton, Pa., international organizer, United Mine Workers, launches a campaign to reorganize the miners in the northern West Virginia Panhandle and the eastern Ohio fields.

Aug. 5—Twenty miners known to have been killed in a mine explosion at Otashinai, on the island of Hokkaido, Japan. Little hope held out for 51 other employees trapped in the mine.

Aug. 6—Thirty-two striking miners killed and 200 others wounded in the Lupeni district of Roumania when fired upon by troops. The cause of the shooting is said to have been the unreasonable attitude of the mines directorate when confronted by the demands of the strikers.

Aug. 8—Governor John Hammill of Iowa calls a conference of miners, operators and consumers at Des Moines for the purpose of effecting a solution of the problems besetting the coal industry of that state.

Aug. 8—On the request of Governor Harry G. Leslie of Indiana, the Columbus (Ind.) school board will use one-third Indiana coal. If it is found to be satisfactory, members of the board state that it will be used exclusively in the future.

Aug. 8—Chesapeake & Ohio Ry. plans to start work on the construction of 18 miles of track between Edwight and Surveyor, Raleigh County, W. Va., uniting the Coal River and Piney River branches.

Aug. 13—National Coal Association representative appears before the National Industrial Traffic League and a committee of the carriers to oppose unlimited reconsigning of coal.

Aug. 14—Orders issued by the Lehigh Valley Coal Co., Wilkes-Barre, Pa., for full-time resumption at all collieries.

Aug. 15—Anthracite Equipment Corporation formed on the initiative of the Anthracite Operators' Conference to promote the sale of approved heating and heat-control devices.

Aug. 17—Sixteen believed to have died in a dust explosion in the Hildebrand Colliery, near Kattowitz, Poland. Nine bodies recovered at last reports.

Aug. 18—Officials of the Glen Alden Coal Co. undertake the task of ventilating subsurface workings preparatory to opening the No. 5 shaft of the Woodward colliery, Wilkes-Barre, Pa., sealed since a squeeze and subsequent explosion, May 26, 1927.

Aug. 20—Advisability of adequate tariff protection on coal byproduct chemicals urged by Harry L. Gandy, executive secretary, National Coal Association, in a letter to Senator Smoot, chairman, U. S. Senate Finance Committee.

Aug. 21—Twenty miners entombed and three killed in a gas explosion near Stara Sagora, Bulgaria, as a result of interruption in ventilation.

Aug. 21—Executive committee, Reading (Pa.) Chamber of Commerce, announces that estimates of the cost of removal of several million tons of coal dirt, much of it marketable, from the Schuylkill River will be made by Frederick H. Dechant.

Aug. 21—George S. Rice, chief mining engineer, U. S. Bureau of Mines, awarded the Medal of the Institution of Mining Engineers at a meeting held in London, Eng., "in recognition of his eminence in all matters relating to the safe working of mines, with special reference to the practical application of scientific knowledge."

Aug. 22—Jonas Waffle, Terre Haute, director of the Indiana Coal Trades Association, elected vice-president, Governor Leslie's advisory committee for the promotion of Indiana-mined coal. William Mitch, Terre Haute, secretary, District No. 11, United Mine Workers, also was elected secretary.

Aug. 26—Western Demurrage & Storage Bureau, acting on the I.C.C. interpretation of the Demurrage Tariff Exception 1-B-3, and for the carriers, announces that demurrage rules and charges will apply on all cars of unbilled coal which are "not on tracks below the tipple." The order is effective Sept. 1, and applies to carriers in the Middle West.

Aug. 27—Six men escape, one is fatally injured and two are entombed as a result of a squeeze in the No. 8 shaft of the Pennsylvania Coal Co., Hughestown, Pa.

Aug. 31—Three hundred miners escape and twelve are burned in an explosion in the Renton mine of the Union Collieries Co., Renton, Pa.

O'Toole Suggests Remedies For British Industry

English coal-mining companies prospered and paid dividends in the past chiefly because they failed to make proper provisions for the future by furnishing bettery machinery to the mine operators is the opinion expressed by Col. Edward O'Toole, general manager, United States Coal & Coke Co., Gary, W. Va., after a private inspection trip made to acquaint himself with British mining conditions. This opinion was expressed in a letter to Major K. C. Appleyard, of the Birtley Iron Works, Ltd., which received wide publicity in England and was brought to the attention of the Prince of Wales.

Colonel O'Toole said in his letter that the coal seams in all the coal fields of the world have, in general, the same characteristics. Based on this conclusion, he stated that the important thing for mining engineers to do is to provide mechanical equipment and tools to enable the coal to be mined and transported to its natural market. He also advocated the payment of a living wage, the establishment of proper sanitary conditions and the organization of the industry as a means of rehabilitating British coal mining.

Iowa Coal Industry To Be Revived

Some 250 representatives of Iowa coal producers, miners and industrial consumers were guests of Governor John Hammill at Des Moines, Aug. 8, for the purpose of effecting a solution for the problems which beset the coal industry of that state. The immediate result was the appointment of a committee to work with the Iowa coal committee recently appointed at Albia. The committee will study Iowa coal, its properties and uses, and report later to the general conference at Albia.

At the Des Moines conference, Governor Hammill stated that the whole influence of the state government would be used to further the use of Iowa coal by official bodies having the spending of public money. As a result of the suggestions at the general conference and a preliminary committee meeting, three lines of procedure were agreed upon. These were: (1) the collection of a fund to advertise Iowa coal; (2) the continuation of the joint committee as a permanent body for the promotion of home-mined coal, and (3) the conduct of a technical study of the properties and uses of the Iowa product.

Speedy Movement Necessary To Avoid Car Shortage

Surplus coal cars reported by the car service division, American Railway Association, as of Aug. 23, totaled 47,121, a decrease of 11,364 within a period of three weeks. As the surplus is scattered throughout the United States there is no great number of cars in any one section. Coal loading is requiring more cars, while calls for open-top equipment for transporting other commodities continues to be heavy.

The National Coal Association says that bituminous producers can materially increase the rapidly diminishing supply by urging prompt unloading and return of equipment on their customers. Shippers should furnish billing instructions promptly to avoid delay in moving cars and part loads at the mines should be reduced to a minimum.

American Engineers Get Russian Contracts

Contracts for four projects in the Donetz coal basin of Soviet Russia to cost $3,000,000 were closed at Kharkov on June 22, by Col. Warren R. Roberts, chairman, Roberts & Schaefer, Chicago. Colonel Roberts, accompanied by Raymond G. Lawry, mining engineer, and his daughter, Elizabeth E. Roberts, attorney and secretary, visited the Russian coal region at the invitation of the Donugol State Coal Trust, which became interested in the air-cleaning process of the company as a result of a study of American industrial conditions by a Soviet commission.

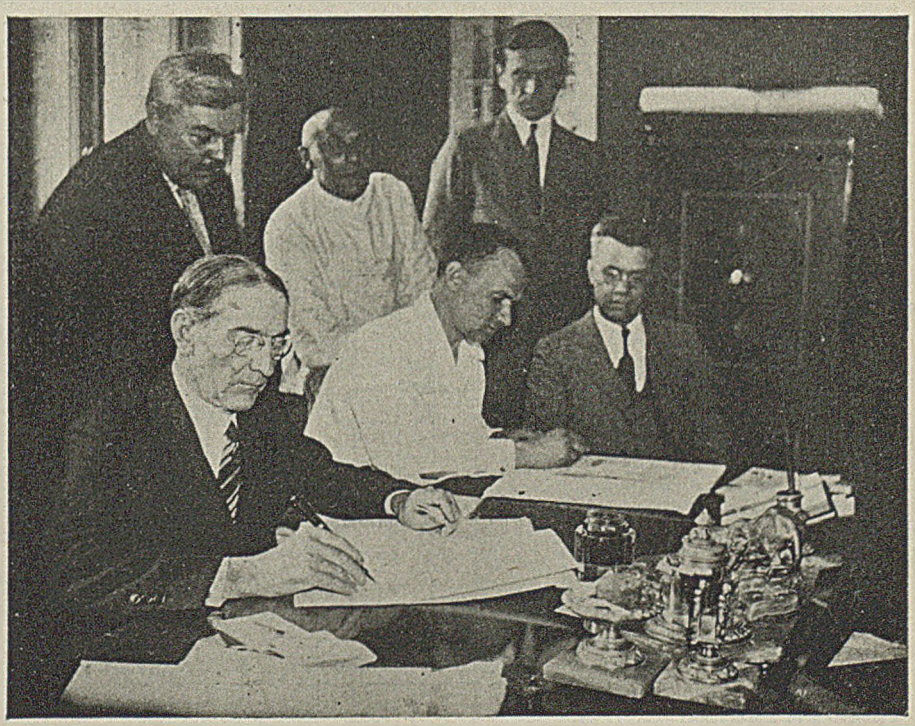
The complete plans and specifications for the four plants are to be completed ready for building the plants in 13 months, and construction will start as soon as those for the first plant are completed. Designing will be done at Chicago, with the co-operation of three engineers from the State Coal Trust. It is expected that these plants will increase the yearly production 3,500,000 tons. Present production is 26,000,000 tons and the trust plans to increase it to 75,000,000 at the end of five years. Russian labor and staffs will be employed in the erection, with American engineers supervising the work, and American machinery will be used where superior to that made in Russia.

The Roberts & Schaefer Co. have an option for additional plants upon completion of the present projects.

Glen Alden Mine Fire Extinguished

After two years spent in fighting a fire in the No. 5 shaft of the Woodward Colliery, Wilkes-Barre, Pa., officials of the Glen Alden Coal Co., aided by state mine inspectors, undertook on Aug. 18 the task of ventilating 30 acres of subsurface workings sealed since a squeeze and subsequent explosion on May 26, 1927. Previous tests indicated that the fire, which was fought with carbon dioxide, methane and water, had been extinguished. Colliery officials hope to penetrate the area affected by the squeeze where five men were killed. Reports indicate that reclamation of the workings will be hampered by rock and coal which fell after a second blast on May 29, 1927.

An inquiry into the use of coal and iron police and other privately employed guards by mining and other industries will be a part of the activities of the Law Enforcement Commission appointed by President Hoover. Frank J. Loesch, Chicago; former Secretary of War Newton D. Baker, Cleveland, Ohio; Henry W. Anderson, Richmond, Va., and Judge Paul J. McCormick, Los Angeles, Calif., are members of the committee.



Present at the Signing of the Contract

Standing (left to right)—E. T. Abakumov and S. S. Dookelsky, directors, and N. L. Levtchenko, vice-president, Donugol State Coal Trust. Seated (left to right)—Col. Warren R. Roberts; President Lomov, Donugol State Coal Trust, and Raymond G. Lawry.

Coal Mine Fatalities in July Show Decline From Previous Month and Year Ago

ACCIDENTS at coal mines in the United States during the month of July, 1929, caused the death of 148 men, according to information received from state mine inspectors by the Bureau of Mines, Department of Commerce. Of this number 31 occurred in the anthracite fields of Pennsylvania; the remaining 117 resulted from accidents at bituminous mines in various states. The total production of coal for the month was 45,628,000 tons, 40,635,000 tons of which was bituminous and 4,993,000 tons was anthracite. Based on these figures the death rate per million tons of coal produced was 3.24 for the industry as a whole, 2.88 for bituminous coal and 6.21 for anthracite coal. The death rates for July, a year ago, were 2.92 for bituminous, 5.36 for anthracite and 3.19 for both bituminous and anthracite combined. The rates for July showed a decrease from those of the preceding month of June for bituminous and also for anthracite mines.

Records for the first seven months of 1929 show a reduction in the industry's death rate, not only for the industry as a whole, but also for anthracite and bituminous mines considered separately. During the first seven months of 1929, 1,142 men lost their lives in coal mines. The production of coal for this period was 335,704,000 tons, resulting in a death rate of 3.40. The bituminous rate during these months was 3.04, based on 894 deaths and 293,842,000 tons of coal mined; that for anthracite was 5.92, based on 248 fatalities and 41,862,000 tons. For the same period in 1928 the rate for bituminous mines alone was 3.86, with a production of 270,565,000 tons of coal and 1,044 deaths. The rate for anthracite was 6.21, based on 41,578,000 tons and 258 deaths, while for the total industry a rate of 4.17 was shown, with a production of 312,143,000 tons and 1,302 fatalities.

The month of July was free from major disasters—that is, accidents in which five or more men lost their lives. However, there have been four such disasters thus far in 1929. Three of these were explosions which killed 70 men and one was a fall of slate, killing 5 men. Based exclusively on these major disasters the death rate per million tons of coal produced during the period from January to the end of July was 0.22, as compared with 0.93 for the same months in 1928, based on 290 deaths, which resulted from nine accidents. Comparative fatality rates for 1929 and 1928 are shown in the following table:

	Year 1928	Jan.-July 1928	Jan.-July 1929
All causes	3.812	4.171	3.402
Falls of roof and coal	1.868	1.877	1.823
Haulage	0.632	0.583	0.664
Gas or dust explosions:			
Local explosions	0.088	0.112	0.060
Major explosions	0.572	0.929	0.220
Explosives	0.130	0.167	0.146
Electricity	0.155	0.154	0.122
Other causes	0.367	0.349	0.367

Ohio Safety Campaign Reduces Deaths

Fatal accidents in Ohio coal mines have sharply decreased in 1929 as a result of the work being done by the Ohio Department of Mines and Mining and the division of safety and hygiene of the Ohio Industrial Commission. Based on the tonnage produced in the first eight months of the year, the number of fatal accidents was 33 per cent less in 1929 than in 1928. L. T. Lewis, special inspector, division of hygiene and safety, and P. W. Moore, safety inspector, Department of Mines and Mining, have been in charge of the safety work. Both agencies have depended to a considerable extent on meetings to bring the benefits of safety home to both miners and employers.

Bussey Plants for Canada?

The Bussey Coal Distillation Co., an English firm, hopes to erect several plants in Canada within the next two years, according to a statement made last month by W. H. Mackenzie while visiting Victoria, B. C. Major Mackenzie, representing the Bussey company, said that each of the plants would have a daily throughput of 10,000 tons. A Bussey plant, said to be the largest low-temperature distillation plant in the world, was erected at Glenboig, Scotland, a few months ago.

Coal-Mine Fatalities During July, 1929, by Causes and States

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

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of Gas or Coal Dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1929	1298
Alabama			2				4					6													6	
Arkansas																									0	3
Colorado		1	1									2	1				1								3	0
Illinois	3		1						1			5													5	9
Indiana													1			1	2								2	3
Iowa																									0	0
Kansas	1											1													1	1
Kentucky	6	1	4		4							15													15	14
Maryland																									0	0
Michigan	1											1													1	0
Missouri																									0	0
Montana																									0	0
New Mexico																									0	0
North Dakota																									0	0
Ohio	4		1	1								6													6	13
Oklahoma																									0	1
Pennsylvania (bituminous)	16	4	6				1		1		2	30											1	1	31	23
Tennessee	2		1									3													0	0
Texas																									3	0
Utah																			1					1	1	2
Virginia	2											2													2	1
Washington																				1				1	1	0
West Virginia	21	6	8		1		2					38											2	2	40	33
Wyoming																									0	1
Total (bituminous)	56	12	24	1	5		7		2		2	109	2			1	3		1	1			3	5	117	106
Pennsylvania (anthracite)	10	5	6	2	1			1			1	26	2				2		1				2	3	31	24
Total, July, 1929	66	17	30	3	6		7	1	2		3	135	4			1	5		2	1			5	8	148	
Total, July, 1928	65	11	20	6	8		8		1		3	122	2				2	1		2		2	1	6		130

Among the Manufacturers

RECENT changes in the organization of the Westinghouse Electric & Mfg. Co. are as follows: F. A. Merrick, former vice-president and general manager has been elected president, succeeding E. M. Herr, who becomes vice-chairman. Harold Smith, general solicitor of the company, has been elected vice-president, with offices in New York City. William G. Marshall, director of personnel for the Philadelphia Co., became assistant to Vice-president T. P. Gaylord. O. H. Eschholz has been appointed manager of the patent department.

* * *

J. F. LINCOLN, president, Lincoln Electric Co., Cleveland, Ohio, sailed recently for London, where he will demonstrate the "electronic tornado" process of carbon-arc welding to European engineers. The company also announces the placing of contracts for the erection of a large addition to the present plant at Cleveland.

* * *

H. W. NEWTON has been appointed district manager of the Birmingham, Ala., territory of the Stephen-Adamson Mfg. Co., Aurora, Ill., succeeding W. E. Harris, who resigned.

* * *

THE WAGNER ELECTRIC CORPORATION, St. Louis, Mo., has moved its Cleveland, Ohio, service station and sales office to a new building at 3756 Carnegie Ave.

* * *

W. A. GRIEVES and H. Supp have been elected secretary and treasurer respectively of the Ohio Malleable Iron Co., a subsidiary of the Jeffrey Mfg. Co. J. F. Davidson was elected to the board of directors.

* * *

C. W. MILLER has resigned as treasurer of the Jeffrey Mfg. Co., Columbus, Ohio, but will continue as a member of the board of directors. He is succeeded by H. Supp, Jr., formerly credit manager. J. X. Farrar, assistant purchasing agent has been appointed credit manager.

THE DOMESTIC ELECTRIC Co., Cleveland, Ohio, has purchased a group of buildings and a tract of land at Kent, Ohio, to be devoted to the manufacture of small, fractional-horsepower motors, according to an announcement by Carl A. Duffner, president.

* * *

GEORGE E. LEARNED has been elected chairman of the board of the International Combustion Tar & Chemical Corporation, succeeding F. J. Lewis, who will continue as a director of the International Combustion Engineering Corporation, a subsidiary. Dr. Walter Runge was elected president of the parent company, succeeding W. H. Lewis, and Grant Thorn became vice-president in charge of sales. W. H. Lewis will be associated with the subsidiary company in an advisory capacity.

* * *

THE UTICA, N. Y., office and plant of the American LaFrance & Foamite Corporation has been removed to the main plant and general offices at Elmira, N. Y.

* * *

THE GEO. D. WHITCOMB Co., Rochelle, Ill., has broken ground for a new factory unit to be devoted largely to the manufacture of large oil-electric locomotives from 20 to 100 tons.

* * *

E. J. SCHWANHAUSSER, formerly assistant manager of the Harrison, N. J., works of the Worthington Pump & Machinery Corporation, has been appointed manager of the Buffalo, N. Y., works.

* * *

THE COPPERWELD STEEL Co., Glassport, Pa., has established a northeastern district under the management of George F. Bain, New York City.

* * *

THE COMBUSTION ENGINEERING CORPORATION, New York City, has divided the Atlanta, Ga., district into three sections, served by offices in Charlotte, N. C., Atlanta, Ga., and New Orleans, La.

CHANGES in the organization of the Timken Roller Bearing Service & Sales Co. are as follows: R. C. Brower, general manager, has been promoted to assistant secretary and assistant treasurer of the Timken Roller Bearing Co. W. H. Richardson, formerly manager of the New York branch of the Service & Sales company has been made its general manager, with headquarters at Canton, Ohio. E. H. Austin, manager, Kansas City branch, becomes manager at New York; L. J. Halderman, Atlanta branch goes to Kansas City; Parker T. Ancarrow, of the Richmond, Va., branch, becomes manager at Atlanta, and Stewart B. Ancarrow goes to Richmond.

* * *

THE AMERICAN HOIST & DERRICK Co., St. Paul, Minn., has opened a branch office and warehouse at Los Angeles, Calif.

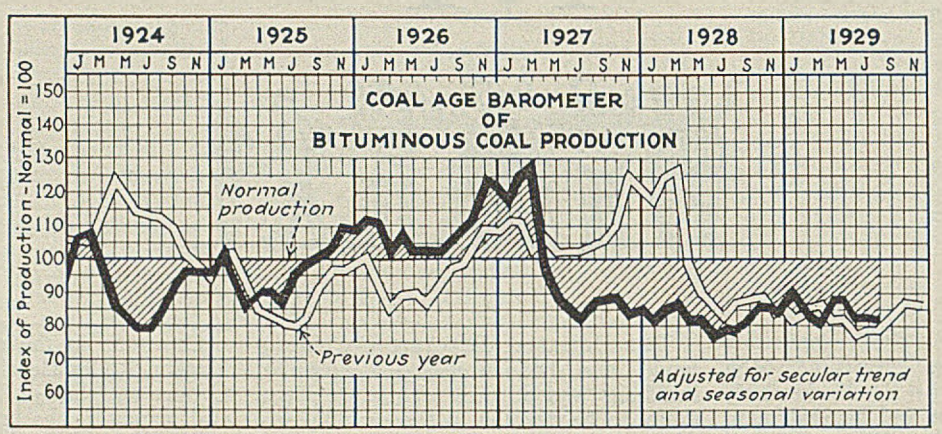
* * *

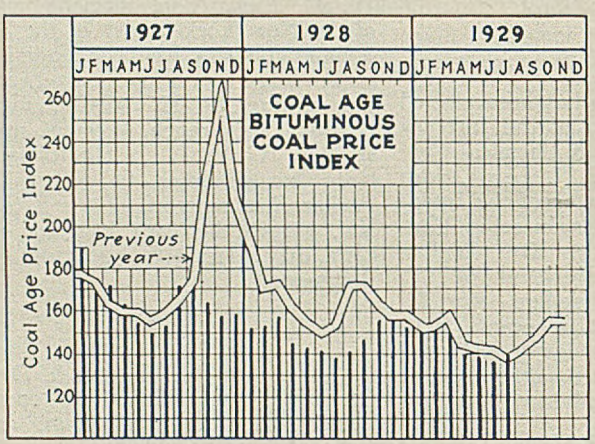
THE NEWHALL CHAIN FORGE & IRON Co., New York City, announces the completion of negotiations for the purchase of the chain shop and other buildings of the Rensselaer Chain Works, Rensselaer, N. Y. The Newhall company is a subsidiary of the Henry B. Newhall Corporation.

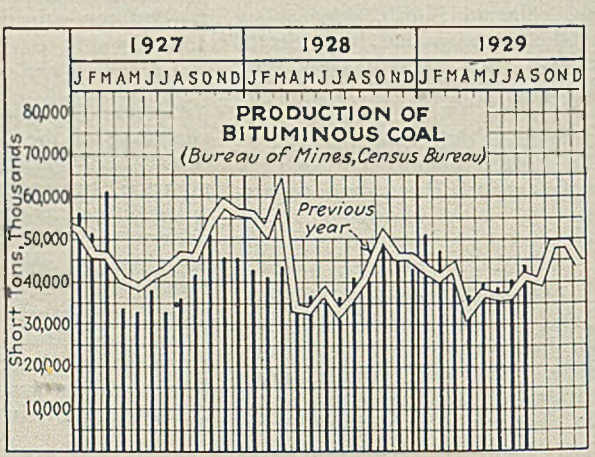
* * *

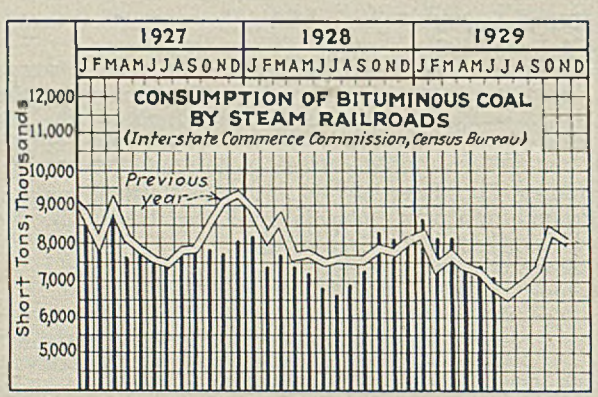
DARIUS E. PECK, formerly assistant manager of the law department, has been elected vice-president and general counsel of the General Electric Co., Schenectady, N. Y., succeeding Allen H. Jackson, retired. Wallace S. Clark, manager of the cable division of the central station department has been retired at his own request and is succeeded by F. H. Winkley, of the same department. E. D. Spicer, superintendent of the refrigeration department, has been made assistant manager of the Schenectady, N. Y., works. F. D. Kramer recently was appointed auditor of disbursements in place of George F. Mosher, who becomes assistant treasurer. Effective Oct. 1, 1929, the 14 wholesale distributing corporations owned by the General Electric Co. will be consolidated into the General Electric Supply Corporation.

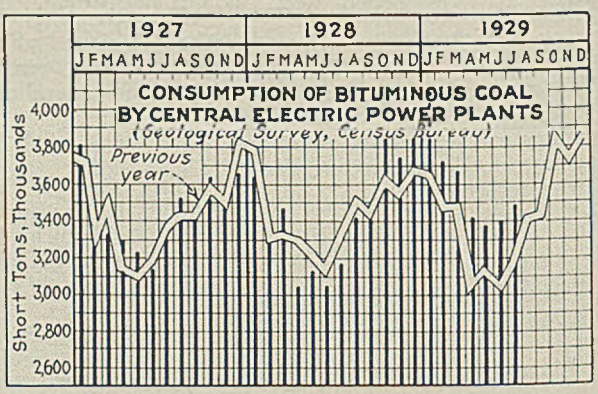
Indicators of Activities in the Coal Industry

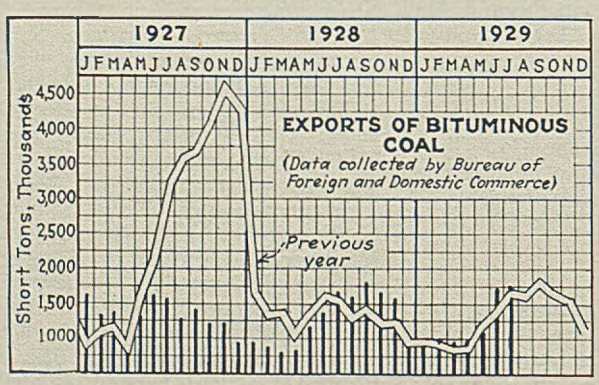


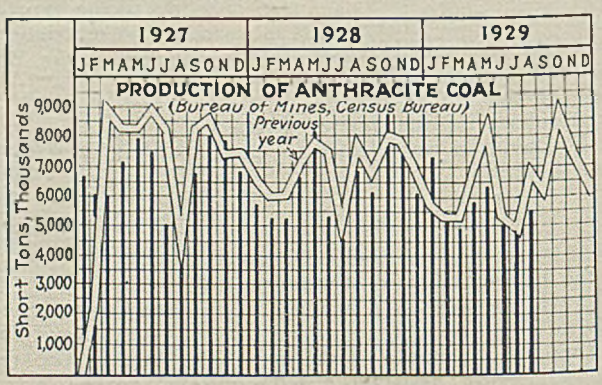












MARKETS *in Review*

THE SITUATION in the bituminous coal markets of the United States showed a distinct improvement in August as compared to the preceding summer months. In all but a few of the principal markets, buying for domestic use increased and was accompanied by a rise in the general price level. Dealers and consumers, however, were still reluctant to add to stocks. Screenings and, to a lesser extent, other steam sizes were adversely affected by the increased output of domestic coal and receded from their former favorable position. Reports indicate that the remainder of the year will be marked by an exceptionally good coal business and the National Coal Association points out that production in 1929 probably will be at least 27,000,000 tons more than in 1928. Surplus coal cars declined from 58,485 on Aug. 1 to 47,121 on Aug. 23, a total of 11,364, and shortages were regarded as impending in some producing localities.

August production is estimated by the U. S. Bureau of Mines at 43,560,000 net tons; an increase of 2,925,000 tons over July and 2,527,000 tons over August of last year. Prices increased materially in response to the increase in demand for domestic coal. *Coal Age* Index of spot bituminous prices was 146, Aug. 3; 145, Aug. 10; 141, Aug. 17, and 142, Aug. 24 and 31. The corresponding weighted average prices were $1.77, Aug. 3; $1.76, Aug. 10; $1.71, Aug. 17, and $1.72, Aug. 24 and 31. These are preliminary figures. The revised Index figure for July was 140, July 6, 13, 20 and 27. The corresponding weighted average prices were $1.70, July 6; $1.69, July 13 and 20, and $1.70, July 27. The monthly Index for July was 140, as compared with the unrevised figure of 143 1/5 for last month.

Shipments to the lakes continued throughout the month at a slightly higher rate than for the corresponding period last year. Dumpings at the lower lake ports for the season to Aug. 27 were 23,664,335 net tons, an increase of 3,378,733 tons over the corresponding period in 1928. Cargo dumpings to Aug. 27 were 22,788,496 tons and bunker fuel loadings were 875,839 tons.

ANTHRACITE demand increased slightly in August, mostly because of domestic buying, stimulated by price advances and the imminence of cold weather. No tendency on the part of dealers and consumers to increase stocks could be discerned, however. Increased buying is expected in September.

Domestic sales were a very encouraging feature of the Chicago coal market in August. An excellent demand for the better grades from all fields developed, causing dealers to be oversold on smokeless lump and egg and Eastern high-volatile block. Movement from southern Illinois, Indiana No. 4 and western Kentucky mines was accelerated by price advances scheduled for September. The imminence of cold weather and depleted stockpiles resulted in some ordering at August circulars in anticipation of early fall and winter buying. Retail dealers, however, still refused to manifest any interest in large stocks. Price advances in the various fields, effective Sept. 1, are as follows: southern Illinois domestic sizes, 10c.@25c.; western Kentucky domestic sizes, approximately 20c.; Indiana No. 4 lump and egg, 25c.

Domestic sizes sold well enough in the latter part of the month to materially reduce the number of "no-bill" cars at all the mines in Illinois, Indiana and western Kentucky. This movement was given added impetus by the Western Demurrage & Storage Bureau which, acting on the Interstate Commerce Commission's interpretation of demurrage tariff exception 1-B-3 and for the carriers, notified operators that, effective Sept. 1, demurrage rules and charges would apply on all cars of unbilled coal not on "coal tracks below the tipple." Lump was oversold at the end of the month and egg was rapidly being cleared out. Nut moved fairly well; steam sizes, on the contrary, were a drug on the market. Prices on screenings were as follows: western Kentucky, 35c.@50c., with some carload lots offered at 25c.; Indiana No. 5, 70c.@$1.10; Indiana No. 4, $1@$1.40; central Illinois, 80c.@90c.; southern Illinois (leading companies), $1.50@$1.60, with some independent offerings at $1.25.

CONTRACT shipments of smokeless mine-run increased slightly at the end of the month but the movement still ran behind the usual seasonal average. Retailers in Chicago were able to accumulate good-sized stocks in August as a result of light public demand. Householders are far behind on purchases and a brisk movement is promised when cold weather arrives.

August proved to be a poor month from the standpoint of domestic sales in the St. Louis market. No efforts were made to build up the low stocks of steam sizes. Mines were left with a surplus on hand as a result, with little prospect for early relief. September holds no promise except for domestic sizes. August prices were as follows: Mt. Olive domestic lump, $2.35@$2.50;

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

		Week Ended					
		Aug. 3, 1929		Aug. 10, 1929	Aug. 17, 1929	Aug. 24, 1929	Aug. 31, 1929	
	Market Quoted	Independent	Company	Independent	Independent	Independent	Independent	Company
Broken	New York		$8.00					$8.00@$8.30
Broken	Philadelphia	$8.30@$8.40	8.30	$8.30@$8.40	$8.30@$8.40	$8.30@$8.40	$8.30@$8.40	8.30
Egg	New York	8.25@ 8.50	8.30	8.25@ 8.50	8.25@ 8.50	8.25@ 8.50	8.40@ 8.50	8.50
Egg	Philadelphia	8.50@ 8.75	8.50	8.50@ 8.75	8.50@ 8.75	8.50@ 8.75	8.50@ 8.75	8.50
Egg	Chicago*	7.59	7.59	7.59	7.59	7.59	7.59	7.59
Stove	New York	8.75@ 9.00	9.00	8.75@ 9.00	8.75@ 9.00	8.75@ 9.00	8.90@ 9.00	9.00
Stove	Philadelphia	9.00@ 9.25	9.00	9.00@ 9.25	9.00@ 9.25	9.00@ 9.25	9.00@ 9.25	9.00
Stove	Chicago*	8.04	8.04	8.04	8.04	8.04	8.04	8.04
Chestnut	New York	8.25@ 8.50	8.50	8.25@ 8.50	8.25@ 8.50	8.25@ 8.50	8.40@ 8.50	8.50
Chestnut	Philadelphia	8.50@ 8.75	8.50	8.50@ 8.75	8.50@ 8.75	8.50@ 8.75	8.50@ 8.75	8.50
Chestnut	Chicago*	7.59	7.59	7.59	7.59	7.59	7.59	7.59
Pea	New York	4.25@ 4.80	4.80	4.30@ 4.80	4.30@ 4.80	4.30@ 4.80	4.50@ 4.80	4.80
Pea	Philadelphia	4.80@ 5.05	4.80	4.80@ 5.05	4.80@ 5.05	4.80@ 5.05	4.80@ 5.05	4.80
Pea	Chicago*	4.29	4.29	4.29	4.29	4.29	4.29	4.29
Buckwheat	New York	2.65@ 2.75	†2.75	2.65@ 2.75	2.65@ 2.75	2.65@ 2.75	2.65@ 2.75	†2.75
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75
Rice	New York	1.65@ 2.00	2.00	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00
Barley	New York	1.40@ 1.50	1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.25 (D. L. & W.)

nut, $2@$2.50; mine-run, $2.10; screenings, $1.35; Standard lump and egg, $1.85@$2.15, nut, $1.40@$1.60; mine-run, $1.75; screenings, 80c.@90c.

An optimistic tone, engendered by an increase in the number of inquiries, prevailed in the Head of the Lakes coal market during August. Preliminary figures show shipments to be about 15,000 cars as compared to 13,588 in June and 19,332 in August of last year. Movement was hampered, however, by a disposition on the part of dealers and consumers to hold their stocks down to a minimum because of unsettled credit conditions. Receipts of bituminous coal from the Lake Erie ports have been at a substantially higher rate than a year ago and it is expected that the season's aggregate will be 1,500,000 tons greater. The August report is expected to show a considerable gain over July, which included receipts of 1,533,303 tons of bituminous coal, 55,477 tons of anthracite and 3,819 tons of coke. Stocks on the docks as of Aug. 15 were approximately 4,800,000 tons of bituminous and 475,999 tons of anthracite. The market in general was firm, with an active demand for Pocahontas and other smokeless coals.

CURRENT prices on the docks at the last of the month were as follows: Pocahontas lump, egg, stove and nut, $7.60; mine-run, $5; screenings, $4.10; Kentucky block and lump, $6.55 @$7.15; stove and egg, $5.80; egg and dock-run, $5.75; stove, $5.70; dock-run, $5.50; screenings, $4.10; splint block, $5.80; lump and egg, $5.55; dock-run, $4.75; screenings, $3.85; Youghiogheny block, lump and egg, $5.50; stove, $5.05; dock-run, $4.50; screenings, $3.85; Hocking block, $5.65; lump and egg, $5.30; stove, $5.05; dock-run, $4.50; screenings, $3.60; anthracite egg and nut, $13.20; stove, $13.60; pea, $9.05; buckwheat, $7.25.

A slight improvement in the demand for domestic sizes in August prompted operators to prepare for reopening Kansas deep-shaft mines in September. Running time improved at most Southwestern mines but, in general, the wholesale trade was dull. Prices on prepared sizes stiffened at the middle of the month, though screenings dropped from $2@$2.25 to $1.75. August storage prices were as follows: Arkansas semi-anthracite lump, $4@$4.50; Spadra (Ark.) anthracite grate, egg and range, $6; Bernice (Ark.) grate and nut, $6.75; McAlester (Okla.) lump, $6.50; Wilburton (Okla.) lump, $5.75; Henryetta (Okla.) lump, $4@$4.25.

RETAIL dealers in the Colorado market manifested an interest in coal for storage purposes, resulting in a slight improvement in demand for domestic sizes in August. New prices, effective Sept. 1, are as follows: Walsenburg-Canon City lump, $5.25; nut, $4.30; washed chestnut, $3.25; Trinidad coking lump, nut and chestnut, $3.25; Crested Butte anthracite egg and furnace, $8.25; Rock Springs-Kemmerer lump, $4.25; nut, $3.75; steam sizes, $1.50; Crested Butte bituminous lump, $5.25; nut, $4.30; Colorado steam sizes, $1.40.

Conditions in the Louisville market showed no great improvement in the month of August other than an increase in the price of Harlan block to $2.40. Other coals maintained their former price levels, and operating time in both eastern and western Kentucky mines was poor—with the exception of captive mines and those with lake contracts. Harlan block was quoted at $2@$2.40 throughout the month, though little could be had for under $2.10. Other eastern Kentucky prices were as follows: Lump and egg, $1.75@$2.25; nut, $1.60@$1.75; mine-run, $1.25@ $1.60; screenings, 60c.@$1.15, with some of low grade offered at 45c. and under. Western Kentucky prices varied little as compared with the preceding month. Block, lump and egg were quoted at $1.25@$1.60; domestic nut, $1.15@$1.60; steam nut, $1.15@$1.40; mine-run, $1.25@$1.65, with poorer grades as low as 85c.; pea and slack, 45c.@60c.; nut and slack, 85c.

INCREASING domestic sales marked each succeeding week of August in the Cincinnati market, with a good movement of both smokeless and high-volatile coals. Steam sizes, on the contrary, showed no improvement. Mine-run maintained its July level but slack went into a slump. Lake business also declined, the weekly movement being between 12,000 and 13,000 cars. Smokeless coals, by reason of strict adherance to circular prices in August, entered September with prospects of an increase of 25c.@50c. over the list prices. The demand for stove sizes increased, though nut was slow at the end of the month, bringing $2 as against a circular price of $2.25. Screenings maintained a fairly good position as a result of steel and byproduct demand, with some weakening in sympathy with a drop in the high-volatile market.

High-volatile dealers were successful in an endeavor to wipe out the surplus of cheap domestic sizes, being helped by a brisk demand which sprung up in the middle of the month. Lump and egg were in fine shape at the end of the month and egg had righted itself in regard to price. Mine-run—gas and by-product—made little headway, however, and steam grades lagged. Slack fell off markedly as a result of the increase in tonnage of prepared sizes. Retail smokeless prices were advanced to $8 for lump early in the month. Mine-run remained at $5.75@$6. High-volatile prices advanced 25c. @50c. the last of the month, with slack remaining at $4@ $4.50.

The domestic trade in Columbus developed considerable strength in August, giving reason to believe that the upturn has arrived. The steam demand held up fairly well, all branches of industry showed renewed activity and mine prices were stronger in practically every field. Dealers reported a marked increase in sales to householders, which generated a heavy buying movement to replenish stocks. Smokeless coals, the better grades of splints and Kentucky block were most in demand. Hocking and Pomeroy coals moved better than earlier in the season. Pre-

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

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Aug. 3, 1929	Aug. 10, 1929	Aug. 17, 1929	Aug. 24, 1929	Aug. 31, 1929
Smokeless lump	Columbus	$2.75@$3.00	$2.75@$3.00	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.10	2.00@ 2.25	2.00@ 2.25
Smokeless screenings	Columbus	1.15@ 1.30	1.15@ 1.30	1.15@ 1.25	1.15@ 1.25	1.10@ 1.25
Smokeless lump	Chicago	2.75@ 3.25	2.75@ 3.25	3.00@ 3.25	3.25@ 3.50	3.25@ 3.50
Smokeless mine-run	Chicago	1.75@ 2.25	1.75@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless lump	Cincinnati	2.75@ 3.00	2.75@ 3.25	2.75@ 3.25	2.75@ 3.25	3.00@ 3.25
Smokeless mine-run	Cincinnati	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless screenings	Cincinnati	1.25@ 1.50	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.20@ 1.35
*Smokeless mine-run	Boston	4.15@ 4.25	4.15@ 4.25	4.20@ 4.25	4.20@ 4.30	4.25@ 4.35
Clearfield mine-run	Boston	1.60@ 1.90	1.60@ 1.90	1.60@ 1.95	1.65@ 1.95	1.65@ 1.95
Cambria mine-run	Boston	1.70@ 2.10	1.70@ 2.10	1.70@ 2.10	1.70@ 2.10	1.70@ 2.10
Somerset mine-run	Boston	1.65@ 2.00	1.65@ 2.00	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00
Pool 1 (Navy Standard)	New York	2.10@ 2.35	2.10@ 2.35	2.10@ 2.35	2.10@ 2.35	2.10@ 2.35
Pool 1 (Navy Standard)	Philadelphia	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60
Pool 9 (super. low vol.)	New York	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90
Pool 9 (super. low vol.)	Philadelphia	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 10 (h. gr. low vol.)	New York	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Pool 10 (h. gr. low vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
Pool 11 (low vol.)	New York	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40
Pool 11 (low vol.)	Philadelphia	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65
HIGH-VOLATILE, EASTERN						
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.05@ 1.40	1.05@ 1.40	1.05@ 1.40	1.05@ 1.40	1.05@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10
Kanawha lump	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.85@ 2.00	1.90@ 2.00
Kanawha mine-run	Columbus	1.25@ 1.55	1.25@ 1.55	1.30@ 1.55	1.30@ 1.55	1.30@ 1.60
Kanawha screenings	Columbus	.85@ 1.00	.85@ 1.00	.75@ .90	.75@ .90	.65@ .90
W. Va. lump	Cincinnati	1.85@ 2.40	1.75@ 2.25	1.65@ 2.25	1.75@ 2.50	1.75@ 2.50
W. Va. gas mine-run	Cincinnati	1.35@ 1.60	1.40@ 1.50	1.40@ 1.50	1.40@ 1.60	1.35@ 1.50
W. Va. steam mine-run	Cincinnati	1.25@ 1.40	1.15@ 1.35	1.15@ 1.40	1.15@ 1.40	1.15@ 1.35
W. Va. screenings	Cincinnati	.75@ 1.00	.75@ 1.00	.75@ 1.00	.50@ 1.00	.50@ .90
Hocking lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.75@ 2.00
Hocking mine-run	Columbus	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.40@ 1.65
Hocking screenings	Columbus	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25	1.00@ 1.20	1.00@ 1.20

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

vailing retail prices are as follows: Smokeless lump and egg, $7.75; splint lump, $6.25@$7; Hocking and Pomeroy lump, $5.50, all subject to a discount of 50c. a ton on 30 days.

SIGNS of revival were noticeable in the steam trade and contracting was brisk, marking a disposition on the part of large users to cover a portion of their requirements. A number of users, however, still depended upon the spot market for their supplies. Larger production of lump caused screenings prices to weaken. Other sizes stiffened and were in good shape at the end of the month.

A slight improvement was noticeable in the Pittsburgh market in August, bringing brighter prospects for September. Movement from the district, fostered by the continued high manufacturing rate, was better than seasonal, with an increase in lake shipments over last year. The opening of the domestic season brought better prices for those sizes, lump advancing from $2@$2.25 to $2.15 @$2.35. Slack prices, however, were adversely affected by the increased production of domestic sizes, going to as low as 75c. Quotations of 80c.@$1 were in force at the end of the month. Gas slack was relatively steady at $1@ $1.10, and industrial lump maintained its previous position.

Central Pennsylvania reported a distinct improvement all along the line in August. Demand was stronger, prices on the higher grades turned upward and remained firm on other grades. Loadings were 3,346,292 tons as compared to 3,124,944 tons in July, 1929, and 2,988,427 tons in August, 1928.

STEAM coal advanced to a firm position in the New England market in August. Shippers reported more orders, contract movement improved and prices were more consistently maintained. At the end of the month, Navy Standard Pocahontas and New River mine-run was being rigidly held to $4.25 f.o.b. vessels, Norfolk and Newport News. The corresponding price on cars at Boston for inland delivery was $5.50. Stoker coal was quoted at $3.90, f.o.b. vessels, Virginia terminals and $5.25 on cars at Boston. These prices were the lowest asked. The demand for Pennsylvania coals increased throughout the month, chiefly in all-rail territory. Prices failed to advance but the low spots disappeared.

The bituminous market in New York picked up slowly in the last two weeks in August, some houses reporting more business in the third week than in the previous two months. Producers expect a greatly increased winter's business as a result of depleted stockpiles and a good industrial situation.

Consumers continued to take large quantities of coal in the Philadelphia market during August though buying for stockpiles did not make itself evident. This fact leads the trade to expect a particularly heavy buiness later in the year. The bunker trade also failed to improve, proceeding at the same rate as in previous months. Prices remained unchanged, with a tendency toward firmness at present levels.

Domestic sales increased slightly in the Birmingham market in August, engendering an optimistic feeling toward the future. Indications point to an active and satisfactory buying movement in September, particularly as stocks represent only a fraction of the normal winter requirements. September prices are as follows: Cahaba lump, $4@$5; egg, $4@$4.75; nut, $3.25@$3.50; Black Creek lump, $4.50@$4.75; egg, $4.25@ $4.50; nut, $3.50; Corona lump, $3.25; egg, $3.10; nut, $2.75; Carbon Hill lump and egg, $2.75; nut, $2.25@$2.50; Big Seam lump and egg, $2.75; nut, $2; Montevallo lump, $5@$5.75; egg, $4.75 @$5.75; nut, $3.25@$3.50.

The steam coal market was inactive for the greater part of the month, though inquiry picked up slightly at the last, causing an increased movement. Though no new bunker business was taken on, the larger shippers reported a good volume moving on contract. Mine quotations showed no change as compared with July, though strong competition for the limited business caused material price shading in some instances.

AS A RESULT of urging on the part of retail dealers and anticipated price advances, a slightly improved demand for anthracite developed in New York toward the last of August. Retailers placed more orders and domestic coals moved well throughout the month. No. 1 buckwheat maintained its lead and the demand for this size was such that producers and sales agents predict a shortage all winter. Rice and barley moved at a steady rate throughout the month.

A material increase in the number of orders received and a corresponding acceleration in deliveries marked the latter half of August in the Philadelphia anthracite trade. The rush was due to a price advance of 50c. per ton scheduled for Sept. 1. Stove sales easily kept up with production and egg and pea were nearly in the same situation. Chestnut could be had in liberal quantities. Steam sizes showed no abnormal activity, shipments just about keeping abreast of production. Buckwheat maintained a good position throughout the month and barley was taken freely. Rice, on the contrary, was slow at times. Prices were well maintained.

Exports of bituminous coal from the United States in July—the latest month for which figures are available—were 1,734,565 net tons, as compared to 1,502,575 tons in July, 1928. Anthracite exports rose from 167,278 gross tons in July, 1928, to 202,513 gross tons in July, 1929. Coke exports were 16,714 gross tons in July, 1929, as compared to 9,258 tons the same month a year ago. Canada was, as usual, the best customer, taking 1,461,508 net tons of bituminous coal in July, an increase of 150,703 tons over a year ago.

Imports for the month of July were 28,331 net tons of bituminous coal, 33,417 gross tons of anthracite and 16,714 tons of coke. The figures for July a year ago were: Bituminous coal, 26,249 tons; anthracite, 10,581 tons, and coke, 9,258 tons.

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

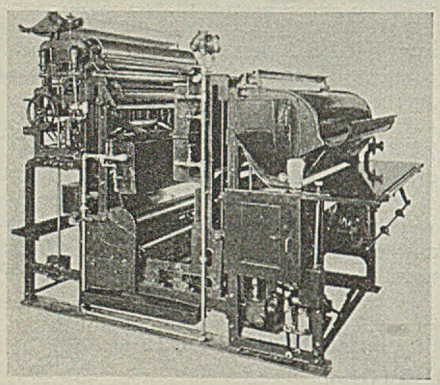
		Week Ended				
MIDDLE WEST	Market Quoted	Aug. 3, 1929	Aug. 10, 1929	Aug. 17, 1929	Aug. 24, 1929	Aug. 31, 1929
Franklin, Ill. lump	Chicago	$2.90	$2.90	$2.90	$2.90	$2.90
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Central, Ill. lump	Chicago	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50
Central, Ill. mine-run	Chicago	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	.90@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25	.80@ 1.25
Ind. 4th vein lump	Chicago	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00
Ind. 4th vein mine-run	Chicago	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90
Ind. 4th vein screenings	Chicago	.90@ 1.50	.90@ 1.50	.90@ 1.50	.90@ 1.50	1.00@ 1.50
Ind. 5th vein lump	Chicago	1.75@ 1.90	1.75@ 1.90	1.75@ 1.09	1.75@ 1.90	1.75@ 1.90
Ind. 5th vein mine-run	Chicago	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75
Ind. 5th vein screenings	Chicago	.70@ 1.00	.70@ 1.00	.90@ 1.00	.80@ 1.00	.70@ 1.00
Mount Olive lump	St. Louis	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50	2.35@ 2.50
Mount Olive mine-run	St. Louis	2.10	2.10	2.10	2.10	2.10
Mount Olive screenings	St. Louis	1.35	1.35	1.35	1.35	1.35
Standard lump	St. Louis	1.85@ 2.15	1.85@ 2.15	1.85@ 2.15	1.85@ 2.15	1.85@ 2.15
Standard mine-run	St. Louis	1.75	1.75	1.75	1.75	1.75
Standard screenings	St. Louis	.80@ .90	.80@ .90	.80@ .90	.80@ .90	.80@ .90
West Ky. block	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60
West Ky. mine-run	Louisville	.80@ 1.00	.90@ 1.40	.85@ 1.25	.85@ 1.25	.85@ 1.25
West Ky. screenings	Louisville	.55@ .65	.60@ .70	.45@ .60	.45@ .60	.45@ .60
West Ky. block	Chicago	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.40@ 1.85
West Ky. mine-run	Chicago	.85@ 1.25	.85@ 1.25	.85@ 1.25	.85@ 1.25	.85@ 1.25
SOUTH AND SOUTHWEST						
Big Seam lump	Birmingham	$2.15	$2.15	$2.15	$2.15	$2.15
Big Seam mine-run	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. block	Chicago	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50
S. E. Ky. mine-run	Chicago	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60
S. E. Ky. block	Louisville	2.00@ 2.30	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40
S. E. Ky. mine-run	Louisville	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60
S. E. Ky. screenings	Louisville	.60@ 1.10	.60@ 1.10	.80@ 1.00	.60@ 1.15	.60@ 1.15
S. E. Ky. block	Cincinnati	2.00@ 2.50	1.85@ 2.25	1.75@ 2.50	1.75@ 2.50	2.00@ 2.60
S. E. Ky. mine-run	Cincinnati	1.25@ 1.50	1.15@ 1.50	1.10@ 1.50	1.15@ 1.70	1.15@ 1.50
S. E. Ky. screenings	Cincinnati	.75@ 1.00	.75@ 1.00	.75@ 1.00	.50@ 1.00	.50@ .90
Kansas shaft lump	Kansas City	3.50	3.50	2.50@ 3.75	3.50@ 3.75	3.50@ 3.75
Kansas strip lump	Kansas City	2.50	2.50	2.75	2.75	2.75
Kansas mine-run	Kansas City	2.50	2.50	2.50	2.50	2.50
Kansas crushed mine-run	Kansas City	2.00@ 2.25	2.00@ 2.25	1.75	1.75	1.75

WHAT'S NEW

In Coal-Mining Equipment

Blue-Printing Machine Said To Be Speedy

Speed in production, high-quality prints and low-cost operation are features claimed for the new Pease "Peerless" Model "30" blue-printing equipment of the C. F. Pease Co., Chicago. Tracings are made on a continuous roll of paper in accordance with the usual practice. After the exposure is made, tracings are automatically returned to the tray at the front of the machine near the operator's hands, while the prints on the continuous roll are carried on through the machine.



Pease Model "30" Blue-Printing Machine

Subsequent operations of washing, potashing and drying take place in succession. The paper is then automatically rolled up in loose-cylinder form at the rear for cutting and trimming. Throughout the travel, the roll of paper is said to be gear-driven without drag or possibility of strain or breakage.

According to the manufacturers, the machine has a speed range of from 4 in. to 12 ft. a minute and is powered with a ¼-hp., variable-speed motor direct-connected to a fully inclosed gear reduction unit running in oil. Mounted in the feed table is a four-point, autotype gear shift providing high and low speeds forward, as well as neutral and reverse positions. The reverse gear is said to be a new departure and enables the operator to withdraw tracings or run the leader roll back whenever desired. An additional speed control in the form of a hand-operated dial connected by a sprocket chain to a rheostat permits speed changes to conform to the character of the tracings.

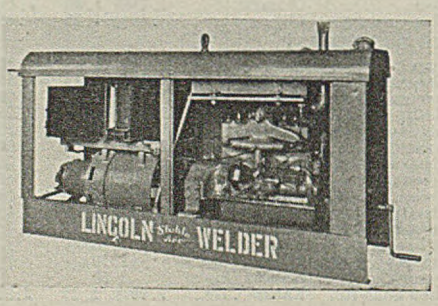
After exposure, the prints are washed by a pressure spray over both the front and back of the paper, said to be more effective than the ordinary flowing type of water wash in removing chemical. After washing, the prints pass a 4-in. rubber-covered roll, revolving in the same direction as the paper, which coats the surface with a potash solution. Negative solution also may be applied by the same roll. The prints are again washed by another spray-jet arrangement and carried over to the drier. Two chromium-plated copper drums and an auxiliary air drying unit compose the drier. Graduated heat arrangement and direct contact with the roll are said to insure smooth prints. An adjustable felt roller-ironing attachment may be used with very thin papers.

Blue-prints, negative prints and blueline and brown-line prints may be made on the Model "30" machine, according to the makers. It may be obtained for either 42- or 54-in. widths and 110- or 220-volt current.

Welder Has Gas Engine

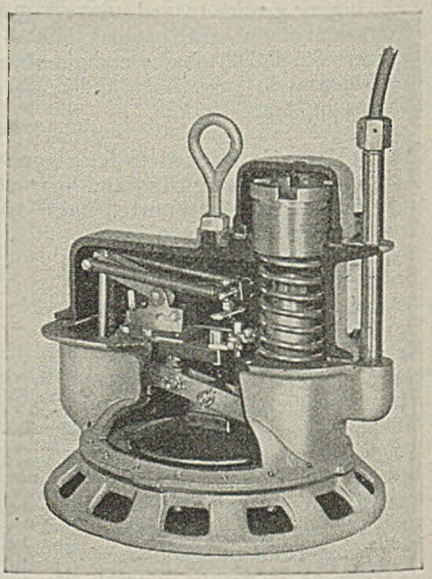
A new model, gas-engine-driven welder, for use where electric power is not available, is now being manufactured by the Lincoln Electric Co., Cleveland, Ohio. Its rating is 200 amp., N.E.M.A. standards, and power is furnished by a 4-cylinder Waukesha engine, operating at 1,500 r.p.m. A feature included in the design, according to the company, is an automatic idling device which reduces the speed of the engine when welding ceases and accelerates it when it begins again. It is claimed that this feature will reduce the gasoline consumption 25 per cent and increase the life of the equipment by reducing wear. A welded steel canopy incloses the outfit and unified control, in which all the operating controls are inclosed in a ventilated steel cabinet, has been incorporated in the design.

Lincoln Gas-Engine-Driven Welder



Diaphragm Switch Tells Water Level

For installation in any sump or tank for controlling pumps or indicators, Barrett, Haentjens & Co., Hazleton, Pa., have developed the new Hazleton diaphragm switch. According to the company, the switch is portable, requires no special mounting and is particularly recommended for inaccessible locations or places having insufficient headroom for the conventional float switch with its chain or rod and counterweight. In tanks and water-tower service it is said that the diaphragm switch is not deranged by cakes of ice rising and falling with the water. No mounting is necessary, as it may be dropped or hung in the water, and a dip of 20 deg. will not interfere with its operation.



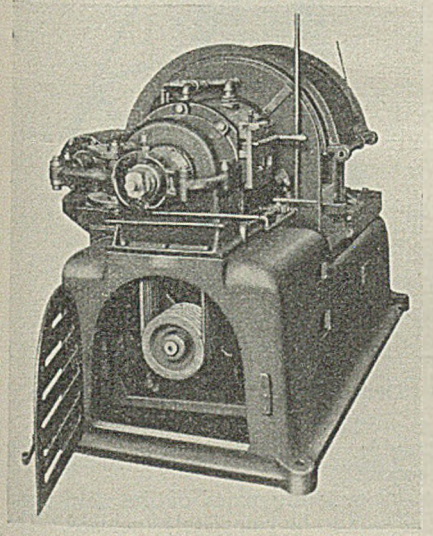
Hazleton Diaphragm Switch

The switch mechanism is of the quick make-and-break type, operated by the pressure of the water on the underside of the rubber diaphragm. Air dis-

placed by the movement of the diaphragm is exhausted through a vent pipe. The housing proper is submerged in the water and electrical connection is made through rubber-covered cables.

Advantages Offered By V-Belt Drives

Application to any type of service, short centers with minimum floor space, increased speed ratios and higher speed motors, better than 98 per cent efficiency and extreme flexibility are advantages claimed for the new V-belt drives, of which the Flex-Mor drive developed by Fairbanks, Morse & Co., Chicago, is an example. In addition, it is said that the use of these drives reduces bearing pressures by allowing higher speeds and by the fact that the wedging action of

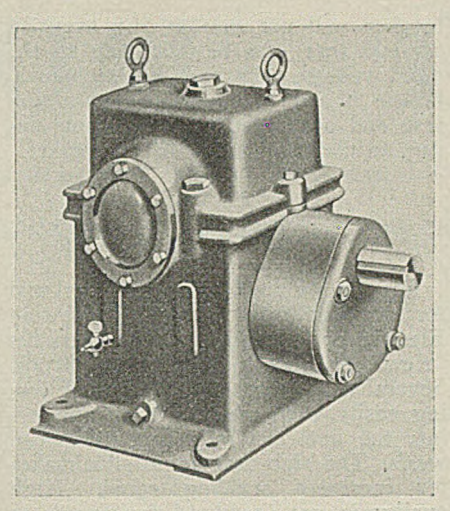


Multiple V-Belts Solve Problems of Short-center Vertical Drive

the belts in the grooves reduces the tension on the return side to practically nothing. V-belts are available for transmitting power from a fraction of a horsepower up to 200 or more and may be used for reducing or increasing speeds.

Intermediate Reducer Now Offered

Foote Bros. Gear & Machine Co., Chicago, has recently developed the "HGX" type, anti-friction, worm-gear speed reducer as an intermediate step between the "HGS" single-reduction unit and the "HGD" double-reduction type, with maximum ratios of 58 to 1 and from 58 to 1 to 5,000 to 1, respectively. The type "HGX" provides higher gear ratios than those listed for the type "HGS" reducer and still maintains the right-angle drive where ratios higher than single-reduction are desired. Maximum motor speed which may be applied to the shaft of the "HGX"



Type "HGX" Worm-Gear Speed Reducer

reducer is 4,000 r.p.m. According to the maker, it is fully inclosed, self lubricated and equipped with anti-friction bearings.

Electrical Products Offered

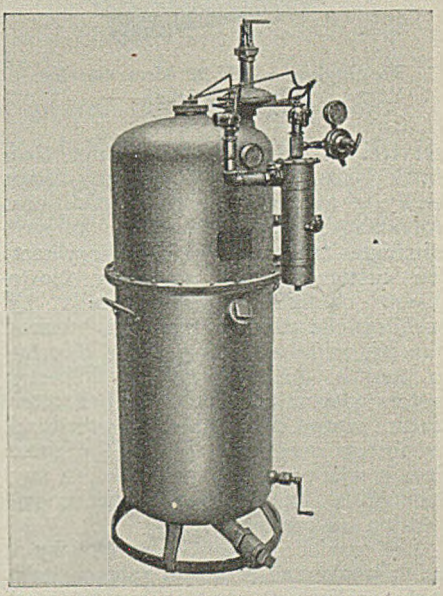
New products announced by the General Electric Co., Schenectady, N. Y., include a small-capacity, oil-immersed magnetic switch and an operating mechanism for use with drum switches mounted in crane cabs and similar places. The magnetic switch, CR-7006-V-7, is said to be particularly suitable for use in gaseous atmospheres in powder plants, chemical plants or other locations where highly corrosive gases or acids are encountered. It has a capacity of 40 amp. and can be used, it is claimed, with any motor, from 110 to 600 volts, where the full-load current does not exceed this value. Contactor and interlock are standard in design and the overload relay used has oil-immersed tips in which the heaters are located above the oil level. The relay is reset from the top of the tank. A felt gasket to exclude dust and provision for wall mounting are incorporated in the inclosing tank, made of ¼-in. sheet steel.

The operating mechanism for crane cabs, superseding the rack-and-pinion, under-lever type, is said to eliminate the trouble experienced in keeping a perfect lineup between the shaft of the operating mechanism and the drum-switch shaft and to make it possible to inclose the mechanism and keep dirt from the gear lubricant. It consists of a pinion on an extended drum-switch shaft, meshing with a segment gear, all housed in a dust-tight case provided with a plugged access hole for gear slushing and a short lever arm projecting below the case. The lever arm can be connected with the reach rod in the same way as with the former type. Mechanism and drum switch will be assembled by the manufacturer.

Some of the advantages claimed are as follows: As the segment gear and its shaft are capable of assembly in different positions, varying by 60 deg. increments, the operating lever may be located in other normal "off" positions than the one at right angles to the conventional center line of the switch. Lesser intermediate variations may be obtained by changing the mesh of the gear teeth. The cast inclosure in which the mechanism operates is practically dust-proof. Use of oilless bearing bushings dispose of the question of bearing lubrication. Keys, pins or set screws are eliminated. The gear ratio is such that the movements of the operating lever are very nearly a straight line for the reach rod and are laid out to give a linear travel equal to older designs.

Acetylene Generator Made Of Sheet Steel

Light weight, strength and dependability are said to result from the use of steel in constructing the new portable acetylene generator for cutting and welding, manufactured by the Alexander Milburn Co., Baltimore, Md. It may be obtained in 35-, 70- and 100-lb. sizes and has been tested by the Underwriters' Laboratories. According to the maker, clocks and motors have been eliminated in the design and the number of moving parts is greatly reduced.



Portable Acetylene Generator for Welding and Cutting

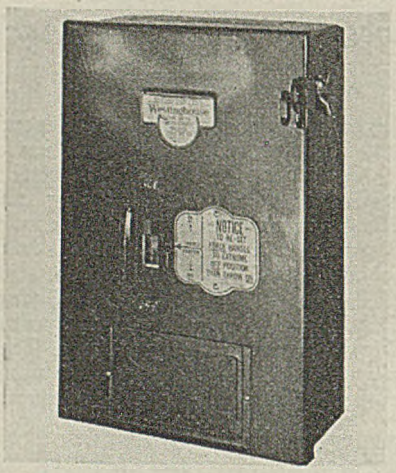
Carbide hopper, feed control and head are assembled in one unit. The carbide feed, it is said, is controlled by a single valve which responds to high or low pressure and automatically closes if the pressure is at zero, the filler plug open or the generator improperly closed.

Safety under various conditions of usage is claimed and tipping or throwing it over will not cause an increase in gas pressure. Blow-off, valves, pres-

sure control, safety gas purifier and strainer and oversize, welded outlets are embodied in the construction. The body has a protective coating inside and out. According to the company, the cost of generating gas in this machine is 1½c. per cubic foot, as compared with 2¼ to 6c. for tank gas.

Meter Service Breaker For Domestic Use

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces the development of a positive automatic circuit breaker in the new WK-50 meter service breaker for 30-amp., 125-volt, 2-wire, solid-neutral domestic



Westinghouse WK-50 Meter-Service Circuit Breaker

service. It is said to be safer than fuses because its performance cannot easily be altered by adverse conditions. Advantages claimed are as follows: eliminates tampering with fuses; protects the customer when replacing blown fuses; eliminates service calls by enabling the user to reset the breaker himself, and has enough time element to permit the starting of domestic motors without tripping out. The latter feature allows the breaker to withstand temporary overloads, but at the same time it will open the circuit before any damage is done to equipment or insulation on conductors.

The service breaker is operated by a quick make-and-break toggle switch, said to eliminate contact burning and variable action. It is operated from the front by an insulated handle which can be locked or sealed in the "off" position if desired. The box is of the usual form and dimensions, with arrangements made for ordinary meter trims and banking troughs. The mechanism is sealed inside the cover to prevent tampering and keep out dust and dirt. External connections are said to facilitate wiring and make it unnecessary to disturb the circuit breaker. The manufacturer claims that the self-heating bi-metal operating the latch on the breaker will not fuse at any overload current that can be obtained at the rated voltage. In case of mechanical failure it acts in the circuit as a link fuse and opens the circuit without injury to the other parts of the breaker.

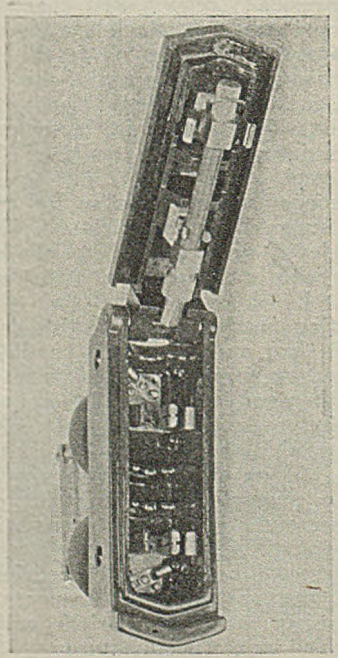
Electrode Developed

For the arc welding of mild steel and for cast-iron repair work, the Lincoln Electric Co., Cleveland, Ohio, offers the "New Kathode" welding electrode. Several advantages are claimed. Flowing easily with freedom from sputtering, the new electrode produces clean welds. The high heat permissible makes for increased welding speed. High quality is not sacrificed for speed, as the electrode fuses easily with deep penetration. The resulting weld is said to be soft and readily machined. The electrode may be obtained in stock lengths of 14 and 24 in.

Primary Cutouts Have Dielectric Strength

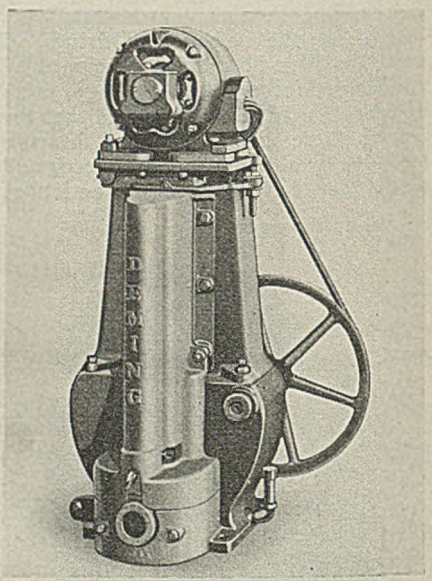
A new line of inclosed expulsion-type cutouts having very high dielectric strength, both for 60-cycle and impulse voltages, has been designed by the General Electric Co. Current ratings and interrupting capacity ratings are said to have been increased over those of previous designs. Four ratings are included in the line, the 60-amp. 2,500/4,000Y-volt cutout being of particular interest. This is an expulsion cutout primarily designed for 2,300/4,000Y-volt systems, and can economically replace the plug-type cutouts generally used on these systems.

Primary Cutout With Door Open



New Deep-Well Pump Fully Inclosed

A new V-type belt, improved forced-feed lubrication, fully-inclosed pump, simplified air compressor and improved appearance are among the features claimed for the new deep-well, "Oil-Rite" pump, manufactured by the Deming Co., Salem, Ohio. It is claimed that the new lubrication system does away entirely with a separate pump, thus eliminating several moving parts and making it practically impossible for



Deming Deep-Well "Oil-Rite" Pump

trouble to occur in the lubricating system.

All working parts of the new pump are said to be completely inclosed. The manufacturer claims that this not only protects the parts from weather and foreign matter, increasing the life of the pump, but also protects the workers from injury. Simplifying the air compressor also is said to have reduced the number of parts in the pump. The pump is designed for use where the vertical lift exceeds 35 ft.

Non-Acid Compound For Battery Use

"Electex," a new battery compound for all storage batteries using sulphuric acid electrolyte, has recently been developed by the Goodyear Chemical Co., Inc., New York City. According to the manufacturer, "Electex" is a non-acid compound designed to increase the performance of a storage battery. This is said to be accomplished primarily by the prevention of excessive sulphation and by considerably reducing the temperature, thus preventing undue expansion with attendent buckling and warping of the plates. It also is claimed that it will increase battery performance without increasing deterioration.